

Appendix G

**Application of
Generic Environmental Impact Statement
Tiering Process Summary**

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1.0 SUMMARY

Appendix E details the DNR's use of the Generic Environmental Impact Statement (GEIS) study on Timber Harvesting and Forest Management in the UPM/Blandin Paper Thunderhawk Project Environmental Impact Statement (EIS). Section 6.3 of the Final Scoping Decision requires use of GEIS information in the project-specific EIS.

2.0 GENERIC ENVIRONMENTAL IMPACT STATEMENTS

2.1 AUTHORIZATION

A Generic Environmental Impact Statement (GEIS) is a specific form of environmental review that can be used to study certain types of projects not adequately reviewed on a case-by-case basis. The authorization for conducting alternative forms of environmental review, such as a GEIS, is found in Minnesota's Environmental Policy Act, MS 116D.04, Subd. 4a. Specific criteria for determining the need for a GEIS and the unit of government most appropriate to oversee its preparation, and the general process and content of a GEIS are identified in Minnesota Rules, part 4410.3800. Although only the Minnesota Environmental Quality Board (EQB) is authorized to order a GEIS, any person or government body may request the EQB to consider the preparation of a GEIS.

2.2 UNIQUE ATTRIBUTES

A GEIS differs from project-specific Environmental Impact Statements (EIS) in the following four major ways:

2.2.1 Cumulative Impacts Focus

While a project-specific EIS typically examines environmental impacts within a limited geographic area, a GEIS analyzes the cumulative impacts associated with a number of separate, yet related activities. In the case of the GEIS on timber harvesting and forest management, cumulative impacts are those resulting from the hundreds of individual logging activities occurring in the state each year—in effect, the collective impacts of these individual operations on the state's overall environmental quality.

2.2.2 Discretionary Nature

The administrative rules governing the state's Environmental Review Program establish general criteria for determining when it would be in the state's best interest to prepare a GEIS. However, these criteria do not specify explicit thresholds, which, if exceeded, mandate the EQB to order such a study. The decision by the EQB to prepare a GEIS is voluntary. Additionally, because a GEIS is considered an alternative form of environmental review, projects under consideration by a GEIS are still subject to normal environmental review procedures and requirements, as well as environmental permit procurement procedures. In essence, a GEIS is considered a long-range planning document that can provide useful information regarding geographically broad and long-term consequences that are unlikely to be identified in project-specific environmental review processes. Therefore, a GEIS provides the context within which future project-specific EISs can be assessed.

2.2.3 Recommendation Development

A third distinction between project-specific EISs and GEISs is the focus of the GEIS on developing recommendations. Traditional environmental review documents assess the likely consequences of feasible and prudent alternatives to a proposed action (e.g., changes in process technology, proposal size or site location), but do not state which of the analyzed alternatives is preferred. These decisions are left to the government agencies responsible for issuing the necessary development and/or environmental permits. However, a GEIS is not limited to strictly the analysis of impacts, but can advocate strategic policy and program direction through the development of recommendations to address the identified impacts.

2.2.4 Funding Mechanism

Unlike project-specific development proposals where the costs associated with preparing environmental review documents are borne by the Project proposer, no mechanism exists for assessing the costs of preparing a GEIS. Funding for a GEIS is typically via special legislative appropriations, contributions of EQB member agencies, or outside funding sources. The EQB does not have the authority to establish rules relating to assessing the costs of preparing a GEIS.

