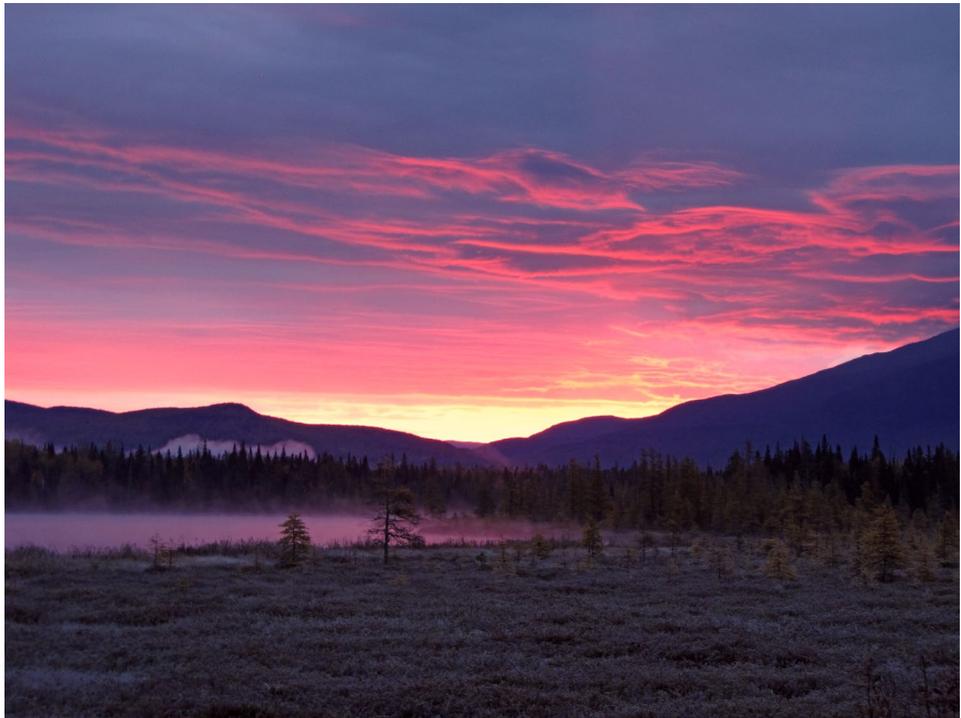


## Appendix I



Dave Govatski

*Cherry Pond sunrise*

# **U.S. Geological Survey Report: Economic Impacts of Current and Proposed Management Alternatives for the Silvio O. Conte National Fish and Wildlife Refuge**

- **Introduction**
- **Section I: Regional Economic Setting**
- **Section II: Current Trends, Objectives, and Potential Impacts of Land-Use Change**
- **Section III: Economic Impacts of Current and Proposed Management Activities**
- **Conclusion**





## United States Department of the Interior

United States Geological Survey

Fort Collins Science Center  
2150 Centre Ave., Building C  
Fort Collins, CO 80526

September 6, 2016

Nancy McGarigal  
U.S. Fish and Wildlife Service, Region 5  
Refuge Planning  
300 Westgate Center Drive  
Hadley, MA 01035

Dear Ms. McGarigal,

This letter is in response to your request for a review of the socioeconomic analysis that was prepared by the U.S. Geological Survey (USGS) for inclusion in the Silvio O. Conte National Fish and Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Impact Statement (EIS). The socioeconomic analysis prepared by the USGS was peer reviewed and subject to USGS Fundamental Science Practices. The USGS analysis was incorporated into the refuge's draft CCP/EIS, which was released for public review in August of 2015.

As a follow-up, we have reviewed the socioeconomic analysis included in the draft CCP/EIS. In the analysis, the USGS estimates the economic impacts of current refuge management. The analysis does not attempt to estimate the economic impacts of management alternatives, because there are many dynamic variables and uncertainties that will affect the long-term social and economic effects of conservation easement and fee title acquisitions in the watershed. The USGS socioeconomic analysis qualitatively describes the potential effects of the alternatives while admitting these uncertainties. The qualitative analysis of the alternatives that is included in the Draft CCP provides the highest possible accuracy given available data and uncertain future conditions. Although quantitative estimates of the effects of alternatives could be predicted, any such predictions would be highly speculative.

If you have any further questions, please contact me at [banowetzm@usgs.gov](mailto:banowetzm@usgs.gov).

Sincerely,

Michele Banowetz, Acting Center Director  
U.S. Geological Survey, Fort Collins Science Center

Cc: Catherine Cullinane-Thomas, USGS Fort Collins Science Center  
Rudy Schuster, USGS Fort Collins Science Center





## Economic Impacts of Current and Proposed Management Alternatives for the Silvio O. Conte National Fish and Wildlife Refuge

By Elizabeth Donovan, William Gascoigne, and Catherine Cullinane Thomas

*U.S. Geological Survey  
Fort Collins Science Center  
Fort Collins, Colorado*

### Introduction

The National Wildlife Refuge System Improvement Act of 1997 requires all units of the National Wildlife Refuge System to be managed under a Comprehensive Conservation Plan (CCP). The CCP must describe the desired future conditions of a refuge and provide long range guidance and management direction to achieve refuge purposes. The Silvio O. Conte National Fish and Wildlife Refuge (Refuge), composed of land area within the borders of the Connecticut River Watershed (Watershed), is in the process of developing a range of management alternatives to present in the Refuge CCP and Environmental Impact Statement (CCP/EIS). Those alternatives will be based on refuge purposes, the proposed refuge vision and management goals, and issues that were raised by other agencies, partners, or the public. The CCP for the Refuge must contain an analysis of expected effects associated with current and proposed refuge management strategies. The purpose of this study was to estimate the regional economic impacts associated with the final CCP/EIS proposed management alternatives.

For refuge CCP planning, a regional economic impact analysis provides a means of estimating how current management compares to the other three proposed management alternatives and how they affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates a refuge's contribution to the local community; and 2) it can help in determining whether local economic effects are or are not a real concern in choosing among management alternatives.

The regional impact analysis is composed of three separate sections. Section I of the report presents a description of the various regional economies and select local communities that comprise the Watershed and specific management areas for the Refuge. Section II is a qualitative discussion regarding the potential economic and fiscal impacts from additional land acquisitions. Section III first describes the methods used to conduct a regional economic impact analysis, followed by an analysis of the final CCP management strategies that could affect the local economy. The refuge management activities of economic concern in this analysis are:

- Refuge purchases of goods and services within the local communities,
- Refuge personnel salary spending,
- Spending in the local communities by refuge visitors,
- Revenues generated from timber harvesting on the refuge, and
- Refuge land purchases and changes in local tax revenue.

Additionally, it is important to note that the economic value of a refuge encompasses more than just the direct impacts to the regional economy. Refuges also provide substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Caudill and Henderson, 2003). The natural 'services' provided by the conserved landscape can be extremely valuable to one's well-being and to society in a more traditional economic sense. For instance, forests and other undisturbed landscapes naturally filter and regulate water that often ends up in the public water supply. This natural process can minimize the economic burden on

municipalities to treat water in accordance with national water quality standards. Such was the case with New York City, who in the 1990's notably invested between \$1 billion and \$1.5 billion in conserving and preserving landscapes in the Catskill Watershed. This investment was calculated to produce cost savings of \$6 billion-\$8 over 10 years, when compared to the alternative of building and maintaining a new treatment facility (Chichilnisky and Heal, 1998). A 2008 study done by Ingraham and Foster attempts to value the bundle of ecosystem services provided by the USFWS National Wildlife Refuges in the contiguous U.S. The authors determined the various habitats within the refuge system were providing services valued at \$32.3 billion (2011 dollars) per year, or an average of \$2,900 per acre per year (Ingraham and Foster, 2008). As the New York City example and this study indicate, these ecosystem service values can be substantial, and should be recognized when evaluating Refuge strategies and goals. However, quantifying individual ecosystem service values is beyond the scope of the economic impact analysis.

## **Section I: Regional Economic Setting**

The Refuge was established in 1997 to conserve, protect, and enhance the abundance and diversity of native plant, fish, and wildlife species and the ecosystems on which they depend throughout the 7.2 million acre Watershed. The Watershed spans from the US/Canada border in the north down to where the Connecticut River meets the Atlantic Ocean below Long Island Sound. It incorporates large areas of Vermont, New Hampshire, Massachusetts, and Connecticut, including lands in 25 counties. The Refuge has three cooperatively managed visitor centers: at the Great Northwoods Interpretive Center in Colebrook, New Hampshire; at the Montshire Museum of Science in Norwich, Vermont; and Great Falls Discovery Center near in Turners Falls, Massachusetts. The Refuge currently consists of seven Units (small tracts) and two Divisions parcels (large tracts): 33 acres of wetlands and a riverine sand spit that hosts a federally-listed beetle in Cromwell, Connecticut; a 4 acre island in Deerfield, Massachusetts; 30 acres at the base of Mt. Toby in Sunderland, Massachusetts; an 18 acre upland and wetland parcel in Westfield, Massachusetts; 140 acres on Mt. Tom in Holyoke, Massachusetts; 20 acres along the Connecticut River in Greenfield, Massachusetts; 283 acres which host a federally endangered plant in Putney, Vermont; 3,670 acres surrounding the Audubon Society of New Hampshire's Pondicherry Refuge in Jefferson, New Hampshire; and 26,381 acres in the Nulhegan Basin in Essex County, Vermont.

The Watershed has been described as a, "rich mosaic of farmland, forests, and compact communities that is for many, the essence of New England life (TPL, 2011)." The river itself is 410 miles long—the longest in all of New England—and supports important fish and wildlife species, while providing 70 percent of Long Island Sound's freshwater (TPL, 2011). It is also 1 of only 14 rivers in the nation that have been designated as American Heritage Rivers (CTRW Council, 2011). The Watershed contains a great diversity of habitats; ranging from tidal salt marshes in the southern portion to mature spruce and hardwood forests in the north.

In its entirety, the Watershed encompasses an area of over 11,000 square miles and contains nearly 400 towns and cities. The waters of the Connecticut River have played an important role in the Watershed's social and economic history. The river itself provided a source of energy to power mills, factories, and entire communities, irrigation water for working farmlands, and a means of transportation for the watershed's people and goods. The regional economy has evolved from the original agricultural colonists and small goods traders, to robust manufacturing production and supporting commodity extraction industries, to relying more on the services sector and travel and tourism spending. Currently, large urban centers within the southern counties of the Watershed serve as hubs to the greater New York City area with many residents employed in the service industry. Counties near the northern headwaters continue to promote a more rural way of life and are still highly dependent on manufacturing jobs.

Many of the towns within the Watershed are attempting to capture more of the valuable tourism market by hosting annual festivals and cultural events that attract crowds from beyond the community borders. Many of these events are centered on the historic, cultural, and economic makeup of the region. Area farmers and artisans

are once again finding local markets for their goods, while catering to buyers and their overall experience. Agritourism seems to be expanding at a considerable rate, with each state in the Watershed now having a website and interactive map just for these enterprises.

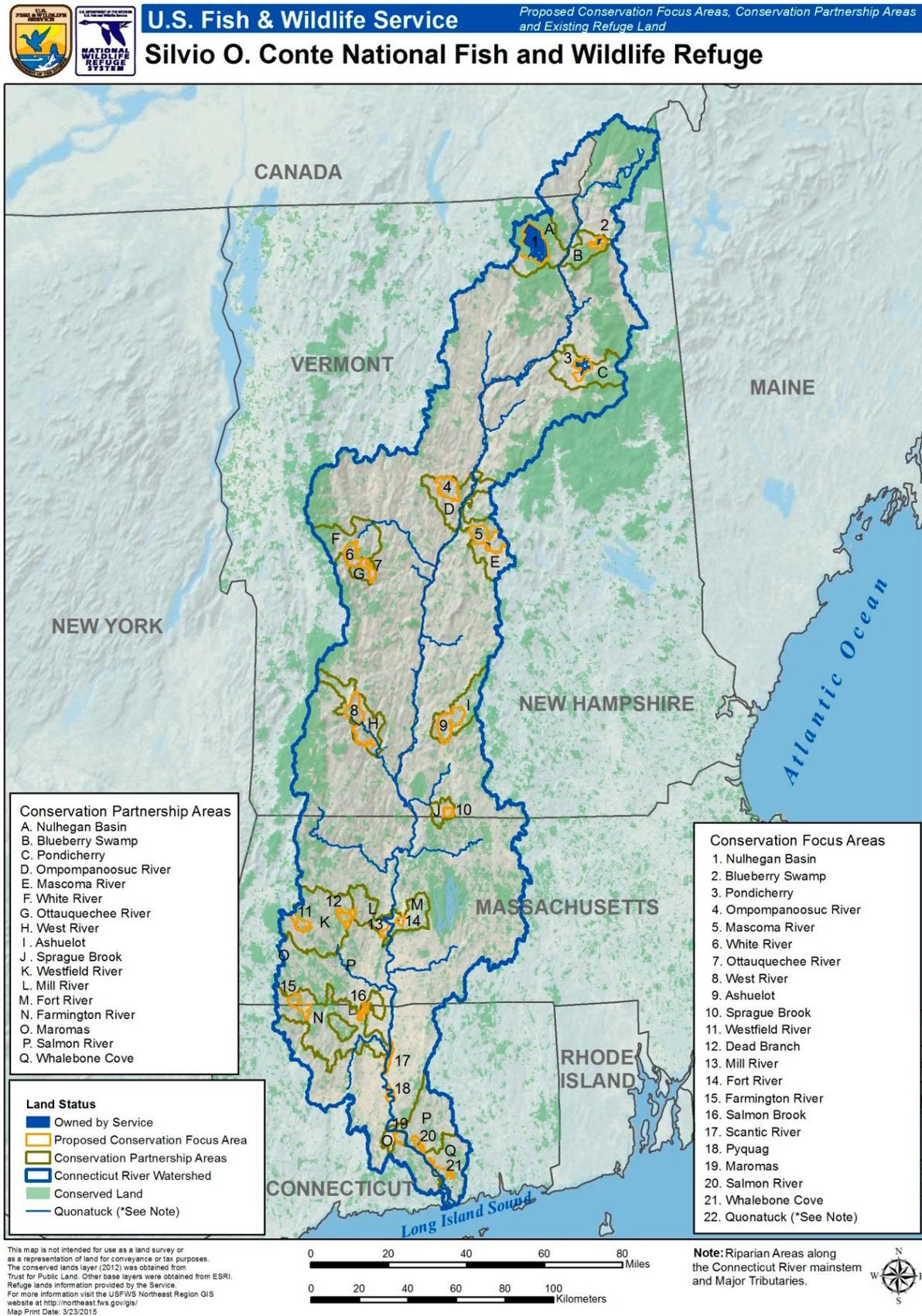
There are abundant recreation opportunities within the counties of the Watershed, and specifically on much of the tracts under Refuge management. Traditional activities on Refuge lands include fishing, hunting, cross-country skiing, wildlife observation, photography, and environmental education. Snowmobiling is very popular in various regions of the Watershed, and is permitted on Refuge land where appropriate and compatible. The Appalachian Trail meanders through the northern portion of the watershed, making its way through the impressive White Mountain National Forest in New Hampshire. The middle portion of the Watershed in Massachusetts is bordered by the Berkshire Mountains to the west, which have been attracting tourists and recreationists for decades. Towns in the southern portion near the mouth of the Connecticut River heavily promote recreation opportunities associated with saltwater experiences. While large tracts of the Watershed remain undeveloped, sprawling communities, particularly in the southern portion of the watershed, have begun to alter the dynamics in the region.

Given the vastness of the Watershed and extensive diversity within, this regional profile of the economic impact analysis is subdivided into six focal sub-regions that are specific only to the regional profile report. The sub-regions incorporate 11 counties that make up the bulk of the Watershed and are central to the Refuge's proposed land Conservation Focus Areas (CFA). These being:

1. *Northern Sub-Region*: Essex County, Vermont and Coos County, New Hampshire
2. *White River Junction Sub-Region*: Orange County, Vermont, Windsor County, Vermont, and Grafton County, New Hampshire
3. *Tri-State Border Sub-Region*: Windham County, Vermont, Cheshire County, New Hampshire, and Franklin County, Massachusetts
4. *Greater Amherst Sub-Region*: Hampshire County, Massachusetts
5. *Greater Hartford Sub-Region*: Hartford County, Connecticut
6. *Southern Connecticut Sub-Region*: Middlesex County, Connecticut.

Individual demographic profiles are provided for each focal sub-region. Each sub-region profile addresses historic and current trends in the area, and highlights important demographic and economic statistics. The sub-region profiles are presented in order from north to south, starting with the Northern Sub-Region and ending with the Southern Connecticut Sub-Region. A few additional towns were included in each sub-region profile. The towns of management interest were determined under future consideration assuming growth in the Refuge's land acquisition program. The towns were chosen given their proximity to existing Refuge lands and/or lands proposed for acquisition under Alternatives B, C, or D. These towns are likely to be impacted by management and acquisition proposals, and thought to have the current infrastructure necessary to harness new visitors, staff members, and additional Refuge non-salary spending.

Figure I.1. Map of Silvio O. Conte Refuge.



### Northern Sub-Region

The Northern Sub-Region of the Watershed consists of Essex County, Vermont and Coos County, New Hampshire. Essex County, located in the northeast corner of Vermont, includes the Nulhegan Basin of the Refuge. The Nulhegan Basin Division recently built a new headquarters office and visitor contact station just outside of town of Island Pond, Vermont. The Basin is recognized for possessing high ecological values and is predominately forested with interspersed wetlands. Essex County maintains a rural way of life, with a density of only 10 people per square mile. The “Gateway to the Nulhegan Basin,” the village of Island Pond is rich with history, recreation opportunities, and community involvement. Island Pond has shifted from being predominantly timber-dependent to an economy where timber and agricultural employment is very minor (U.S. Census Bureau, 2009). Once a major railway junction and destination for timber industry leaders, the grand houses in the area are said to reflect the wealth of another era (Northeast Kingdom Travel and Tourism Association, Accessed August, 2011).

Coos County makes up the northern tip of New Hampshire and is also the least populated county in the state, despite being the largest in terms of land area. The county is home to both the Mohawk River and Pondicherry Divisions of the Refuge, and encompasses most of the northern portion of the White Mountains. The Mohawk River Division is located near Colebrook, New Hampshire, which is the location for the Great Northwoods Interpretive Center. This site is a rest area and information center that is run by the New Hampshire Department of Transportation. The Pondicherry Division is located near the towns of Whitefield, New Hampshire and Lancaster, New Hampshire. Colebrook, Lancaster and Whitefield have a deep history in New England’s railroad system. The towns also lend themselves to outdoor enthusiasts eager to brave the cold in the winter, or enjoy the temperate conditions of the summer.

### Population

Table I.1 gives the population estimates and trends for Vermont and New Hampshire, the two Northern Sub-Region counties, and the four towns of management interest. From 2000 to 2010, New Hampshire’s overall population saw an increase of 6.5 percent, while Coos was the only county in the state to report a decline in population (0.2 percent) during that same time period. Similarly, Vermont experienced steady growth over the last decade, while Essex was one of only three counties in the state to report a decline in population. The 2010 population of 6,306 makes Essex County the least populous county in the state of Vermont and all of New England. Looking at Figure I.2, the population in the two-county sub-region has been declining over the last two decades, with elevated rates of decline observed in recent years. Based on population forecasts from respective state departments, these county population trends are expected to level out over the next decade, with very minor growth by 2020. While Coos County documents a population over five times that of Essex, they both retain a population density under twenty residents per square mile—the lowest concentrations in the entire Watershed.

**Table I.1. Population Figures for Northern Sub-Region**

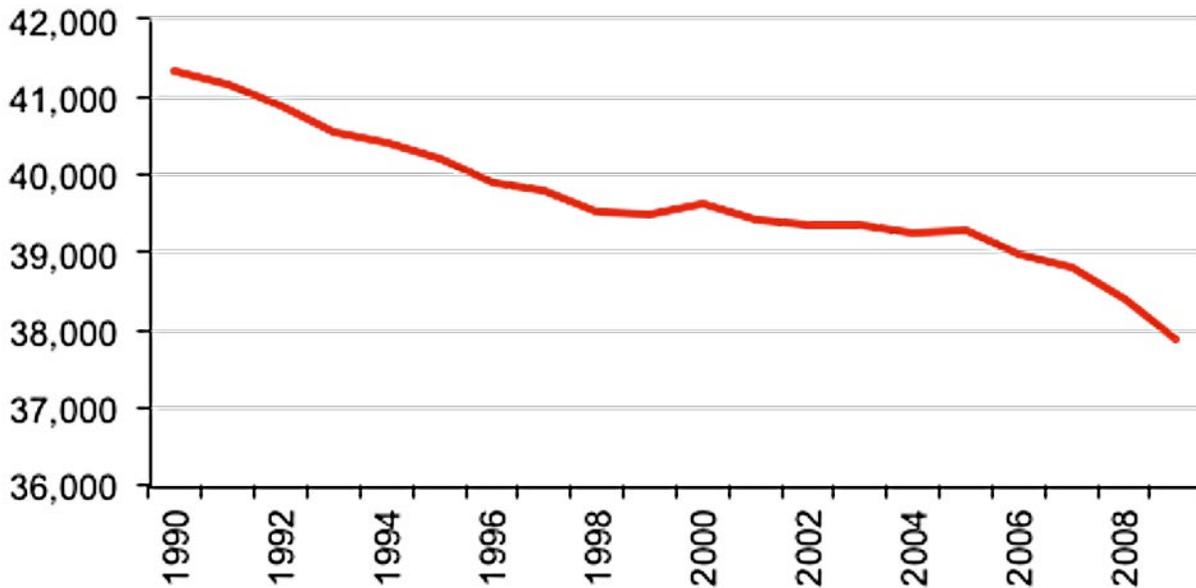
Northern Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Vermont	625,741	40	68	9,250	2.8	638,809
New Hampshire	1,316,470	39	147	8,968	6.5	1,470,000
Essex County (VT)	6,306	43.9	10	674	-2.4	6,318
Coos County (NH)	33,055	45.1	18	1,831	-0.2	33,369
<i>Towns of Interest</i>						
Island Pond, VT	723	46.8	161	4.5	-14.8	N/A
Colebrook, NH	2,141	45.4	52	41.0	-7.8	N/A
Lancaster, NH	3,264	37.1	64	51.0	-0.5	N/A
Whitefield, NH	2,125	47.5	61	34.7	4.1	N/A

Source: U.S. Census Bureau, 2010; New Hampshire Office of Energy and Planning, 2006; Vermont DOL, 2010a. \*Note: Resident populations and median age estimates for Towns of Interest were pulled from U.S. Census Bureau’s 2005-2009 American Survey 5-year Estimates.

