Appendix G

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Umbagog Lake

Economic Analysis

Economic Impacts of Current and Proposed Management Alternatives for Lake Umbagog National Wildlife Refuge

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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. Lake Umbagog National Wildlife Refuge, located in Coos County, New Hampshire and Oxford County, Maine, is in the process of developing a range of management goals, objectives, and strategies for the CCP. The CCP for the refuge must contain an analysis of expected affects associated with current and proposed refuge management strategies.

The purpose of this study was to estimate the regional economic impacts associated with Draft CCP management strategies. Special interest groups and local residents often criticize a change in refuge management, especially if there is a perceived negative impact to the local economy. Having objective data on income and employment impacts may show that these economic fears are overstated. Quite often, the extent of economic benefits a refuge provides to a local community are not fully recognized, yet at the same time the impact of negative changes are overstated. Spending associated with refuge recreational activities such as wildlife viewing and hunting can generate considerable tourism activity for surrounding communities. Additionally, refuge personnel typically spend considerable amounts of money purchasing supplies in local stores, repairing equipment and purchasing fuel at the local service stations, as well as reside and spend their salaries in the local community.

For refuge CCP planning, a regional economic impact analysis provides a means of estimating how current management (No Action Alternative) and proposed management activities (alternatives) 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.

It is important to note that the economic value of a refuge encompasses more than just the impacts of 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). However, quantifying these types of nonmarket values are beyond the scope of this study.
This report first presents a description of the local community and economy near the refuge. Next, the methods used to conduct a regional economic impact analysis are described. An analysis of current and proposed management strategies that could affect the local economy is then presented. The refuge management activities of economic concern in this analysis are:

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

Regional Economic Setting

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30-60 mile radius of the impact area. Only spending that takes place within this local area is included as stimulating the changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. Based on the relative self-containment in terms of retail trade, Coos County, New Hampshire and Oxford County, Maine were assumed to comprise the economic region for this analysis.

Local and Regional Demographics

Lake Umbagog NWR is located in Coos County, New Hampshire and Oxford County, Maine. Located within the area know as the 'Northern Forest', residents of Coos and Oxford Counties depend on the forest to provide clean water, habitat for plants and wildlife, wood and paper products, recreation opportunities, and cultural identity (North East State Foresters Association (NEFA) 2004). The area also provides numerous recreational opportunities for millions of visitors annually. According to High et al. (2004), over 46 million Americans and 12 million Canadians live within 400 miles of Coos and Oxford Counties, including the major metropolitan areas of New York, Boston, Philadelphia, and Montreal.

Coos County, derived from the Indian word for pines, "cohos," encompasses the entire northern section of New Hampshire, covering 1,804 square miles, accounting for 20% of New Hampshire's total land area. Oxford County, located in northwestern Maine, covers 2,078 square miles, accounting for almost 7% of the land area in Maine. The eastern boundary of Coos County adjoins the western boundary of Oxford County. The northern boundary of both counties borders Quebec, Canada.

Population

Table G.1 shows the population estimates and trends for the regional area and communities near the refuge. While Coos is the largest New Hampshire County in total land area, it is the smallest in population, accounting for less than 3% of New Hampshire's total population in 2000 (U.S. Census Bureau 2005). From 1990 to 2000, New Hampshire's overall population increased by 11.4% while Coos was the only county to lose population, decreasing by 4.9% over the same period. According

to High et al. (2004), Coos County has not been able to benefit from population growth that accompanies economic development or interstate access to the same extent as counties in south and central New Hampshire.

In 2000, Oxford County accounted for approximately 4% of Maine's total population (U.S. Census Bureau 2005). From 1990 to 2000, the population growth rate for Oxford County was approximately 4% which was similar to Maine's overall population increase (table G.1).

Table G.1. Local and Regional Population Estimates and Characteristics

	Population in 2000			% Population Change	Projected % Population Change
	Residents	Persons per Square Mile	Median Age	1990 to 2000	2000 to 2010
New Hampshire	1,235,786	137.8	37.1	+11.4%	+12.7%
Coos County, NH	33,111	18.4	41.5	-4.9%	-6.0%
NH Communities near refuge					
Berlin	10,331	167.4	42.5	-13.0%	-7.0%
Colebrook	2,321	56.6	41.2	-5.3%	-6.4%
Errol	298	4.9	47.2	+2.1%	-7.1%
Gorham	2,895	90.7	42.0	-9.5%	-6.7%
Maine	1,274,923	41.3	38.6	+3.8%	+4.6%
Oxford County, ME	54,755	26.3	40.2	+4.1%	+3.5%
ME Communities near refuge					
Bethel	2,411	37.2	40.8	+3.2%	+2.6%
Upton	62	1.6	56.0	-13.9%	+16.1%

Source: U.S. Census Bureau (2005), Maine State Planning Office (2002, projections compiled Dec. 2001 based on past trends), and New Hampshire Office of Energy and Planning (2004, projections compiled Sept. 2004 based on past trends).

The towns of Upton and Bethel in Oxford County and the towns of Errol, Berlin, Gorham, and Colebrook in Coos County are the primary communities near the refuge. Errol and Upton are closest in proximity to the refuge and, as shown in Table G.1, are also the smallest communities in the area near the refuge. The town of Errol is close to the western side of the refuge and is the town nearest the refuge headquarters. In 2000, the population of Errol was 298 residents, averaging 4.9 persons per square mile (table G.1). Upton is a very small community near the southern end of the refuge with a population of 62 residents, averaging 1.6 persons per square mile. Berlin is the northern most city in New Hampshire and is located approximately 30 miles south of the refuge near the White Mountain National Forest. The town of Gorham is located just south of Berlin. Colebrook is approximately 25 miles north of the refuge in northern Coos County at the junction of the Connecticut and Mohawk Rivers. Bethel is located 35 miles southeast of the refuge on the Androscoggin River.

In 2000, approximately 98% of the Coos and Oxford County population consisted of white persons not of Hispanic or Latino origin, 0.5% of persons of Hispanic or Latino descent, 0.4% of Asian persons, 0.3% of American Indian or Alaska Native persons, and less than 0.2% of Black or African Americans (U.S. Census Bureau 2005). Population origin estimates were similar for New Hampshire and Maine. In Coos County, approximately 77% of residents over the age of twenty four were high school graduates and 12 % have earned a bachelor's or advanced degree (US. Census Bureau 2005). Similarly, 82% of residents over the age of twenty four in Oxford County were high school graduates and 16 % have earned a bachelor's or advanced degree (US Census Bureau 2005).

The average median ages in table G.1 reflect the post-war baby boom generation that is nearing retirement age (New Hampshire Office of Energy and Planning 2004). The highest median ages are in Upton and Errol, 56 years and 47 years respectively, which are well above the state and county level averages. The percent of population 65 years and older is 16% for Oxford County and 18% for Coos County while the state averages were 14% for Maine and 12% for New Hampshire (U.S. Census Bureau 2005). Consequences associated with the aging workforce include increased demand for healthcare and social services coupled with decreasing income tax collections (due to retirees leaving the workforce) needed to pay for these services (Maine State Planning Office 2005).

As shown in table G.1, population projections for the year 2010 anticipate New Hampshire's overall population will continue to increase while Coos County will continue to decrease similar to past trends (New Hampshire Office of Energy and Planning 2004). Populations in communities near the refuge in Coos County are anticipated to decline by six to seven percent over the same time period. These projected changes for the local communities and the overall Coos County population could have important implications for region's forest based economy and forest visitors coming to the area (High et al. 2004).

Population forecasts for the year 2010 anticipate the population in Maine and Oxford County to follow a similar growth trend with the overall state of Maine's population growing slightly more than Oxford County (Table G.1; Maine State Planning Office 2005).

Employment and Income

Coos and Oxford County 2002 employment estimates are shown in table G.2. According to the U.S. Department of Commerce, most jobs in Coos and Oxford Counties were in the industries of manufacturing, health care & social assistance services, retail trade and government agencies. Compared to counties in southern New Hampshire and Maine, Coos and Oxford Counties have slower economic growth and a greater dependence on traditional natural resource based manufacturing activities (High et al. 2004). According to NH Economic and Labor Market Information Bureau (2005), Coos County employment projections for 2000 to 2010 suggest most new jobs will be in service related industries especially in the fields of health services, amusement and recreation services, and business services (i.e., computer–related services, advertising, and temporary help services).

Table G.2. 2002 Full Time and Part Time Employment for Coos and Oxford Counties.

	Coos County NH	Oxford County ME
Total non-farm employment (jobs)	18,876	24,703
Percent of Employment by Industry		
Ag, forestry, fish & hunting	2.6%	2.6%
Mining & Utilities	0.7%	0.1%
Construction	5.4%	8.3%
Manufacturing	10.4%	15.2%
Wholesale trade	1.7%	0.7%
Transportation & warehousing	3.6%	2.0%
Retail trade	14.4%	13.3%
Finance, insurance, real estate, & information	6.2%	6.2%
Services		
Professional, management, admin., & waste	3.9%	6.3%
Health care, social assistance, & educational	14.3%	14.3%
Arts, entertainment, & recreation	4.8%	5.2%
Accommodation & food	11.1%	5.8%
Other services	5.3%	5.8%
Government (federal, state, & local)	15.5%	14.2%

Sources: U.S. Dept. of Commerce, Bureau of Economic Analysis, Regional Economic Information System 2002, and IMPLAN 2002 data. Self-employment is not included.

U.S Census Bureau (2005) data for median household income, unemployment and percentage of persons below poverty in 1999 are shown in table G.3 (U.S. Census 2005). As shown in table G.3, median household income and percent unemployed are similar for Coos and Oxford Counties. The percent of population below the federal poverty line is an indicator of the economic distress within a community (High et al. 2004). The percent below poverty in Coos and Oxford Counties, 10% and 11.8% respectively, are below the national average of 12.4% but are above their state average (table G.3). The average income for both counties are below the state and national averages. New Hampshire's median household income is more than $7,400 above the national average, while Maine's is more than $4,700 below the national average.

