SECTION 3 | TIMBER ACTIVITIES

44. This section addresses potential impacts to silviculture resulting from lynx conservation efforts. Approximately 9.4 million acres included in the study area (85 percent of total study area) are currently managed for timber harvest. Landowners that conduct silvicultural activities in the study area include both public and private timber companies, state and county land management agencies, and individuals. Two of the largest landowners are timber companies: JD Irving, Limited (1.13 million acres) and Plum Creek Timber Company (969,000 acres).

45. Impacts to timber activities have historically resulted from implementation of existing lynx conservation plans in Minnesota and Washington. In addition to these continuing impacts, under Scenario 1, this analysis forecasts the impact of minimal compliance with LCAS guidelines (e.g. preparing lynx management plans). Under Scenario 2, in addition to Scenario 1 costs, impacts are based on the assumption that landowners would comply with Lynx Conservation Assessment Strategy (LCAS) guidelines regarding pre-commercial thinning (effectively precluding investment in pre-commercial thinning) throughout the study area.[25] Total forecast impacts to timber activities over 20 years are summarized below.

Post-designation impacts in areas proposed for designation

- Undiscounted: $117 million to $809 million
- Present value applying a seven percent discount rate: $63.5 million - $210 million (annualized $6.0 million - $19.8 million)
- Present value applying a three percent discount rate: $78.1 million - $348 million (annualized $5.3 million - $23.4 million)

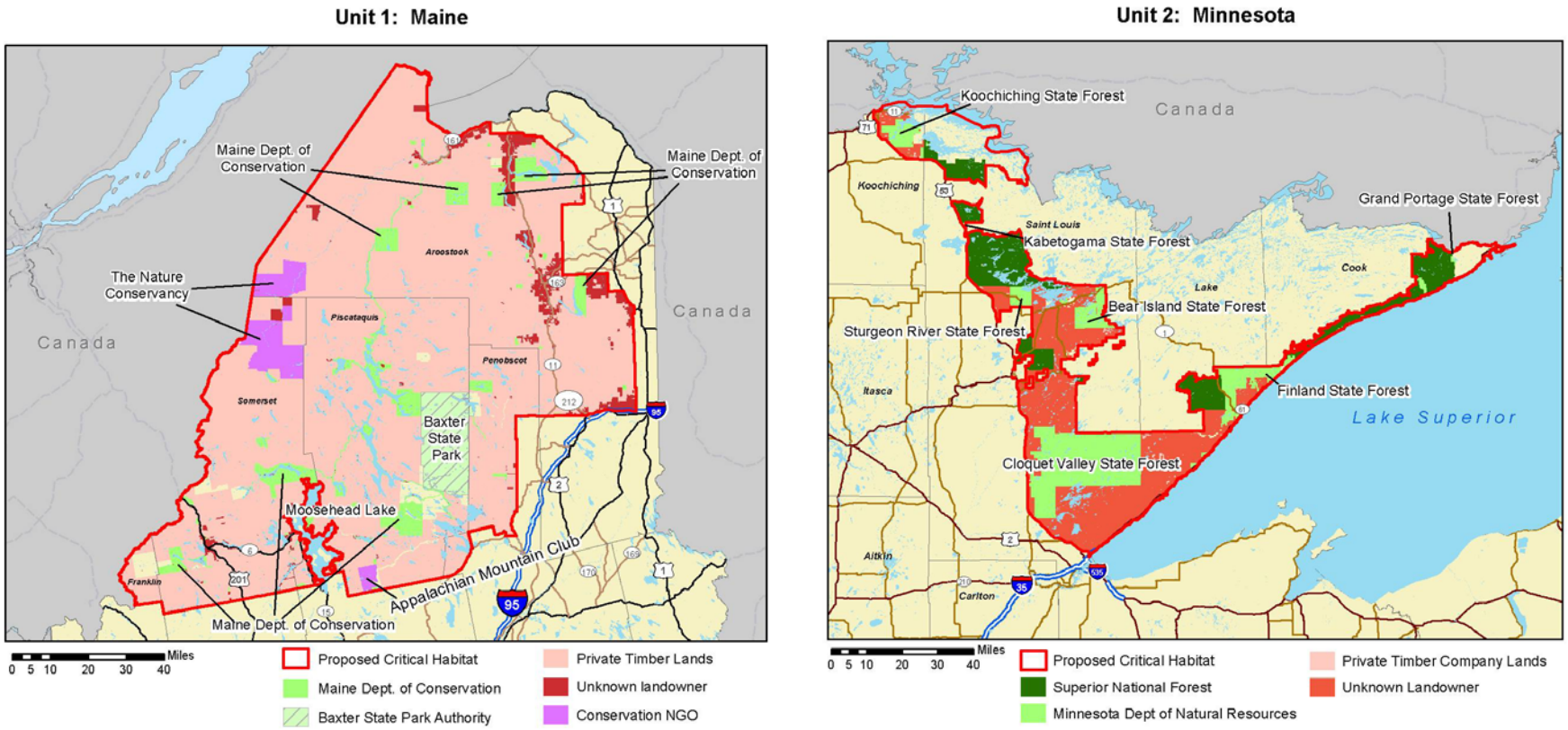
46. This remainder of this section is divided into five parts. The first provides an overview of the regional timber industry within the study area. Changes in timber activities expected to result from lynx conservation efforts are summarized in the second section. The third and fourth sections provide a summary of pre-designation and post-designation impacts to timber activities, respectively. The last section describes the major uncertainties underlying the analysis of timber impacts. Additional detail regarding the analysis of timber impacts is included in Appendix D.

[25] Ruediger, B., et. al. 2000. Canada lynx conservation assessment and strategy 2nd Edition. August 2000 (as amended Oct. 23-24, 2001, May 6-8, 2003 and Nov. 12-13, 2003). USDA Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Forest Service Publication #R1-00-53. Also, Personal communications with Bob Seymour University of Maine, March 24, 2006; Kenny Ferguson, Huber Resources, March 1, 2006; and, Russell Roy, Penobscot Nation, March 8, 2006.