Island Pond, Vermont is a census-designated place within the larger town of Brighton, Vermont. Together, they have a population that is still under 2,000 residents. When compared to 2000 U.S. Census data, this area has experienced the largest decreases in overall population out of the four towns in the Northern Sub-Region profile. In contrast to the other three towns in the analysis, Whitefield, New Hampshire experienced moderate amounts of growth over the last decade.

The median age of the population within the two northern states has been increasing slightly as the post-war baby boom generation continues to age (New Hampshire Office of Energy and Planning, 2006). Both Essex and Coos County report higher median ages than respective state-wide estimates. The median age in the towns of Island Pond, Colebrook, and Whitefield all are above that of their respective counties.

Figure I.2. Population Trends for Northern Sub-Region, 1990-2008



Source: U.S. Department of Commerce, BEA, 2011a.

In 2010, the U.S. population consisted of 63.7 percent of white persons not of Hispanic or Latino origin (U.S. Census Bureau, 2010). Comparatively, Vermont's resident population consisted of 94.3 percent, which currently ranks it as having the second highest proportion of white persons in the nation. New Hampshire shares a similar racial makeup, with 92.3 percent of the population designated as white people not of Hispanic or Latino origin. Essex and Coos County retain ethnicity proportions even higher than their respective state averages, with both at around 96 percent. These proportions are the highest out of the eleven counties included in the Watershed profile. Nearly 95 percent of the residents in the two Northern Sub-Region counties were born in the U.S. In both Essex and Coos County, around 84 percent of residents over the age of twenty-four are high school graduates and 16 percent have earned a bachelor's or advanced degree (U.S. Census Bureau, ACS, 2009). Comparatively, 90 percent of the state-wide population for New Hampshire and Vermont has graduated from high school, and 32 percent have received advanced degrees.

### Regional Employment and Income

The Northern Sub-Region maintains a rural way of life that has personal and professional ties to its residents. While natural commodity industries have a longstanding presence in the area, the service sector and tourism industry continue to expand. Many of the local economies within the Northern Sub-Region are said to be at an "inflection point," in which they are losing traditional manufacturing jobs and gaining new ones through increased tourism and recreation (New Hampshire Office of Energy and Planning, 2006). According to the North East

State Foresters Association, the value of forest-based manufacturing shipments made up almost 64 percent of annual revenues from New Hampshire's forest in 2001. By 2005, the share of those revenues had dropped to just over 53 percent. Forest-related recreation and tourism had contributed about 36 percent of the revenues in 2001 and grew to over 46 percent in the same time period (NEFA, 2007). Table I.2 gives median household income, unemployment rates, and the percent of the population living in poverty for Vermont and New Hampshire, the two Northern Sub-Region counties, and four communities of interest.

**Table I.2. Income, Employment, and Poverty Rates in the Northern Sub-Region**

	Median Household Income (2009 \$s)	Percent Unemployed			Percent below Poverty (2009)
		2000	2009*	2010*	
US	50,221	4.0	9.9	9.4	14.3
Vermont	51,284	2.7	6.6	5.6	11.5
New Hampshire	63,033	2.7	6.4	5.3	8.6
<b>Northern Sub-Region</b>					
Essex County (VT)	40,046	3.7	10.9	7.9	16.9
Coos County (NH)	42,786	3.7	9.1	8.4	14.5
<b>Towns of Interest</b>					
Island Pond, VT	22,019	5.1	N/A	N/A	N/A
Colebrook, NH	29,643	3.1	N/A	8.9**	N/A
Lancaster, NH	53,292	2.7	7.1	5.6**	N/A
Whitefield, NH	39,211	3.5	N/A	7.0**	N/A

Source: U.S. Bureau of Labor Statistics, 2011; U.S. Census Bureau, ACS, 2009; U.S. Census Bureau Quickfacts, 2009; New Hampshire ELMIB, 2010; Vermont DOL, 2010b; (\*) Denotes unemployment rates as of December of that year; (\*\*) Denotes estimates made using the Wolfram Alpha Computational Knowledge Engine, 2011.

Median household income in 2009 for Essex County, Vermont was \$40,046, which is the lowest in the entire Watershed and more than \$10,000 lower than the Vermont state median. The median household income in Coos County of \$42,786 is slightly higher; however it is more than \$20,000 less than the New Hampshire state average. Unemployment figures are presented in Table I.2 for the years 2000, 2009, and 2010, given the recent recession and economic volatility. All counties within the Watershed experienced unemployment levels under 4 percent at the start of the decade. However, by 2009 unemployment rates were above 9 percent in both Northern Sub-Region counties, with Essex County reaching the highest level of unemployment at 10.9 percent. While Essex and Coos County continue to experience relatively high unemployment, rates in both counties were on the decline by the end of 2010. The percentage of the population in Coos and Essex County living below the poverty line in 2009 was slightly greater than the national average (14.3) and were the two highest rates out of the eleven counties included in the larger Watershed profile. Unemployment rates for the four selected communities of interest are on par with those at the county level. As of December, 2010, the town of Lancaster, New Hampshire maintained the lowest rate of unemployment, at 5.6 percent.

Table I.3 gives the employment breakdown by industry for the counties in the Northern Sub-Region. The largest employer in both counties is the education services, health care and social assistance sector, which accounts for more than 20 percent of total employment. The manufacturing and retail sectors round out the top three, respectively. The percent of the total workforce employed in the manufacturing and retail industries in Essex and Coos County are the highest among all counties within the Watershed.

Table I.3. Employment by Industry in Northern Sub-Region Counties

Full-Time and Part-Time Employment	Northern Sub-Region	
	Essex County	Coos County
Civilian employed pop. (16 years and over)	3,107	15,369
<b>Percent of Employment by Industry</b>		
Agriculture, forestry, fishing and hunting, and mining	4.4	2.9
Construction	8.6	8.7
Manufacturing	18.3	13.6
Wholesale trade	0.7	1.6
Retail trade	14.7	12.7
Transportation and warehousing, and utilities	5.4	4
Information	1.2	1.6
Finance and insurance, and real estate	2.7	4.3
Professional, scientific, and management, admin. and waste mgmt. Services	4.4	4.5
Education services, health care, and social assistance	22.9	24.5
Arts, entertainment, and recreation, and accommodation and food services	6.7	12
Other services, except public administration	3.9	4.5
Public administration	6.1	5.1

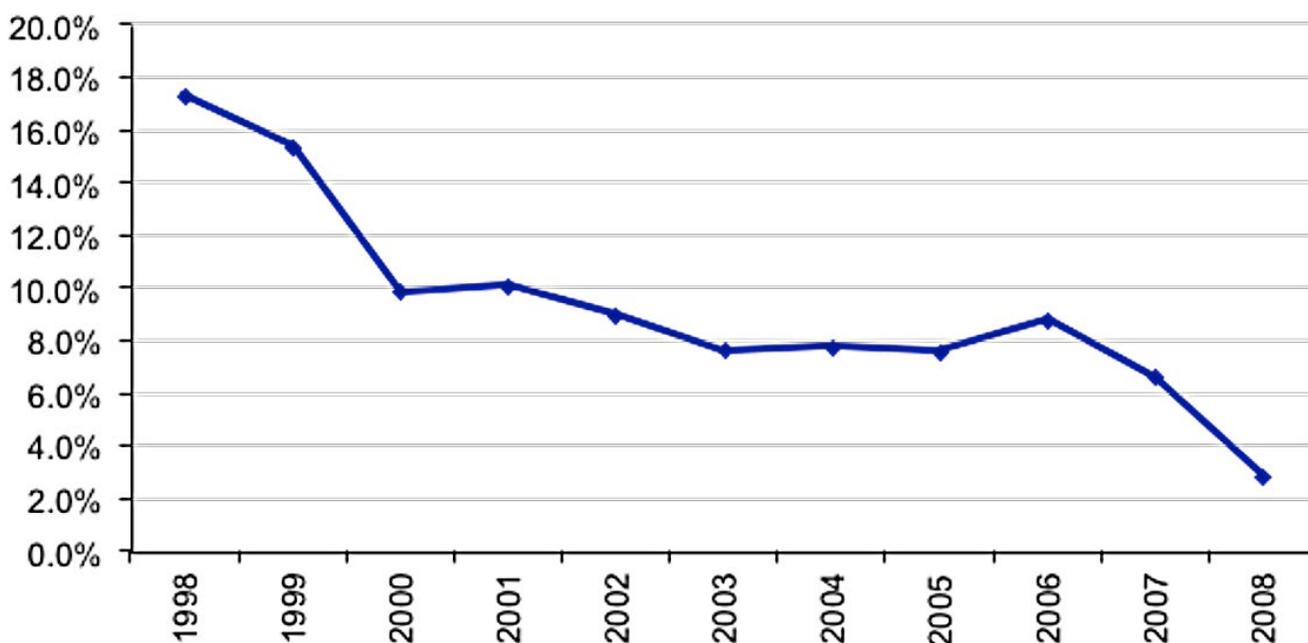
Source: U.S. Census, ACS, 2009.

### Commodity Industries

#### Timber

There is a long standing history of timber harvesting in the Watershed, especially in the northern states of Vermont and New Hampshire. Huge log drives down the Connecticut River remain iconic images of the region and its residents. The expansive timber production in the area gave way to timber-related industries, such as saw mills, pulp/paper mills, and wood-product manufacturers. However, these once dominant industries have been in sharp decline. In 1998, timber-related jobs represented 17.3 percent of total employment in the two-county Northern Sub-Region. By 2008, this figure was down to 2.9 percent (see Figure I.3). The total number of timber-related jobs in the Northern Sub-Region is estimated at under 600, including both private employment and independent proprietors (U.S. Dept of Commerce, 2010a,b). This industry has especially been hit hard in Coos County in recent years. There has been the closure of the Groveton Paperboard mill in March 2006, leaving 108 workers unemployed, then two months later Fraser Paper closed their pulp mill within the county, affecting another 250 area workers, and again with the December 2007 closure of the Wausau Paper Mill that employed 303 people (New Hampshire ELMIB, 2007).

Figure I.3. Percent of Total Private Employment in Timber Industries, Northern Sub-Region



Source: U.S. Dept. of Commerce, Census Bureau. 2010a

In 2009, 1.17 million cords of wood were harvested in New Hampshire forests (NEFA, 2011). This is a significant reduction from 2005 levels, which is consistent with the economic recession. In 2009, New Hampshire private landowners received over \$30 million from timber sales, and forest-based manufacturing's estimated contribution to the state's economy was \$1.15 billion in output, 8,160 jobs, and a payroll of around \$384 million per year to the state's economy (NEFA, 2011). In 2005, Vermont forest-based manufacturing was estimated to have contributed nearly \$1.0 billion in value of shipments to the economy, or 9.3 percent of the state's total manufacturing sales (NEFA, 2007).

#### *Agriculture*

Each of the counties and towns of interest in the Northern Sub-Region have historic ties to agriculture and both Vermont and New Hampshire continue to embrace investment in their state's agriculture sector. In the summer of 2011, Governor Shumlin of Vermont introduced the newly enacted House Bill 287 that creates a grant program for area producers and processing facilities, which is engineered to sustain and grow jobs in agriculture. The Bill begins the process of addressing barriers and opportunities identified through Vermont's Farm to Plate Strategic Plan—a 10-year plan to strengthen the state's food system. The Farm to Plate Strategic Plan currently estimates Vermont's food system generates \$2.7 billion annually in total economic output, employing over 55,500 people at nearly 11,000 private sector businesses across the state (Vermont Sustainable Jobs Fund, 2011). The New Hampshire Department of Agriculture (among others) recently funded a similar research effort looking into the economic contribution of their food system. The report titled, "Home Grown," estimates New Hampshire's local food system—including local agriculture (e.g. farming), food manufacturing, food support services (e.g. food distributors), and food retailers (e.g. supermarkets and restaurants)—annually contributes \$3.3 billion in gross state product, or 5.7 percent of New Hampshire's \$58 billion economy (Magnusson et al, 2010).

Table I.4 gives the number of farming operations, farm size, acres of farmland, and the value of agricultural products produced in New Hampshire and Vermont and each of the focal counties in the sub-region, while Figure 4 graphically displays employment in natural commodity industries for Coos and Essex Counties, the county region and the US. The state of Vermont has more than double the amount of farmland acreage than any of the other three states in the Watershed, with a commodity market value of around \$670 million per year. Essex County experienced a substantial increase (35 percent) in its farmland acres from 2002-2007. This growth is the largest percent increase out of any county in the Watershed. USDA Census data also reveals the number of agricultural enterprises in New Hampshire increased by over 800 during that time period. Coos County, similar to the other two New Hampshire counties included in the larger Watershed profile, experienced a 15 percent increase in farmland acreage compared to 2002 figures.

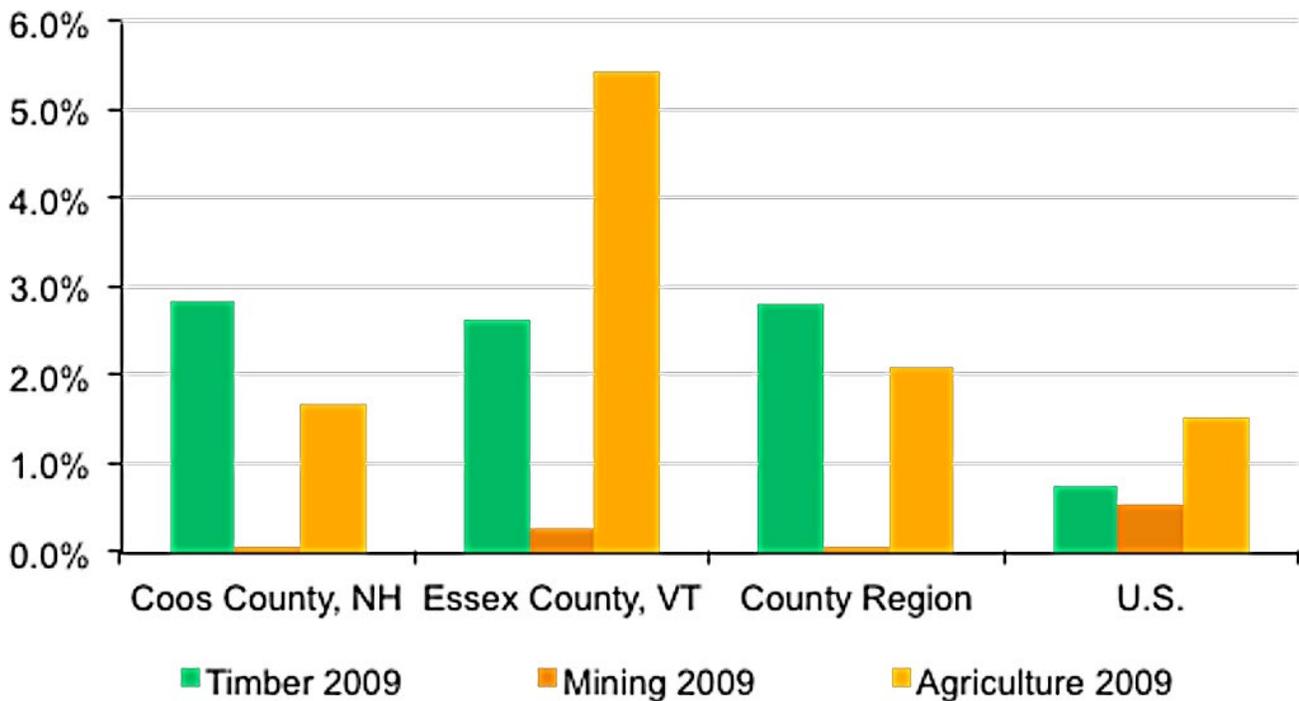
**Table I.4. Farming in the Northern Sub-Region**

Agriculture in the Northern Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Vermont	6,984	177	1,233,313	-0.93	673,713,000
New Hampshire	4,166	113	471,911	6.08	199,051,000
Essex County (VT)	94	284	26,732	34.75	12,147,000
Coos County (NH)	262	194	50,895	15.44	13,003,000

Source: USDA, Ag. Census. 2002, 2007.

While farmland statistics are not provided at the community level, there is a farming history within the communities of interest. Colebrook, New Hampshire was known historically for its excellent soil, and was even titled the “Potato Capital of New Hampshire” in the 1874 Gazetteer. Lancaster, New Hampshire shared similar notoriety, helping supply area mills and railroad stations with grains and starches. While this industry and accompanying employment is nowhere near its historic levels, these communities continue to embrace their farming heritage.

**Figure I.4. Commodity Industries in Northern Sub-Region, Percent of Total Employment.**



Source: U.S. Dept. of Commerce, BEA. 2011b.

\* Note data for timber and mining are from County Business Patterns which excludes proprietors, government, and railroad. Data for agriculture are from Bureau of Economic Analysis. The latest year for each data source may vary due to different data release schedules.

**Recreation and Tourism-Related Industries**

The travel and tourism industry continues to be a significant and growing contributor to the local and regional economies within the Watershed. Total direct spending from annual travel and tourism in the northern states of Vermont and New Hampshire is estimated at nearly \$6 billion; this spending supports nearly 12 percent of the total workforce in Vermont (Economic & Resources Policy, Inc., 2007; Goss, 2011). The growing tourism industry in Coos County has been supported by the natural beauty of the area and access to public lands for recreating, including a National Forest, designated wilderness, and various state parks within the county’s boundaries.

Recreation activities occurring on lands under Refuge management include hunting, fishing, snowmobiling, canoeing, photography, and wildlife viewing. Other popular recreation activities that bring large amounts of visitors to the area include downhill and cross-country skiing. Details about the economic contribution associated with wildlife viewing, hunting, and fishing in Vermont and New Hampshire are provided in Table I.5.

**Table I.5. Recreation Estimates and Expenditures in Vermont and New Hampshire**

Recreation Estimates	Residents and Non-Residents	Vermont	New Hampshire
Fishing	# of Anglers	114,000	230,000
	Total Expenditures	63,749,000	172,413,000
	Trip-Related	40,535,000	88,581,000
	Equipment and Other (\$)	23,214,000	83,832,000
Hunting	# of Hunters	73,000	61,000
	Total Expenditures	189,707,000	74,467,000
	Trip-Related	20,928,000	17,665,000
	Equipment and Other (\$)	168,779,000	56,802,000
Wildlife Watching	Total Participants	468,000	710,000
	Total Expenditures	122,841,000	273,769,000
	Trip-Related	58,219,000	116,136,000
	Equipment and Other (\$)	64,622,000	157,633,000

Source: USFWS National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 2006.

### Land Use and Ownership

The two-county Northern Sub-Region is about 90 percent forested (NASA MODIS, 2006). In 2000, estimated residential land accounted for 11.1 percent of the total land area in Essex County, Vermont and 13.6 percent of the total land area in Coos County, New Hampshire. These residential percentages are almost entirely classified as 'exurban,' in which average lot sizes are between 1.7 and 40 acres (Headwaters Economics EPS-HDT Toolkit and Report, 2011). While these percentages are the smallest in the entire Watershed, they represent a 36 percent and 20.4 percent increase from 1980 and 2000, respectively (Theobald, 2005). Coos County is made up of roughly 20 percent federal lands, while Essex County contains less than 7 percent federal lands. Table I.6 reveals the breakdown of landownership for the two counties.

**Table I.6. Land Ownership (acres) in the Northern Sub-Region**

	Coos County, NH	Essex County, VT	County Region
Total Area	1,170,136	430,700	1,600,836
Private Lands	857,822	315,768	1,173,590
Federal Lands	244,255	28,159	272,414
State Lands	55,479	84,372	139,851
City, County, Other	12,580	2,402	14,982

Source: Conservation Biology Institute, 2006, 2008 (As cited by Headwater Economics EPS-HDT, 2011).

In a 2008 real estate transaction, the Plum Creek Timber Co. purchased an expansive 86,212 acre land track that covers parts of 14 towns in Essex County. Before this sale, the state of Vermont and Freeman Foundation purchased easements on this property to guarantee traditional uses of the land for logging and recreation (Sutkowski, 2008).

To date, the Refuge has acquired and conserved just over 35,000 acres throughout the Watershed, almost exclusively through fee-acquisitions. The largest conserved land tract—26,381 acres—is found in the Nulhegan Basin located in Essex County, Vermont. The Refuge currently owns approximately 7,200 acres in Coos County, New Hampshire. Additional lands in the riparian area along the Connecticut River, as well as adjoining lands near the present Divisions, have been identified for their high ecological value and potential acquisition. For a comprehensive discussion on the Refuge’s land acquisition program and the potential economic impacts of federal fee acquisitions and conservation easements, please reference Section II.

**White River Junction Sub-Region**

The White River Junction (WRJ) Sub-Region of the Watershed consists of Orange County, Vermont, Windsor County, Vermont, and Grafton County, New Hampshire. The sub-region is located in the middle portion of Vermont and New Hampshire’s co-boundary. The area houses the Refuge’s cooperatively managed Montshire Museum of Science in Norwich, Vermont. The Montshire Museum has gained tremendous notoriety in the northeast and beyond, and now typically sees 150,000 visitors each year. Windsor County is the largest county in the state in terms of land area (U.S. Census Bureau, 2010). Grafton County is home to two large colleges and has been rated as a great rural place to live (Progressive Farmer, 2006). The county cites low unemployment (despite relatively slow economic growth), favorable cost of living, and accessibility the White Mountain National Forest (Grafton County Economic Development Council, 2011). The Dartmouth Hitchcock Medical Center and four other local hospitals, along with supporting medical firms, have had a strong influence on employment (UNH Cooperative Extension, 2010). These favorable traits have helped lead to one of the largest population increases (in percentage terms) found within the entire Watershed.

Four communities are also highlighted in the WRJ Sub-Region profile. These being: Bradford, Vermont; Woodstock, Vermont; Hanover, New Hampshire; and Lebanon, New Hampshire. Bradford is a relatively small Vermont town that is dissected by many rivers and streams that are tributaries to the larger Connecticut River. These sources of water provided the foundation for farming, milling, and manufacturing to take root early in the town’s history. Today, the town relies on the adjacent water sources and natural beauty of the area to attract visitors year-round. The other three towns in the profile lie further south, with Woodstock the furthest west. Woodstock is a quintessential New England town with beautiful Colonial homes and churches, a quaint main street supporting small-scale shops and bread and breakfast establishments, and is dissected with a free-stone river that is dotted with wooden covered bridges. Hanover and Lebanon are larger communities located near the state border in New Hampshire and continue to experience population growth. They are largely dependent on the prestigious Dartmouth College and its various campuses and centers for both employment and as a market for local goods and services.