Table G.3. Income, Unemployment and Poverty estimates

	Median Household Income (1999)	Percent Unemployed (2000)	Percent of Persons below Poverty (1999)
United States Average	$41,994	4.1%	12.4%
New Hampshire	$49,467	2.7%	6.5%
Coos County, NH	$33,593	3.3%	10.0%
Maine	$37,240	3.1%	10.9%
Oxford County, ME	$33,435	3.3%	11.8%

Source: U.S Census Bureau (2005)

Natural Resource Based Industries: Timber and Tourism

Maine and New Hampshire are the first and second, respectively, most forested states in the nation (NEFA 2004). Timber and tourism, the prominent natural resource based industries with ties to the refuge, are described in more detail below.

Timber Harvesting and Production Industries

Forests cover 95% (17.7 million acres) of Maine and 84% (4.7 million acres) of New Hampshire (NEFA 2004). Maine is the major timber producer of the larger NEFA region (ME, NH, VT, and NY), accounting for roughly half of wood proAduced annually (NEFA 2004). In 2003, Maine harvested 5.9 million cords and processed almost as much (5.6 million cords) in-state (Maine Department of Conservation 2004). According to NEFA (2001a), imports to Maine in 2001 were dominated by pulpwood and nearly 67% of its exports were high value softwood sawlogs. In 2003, Oxford County accounted for 8% of the total amount of timber (sawlogs and pulpwood) harvested in Maine, ranking sixth in the state (Maine Department of Conservation 2004).

In contrast to the timber industry in Maine, New Hampshire is cutting much more timber than it is processing (High et al. 2004). In 2001, the amount of timber processed in New Hampshire accounted for approximately 83% of the amount harvested within the state (NEFA 2001b). However, part of this difference could be due to the brief closing of the primary pulp mill near Berlin from October 2001 to June 2002. In 2002, Coos County accounted 16.5 % of the total timber harvested in New Hampshire, ranking second in the state to Cheshire County (U.S. Forest Service Timber Products Output Data 2002).

In 2001, forest-based industries employed over 21,600 people in Maine and 9,800 in New Hampshire and generated over $1.0 billion in income in Maine and $333 million in income in New Hampshire (NEFA 2004). According to NEFA, each 1,000 acres of forestland in New Hampshire supports 2.0 forest-based jobs, while 1.2 forest based jobs are supported by 1,000 acres of forestland in Maine.

According to New Hampshire Economic and Labor Market Information Bureau (2003), the lumber and paper products industries have been the mainstay of employment in Coos County. There is one integrated pulp and paper mill in the region located between Berlin and Gorham. The mills were shut down in October 2001 and reopened in June 2002 under the ownership of Nexfor, Inc. of Toronto, Canada and currently employ about 500 union workers and 100 salaried workers (U.S. Forest Service 2005). Table G.4 shows output and employment associated with forest-based industries in Coos and Oxford Counties in 2002. Pulp and paper industries account for the largest portion of regional forest related output (67%) and employment (44%) followed by timber harvesting and logging industries which account for approximately 15% of output and 24% of employment (table G.4). The 4,148 total jobs directly linked to forest related industries account for 9.5% of the overall employment (43,570 jobs) in Coos and Oxford Counties reported in table G.2.

Table G.4. Output and Employment for forest related industries in Coos and Oxford Counties

Forest Related Industries	Output (in millions)	Employment
Timber Harvesting/Logging	$178.5	975
Sawmills	$131.9	760
Wood Products Manufacturing (veneer and plywood manufacturing, floors, wood windows, doors, etc.)	$72.1	587
Pulp and Paper	$780.9	1,826
Total	**$1,163.4**	**4,148**

Source: 2002 IMPLAN model data

In recent years the lumber and paper industries have experienced declines in employment (Maine State Planning Office, 2005; New Hampshire Economic and Labor Market Information Bureau 2003). Coos County employment projections for 2000 to 2010 suggest the lumber and paper industries will continue to decline, possibly by a substantial amount with workforce decreases by nearly 24% in paper industries and 39% in lumber industries (New Hampshire Economic and Labor Market Information Bureau 2003). Although employment and the number of mills in operation has decreased, the remaining mills maintain a production output for the region that is almost as large as it was four decades ago due to improved machinery and greater yield from each log (NEFA 2004).

According to High et al. (2004), increasing pressure from the global paper industry, increased recycling of wastepaper, efficiency in the pulping process, and loss of market share to other regions has contributed to the slower than expected growth in the regional pulpwood market. Trade agreements such as the North Atlantic Free Trade Agreement of 1994 have also affected trends in the regional timber market by creating opportunities for international trade resulting in increases in exports from Maine and New Hampshire to Canada while at the same time allowing new competitors into local markets (Innovative Natural Resource Solutions 2005; High et al. 2004).

Recreation and Tourism Related Industries

The travel and tourism industry continues to be a significant and growing contributor to the economies of Maine and New Hampshire. A survey of Maine visitors in 2003 estimated resident and nonresident visitors spent $6.1 billon in Maine, which direct and indirectly (i.e., the multiplier effect as initial spending is recycled through the economy) generated: $13.4 billion in sales of goods and services; 173,181 jobs; $3.8 billion in income; and $549 million in state and local tax revenue (Longwoods International 2004). Results suggest overnight visitors come to tour the state (36%), enjoy Maine's superb outdoors (24%), take a beach vacation (12%), and to attend a special event (10%). In 2003, Maine's lakes and mountains region was the primary regional destination for 15%, and was visited by 19% of those traveling in Maine (Longwoods International 2004).

In New Hampshire, resident and nonresident visitors spent $3.7 billon in 2002 (an increase of 2.9% from 2000), accounting for the multiplier effect this spending generated: $9.8 billion in sales of goods and services; 88,427 jobs; and $419 million in state and local tax revenue (Goss 2003). A recent survey of New Hampshire visitors in 2003/2004 conducted by the Institute for New Hampshire Studies reported that popular visitor activities include sightseeing, skiing/snowmobiling, shopping, and scenic drives (Thurston 2004). The White Mountain region was reportedly the most visited region in all seasons followed by the Lakes region (except in winter). While White Mountain region includes the southern section of Coos County (and also extends into Oxford County), the area surrounding the refuge is known as the great north woods region. Survey results reported New Hampshire's great north woods region was visited by 15% of visitors to New Hampshire during the summer and fall, 10% of winter visitors, and 7% of visitors during the spring season (Thurston 2004).

Located within the Northern Forest, Coos and Oxford Counties provide abundant year round recreational opportunities. For example, in Coos County there are 271 recreation areas covering nearly 30% of the county's total acreage (New Hampshire Office of State Planning, 2003). Coos County employment projections indicate the amusement and recreation services industry will contribute 260 new jobs between 2000 and 2010 (New Hampshire Economic and Labor Market Information Bureau 2003).

Popular activities on or near the refuge include hiking, camping, wildlife viewing, picnicking, snowmobiling, fishing, hunting, boating, canoeing, and cross-country skiing. The area is also a nationally recognized destination for fall foliage enthusiasts. Details about the economic contributions associated with wildlife viewing, fishing, hunting, boating, and other recreational activities in Maine and New Hampshire are provided below.

Wildlife Viewing

Abundant opportunities are available throughout Maine and New Hampshire for formal wildlife education or recreational viewing. Since the 1970's, wildlife viewing has grown to become one of the most popular outdoor recreation activities in New Hampshire (Silverberg 1997). Wildlife viewing can include the activities of observing, identifying, photographing or feeding wildlife. In 2001, the number of people that reported participating in wildlife viewing as a primary form of recreation totaled 766,000 in New Hampshire and 778,000 in Maine (U.S. Department of the Interior 2003a and 2003b). Spending associated with wildlife viewing in Maine totaled $346 million in 2001; of which 43% ($148 million) were trip related expenditures, 41% ($140 million) were spent on equipment related expenses, and 17% ($59 million) were other expenses such as magazines, membership dues, and land leasing (U.S. Department of the Interior 2003a). In New Hampshire, wildlife viewing related spending totaled $343 million in 2001; of which 52% ($177 million) were trip related expenditures, 43% ($148 million) were spent on equipment related expenses, and 5% ($17 million) were other expenses (U.S. Department of the Interior 2003b).

According to a USFWS report on the national and state economic impacts of wildlife watching (U.S. Department of the Interior 2003c) accounting for the multiplier effect, spending by resident and nonresident wildlife watchers in Maine in 2001 generated; $856 million in output, $255 million in wages, 13,638 jobs, and $16 million in state sales tax revenue. This accounted for 2.2% of total employment and 1.4% of employment income in Maine. In 2001, spending in New Hampshire by wildlife viewers generated $567 million in output, $173 million in wages, and 8,239 jobs which accounted for 1.3% of total employment and 0.8% of employment income in New Hampshire (U.S. Department of the Interior 2003c).

Hunting

In 2001, there were a total of 164,000 resident and non resident hunters in Maine; 95% participated in hunting big game, 39% participated in hunting small game, and the number for migratory birds was negligible (totals exceed 100% because most hunters participated in both big and small game hunting). Residents of Maine accounted for 75% of total hunters and 86% of the total days of hunting in Maine (U.S. Department of the Interior 2003a). In New Hampshire, there were a total of 78,000 hunters in 2001; 91% participated in big game hunting, 38% participated in small game hunting, and the number for migratory birds was negligible (U.S. Department of the Interior 2003b). Residents of New Hampshire accounted for 67% of total hunters and 78% of the total days of hunting in New Hampshire.

According to USFWS (2003a), hunting related expenditures by state residents and nonresidents in Maine totaled $162 million in 2001; of which 33% ($54 million) were trip related expenditures, 44% ($72 million) were spent on equipment related expenses, and 23% ($37 million) were other hunting-related expenses (i.e., membership dues, licenses, permits and land leasing). In New Hampshire, hunting related

expenditures by state residents and nonresidents totaled $71 million in 2001; of which 5% ($15 million) were trip related expenditures, 66% ($47 million) were spent on equipment related expenses, and 13% ($9 million) were other hunting-related expenses (U.S. Department of the Interior 2003b).

According to a report by the International Association of Fish and Wildlife Agencies (IAFWA 2002) accounting for the multiplier effect, spending by resident and nonresident hunters in Maine in 2001 generated; $326 million in output, $74 million in income, 3,643 jobs, and $9.3 million in state and local sales taxes. Resident and nonresident hunter spending in New Hampshire in 2001 generated $155 million in output, $36 million in salary and wages, 1,429 jobs, and $827,000 in state and local taxes (IAFWA 2002).