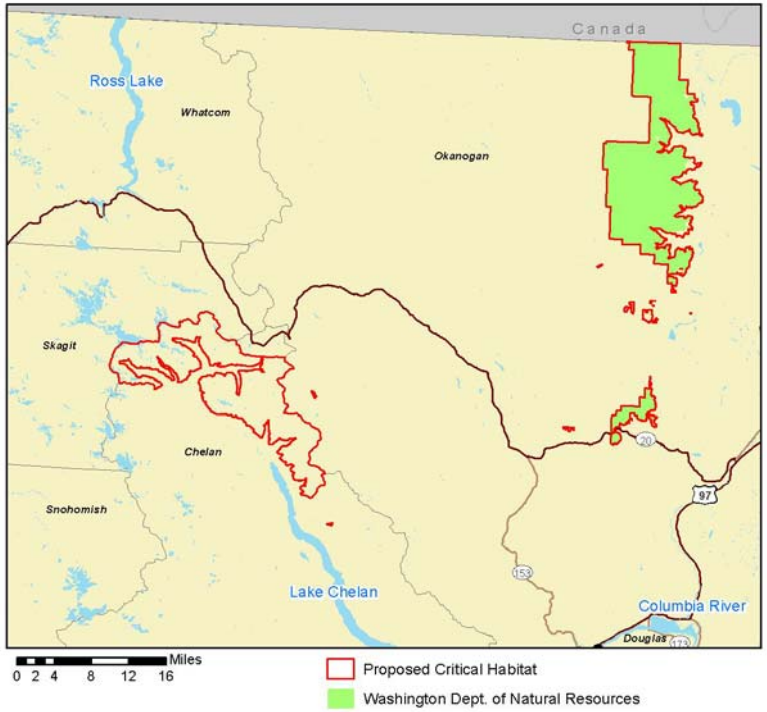
3.1 PROFILES OF REGIONAL TIMBER INDUSTRIES

47. Exhibit 3-1 illustrates the location of timberlands within the study area. As a means of providing context for the impact estimates provided in this section, the full value of timberlands in the study area is estimated in Exhibit 3-2. The timber values presented in Exhibit 3-2 represent the value of land as a silvicultural input and generally reflect the present value of the standing timber. The timber value of these lands is separate from development value, which is discussed in Section 4.

EXHIBIT 3-1. LOCATION OF TIMBERLANDS IN STUDY AREA



Unit 4: North Cascades



Unit 3: Northern Rockies

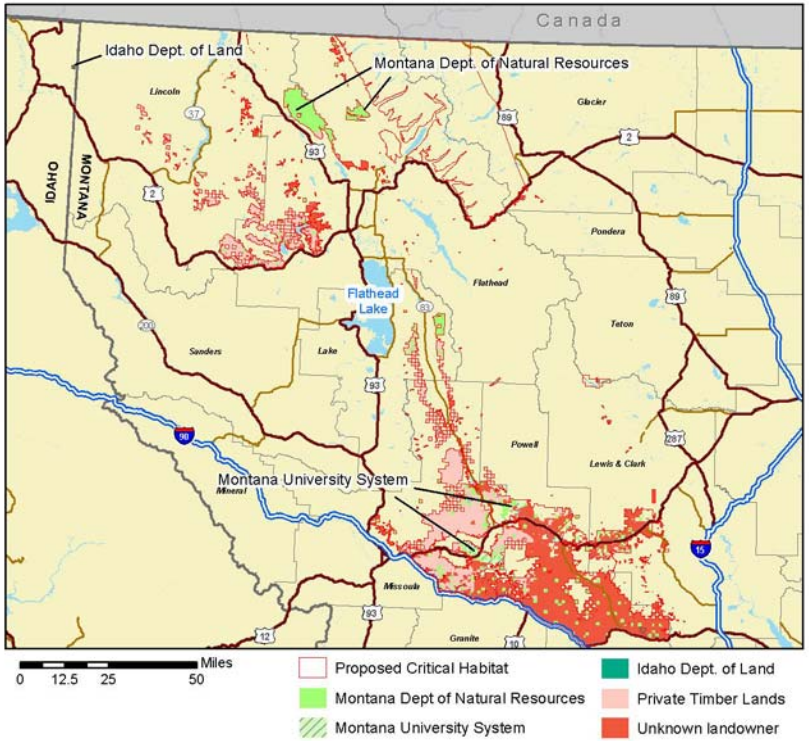


EXHIBIT 3-2. VALUE OF TIMBERLANDS IN STUDY AREA

UNIT	TIMBERLAND IN STUDY AREA (ACRES)	TIMBER VALUE PER ACRE (2006$)	VALUE OF TIMBERLAND IN STUDY AREA (2006$)
Unit 1: Maine	6,093,116	$300	$1,830,000,000
Unit 2: Minnesota	1,882,434	$880	$1,660,000,000
Unit 3: Northern Rockies	1,284,306	$652	$837,000,000
Unit 4: North Cascades	105,023	$1,440	$151,000,000
TOTAL	9,364,879		$4,470,000,000

Sources:
Unit 1. MRS appraisal data provided by LURC on April 19, 2006 and subsequent communication with Bob Doirion at MRS on April 26, 2006.
Unit 2. Data from St. Louis County Parent Land Sales Database. Received from Bruce Grohn, GIS Specialist, St. Louis County Planning Dept. on April 20, 2006.
Unit 3. Data from the Montana State Cadastral database for acreage type "timber". Accessed at http://nris/mt/gov/gis/gisdatalib/gisddatalist.aspx
Unit 4. Data for parcels denoted "Designated Forest Land" (use code 88) from Okanogan County Assessors office data, "Book of Sales.zip" downloaded 6/14/06 from http://okanogancounty.org/Assessor. Discussion with WADNR indicates that most recent sale of WADNR lands in this area were sold for $800/acre; however, this was a large parcel (25,000 acres) that went into a conservation easement (thus may not have been as productive for timber purposes). Personal communication with Kymm Boire, WADNR, June 19, 2006.

48. Exhibit 3-3 presents an overview of industry statistics, by unit. A brief discussion of regional timber industries follows.