2.3 GEIS NEED CRITERIA

Although Minnesota's Environmental Review Program does not recognize circumstances in which preparation of a GEIS is mandatory, certain factors are considered by the EQB in determining the need for a GEIS. These factors are:

- ❖ Whether reviewing the proposed action can be better accomplished by a GEIS than by project-specific review;
- ❖ Whether the possible effects on the human environment are highly uncertain and involve unique or unknown risks;
- ❖ Whether a GEIS can be used in a subsequent project-specific EIS to provide a context in which the individual project can be assessed;
- ❖ The amount of basic research needed to understand the impacts of such projects;
- ❖ The degree to which decision makers or the public have a need to be informed of the potential impacts of such projects;
- ❖ The degree to which information to be presented in the GEIS is needed for governmental or public planning;
- ❖ The potential for significant environmental effects as a result of the cumulative impacts of such projects;
- ❖ The regional and statewide significance of the impacts and the degree to which they can be addressed on a project-by-project basis; and,
- ❖ The degree to which governmental policies affect the number or location of such projects or the potential for significant environmental effects.

3.0 FINAL GEIS STUDY ON TIMBER HARVESTING AND FOREST MANAGEMENT

Indicative of a growing concern about the impact of increased timber harvesting on Minnesota's environment, a citizens' petition was brought before the Minnesota Environmental Quality Board in July 1989. The petition requested the EQB to prepare a Generic Environmental Impact Statement on the cumulative impacts associated with timber harvesting and forest management in Minnesota. In December 1989, the EQB unanimously passed a resolution authorizing the preparation of such a GEIS and designated itself the Responsible Governmental Unit (RGU) for the study's preparation.

The EQB established a ten-person citizen's Advisory Committee to help provide a direction and oversight through recommendations to the EQB. Specifically, the Advisory Committee was asked to assist in the preparation of the Final Scoping Decision, advise on selection of a project consultant, review, and comment on all project work products, and make mitigation strategy recommendations. The FSD was prepared during 1990 and issued in December 1990. The objectives called for in the FSD were to:

- ❖ Develop a basic understanding of the status of timber harvesting and related forest management activities in Minnesota, and how this level of statewide activity relates to long-term sustainable levels of timber removals;
- ❖ Identify and assess the environmental and related (i.e., economic and social) impacts associated with current and potential elevated levels of statewide timber harvesting and forest management activity; and,
- ❖ Develop strategies to mitigate potential significant adverse impacts that are identified.

The GEIS included a number of study components that were designed to address the objectives of the FSD. Specifically:

- ❖ Feasibility Study: established the study's structure;
- ❖ Work Plan: outlined the study's methodology;
- ❖ Statewide Timber Harvesting Scenarios: initial analyses of the three harvesting levels used to help identify probable impacts for all FSD issues;
- ❖ Study Criteria: criteria developed to help assess significant impacts, mitigation alternatives, and mitigation strategies;
- ❖ Technical papers: nine stand alone studies addressing collectively the FSD technical issues of concern; these include: Biodiversity, Economics and Management Issues, Forest Wildlife, Forest Health, Forest Soils, Maintaining Productivity and the Forest Resource Base, Recreation and Aesthetic Resources, Unique Historical and Cultural Resources, and Water Quality and Fisheries;
- ❖ Background papers: five support studies addressing the other identified areas of interest; these include: Global Atmospheric Change, Harvesting Systems, Public Forestry Organizations and Policies, Recycled Fiber Opportunities, Silvicultural Systems;
- ❖ Draft GEIS document: initial report targeted to fully synthesize and integrate the materials from the nine technical papers and five background papers, clearly summarize all relevant impacts, and describe recommendations to address the identified impacts; and

- ❖ Final GEIS document: subsequent and final report to address the above contents as modified to reflect review, commentary, and inputs from the peer review process, the Advisory Committee, the EQB, and the public at large.

The Final GEIS adequacy determination was issued by the EQB in May 1994. Please refer to Appendix F for the Executive Summary on the GEIS Report Card Study.

4.0 TIERING FROM GENERIC REVIEW TO PROJECT-SPECIFIC REVIEW

4.1 BASIS

RGUs are required to consider information from an available GEIS by tiering according to Minn. Rules part 4410.3800, subpart 8. Tiering is defined as “incorporating by reference the discussion of an issue from a broader or more general EIS” under Minn. Rules part 4410.0200, subpart 88. Consistent with the cited rules, DNR scoped the Thunderhawk Project EIS to include use of GEIS-related information; see Final Scoping Decision Section 6.3. This was appropriate because the Thunderhawk Project is one of the project types evaluated in the GEIS.