**Population**

Table I.7 gives the population estimates and trends for Vermont and New Hampshire, the three WRJ Sub-Region counties, and the four towns of interest. Over the last decade, New Hampshire’s overall population increased by 6.5 percent. Vermont experienced more moderate growth, documenting close to a 3 percent increase in the state’s total population during the same time period. The two-county sub-region experienced steady growth throughout the 1990’s, yet has been tapering off for most of the 2000s (see Figure I.5). The population growth observed in Grafton County, New Hampshire (9 percent) exceeds that of the state. Orange County’s growth rate over the last ten years is in line with that of Vermont’s, while Windsor County’s population shrunk by 1.3 percent. The 2010 population of 28,936 in Orange County, Vermont makes it the least populated County in the WRJ Sub-Region. However, the population densities across the three counties are fairly similar. Population densities ranging from 42-58 people per square mile reveal the rural character of the WRJ Sub-Region. Population trends for New Hampshire and Vermont, and the three counties included sub-region profile, are expected to continue over the next decade.

**Table I.7. Population Figures for WRJ Sub-Region**

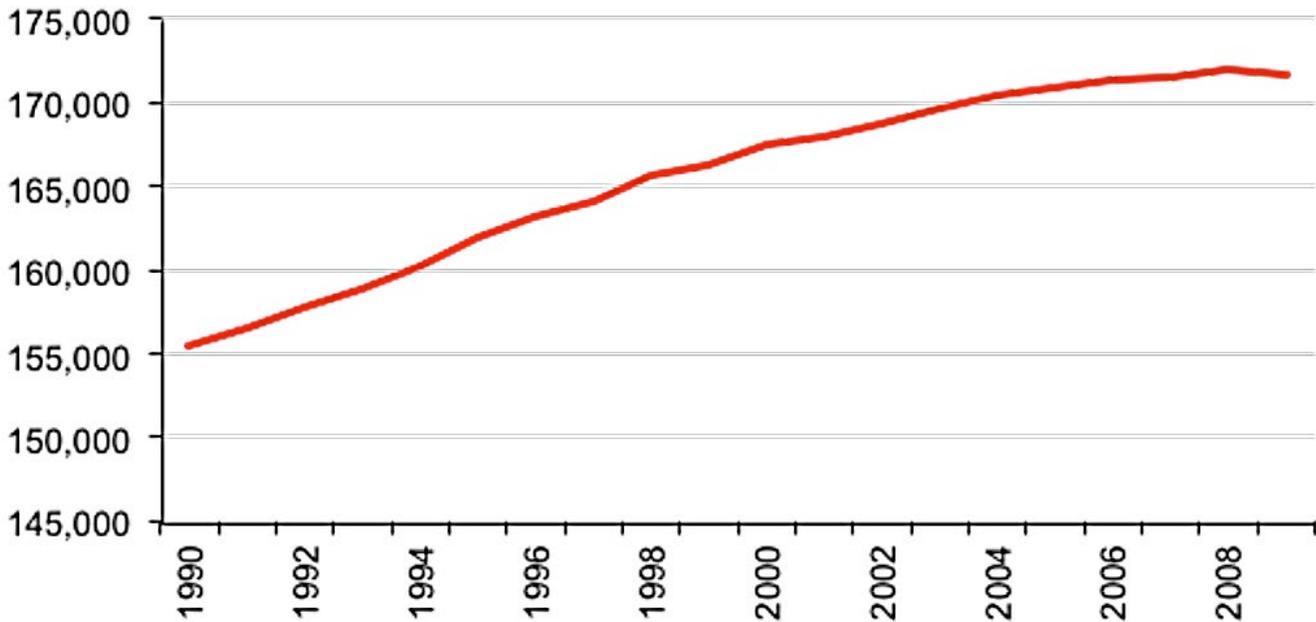
White River Junction Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Vermont	625,741	40.6	68	9,250	2.8	638,809
New Hampshire	1,316,470	39.6	147	8,968	6.5	1,470,000
Orange County (VT)	28,936	42.3	42	692	2.5	29,730

White River Junctio Sub- Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Windsor County (VT)	56,670	44.5	58	971	-1.3	55,515
Grafton County (NH)	89,118	39.6	51	1,750	9.0	95,109
Towns of Interest						
Bradford, VT	2,663	49.5	89	29.9	1.7	N/A
Woodstock, VT	3,148	47.9	71	44.6	-2.6	N/A
Hanover, NH	11,098	21.9	221	50.2	2.2	N/A
Lebanon, NH	12,762	36.9	308	41.4	1.5	N/A

Source: U.S. Census Bureau, 2010; New Hampshire Office of Energy and Planning, 2006; Vermont DOL, 2010a. \*Note: Resident population and median age estimates for Towns of Interest were pulled from U.S. Census Bureau's 2005-2009 American Community Survey 5-yr. Estimates.

The two Vermont towns in the profile (Bradford and Woodstock) both have populations lower than 3,500 and median ages above 47. They are in more rural areas of the Watershed. Hanover and Lebanon, on the other hand, both have populations above 11,000 and median ages below 40, with Hanover reporting a median age of 21.9 years old (U.S. Census Bureau, ACS, 2009). This statistic is reflective of the significant local student population in the area. Hanover and Lebanon reported population growth of 2.2 percent and 1.5 percent, respectively. This continued growth has been aided by the presence of Dartmouth College and many of the supporting firms in the area (UNH Cooperative Extension, 2010).

Figure I.5. Population Trends for the WRJ Sub-Region, 1990-2008



Source: U.S. Department of Commerce, BEA, 2011a.

In 2010, the U.S. population consisted of 63.7 percent of white persons not of Hispanic or Latino origin (U.S. Census Bureau, 2010). Comparatively, Vermont's resident population consisted of 94.3 percent, which currently ranks it as having the second highest proportion of white persons in the nation. New Hampshire shares a similar

racial makeup, with 92.3 percent of the population designated as white people not of Hispanic or Latino origin. This is the same percentage recorded at the county-level for Grafton, New Hampshire. Orange and Windsor Counties in Vermont each have percentages of white persons around 95 percent. Close to 96 percent of residents in each of the three WRJ Sub-Region counties were born in the U.S. The two states and three sub-region counties all document around 90 percent of their respective populations over the age of twenty-four having a high school degree, and between 28 to 34 percent having earned a bachelor's or advanced degree (U.S. Census Bureau, ACS, 2009).

**Regional Employment and Income**

The WRJ Sub-Region maintains a rural way of life. Natural commodity industries have a longstanding presence in the area, yet their dominance continues to decline. Concurrently, the service sector and tourism industry continue to expand (U.S. Census Bureau, ACS, 2009). Table I.8 displays the median household income, unemployment rates, and percentages of those living in poverty for the WRJ Sub-Region counties, communities of interest, and their respective states.

**Table I.8. Income, Unemployment, and Poverty Rates in the WRJ Sub-Region**

	Median Household Income (2009 \$'s)	Percent Unemployed			Percent below Poverty (2009)
		2000	2009*	2010*	
US	50,221	4.0	9.9	9.4	14.3
Vermont	51,284	2.7	6.6	5.6	11.5
New Hampshire	63,033	2.7	6.4	5.3	8.6
Orange County (VT)	51,011	2.2	6.2	5.5	10.8
Windsor County (VT)	51,066	2.1	5.9	5.2	10.5
Grafton County (NH)	52,691	2.4	5.5	4.2	10.3
<i>Towns of Interest</i>					
Bradford, VT	51,071	2.9	8.1	7.1	N/A
Woodstock, VT	76,184	2.0	5.3	4.9	N/A
Hanover, NH	99,053	2.4	3.4	2.3	N/A
Lebanon, NH	57,982	1.7	4.2	2.9	N/A

Source: U.S. Bureau of Labor Statistics, 2011; U.S. Census Bureau, ACS, 2009; U.S. Census Quickfacts, 2009; New Hampshire ELMIB, 2010; Vermont DOL, 2010b. (\*) Denotes unemployment rates as of December of that year.

The 2009 Median household income in Vermont was on par with the national median of \$50,221, as were the two Vermont counties included in the sub-region profile. In contrast, the state of New Hampshire reported a median household income of \$63,033. This state-wide figure is more than \$10,000 higher than that recorded in Grafton County, New Hampshire. The town of Hanover in Grafton County however, reported one of the highest median incomes in the Watershed at \$99,053. One can infer that Dartmouth professors, administrators or others associated with the prestigious school contribute heavily to this figure. Unemployment figures are presented in Table I.8 for the years 2000, 2009, 2010 given the recent volatility in the economy. The three counties in the WRJ Sub-Region have documented unemployment figures below the New Hampshire and Vermont state averages since 2000. In late 2010, unemployment figures in the three counties were nearly 4 percent lower than the national

average. The four towns of management interest also had unemployment rates below 3 percent in the year 2000. Bradford, Vermont experienced the highest spike in unemployment at the height of the recession in late 2009 at just over 8 percent. Unemployment rates in each of the four towns were on the decline by the end of 2010. The towns of Hanover and Lebanon currently maintain the lowest unemployment rates out of any town examined in the larger Watershed profile.

Table I.9 gives the employment breakdown by industry for the counties in the WRJ Sub-Region. The largest employer in each of the three counties is the educational services, and health care and social assistance industry; accounting for more than 30 percent in Orange and Grafton Counties, and 25 percent in Windsor County. The second largest employer for all three counties is the retail trade industry, ranging from 10 to 13 percent.

**Table I.9. Regional Employment by Sector in the WRJ Sub-Region**

Full-Time and Part-Time Employment for White River Junction Sub-Region by Industry	WRJ Sub-Region		
	Orange County	Windsor County	Grafton County
Civilian employed pop. (16 years and over)	15,370	29,715	44,389
Percent of Employment by Industry (percent)			
Agriculture, forestry, fishing and hunting, and mining	5.3	2.5	1.9
Construction	9.4	9.2	8.7
Manufacturing	9.7	9.7	9.3
Wholesale trade	2.5	2.6	1.6
Retail trade	10.3	11.2	12.7
Transportation and warehousing, and utilities	2.9	4.1	2.8
Information	1.5	2.1	1.4
Finance and insurance, and real estate	4.7	4.8	4.5
Professional, scientific, and mgmt., admin. and waste mgmt. services	8.8	9.5	7.1
Education services, health care, and social assistance	30.4	25.3	33.1
Arts, entertainment, and recreation, and accomd. and food services	5.5	10.1	11.0
Other services, except public administration	3.9	4.9	3.7
Public administration	5.1	3.8	2.1

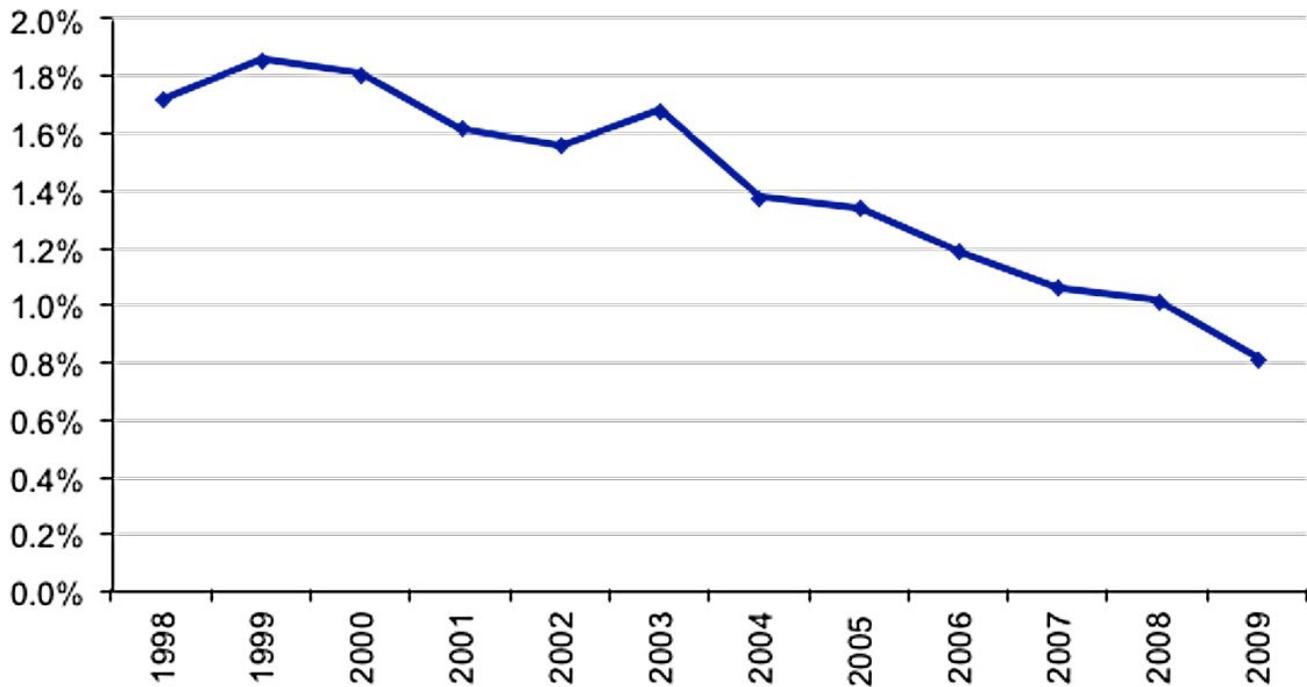
Source: U.S. Census Bureau, ACS, 2009.

### Commodity Industries

#### Timber

There is a long standing history of timber harvesting and wood-product manufacturing in the northern states of Vermont and New Hampshire. However, as was the case in the Northern Sub-Region, these once dominant industries have been in sharp decline. In 1998, timber-related jobs represented 1.7 percent of total employment in the three-county WRJ Sub-Region. By 2008, this figure was down to 0.8 percent (see Figure I.6) (U.S. Dept of Commerce, 2010a). In 2010, the total number of timber-related jobs in the WRJ Sub-Region is estimated at 735, including both private employment and independent proprietors (U.S. Dept of Commerce, 2010a, b).

Figure I.6. Percent of Total Private Employment in Timber in the WRJ Sub-Region, 1998-2009



Source: U.S. Dept. of Commerce, Census Bureau. 2010a

In 2009, 1.17 million cords of wood were harvested in New Hampshire forests (NEFA, 2011). This is a significant reduction from 2005 levels, which is consistent with the economic recession. New Hampshire landowners received over \$30 million from timber sales, and forest-based manufacturing’s estimated (2009) contribution to the state’s economy was \$1.15 billion in output, 8,160 jobs, and a payroll of around \$384 million a year (NEFA, 2011). Vermont recorded similar figures in 2005, which have also likely declined in the last few years. Based on 2005 figures, Vermont forest-based manufacturing is estimated at contributing nearly \$1.0 billion in value of shipments to the economy, or 9.3 percent of the state’s total manufacturing sales (NEFA, 2007). Windsor County was responsible for the most timber harvesting in the state in 2007, with 17 sawmills in the area relying on this activity (VT DOL, 2010a).

*Agriculture*

Table I.10 reveals the number of farming operations, farm size, acres of farmland, and the value of agricultural products produced in Vermont and New Hampshire and each of the focal counties in the sub-region. The state of Vermont has more than double the amount of farmland acreage than any of the other states in the region, with a commodity market value of over \$670 million per year. While New Hampshire has far less land in agricultural production, USDA Census data reveals the number of agricultural enterprises in the state increased by over 800 during 2002-2007. In 2007, there were just less than 300 thousand acres of farmland within the three counties of the WRJ Sub-Region. In comparison to the other two counties, Grafton County experienced the largest percent increase in farmland acres from 2002-2007, at 16.5 percent.

Table I.10. Farming in the WRJ Sub-Region

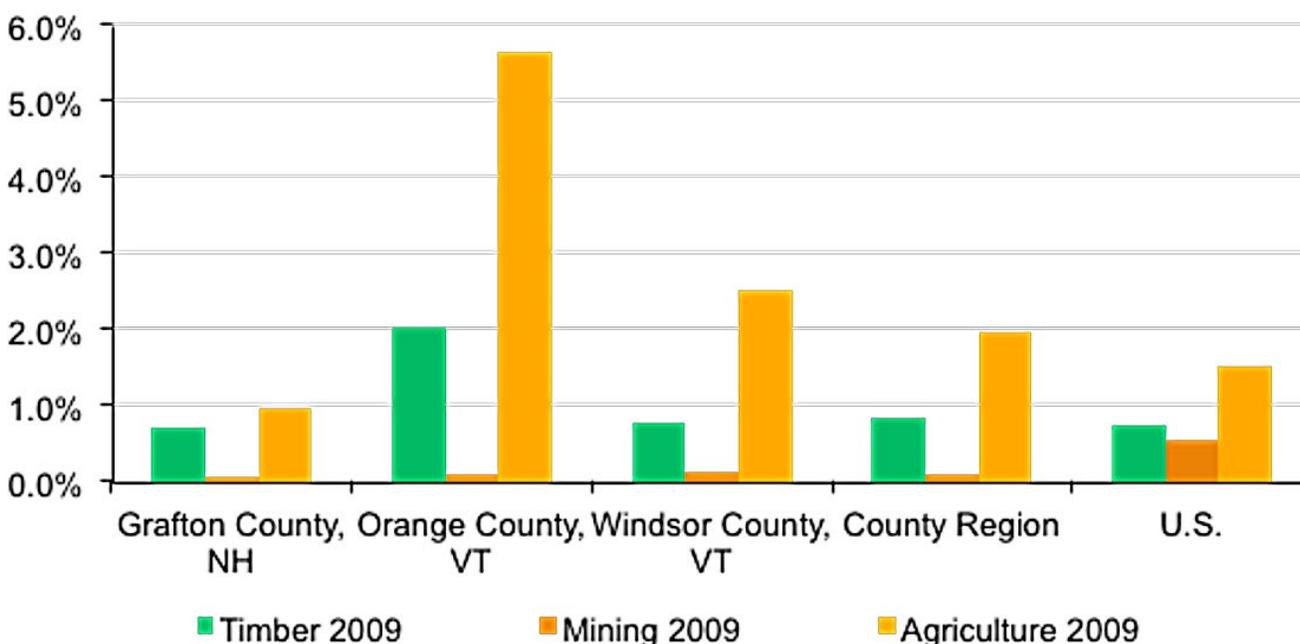
Agriculture in the WRJ Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Vermont	6,984	177	1,233,313	-0.93	673,713,000
New Hampshire	4,166	113	471,911	6.08	199,051,000
Orange County (VT)	683	149	101,645	-7.94	43,292,000

Agriculture in the WRJ Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Windsor County (VT)	767	125	95,972	6.69	24,978,000
Grafton County (NH)	552	181	99,964	16.52	34,393,000

Source: USDA, Ag. Census, 2002; 2007.

Orange County has the highest market value of agricultural products sold out of the three counties, and relies much more heavily on the agricultural industry for employment compared to the sub-region as a whole (BEA, 2011b). Figure I.7 shows the breakdown of employment by commodity industry. Unlike other regions, agricultural employment is larger than timber in each county, while mining is again a minimal contributor to employment in the region.

Figure I.7. Commodity Sectors in WRJ Sub-Region, Percent of Total Employment



Source: U.S. Dept. of Commerce, BEA, 2011b.

\* Note data for timber and mining are from County Business Patterns which excludes proprietors, government, and railroad. Data for agriculture are from Bureau of Economic Analysis. The latest year for each data source may vary due to different data release schedules.

As noted in the Northern Sub-Region profile, both Vermont and New Hampshire are working to strengthen their food system and abilities to meet local demands with locally produced products. New grant and loan programs have been put in place to try and retain productive working lands and lessen the financial barriers for beginning farmers (American Farmland Trust, 2011).

### Recreation and Tourism-Related Industries

The travel and tourism industry continues to be a significant and growing contributor to the local and regional economies within the Watershed. Total direct spending from annual travel and tourism in the northern states of Vermont and New Hampshire is estimated at nearly \$6 billion (Economic & Resources Policy, Inc., 2010; Goss, 2011). This spending supports nearly 17 percent of the total private workforce in the WRJ Sub-Region (BEA, 2011b). As with other parts of the Northeast, towns within the Watershed are expanding opportunities

associated with recreation and tourism. Many of the quaint towns in the sub-region host annual festivals and cultural events aimed at attracting crowds from beyond the community borders. A majority of these events are centered on the historic cultural and economic makeup of the region, and supported by the beauty of the natural landscape. The WRJ Sub-Region is home to designated national historic districts and a national scenic byway. The town of Woodstock is centered by a storybook New England village with beautiful late Colonial and Victorian architecture, covered bridges, and a main street with quaint shops and bed and breakfast establishments. Woodstock and many of the towns in the region rely heavily on those visiting and passing through on to other northern attractions. With the strong presence of agriculture and tourism in the region, especially in Orange County, agritourism seems to be expanding at a considerable rate.

Recreation opportunities abound within the counties of the WRJ Sub-Region as they do in much of the Watershed. To the west is the Mt. Carmel State Forest and eastern range of the Green Mountains. The Connecticut River in the region is enjoyed both leisurely and those seeking an adventure. Additional lands acquired by the Refuge would provide further opportunities to locals and non-local visitors. Traditional activities on lands under Refuge management include fishing, hunting, wildlife observation, photography, and environmental education. Snowmobiling is a very popular activity in this region and would be permitted on lands under Refuge management. The economic contribution of the snowmobile industry in Vermont alone has grown to an estimated \$550 million (Watson, 2003). Details about the economic contribution associated with wildlife viewing, hunting, and fishing in Vermont and New Hampshire are provided in Table I.5 in the previous sub-region profile.

As touched on in the Northern Sub-Region profile, some of the most popular activities in Vermont and New Hampshire do not fall into the category of traditional recreation. Nearly half of all Vermont and New Hampshire residents participate in hiking and a third participate in kayaking and canoeing (Outdoor Industry Foundation, 2003). Water-based recreation (boating, fishing, and swimming) on all New Hampshire rivers, streams, lakes and ponds is said to have contributed \$1.2 billion in 2003, and \$109 million in Vermont in 2004 (Shapiro and Kroll, 2003). New Hampshire and Vermont recently developed a partnership and released the Connecticut River Recreation Management Plan in 2009 that discusses, among other things, how to encourage businesses to capture the outdoor recreation market while protecting the fragile ecological systems of the river and surrounding areas.

### Land Use and Ownership

Similar to the Northern Sub-Region, a vast majority (91 percent) of the landscape in the WRJ Sub-Region is classified as forest (NASA MODIS, 2006). Rural Grafton County with its designated White Mountain National Forest ranked the highest at 95 percent forested. In 2000, residential land was estimated at 34.3 percent in Orange County, 47.2 percent in Windsor County, and 40.1 percent in Grafton County. These residential percentages are almost entirely classified as ‘exurban,’ where average lot sizes can range from 1.7 to 40 acres (Headwaters Economics EPS-HDT, 2011; Theobald, 2005). When compared to 1980 levels, residential acres (in 2000) represented increases of 55 percent, 19.8 percent, and 23.6 percent, respectively.

Grafton County’s total land area of 1.1 million acres is more than the combined acreage of Windsor and Orange County. Grafton County’s 356,061 acres of Federal land also dwarfs Windsor and Orange County’s 29,168 and zero acres, respectively. A vast majority of these federal acres are under the management of the U.S. Forest Service. Table I.11 gives the general breakdown of total land ownership by county.