Fishing and Boating Activities

In 2001, more than 272,000 people in Maine and 221,000 people in New Hampshire participated in freshwater fishing. Maine residents accounted for 65% of total freshwater anglers and 83% of total days of freshwater fishing in Maine (U.S. Department of the Interior 2003a). In New Hampshire, a total of 221,000 anglers participated in freshwater fishing in 2001. Of these anglers, New Hampshire residents accounted for 57% of the total freshwater fishermen and 83% of total days of freshwater fishing in the state (U.S. Department of the Interior 2003b). Direct spending in Maine by state resident and nonresident freshwater anglers totaled $108 million in 2001. Trip costs (food, lodging, transportation and other trip costs) were $71 million (66%) and equipment costs represented $37 million (34%) of total spending (U.S. Department of the Interior 2003a). In New Hampshire, state resident and nonresident freshwater anglers spent a total of $70 million in 2001; of which $43 million (61%) were trip related expenditures and $27 million (39%) were equipment expenses (U.S. Department of the Interior 2003b).

Including the multiplier effect, total output generated from expenditures by freshwater anglers in New Hampshire ranged between $245-$352 million in 1996 which supported between 2,100 to 4,300 full and part-time jobs, generating household income in the range of $84-$103 million (Shapiro and Kroll 2003).

The region's plentiful supply of surface water makes boating a popular activity. According to the New Hampshire Office of State Planning (2003), 45% of New Hampshire households participated in canoeing, kayaking and rowing activities and 43% participated in motor boating in 1997. A recent study reported pure boating (boating not associated with fishing or hunting) annually generates $328-$450 million in final output and 3,400-5,700 jobs in the state (Shapiro and Kroll 2003).

Other activities

The bountiful snowfall in northern New Hampshire and Maine make snowmobiling and skiing popular activities. In recent surveys of visitors to New Hampshire conducted by the Institute for New Hampshire Studies (Thurston 2004), skiing/snowmobiling ranked as the top winter activity by 72% of overnight visitors and 49% of day trip visitors. The percentage of New Hampshire residents (19%) who enjoyed snowmobiling on the state's estimated 6,000 miles of trails is nearly four times the national participation rate of 5.6% (New Hampshire Office of State Planning 2003). A 2003 study conducted by Plymouth State University showed that New Hampshire resident snowmobile

participants spent approximately $66 per visitor day, while out-of-state snowmobile participants visiting New Hampshire spent nearly $88 per visitor day (Okrant and Goss 2003). In addition to trip-related expenditures, New Hampshire snowmobile owners spent, on average, $1,200 annually on equipment, clothing, insurance, club memberships and state license fees. Combined total snowmobile-related expenditures are estimated to have a total economic impact of $1.2 Billion annually in New Hampshire, while supporting approximately 6,500 jobs (Okrant and Goss 2003).

Maine resident snowmobile registrations increased nearly four percent from the 1995-96 season to the 1997-98 season. In addition, nonresident registrations increased 71% over the same time (Reiling 1998). A large proportion of snowmobile spending in Maine is for the purchase and maintenance of equipment, specialty equipment and trip related expenditures. In 1998, the University of Maine and the Maine Snowmobile Association conducted a study showing the economic impact of all snowmobiling related activity on Maine to be $261 million, providing the equivalent of 3,100 full-time jobs (Reiling 1998).

Visitation trends suggest that more people are participating in non-consumptive recreation in the Northeast region of the country (New Hampshire Office of State Planning 2003). Driving for pleasure, sightseeing, hiking and mountain biking are extremely popular activities in the Northeast. In 1996, 73% of New Hampshire households went day hiking, with 25% of all households hiking seven or more times. In the same survey, 27% percent of New Hampshire households reported they went mountain biking, and 12% reported doing so seven or more times a year. Hiking trails total an estimated 2,800 miles in New Hampshire (New Hampshire Office of State Planning 2003). Swimming is another favorite activity in the region, as 71% percent of New Hampshire households had swum in a lake or stream in 1997 (Shapiro and Kroll 2003).

Land Development, Ownership, and Protection

Since the 1980's, areas of large intact sections of forestland in the Northern Forest have declined as development has divided large forests into several smaller disconnected forests. Development of forest lands can result in habitat loss, forest fragmentation, loss in public access, as well as change in the traditional character of the region (Appalachian Mountain Club 2005). According to a recent report by the Society for the Protection of New Hampshire Forests (SPNHF), sustainable forest management and ecological significance requires forest blocks that are at least 5,000 acres, most remaining areas of this size in New Hampshire are in the White Mountains and Coos County (SPNHF 2005).

The increasing turnover in land ownership from traditional industrial landowners (i.e., paper companies) to private investors and other nontraditional owners has raised concerns over habitat protection and continued access to traditional recreational lands. According to a report produced for the State of Maine's 120th Legislature by the Committee to Study Access to Private and Public Lands in Maine (2001),

> *"residents and visitors of Maine have enjoyed a tradition of access to millions of acres of privately owned land. The extraordinary changes in land ownership in the State during the last 10 years have caused growing uncertainty among the recreational users of these vast private land ownerships. Continuing access to private lands cannot be taken for granted."*

Potential loss in recreational lands is also an issue for heavily tourism dependent businesses near the refuge and throughout the Northern Forest region. According to a report prepared at the request of Maine's Governor to identify the economic and cultural importance of tourism in Maine (Vail 2003),

> *"new owners and growing fragmentation of ownerships add layers of complexity (and frustration) to negotiations between user groups and owners. More land is gated; day use and lease fees are raised; large kingdom lots are carved out of the wildlands; and subdivisions have cumulative and irreversible impacts on public access to lakes and ponds."*

While most forestland in northern New Hampshire and Northeastern Maine have not yet experienced development pressures and changing forest ownership to the same degree as other areas in New Hampshire and Maine, in December 2004, a new development proposal was announced for nearly 1,000 camp lots and two resorts in the nearby community of Greenville, Maine (85 miles from the refuge) (ABC News 2004). This land is owned and being developed by Plum Creek Timber Company, which also owns large amounts of land surrounding the refuge.

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 LUNWR were estimated using IMPLAN (Impact Analysis for Planning), a regional input-output modeling system developed by the USDA 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 five 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 (Olson and Lindall 1999). The year 2002 Coos and Oxford County IMPLAN data profiles 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 2002.

Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. 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 (Caudill and Henderson 2003). 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 county. The input supplier's new employees 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

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.

For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- ***Local output*** represents the change in local sales or revenue
- ***Personal Income*** represents the change in employee income in the region that is generated from a change in regional output.
- ***Employment*** represents the change in number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full time and part time workers, which are measured in total jobs.

The CCP provides long range guidance and management direction to achieve refuge purposes over a 15 year timeframe. The economic impacts reported in this report are on an annual basis in 2005 dollars. Large management changes such as land acquisition often take several years to achieve. The estimates reported for alternatives B and C represent the final economic effects after all changes in management have been implemented.

Economic Impacts of Alternative A

Impacts from Proposed Land Acquisition and Protection Measures

Refuge Revenue Sharing

Under provisions of the Refuge Revenue Sharing (RRS) Act, local towns receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greater of 75 cents per acre or 0.75% of the market value of lands acquired by the Service. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In the most recent fiscal year (FY05), actual RRS payments were 41% of authorized levels. In 2005, payments to local townships were $5,049 to Magalloway ME, $6,018 to Upton ME, $603 to Cambridge NH, $19,509 to Errol NH, and $6,467 to Wentworth Location NH for a total payment of $37,646. Table G.5 shows the resulting economic impacts of RRS payments under alternative A. Accounting for both the direct and secondary effects, RRS payments for alternative A generate total annual economic impacts of $ 51,700 in local output, $30,700 in personal income, and 1 job in Coos and Oxford Counties.

Table G.5. Annual impacts from refuge revenue sharing payments for alternative A (2005, $,000).

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$37.6	$26.1	0.8
Secondary effects	$14.1	$4.6	0.2
Total economic impact	**$51.7**	**$30.7**	**1.0**

Impacts from Public Use and Access Management

Refuge visitor expenditures in local economy

Spending associated with recreational visits to national wildlife refuges generates significant economic activity. 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. The recent FWS report *Banking on Nature: The Economic Benefits of National Wildlife Refuges Visitation to Local Communities* estimated the impact of national wildlife refuges on their local economies (Caudill and Henderson 2003). According to the report, more than 35.5 million visits were made to national wildlife refuges in FY 2002 which generated $809 million of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife visitors generated nearly 19,000 jobs, and over $315 million in employment income (Caudill and Henderson 2003). In FY2002, hunting and fishing related visitors typically spent longer amounts of time on national wildlife refuges than non-consumptive users, but non-consumptive users generated approximately 30% more economic activity because the numbers of non-consumptive users of wildlife at many refuges far exceeded the number of hunters and anglers (Caudill and Henderson 2003).

The refuge offers a wide variety of year round accessible recreational opportunities including wildlife viewing (on land and water), fishing, hunting, and other activities such as snowmobiling. Information on state and regional trends and associated economic impacts of these recreational activities were presented in the previous section. This section focuses on the local economic impacts associated with refuge visitation. Annual refuge visitation estimates are based on several refuge statistic sources including: visitors entering the Visitor Center/Office, boat activity surveys conducted from 2000 to 2004, the number of information sheets given out to the public, reservations for the waterfowl hunting blind, and general observation by refuge personnel. Hunting license sales statistics from the New Hampshire Department of Resources and Economic Development and the Maine Department of Inland Fisheries and Wildlife were also used for estimating the annual number of upland and big game hunters on the refuge. Annual refuge visitation estimates are on a per visit basis. Table G.6 summarizes estimated refuge visitation by type of visitor activity for alternative A. The visitation estimates for alternative A assume a ten percent increase over the previous five year average annual refuge visitation estimate of 49,500 to reflect the increasing trend in regional visitation.