4.2 EQB GEIS ADEQUACY DETERMINATION

State rules also dictate that an RGU use GEIS-related information subject to an adequacy determination rendered by the EQB “at the time the specific project is subject to review;” see Minn. Rules part 4410.3800, subpart 8. The determination of “continuing” adequacy applies to a RGU’s use of an existing GEIS (in the present) in its evaluation of a specific project, which in this case is the UPM/Blandin Paper Thunderhawk Project. This is separate and distinct from the procedural determination of adequacy originally rendered by EQB on April 21, 1994. DNR requested an adequacy determination for the UPM/Blandin Paper Project from EQB on May 20, 2005. [See May 20, 2005 letter from DNR Assistant Commissioner Brad Moore to EQB Executive Director Michael Sullivan]

EQB considered DNR’s request on June 16, 2005. EQB noted that the Environmental Review Program rules do not establish criteria to guide a determination of continuing GEIS adequacy. EQB staffed advised that criteria developed in 1999 to support an MPCA request for a GEIS adequacy determination during the environmental review of the Boise Cascade International Falls Efficiency Improvement Project remained applicable. The GEIS remains adequate criterion was developed from the rule used in determining whether preparation of an EIS supplement was appropriate for a project. Specifically, to render a decision of continuing adequacy, EQB would consider:

- ❖ Whether substantial new information or new circumstances have developed since the GEIS was declared adequate that may significantly affect the potential environmental effects or the availability of prudent and feasible alternatives with lesser environmental effects, and those circumstances or information cannot be adequately considered in project-specific environmental review; see EQB Order dated June 16, 2005.

In considering the issue, EQB relied on points raised by DNR regarding the current status of the GEIS and related information. Specifically, DNR noted:

- ❖ Base Forest Data. The Forestry GEIS analysis relied on the 1990 Forest Inventory and Assessment (FIA) as the basis for modeling future forest condition. A new FIA dataset is available for consideration in the project-specific review of the Thunderhawk Project.
- ❖ Forest Project Modeling. The Forestry GEIS modeled future forest conditions in terms of cover type and age class distributions at ten-year intervals over a 50-year planning horizon. Sufficient time has passed to allow for comparison of the GEIS's first decade predictions with forest data collected some 10 years later. This comparison is now underway in the GEIS Report Card Study, which is being conducted by the University of Minnesota under DNR oversight.
- ❖ Forest Practices. The Forestry GEIS considered forest practices in place in the early 1990s, or that were expected to be in place by the mid-1990s, to project potential impacts and mitigation. New information, some of it unforeseen at the time the GEIS was completed in 1994, is available on forest practices.
- ❖ Programmatic Mitigation. The original GEIS study recommended institution of a Forest Practices Act that was based on a voluntary, programmatic approach to mitigation. Since the Forestry GEIS was completed, the Sustainable Forest Resources Act was adopted, which has resulted in the implementation of a range of provisions to mitigate the potentially significant impacts associated with statewide timber harvest. The status of mitigation implementation is now being assessed through the GEIS Report Card Study.
- ❖ Wildlife Population Data. The Forestry GEIS used data on Minnesota's wildlife populations as it existed in the early 1990s. For some suites of species, such as small mammals and forest birds, little or no population data was available at that time. Updated population data is now available for the species examined in the GEIS. In addition, the number of species where we have reliable population information has expanded since completion of the original study.
- ❖ Reports and Studies. Numerous reports and studies have been conducted since the Forestry GEIS was done, many of which are based upon the findings and recommendations of the GEIS.

When considering the factors raised by DNR against the remains adequate criterion, EQB determined that the GEIS did not remain adequate for use in accordance with Minn. Rules part 4410.3800, subpart 8, for use in project-specific review. EQB also noted, "While the Timber Harvesting GEIS is no longer adequate as a whole, nor as accurate as it was when completed, it still contains useful information."