3.1.1 UNIT 1: MAINE

49. A total of 6.1 million acres of timberlands (36 percent of timberland in the state) are included in the study area in Maine. At 90 percent, Maine has the highest percentage of forested land of any state. In addition, it has one of the highest percentages of privately-owned forestland (95 percent). The Maine Forest Practices Act, initially implemented in 1990, reduced the practice of clearcutting while increasing use of partial harvest and shelterwood harvest methods. In 2004, clearcutting accounted for less than five percent of acres harvested.[26] Many of the stands that were affected by the spruce budworm outbreak (1970 – 1990), and subsequent extensive harvesting, are nearing merchantability. In addition, over the last several decades, ownership of Maine's forests has changed, with land investment ownership increasing and forest industry ownership declining.[27] This change in ownership may lead to changes in timber management practices, as investors look to maximize earnings over a shorter investment timeframe.

[26] Maine Forest Service. 2005. 2004 Silvicultural Activities Report. Published October 27, 2005. Available online at www.maineforestservice.org.

[27] Maine Forest Service. 2005. The 2005 Biennial Report on the State of the Forest and Progress Report on Forest Sustainability Standards. December 29, 2005. Accessed at: http://www.state.me.us/doc/mfs/pubs.htm. Also, Hagan, J.M., L.C. Irland, and A.A. Whitman. 2005. Changing timberland ownership in the Northern Forest and implications for biodiversity. Manomet Center for Conservation Sciences, Report # MCCS-FCP-2005-1, Brunswick, Maine.

EXHIBIT 3-3. STATEWIDE FORESTRY INDUSTRY STATISTICS

DATA ITEM	MAINE	MINNESOTA	MONTANA	WASHINGTON
Forested Area (2002) (1)	17.7 million acres (90% of total land area)	16.7 million acres (33% of total land area)	23.3 million acres (25% of total land area)	21.8 million acres (51% of total land area)
Timberland Ownership (2002)(1)	17.0 million acres (96% private; 5% state and Federal government)	14.7 million acres (48% private; 38% state and local government; 14% Federal)	19.2 million acres (65% Federal; 31% private; 4% state and local government)	17.3 million acres (65% private; 35% Federal; 13% state and local government)
Growing Stock Species Mix (1) (5)	Approximately 60% hardwood/40% softwood	Approximately 76% hardwood/24% softwood	Nearly all softwood (softwoods were over 95% of 1998 harvest)	Primarily softwood (85% conifers)
Annual Harvest Levels (2004)(2)	3,250 mmbf (6.5 million cord equivalents)	1,800 mmbf (3.6 million cords)	Average of 690 mmbf annually (2003-2004)	3,539 mmbf
Average Stumpage Prices (3)	Sawlogs $61 - $304/mbf; veneer $86 - $563/mbf	Sawtimber $27 - $169/mbf; pulpwood $5 - $37/cord	Sawlogs $364 - $513/mbf; veneer logs $413 - $550/mbf	$22 - $523/mbf
Forestry Earnings and Employment (2003) (4)	$440.9 million (2% of total) 29,925 jobs (4 % of total)	$1.0 billion (1% of total); 56, jobs (2% of total)	$327.2 million (2% of total); 10,718 jobs (2% of total)	$1.4 billion (1% of total); 59,239 jobs (2% of total)
Number of Wood Product and Paper Manufacturing Facilities(1) (6)	289 facilities	493 facilities	205 facilities	178 facilities

Notes: 1 mbf = 500 cords

(1) American Forest and Paper Association state economic brochures, available at www.afandpa.org. Revised 2003.

(2) Maine Forest Service. 2005. 2004 Wood Processors Report. Published October 27, 2005. Available online at www.maineforestservice.org. Keegan, Charles and Todd Morgan. 2005. Montana's Timber and Forest Products Industry Situation, 2004 . May 2, 2005. Available at http://www.bber.umt.edu/content/?x=1079. Washington State Department of Natural Resources. 2004. Preliminary Timber Harvest Report Data. Washington State Timber Harvest Calendar Year 2003. Accessed at http://dnr.wa.gov/htdocs/obe/timberharvest/2003preliminary.htm.

(3) Maine Forest Service. 2005. 2004 Stumpage Prices by Maine County. Published October 27, 2005. Available online at www.maineforestservice.org. Range of prices represents different species. Minnesota Department of Natural Resources, Division of Forestry. 2005. Minnesota's Forest Resources. December 2005. Accessed at http://files.dnr.state.mn.us/forestry/um/index.html on March 27, 2006. Bureau of Business and Economic Research. University of Montana. 2005. Montana Sawlog and Veneer Log Price report for July – September, 2005. Accessed at www.bber.umt.edu. State of Washington, Department of Revenue. 2006. Tax reporting instructions and Stumpage value determination tables January 1 through June 30, 2006. Accessed at http://dor.wa.gov.content.taxes.timber/forst_stump00.aspx.

(4) Forestry-related earnings combines code 101 Forestry & Logging and code 511 Wood Product manufacturing. Earnings information and total state employment from BEA, accessed at http://www.bea.gov/bea/regional/reis. Forestry-related employment from state economic brochures compiled by the American Forest and Paper Association, available at www.afandpa.org.

(5) Keegan, Charles, et. al 2001. Montana's Forest Products Industry: A descriptive analysis, 1969-2000. Accessed at http://www/bber.umt.edu/frest/pdf/fidacs/mt2000.pdf, March 22, 2006

(6) Washington State Department of Natural Resources. 2005. Washington Mill Survey 2002. Series Report #16. May 2005. Accessed at http://www.dnr.wa.gov/htdocs/millsurveys/2002ms.html.