Table G.6. Estimated annual refuge visitation by visitor activity for alternative A

Visitor Activity	Total # of visits	Percentage (%) of non-local visits	Total # of non-local visits	Number of hours spent at refuge	Number of non-local visitor days[1]
Consumptive Use					
Fishing	11,000	70%	7,700	8	7,700
Big Game hunting	2,500	67%	1,675	8	1,675
Upland game hunting	3,000	67%	2,010	8	2,010
Waterfowl and migratory bird hunting	150	60%	90	8	90
Non-Consumptive Use					
Wildlife viewing: boating/water use	14,000	60%	8,400	8	8,400
Wildlife viewing: nature trails and other wildlife observation	4,500	85%	3,825	2	956
Other recreation (snowmobiling)	20,000	60%	12,000	1	1,500
Total	**55,150**		**35,700**		**22,331**

[1]One visitor day = 8 hours.

To determine the local economic impacts of visitor spending, only spending by persons living outside the local area of Coos County and Oxford County are included in the analysis. The rational for excluding local visitor spending is two fold. First, money flowing into Coos and Oxford Counties 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 Coos and Oxford Counties visit Lake Umbagog NWR more or less due to the management changes, they will correspondingly change their spending of their money elsewhere in Coos and Oxford Counties, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level. Refuge visitation statistics, the FWS National Survey of Fishing, Hunting, and Wildlife Associated Recreation (NSHFWR) statistics (U.S. Department of the Interior 2003a and 2003b), the New Hampshire Statewide Comprehensive Outdoor Recreation Plan (SCORP) Statistics (New Hampshire Office of State Planning 2003) and a recent report on the economic values of New Hampshire's lakes, river, and streams by Shapiro and Kroll (2003) were used to determine the percentage of non-local refuge visitors. Table G.6 shows the estimated percent of non-local refuge visits for alternative A.

In this analysis we use the average daily visitor spending profiles from the Banking on Nature report (Caudill and Henderson 2003) that were derived from the 2001 NSHFWR. The NSHFWR reports trip related spending of state residents and non residents for several different wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Caudill and Henderson (2003) calculated the average per-person per-day expenditures by recreation activity for each FWS region. Residents were defined as living within 30 miles of the refuge and nonresidents as living outside the 30 mile radius (Caudill and Henderson 2003). For our analysis, non-local visitors match the nonresident spending profile definition. Therefore, we used the spending profiles for nonresidents for FWS Region 5 (the region LUNWR is located in). Nonresident spending profiles for big game hunting, small game hunting, migratory bird hunting, and fresh water fishing were used to estimate non-local visitor spending for the LUNWR hunting and fishing related activities. The nonresident spending profiles for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) were used for wildlife viewing activities.
The visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time on the 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 visitors participating in hunting, fishing, and wildlife viewing activities related to boating/water use spend a full visitor day (8 hours) on the refuge. Non-local visitors that view wildlife on the nature trail or participate in other wildlife observation activities typically spend 2 hours (1/4 of a visitor day) on the refuge. Most snowmobile visitors quickly pass through refuge lands (within an hour) while riding on the regional trail system. Table G.6 shows the number of non-local visitor days by recreation activity for alternative A.

Fishing

Fishing is a popular pastime on Umbagog Lake and surrounding rivers, including the Rapid, Magalloway, and Androscoggin Rivers. Total spending by refuge anglers was determined by

multiplying the average non-local daily spending by the number of non local fishing related visitor days. Based on the regional freshwater fishing visitor spending profile from the Banking on Nature report (Caudill and Henderson 2003), the average non-local refuge angler spends $35.67 per-day. As shown in table G.6, the annual number of visitors fishing on the refuge includes 11,000 visits. Approximately 70% are non-local visitors that spend 8 hours (full visitor day) at the refuge thus accounting for 7,700 annual non-local visitor days. For alternative A, annual non-local refuge anglers spend almost $274,700 in Coos and Oxford Counties. This spending directly accounts for $212,000 in local output, 3.2 jobs, and $76,600 in personal income in the local economy. The secondary or multiplier effects generate an additional $73,600 in local output, 1 job, and $23,800 in personal income. Accounting for both the direct and secondary effects, spending by non-local anglers for alternative A generates total economic impacts of $285,700 in local output, 4.2 jobs and $100,400 in personal income.

Hunting

Migratory game bird and waterfowl, upland game, and big game hunting are offered on refuge lands. Total spending by refuge hunters was determined by multiplying the average non-local daily spending by the number of non local hunting related visitor days. Using the regional hunting visitor spending profiles from the Banking on Nature report (Caudill and Henderson 2003), the average non-local big game hunter spends $46.19 per-day, a non-local upland game hunter spends $37.46 per-day, and a non-local migratory waterfowl hunter spends $67.96 per-day. As shown in table G.6, the annual number of hunters on refuge lands includes 2,500 visits for big game hunting, 3,000 visits for upland game hunting, and 150 visits for migratory waterfowl hunting. Approximately 67% of the big game and upland game hunters and 60% of the migratory waterfowl hunters are non-local visitors. All hunter types spend 8 hours (full visitor day) at the refuge. Annually, non-local big game hunters account for 1,675 visitor days, non-local upland game hunters for 2,010 visitor days, and non-local migratory waterfowl hunters for 90 visitor days. For alternative A, annual non-local refuge big game hunters spend $77,400, upland game hunters spend $75,300, and migratory bird hunters spend $4,200 in Coos and Oxford Counties. This spending directly accounts for $119,300 in local output, 1.9 jobs, and $41,900 in personal income in the local economy. The secondary or multiplier effects generate an additional $43,900 in local output, half a job, and $14,000 in personal income. Accounting for both the direct and secondary effects, spending by non-local hunters for alternative A generates total economic impacts of $161,300 in local output, 2.4 jobs and $55,900 in personal income.

Wildlife Viewing

The refuge provides wildlife viewing opportunities on the land and water. The Magalloway River Trail features a handicapped accessible trail through a forested river's edge to an observation platform overlooking the Magalloway River's backwaters. The majority of the refuge is only water accessible providing ample opportunity for exploration by canoe, kayak, or boat. Whether visitors are interested in wildlife photography, fall foliage, moose-watching, listening to the songs of neotropical migrants, viewing the bald eagles and osprey, or enjoying the antics of waterfowl broods, an expedition on the waterways is an ideal way to experience wildlife on the refuge.

Total spending by refuge wildlife viewers was determined by multiplying the average non-local daily spending by the number of non local wildlife viewing related visitor days. Based on the regional

non-consumptive visitor spending profile from the Banking on Nature report (Caudill and Henderson 2003), the average non-local visitor participating in wildlife viewing activities spends $45.77 per-day. As shown in table G.6, the annual number of visitors participating in wildlife viewing activities includes 14,000 visits for boating and water use (not fishing related) and 4,500 visits for the nature trail and other wildlife observation activities. Approximately 60% of the water related wildlife viewers are non-local visitors that spend 8 hours (full visitor day) at the refuge thus accounting for 8,400 annual visitor days. Nature trail and other wildlife observation visitors spend about 2 hours (1/4 of a visitor day) and approximately 85% are non-local visitors, accounting for 956 annual visitor days. For alternative A, the 9,356 annual non-local visitor days associated with wildlife viewing generate $428,200 in visitor spending in Coos and Oxford Counties. This spending directly accounts for $351,400 in local output, 5.5 jobs, and $127,000 in personal income in the local economy. The secondary or multiplier effects generate an additional $122,000 in local output, 1.6 jobs, and $39,200 in personal income. Accounting for both the direct and secondary effects, spending by non-local wildlife viewing visitors for alternative A generates total economic impacts of $473,400 in local output, 7.1 jobs and $166,200 in personal income.

Other Activities (Snowmobiling)

With hundreds of miles of groomed trails, the Umbagog area is know as the "Snowmobile Capital" of the Northeast (Umbagog Chamber of Commerce 2005). As shown in table G.6, the annual number of visitors snowmobiling on the refuge includes 20,000 visits. Approximately 60% are non-local visitors that quickly pass through refuge lands (within an hour) while riding on the regional trail system thus accounting for 1,500 annual non-local visitor days. The NSHFWR is focused on wildlife-associated recreational activities and does not report trip related spending for snowmobile visitors. Snowmobiling is not considered to be a compatible use on most National Wildlife Refuges and spending by refuge snowmobile visitors was not included in the Banking on Nature economic impact estimates of refuge visitation. To estimate the economic impacts of refuge snowmobile visitors, we used the spending estimates from the recent report *The Impact of Spending by Snowmobiliers on New Hampshire's Economy during the 2002-03 Season* conducted by the Institute for New Hampshire Studies at Plymouth State University (Okrant and Goss 2003). Results showed that New Hampshire resident snowmobile participants spent approximately $66 per visitor day, while out-of-state snowmobile participants visiting New Hampshire spent nearly $88 per visitor day during the 2002-2003 season (Okrant and Goss 2003). For our analysis, non-local resident visitors (from Maine and New Hampshire) matched the New Hampshire resident profile definition and nonresidents matched the nonresident spending profile definition. Refuge personnel estimate that 55% of the 1,500 annual non-local snowmobile visitor days are non-local New Hampshire and Maine residents and 45% are nonresident visitors. For alternative A, the 1,500 annual non-local visitor days associated with snowmobiling generate $114,100 in visitor spending in Coos and Oxford Counties. This spending directly accounts for $94,100 in local output, 1.4 jobs, and $32,400 in personal income in the local economy. The secondary or multiplier effects generate an additional $33,000 in local output, half of a job, and $10,500 in personal income. Accounting for both the direct and secondary effects, spending by non-local snowmobiling visitors for alternative A generates total economic impacts of $127,100 in local output, 1.9 jobs and $42,900 in personal income.

Cumulative Impacts from Refuge Visitation for Alternative A

Table G.7 summarizes the total economic impacts associated with current non-local visitation for alternative A. Accounting for both the direct and secondary effects, spending by non-local refuge visitors for alternative A generates total annual economic impacts of $1.05 million in local output, $365,400 in personal income, and 15.6 jobs.