5.0 USE OF THE FORESTRY GEIS IN THE DRAFT EIS

The Final Scoping Decision dictates which GEIS-type information is to be explicitly considered in the DEIS. This includes the GEIS's: forest condition projections; identification of potentially significant cumulative impacts; and recommended programmatic mitigative responses. The DEIS incorporates by reference Final GEIS Chapter 5 as per Minn. Rules part 4410.2400.

The DEIS also considers related information reported in the GEIS Report Card Study regarding: 1) the current status of mitigation implementation, and 2) a comparison of the GEIS's first decade projections with the most recent FIA dataset.

5.1 FOREST CONDITIONS COMPARISONS

The DEIS compares forest condition projections between the GEIS and new modeling conducted for the DEIS. The comparison is in terms of cover type and age-class distributions at both the statewide and ecoregion scales for the GEIS Base Harvest Scenario.

Final GEIS Sections 5.1.2 through 5.1.5 provide information on the forest condition modeling conducted to support the GEIS impact assessment. Assessments are both quantitative and qualitative. The quantitative results are as follows:

From Final GEIS Section 5.1.2 – Cover Types and Species Harvested

Table G-1
Assumed Roundwood Consumption Levels by Species Group and Market for the
GEIS Base Harvest Scenarios (thousands of cords per year)

Species Group Market	Period 1 (1990–99)	Period 2 (2000–2009)	Periods 3-6 (2010–49)
Aspen			
Bemidji	572	522	435
Brainerd	256	260.1	216.75
Cook	210	182.7	152.25
Duluth	506	454.5	378.75
Grand Rapids	433	390.6	325.5
I. Falls	415	412.2	343.5
Subtotal	2,392	2,222.1	1,851.75
Spruce-fir			
Brainerd	70	70	70
Duluth	220.5	219.5	219.5
Grand Rapids	115.5	118.5	118.5
Subtotal	406	408	408
Pine			
Bemidji	159	188	188
Duluth	151	153	153
I. Falls	111	98	98
Subtotal	421	439	439
Northern Hdws			
Bemidji	83	147	234
Brainerd	190	226.9	270.25
Cook	51	79.3	109.75
Duluth	93	145.5	221.25
Grand Rapids	61	112.4	177.5
I. Falls	48	94.8	163.5
Subtotal	526	805.9	1,176.25
Total – North	3,745	3,875	3,875
Southern Region			
Red oak sawlogs	50	50	50
Other wood	250	250	250
Total – South	300	300	300
Total – Statewide	4,045	4,175	4,175

Source: Jaakko Pöyry Consulting, Inc. (1992a)

Table G-2
Summary of Original Timberland Acres Clearcut and/or Thinned
for the GEIS Base Harvest Scenario, 1990 – 2040

Action Category	North	South	Total
1. Total Timberland			14,773,400
2. Not Considered			1,356,500
3. Considered	12,409,900	1,007,000	13,416,900
4. Not cut	5,591,300	652,200	6,243,500
5. Clearcut once	5,775,300	320,700	6,096,000
6. Clearcut twice	846,000	0	846,000
7. Thinned but not clearcut	197,300	34,100	231,400
8. Thinned and clearcut	2,100	19,900	22,000
9. Total not cut - Sum (2+4)			7,600,000
10. Total cut - Sum (5-7)			7,173,400

Source: Jaakko Pöyry Consulting, Inc. (1992a)

* Not considered are those plots representing young stands, old growth or areas assumed not available and therefore not considered for harvest in the period 1990-2040. Considered are those plots representing stands that are available and in terms of age, etc., feasible to consider for harvest during the 50-year study period. Action category 8, thinned and clearcut, is included in the clearcut once category.