50. Maine's primary manufacturing sector is dominated by paper manufacturing; Maine is the second largest paper producing state (by volume). While output volume at paper mills and sawmills in Maine has reached near record levels recently, employment is down. The need to be competitive in a global market has meant decreasing employment as manufacturers look to increase productivity by employing fewer, more highly skilled workers.[28]

3.1.2 UNIT 2: MINNESOTA

51. A total of 1.9 million acres of timberlands (13 percent of timberland in the state) are included in the study area in Minnesota. The following factors are currently affecting the timber industry in Minnesota:

- Currently, demand for the limited local supply of aspen is high, leading to increased imports into the state as stumpage prices for aspen in Minnesota have risen significantly in the last several years.[29] Aspen pulpwood is an important component for many mills in Minnesota; aspen makes up 60 percent of timber harvested in the State (by volume).[30]
- Harvest on lands managed by state and county agencies has become an increasingly important source of timber as changes in management emphasis have led to reductions in timber harvest on Federal lands.[31]
- The Minnesota legislature has approved funding for several biomass energy plants, which are scheduled to come online within the next year. The biomass industry may provide a new market for pre-commercial thinning residues and other slash and brush. Minnesota Department of Natural Resources (MNDNR) is part of a committee formulating guidelines for biomass harvests that could include lynx conservation measures. [32]

3.1.3 UNIT 3: NORTHERN ROCKIES

52. A total of 1.3 million acres of timberlands (7 percent of timberland in the state) are included in the study area in the Northern Rockies unit. The primary issues facing the timber industry in the Northern Rockies relate to the level of harvest necessary to keep timber-processors operating efficiently. A May 2005 report states "with no change in

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[28] Innovative Natural Resource Solutions, LLC. Maine Future Forest Economy Project – Current Conditions and Factors Influencing the Future of Maine's Forest Products Industry. March 2005. Prepared for Department of Conservation – Maine Forest Service and Maine Technology Institute. Available online at http://www.state.me.us/doc/mfs/mfshome.htm

[29] Minnesota Department of Natural Resources, Division of Forestry. 2005 Public Stumpage Price Review and Price Index. Provided by fax from Jon Nelson, April 7, 2006. The Minnesota stumpage price index rose to 208.1 versus an inflation index of 112.1 in 2005 (base year 2000 = 100).

[30] Minnesota Department of Natural Resources, Division of Forestry. 2005. Minnesota's Forest Resources. December 2005. Accessed at http://files.dnr.state.mn.us/forestry/um/index.html on March 27, 2006.

[31] Ibid.

[32] Personal communication with St. Louis County Lands Department, March 23, 2006. Also see, Minnesota Department of Natural Resources, Division of Forestry. 2005. Minnesota's Forest Resources. December 2005. Accessed at http://files.dnr.state.mn.us/forestry/um/index.html on March 27, 2006

current harvest levels, Montana will likely see the closure of more than one of its largest timber processors, along with the shut-down of several smaller mills."[33] Timber harvest on National Forests in Montana declined 70 percent from 1980 to 2004. This decline is attributable to various factors including lawsuits challenging timber sales, cumulative effects of past harvesting, and reductions in Forest Service budgets. Timber processing facilities in Montana were operating at 70 percent in 2004.[34] Within the study area in the Flathead Valley, a local mill recently shut-down the night shift on half of its operations due to decreased timber harvest on Federal lands.[35] Earnings received by workers in the lumber and wood products and forestry sub-sector in Flathead County, Montana, decreased by $9.0 million (1996$) over the period from 1990 to 2000.[36]

3.1.4 UNIT 4: NORTH CASCADES

53. Approximately 105,000 acres of timberlands (1 percent of timberland in the state) are included in the study area in Washington. Of timberlands in the eastern Washington region, where the study area is located, the majority are National Forest lands (38 percent), while other public ownership makes up 12 percent, forest industry ownership 14 percent, and other private (primarily tribal) ownership 36 percent.[37] However, in 2003, National Forests contributed only eight percent of regional timber harvest, while private lands contributed 59 percent, tribal lands contributed 21 percent, and state and other public lands contributed 12 percent.[38] Within Okanogan County, where the timberlands in the study area are located, designated timberlands receive substantial tax advantages.[39]

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[33] Keegan, Charles and Todd Morgan. 2005. Montana's Timber and Forest Products Industry Situation, 2004. May 2, 2005. Available at http://www.bber.umt.edu/content/?x=1079.

[34] Ibid.

[35] Public comments by Ron Buentemeier, F.H. Stoltze Lumber Company, at the Lynx Critical Habitat public meeting January 10, 2006, Kalispell, Montana.

[36] National Parks Conservation Association. 2003. Gateway to Glacier The Emerging Economy of Flathead County. Available at http://www.npca.org/across_the_nation/npca_in_the_field/northern_rockies/gateway/introduction.asp.

[37] Bolsinger, Charles, et. al. 1997. Washington's public and private forests. Resour. Bull PNW-RB-218. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Available at http://www.fs.fed.us/pnw/publications/rb218/.

[38] Washington State Department of Natural Resources. 2003. Preliminary Timber Harvest Report Data. Washington State Timber Harvest Calendar Year 2003, Preliminary data as of 11/10/04. Available at http://dnr.wa.gov/htdocs/obe/timberharvest/2003preliminary.htm.

[39] Designated forest land refers to "land in any contiguous ownership of 20 or more acres, which is primarily devoted to and used for growing and harvesting timber." (http://okanogancounty.org/assessor/designat.htm). Personal communication Jim White, Okanogan County Assessors Office, June 16, 2006.

Market for Pre-commercial thinning Residue: Biomass Energy Production

Within the context of energy production, biomass consists primarily of waste products from the agriculture and timber industry. In 2003, biomass was the leading source of renewable energy in the United States, representing 47 percent of all renewable energy sources and four percent of the total energy produced nationally.[a] A large percentage of biomass fuelstock comes from forestry residue, often deriving from unmerchantable or pre-commercial thinning.

With rising energy prices and advances in technology like the ability to retrofit coal plants to burn both coal and biomass, biomass is becoming increasingly attractive. The U.S. Department of Energy and National Renewable Energy Laboratory has rated biomass production potential for areas in and around all four proposed critical habitat units as "good" or "excellent" and demand for biomass fuel is expected to increase over the coming decades.[b]

Biomass energy production within the study area is increasing. In the Maine counties containing lynx critical habitat, over 4.8 million tons of forestry residue was purchased for biomass at a cost of approximately $6.5 million from 1999 to 2004.[c] Two biomass plants exist within Unit 1 (Stratton and Ashland) and three more are situated within a 100 miles.[d] Within Unit 2 in northeastern Minnesota, the state legislature recently passed a measure that included funding to retrofit two energy plants within to utilize biomass. A study conducted to determine the available forest residue around these plants (to be operated by the Laurentian Energy Authority) estimated that approximately 730,000 green tons of residue could be available annually within a 100 mile radius.[e] In support of this project, the St. Louis County Land Commissioner provided a letter of intent to the Laurentian Energy Authority offering to provide waste wood from its logging operations for biomass production.[f] In Montana, biomass energy production currently provides only three percent of energy consumed. However, it is estimated that potential biomass fuel sources (including 1.3 million dry tons of forest residues) could provide up to 23 percent of Montana's energy consumption.[g]

An increase in biomass energy production could increase the demand and provide a market for residue from pre-commercial thinning. If this occurs, the impacts of restricting pre-commercial thinning estimated in this report could be understated.