**Table I.11. Land Ownership (acres) in WRJ Sub-Region**

	Orange County, VT	Windsor County, VT	Grafton County, NH	County Region
<b>Total Area</b>	442,432	624,855	1,119,017	2,186,305
<b>Private Lands</b>	427,622	545,381	733,230	1,706,233
<b>Federal Lands</b>	0	29,168	356,061	385,229
<b>State Lands</b>	9,635	44,808	26,876	81,319
<b>City, County, Other</b>	3,838	5,490	2,850	12,178

*Source: Conservation Biology Institute, 2006, 2008. (As cited by Headwaters Economics EPS-HDT Report)*

To date, the Refuge has acquired and conserved just over 35,000 acres throughout the Watershed, almost exclusively through fee-acquisitions. The Refuge currently does not own any acreage in the WRJ Sub-Region; however large tracts in Orange and Grafton County have been identified for their high ecological value and

acquisition potential. For a comprehensive discussion on the potential impacts of Federal fee acquisitions and conservation easements, please reference Section II.

### Tri-State Border Sub-Region

The Tri-State Border (TSB) Sub-Region of the Watershed consists of Windham County, Vermont, Cheshire County, New Hampshire, and Franklin County, Massachusetts. Currently, there is a 285-acre parcel in Windham County, and three relatively small land units equating to 55 acres in Franklin County, that are under Refuge ownership and management. Additional lands near the junction of the three state borders have been identified for potential acquisition and others solely for their ecological significance. The Refuge's flagship cooperative center—Great Falls Discover Center—in partnership with the Massachusetts Department of Conservation and Recreation and a number of other partners, is located in nearby Turners Falls, Massachusetts.

Four additional communities of management interest are highlighted in the TSB Sub-Region profile. These being: Brattleboro, Vermont; Keene, New Hampshire; Winchester, New Hampshire; and Greenfield, Massachusetts. Brattleboro is Windham County's largest township, and like many other noted communities in Vermont, it is rich in the arts, rooted in agriculture, and teeming with summer and winter recreation opportunities. The town of Keene, accounts for nearly 30 percent of Cheshire County's entire population and serves as the geographic and socio-economic center of the county (UNH Extension, 2010). Historically, Keene was known for its textile mills which held contracts with the U.S. Government throughout the Civil War, World War I, and World War II (Miller, 2003). Today, Keene is home to two colleges and is a center for insurance, education and tourism, while still retaining the Victorian architecture from its mill town era. Winchester, NH is a smaller town located just 13 miles south of the larger town of Keene. It, too, has historic ties to the textile industry and now retains a rural way of life with adjacent parks and preserves. Greenfield is also its respective county's largest city and is noted for a vibrant downtown that continues to see considerable infrastructure investment. Such investments are expected to add to population growth in the near term.

### Population

Table I.12 gives the population estimates and trends for Vermont, New Hampshire, and Massachusetts, the three TSB Sub-Region counties, and the four towns of interest. Each of the three states experienced growth in their total population from 2000 to 2010, with New Hampshire documenting the highest increase at 6.5 percent. Cheshire County, New Hampshire and Franklin County, Massachusetts have similar populations with just over 70,000 residents. However, Franklin County is the least populated county in the state of Massachusetts. Windham County is home to 30,000 fewer residents, yet is one of the more populous Vermont counties in the Watershed. Population densities for the counties reflect their contrast in population size as they have fairly similar land areas. Total population for the three-county sub-region has been increasing relative to 1990 levels, yet has experienced some decline in the past few years (see Figure I.8). Based on population forecasts from respective state departments, moderate population increases are expected for Cheshire and Franklin County over the next decade, with slight declines expected in Windham County.

**Table I.12. Population Figures for TSB Sub-Region**

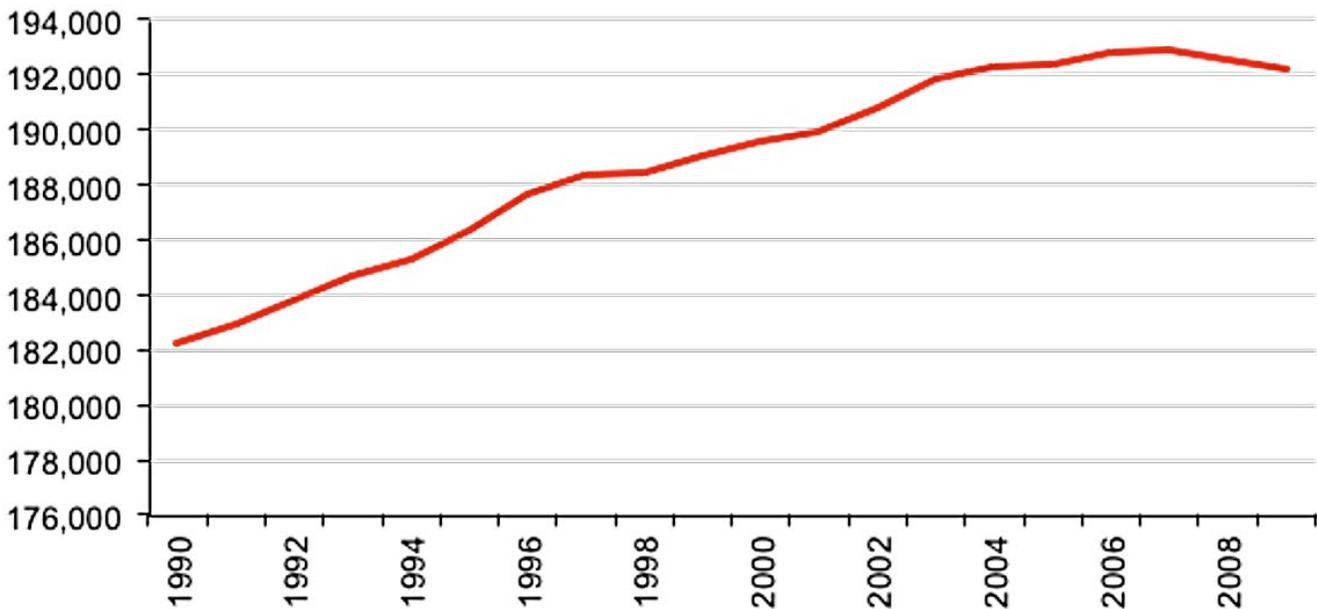
Tri-State Border Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Vermont	625,741	40.6	67.65	9,250	2.8	638,809
New Hampshire	1,316,470	39.6	146.80	8,968	6.5	1,470,000
Massachusetts	6,547,629	38.5	738	4,845	3.1	6,767,712
<i>Tri-State Border Region</i>						
Windham County (VT)	44,513	43.6	56	798	0.7	42,585
Cheshire County (NH)	77,117	40	104	739	4.5	84,672
Franklin County (MA)	71,372	42.8	102	702	-0.2	78,452

Tri-State Border Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
<i>Towns of Interest</i>						
Brattleboro, VT	11,633	44.9	359	32.4	-3.1	N/A
Greenfield, MA	17,862	41.5	816	21.9	-1.7	N/A
Keene, NH	22,539	32.6	599	37.6	-0.1	N/A
Winchester, NH	4,283	40.8	77	55.5	3.2	N/A

Source: U.S. Census Bureau, 2010; New Hampshire Office of Energy and Planning, 2006; Vermont DOL, 2010a; MISER, 2003. \*Note source for Resident population and median age estimates for Towns of Interest: U.S. Census Bureau's 2005-2009 American Community Survey 5-yr. Estimates.

The towns of Brattleboro, Keene, and Greenfield have experienced slight declines in their population over the last decade, while remaining the most populous cities in their respective counties. Winchester was the only town of the four to experience a growth in population over the last ten years. With only 77 people per square mile, Winchester is much more rural when compared to the other population densities in the several hundred. The town of Keene maintains a median age of 32 years, which is eight years younger than any other town in the sub-region profile. This statistic is likely representative of the large student population in the county.

Figure I.8. Regional Population Trends in TSB Sub-Region, 1990-2008



Source: U.S. Department of Commerce, BEA, 2011a.

In 2010, the U.S. population consisted of 63.7 percent of white persons not of Hispanic or Latino origin (U.S. Census Bureau, 2010). Comparatively, Vermont's resident population consisted of 94.3 percent, which currently ranks it as having the second highest proportion of white persons in the nation. New Hampshire shares a similar racial makeup with that of Vermont, with 92.3 percent of the population designated as white people not of Hispanic or Latino origin. While, the state of Massachusetts documents a lower percentage of white residents (76.1percent), all three counties included in the TSB Sub-Region profile note percentages above 92 percent. Over 96 percent of the residents in each of the three counties were born in the U.S. Education attainment figures in all three counties are also above the national average. In Windham, Cheshire, and Franklin County, 90 percent of the residents over the age of twenty-four are high school graduates and 30 percent have earned a bachelor's or advanced degree (U.S. Census Bureau, ACS, 2009).

### Regional Employment and Income

The TSB Sub-Region continues to sustain a fairly rural way of life, especially when compared to regions further south in the Watershed. Like many of the communities along the Connecticut River, towns in this area were historically known for their manufacturing capabilities. While this sector of the economy is nowhere near its historic levels, it is still a major economic engine for the area. Table I.13 gives median household income, unemployment rates, and the percentage of the population living below the poverty line in the TSB Sub-Region.

**Table I.13. Income, Unemployment, and Poverty Rates**

	Median Household Income (2009 \$s)	Percent Unemployed			Percent below Poverty (2009)
		2000	2009*	2010*	
US	50,221	4.0	9.9	9.4	14.3
Vermont	51,284	2.7	6.6	5.6	11.5
New Hampshire	63,033	2.7	6.4	5.3	8.6
Massachusetts	64,496	2.7	8.5	8.0	10.3
<i>TSB Sub-Region</i>					
Windham County (VT)	46,465	2.4	6.1	5.3	12.3
Cheshire County (NH)	55,719	2.7	6.0	5.1	9.6
Franklin County (MA)	52,185	2.5	8.6	7.6	10.3
<i>Towns of Interest</i>					
Brattleboro, VT	38,301	2.7	6.2	5.2	N/A
Greenfield, MA	45,188	2.7	8.5	7.6	N/A
Keene, NH	51,375	2.6	5.4	4.7	N/A
Winchester, NH	40,821	4.6	N/A	6.5**	N/A

*Source: U.S. Bureau of Labor Statistics, 2011; U.S. Census, ACS, 2009; U.S. Census Quickfacts, 2009; New Hampshire ELMIB, 2010; Vermont DOL, 2010b; Massachusetts EOLWD, 2010; U.S. Census Bureau, 2000. (\*) Denotes unemployment rates as of December of that year. (\*\*) Denotes estimates made using the Wolfram Alpha Computational Knowledge Engine, 2011.*

As of 2009, the three counties in the TSB Sub-Region all reported median incomes below their respective state-wide medians. Furthermore, each of the towns included in this profile reported median incomes below their respective county-wide medians. The (2009) median household income in Brattleboro, Vermont, \$38,301, is the lowest out of any town examined in the Watershed profile. Unemployment rates are presented for the years 2000, 2009, and 2010 given the economic volatility in recent years. At the start of the decade in year 2000, all three counties reported unemployment below 3 percent. By the end 2009, unemployment in the sub-region was above 6 percent, with Franklin documented the highest rate at 8.6 percent. Unemployment rates in the towns of interest remained below the national average throughout the recession and were declining in all areas by the end of 2010. Keene, New Hampshire endured the best in terms of unemployment throughout the volatility of the last decade.

Table I.14 gives the employment breakdown by industry for the three counties of interest. The largest employer in all three counties is the educational services, health care, and social assistance industry, accounting for between 24.8 percent and 31.3 percent of the workforce. Manufacturing was the second largest employer in Cheshire and Franklin Counties, while retail was the second largest in Windham County.

Table I.14. Employment by Industry in the TSB Sub-Region

Full-Time and Part-Time Employment by Sector	TSB Sub-Region		
	Windham County	Cheshire County	Franklin County
Civilian employed pop. (16 years and over)	23,401	40,874	37,729
Percent of Employment by Industry (percent)			
Agriculture, forestry, fishing and hunting, and mining	2.0	1.0	2.1
Construction	8.8	7.3	6.6
Manufacturing	8.9	15.2	13.4
Wholesale trade	4.0	4.5	2.2
Retail trade	11.7	14.6	10.8
Transportation and warehousing, and utilities	4.7	3.6	4.9
Information	1.7	2.1	2.9
Finance and insurance, and real estate	5.5	5.1	3.9
Professional, scientific, and mgmt., admin. and waste mgmt. services	7.3	7.3	6.5
Education services, health care, and social assistance	26.7	24.8	31.3
Arts, entertainment, and recreation, and accomd. and food services	11.0	7.8	6.9
Other services, except public administration	4.8	3.9	4.4
Public administration	2.8	2.7	4.1

Source: U.S. Census Bureau, ACS, 2009.

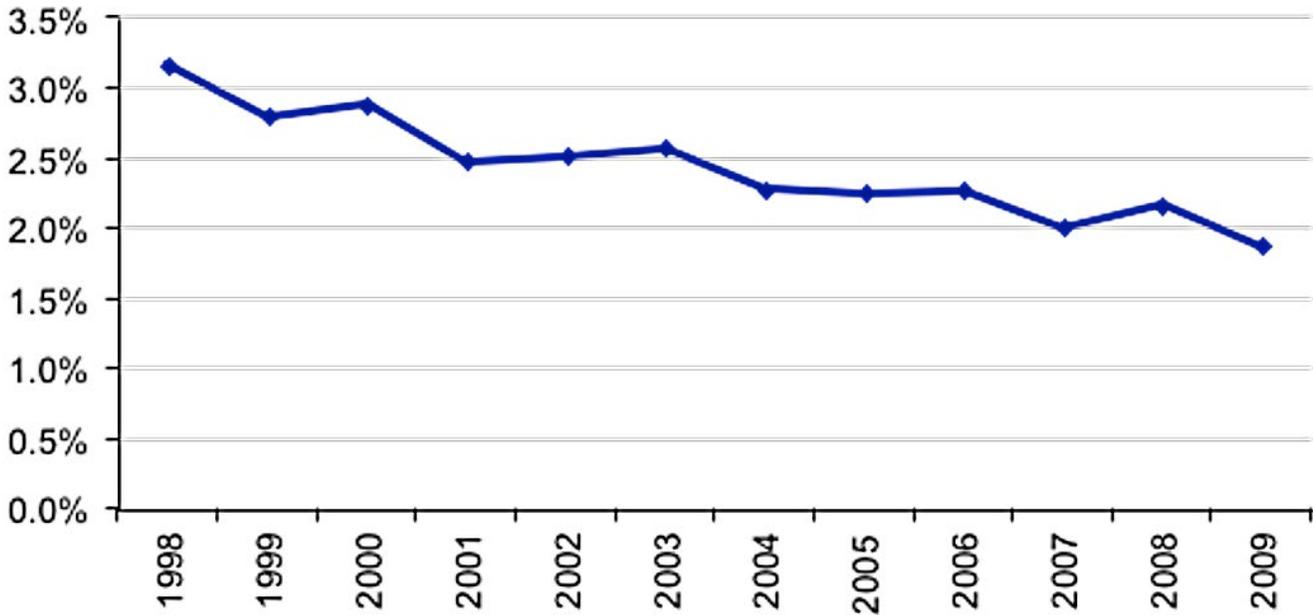
Brattleboro, Keene, and Greenfield remain the prominent city centers within their respective counties. These towns have historic ties to industries such as textiles and agriculture. While production practices may have ceased, these towns now lean on the cultural history and natural attractions of the area to attract visitors. Greenfield especially has been the site of considerable infrastructure investment. Proposed projects include a solar farm installation on the city's capped landfill (which would be the largest in all of New England), as well as a regional transit center and proposed Amtrak service along the Burlington-New York-Washington corridor (Town of Greenfield, Accessed 2011). If approved, these projects could contribute significant economic activity and attract new residents in the future.

### Commodity Industries

#### Timber

There is a long standing history of timber harvesting in the Watershed, especially in the northern states of Vermont and New Hampshire. The expansive timber production in the area gave way to timber-related industries, such as saw mills, pulp/paper mills, and wood-product manufacturers. However, these once dominant industries have been in sharp decline. In 1998, timber-related jobs represented 3.2 percent of total employment in the three-county region. By 2009, this figure was down to 1.9 percent (see Figure I.9). The total number of timber-related jobs in the Tri-State Border Sub-Region is estimated at 1,345, including both private employment and independent proprietors (U.S. Dept. of Commerce, 2010a, b).

Figure I.9. Percent of Total Private Employment in Timber in the TSB Sub-Region, 1998-2009



Source: U.S. Dept. of Commerce, 2010a

As previously noted in the sub-region profiles prior, 1.17 million cords of wood were harvested in New Hampshire forests in 2009 (NEFA, 2011). This is a significant reduction from 2005 levels, which is consistent with the recent economic recession. New Hampshire landowners received over \$30 million from timber sales, and forest-based manufacturing's estimated (2009) contribution to the state's economy was \$1.15 billion in total output, 8,160 jobs, and a payroll of around \$384 million per year to the state's economy (NEFA, 2011). Vermont recorded similar figures in 2005, which have also likely declined in the last few years. In 2005, Vermont forest-based manufacturing is estimated to have contributed nearly \$1.0 billion in value of shipments to the economy, or 9.3 percent of the state's total manufacturing sales (NEFA, 2007). In 2008, Windham County was the top-ranking timber harvesting county in Vermont, with 15 supporting sawmills (Vermont DOL, 2010a). Massachusetts has experienced similar reductions in production and processing. In 1993 there were 94 confirmed active sawmills; by 2005 there were only 49, which were producing roughly 49 million board feet (Damery et al., 2006). Individually, Franklin County, Massachusetts has six registered sawmills and two portable bandmills (Damery et al., 2006).

#### Agriculture

Table I.15 reveals the number of farming operations, average farm size, acres of farmland, and the value of agricultural products produced in the three states and three focal counties that make up the TSB Sub-Region. The state of Vermont has more than double the amount of farmland acreage than any of the other states in the Watershed, with an annual commodity market value of \$673 million. This is nearly \$200 million more than Massachusetts' agricultural value, and over three times that of New Hampshire. USDA Census data reveal the number of agricultural enterprises in New Hampshire increased by over 800 from 2002 to 2007. Additionally, the three New Hampshire counties examined in the Watershed (Coos, Grafton, and Cheshire) all experienced increases in farmland acres of 15 percent or higher from 2000 to 2007. Windham County, Vermont was the only county in the sub-region to experience a decline in farmland acres during this time period. As of 2007, the three-county TSB Sub-Region encompassed 178,000 acres of active farmland.

Table I.15. Farming in the TSB Sub-Region

Agriculture in the TSB Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Vermont	6,984	177	1,233,313	-0.9	673,713,000
New Hampshire	4,166	113	471,911	6.1	199,051,000
Massachusetts	7,691	67	517,879	-0.1	489,820,000

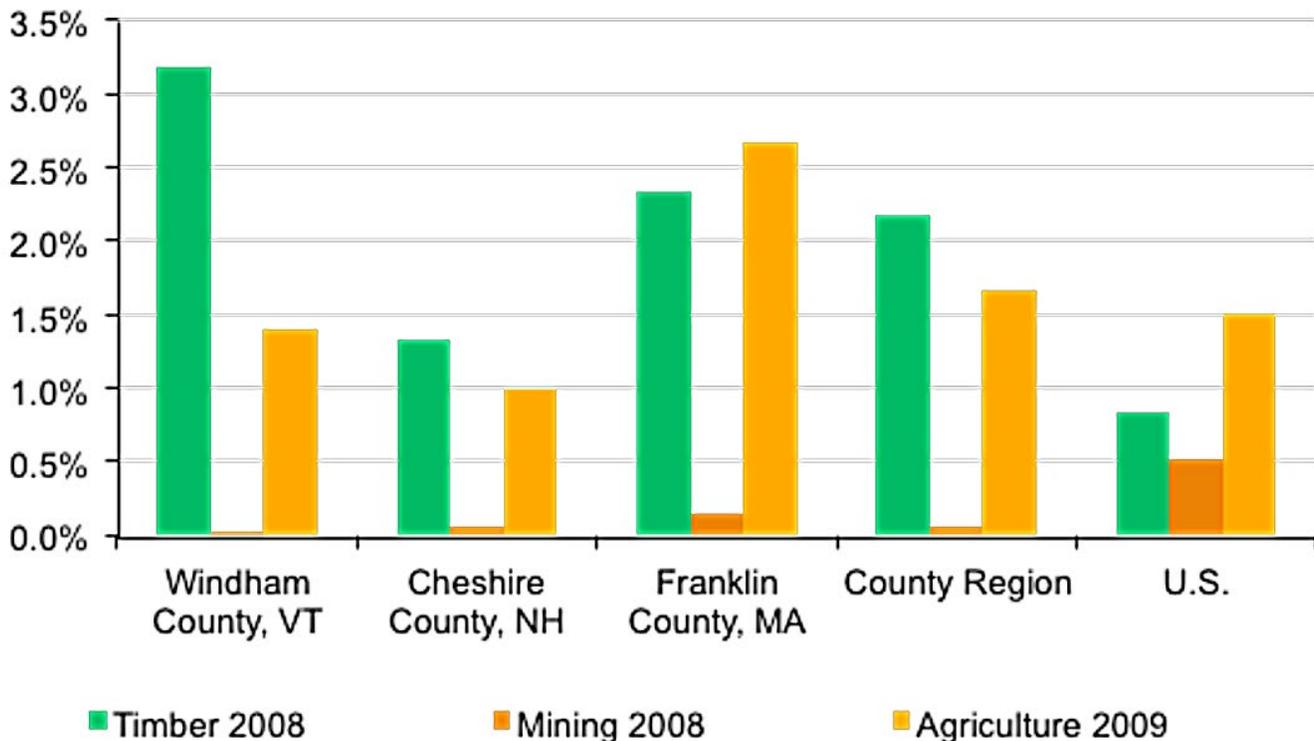
Agriculture in the TSB Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Windham County (VT)	428	119	50,764	-17.6	21,408,000
Cheshire County (NH)	419	115	48,241	16.9	15,406,000
Franklin County (MA)	741	107	79,465	7.0	56,844,000

Source: USDA, Ag Census, 2002, 2007.

As noted in the previous sub-region profiles, Vermont and New Hampshire are investing resources to strengthen their food systems and abilities to meet local demands with locally produced products. The state of Massachusetts seems to share these ambitions with Governor Patrick recently announcing the establishment of the Massachusetts Food Policy Council, who is set with advancing the goals of bringing healthy, local foods to all residents in the Commonwealth (*Mass.gov*, 2011). Farmers in Massachusetts are recognizing and establishing local outlets for their products. For instance, the state has seen almost a 250% increase in the number of farmers markets between 2007 and 2010 alone (Agricultural Day Priority Issues, 2011).