Table G-3
Projected Acres of Timberland (by initial cover type) that are Harvested and
Not Harvested in the GEIS Base Harvest Scenario 1990 – 2040

Forest Type	Clearcut Once	Clearcut Twice	Thinned	Total Acres Harvested	Total Acres	Acres Never Harvested	Harvest Acres as % of Total Acres	Harvest Acres as % of Total Harvest	Forest Type Acres as % of Acres
Jack pine	117,700	5,900	1,100	124,700	446,600	321,900	27.9	1.7	3.0
Red pine	188,900	6,700	11,600	207,200	354,700	147,500	58.4	2.9	2.4
White pine	37,900	1,700	0	39,600	68,600	29,000	57.7	0.6	0.5
Black spruce	281,900	15,500	5,200	302,600	1,349,900	1,047,300	22.4	4.2	9.1
Balsam fir	311,000	46,400	16,800	374,200	809,200	435,000	46.2	5.2	5.5
Northern white cedar	10,200	0	0	10,200	648,400	638,200	1.6	0.1	4.4
Tamarack	45,300	0	4,000	49,300	719,400	670,100	6.9	0.7	4.9
White spruce	23,700	1,300	2,900	27,900	91,700	63,800	30.4	0.4	0.6
Oak-Hickory	466,900	0	23,200	490,100	1,124,700	634,600	43.6	6.8	7.6
Elm-Ash-Soft maple	248,800	2,900	13,400	265,100	1,124,600	859,500	23.6	3.7	7.6
Maple-Basswood	314,400	3,100	17,900	335,400	1,470,200	1,134,800	22.8	4.7	10.0
Aspen	3,436,600	660,300	113,100	4,210,000	5,242,200	1,032,200	80.3	58.7	35.5
Paper birch	335,500	4,000	8,200	347,700	819,000	471,300	42.5	4.8	5.5
Balsam poplar	277,200	98,200	14,000	389,400	504,200	114,800	77.2	5.4	3.4
Total	6,096,000	846,000	231,400	7,173,400	14,773,400	7,600,000	48.6	100.0	100.0

Source: Jaakko Pöyry Consulting, Inc. (1992a)

Table G-4
Scheduling Model Harvest Summary under the GEIS Base Harvest Scenario
(thousands of cords per year)

Product Group	Component	Period					
		1990-99	2000-09	2010-19	2020-29	2030-39	2040-49
a) Northern Region							
Aspen	Aspen pulp	1,297.7	1,281.2	1,276.80	1,379.1	1,334.6	1,375.4
	Aspen saw	1,083.8	956.5	587.70	475.3	532.2	481.4
	Total	2,381.8	2,237.6	1,864.70	1,854.4	1,866.7	1,856.6
	Target	2,392	2,222.1	1,851.75	1,851.75	1,851.75	1,851.75
Spruce-fir	S-fir pulp	240.2	204.3	176.10	156.9	159.5	144.5
	S-fir saw	165.1	204.3	229.60	244.4	252.5	264.4
	Total	405.3	408.5	405.60	401.3	412.1	408.8
	Target	406	408	408.00	408	408	408
Pine	Pine pulp	77.1	93	79.80	74	108.1	119.5
	R&W saw	303.1	258.7	283.90	311.5	243	212.9
	Other saw	34.6	89.5	71.50	52.3	91.1	109.9
	Total	414.8	441.1	435.30	437.9	442.1	442.2
	Target	421	439	439.00	439	439	439
Northern Hardwoods	Pulp	406.5	552.1	746.40	698	695.5	676.7
	R Oak saw	45.7	74.3	136.70	133.3	102.9	59.5
	Other saw	78.4	175.3	293.80	343.7	373.1	438.9
	Total	530.8	801.4	1,176.80	1,175	1,171.4	1,174.9
	Target	526	805.9	1,176.25	1,176.25	1,176.25	1,176.25
All Groups	Total	3,732.7	3,888.6	3,882.4	3,868.6	3,892.3	3,882.5
	Target	3,745	3,875	3,875	3,875	3,875	3,875
b) Southern Region							
Red oak	Sawlogs	50.3	50.4	49.3	49.1	49.9	49.6
	Target	50	50	50	50	50	50
Other Wood	Various	246.2	249.9	255.4	253.8	246.7	244.5
	Target	250	250	250	250	250	250
All Groups	Total	296.5	300.3	304.7	303.9	296.6	293.6
	Target	300	300	300	300	300	300