[a] Biomass Program, Energy Efficiency and Renewable Energy, U.S. Department of Energy. May 2006. Available at http://www1.eere.energy.gov/biomass/biomass_today.html
[b] Bioenergy Basics, U.S. Department of Energy. May 2006. At http://www.arkansasrenewableenergy.org/bioenergy/bioenergy.html.
[c] Email communication containing stumpage price records for counties containing proposed lynx critical habitat, from Gregory Lord, Maine Forest Service, April 11, 2006.
[d] Maine Renewable Energy - Hydroelectric and Biomass Generating Stations. May 2006. Available at http://www.energymaine.com/docs/List%20of%20Generating%20Facilities.xls
[e] Berguson et al. "Analysis of Forest Harvest Residue Availability for the Laurentian Energy Authority Project." University of Minnesota, Natural Resources Research Institute. January 20, 2005.
[f] Letter from David Epperly, Land Commissioner, Saint Louis County, to the Laurentian Energy Authority, dated July 22, 2005.
[g] Rogers, Hiram. "Biorefineries: Building the Road from Petroleum to Biomass". May 2006. Available at http://www.biomass.govtools.us/newsletters/Apr_2006/default.html
Haq, Zia. "Biomass for Electricity Generation". Energy Information Administration, Biomass for Electricity Generation. May 2006. Available at http://www.eia.doe.gov/oiaf/analysispaper/biomass/pdf/biomass.pdf.

3.2 CHANGES IN TIMBER MANAGEMENT PRACTICES AS A RESULT OF LYNX CONSERVATION EFFORTS

54. To estimate impacts to timber management activities, this analysis employs two scenarios to bound the potential impacts, recognizing that there is significant uncertainty regarding the type and level of lynx conservation that will be undertaken by timber landowners

following designation. While both scenarios assume that all landowners will undertake lynx conservation efforts; they differ in the type of lynx conservation undertaken.

55. Scenario 1, the lower-bound scenario, quantifies two types of lynx management: 1) landowners continue to implement their ongoing lynx conservation efforts (e.g., adherence to ongoing management plans and limiting roads through habitat); and 2) landowners that do not currently actively manage for the lynx develop lynx management plans. Specifically, Scenario 1 includes:

- **Adherence to ongoing lynx management efforts in Conservation NGO lands in Maine, Superior National Forest lands, WADNR lands, and MTDNRC lands.** These lands are all expected to be operating under management plans with guidelines similar to the guidelines outlined in the Lynx Conservation Assessment Strategy (LCAS), including restrictions on pre-commercial thinning activities. In addition, in some areas, activities may be modified to avoid lynx denning areas and to maintain threshold levels of suitable lynx habitat specified in management plans. [40]
- **Modifications to timber projects needing permits to access private timberland inholdings across Federal lands**. The study area in Minnesota and Montana is characterized by numerous private inholdings on Federal lands. Scenario 1 quantifies the impacts of closing access routes when they are no longer needed. In addition, Federal review of access permits may delay projects from one month to two years or more in some instances.[41] The analysis estimates costs of building alternative roads in lieu of obtaining an access permit.[42]
- **Researching and developing lynx management guidelines.** Scenario 1 assumes that all timber landowners will undertake development of lynx management plans including associated species surveying and monitoring.[43]

56. Scenario 2, the upper-bound scenario, assumes that, in addition to the cost components of Scenario 1, landowners will restrict pre-commercial thinning activities on their lands. This scenario assumes that the LCAS represents the best available information regarding lynx conservation needs and identifies pre-commercial thinning as a threat to the lynx (see text box). This scenario is considered an upper bound because it assumes all land managers will cease all pre-commercial thinning activities whereas the restrictions on pre-commercial thinning in the LCAS have not been adopted by private timber

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[40] Ruediger, B., et. al. 2000. Canada lynx conservation assessment and strategy 2nd Edition. August 2000 (as amended Oct. 23-24, 2001, May 6-8, 2003 and Nov. 12-13, 2003). USDA Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Forest Service Publication #R1-00-53.

[41] Personal communication with Mike Houser, Potlatch Corporation April 14, 2006. Personal communication Scott McLeod, MTDNRC, April 14, 2006.

[42] Note that the analysis does not anticipate any changes to the current exemption from U.S. Army Corps of Engineering 404 wetlands permits for roads constructed and used specifically for timber access; however, stakeholders have expressed concern that if this exemption were affected by lynx conservation efforts this could result in extensive impacts.

[43] Note that costs of developing lynx management plans on public lands are included in Section 6; thus this section only includes these costs for private and unknown lands.

companies to date; and programmatic planning standards in the LCAS state, "Conservation measures will generally apply only to lynx habitat on Federal lands within LAUs."[44]

57. The actual impact likely falls between these two bounds; however, information allowing for further refinement regarding where pre-commercial thinning may be restricted for the benefit of the lynx in the future is not readily available. More research is needed to evaluate the effects of pre-commercial thinning in geographic areas other than those covered in the LCAS.[45]

PRE-COMMERCIAL THINNING

Pre-commercial thinning refers to "thinnings made purely as investments in future growth of stands so young that none of the felled trees are extracted and utilized."[a] Typically, pre-commercial thinning is performed when a stand is between 10 and 20 years old and is usually performed manually, although mechanical methods are sometimes applied, as is the case in aspen stands in Minnesota.