Figure I.10 displays the breakdown of employment by commodity industry in the TSB Sub-Region. Windham County, Vermont has the highest percentage of timber employment across the three counties, while Franklin County, Massachusetts has the highest percentage of agricultural employment. The TSB Sub-Region as a whole maintains a higher percentage of total employment in the timber and agricultural industries than the national average.

Figure I.10. Commodity Industries in the TSB Sub-Region, Percent of Total Employment



Source: U.S. Dept of Commerce, BEA. 2011b.

\* Note data for timber and mining are from County Business Patterns which excludes proprietors, government, and railroad. Data for agriculture are from Bureau of Economic analysis. The latest year for each data source may vary due to different data release schedules.

### Recreation and Tourism-Related Industries

The travel and tourism industry continues to be a significant and growing contributor to the local and regional economies within the Watershed. Total direct spending from annual travel and tourism in the northern states of Vermont and New Hampshire is estimated at nearly \$6 billion (Economic & Resources Policy, Inc., 2010; Goss, 2011). In 2009, total direct spending from annual travel and tourism in Massachusetts was estimated at \$14.4 billion (Massachusetts Department of Travel and Tourism, 2010). This area of spending is said to support nearly 12 percent of the total workforce in Vermont, and is tied to over 120 thousand jobs in the state of Massachusetts. Many of the towns within the TSB Sub-Region are attempting to capture more of this valuable market by hosting annual festivals and cultural events. For instance, the town of Keene is notorious for hosting the annual Pumpkin Festival which is estimated to have between 50-80,000 attendees (Keene Pumpkin Festival, 2011). The smaller town of Winchester, New Hampshire has continued to host the annual Pickle Festival that has the ambiance of an old-fashioned town fair. There are many other events in the region that lean on the area's historic and cultural roots. Area farmers and artisans are once again finding local markets for their goods, while catering to buyers and their overall experience. Agritourism seems to be expanding at a considerable rate, with each state in the Watershed now having a website and interactive map just for these enterprises. In Massachusetts alone, there are over 400 enterprises registered in the state's agritourism brochure with a significant concentration of them located within the Watershed (MA Dept. of Ag. Resources, 2011).

There are abundant recreation opportunities within the TSB Sub-Region. Traditional activities on lands under Refuge ownership and management include fishing, hunting, wildlife observation, photography, and environmental education. Snowmobiling is a popular winter recreation activity that is often allowed on lands under Refuge ownership. The economic contribution of the snowmobile industry in Vermont alone has grown to an estimated \$550 million (Watson, 2003). Details about the economic contribution associated with wildlife viewing, hunting, and fishing in Vermont, New Hampshire and Massachusetts are provided in Table I.16.

**Table I.16. Recreation Estimates and Expenditures for Vermont, New Hampshire, and Massachusetts**

Recreation Estimates	Residents and Non-Residents	Vermont	New Hampshire	Massachusetts
<b>Fishing</b>	# of Anglers	114,000	230,000	497,000
	Total Expenditures	63,749,000	172,413,000	769,631,000
	Trip-Related	40,535,000	88,581,000	297,312,000
	Equipment and Other (\$)	23,214,000	83,832,000	472,319,000
<b>Hunting</b>	# of Hunters	73,000	61,000	73,000
	Total Expenditures	189,707,000	74,467,000	70,824,000
	Trip-Related	20,928,000	17,665,000	36,675,000
	Equipment and Other (\$)	168,779,000	56,802,000	34,149,000
<b>Wildlife Watching</b>	Total Participants	468,000	710,000	1,919,000
	Total Expenditures	122,841,000	273,769,000	754,965,000
	Trip-Related	58,219,000	116,136,000	148,779,000
	Equipment and Other (\$)	64,622,000	157,633,000	606,186,000

Source: USFWS National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 2006.

As mentioned previously, some of the most popular activities in Vermont and New Hampshire do not fall into the category of traditional recreation. Nearly half of all Vermont and New Hampshire residents participate in hiking and a third participate in kayaking and canoeing (Outdoor Industry Foundation, 2003). Water-based recreation (boating, fishing, and swimming) on all New Hampshire rivers, streams, lakes and ponds is said to have contributed \$1.2 billion in 2003, and \$109 million in Vermont in 2004 (Shapiro and Kroll, 2003). New Hampshire and Vermont recently developed a partnership and released the Connecticut River Recreation Management Plan

in 2009 that discusses, among other things, how to encourage businesses to capture the outdoor recreation market while protecting the fragile ecological systems of the river and surrounding areas.

**Land Use and Ownership**

Similar to the Northern and WRJ Sub-Regions, a vast majority (95 percent) of the landscape in the TSB Sub-Region is classified as forest (NASA MODIS, 2006). Land classified as residential (in 2000) was estimated at 50 percent in Windham County, 47 percent in Cheshire County, and 49 percent in Franklin County (Theobald, 2005). These residential percentages are almost entirely classified as ‘exurban,’ where average lot sizes can range from 1.7 to 40 acres, and allude to the region’s relatively rural landscape (Headwaters Economics EPS-HDT, 2011). When compared to 1980 levels, the classified residential acres in year 2000 represented increases of 107 percent, 50 percent, and 21 percent in the three counties, respectively.

The three counties included in the TSB Sub-Region are fairly similar in terms of total land area. A vast majority of their lands are also in private ownership (88 percent or over). Nearly all of the 37,121 federally owned acres in the sub-region are located within Windham County, however, both Franklin and Cheshire County have a fair amount of public land owned by the state. Table I.17 gives the breakdown of land ownership across the three counties.

**Table I.17. Land Ownership (acres) in the TSB Sub-Region**

	Windham County, Vermont	Cheshire County, New Hampshire	Franklin County, Massachusetts	County Region
<b>Total Area</b>	510,425	466,313	463,589	1,440,327
<b>Private Lands</b>	460,867	439,062	407,989	1,307,918
<b>Federal Lands</b>	37,087	0	34	37,121
<b>State Lands</b>	5,793	20,860	52,684	79,337
<b>City, County, Other</b>	6,535	6,392	2,882	15,808

*Source: Conservation Biology Institute, 2006, 2008 (As cited by Headwaters Economics EPS-HDT Report, 2011).*

To date, the Refuge has acquired and conserved just over 35,000 acres throughout the Watershed, almost exclusively through fee-acquisitions. Within the TSB Sub-Region, the Refuge owns three smaller parcels in Franklin County amounting to 55 acres, and an additional 283 acre tract in Windham County. Additional lands in the TSB Sub-Region have been identified for the high ecological value and acquisition potential. The identified acres are located predominantly in the riparian areas along the Connecticut River and in the adjacent floodplains. For a comprehensive discussion on the potential impacts of federal fee acquisitions and conservation easements, please reference Section II.

**Greater Amherst Sub-Region**

The Greater Amherst Sub-Region of the Watershed consists exclusively of Hampshire County, Massachusetts. Hampshire County, located in west-central Massachusetts, includes the Fort River Division of the Refuge. The Division currently occupies 197 acres within an approved Refuge boundary of 2,200 acres. The acquired division lands about the Fort River, which is an influential tributary to the larger Connecticut River. The county also includes the Mill River Division of the Refuge which currently occupies 257 acres adjacent to the Connecticut River; and has an approved Refuge boundary of 2,000 acres. Hampshire County has rich soils and makes up the middle portion of what has been referred to as “Pioneer Valley.” The fertile soil and adjacent water source of the Connecticut River laid the ground work for early agricultural production. The river also provided a source of power that allowed area towns to boom with manufacturing jobs in the 19<sup>th</sup> and 20<sup>th</sup> centuries. Today, Hampshire County is notable for the presence within its borders of the “Five Colleges”, comprising the University of Massachusetts flagship campus and four well-known private colleges (Hampshire County, 2011).

Four Massachusetts' communities are also highlighted in the Greater Amherst Sub-Region profile. These include: Hadley, Northampton, Lee, and Westfield. Lee, Massachusetts, just over the Hampshire County boundary in Berkshire County, is one of the area towns deeply rooted in manufacturing. The town was once home to 25 operating paper mills, yet today only one papermaking facility remains still in operation (CPBIS, 2011; Town of Lee, 2011). However, the historic sites and architecture from the early time period, along with the natural beauty of the surrounding watershed have made this area a year-round tourist destination for more than 50 years. The towns of Hadley, Northampton, and Westfield all seem to cater to the large collegiate student population in the area. The region has become known as the "happy valley" due to the eclectic art and music communities, progressive ideas, prestigious colleges and large student population.

### Population

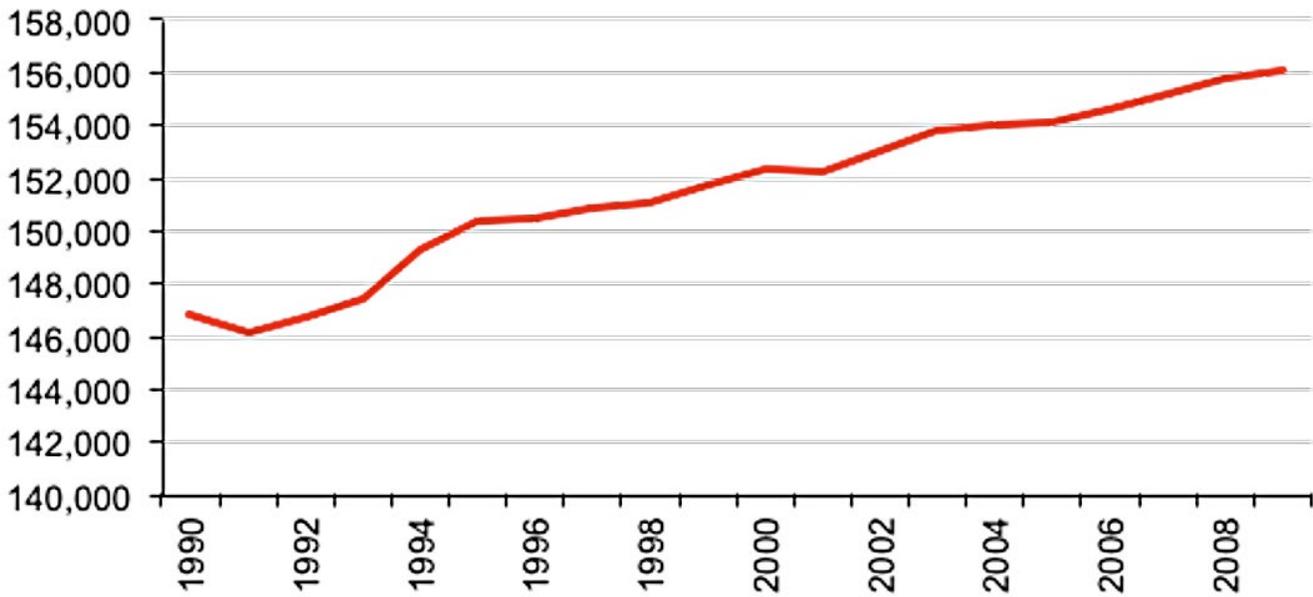
Table I.18 gives the population estimates and trends for the state of Massachusetts, Hampshire County, and the four towns of interest in the Greater Amherst Sub-Region. Both the state of Massachusetts and Hampshire County have experienced moderate growth in population between 3-4 percent over the last ten years. These population growth trends are expected to continue over the next decade. The 2010 population of 158,080 makes Hampshire County one of the least populated counties in Massachusetts. The population density in Hampshire County, 299 persons per square mile, is less than a third as dense as the entire state. The median age of the county, 36.8, is the youngest out of all of the eleven counties examined in the Watershed. This may account for the considerable student population in the county. The only town included in the Greater Amherst Sub-Region profile to post positive growth in the last ten years is the largest city included, Westfield, Massachusetts, just over the border in Hampden County. The three other communities in the profile document moderate declines of less than 4 percent.

**Table I.18. Population Figures for the Greater Amherst Sub-Region**

Greater Amherst Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Massachusetts	6,547,629	38.5	835	7,840	3.1	6,767,712
<b>Greater Amherst Sub-Region</b>						
Hampshire County (MA)	158,080	36.8	299	529	3.8	173,181
<b>Towns of Interest</b>						
Hadley, MA	4,740	49.0	192	24.7	-1.1	N/A
Northampton, MA	28,548	38.9	214	27	-1.5	N/A
Lee, MA	5,774	43.7	802	35.6	-3.5	N/A
Westfield, MA	41,373	37.4	875	47.3	3.1	N/A

Source: U.S. Census Bureau, 2010; MISER, 2003. \*Note: Resident population and median age estimates for Towns of Interest were pulled from U.S. Census Bureau's 2005-2009 American Community Survey 5-yr. Estimates.

Figure I.11. Regional Population Trends in the Greater Amherst Sub-Region, 1990-2008



Source: U.S. Department of Commerce, BEA, 2011a.

In 2010, the U.S. population consisted of 63.7 percent of white persons not of Hispanic or Latino origin (U.S. Census Bureau, 2010). Comparatively, Massachusetts’s population consisted of 76.1 percent white people (U.S. Census Bureau, 2010). Hampshire County reported figures well above the state demographic, with 86.2 percent of residents consisting of white people not of Hispanic or Latino origin. While this proportion is still well above the national average, it ranks Hampshire County second in the entire Watershed profile only to Hartford County, Connecticut. The majority of residents in Hampshire County, 90.7 percent, were born in the United States. Additionally, 91.7 percent of Hampshire County residents 25 years of age and older are high school graduates and 40.5 percent have earned a bachelor’s or advanced degree (U.S. Census Bureau, ACS, 2009). These percentages of education attainment are the highest among the eleven counties included in the Watershed profile.

**Regional Employment and Income**

The Greater Amherst Sub-Region, like much of the Watershed, was characterized by its farms, working forests, and manufacturing towns. At the center of the Pioneer Valley, the area has long been famous for its fertile soils and beautiful scenery. Subsequently, it has been a very popular year-round tourist destination for quite some time. The region maintains much of its rural character still today, while also being known now for its relatively liberal cities that are home to large student populations. Table I.19 gives estimates for median household income, unemployment, and the percentage of the population living in poverty.

Table I.19. Income, Unemployment, and Poverty Rates

	Median Household Income (2009 \$s)	Percent Unemployed			Percent below Poverty (2009)
		2000	2009*	2010*	
US	50,221	4.0	9.9	9.4	14.3
Massachusetts	64,496	2.7	6.6	5.6	10.3
<b>Greater Amherst Sub-Region</b>					
Hampshire County (MA)	57,293	2.2	7.1	6.6	11.3
<b>Towns of Interest</b>					
Hadley, MA	62,731	2.1	7.0	7.2	N/A

	Median Household Income (2009 \$s)	Percent Unemployed			Percent below Poverty (2009)
		2000	2009*	2010*	
Northampton, MA	51,018	2.1	5.9	5.7	N/A
Lee, MA	48,860	2.5	7.0	6.5	N/A
Westfield, MA	52,425	2.7	8.2	7.9	N/A

Source: U.S. Bureau of Labor Statistics, 2011; U.S. Census Bureau Quickfacts, 2009; U.S. Census Bureau, ACS, 2009-adjusted estimates; Massachusetts EOLWD, 2010. (\*) Denotes unemployment rates as of December of that year.

In 2009, Massachusetts recorded a state-wide household median income of \$64,496; roughly \$14,000 higher than the national median. The median household income in Hampshire County is over \$7,000 less than the state average. Out of the four communities examined in the sub-region, the town of Hadley documents the highest median household income, while the town of Lee notes the least. All four communities have median household income levels below that of the state.

Unemployment figures are presented in Table I.19 for the years 2000, 2009, and 2010, given the recent recession and economic volatility. In 2000, Hampshire County and the state as a whole reported relatively low unemployment rates of 2.2 percent and 2.7 percent, respectively. At the height of the recession in late 2009, the unemployment rate in county tipped 7 percent. By the end of 2010, the rate had declined to 6.6 percent. The town of Westfield documented the highest unemployment in both 2009 and 2010 when compared to the other towns in the profile. Furthermore, Hampshire County reported poverty figures slightly above the state average, with 11.9 percent of the total county population living at or below the poverty line.

Table I.20 gives the employment breakdown by industry for Hampshire County. The largest employer in the county is, overwhelmingly, education, healthcare and social assistance services. This sector accounts for almost 39 percent of total employment in the county. The second largest employer is the retail trade industry, with 10.6 percent of total employment. Rounding out the top three is the arts, entertainment and recreation industry, accounting for 8.6 percent of total employment in the county. Hampshire County's dependence on the education, healthcare and social assistance services is the highest in the Watershed. This is not all that surprising with the county being home to five major college campuses that house a combined student population of over 35,000.

**Table I.20. Employment by Industry in Greater Amherst Sub-Region**

Full-Time and Part-Time Employment	Greater Amherst Sub-Region Hampshire County
Civilian employed pop. (16 years and over)	80,804
Percent of Employment by Industry (percent)	
Agriculture, forestry, fishing and hunting, and mining	0.8
Construction	4.9
Manufacturing	7.9
Wholesale trade	2.4
Retail trade	10.6
Transportation and warehousing, and utilities	3.7
Information	2.1
Finance and insurance, and real estate	4.6
Professional, scientific, and mgmt., admin. and waste mgmt. services	8.0
Education services, health care, and social assistance	38.8

Full-Time and Part-Time Employment	Greater Amherst Sub-Region	
	Hampshire County	
Arts, entertainment, and recreation, and accom. and food services	8.6	
Other services, except public administration	3.8	
Public administration	3.7	

Source: U.S. Census Bureau, ACS, 2009.

**Commodity Industries**

As noted, Hampshire County is in the center of the Pioneer Valley, which is historically known to have some of the most fertile soil and unspoiled forests in all of New England (Pioneer Planning Valley Commission, 2012). The commodity industries, however, have been in decline. Looking at both U.S. Census and Bureau of Economic Analysis data, commodity sector employment is estimated to only account for 0.8-2.46 percent of total employment in the County. Paper-product manufacturing has been especially hit hard, which has had subsequent impacts on timber harvesting companies. In 1993 there were 94 confirmed active sawmills in Massachusetts. As of 2005 there were only 49, which were producing roughly 49 million board feet (Damery et al., 2006). Only seven sawmills and two portable bandmills were registered within Hampshire County in 2005. The town of Lee was a prominent paper mill town in the region, yet has witnessed a drastic decline in its manufacturing. In 1857 there were 25 paper mills operating in Lee town limits. Today, there is only 1 small papermaking facility still in operation; the most recent closure coming in 2008 that put 170 people out of work (CPBIS, 2011; Thompson, 2007).

Much of Hampshire County has roots in agriculture. While the landscape has seen a lot of change over the last century, especially in areas along the Connecticut River, farming operations have maintained a presence in the County. Table I.21 provides the number of farms, total acreage, and the value of agricultural products sold in 2007 at the county and state level.

**Table I.21. Farming in the Greater Amherst Sub-Region**

Agriculture in the Greater Amherst Sub-Region	# of Farms (2007)	Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Massachusetts	7,691	67	517,879	-0.1	489,820,000
Hampshire County	711	74	52,756	3.9	38,617,000

Source: USDA, Ag. Census, 2002; 2007

In 2007, Massachusetts’ total agricultural production was estimated to have an annual market value of close to \$500 million. Agriculture statistics for Hampshire County are fairly proportional; accounting for about 10 percent of total farm acreage in the state, just less than 10 percent of the total number of farms, and about 8 percent of the total annual product value. The county documented roughly a 4 percent increase in farmland acres from 2002-2007.

While farmland statistics are not provided at the community level, the towns along the Connecticut River in this region have historic ties to agriculture. Hadley’s agricultural history ranges from broomcorn in the 1700s, tobacco and vegetables in the 1800s, to unofficially being named the asparagus capital of the world in the 1900s (Moore, 2007). However, towns such as Hadley have seen much of their farmland give way to new housing and road expansion associated with the nearby universities and the influx of faculty and students. While expanding, towns in this region such as Northampton have become sites for restaurants that feature the use of local ingredients. Area farm markets are held multiple times a week (Pioneer Planning Valley Commission, 2012). This increase in local demand and accompanying outlets could lead to more agricultural production in the region.

**Recreation and Tourism-Related Industries**

The travel and tourism industry continues to be a significant and growing contributor to the local and regional economies within the Watershed. Total direct spending from annual travel and tourism in Massachusetts in

2009 was estimated at \$14.4 billion, supporting over 120 thousand jobs in the state (Massachusetts Department of Travel and Tourism, 2010). Of these state figures, Hampshire County was estimated to have experienced \$96 million in total direct spending, 830 jobs, and contributed \$7.8 million to state and local revenue (Massachusetts Department of Travel and Tourism, 2010). Many of the towns within this region of the Watershed are attempting to capture more of this valuable market by hosting annual festivals and cultural events that attract crowds from beyond the community borders. Many of these events are centered on the historic cultural and economic makeup of the region. The town of Northampton has the longest continuously running agricultural fair in the nation (Williamstown Chamber of Commerce, Accessed 2011). Area farmers and artisans are once again finding local markets for their goods, while catering to buyers and their overall experience. Agritourism seems to be expanding at a considerable rate, with Massachusetts having a website and interactive map/brochure with over 400 registered enterprises (MA Dept. of Ag. Resources, 2011).

There are abundant recreation opportunities within Hampshire and surrounding counties. The foothills of the Berkshire Mountains to the west offer up great outdoor experiences. Traditional activities taking place on Refuge lands include fishing, hunting, wildlife observation, photography, and environmental education. Details about the economic contribution associated with wildlife viewing, hunting, and fishing in Massachusetts are provided in Table I.16 in the previous sub-region profile. Other popular activities not accounted for below include a wide variety of water-based recreation. The Connecticut River is popular for both motorized and non-motorized boating and swimming.

### Land Use and Ownership

A large majority (85 percent) of the landscape in Hampshire County is classified as forest (NASA MODIS, 2006). Additionally, 8 percent is classified as mixed cropland, which is relatively high when compared to the other counties in the larger Watershed analysis. Land classified as residential makes up 65 percent of the total land area in the county (Theobald, 2005; Headwaters Economics EPS-HDT Report, 2011). This represents a 15 percent increase over 1980 levels. A majority of this residential land is classified as 'exurban,' which accounts for lot sizes ranging from 1.7 to 40 acres. Table I.22 displays the breakdown of land ownership in Hampshire County. An overwhelming majority (89.9 percent) of the land in Hampshire County is privately owned. Less than 1 percent of the land is in Federal ownership.

**Table I.22. Land Ownership (acres) in Greater Amherst Sub-Region**

	Hampshire County, MA
<b>Total Area</b>	348,921
<b>Private Lands</b>	313,419
<b>Federal Lands</b>	2,740
<b>State Lands</b>	25,918
<b>City, County, Other</b>	6,844

*Source: Conservation Biology Institute, 2006 (As cited by Headwaters Economics EPS-HDT Report, 2011).*

To date, the Refuge has acquired and conserved just over 35,000 acres throughout the Watershed, almost exclusively through fee-acquisitions. Of that total, just over 600 acres are located within Hampshire County. In addition, localized areas around the city of Northampton, Handley, and Amherst have been identified for their high ecological value and possible acquisition potential. An additional, larger tract has been identified in the western portion of the county. For a comprehensive discussion on the potential impacts of federal fee acquisitions and conservation easements, please reference Section II.