Source: Jaakko Pöyry Consulting, Inc. (1992a)

From Final GEIS Section 5.1.3 – Harvesting by Ownership

Table G-5
Original Timberland Acreage Harvested by Ownership under the
GEIS Base Harvest Scenario, 1990 – 2040

Ownership	Acres Harvested	Percent	Timberland	
			Acres	Percent
Chippewa National Forest	160,200	2.23	567,200	3.84
Superior National Forest	349,500	4.87	1,253,900	8.49
Miscellaneous federal	53,700	0.75	197,700	1.34
Native American	171,200	2.39	490,600	3.32
State	1,296,900	18.08	3,077,900	20.83
County and municipal	1,612,800	22.48	2,505,600	16.96
Forest industry	451,400	6.29	751,300	5.09
Other private	3,077,700	42.90	5,929,200	40.13
Total	7,173,400	100.00	14,773,400	100.00

Source: Jaakko Pöyry Consulting, Inc. (1992a)

From Final GEIS Section 5.1.4 – Spatial Distribution

Table G-6
Original Forest Acreage and Timberland Acres Cut and Not Cut by Ecoregion
under the GEIS Base Harvest Scenario, 1990 – 2040

	Ecoregion							Total
	1	2	3	4	5	6	7	
Total forest land acres	3,372,000	2,023,700	903,000	8,172,900	934,700	637,200	666,300	16,714,800
Reserve/unproductive	509,600	973,900	36,300	359,800	24,400	17,300	20,100	1,941,400
Timberland acres (1-2)	2,862,400	1,049,800	871,700	7,813,100	910,300	619,900	646,200	14,773,400
Acres not cut - base	1,566,000	619,200	546,900	3,447,300	629,200	408,200	378,200	7,600,000
Acres cut - base	1,296,400	430,600	319,800	4,365,800	281,100	211,700	268,000	7,173,400

Source: Jaakko Pöyry Consulting, Inc. (1992a)

The qualitative assessments reflect interpretation of the information contained in these tables.

Final GEIS Section 5.2 provides information on how the key characteristics of forest age class, cover type, and species composition are likely to change under the GEIS Base Harvest Scenario. Both quantitative and qualitative assessments are offered. The quantitative results are as follows.

From Final GEIS Section 5.2.1 – Forest Area and Cover type Abundance

Table G-7
Projections of Total Forestland Area Change by Survey Unit for the Second Runs, 1990 – 2040

FIA Unit	1990	2040	Change	Percent Change
a) Timberland				
Aspen-birch	5,878,700	5,524,119	-354,581	-6.0
Northern pine	5,975,500	5,456,956	-518,544	-14.6
Central hardwood	2,275,400	2,988,059	+712,659	+31.3
Prairie	643,000	910,315	+266,515	+41.4
All units	14,773,400	14,879,449	+106,049	+0.7
b) Total Forest Area				
Aspen-birch	7,362,000	7,007,419	-354,581	-4.8
Northern pine	6,336,400	5,816,556	-519,844	-8.2
Central hardwood	2,357,200	3,098,307	+741,107	+31.5
Prairie	660,400	934,697	+274,297	+41.5
All units	16,714,800	16,856,979	+142,179	+0.8

Source: Jaakko Pöyry Consulting, Inc. (1992a)

Table G-8
Forest Type Acreage (as determined by GEIS cover type algorithm) for Timberland, Reserved and Unproductive Plots under the GEIS Base Harvest Scenario, 1990 and Projected 2040, Statewide (thousand acres)