Table G.7. Annual impacts of non-local visitor spending for alternative A (2005 $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects			
Fishing	$212.0	$76.6	3.2
Hunting	$119.3	$41.9	1.9
Wildlife viewing	$351.4	$127.0	5.5
Other (snowmobiling)	$94.1	$32.4	1.4
Secondary effects			
Fishing	$73.6	$23.8	1.0
Hunting	$43.9	$14.0	0.5
Wildlife viewing	$122.0	$39.2	1.6
Other (snowmobiling)	$33.0	$10.5	0.5
Total effects			
Fishing	$285.7	$100.4	4.2
Hunting	$163.3	$55.9	2.4
Wildlife viewing	$473.4	$166.2	7.1
Other (snowmobiling)	$127.1	$42.9	1.9
Total economic impact	**$1,049.4**	**$365.4**	**15.6**

Impacts from Refuge Administration

Staff – personal purchases

Employees of Lake Umbagog NWR reside and spend their salaries on daily living expenses in communities near the refuge thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals/households to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household 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 current approved refuge staff consists of ten permanent and nine seasonal employees for alternative A (table G.8). Five of the permanent positions are currently vacant but are anticipated to be filled under alternative A.

Table G.8. Current Approved Staff (alternative A)

Refuge Manager
Deputy Refuge Manager
Administrative Support Assistant
Biologist
Maintenance Worker
Outdoor Recreation Planner (vacant)
Park Ranger (vacant)
Maintenance Worker (vacant)
Forester (vacant)
Biologist (vacant)
Biological Technician (seasonal)
3 Summer Interns (seasonal)
YCC Crew leader (seasonal)
4 YCC interns (seasonal)

Based on FY 2005 salary charts, it was estimated that annual salaries for alternative A would total over $721,000. Table G.9 shows the economic impacts associated with spending of salaries in Coos and Oxford Counties by refuge employees under alternative A. For alternative A, salary spending by refuge personnel would directly account for $541,300 in local output (sales or revenue), 3.8 jobs, and $89,000 in personal income in the local economy. The secondary or multiplier effects would generate an additional $91,800 in local output, 1.2 jobs, and $30,300 in personal income. Accounting for both the direct and secondary effects, salary spending by refuge personnel for alternative A would generate total economic impacts of $633,100 in local output, 5 jobs and $119,300 in personal income.

Table G.9. Annual local economic impacts of salary spending by refuge personnel (2005, $000)

	Local Output	**Personal Income**	**Employment (# jobs)**
Direct effects	$541.3	$89.0	3.8
Secondary effects	$91.8	$30.3	1.2
Total economic impact	**$633.1**	**$119.3**	**5.0**

Work-related purchases

A wide variety of supplies and services are purchased for refuge operations and maintenance activities. Refuge purchases made in Coos and Oxford Counties, contribute to the local economic impacts associated with the refuge. According to refuge records, approximately 78% of the annual non-salary budget expenditures are spent on goods and services purchased in Coos and Oxford

Counties. Major local expenditures include: supplies and services related to building maintenance and construction; auto repairs, parts, and fuel; and utilities. In 2003, refuge non-salary budget was about $72,500. Non salary expenditures for alternative A are anticipated to increase by roughly 19% (in proportion with the increase in salaries) to $139,400 annually. Table G.10 shows the economic impacts associated with work related expenditures in Coos and Oxford Counties. For alternative A, work related expenditures would directly account for $92,900 in local output, 1.1 jobs, and $32,300 in personal income in the local economy. Accounting for both the direct and secondary effects, work related purchases for alternative A would generate total economic impacts of $126,500 in local output, 1.5 jobs and $43,500 in personal income.

Table G.10. Local economic impacts of refuge related purchases for alternative A (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$92.9	$32.3	1.1
Secondary effects	$33.6	$11.2	0.4
Total economic impact	**$126.5**	**$43.5**	**1.5**

Impacts from Habitat Management

Refuge timber harvest contributions in local economy

No timber harvesting occurs under alternative A.

Summary of Economic Impacts for Alternative A

Table G.11 summarizes the direct and total economic impacts of all refuge management activities for alternative A in Coos and Oxford Counties. Under alternative A, refuge management activities directly related to all refuge operations generate an estimated $1.45 million in local output, 17.7 jobs and $425,300 in personal income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of $1.86 million in local output, 23.1 jobs and $558,900 in personal income. In 2000, total personal income was estimated at $2.16 billion and total employment was estimated at 36,874 jobs for Coos and Oxford Counties (U.S. Department of Commerce 2002). Total economic impacts associated with refuge operations under alternative A represent well less than one percent of total income (0.03%) and total employment (0.1%) in the overall Coos County and Oxford County economy. Total economic effects of refuge operations play a much larger role in the smaller communities near the refuge such as Errol, NH and Upton ME where most of the refuge related economic activity occurs as compared to the overall two county economy.

Table G.11. Economic impacts of all refuge management activities for alternative A (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
	Refuge Revenue Sharing		
Direct Effects	$37.6	$26.1	0.8
Total Effects	$51.7	$30.8	1.0
	Refuge Administration (staff salary spending and work related purchases)		
Direct Effects	$634.2	$121.3	4.9
Total Effects	$759.7	$162.8	6.5
	Public Use Activities		
Direct Effects	$776.9	$277.9	12.0
Total Effects	$1,049.4	$365.4	15.6
	Habitat Management (timber harvesting)		
Direct Effects	*No timber harvesting occurs under alternative A*		
Total Effects			
	Aggregate Impacts		
Direct Effects	$1,448.7	$425.3	17.7
Total Effects	$1,860.8	$558.9	23.1

Economic Impacts of Alternative B

Impacts from Proposed Land Acquisition and Protection Measures

Property tax impacts and refuge revenue sharing

The proposed acquisition of lands to be acquired as a fee simple acquisition will have an effect on the amount of local property taxes collected as land is transferred from private taxable ownership to public nontaxable ownership. Although lands acquired by means of fee simple acquisition by the Service are removed from the tax rolls, the local taxing entities will receive an annual payment, under provisions of the Refuge Revenue Sharing Act. Payments to local towns are based on the greater of 75 cents per acre or 0.75% of the market value of lands acquired by the Service. The exact amount of the annual RRS payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In the most recent fiscal year (FY05), actual RRS payments were 41% of authorized levels. Lands acquired by conservation easements would remain in private ownership subject to appropriate property taxes, and RRS payments would not apply.

The loss in local property tax revenue was estimated by using the 2005 current value assessments for each land type to be acquired by fee simple acquisition and the 2005 tax rates for each potentially

affected community. As an incentive to discourage development, Maine's Tree Growth Tax Law and New Hampshire's Current Use Program assess forest land values on the basis of its current use (rather than the highest and best use). For Oxford County, Maine the 2005 assessment rates per acre were $162.80 for softwood, $121.10 for mixed wood, and $98.60 for hardwood. Each of the townships in Maine has an established value for wetlands which in 2005 ranged from $100/acre for Magalloway to $360/acre for Upton. The Current Use Program for New Hampshire provides a range of values per acre for the habitat classification types of white pine, hardwood, all other woods, and unproductive lands. To be consistent with how the State of New Hampshire calculates payments of State lands to towns, we used the average value of $71.50/acre for the 'all other wood' classification as the overall value of a forestland acre in New Hampshire. The unproductive lands valuation of $15/acre was used to estimate the value of wetland acres in New Hampshire.

RRS payments were calculated at the full appropriated and FY05 authorized funding levels. Market value for lands in the acquisition area was estimated at $500/acre based on recent forest land sales to the refuge. Table G.12 shows the estimated change in property taxes collected and the RRS Payments for lands to be acquired as a fee simple acquisition under alternative B. Land acquisition under alternative B will result in an annual loss of $30,511 in property tax collections in Coos and Oxford Counties. RRS payments at the current authorized funding level of 41% would result in an annual payment of $49,444 which would offset the loss in property tax collections and result in an annual net increase of $18,934. Upton, Maine is the only town that would experience an actual net loss of $1,377 annually. Cambridge, NH does not assess property taxes and would benefit the most from the RRS payments under alternative B.

Table G.12. Impacts for lands to be acquired as a fee simple acquisition for alternative B

Township	Tax Assessed Values	Change in Taxes Collected	Full Refuge Revenue Sharing (RRS) Payment	41% of RRS Payment	Overall Change in Taxes Collected Net of 41% RRS Payments
Grafton, ME	$358,810	-$3,061	$9,334	$3,827	+$766
Lincoln Plantation, ME	$0	$0	$0	$0	$0
Magalloway Plantation, Me	$682,436	-$4,095	$18,416	$7,551	+$3,456
Upton, ME	$1,691,442	-$18,322	$41,329	$16,945	-$1,377
Cambridge, NH	$443,583	$0	$26,824	$10,998	+$10,998
Errol , NH	$339,682	-$4,243	$19,268	$7,900	+$3,657
Wentworth Location, NH	$101,031	-$791	$5,426	$2,225	+$1,434
Totals	**$3,616,984**	**-$30,511**	**$120,596**	**$49,444**	**+$18,934**

Accounting for the current RRS payments of $37,646 (alternative A) and the $49,444 increase for new land acquisition, RRS payments would total $87,090 under alternative B. Table G.13 shows the resulting economic impacts of RRS payments under alternative B. Accounting for both the direct and secondary effects, RRS payments for alternative B would generate total annual economic impacts of $119,700 in local output, $71,200 in personal income, and 2.3 jobs in Coos

and Oxford Counties. A portion ($30,511) of the increase in RRS payments under alternative B offsets the loss in private property tax collections which does not represent a real increase economic activity to the area. Accounting for the loss in property tax collections, RRS payments under alternative B would generate new total economic impacts of $77,800 in local output, 1.5 jobs, and $46,200 in personal income.

Table G.13. Annual impacts from refuge revenue sharing payments for alternative B (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$87.1	$60.5	1.9
Secondary effects	$32.6	$10.7	0.4
Total economic impact	**$119.7**	**$71.2**	**2.3**

Impacts from Public Use and Access Management

Refuge visitor expenditures in local economy

Changes in refuge management activities can affect recreational opportunities offered and visitation levels. Table G.14 shows the estimated visitation levels associated with each visitor activity for alternative B. Under alternative B, visitation is anticipated to increase for all activities compared to alternative A (table G.6). The increases in visitation levels are due to refuge land acquisition, additional public use infrastructure, and regional visitation trends. Specific details for each activity are explained below.