### Greater Hartford Sub-Region

The Greater Hartford Sub-Region within the Watershed consists exclusively of Hartford County, Connecticut. Hartford County, located in the north-central part of the state, is the location of the proposed Pyquag Division of the Refuge. This division consists of 4,085 acres that is yet to be established. The area spans a floodplain that contains freshwater marshes, floodplain forests, and agricultural lands. Hartford County is the most populous county in the Watershed profile and maintains the highest population density. The county is home to the capital city of the state, Hartford. Hartford (city) is recognized to be very dependent on the insurance and financial industries, and has been hard hit by the recent recession. By the end of 2010, the county as a whole had the highest unemployment rate out of the eleven counties included in the Watershed profile.

Three additional Connecticut communities are highlighted in the Greater Hartford Sub-Region profile given the potential influence of Refuge management. These being: East Hartford, Wethersfield, and Windsor Locks. East Hartford and Wethersfield are relatively urban areas that are part of the Greater Hartford Metropolitan Area (1.2 million residents). The town of Windsor Locks serves as a major distribution point due to the presence of the Bradley International Airport. The town is also known for its production of aerospace products as well as paper goods (Town of Windsor Locks, 2014). Cultural and historical museums are abundant in the towns and attract visitors eager to learn about the early years of life in New England.

**Population**

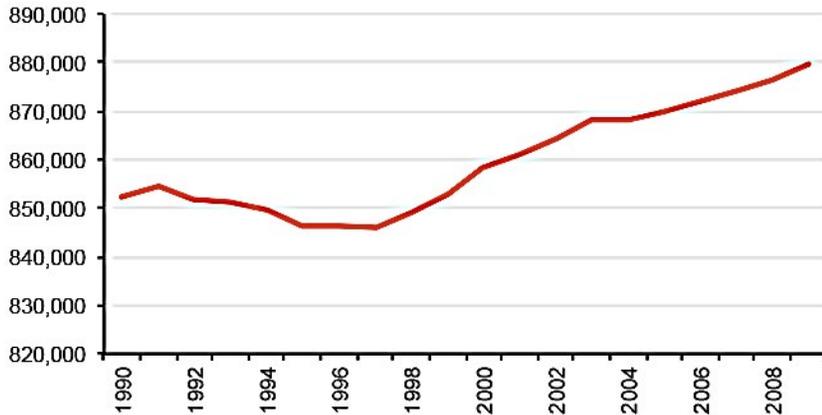
Table I.23 gives the population estimates and trends for the state of Connecticut, Hartford County, and the three towns of interest in the Greater Hartford Sub-Region. The 2010 population of 894,014 makes Hartford County the second most populous in Connecticut, and the most populated in the larger Watershed profile. The population density in Hartford County—1,216 persons per square mile—is more than 2.5 times the next highest density noted in the eleven-county Watershed profile and is considerably higher than the state average of 738 persons per square mile. The population in the county has been steadily increasing for most of the past fifteen years (see Figure I.12).

**Table I.23. Population Figures for Greater Hartford Sub-Region**

Greater Hartford Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Connecticut	3,574,097	39	738	4,845	4.9	3,613,583
<b>Greater Hartford Sub-Region</b>						
Hartford County (CT)	894,014	39.2	1,216	735	4.3	873,647
<b>Towns of Interest</b>						
East Hartford, CT	48,627	37.8	2,587	18.8	-1.9	49,145
Wethersfield, CT	25,788	44.1	1,969	13.1	-1.8	25,626
Windsor Locks, CT	12,422	41.7	1,321	9.4	3.1	13,434

*Source: U.S. Census Bureau, 2010; Connecticut State Data Center, 2007;\* Note: Resident populations and median age estimates for Towns of Interest were pulled from U.S. Census Bureau’s 2005-2009 American Survey 5-year Estimates. Population projections were calculated by the Connecticut State Data Center in 2007 and therefore might be inconsistent with 2010 estimates and recent population change figures.*

The town of Windsor Locks is the least populated town of the three examined, yet experienced a population growth near 3 percent over the last decade. Both East Hartford and Wethersfield documented moderate declines near 2 percent over that same time period. All three towns have population densities over 1,300 people per square mile, making them far more urban than most other areas examined in the Watershed.

**Figure I.12. Regional Population Trends for Hartford County, Connecticut 1980-2008**

Source: U.S. Department of Commerce, BEA, 2011a.

In 2010, the U.S. population consisted of 63.7 percent of white persons not of Hispanic or Latino origin (U.S. Census, 2010). Comparatively, Connecticut's state-wide population consisted of 71.2 percent white people. Hartford County lies closer to the national demographic, with 66.1 percent of its population consisting of white people not of Hispanic descent. This demographic for Hartford County is also 20 percent less than any other county in the larger Watershed profile. The majority of residents in Hartford County, 86.5 percent, were born in the U.S. Furthermore, nearly 87 percent of the residents over the age of twenty-four in Hartford County are high school graduates, and close to 33 percent have earned a bachelor's or advanced degree (U.S. Census Bureau, ACS, 2009). These percentages of education attainment are slightly higher than the national average, yet slightly lower than the state-wide average.

### Regional Employment and Income

The Greater Hartford Sub-Region is more urban than other regions in the analysis and tends to rely less on agriculture and natural commodities than it does the service and retail industries. The capital city of Hartford is even referred to as the "Insurance Capital of the World," as it is home to some of the nation's largest insurance companies (City of Hartford, 2011). Table I.24 shows the median household income, unemployment rates, and percent of the population living in poverty in the state of Connecticut, Hartford County, and the communities of interest.

**Table I.24. Income, Unemployment, and Poverty Rates**

	Median Household Income (2009 \$s)	Percent Unemployed			Percent below Poverty (2009)
		2000	2009*	2010*	
US	50,221	4.0	9.9	9.4	14.3
Connecticut	68,294	2.3	8.4	8.6	9.3
Hartford County (CT)	64,045	2.5	9.1	9.1	10.1
<i>Towns of Interest</i>					
East Hartford	48,747	3.4	10.7	10.6	N/A
Wethersfield	70,525	2.2	8.3	8.4	N/A
Windsor Locks	64,110	2.0	9.7	7.8	N/A

Source: U.S. Bureau of Labor Statistics, 2011; U.S. Census Bureau Quickfacts, 2009. U.S. Census Bureau, ACS, 2009; Connecticut Department of Labor, 2010. (\*) Denotes unemployment rates as of December of that year.

Median household income for Hartford County in 2009 was an estimated \$64,045. This figure is roughly \$4,000 less than the state median, however \$14,000 higher than the national median. There is even more disparity within the three communities of interest in the sub-region. The town of East Hartford reported a median household income of \$48,747 in 2009, while the town Wethersfield reported a median of \$70,525; a difference of nearly \$22,000.

Unemployment figures are presented in Table I.24 for the years 2000, 2009 and 2010, given the recent recession and economic volatility. In 2000, prior to the economic downturn, Hartford County reported relatively low unemployment at 2.5 percent. The county experienced a large spike in 2009 during the financial crisis. By the end of 2010, unemployment in the county remained above 9 percent. This is not entirely surprising as much of the county's economy is supported by service and retail industries that are largely dependent on consumer spending. One note is that the only two counties in the Watershed that did not report a decline in unemployment from 2009-2010 were Hartford, Connecticut and Middlesex, Connecticut—the two most populated counties with the highest median incomes. Of the three communities examined, Windsor Locks has been able to recover the most since the peak of the recession in 2009. By the end of 2010, the unemployment rate in Windsor Locks was down to 7.8 percent. East Hartford has fared the worst, with unemployment at the end December, 2010 still above 10 percent. This ranks above the national average and is the highest rate observed out of any of the towns examined throughout the Watershed.

Table I.25 gives the employment breakdown by industry for Hartford County. The largest employer in the county is the educational, healthcare, and social assistance services, accounting for 24 percent of employment. Finance, insurance and real estate, manufacturing, and retail trade account for 12.4 percent, 11.8 percent and 10.8 percent of employment, respectively. Major businesses and employers in the area include Pratt & Whitney, Coca-Cola, the University of Connecticut, Connecticut Departments of Correction and Motor Vehicles, and the Bradley International Airport. The communities included in this profile are in close proximity to Hartford and house many commuters. They have been gearing portions of their business development around commuters in the region. In turn, local economies within the area are growing more dependent on service and retail industries.

**Table I.25. Employment by Industry in the Greater Hartford Sub-Region**

Full-Time and Part-Time Employment	Greater Hartford Sub-Region
	Hartford County
Civilian employed pop. (16 years and over)	432,283
<i>Percent of Employment by Industry (percent)</i>	
Agriculture, forestry, fishing and hunting, and mining	0.2
Construction	5.5
Manufacturing	11.8
Wholesale trade	2.9
Retail trade	10.8
Transportation and warehousing, and utilities	4.1
Information	2.5
Finance and insurance, and real estate	12.4
Professional, scientific, and mgmt., admin. and waste mgmt. services	9.7
Education services, health care, and social assistance	24.0
Arts, entertainment, and recreation, and accom. and food services	7.1
Other services, except public administration	4.5
Public administration	4.4

Source: U.S. Census Bureau, ACS, 2009.

### Commodities, Recreation, and Tourism

The commodity sectors (Timber, Agriculture, and Mining) only make up 0.73 percent of the total jobs in Hartford County. Timber is the largest component of commodity sector employment in Hartford County; however only accounts for 0.38 percent of total jobs (BEA, 2011). Farm acres, number of farms, and the market value of agricultural products produced are displayed in Table I.26 for the county and state level.

**Table I.26. Farming in the Greater Hartford Sub-Region**

Agriculture in the Greater Hartford Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	Percent Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Connecticut	4,916	83	405,616	13.6	551,553,000
Hartford County	790	68	53,504	6.6	133,582,000

Source: USDA, *Ag. Census, 2002; 2007.*

The state of Connecticut is home to just over 400,000 acres of active farmland, with an annual market value of agricultural products close to \$551 million. This ranks Connecticut as having the least amount of farmland acres out of the four states in the Watershed, yet is ranks second in the total market value of agricultural products sold (only to Vermont). Hartford County accounts for about 13 percent of the farmland in Connecticut, but almost 25 percent of the market value of agricultural products sold.

The travel and tourism industry continues to be a significant and growing contributor to the local and regional economies throughout the Watershed. Travel and tourism in Connecticut is estimated to contribute \$8 billion to the gross state product annually, which supports 110,000 jobs, or 6.5 percent of the state's workforce (McMillen, 2006). In addition, it is estimated tourism expenditures contribute \$1.1 billion in state and local revenue (McMillen, 2006). Travel and tourism account for around 11 percent of the total jobs in Hartford County, with most coming from the accommodation and food services industry (BEA, 2011b). Much of the tourism in Hartford County is centered on the history of the area and surrounding Watershed. With some of the oldest towns in the country, visitors have their choice of visiting multiple museums and various exhibits, while observing the colonial architecture scattered about.

While much more urban than other sub-regions examined in the Watershed, Hartford County still provides many recreation opportunities. Lands acquired by the Refuge traditionally allow recreation activities such as fishing, hunting, wildlife observation, photography, and environmental education to take place. Details about the economic contribution associated with wildlife viewing, hunting, and fishing in the state of Connecticut are provided in Table I.27.

**Table I.27. Recreation Estimates and Expenditures in Connecticut**

Recreation Estimates	Residents and Non-Residents	Connecticut
<b>Fishing</b>	# of Anglers	302,000
	Total Expenditures	243,552,000
	Trip-Related	130,742,000
	Equipment and Other (\$)	112,810,000
<b>Hunting</b>	# of Hunters	38,000
	Total Expenditures	68,530,000
	Trip-Related	5,991,000
	Equipment and Other (\$)	62,539,000
<b>Wildlife Watching</b>	Total Participants	1,170,000

Recreation Estimates	Residents and Non-Residents	Connecticut
	Total Expenditures	509,432,000
	Trip-Related	53,025,000
	Equipment and Other (\$)	456,407,000

Source: USFWS National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 2006.

**Land Use and Ownership**

As noted earlier, Hartford County is the most populous county in the overall Watershed profile and maintains the highest population density. In 2010, 72.7% of private land was considered residential (Headwater Economics EPS Tool, 2011). Out of the 480,160 acres in the county, 264,000 (55 percent) are considered forest, and 139,246 (29 percent) are noted as an urban land use. Hartford County currently has 91 percent of its land in private ownership, with no documented land in federal ownership (Table I.28).

**Table I.28. Land Ownership (acres) in the Greater Hartford Sub-Region**

	Hartford County, Connecticut
<b>Total Area</b>	480,160
<b>Private Lands</b>	436,813
<b>Federal Lands</b>	-
<b>State Lands</b>	26,965
<b>City, County, Other</b>	16,382

Source: Conservation Biology Institute, 2008 (As cited by Headwater Economics EPS-HDT Report, 2011).

To date, the Refuge has acquired and conserved just over 35,000 acres throughout the Watershed, almost exclusively through fee-acquisitions. The Service has proposed plans to purchase what will be the Pyquag Division of the Refuge, through fee acquisition titles with willing sellers. This division is designed around 4,085 acres and encompasses a floodplain that contains freshwater marshes, floodplain forests, and agricultural lands. The proposed land area for the division edges up to the towns of Wethersfield, Glastonbury, and Rock Hill, and is about 7 miles directly south of metropolitan Hartford. For a comprehensive discussion on the potential economic impacts of federal fee acquisitions and conservation easements, please reference Section II.

**Southern Connecticut Sub-Region**

The Southern Connecticut Sub-Region of the Watershed consists of Middlesex County, Connecticut. Middlesex County, located in the south-central part of the state, is the southernmost county in the Watershed, with its southern tip bordering the Long Island Sound. The Salmon River Division of the Refuge is located within the county, encompassing 285 acres that were acquired in 2009. An additional 2,550 acres in the surrounding area have been approved for purchase from willing sellers. The management area includes an extensive freshwater tidal marsh important to migratory waterfowl and anadromous fish species. Settlements and ports within the county were established during colonial times, as explorers traversed up the Connecticut River. The colonial history is apparent and embraced in many parts of the county still today. The county prides itself as a great place to live, work, and recreate, and currently maintains the highest median household income out of any county in the Watershed.

Four Connecticut communities are also examined in the Southern Connecticut Sub-Region profile. These being: East Hampton, Chester, Old Lyme, and Old Saybrook. The towns are in close proximity to the Salmon River Division and have the potential to be influenced by management decisions. Rich with history, all the towns date back to the 1600s and have original roots in farming and early manufacturing in Connecticut. The town Chester has a “picturesque Main Street” with shops and restaurants, but does everything it can to maintain its small

town way of life and natural amenities (Town of Chester, 2011). Old Lyme is a community still rich in the arts, being home to many famous artists and now the location for a fine arts institution and multiple museums. It is a growing 'bedroom' community for people working in the larger urban areas within and even outside the state (Old Lyme, 2011). Both Old Lyme and Old Saybrook are located near the outflow of the Connecticut River into Long Island Sound. The nearby access to both waterways has made it an area with great recreation opportunities and a destination that attracts several thousand vacationers in the summer months each year.

### Population

Table I.29 gives the population estimates and trends for the state of Connecticut, Middlesex County, and towns of interest in the Southern Connecticut Sub-Region of the Watershed. Both the state of Connecticut and Middlesex County have experienced a steady growth in total population over the last decade. Figure I.13 reveals the population growth in Middlesex County has been consistent since 1990. The 2010 population of 165,676 makes Middlesex County the second-most populous county in the larger Watershed profile. The population density in Middlesex County, 449 persons per square mile, is considerably lower than the state average of 738 persons per square mile. According to state department estimates, these population trends are expected to continue in the coming years (Connecticut State Data Center, 2007).

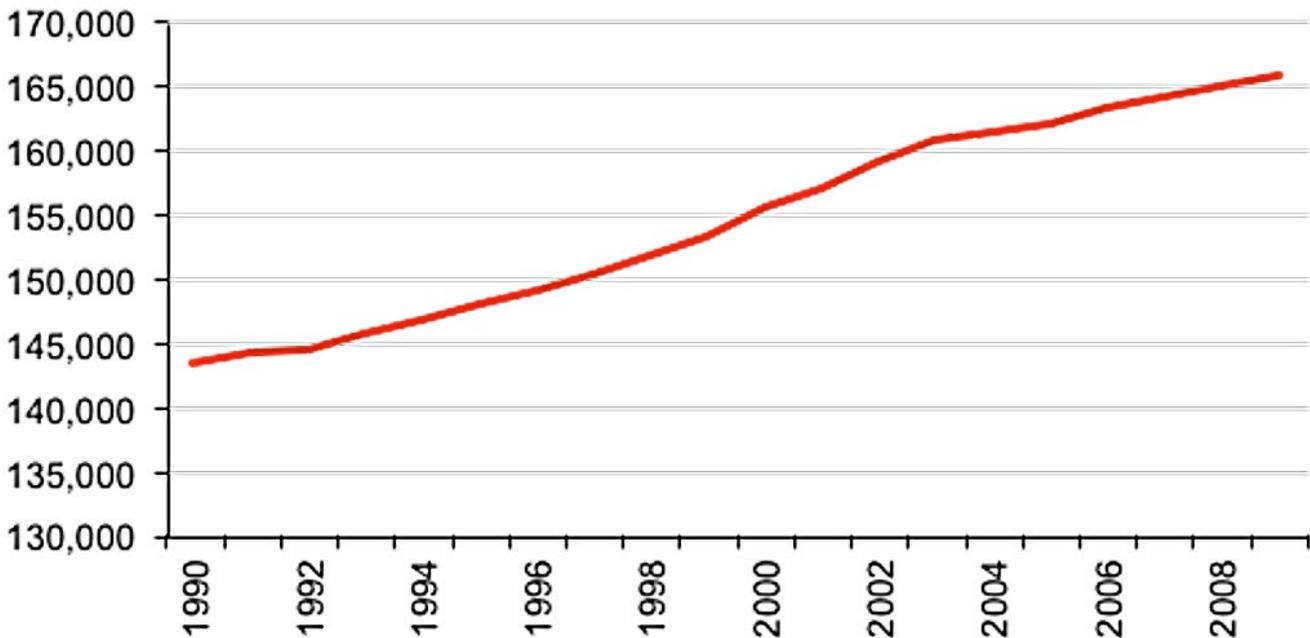
**Table I.29. Population Figures for the Southern Connecticut Sub-Region**

The Southern Connecticut Sub-Region	Population (2010)	Median Age	Persons per Square Mile	Land Area (Square Miles)	Percent Change in Population 2000-2010	Population Projection in year 2020
Connecticut	3,574,097	39	738	4,845	4.9	3,613,583
<b>Southern Connecticut Sub-Region</b>						
Middlesex County (CT)	165,676	41.3	449	369	6.8	174,950
<b>Towns of Interest</b>						
Chester, CT	3,829	45	228	16.8	2.2	3,908
East Hampton, CT	12,507	41.7	340	36.8	-6.3	11,762
Old Lyme, CT	7,419	47.1	258	28.8	0.2	N/A
Old Saybrook, CT	10,517	48.6	487	21.6	1.4	10,352

*Source: U.S. Census Bureau, 2010; Connecticut State Data Center, 2007. \* Note resident population and median age estimates for Towns of Interest were pulled from U.S. Census Bureau's 2005-2009 American Community Survey 5-yr. estimates. Population projections were calculated by the Connecticut State Data Center in 2007 and therefore might be inconsistent with 2010 estimates and recent population change figures.*

The towns of Chester, Old Lyme, and Old Saybrook all experienced moderate population growth (under 3 percent) over the last ten years. In contrast, East Hampton documented a 6.3 percent decline in population over the same time period. Three of the four communities of interest all maintain median ages of 45 years or higher, with Old Saybrook being the highest at almost 49 years of age.

Figure I.13. Population Trends for Southern Connecticut Sub-Region 1990-2008



Source: U.S. Department of Commerce, BEA, 2011a.

In 2010, the U.S. population consisted of 63.7 percent of white persons not of Hispanic or Latino origin (U.S. Census Bureau, 2010). Comparatively, Connecticut’s population consisted of 71.2 percent white people. Middlesex County has a larger disparity from the national average, with 86.4 percent white persons not of Hispanic or Latino origin. The majority of residents in the county, 92.7 percent, were born in the U.S. Education attainment figures for the resident population in Middlesex County are also higher than state-wide and national averages. In Middlesex County, around 92 percent of residents over the age of twenty-four are high school graduates and close to 37 percent have earned a bachelor’s or advanced degree (U.S. Census Bureau, ACS, 2009).

**Regional Employment and Income**

The Southern Connecticut Sub-Region is more urban than other regions in the analysis and relies less on agriculture and natural commodities than it does the service and retail industries. Table I.30 gives the median household income, unemployment rates, and percentage of the population living in poverty for the state of Connecticut, Middlesex County, and the four communities of interest.

Table I.30. Income, Unemployment, and Poverty Rates in the Southern Connecticut Sub-Region

Full-Time and Part-Time Employment for White River Junction Sub-Region by Industry	WRJ Sub-Region		
	Orange County	Windsor County	Grafton County
Civilian employed pop. (16 years and over)	15,370	29,715	44,389
<i>Percent of Employment by Industry (percent)</i>			
Agriculture, forestry, fishing and hunting, and mining	5.3	2.5	1.9
Construction	9.4	9.2	8.7
Manufacturing	9.7	9.7	9.3
Wholesale trade	2.5	2.6	1.6
Retail trade	10.3	11.2	12.7

Full-Time and Part-Time Employment for White River Junction Sub-Region by Industry	WRJ Sub-Region		
	Orange County	Windsor County	Grafton County
Transportation and warehousing, and utilities	2.9	4.1	2.8
Information	1.5	2.1	1.4
Finance and insurance, and real estate	4.7	4.8	4.5
Professional, scientific, and mgmt., admin. and waste mgmt. services	8.8	9.5	7.1
Education services, health care, and social assistance	30.4	25.3	33.1
Arts, entertainment, and recreation, and accomd. and food services	5.5	10.1	11.0
Other services, except public administration	3.9	4.9	3.7
Public administration	5.1	3.8	2.1

Source: U.S. Bureau of Labor Statistics, 2011; U.S. Census Bureau Quickfacts, 2009; U.S. Census Bureau, ACS, 2009; Connecticut Dept. of Labor, 2010. (\*) Denotes unemployment rates as of December of that year.

Median household income in 2009 for Middlesex County was \$74,965, which is \$10,000 higher than any other county in the Watershed, and around \$7,000 higher than the state median. The four Southern Connecticut Sub-Region communities all document median household income greater than \$80,000.