Forest Type	1990				2040			
	Timberland	Reserved	Unproductive	Total	Timberland Base Scenario	Reserved	Unproductive	Total Base Scenario
Jack pine	487.1	125.9	1.2	614.2	329.6	56.2	1.2	387.0
Red pine	350.6	78.6	0.9	430.1	452.4	87.7	0.9	541.0
White pine	137.3	9.7	1.3	148.3	141.0	32.6	1.3	174.9
Black spruce	1,320.8	129.6	527.5	1,997.9	1,001.2	88.3	547.5	1,637.0
Balsam fir	1,012.5	117.0	21.9	1,151.4	657.4	72.9	18.5	748.8
Northern white cedar	322.4	8.2	37.3	367.9	360.9	8.5	40.7	410.1
Tamarack	696.2	7.9	118.1	822.2	678.7	6.9	118.2	803.8
White spruce	137.1	43.9	0	181.0	227.9	106.7	0	334.6
Oak-Hickory	1,288.0	13.6	14.0	1,315.6	1,370.2	18.6	18.8	1,407.6
Elm-Ash-Soft maple	1,564.2	64.9	33.4	1,662.5	1,744.0	95.4	35.2	1,874.6
Maple-Basswood	1,301.8	30.6	2.1	1,334.5	1,460.2	34.8	2.1	1,497.1
Aspen	4,496.0	358.1	33.9	4,888.0	5,238.7	393.5	36.8	5,669.0
Paper birch	1,179.3	109.7	6.1	1,295.1	803.4	123.6	6.5	933.5
Balsam poplar	480.1	15.4	10.6	506.1	413.7	14.5	9.5	437.7
Nonstocked	0	0	0	0				
Other	0	0	0	0				
Total	14,773.4	1,113.1	828.3	16,714.8	14,879.4	1,140.2	837.3	16,857.0

Source: Jaakko Pöyry Consulting, Inc. (1992a)

From Final GEIS Section 5.2.2 – Cover type Size and Age Class Structure

Table G-9
Average Stand Age by Cover Type under the GEIS Base Harvest Scenario 1977 – 2040

Cover Type	Average Age of FIA Plots (years)*		
	1977	1990	2040
Jack pine	42	48	77
Red pine	43	44	54
White pine	73	80	104
Black spruce	46	59	89
Balsam fir	42	46	82
Northern white cedar	82	97	116
Tamarack	52	57	99
White spruce	33	42	90
Oak-Hickory	63	69	78
Elm-Ash-Soft maple	56	56	86
Maple-Basswood	61	58	90
Aspen	38	41	34
Paper birch	49	58	92
Balsam poplar	39	41	33

Source: Jaakko Pöyry Consulting, Inc. (1992a), projected ages for stands not clearcut were determined by adding 50 years. See Appendix 2, Table 2.2 for more detail.

* Weighted by acreage.

Table G-10
Area of Old Forest for 1990 and Projected to 2040 for the GEIS Base Harvest Scenario, all Forestlands (acres)

Forest type (threshold age)	Current 1990	Base Scenario 2040
Red pine (120)	21,200	107,496
White pine (120)	12,300	91,674
Black spruce (120)	157,800	614,219
White cedar (120)	60,000	225,600
Tamarack (120)	73,000	299,604
White spruce (90)	27,400	211,815
Oak-Hickory (120)	51,400	342,702
Elm-Ash-Soft maple (120)	69,400	483,185
Maple-Basswood (120)	37,000	404,502
Jack pine (70)	115,100	244,518
Balsam fir (70)	304,000	452,468
Aspen (70)	467,500	982,911
Balsam poplar (70)	24,900	76,629
Paper birch (70)	324,400	643,809

Source: Jaakko Pöyry Consulting, Inc. (1992a,e)

* Acreages are those determined from GEIS cover type algorithm.