Table G.14. Estimated annual refuge visitation by visitor activity for alternative B

Visitor Activity	Total # of visits	Percentage (%) of non-local visits	Total # of non-local visits	Number of hours spent at refuge	Number of non-local visitor days[1]
Consumptive Use					
Fishing	14,000	70%	9,800	8	9,800
Big Game hunting	6,250	67%	4,188	8	4,188
Upland game hunting	7,500	67%	5,025	8	5,025
Waterfowl and migratory bird hunting	200	60%	120	8	120
Non-Consumptive Use					
Wildlife viewing: boating/water use	18,000	60%	10,800	8	10,800
Wildlife viewing: nature trails and other wildlife observation	10,000	85%	8,500	2	2,125
Other recreation (snowmobiling)	35,000	60%	21,000	4	10,500
Total	**90,950**		**59,433**		**42,558**

Fishing

The increase in fishing visitors under alternative B is based on refuge land acquisition that would provide more fishing opportunities on the refuge, increasing fishing related visitation by 3,000 visits as compared to alternative A. The increased level of fishing visitors are all transfers of visitors from other lands to refuge lands. As shown in table G.14, the annual number of visitors fishing on the refuge under alternative B would account for 9,800 annual non-local visitor days. For alternative B, annual non-local refuge anglers would spend almost $349,600 in Coos and Oxford Counties. This spending would directly account for $269,900 in local output, 4.1 jobs, and $97,500 in personal income in the local economy. The secondary or multiplier effects would generate an additional $93,700 in local output, 1.2 jobs, and $30,300 in personal income. Accounting for both the direct and secondary effects, spending by non-local anglers for alternative B would generate total economic impacts of $363,600 in local output, 5.3 jobs and $127,800 in personal income. The increase in visitation was based on the number of people that currently fish on lands that will be acquired by the refuge which is not a real increase in visitation or economic activity to the area. However, the refuge land acquisition maintains fishing access that is not guaranteed under alternative A.

Hunting

The increase hunting visitors under alternative B is based on refuge land acquisition that would provide more hunting opportunities on the refuge. It is anticipated that hunting related visits under alternative B would increase by 3,700 for big game, 50 for migratory birds, and 4,500 for upland game as compared to alternative A. As shown in table G.14, the annual number of hunting visitors on the refuge under alternative B would account for 4,188 non-local big game hunter visitor days, 5,025 non-local upland game hunter visitor days, and 120 non-local migratory bird hunter visitor days. For alternative B, annual non-local refuge hunters would spend almost $389,800 in Coos and Oxford Counties. This spending would directly account for $292,700 in local output, 4.5 jobs, and $102,800 in personal income in the local economy. The secondary or multiplier effects would generate an additional $107,800 in local output, 1.4 jobs, and $34,400 in personal income. Accounting for both the direct and secondary effects, spending by non-local hunters for alternative B would generate total economic impacts of $400,400 in local output, 5.9 jobs and $137,100 in personal income. The increase in visitation was based on the number of people that currently hunt on lands that will be acquired by the refuge which is not a real increase in visitation or economic activity to the area. However, the refuge land acquisition maintains hunting access that is not guaranteed under alternative A.

Wildlife Viewing

Regional visitation trends indicate more people are participating in non-consumptive recreation (New Hampshire Office of State Planning 2003; Shapiro and Kroll 2003). It is anticipated that wildlife viewing related visits under alternative B would increase by 4,000 for boating and water use activities, and 5,500 for nature trails and other wildlife observation. As shown in table G.14, the annual number of wildlife viewing visitors on the refuge under alternative B would account for 10,800 non-local boating and water use visitor days and 2,125 non-local nature trails and other wildlife observation visits visitor days for an increase of 3,569 wildlife viewing related visitor days as compared to

alternative A. For alternative B, annual non-local refuge wildlife viewers would spend almost $591,600 in Coos and Oxford Counties. This spending would directly account for $485,400 in local output, 7.6 jobs, and $175,500 in personal income in the local economy. The secondary or multiplier effects would generate an additional $168,500 in local output, 2.3 jobs, and $54,100 in personal income. Accounting for both the direct and secondary effects, spending by non-local wildlife viewers for alternative B would generate total economic impacts of $653,900 in local output, 9.9 jobs and $229,600 in personal income.

The increase in boating and water use visits was based on the increasing trend in water related recreation. This is an actual increase in visitation and economic activity to the area, rather than a transfer from non-refuge lands due to refuge land acquisition. Half of the increase for nature trails and wildlife observation visits was based on the additional public use infrastructure the refuge will be adding under alternative B as well as the growing regional trend in nature trail use, while the other half of the increase was based on refuge land acquisition leading to more places on the refuge to hike and observe wildlife. Therefore, all of the increased boating and water use visits and half of the nature trails and other wildlife observation visits are new visits, accounting for 2,985 more visitor days compared to alternative A that generate new economic activity to the area. The other half of nature trails and other wildlife observation visits are transfers of visitors from other lands to refuge lands, accounting for 584 more visitor days compared to alternative A that are not a real increase in visitation or economic activity to the area.

Other Activities

The increase snowmobiling visits under alternative B is based on refuge land acquisition that would provide more snowmobiling opportunities on refuge lands, increasing snowmobile related visits by 15,000 and increasing the time spent on refuge lands from one hour to four hours as compared to alternative A. This increase was based on the number of people that currently snowmobile on lands that will be acquired by the refuge. As shown in table G.14, the annual number of visitors snowmobiling on the refuge under alternative B would account for 10,500 annual non-local visitor days. For alternative B, annual non-local refuge snowmobiliers would spend $798,700 in Coos and Oxford Counties. This spending would directly account for $658,900 in local output, 9.9 jobs, and $226,600 in personal income in the local economy. The secondary or multiplier effects would generate an additional $230,900 in local output, 3.1 jobs, and $73,500 in personal income. Accounting for both the direct and secondary effects, spending by non-local snowmobiliers for alternative B would generate total economic impacts of $889,800 in local output, 13 jobs and $300,000 in personal income. The increased levels of snowmobile visits are all transfers of visitors from other lands to refuge lands, not an increase in visitation or economic activity to the area. However, the refuge land acquisition maintains snowmobile access that is not guaranteed under alternative A.

Cumulative Impacts from Refuge Visitation for Alternative B

Table F.15 summarizes the total economic impacts associated with projected non-local visitation for alternative B. Accounting for both the direct and secondary effects, spending by non-local refuge

visitors for alternative B would generate total economic impacts of $2.31 million in local output, $794,600 in personal income, and 34.1 jobs. Most of the increase in visitation is based on the number of people that currently recreate on lands that will be acquired by the refuge. Therefore, it is not a real increase in visitation or economic activity to the area. However, the refuge land acquisition maintains recreation access that is not guaranteed under alternative A. Of the increase in visitation under alternative B, 2,985 out of the 3,569 wildlife viewing related visitor days would be an actual increase in visitation and economic activity to the area that would generate total economic impacts of $150,900 in local output, 2.4 jobs and $53,000 in personal income.

Table G.15. Annual impacts of non-local visitor spending for alternative B (2005 $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects			
Fishing	$269.9	$97.5	4.1
Hunting	$292.7	$102.8	4.5
Wildlife viewing	$485.4	$175.5	7.6
Other (snowmobiling)	$658.9	$226.6	9.9
Secondary effects			
Fishing	$93.7	$30.3	1.2
Hunting	$107.8	$34.4	1.4
Wildlife viewing	$168.5	$54.1	2.3
Other (snowmobiling)	$230.9	$73.5	3.1
Total effects			
Fishing	$363.6	$127.8	5.3
Hunting	$400.4	$137.1	5.9
Wildlife viewing	$653.9	$229.6	9.9
Other (snowmobiling)	$889.8	$300.0	13.0
Total economic impact	**$2,307.7**	**$794.6**	**34.1**

Impacts from Refuge Administration

Staff – personal purchases

Proposed staff for alternative B includes all approved staff positions (alternative A, table G.8) plus an additional three permanent and four seasonal positions. The new permanent positions are: Business/Facilities Manager, Forester, and LMRD Coordinator. The new seasonal positions are for a Biological Technician, Maintenance Worker, an Assistant Outdoor Recreational Planner,

and a Summer Intern. Table G.16 shows the economic impacts associated with spending of salaries in Coos and Oxford Counties by refuge employees under alternative B. For alternative B, salary spending by refuge personnel would directly account for $777,800 in local output, 5.4 jobs, and $127,900 in personal income in the local economy. The secondary or multiplier effects would generate an additional $131,900 in local output, 1.8 jobs, and $43,500 in personal income. Accounting for both the direct and secondary effects, salary spending by refuge personnel for alternative B would generate total economic impacts of over $909,700 in local output, 7.2 jobs and $171,400 in personal income. Due to the increased staffing levels for alternative B, the associated economic effects of staff salary spending would generate $276,500 more in local output, 2.2 more jobs, and $52,100 more in personal income than alternative A.

Table G.16. Local economic impacts of salary spending by refuge personnel for Alt. B (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$777.8	$127.9	5.4
Secondary effects	$131.9	$43.5	1.8
Total economic impact	**$909.7**	**$171.4**	**7.2**

Work-related purchases

Non salary expenditures for alternative B are anticipated to increase in proportion with the salary increase for the new staff positions for a total annual non salary budget $212,600 (in 2005 dollars). Table G.17 shows the economic impacts associated with work related expenditures in Coos and Oxford Counties for alternative B. These estimates assume 78% of the non-salary budget will be spent on goods and services purchased in Coos and Oxford Counties (same as current and alternative A). Work related expenditures under alternative B would directly account for $141,700 in local output, 1.6 jobs, and $49,300 in personal income in the local economy. Accounting for both the direct and secondary effects, work related purchases for alternative B would generate a total economic impact of $193,000 in local output, 2.3 jobs and $66,300 in personal income. Due to the increased non-salary expenditures for alternative B, the associated economic effects of work related purchases would generate $66,500 more in local output, 0.8 more of a job, and $22,900 more in personal income than alternative A.