Pre-commercial thinning is identified in the proposed rule as one of the activities that may "significantly reduce the quality of snowshoe hare habitat such that the landscape's ability to produce adequate densities of snowshoe hares to support persistent lynx populations is at least temporarily diminished."[b] As snowshoe hare are the primary prey of the lynx, pre-commercial thinning is therefore considered a threat to lynx. Several studies have determined that pre-commercial thinning activity may affect usage of an area by snowshoe hare.[c] However, it is important to note that research is ongoing to understand impacts of timber practices on lynx and its habitat. As mentioned in the proposed rule, "Timber management practices that provide for a dense understory are beneficial for lynx and snowshoe hares."[d] For example, in Maine, when a stand regenerates after a clearcut, there is typically a dense understory. However, in order to make these stands more productive, pre-commercial thinning is often applied, which reduces dense understory and thus reduces hare habitat.

Pre-commercial thinning provides a variety of benefits including increasing yields, decreasing time to commercial harvest, allowing for growth of desired species, and reducing risk of blowdowns and disease. Additionally, "economic analyses have repeatedly shown that precommercial thinning often is the most rewarding long-term investment that can be made in silvicultural treatment."[a] Available information indicates that pre-commercial thinning is performed regularly across private timberlands in the study area in Maine and Montana, but less frequently in Minnesota. LCAS guidance recommends delaying pre-commercial thinning until stands no longer provide snowshoe hare habitat. Based on discussions with timber land managers, delaying pre-commercial thinning until such a time as a specified in the LCAS effectively means precluding pre-commercial thinning activity.[e]

[a] Smith, David et. al. 1997, The Practice of Silviculture: Applied Forest Ecology. 9th Ed. Published by John Wiley & Sons, Inc.
[b] 70 FR 68306.
[c] Ausband, D.E. and G.R. Baty. 2005. Effects of precommercial thinning on snowshoe hare habitat use during winter in low-elevation montane forests. Canadian Journal of Forest Research 35:206-210. Homyack, J.A. 2003. Effects of precommercial thinning on snowshoe hares, small mammals, and forest structure in northern Maine. M.S. Thesis, University of Maine. May 2003
[d] 70 FR 68304.
[e] Personal communications with Bob Seymour University of Maine, March 24, 2006; Kenny Ferguson, Huber Resources, March 1, 2006; and, Russell Roy, Penobscot Nation, March 8, 2006.

[44] Ruediger 2000, p. 7-3.

[45] Comments provided by Mark McCollough, FWS MEFO, provided to IEc on June 12, 2006.

58. In addition to the standard regarding pre-commercial thinning, the LCAS includes the following timber-related conservation guidelines:

- Management actions (e.g., timber sales, salvage sales) shall not change more than 15 percent of lynx habitat within a lynx analysis unit (LAU) to an unsuitable condition within a 10-year period;
- If more than 30 percent of lynx habitat within an LAU is in unsuitable condition, no further reduction of suitable conditions shall occur; and,
- Within an LAU, maintain denning habitat in patches generally larger than five acres, comprising at least 10 percent of lynx habitat.

59. Quantification of the costs of managing land uses according to these guidelines is complicated by a number of factors. First, the lynx conservation efforts quantified in this analysis (e.g., restrictions on pre-commercial thinning and development of snowmobile trails) are relevant to these thresholds. That is, this analysis includes the effects of limiting or modifying land use activities that may reduce suitable lynx habitat and therefore quantifies the impacts of accomplishing a degree of compliance with the three conservation standards highlighted above.

60. Specifically, the extent to which these three standards are met by the conservation efforts quantified in this analysis is unknown as LAUs have not been delineated in the study area (with the exception of WADNR lands). Assigning proxy boundaries for LAUs based, for example, on subunits for the purpose of this analysis would be arbitrary and potentially misleading, as estimated impacts would be sensitive to LAU boundaries.

61. While this analysis does not separately quantify costs of accommodating these three conservation guidelines because of their dependence on LAU boundaries, it does estimate the impacts of lynx conservation to land use activities that may otherwise reduce the amount of suitable lynx habitat within the study area, including pre-commercial thinning and development of snowmobile trails. In addition, the analysis provides the full value of these lands for timber purposes is estimated to inform decision makers and to provide context, as shown earlier in Exhibit 3-2.

3.3 PRE-DESIGNATION IMPACTS TO TIMBER ACTIVITIES

62. Pre-designation impacts on timber activities have occurred in Minnesota and Washington, and are summarized in Exhibit 3-4. In Minnesota, past impacts have been associated with implementing lynx conservation efforts included in the Superior National Forest forest plan and project modifications for projects requiring road access across national forest land. In addition, pre-designation impacts include implementation costs for WADNR's lynx conservation plan, which has been in place since 1996.

EXHIBIT 3-4. PRE-DESIGNATION IMPACTS (2000 – 2005)

CRITICAL HABITAT UNIT	SUBUNIT	UNDISCOUNTED	PRESENT VALUE 3 PERCENT	PRESENT VALUE 7 PERCENT
Unit 2: Minnesota	Superior National Forest	$180,000	$187,000	$197,000
Unit 4: North Cascades	WADNR	$6,140,000	$6,820,000	$7,840,000
	Total	**$6,320,000**	**$7,010,000**	**$8,030,000**
Note: Totals may not sum due to rounding.				

3.4 POST-DESIGNATION IMPACTS TO TIMBER ACTIVITIES

63. Exhibit 3-5 presents a summary of post-designation impacts under the two scenarios outlined earlier. Detailed discussion of the derivation of these impacts is provided in the Appendix D. Post-designation impacts are presented over a 20-year timeframe.[46]

64. Under Scenario 1, impacts were estimated based on the following steps:

- Estimated costs of implementing existing lynx conservation efforts on Maine Conservation NGO, Superior National Forest, MTDNRC and WADNR lands based on input from these landowners;
- Identified types and costs of project modifications based on review of section 7 consultation history and communication with affected land managers; and,
- Developed estimates of costs to prepare a lynx management plan, based on costs to landowners who had previously conducted similar efforts.

65. Under Scenario 2, additional impacts were estimated based on the following methods:

- For Maine, estimated costs of precluding pre-commercial thinning based on previously conducted modeling by the University of Maine Cooperative Forestry Research Unit; and,
- For Minnesota and Northern Rockies, modeled impacts resulting from precluding pre-commercial thinning based on available regional information on expected levels of pre-commercial thinning, timing and costs of pre-commercial thinning activities, and timing and value of expected increases in harvest resulting from pre-commercial thinning.