Unemployment figures are presented in Table I.30 for the years 2000, 2009, and 2010, given the recent recession and economic volatility. At the start of the decade, the state of Connecticut reported relatively low unemployment at 2.3 percent. Likewise, unemployment in 2000 in Middlesex County was estimated at 2 percent. Both the state and Middlesex County experienced spikes in unemployment during the height of the recession in 2009, with even higher rate observed in late 2010. The county also outperformed the state in percentage of residents earning less than the poverty line. In 2009, 5.7 percent of the county's residents earned less than the poverty line, compared with 9.3 percent statewide.

Table I.31 gives the employment breakdown by industry for Middlesex County, Connecticut. The largest employer in the county is the educational, healthcare, and social assistance services, accounting for 24.4 percent of employment. Manufacturing, retail trade, and professional services accounted for 13.7 percent, 10.3 percent and 10.1 percent of employment, respectively.

**Table I.31. Employment by Industry in Southern Connecticut Sub-Region**

Full-Time and Part-Time Employment	Southern CT Region
	Middlesex County
Civilian employed pop. (16 years and over)	86,437
<i>Percent of Employment by Industry (percent)</i>	
Agriculture, forestry, fishing and hunting, and mining	0.4
Construction	6.7
Manufacturing	13.7
Wholesale trade	2.9
Retail trade	10.3
Transportation and warehousing, and utilities	3.7
Information	2.8
Finance and insurance, and real estate	9.7

Full-Time and Part-Time Employment	Southern CT Region
	Middlesex County
Professional, scientific, and mang., admin. and waste mang. services	10.1
Education services, health care, and social assistance	24.4
Arts, entertainment, and recreation, and accom. and food services	6.8
Other services, except public administration	3.9
Public administration	4.5

Source: U.S. Census, ACS, 2009.

Many of the local communities in the area of the Salmon River Division have become ‘bedroom’ communities for people commuting to larger metropolitan areas within, and even outside the state. Middletown, Connecticut is one such city, located along the Connecticut River and home to major employers such as Pratt & Whitney, Aetna, Middlesex Hospital, Connecticut Valley Hospital, Liberty Bank, and Wesleyan University. Similarly, it is noted East Hampton has both the smallest jobs to housing ratio and the smallest jobs to worker ratio among neighboring communities. East Hampton’s ratios indicate that there are nearly three times more homes than jobs and nearly four times as many residents in the workforce than jobs available in the town, marking East Hampton as a bedroom community and source of labor for surrounding communities (East Hampton Plan of Conservation & Development, 2001). Many of the smaller towns are gearing their business development around these commuters, along with relying on the influx of visitors and second-home owners in the summer months. In turn, local economies within the area are growing more dependent on service and retail industries.

**Commodities, Recreation and Tourism**

Only 1.3 percent of total employment within Middlesex County is in the commodity sectors (Timber, Agriculture, and Mining) (BEA, 2011b). Commodity production and related industry has been further stressed by development pressures and population growth in the county. Agriculture is the largest component of commodity sector employment in Middlesex County; however this sector accounts for only 0.79 percent of total jobs (BEA, 2011b). Farm acres, number of farms, and the market value of agricultural products produced are displayed in Table I.32 for the county and state.

**Table I.32. Farming in the Southern CT Sub-Region**

Agriculture in the Southern Connecticut Sub-Region	# of Farms (2007)	Avg. Farm Size (acres) (2007)	Farm Acres (2007)	% Change in Farmland Acres (2002-2007)	Mkt. Value of Ag. Products Sold (\$)
Connecticut	4,916	83	405,616	13.6	551,553,000
Middlesex County	393	42	16,623	-6.6	55,753,000

Source: USDA, Ag. Census, 2002, 2007.

The State of Connecticut has the least amount of farmland acres out of the four states in the Watershed, yet is ranks second in the total market value of agricultural products sold (only to Vermont). Middlesex County experienced a slight decline in active farmland acres from 2002-2007, and now accounts for roughly 4 percent of the state’s total acreage in agricultural production. While farmland statistics are not provided at the community level, there are ties to the farming industry within the communities of interest. Old Saybrook is a coastal city, allowing it to serve as a central hub for merchants as well as grain milling prior to modernization (Town of Old Saybrook, 2011). Chester, East Hampton and Old Lyme all began as land grants on which the early settlers farmed and raised livestock.

There are a variety of recreation opportunities in Middlesex County. The Connecticut River spans the length of the county and is a prominent source and site of recreation. Traditional recreation activities on lands under Refuge management include fishing, hunting, wildlife observation, photography, and environmental education. The southern location of towns like Old Saybrook allow for other opportunities like spending time at the beach and ocean-based recreation. Details about the economic contribution associated with wildlife viewing, hunting, and fishing in Connecticut are provided in Table I.27 in the previous sub-region profile.

Direct spending in Connecticut by travelers and tourists is estimated at around \$9.1 billion each year, and accountable for 110 thousand jobs in the state (McMillen, 2006). Travel and tourism account for about 14 percent of the total jobs in Middlesex County, with most coming from the accommodation and food services industry (BEA, 2011b). Many of the towns within the county rely heavily on the influx of tourist and vacationers, especially during the summer months. The coastal towns of Old Lyme and Old Saybrook experience a surge in seasonal residents and visitors during the 14 weeks of summer that more than doubles their year-round population. Towns located further inland such as East Hampton and Chester continue to embrace the historic charm and roots of the area, offering tourism experiences centered on the historic cultural and economic makeup of the region.

**Land Use and Ownership**

As noted previously, Middlesex County is more populated and developed when compared to other counties in the Watershed further north. However, 87 percent of its landscape is still considered forested (NASA MODIS, 2006). As of 2010, 62.5 percent of the residential land in Middlesex County was considered to be ‘exurban’ residential, in which lot sizes averaged between 1.7 and 40 acres (Theobald, 2005; Headwaters Economics EPS-HDT Tool and Reports, 2011). Middlesex County has only 309 acres in federal ownership, representing only 0.1 percent of the total land area in the county (see Table I.33). The 31,545 acres of state-owned public lands in Middlesex County accounts for around 11 percent of the total land area.

**Table I.33. Land Ownership (acres) in the Southern Connecticut Sub-Region**

Middlesex County, Connecticut	
Total Area	280,882
Private Lands	211,624
Federal Lands	309
State Lands	31,545
City, County, Other	2,596

*Source: Conservation Biology Institute, 2008 (As cited by Headwaters Economics EPS-HDT Report, 2011).*

To date, the Refuge has acquired and conserved just over 35,000 acres throughout the Watershed, almost exclusively through fee-acquisitions. The Salmon River Division of the Refuge is located within Southern Connecticut Region, encompassing 285 acres that were acquired in 2009. An additional 2,550 acres in the surrounding area have been approved for purchase from willing sellers. Refuge personnel have identified additional lands along the Connecticut River and in the western portions of the county for their high ecological values and as potential acquisition sites. For a comprehensive discussion on the potential impacts of federal fee acquisitions and conservation easements, please reference Section II.

**Section II: Current Trends, Objectives, and Potential Impacts of Land-Use Change**

The 1995 environmental impact statement (EIS) creating the Silvio O. Conte National Fish and Wildlife Refuge (Refuge) approved acquisition of 78,395 acres within 65 special focus areas (SFAs) in the Connecticut River Watershed (Watershed). Presently, the Silvio O. Conte National Fish and Wildlife Refuge encompasses over 35,000 acres, most of which has been acquired in fee title. A vast majority—26,381 acres—is located in the Nulhegan Basin Division, located in Essex County, Vermont. Within the eleven Watershed counties included in the larger profile analysis, over 81 percent of the total acreage is in private ownership, with 44 percent of this land zoned as residential. This represents a 26 percent increase in residential lands in the region since 1980 (Headwaters Economics EPS). Nonetheless, the vast majority (88 percent as of 2006) of the lands in the larger region remain classified as forested land cover (NASA, 2006).

Changes in technology have dramatically changed the economic dynamics of farming, forestry, and real estate development while generational succession of landowners has changed the pattern of land use and management in the Watershed. A commonly observed trend is for habitat fragmentation to be preceded by ownership fragmentation. Ownership fragmentation has increased in a majority of the Watershed. As ownership changes overtime, land parcels typically become smaller and become more susceptible to conversion for development and other uses. A major focus of the refuge conservation proposal is to protect and assemble larger contiguous habitats along latitudinal and elevation gradients in an effort to counter ownership and habitat fragmentation. In doing so, the Refuge hopes to promote connectivity in area, elevation, latitude, and aspect. The overall objectives

of the land acquisition proposals include building on the 1995 EIS goals to protect federally listed and candidate species, rare or exemplary natural communities, important fisheries habitat, important and vulnerable wetlands, and landbird and waterbird breeding and migratory stopover habitat. Other long-term goals in the proposal are to:

- Maintain the diversity of habitat types in the Watershed to support healthy populations of fish and wildlife;
- Conserve sizable core areas nested within the larger matrix of conserved lands to protect biological integrity and ecosystem health, and contribute to ecosystem services;
- Distribute and connect conserved lands across elevation and latitude gradients in the Watershed with consideration to habitat resiliency and redundancy in anticipation of impacts from climate and land use changes.

Currently, the Service is considering expanding the Refuge's total acreage under ownership through additional fee and easement acquisitions. These transactions are typically in the form of a one-time payment. A transaction of this type and shift in private to public landownership can have an assortment of economic impacts. Some examples include effects to the local tax base and adjoining revenues, the amount of municipal services required, spillover property value impacts, and various dynamics with development in the region. The effect of fee acquisitions on local government revenue is complex and speculative. Many variables are at play, often requiring time to unfold. While there may be some upfront reductions in local tax revenues, reduced dependence on municipal services could more than counter these losses. Other unknowns, such as relocation and spending decisions, and property enhancement effects, will ultimately determine the extent of the economic and fiscal impacts within the region. While these relationships are identified and discussed, estimating these impacts quantitatively requires a large degree of speculation and is beyond the scope of this analysis.

The sale of interest in land (fee and easement) will provide the original landowner with additional revenue following the sale. The landowner might go on to spend some percentage of the funds from their equity in the property in the regional economy, including new real estate investment in the local area. This spending activity can directly impact local industries such as construction and various service sectors, with additional indirect impacts to follow suit. Contrarily, these types of economic impacts could be relinquished if former landowners emigrate outside the region. There is also the possibility of removing a production practice on the land parcel, such as farming or forestry, which could have negative economic consequences. These, too, could be negated by the expenditures required for habitat restoration and stewardship fronted by the Service once acquired. As indicated, there are many dynamic relationships at play that ultimately determine net economic impacts to the local and regional economies.

There are also many dynamic variables at play when considering effects to local tax revenues. Property taxes constitute the largest source of local governments' own revenue (Urban Institute and Brookings Institution, 2008). Lands acquired by the Service would be exempt from local property taxation. However, under provisions of the Refuge Revenue Sharing (RRS) Act, local townships and/or counties receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greatest of 25 percent of net receipts<sup>1</sup>, 75 cents per acre, or 0.75 percent of the market value<sup>2</sup> of lands acquired by the Service. The exact amount of the annual payment depends on Congressional appropriations, which has tended to be less than the amount to fully fund the authorized level of payments, and has been progressively declining. In fiscal year (FY) 2011, actual RRS payments were 21.6 percent of authorized levels.

Lands acquired by the Service through fee acquisition would lose their development potential in perpetuity. While this could affect local property tax and income tax revenues, conserved and protected land requires fewer municipal services. New and existing residential developments require local governments to provide services such as fire protection, police services and schools, and to construct new infrastructure such as roads, waste treatment facilities, and water and electrical delivery systems. Providing such services can be very expensive for municipalities in rural settings with a relatively low tax base. A majority of studies conducting community services analysis have concluded land in residential use requires more service expenditures (paid by the municipality) than it generates in tax revenues. Additionally, these studies have typically found land classified as open space to provide a net gain in local revenues. Table I.34 below highlights the revenue-to-expenditure findings

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<sup>1</sup> Revenues are derived from the sale or disposition of products (e.g., timber and gravel), privileges (e.g., right-of-way and haying/grazing permits), and/or leases for public accommodations or facilities (e.g., oil and gas exploration and development) providing economic activities incidental to, and not in conflict with, refuge purposes.

<sup>2</sup> Updated appraisals of Refuges are to be completed every 5 years to determine the market value.

from service studies done for eleven towns in New Hampshire. A revenue-to-expenditure ratio of 1:1.30 translates to the town receiving \$1 in revenue for every \$1.30 it has to spend on that land use. Or in other words, for every \$10,000 in property tax and other revenues the town receives from that land use, it spends \$13,000 in providing services to it.

**Table I.34. Revenue-to-Expenditure Ratios by Land Use in New Hampshire Communities Studied**

New Hampshire Community	Residential Land Use (including farm houses)	Commercial & Industrial	Working & Open Land	Source
Brentwood	1 : 1.17	1 : 0.24	1 : 0.83	Brentwood Open Space Task Force, 2002
Deerfield	1 : 1.15	1 : 0.22	1 : 0.35	Auger, 1994
Dover	1 : 1.15	1 : 0.63	1 : 0.94	Kingsley, et al., 1993
Exeter	1 : 1.07	1 : 0.40	1 : 0.82	Niebling, 1997
Fremont	1 : 1.04	1 : 0.94	1 : 0.36	Auger, 1994
Groton	1 : 1.01	1 : 0.12	1 : 0.88	New Hampshire Wildlife Federation, 2001
Hookset	1 : 1.16	1 : 0.43	1 : 0.55	Innovative Natural Resource Solutions, 2008
Lyme	1 : 1.05	1 : 0.28	1 : 0.23	Pickard, 2000
Milton	1 : 1.30	1 : 0.35	1 : 0.72	Innovative Natural Resource Solutions, 2005
Mont Vernon	1 : 1.03	1 : 0.04	1 : 0.08	Innovative Natural Resource Solutions, 2002
Stratham	1 : 1.15	1 : 0.19	1 : 0.40	Auger, 1994

Source: *American Farmland Trust, 2010.*

As noted earlier, there is also the chance for land acquisition to spur development in other areas within the region as private landowners relocate and new residents are attracted by the publically conserved natural landscape and the almost guaranteed opportunities for compatible outdoor recreation. It is well documented that open space carries positive values to local residents and communities, as well as passers-by (McConnell and Walls, 2005). This is evidenced by the success of open space preservation ballot initiatives at the local, county, and state levels. Banzhaf et al. (2006) point out that between 1997 and 2004, over 75 percent of the more than 1,100 referenda on open space conservation that appeared on ballots across the U.S. passed, most by a wide margin. Accessibility to outdoor trails and park usage can be prime attractions to new homebuyers (National Park Service, 1995). It is also well documented that open space and protected natural areas can increase surrounding property values; that is properties in the vicinity of parks and preserved open space can have higher property values than those not in the vicinity (see McConnell and Walls, 2005, for a comprehensive review). In essence, the real estate market is quantifying the demand and desirability of land that is nested within or adjacent to a conservation mosaic. For example, an analysis of properties surrounding multiple parks in Worcester, Massachusetts, revealed, on average, a house located 20 feet from a park sold for \$6,445 (converted to 2012 dollars) more than a similar house located 2,000 feet away (More et al., 1982). Another study that was conducted in the early 90's in Maryland showed that preserving a significant amount of forest land accounted for anywhere from four to ten percent of the value of houses within one mile of the site, in three different counties (Curtis, 1993; Crompton, 2000).

The reciprocating value of open space on property values will vary depending on landscape characteristics and location attributes (e.g. distance to the conserved area) (Kroeger, 2008). Permanence of the open space is also an influencing factor. Typically, open space that is permanently protected (such as refuge lands) will generate a higher enhancement value of local properties than land that has the potential for future development. A study done by Goeghegan (2002) in a suburban county in Maryland shows that permanently protected open space generates a property enhancement value of over three times that of developable open space. Irwin (2002) conducted a similar analysis (in context and location) and found that protected open space increases residential property values by between 0.6 percent and 1.9 percent more in absolute terms than developable open space. As noted, location and demographic factors in the region can influence the relative level of property enhancement

value. For instance, open space may generate larger amenity premiums for property in a more urbanized area and where median incomes are higher (see Netusil et al., 2000); that is not to say there isn't the chance for property values to increase substantially in rural areas as well (see Phillips, 2000; Crompton, 2001; Vrooman, 1978; Thorsnes, 2002).

King and Anderson (2004) examined the marginal property tax effects of conservation easements—representing a similar loss of development rights, but without any county payments—in 29 Vermont towns. Their analysis found conservation easements do slightly raise marginal property tax rates in the short run (2-3 years after conservation), as the overall tax base is lessened and bares more of the tax burden. However, in the long run (6-8 years after conservation) they found conservation easements to be tax-neutral or even tax-suppressing as nearby property values increased.

Furthermore, protected open space is a public good that generates many benefits for local residents, communities, and governments. Protected open space can protect values associated with biodiversity and wildlife abundance, maintain aesthetic beauty, and protect traditional, social, and culturally significant features of landscapes and livelihoods (Holdren & Ehrlich 1974; Ehrlich & Ehrlich 1992; Daily et al. 1997; MEA 2005). Ecosystem services, such as water purification, oxygen production, pollination, and waste breakdown, are also maintained for local residents through protected open space (MEA 2005). Some of these services provided by the landscape can reduce the need for certain municipal services (ex. expanding or building new waste treatment facilities). A primary public benefit of U.S. Fish and Wildlife Service acquisitions is enhanced and preserved wildlife habitat. As development stressors increase over time, many key off-refuge habitat areas may become less available due to conversion to non-wildlife habitat uses. Unlike goods derived from natural resources that are traded in a traditional market setting, many of the benefits from land conservation, such as ecosystem services and intrinsic worth, can be difficult to quantify and value monetarily. We do not attempt to provide estimates of non-market values for this assessment; however, they can be significant in some cases.

### **Section III: Economic Impacts of Current and Proposed Management Activities**

#### **Methods for a Regional Economic Impact Analysis**

Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for the Silvio O. Conte NWR were estimated using IMPLAN (Impact Analysis for Planning), a regional input-output modeling system developed by the U.S. Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving more than four hundred economic sectors (Olson and Lindall, 1999). The IMPLAN model draws upon data collected by the Minnesota IMPLAN Group from multiple federal and state sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau. The year 2009 IMPLAN data profiles for each county in the study area were used in this study. The IMPLAN county level employment data estimates were found to be comparable to the US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2009 (Olson and Lindall, 1999).

For this analysis, IMPLAN models were developed for the four sub-regions where land is currently managed by the Refuge (Northern, Tri-State Border, Greater Amherst, and Southern Connecticut). The Northern Sub-Region model included Essex and Coos Counties, NH and Caledonia and Orleans Counties, VT. Though the Refuge is not actively managing land in Caledonia or Orleans counties, these counties along with Essex County, NH make up what is known as the Northeast Kingdom where much trade occurs and, as a whole, it serves as an important source of goods and services for the Refuge. The Tri-State Border model consisted of Windham and Franklin Counties, VT and Cheshire County, NH. The Greater Amherst Sub-Region model analyzed Hampshire County, MA and the Southern Connecticut Sub-Region model analyzed the Refuge's impacts in Middlesex County, CT. The White River Junction (Orange County, VT and Windsor and Grafton Counties, NH) and Greater Hartford (Hartford County, CT) Sub-Regions are areas of projected expansion for the Refuge, across the 4 alternatives. IMPLAN models were not developed for these two sub-regions, as land is not currently being managed by the Refuge. IMPLAN modeling was used to show only the current effects of Refuge management. The economic impacts of the alternatives are presented qualitatively and have been discussed across all six sub-regions as expansion into the White River Junction and Greater Hartford Sub-Regions is expected under all proposed alternatives.

Regional economic impact analyses capture the complex interactions of consumers and producers of goods and services in local economies. Economies are complex webs of interacting consumers and producers in which

goods produced by one sector of an economy become inputs to another; and the goods produced by that sector can become inputs to yet other sectors. Thus, a change in the final demand for a good or service can generate a ripple effect throughout an economy. For example, if more visitors come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the direct effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending; the amount that doesn't stay in the local economy is termed a leakage (Carver and Caudill, 2007). In order to increase supplies to local businesses, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the indirect effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the induced effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. "Multipliers" (or "response coefficients") capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes, 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

The CCP provides long range guidance and management direction to achieve Refuge purposes over a 15-year timeframe. The economic impacts provided in this report are a reflection of the Refuge's current activities and are reported on an annual basis in 2012 dollars. There are many dynamic variables at play when considering the social and economic effects of conservation easement acquisitions, especially given that potential purchases may span decades. Due to future uncertainty surrounding such factors as the likelihood and timing of land acquisitions, the availability of Service funds to purchase lands, land values, and agricultural/forestry commodity markets, the economic effects of land acquisitions, cannot be quantified. As the effects of the proposed management alternatives are highly dependent on future land acquisitions, the effects have not been quantified, but are instead discussed qualitatively in this report. The projected impacts of the alternatives were not analyzed as large management changes often take several years to achieve and land acquisition can be highly variable and speculative. Regional economic effects from the IMPLAN model are reported for the following economic measures:

**Employment** represents the change in the number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include full time, part time, and temporary jobs.

**Labor Income** includes employee wages and salaries, including income of sole proprietors and payroll benefits.

**Value Added** measures contribution to Gross Domestic Product (GDP). Value added is equal to the difference between the amount an industry sells a product for and the production cost of the product, and is thus net of intermediate sales.

## **Refuge Administration**

### **Purchase of Goods and Services within Sub Regions**

The Refuge purchases a wide variety of supplies and services for operation and maintenance activities, and many of these supplies and services are purchased within the local area of each sub-region. Service purchases made within each sub-region contribute to the local economic impacts associated with the Refuge. In the Northern Sub-Region, the majority (approximately 80%) of non-salary expenditures are spent on cooperative agreements to fund the Youth Conservation Corp program, environmental programs and a mobile environmental education center. In both the Tri-State Border and Greater Amherst Sub-Regions, the majority of non-salary expenditures are spent on overhead and administration costs, while in the Southern Connecticut Sub-Region a majority of the expenditures are spent on habitat and grounds improvements.

Currently, non-salary Refuge expenditures total approximately \$248,000 in the Northern Sub-Region, \$95,000 in the Tri-State Border Sub-Region, \$27,000 in the Greater Amherst Sub-Region, and \$2,000 in the Southern Connecticut Sub-Region. To determine the local economic impacts of non-salary expenditures, only expenditures made within the local area are included in the analysis. The economic impacts associated with current non-salary Refuge expenditures were estimated using IMPLAN and are summarized in Table I.35. Across all four sub-regions, total Refuge spending generates an estimated 2 jobs, \$57,100 in labor income and \$73,900 and in value added.