Table G.17. Local economic impacts of refuge related purchases for alternative B (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$141.7	$49.3	1.6
Secondary effects	$51.3	$17.0	0.7
Total economic impact	**$193.0**	**$66.3**	**2.3**

Impacts from Habitat Management

Refuge timber harvest contributions in local economy

Refuge timber harvest quantities for alternative B are based on a 15% management unit harvest in 15 year intervals. Table G.18 shows the average annual harvest quantities for the 15 year harvest cycle

and the associated annual stumpage revenue. Average annual sawtimber, pulp, and fuelwood harvest quantities were determined by refuge personnel. Annual harvest quantities were based on two major assumptions: 1) harvest numbers were based on current refuge lands at current stocking volumes; and, 2) as land is acquired (over the next 15 year period) those lands would have been harvested by the private owner prior to sale. Stocking volumes on these lands are anticipated to be low and not allow additional harvest within the 15 year planning horizon of this CCP. All economic gains would be realized by the private owner prior to Service ownership. Estimated revenues were based stumpage value estimates for northern New Hampshire (New Hampshire Department of Revenue 2005). The revenue estimates account for the stumpage values of the different species types (by percent of composition) within the refuge harvest. Over the 15 year refuge harvest cycle, an annual average of 135 MBF of softwood sawtimber, 27 MBF of hardwood sawtimber, 125.3 cords of softwood pulp, 371.3 cords of hardwood pulp, and 88.4 cords of fuelwood would be harvested with stumpage valued at $27,700. Total sawtimber, pulp and fuelwood product resulting from timber activities in Coos and Oxford County was estimated to be 657,000 CCF in 2002 (US Forest Service Timber Products Output Data 2002). The total annual harvest quantity under alternative B represents 0.1% of this total.

Table G.18. Average annual refuge timber quantities and revenue for alternative B (2005, $,000)

	Units	Quantity Harvested	Revenue
Softwood Sawtimber	MBF	135.0	$16.8
Softwood Pulp	Cords	125.3	$1.1
Hardwood Sawtimber	MBF	27.0	$5.1
Hardwood Pulp	Cords	371.3	$3.7
Fuelwood	Cords	88.4	$0.9
Total			**$27.7**

In order to estimate the economic impact of the refuge timber harvest on the local economy, the value added to refuge stumpage during harvest and primary processing must be estimated. New Hampshire Department of Resources and Economic Development and the Maine Forest Service assisted with the identification of the forest products sectors in Coos and Oxford Counties that use would use refuge stumpage in the production process and the proportion of volume that would be processed locally. The U.S.D.A. Forest Service Inventory and Monitoring Institute helped us adjust the IMPLAN model data to better reflect the timber production flows in the local economy (Winter, personal comm., 2005).

The economic impacts associated with timber production in Coos and Oxford Counties from refuge stumpage for alternative B are shown in table G.19. Timber production in Coos and Oxford related to refuge harvests would directly account for $21,200 in local output, one-tenth of job (0.1), and $2,800 in personal income in the local economy. The value of local output is lower than the stumpage revenue reported in table G.18 because a portion of the refuge stumpage will be exported outside the local economy for processing. Accounting for both the direct and secondary effects, timber production related to refuge harvests for alternative B would generate a total economic impact of $24,500 in local output, one-tenth of job and $4,000 in personal income. As previously shown in table G.4, forest-based industries in Coos and Oxford Counties generated over $1.16 billion in local output and 4,148 jobs in 2002. Therefore, timber production related to refuge harvests for alternative

B would have a very insignificant role in the Coos and Oxford Counties forest related industries, accounting for less than 0.003% of local output and employment.

Table G.19.Average annual economic impacts of the refuge timber harvest for alternative B (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$18.6	$2.4	0.1
Secondary effects	$5.8	$1.6	0
Total economic impact	**$24.5**	**$4.0**	**0.1**

Summary of Economic Impacts for Alternative B

Table G.20 summarizes the direct and total economic impacts of all refuge management activities for alternative B in Coos and Oxford Counties. Under alternative B, refuge management activities directly related to all refuge operations generate an estimated $2.73 million in local output, 35.1 jobs and $842,400 in personal income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of $3.56 million in local output, 46 jobs and $1.11 million in personal income. Total economic impacts associated with refuge operations under alternative B represent less than one percent of total income (0.05%) and total employment (0.11%) in the overall Coos County and Oxford County economy. Total economic effects of refuge operations play a much larger role in the smaller communities near the refuge such as Errol, NH and Upton ME where most of the refuge related economic activity occurs as compared to the overall two county economy.

Table G.20.Summary of all refuge management activities for alternative B (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Refuge Revenue Sharing			
Direct Effects	$87.1	$60.5	1.9
Total Effects	$119.7	$71.2	2.3
Refuge Administration (staff salary spending and work related purchases)			
Direct Effects	$919.5	$177.2	7.0
Total Effects	$1,102.7	$237.7	9.5
Public Use Activities			
Direct Effects	$1,706.8	$602.3	26.1
Total Effects	$2,307.7	$794.6	34.1
Habitat Management (timber harvesting)			
Direct Effects	$18.6	$2.4	0.1
Total Effects	$24.5	$4.0	0.1
Aggregate Impacts			
Direct Effects	$2,732.1	$842.4	35.1
Total Effects	$3,554.6	$1,107.4	46.0

Table G.21 summarizes the change in economic effects associated with refuge operations under alternative B as compared to alternative A. As described in the RRS section above, a portion of the increase in RRS payments under alternative B offsets the loss in private property tax collections which does not represent a real increase economic activity to the area. The economic impacts associated with refuge administration and timer harvesting represent new economic activity. As described in the cumulative impacts of refuge visitation section above, most of the increase in public use activities is based on the number of people that currently recreate on lands that will be acquired by the refuge and do not represent a real increase in visitation or economic activity to the area. However, the refuge land acquisition under alternative B maintains recreation access that is not guaranteed under alternative A.

Table G.21.Change in economic impacts under alternative B compared to alternative A (2005, $000).

	Local Output	Personal Income	Employment (# jobs)
	Refuge Revenue Sharing		
Direct Effects	+$49.4	+$34.3	+1.1
Total Effects	+$67.9	+$40.4	+1.3
	Refuge Administration (staff salary spending and work related purchases)		
Direct Effects	+$285.3	+$55.9	+2.1
Total Effects	+$343.0	+$75.0	+3.0
	Public Use Activities		
Direct Effects	+$930.0	+$324.4	+14.1
Total Effects	+$1,258.3	+$429.2	+18.5
	Habitat Management (timber harvesting)		
Direct Effects	+$18.6	+$2.4	+0.1
Total Effects	+$24.5	+$4.0	+0.1
	Aggregate Impacts		
Direct Effects	+$1,283.3	+$417.0	+17.4
Total Effects	+$1,693.8	+$548.5	+22.9

Economic Impacts of Alternative C

Impacts from Proposed Land Acquisition and Protection Measures

Property tax impacts and Refuge revenue sharing

The proposed acquisition of lands to be acquired as a fee simple acquisition will have an effect on the amount of local property taxes collected as land is transferred from private taxable ownership to public nontaxable ownership. Although lands acquired by means of fee simple acquisition by the Service are removed from the tax rolls, the local taxing entities will receive an annual payment,

under provisions of the Refuge Revenue Sharing Act. Payments to local towns are based on the greater of 75 cents per acre or 0.75% of the market value of lands acquired by the Service. The exact amount of the annual RRS payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In the most recent fiscal year (FY05), actual RRS payments were 41% of authorized levels. Lands acquired by conservation easements would remain in private ownership subject to appropriate property taxes, and RRS payments would not apply.

As explained for alternative B, the loss in local property tax revenue was estimated by using the 2005 current value assessments for each land type to be acquired by fee simple acquisition and the 2005 tax rates for each potentially affected community. RRS payments were calculated at the full appropriated and FY05 authorized funding levels. Table G.22 shows the estimated change in property taxes collected and the RRS Payments for lands to be acquired as a fee simple acquisition under alternative C. Land acquisition under alternative C will result in an annual loss of $51,628 in property tax collections in Coos and Oxford Counties. RRS payments at the current authorized funding level of 41% would result in an annual payment of $117,317 which would offset the loss in property tax collections and result in an annual net increase of $65,689. No town would experience an actual net loss in collections. Cambridge, NH does not assess property taxes and would benefit the most from the RRS payments under alternative C.

Table G.22. Property tax impacts from acquisition of privately owned lands for alternative C.

Township	Tax Assessed Values	Change in Taxes Collected	Full Refuge Revenue Sharing (RRS) Payment	41% of RRS Payment	Overall Change in Taxes Collected Net of 41% RRS Payments
Grafton, ME	$1,176,452	-$10,035	$37,166	$15,238	+$5,203
Lincoln Plantation, ME	$147,885	-$784	$4,530	$1,857	+$1,074
Magalloway Plantation, Me	$1,382,969	-$8,298	$44,284	$18,156	+$9,859
Upton, ME	$2,241,212	-$24,277	$65,213	$26,737	+$2,460
Cambridge, NH	$1,677,018	$0	$93,645	$38,394	+$38,394
Errol , NH	$497,975	-$6,220	$27,596	$11,314	+$5,095
Wentworth Location, NH	$257,321	-$2,015	$13,706	$5,620	+$3,605
Totals	**$7,380,832**	**-$51,628**	**$286,140**	**$117,317**	**+$65,689**

Accounting for the current RRS payments of $37,646 (alternative A) and the $117,317 increase for new land acquisition, RRS payments would total $154,963 under alternative C. Table G.23 shows the resulting economic impacts of RRS payments under alternative C. Accounting for both the direct and secondary effects, RRS payments for alternative C would generate total annual economic impacts of $212,900 in local output, 4.2 jobs, and $126,600 in personal income in Coos and Oxford Counties. A portion ($51,628) of the increase in RRS payments under alternative C offsets the loss in private property tax collections which does not represent a real increase

economic activity to the area. Accounting for the loss in property tax collections, RRS payments under alternative C would generate new total economic impacts of $103,300 in local output, 2.8 jobs, and $84,400 in personal income.