[46] Note that these include pre-commercial thinning impacts calculated over a 100-year period and then annualized. Twenty years of annualized costs are included in the total present value estimates reported in this chapter.

EXHIBIT 3-5. POST-DESIGNATION IMPACTS (2006-2025)

CRITICAL HABITAT UNIT	SUBUNIT	TOTAL IMPACTS (1) (UNDISCOUNTED)		TOTAL PRESENT VALUE (1) (DISCOUNTED AT 7 PERCENT)		TOTAL PRESENT VALUE (1) (DISCOUNTED AT 3 PERCENT)	
		SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2	SCENARIO 1	SCENARIO 2
Unit 1: Maine	Maine Dept. of Conservation	$0	$11,300,000	$0	$7,330,000	$0	$6,270,000
	Private Timber Lands	$31,100,000	$240,000,000	$26,400,000	$163,000,000	$28,900,000	$145,000,000
	Conservation NGO	$5,170,000	$5,460,000	$1,780,000	$1,880,000	$2,140,000	$2,260,000
	Unknown	$1,640,000	$11,200,000	$1,340,000	$7,590,000	$1,500,000	$6,840,000
	Subtotal Unit 1	$37,900,000	$268,000,000	$29,500,000	$179,000,000	$32,500,000	$161,000,000
	Annualized Unit 1			$2,780,000	$16,900,000	$2,190,000	$10,800,000
Unit 2: Minnesota	Superior National Forest	$3,500,000	$42,000,000	$1,980,000	$2,500,000	$2,680,000	$19,800,000
	MNDNR	$0	$41,300,000	$0	$558,000	$0	$18,400,000
	Private Timber Lands	$295,000	$1,280,000	$191,000	$204,000	$243,000	$681,000
	Unknown	$5,320,000	$77,700,000	$4,460,000	$5,440,000	$4,920,000	$37,200,000
	Subtotal Unit 2	$9,120,000	$162,000,000	$6,640,000	$8,710,000	$7,840,000	$76,100,000
	Annualized Unit 2			$627,000	$822,000	$527,000	$5,110,000
Unit 3: Northern Rockies	MTDNRC	$43,000,000	$43,000,000	$0	$0	$10,600,000	$10,600,000
	Montana University System	$0	$6,100,000	$0	$0	$0	$1,450,000
	Idaho Dept. of Land	$0	$0	$0	$136,000	$0	$75,900
	Private Timber Lands	$2,680,000	$123,000,000	$2,220,000	$0	$2,460,000	$31,000,000
	Unknown	$3,920,000	$185,000,000	$3,270,000	$0	$3,610,000	$46,600,000
	Subtotal Unit 3	$49,600,000	$358,000,000	$5,490,000	$136,000	$16,700,000	$89,800,000
	Annualized Unit 3			$$518,000	$12,900	$1,120,000	$6,030,000
Unit 4: North Cascades	WADNR	$20,500,000	$20,500,000	$21,900,000	$21,900,000	$21,100,000	$21,100,000
	Subtotal Unit 4	$20,500,000	$20,500,000	**$21,900,000**	**$21,900,000**	$21,100,000	$21,100,000
	Annualized Unit 4			$2,070,000	$2,070,000	$1,420,000	$1,420,000
Total All Units		**$117,000,000**	**$809,000,000**	**$63,500,000**	**$210,000,000**	**$78,100,000**	**$348,000,000**
Annualized All Units				**$6,000,000**	**$19,800,000**	**$5,250,000**	**$23,400,000**

Notes: Totals may not sum due to rounding. Administrative costs of consultations are included in Appendix A.

(1) To estimate impacts of precluding pre-commercial thinning, total impacts are calculated over a 100-year period and then annualized. Twenty years of annualized costs are included in the total present value estimates reported here. For Unit 3, benefits are shown as zero, assuming that analysis has understated impacts.

66. Under the simplified model applied in Montana, when a seven percent discount rate is applied, the analysis finds that eliminating pre-commercial thinning may result in a net benefit across the 100 year timeframe. This is due to the near term savings associated with removing the cost of pre-commercial thinning, despite the future costs of reduced harvest at the time of cutting. However, since firms indicate that they are performing pre-commercial thinning, and assuming these firms are acting to maximize revenues, it is unlikely that eliminating pre-commercial thinning would result in net benefits. Rather, the outcome likely indicates that seven percent is an inappropriate discount rate to apply to this industry. Thus, the results report a zero for subunits where the model calculates a net benefit.

SENSITIVITY OF TIMBER IMPACTS ANALYSIS

Timeframe

For the purposes of this analysis, impacts stemming from a restriction on pre-commercial thinning activities are modeled over a 100-year time period.[a] Rotation schedules vary across the study area and are dependent on species mix and timber management regime. The 100 year timeframe captures impacts of approximately one to one and a half rotations.

Discount Rate

Given the time period over which impacts are modeled and the timing of cash flows, the results of this analysis are sensitive to the discount rate applied. This analysis quantifies impacts at both three and seven percent discount rates.[a] Available information, however, indicates that industry specific discount rates of four to six percent (real discount rates) may be more appropriate.[b] Under the simplified model applied in Montana, the analysis finds that if impacts are discounted at seven percent, eliminating pre-commercial thinning may result in a net benefit across the 100 year timeframe. This is due to the near term savings associated with removing the cost of pre-commercial thinning, despite the future costs of reduced harvest at the time of cutting. However, since firms indicate that they are performing pre-commercial thinning, and assuming these firms are acting to maximize revenues, it is unlikely that eliminating pre-commercial thinning would result in net benefits. Rather, the outcome likely indicates that seven percent is an inappropriate discount rate to apply to this industry and activity.