**Table I.35. Average Annual Impacts of Current Non-Salary Spending**

	<b>Employment (# full &amp; part time jobs)</b>	<b>Labor Income (\$2012)</b>	<b>Value Added (\$2012)</b>
<b>Northern Sub-Region</b>			
Direct effects	< 1	\$25,400	\$30,300
Secondary effects	< 1	\$8,500	\$14,500
Total effect	< 1	\$33,900	\$44,800
<b>Tri-State Border Sub-Region</b>			
Direct effects	< 1	\$8,800	\$10,000
Secondary effects	< 1	\$3,500	\$5,900
Total effect	< 1	\$12,300	\$15,900
<b>Greater Amherst Sub-Region</b>			
Direct effects	< 1	\$6,700	\$7,300
Secondary effects	0	\$2,200	\$3,800
Total effect	< 1	\$8,900	\$11,100
<b>Southern Connecticut Sub-Region</b>			
Direct effects	< 1	\$1,500	\$1,300
Secondary effects	0	\$500	\$800
Total effects	< 1	\$2,000	\$2,100
<b>Total Effects Across Regions</b>			
Direct effects	1	\$42,400	\$48,900
Secondary effects	< 1	\$14,700	\$25,000
Total effect	2	\$57,100	\$73,900

Refuge personnel estimate that under Alternative A, non-salary expenditures will decrease in both the Northern and Tri-State Border Sub-Regions, by \$8,500 and \$63,000, respectively. Non-salary expenditures are expected to increase across the remaining sub regions. Within the Greater Amherst and Southern Connecticut Sub-Regions, expenditures are expected to increase by nearly \$30,000 and \$26,000, respectively. Currently, the Refuge does not spend money in the White River Sub-Region or the Greater Hartford Sub-Region as lands are not actively managed in these areas. Under Alternative A, the Refuge is expected to spend approximately \$4,000 in the White River Sub-Region and nearly \$40,000 in the Greater Hartford Sub-Region. All non-salary expenditures will be highly dependent on land acquisitions and therefore estimates of future expenditures are speculative and have not been modeled.

**Refuge Personnel Salary Spending**

Refuge employees reside and spend their salaries on daily living expenses in communities within each sub-region, thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals and households to industries for goods and services used for personal consumption. Salary expenditures made by Refuge personnel contribute to the local economic impacts associated with the Refuge. This section presents an analysis of the economic impacts to the four sub-regions of current Refuge personnel salary expenditures.

Currently, Refuge salaries total over \$1.21 million per year across all four sub-regions. The Greater Amherst Sub-Region receives a majority of the funds, with an average of \$550,500 spent annually in the region. Salary expenditures in the Northern Sub-Region and Tri-State Border Sub-Region total \$266,500 and \$397,100, respectively. Currently, funds are not allocated to the Southern Connecticut Sub-Region for Refuge personnel

salaries. The IMPLAN modeling system contains household income consumption spending profiles that account for average household spending patterns by income level. These profiles also capture average annual savings and allow for leakage of household spending to outside the region. The IMPLAN household spending pattern for households earning \$75-100 thousand per year was used to reflect the average salary of full-time permanent employees at the Refuge while the spending pattern for households earning less than \$10 thousand per year was used for the students enrolled in the Youth Conservation Corps (YCC) summer program. The YCC program occurs in the Northern Sub-Region and Greater Amherst Sub-Region.

The economic impacts associated with spending of salaries in the four sub-regions by Refuge employees are summarized in Table I.36. These impacts only include secondary effects on non-Refuge jobs created as Refuge employees spend their salaries in the four sub-regions. Currently, salary spending by Refuge personnel generates secondary effects (i.e., additional non-Refuge jobs in the local economy) of 8 jobs, \$283,200 in labor income and \$507,400 in value added, across all four sub-regions.

**Table I.36. Average Annual Impacts of Current Refuge Personnel Salary Spending**

	<b>Employment (# full &amp; part time jobs)</b>	<b>Labor Income (\$2012)</b>	<b>Value Added (\$2012)</b>
<b>Northern Sub-Region</b>			
<b>Direct effects</b>	0	\$0	\$0
Secondary effects	2	\$52,000	\$95,100
Total effect	2	\$52,000	\$95,100
<b>Tri-State Border Sub-Region</b>			
<b>Direct effects</b>	0	\$0	\$0
Secondary effects	3	\$92,800	\$167,900
Total effect	3	\$92,800	\$167,900
<b>Greater Amherst Sub-Region</b>			
<b>Direct effects</b>	0	\$0	\$0
Secondary effects	3	\$138,400	\$244,400
Total effect	3	\$138,400	\$244,400
<b>Southern Connecticut Sub-Region</b>			
<b>Direct effects</b>	0	\$0	\$0
Secondary effects	0	\$0	\$0
Total effect	0	\$0	\$0
<b>Total Effects Across Regions</b>			
<b>Direct effects</b>	0	\$0	\$0
Secondary effects	8	\$283,200	\$507,400
Total effect	8	\$283,200	\$507,400

Under Alternatives A and B, staffing would remain the same within the Northern, Tri-State Border, Greater Amherst and Southern Connecticut sub-regions. Under these two alternatives, new staff would not be hired in the White River Sub-Region or the Greater Hartford Sub-Region. Under Alternatives C and D, an additional 10 positions are projected for the Tri-State Border Sub-Region and 6 additional positions are projected for the Northern Sub-Region. Similarly to Alternatives A and B, under Alternatives C and D, new staff will not be hired in the White River or Greater Hartford Sub-Regions. The hiring of new staff will be dependent on budgets and will vary depending on availability of funds. Additionally, it is not known in which sub-region new staff will live and subsequently spend their salaries and as a result, the economic impacts of new staff cannot be reasonably allocated to a specific region to be modeled.

**Refuge Revenue Sharing**

The Fish and Wildlife Service (FWS) makes revenue sharing payments to the counties for the land that is under administration. Under provisions of the Refuge Revenue Sharing (RRS) Act, local counties receive an annual payment for lands that have been purchased by full fee title acquisition by the FWS. Payments are based on the greater of 75 cents per acre or 0.75% of the fair market value. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be substantially less than the amount required to fully fund the authorized level of payments. In fiscal year 2011, RRS payments were appropriated at only 21.6% of the approved value. All four sub-regions where land is currently managed by the Refuge, the Northern, Tri-State Border, Greater Amherst and Southern Connecticut Sub-Regions, receive RRS payments. The majority of RRS payments were made to the Northern Sub-Region, \$27,500, while the Tri-State Border, Greater Amherst, and Southern Connecticut Sub-Regions received approximately \$2,100, \$8,200, and \$2,700, respectively.

Table I.37 shows the impacts of the \$40,500 received by the four sub-regions in RRS payments. The RRS payments generate an estimated total impact of less than 1 job, \$22,200 in labor income and \$28,900 in value added.

**Table I.37. Annual Impacts of Current RRS Payments**

	<b>Employment (# full &amp; part time jobs)</b>	<b>Labor Income (\$2012)</b>	<b>Value Added (\$2012)</b>
<b>Northern Sub-Region</b>			
<b>Direct effects</b>	< 1	\$11,900	\$14,200
Secondary effects	< 1	\$2,400	\$4,200
Total effect	< 1	\$14,300	\$18,400
<b>Tri-State Border Sub-Region</b>			
<b>Direct effects</b>	0	\$900	\$1,100
Secondary effects	0	\$200	\$400
Total effect	0	\$1,100	\$1,500
<b>Greater Amherst Sub-Region</b>			
<b>Direct effects</b>	< 1	\$3,700	\$4,400
Secondary effects	0	\$1,000	\$1,700
Total effect	< 1	\$4,700	\$6,100
<b>Southern Connecticut Sub-Region</b>			
<b>Direct effects</b>	0	\$1,700	\$2,000
Secondary effects	0	\$400	\$800
Total effect	< 1	\$2,100	\$2,800
<b>Total Effects Across Regions</b>			
<b>Direct effects</b>	< 1	\$18,200	\$21,800
Secondary effects	< 1	\$4,000	\$7,100
Total effect	< 1	\$22,200	\$28,900

The RRS payments may change in the future, given additional land acquisitions. There is much uncertainty regarding the time of acquisitions as well as the location and thus, future RRS payments have not been estimated.

**Refuge Visitor Spending**

Spending associated with recreational visits to national wildlife refuges generates significant economic activity. The FWS report *Banking on Nature: The Economic Benefits of National Wildlife Refuge Visitation to Local*

Communities, estimated the impact of national wildlife refuges on their local economies (Carver and Caudill, 2007). According to the report, more than 34.8 million visits were made to national wildlife refuges in FY 2006 which generated \$1.7 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife visitors generated nearly 27,000 jobs, and over \$542.8 million in employment income (Carver and Caudill, 2007). Approximately eighty-two percent of total expenditures were from non-consumptive activities, twelve percent from fishing, and six percent from hunting (Carver and Caudill, 2007).

This section focuses on the local economic impacts associated with Refuge visitation. Silvio O. Conte National Wildlife Refuge offers a wide variety of recreation opportunities including wildlife observation and photography, interpretation, environmental education, hunting and fishing. Annual visitation estimates for the Refuge are based on several Refuge statistic sources including: visitors entering the Visitor Center/Office and general observation by Refuge personnel. Annual visitation estimates are on a per visit basis. Table I.38 summarizes estimated visitation by type of visitor activity across the Northern, Tri-State Border, Greater Amherst and Southern Connecticut sub-regions.

**Table I.38. Estimated Current Annual Visitation to Refuge Across Sub-Regions**

Visitor Activity	Total number of visits to the Northern Sub-Region	Total number of visits to the Tri-State Border Sub-Region	Total number of visits to the Greater Amherst Sub-Region	Total number of visits to the Southern Connecticut Sub-Region	Total number of visits across sub-regions	Number of non-local visitor days across sub-regions <sup>a</sup>
<i>Consumptive Uses:</i>						
Fishing	150	10	25	25	210	26
Hunting: Big Game	770	10	10	20	810	401
Hunting: Waterfowl	15	0	5	5	25	5
Hunting: Migratory Birds	250	0	30	20	300	100
Hunting: Upland Game	715	30	50	50	845	409
<i>Non-Consumptive Uses:</i>						
Nature trails/auto tour/other wildlife observation/ office visits	20,000	7,884	300	100	28,284	3,511
<b>Total Visitation</b>	<b>21,900</b>	<b>7,934</b>	<b>420</b>	<b>220</b>	<b>30,474</b>	<b>4,451</b>

<sup>a</sup> One visitor day = 8 hours.

Visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time visiting a refuge, counting each refuge visit as a full visitor day would overestimate the economic impact of Refuge visitation. In order to properly account for the amount of spending, the annual number of non-local refuge visits were converted to visitor days. Refuge personnel estimate that non-local anglers spend approximately 4 hours (1/2 a visitor day) on the Refuge, while migratory, waterfowl and upland game hunters spend approximately 6 hours (3/4 a visitor day) and non-local big game hunters spend approximately 8 hours (1 visitor day) on the Refuge. Non-local visitors that view wildlife on nature trails or participate in other wildlife observation activities typically spend 2 hours (1/4 a visitor day). Table I.38 shows the number of non-local visitor days by recreation activity across the Refuge. Total spending by non-local Refuge visitors was determined by multiplying the average non-local visitor daily spending by the number of non-local visitor days at the Refuge.

Spending associated with recreational visits generates significant economic activity in each sub-region. A visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. To determine the local economic impacts of visitor spending, only spending by persons living outside of the local area are included in the analysis. The rationale for excluding local visitor spending is twofold. First, money flowing into the local area from visitors living outside the local area (hereafter referred to as non-local visitors) is considered new money injected into the local economy. Second, if residents of the local area visit the Refuge more or less due to the management changes, they will correspondingly change the spending of their money elsewhere in the local area, resulting in

no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level. Refuge personnel determined the percentage of non-local Refuge visitors. Table I.38 shows the estimated percent of non-local Refuge visits and visitor days across all sub-regions.

To estimate visitor expenditures, we use average daily visitor spending profiles from the Banking on Nature report (Carver and Caudill, 2007) that were derived from the 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation (FWS, 2008). The National Survey reports trip related spending of state residents and non-residents for wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-visitor day expenditures by recreation activity for each FWS region. The spending profiles for nonresidents for FWS Region 5 were used. Dollar values for these expenditure profiles were updated from 2006 dollars to 2012 dollars using the Bureau of Labor Statistics CPI calculator. Average daily spending profiles for nonresident visitors to Region 5 for fishing (\$60.81 per-day), upland game and other migratory bird hunting (\$106.92 per-day), waterfowl (\$122.53 per-day), and big game hunting (\$55.64 per-day) were used to estimate non-local visitor spending for Refuge fishing and hunting related activities. The average daily nonresident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) was used for non-consumptive wildlife viewing activities (\$90.71 per-day).

Table I.39 summarizes the total economic impacts, in thousands of dollars, associated with current non-local visitation by sub-region. In the Northern Sub-Region, non-local visitation accounts for about 3 jobs, \$107,200 in labor income and \$176,300 in value added. Non-local visitor spending in the Tri-State Border Sub-Region accounts for 1 job, \$35,900 in labor income and nearly \$60,000 in value added. In the Greater Amherst Sub-Region, the total economic impact of non-local visitor spending is less than one job, \$1,300 in labor income and \$2,400 in value added. Finally, in the Southern Connecticut Sub-Region, the total economic impact of non-visitor spending is less than one job, \$1,900 in labor income and \$3,100 in value added.

**Table I.39. Annual Impacts of Current Non-Local Visitor Spending**

	<b>Employment (# full &amp; part time jobs)</b>	<b>Labor Income (\$2012)</b>	<b>Value Added (\$2012)</b>
<b>Northern Sub-Region</b>			
Direct effects	3	\$78,700	\$127,400
Secondary effects	< 1	\$28,500	\$48,900
<i>Total Economic Impact</i>	3	\$107,200	\$176,300
<b>Tri-State Border Sub-Region</b>			
Direct effects	< 1	\$24,100	\$39,400
Secondary effects	< 1	\$11,800	\$20,500
<i>Total Economic Impact</i>	1	\$35,900	\$59,900
<b>Greater Amherst Sub-Region</b>			
Direct effects	< 1	\$900	\$1,600
Secondary effects	< 1	\$400	\$800
<i>Total Economic Impact</i>	< 1	\$1,300	\$2,400
<b>Southern Connecticut Sub-Region</b>			
Direct effects	< 1	\$1,300	\$2,100
Secondary effects	< 1	\$600	\$1,000
<i>Total Economic Impact</i>	< 1	\$1,900	\$3,100

	<b>Employment (# full &amp; part time jobs)</b>	<b>Labor Income (\$2012)</b>	<b>Value Added (\$2012)</b>
<b>Total Effects Across Regions</b>			
Direct effects	3	\$105,000	\$170,500
Secondary effects	1	\$41,300	\$71,200
<i>Total Economic Impact</i>	4	\$146,300	\$241,700

Under Alternative A, visitation is expected to remain the same in the Northern, White River Junction, and Tri-State Border Sub-Regions. In the Greater Amherst Sub-Region, the Fort River Universal Access Trail will be completed and visitation is expected to increase tenfold (to approximately 3,000 visits). In the Greater Hartford Sub-Region, two universal access trails are expected to be completed. It is estimated by Refuge staff that the additional access will add an additional 12,000 visits. Current visitation is also expected to increase in the Southern Connecticut Sub-Region as land acquisitions occur. The additional land purchased is expected to draw about 4,000 visitors annually to the sub-region.

In the Northern Sub-Region, it is estimated that visitation will not change under Alternative B. If Alternative B is chosen for implementation, visitation in the White River Junction Sub-Region is expected to increase by an additional 4,500 visits annually as additional land is acquired and universal trail access is established at the Ompompanoosuc River. Similarly, visitation in the Tri-State Border Sub-Region is expected to increase by 3,000 visits as additional lands are acquired and trail access improved. In the Greater Amherst Sub-Region it is estimated that annual visitation will be 4,000 as universal trail access is established at the Deadbranch, Westfield River and Mill River Conservation Focus Areas. In the Greater Hartford Sub-Region, visitation is expected to increase by an estimated 1,500 visits annually as universal trail access is added to the Farmington River Division. Finally, visitation in the Southern Connecticut Sub-Region under Alternative B is predicted to be the same as under Alternative A.

Similarly to Alternative B, if Alternative C is implemented, visitation in the Northern Sub-Region is not expected to change. Under Alternative C, visitation in the White River Junction is expected to increase similarly to Alternative B, plus an additional 1,500 visitors due to the establishment of a trail at the Sprague Brook CFA, for a total of 6,000 additional visitors to the sub-region. Visitation to both the Greater Amherst and Greater Hartford sub-regions is expected to increase similarly under Alternative C as estimated for Alternative B. Under Alternative C, visitation to the Southern Connecticut Sub-Region is expected to be the same as Alternative A.

Under Alternative D, visitation in the Northern Sub-Region is expected to decrease by 8,000 visitors as the 35 miles of snowmobile trails will be reduced to 11 miles. Total visitation is estimated to be about 14,000 visitors. Alternative D does not include the construction of developed trail, so visitation in the White River Junction and Greater Amherst Sub-Regions, is expected to increase annually by only 2,000 visits and 1,500 visits, respectively. Although trail development in the Greater Hartford Sub-Region is also not included under Alternative D, due to the region's close proximity to Hartford, visitation is expected to increase by 4,500 visitors. Finally, in the Southern Connecticut Sub-Region, a trail development is planned once acquisition of the Whalebone Cove CFA is completed. This is expected to result in an additional 1,500 visits, annually.

Similarly to non-salary expenditures, changes in visitation to the Refuge will be highly dependent on land acquisition. Refuge staff have used historic data and trends to estimate how visitation will change across alternatives, but this can vary considerably, especially in areas where the Refuge does not currently manage land and historical data is not available to provide a baseline for projections. As a result of this uncertainty, the impacts of changes in visitation across alternatives have not been quantified.

### **Economic Contribution of Timber Harvesting and Agriculture**

#### **Timber Harvesting**

Forestry continues to be an important industry in the Northeastern United States, specifically in both Vermont and New Hampshire. According to the U.S. Forest Service, as of 2011, 73% (approximately 4.477 million acres) of the state of Vermont was considered timberland and as of 2009, 78.1% (approximately 4.641 million acres) of the state of New Hampshire was considered timberland (U.S. Forest Service, 2013). It is estimated that forest-based manufacturing and forest-related recreation and tourism contributes \$1.5 billion annually to the Vermont economy (NEFA, 2007). These same industries contribute about \$2.259 billion annually to the economy of New Hampshire (NEFA, 2011).

In addition to injecting revenue into the economies of Vermont and New Hampshire, commercial forestry and related industries are important sources of employment, providing over 12,600 jobs and 19,500 jobs in Vermont and New Hampshire, respectively (NEFA, 2007, 2011). According to NEFA, each 1,000 acres of forestland in New Hampshire directly supports an average of 1.7 forest-based manufacturing jobs and an average of 2.4 forest-related tourism and recreation jobs while in Vermont each 1,000 acres of forestland directly supports an average of 1.4 jobs in forest-based manufacturing and an average of 1.4 jobs in forest-related tourism and recreation (NEFA 2007, 2011). These are jobs supported directly and these figures do not include secondary effects.

According to Refuge staff, it is assumed that the Refuge will acquire the same amount of forestland, regardless of the chosen alternative. In order to project potential forest land that may be acquired by the Refuge, historical acquisition data were used. Based on historical land acquisitions, Table I.40 indicates, by sub-region, acreage of potential forestland that may be acquired by the Refuge during the 15-year time horizon.

**Table I.40. Acres of Potential Commercial Forest Land Likely to be Acquired**

	Total Acres
Northern Sub-Region	32,000
Tri-State Border Sub-Region	0
Greater Amherst Sub-Region	100
Southern Connecticut Sub-Region	300
<b>Total Acres Across Regions</b>	<b>32,400</b>

There are several factors that would potentially moderate the effects to the communities of the Refuge acquisitions and make directly combining the historical acquisition data with NEFA’s forestry-based employment statistics to determine direct jobs lost as a result of Refuge land acquisitions unreasonable, including: 1) the employment associated with forest-based recreation and tourism is likely to remain unchanged or increase as these activities will still be taking place on Refuge managed lands and demand for these services and goods will continue or increase; 2) land acquisitions will be from willing sellers only and landowners are most likely to sell marginal lands while the NEFA employment statistics are based on statewide averages of production on all types of lands (ie highly productive to marginal); 3) acquired lands will likely be harvested by the private owner prior to sale thus all economic gains will be realized by the private owner prior to Service ownership and the harvested wood would be processed through the same channels; 4) landowners are financially compensated when they enter into a purchase agreement with the Service. Though it is unknown how those dollars would be spent, it is likely that some of the money would be injected into the local economy through the purchase of additional lands or the purchase of equipment from a local retailer; 5) some of the same forestry-based inputs will likely be purchased within the local economy as the land is managed by Refuge personnel for wildlife habitat; and 6) the amount and location of commercial forestry land to be acquired is highly uncertain, and acquisition is expected to occur gradually over the next 15 years or longer. The rate of conversion will depend on willing sellers and available budgets.

**Agriculture**

Of the nearly 32,500 acres of land the Refuge expects to acquire 0.18%, or 60 acres, may be agricultural lands. The majority of the acquired agricultural lands would be in the Northern Sub-Region. Table I.41 indicates, by sub-region, where agricultural lands are likely to be acquired.

**Table I.41. Acres of Agricultural Land Likely to be Acquired**

	Total Acres
Northern Sub-Region	50
Tri-State Border Sub-Region	0
Greater Amherst Sub-Region	10
Southern Connecticut Sub-Region	0
<b>Total Acres Across Regions</b>	<b>60</b>

According to the 2007 Census of Agriculture, there are approximately 77,600 acres of farmland in Coos and Essex Counties combined (USDA, 2007). If the CCP is fully implemented, approximately 0.08% of land in production will be acquired by the Refuge. The cumulative economic impacts of this acquisition will likely be negligible across the study area.

## Conclusion

Current Refuge activities generate an economic impact across the four sub-regions where the Refuge currently manages land. Refuge non-salary expenditures directly account for 2 jobs, \$57,100 in labor income and \$73,900 in value added. Refuge salary spending generates an estimated 8 jobs, \$283,200 in labor income and \$507,400 in value added across all four sub-regions where land is currently managed by the Refuge. Current Refuge Revenue Sharing payments account for less than 1 job, \$22,200 in labor income and \$28,900 in value added. Current non-local visitor spending generates 4 jobs, \$146,300 in labor income and \$241,700 in value added. Total economic effects of Refuge operations play a much larger role in the communities near the Refuge where most of the refuge-related expenditures and public use related economic activity occurs. The economic impacts of the alternatives are highly dependent on future Refuge land acquisitions. The location and the rate of land acquisitions are unknown and thus, economic impacts of the proposed management alternatives have not been quantified.

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