Table G.23. Annual impacts from refuge revenue sharing payments for alternative C (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$155.0	$107.6	3.4
Secondary effects	$57.9	$19.0	0.8
Total economic impact	**$212.9**	**$126.6**	**4.2**

Impacts from Public Use and Access Management

Refuge visitor expenditures in local economy

Table G.24 shows the estimated visitation levels associated with each visitor activity for alternative C. Under alternative C, visitation is anticipated to increase for all activities as compared to alternative A (table G.6). The increase in visitation is due to refuge land acquisition, additional public use infrastructure, and regional visitation trends. Specific details for each activity are explained below.

Table G.24. Estimated annual refuge visitation by visitor activity for alternative C

Visitor Activity	Total # of visits	Percentage (%) of non-local visits	Total # of non-local visits	Number of hours spent at refuge	Number of non-local visitor days[1]
Consumptive Use					
Fishing	14,000	70%	9,800	8	9,800
Big Game hunting	7,500	67%	5,025	8	5,025
Upland game hunting	9,000	67%	6,030	8	6,030
Waterfowl and migratory bird hunting	200	60%	120	8	120
Non-Consumptive Use					
Wildlife viewing: boating/water use	18,000	60%	10,800	8	10,800
Wildlife viewing: nature trails and other wildlife observation	10,000	85%	8,500	2	2,125
Other recreation (snowmobiling)	35,000	60%	21,000	4	10,500
Total	**93,700**		**61,275**		**44,400**

Fishing

Same as alternative B.

Hunting

More land would be acquired under alternative C as compared to alternative B which would increase the number of big game and upland game hunting opportunities on refuge owned lands. The number of migratory bird hunters allowed under alternative C would stay the same as alternative B. It is anticipated that hunting related visits under alternative B would increase by 5,000 for big game, 50 for migratory birds, and 6,000 for upland game as compared to alternative A. This would be an increase of 1,250 big game and 1,500 upland game hunters compared to alternative B. As shown in Table G.24, the annual number of hunting visitors on the refuge under alternative C would account for 5,025 non-local big game hunter visitor days, 6,030 non-local upland game hunter visitor days, and 120 non-local migratory bird hunter visitor days. For alternative C, annual non-local refuge hunters would spend $466,100 in Coos and Oxford Counties. This spending would directly account for $350,000 in local output, 5.4 jobs, and $122,900 in personal income in the local economy. The secondary or multiplier effects would generate an additional $128,900 in local output, 1.7 jobs, and $41,100 in personal income. Accounting for both the direct and secondary effects, spending by non-local hunters for alternative B would generate total economic impacts of $478,900 in local output, 7.1 jobs, and $164,000 in personal income. The increase in visitation was based on the number of people that currently hunt on lands that will be acquired by the refuge. Therefore, it is not a real increase in visitation or economic activity to the area. However, the refuge land acquisition maintains hunting access that is not guaranteed under alternative A.

Wildlife Viewing

Same as alternative B.

Other Activities

Same as alternative B.

Cumulative Impacts from Refuge Visitation for Alternative C

Table G.25 summarizes the total economic impacts associated with projected non-local visitation for alternative C. Accounting for both the direct and secondary effects, spending by non-local refuge visitors for alternative C would generate total economic impacts of $2.39 million in local output, $821,500 in personal income, and 35.3 jobs. Most of the increase in visitation is based on the number of people that currently recreate on lands that will be acquired by the refuge which is not a real increase in visitation or economic activity to the area. However, the refuge land acquisition maintains recreation access that is not guaranteed under alternative A. Of the increase in visitation under alternatives B and C, 2,985 out of the 3,569 wildlife viewing related visitor days would be an actual increase in visitation and economic activity to the area that would generate total economic impacts of $150,900 in local output, 2.4 jobs and $53,000 in personal income.

Table G.25. Annual impacts of non-local visitor spending for alternative C (2005 $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects			
Fishing	$269.9	$97.5	4.1
Hunting	$350.0	$122.9	5.4
Wildlife viewing	$485.4	$175.5	7.6
Other (snowmobiling)	$658.9	$226.6	9.9
Secondary effects			
Fishing	$93.7	$30.3	1.2
Hunting	$128.9	$41.1	1.7
Wildlife viewing	$168.5	$54.1	2.3
Other (snowmobiling)	$230.9	$73.5	3.1
Total effects			
Fishing	$363.6	$127.8	5.3
Hunting	$478.9	$164.0	7.1
Wildlife viewing	$653.9	$229.6	9.9
Other (snowmobiling)	$889.8	$300.0	13.0
Total economic impact	**$2,386.1**	**$821.5**	**35.3**

Impacts from Refuge Administration

Work-related purchases

Same as alternative B.

Staff – personal purchases

Same as alternative B.

Impacts from Habitat Management

Refuge timber harvest contributions in local economy

Refuge timber harvest quantities for alternative C are based on a 4% management unit harvest in 15 year intervals. The management unit that would be harvested under alternative C is equivalent to the management unit that would be harvested under alternative B. Therefore the only change in refuge timber harvesting between alternative B and C is the quantity harvested (the same composition of tree species would be harvested). Under alternative B, 15% of the management unit would be harvested in 15 year intervals as compared to only 4% under alternative C. Over the 15 year harvest cycle, the refuge harvest would produce approximately 25% of the quantity harvested for alternative B (table G.18) resulting in an annual harvest average of 33.8 MBF of softwood sawtimber, 6.8 MBF of hardwood sawtimber, 31.3 cords of softwood pulp, 92.8 cords of hardwood pulp, and 22.1 cords of fuelwood with stumpage valued $6,900.

Table G.26. Average annual economic impacts of the refuge timber harvest for alternative C (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Direct effects	$4.7	$0.6	0
Secondary effects	$1.5	$0.4	0
Total economic impact	**$6.1**	**$1.0**	**0**

The economic impacts associated with timber production in Coos and Oxford Counties from refuge stumpage for alternative C are shown in table G.26. Timber production in Coos and Oxford related to refuge harvests would directly account for $4,700 in local output and $600 in personal income in the local economy. The level of refuge timber production for alternative C is not large enough to generate any employment impacts. Accounting for both the direct and secondary effects, timber production related to refuge harvests for alternative C would generate a total economic impact of $ 6,100 in local output and $1,000 in personal income.

Summary of Economic Impacts for Alternative C

Table G.27 summarizes the direct and total economic impacts of all refuge management activities for alternative C in Coos and Oxford Counties. Under alternative C, refuge management activities directly related to all refuge operations generate an estimated $2.84 million in local output, 37.4 jobs and $908,000 in personal income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of $3.71 million in local output, 49 jobs and $1.19 million in personal income. Total economic impacts associated with refuge operations under alternative C represent less than one percent of total income (0.05%) and total employment (0.11%) in the overall Coos County and Oxford County economy. Total economic effects of refuge operations play a much larger role in the smaller communities near the refuge such as Errol, NH and Upton ME where most of the refuge related economic activity occurs as compared to the overall two county economy.

Table G.27.Summary of all refuge management activities for alternative C (2005, $,000)

	Local Output	Personal Income	Employment (# jobs)
Refuge Revenue Sharing			
Direct Effects	$155.0	$107.6	3.4
Total Effects	$212.9	$126.6	4.2
Refuge Administration (staff salary spending and work related purchases)			
Direct Effects	$919.5	$177.2	7.0
Total Effects	$1,102.7	$237.7	9.5
Public Use Activities			
Direct Effects	$1,764.2	$622.4	27.0
Total Effects	$2,386.1	$821.5	35.3
Habitat Management (timber harvesting)			
Direct Effects	$4.7	$0.6	0
Total Effects	$6.1	$1.0	0
Aggregate Impacts			
Direct Effects	$2,843.3	$907.8	37.4
Total Effects	$3,707.9	$1,186.8	49.0

Table G.28 summarizes the change in economic effects associated with refuge operations under alternative C as compared to alternative A. As illustrated in the RRS section above, a portion of the increase in RRS payments under alternative C offsets the loss in private property tax collections which does not represent a real increase economic activity to the area. The economic impacts associated with refuge administration and timer harvesting represent new economic activity. As illustrated in the cumulative impacts of refuge visitation section above, most of the increase in public use activities is based on the number of people that currently recreate on lands that will be acquired by the refuge and do not represent a real increase in visitation or economic activity to the area. However, the refuge land acquisition under alternative C maintains recreation access that is not guaranteed under alternative A.

Table G.28. Change in economic impacts under alternative C compared to alternative A (2005, $000)

	Local Output	Personal Income	Employment (# jobs)
	Refuge Revenue Sharing		
Direct Effects	+$117.3	+$81.5	+2.6
Total Effects	+$161.2	+$95.9	+3.2
	Refuge Administration (staff salary spending and work related purchases)		
Direct Effects	+$285.3	+$55.9	+2.1
Total Effects	+$343.0	+$75.0	+3.0
	Public Use Activities		
Direct Effects	+$987.3	+$344.6	+15.0
Total Effects	+$1,336.8	+$456.1	+19.7
	Habitat Management (timber harvesting)		
Direct Effects	+$4.7	+$0.6	0.0
Total Effects	+$6.1	+$1.0	0.0
	Aggregate Impacts		
Direct Effects	+$1,394.6	+$482.5	+19.7
Total Effects	+$1,847.1	+$627.9	+25.9

Summary and Conclusions

Under alternative A, refuge management activities directly related to all refuge operations generate an estimated $1.45 million in local output, 17.7 jobs and $425,300 in personal income in the local economy. Including direct, indirect, and induced effects, all refuge activities would generate total economic impacts of $1.86 million in local output, 23.1 jobs and $558,900 in personal income. The associated economic effects of alternatives B and C generate more output, jobs and income than alternative A. The economic impacts associated with refuge administration and timer harvesting under alternatives B and C represent new economic activity. A portion of the increase in RRS payments under alternatives B and C offsets the loss in private property tax collections which does not represent a real increase economic activity to the area. Most of the increase in public use activities under alternatives B and C are based on the number of people that currently recreate on lands that will be acquired by the refuge and do not represent a real increase in visitation or economic activity to the area. Total economic impacts associated with refuge operations under all management alternatives represent less than one percent of total income and total employment in the overall Coos County and Oxford County economy. Total economic effects of refuge operations play a much larger role in the smaller communities near the refuge such as Errol, NH and Upton ME where most of the refuge related economic activity occurs as compared to the overall two county economy.

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