Other Factors

Two other factors may contribute to the underestimate of impacts associated with restricting pre-commercial thinning in Minnesota and Montana. First, the model does not include impacts of any related lost cash flows that may result from delaying harvests across ownerships (e.g., allowable cut effects). If owners are no longer able to increase growth through high-yield practices such as pre-commercial thinning, they may compensate by adjusting harvest schedules to make standing timber last longer. The analysis only accounts for a reduction in harvest at the time at which increased yields would have been available on thinned acres. While this type of factor is included in the model applied to estimate impacts in Maine, information is not available to account for it in Minnesota and Montana. Additionally, this analysis does not account for potential difference in stumpage prices between thinned and unthinned stands. That is, the extent to which thinning may provide better quality timber is not known and therefore not incorporated. Furthermore, no attempt is made to forecast future timber markets or prices in this analysis.

[a] This time frame was chosen in part to match the University of Maine model (Wagner et. al., 2003) used to assess silvicultural research priorities in Maine, which is applied in this analysis.
[b] Based on OMB guidance. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 Federal Register 5492, February 3, 2003.)
[c] Idaho Department of Lands and MTDNRC both use four percent real discount rates when evaluating forestry practices. Wagner et. al. (2003) note that they apply a six percent real discount rate for forestry in Maine because it represents the lower rate of return required by timberland investment management organizations, and they recognize that not all timberlands in their analysis are investment grade.

67. Plum Creek provided comment on the Proposed Rule that include an estimate of timber impacts on their lands in the study area.[47] Similar to this analysis, the Plum Creek analysis of timber impacts is based the assumption that "protecting denning environments

[47] Plum Creek Timber Company comments prepared with assistance from Dr. David L. Sunding (Senior Consultant at CRA International) and Kristina Sepetys (Senior Consultant at NERA Economic Consulting), Economic Comments: Proposed Designation of Critical Habitat for the Canada Lynx on Plum Creek Lands in Maine and Montana, April 2006.

for both the Canada lynx and its primary prey (the snowshoe hare) may result in thinning and cutting limits, and harvest scheduling limitations." The major assumptions underlying the Plum Creek analysis, and their per-acre results, are compared to those utilized in this analysis in Exhibit 3-6.

68. Plum Creek's estimated impacts are not directly comparable to the results of this analysis because Plum Creek's per acre impacts are applied on only a portion of their timberlands in the study area (approximately one percent), whereas this analysis estimates impacts across the entire ownership. In addition, the Plum Creek estimate in Montana may incorporate specific information about their timber practices (such as how harvests are scheduled across their ownership) that was not available to customize the model of pre-commercial thinning impacts in Montana in this analysis.

EXHIBIT 3-6. COMPARISON OF ANALYTIC ASSUMPTIONS

ANALYSIS	DISCOUNT RATE	ANALYSIS TIME PERIOD (YEARS)	PER-ACRE IMPACT(1)
Maine: Plum Creek	15%	20	$14 per year
Maine: Wagner Model Applied by IEc (2)	Undiscounted	100	$194 present value
	3%	100	$34 present value
	7%	100	$18 present value
Montana: Plum Creek	15%	20	$15 per year
Montana: IEc Model	Undiscounted	100	$1,364 present value
	3%	100	$102 present value
	7%	100	$0

Notes:
(1) Note that Plum Creek impacts are only spread across affected acreage (equal to one percent of total Plum Creek timberland in study area), whereas the IEc analysis impacts are spread across all acres of timberland in the unit.
(2) Wagner, Robert G., Bowling, Ernest, and Seymour, Robert. 2003. Assessing Silviculture Research Priorities for Maine Using Wood Supply Analysis. Technical Bulletin 186. February 2003 Maine Agricultural and Forest Experiment Station. The University of Maine. Accessed at http://library.umaine.edu/cfru/pubs/CFRU309.pdf on March 14, 2006. Additional model runs provided by Ernest Bowling, JW Sewall on June 15, 2006.

3.5 CAVEATS

69. The major assumptions underlying the analysis of impacts to timber activities are summarized in Exhibit 3-7. The majority of timber impacts quantified relate to a potential restriction on pre-commercial thinning. The analysis of impacts related to restrictions on pre-commercial thinning is sensitive to the timing of thinning and harvesting activities. For Minnesota and Montana, the analysis assumes that pre-commercial thinning would occur when a stand is between 10 and 20 years old. Thus, annual cost savings of not performing pre-commercial thinning begin at that time. However, impacts of reduced timber harvest are not incurred until a stand reaches rotation age (age 50 in Minnesota and age 85 in Montana for purposes of this analysis). The long term nature of these impacts adds greatly to their uncertainty, and sensitivity to choice of discount rate.

EXHIBIT 3-7. SUMMARY OF CAVEATS TO TIMBER ANALYSIS

ASSUMPTION	POTENTIAL EFFECT ON RESULTS
Under Scenario 2, pre-commercial thinning restrictions outlined in the LCAS will be implemented on all timberlands. This results in no pre-commercial thinning within the study area under this Scenario.	+
Lands where ownership is unknown are assumed to be managed for timber purposes.	+
Impacts of implementing LCAS measures relating to maintaining lynx habitat threshold levels within LAUs are not quantified where LAUs have not been defined.	-
Private timberland owners will undertake lynx conservation efforts akin to the LCAS including preparation of lynx management plans.	+
The analysis of pre-commercial thinning impacts in Maine does not take into account potential future declines in the amount of pre-commercial thinning activity occurring in the study area These declines may result from changes in ownership to shorter-term timber management investment organizations.	+
The analyses of pre-commercial thinning impacts in Minnesota and Montana do not account for potential adjustment of harvest schedules which could result in delays in harvesting across ownerships in response to pre-commercial thinning restrictions.	-
No alternative management to speed growth or increase yield will occur in response to prohibitions on pre-commercial thinning (i.e., no substitute Silviculture treatment will be used in on stands that would have been pre-commercially thinned).	+
The analysis includes the full costs of project modifications related to road closures and preparation of management plans that may be undertaken for the benefit of other wildlife species in addition to the lynx.	+
The analysis assumes no market for slash from pre-commercial thinning exists. An increase in biomass energy production would create demand and provide a market for residue from pre-commercial thinning.	-
Analysis does not forecast future timber markets or prices; assumes future stumpage prices will be comparable to past prices.	+/-
Differences in quality between thinned and unthinned stands are not anticipated.	-
+: This assumption may result in an overestimate of real costs. - : This assumption may result in an underestimate of real costs. +/-: This assumption has an unknown effect on estimates.	