From Final GEIS Section 5.2.3 – Tree Species Abundance and Diversity

Table G-11
Summary of Projected Tree Species Numbers on Timberlands for 1990 and 2040
for the GEIS Base Harvest Scenario (thousands of trees > 1.0 inch dbh)

Tree Species	1990	2040	Tree Species	1990	2040
Ailanthus	39	15	Mountain maple	105,825	115,557
American hornbeam	14,419	12,049	Northern white-cedar	386,818	615,904
American basswood	192,090	191,702	Northern pin oak	5,975	5,541
American elm	150,006	147,215	Northern red oak	111,893	97,402
Apple	386	430	Other hardwood	41,155	32,342
Balsam fir	979,317	863,263	Paper birch	570,934	440,801
Balsam poplar	266,466	283,080	Peachleaf willow	489	642
Bigtooth aspen	73,184	82,074	Pincherry	13,140	16,541
Bitternut hickory	8,044	8,573	Ponderosa pine	398	387
Black ash	527,482	662,467	Quaking aspen	1,986,789	2,730,630
Black cherry	35,429	46,605	Red maple	290,717	223,765
Black locust	455	133	Red mulberry	988	985
Black maple	154	125	Red pine	97,800	107,691
Black oak	710	792	River birch	185	1,682
Black spruce	1,039,098	911,752	Rock elm	1,572	1,881
Black walnut	2,289	2,222	Scotch pine	1,630	1,123
Black willow	5,702	4,721	Shagbark hickory	9,145	11,075
Boxelder	66,672	82,430	Siberian elm	399	391
Bur oak	190,446	183,028	Silver maple	9,552	8,890
Butternut	2,941	4,442	Slippery elm	23,016	27,284
Chokecherry	33,848	36,689	Striped maple	463	397
Eastern cottonwood	2,735	2,272	Sugar maple	283,728	266,355
Eastern redcedar	14,051	17,977	Swamp white oak	454	1,310
Green ash	86,474	79,551	Tamarack	361,461	299,180
Hackberry	14,714	14,842	White ash	2,494	2,835
Hawthorn	8,810	8,922	White oak	10,058	11,377
Ironwood	117,990	130,328	White pine	29,566	29,709
Jack pine	164,593	93,530	White spruce	78,620	76,604
Kentucky coffee tree	445	142	Wild plum	5,331	5,361
Mountain ash	1,497	3,273	Yellow birch	11,746	20,882
Grand Total				8,442,827	9,029,168

Source: Jaakko Pöyry Consulting, Inc. (1992a)

The accompanying text describes the principle findings of this modeling, including interpretation necessary to understand the results. See Final GEIS Sections 5.1 and 5.2.

5.2 POTENTIALLY SIGNIFICANT CUMULATIVE IMPACTS

The DEIS compares forest condition projections for both the Build and No-Build Alternatives studied in the DEIS in terms of the 17 significant impacts projected in the GEIS.

Final GEIS Section 5.6 identifies significant impacts as drawn from the assessments in the GEIS technical papers. Impacts were grouped under the following headings:

- ❖ Forest Resources – Extent, Composition, and Condition
- ❖ Soil Resources
- ❖ Water Resources and Aquatic Ecosystems
- ❖ Wildlife Populations
- ❖ Recreation and Aesthetics
- ❖ Unique Cultural and Historical Resources
- ❖ Economics

The Final GEIS Section 5.6.8 summarizes the 17 significant impacts as being:

1. Projected significant loss of forest area in ecoregions 1, 2, 3, and 4 due to land use change (also includes consideration of the loss of timberland in the north);
2. Projected harvesting affecting patterns of forest cover in areas of mixed land use (considers amount, type, and fragmentation of cover important to wildlife habitat);
3. Projected changes to tree species mix (important to maintaining biodiversity and wildlife habitat; four tree species show significant declines in stem number);
4. Projected changes in the age class structure of paper birch (important to community replacement capability for this species; the young age classes appear deficient in acreage for replacing the older age classes);
5. Projected harvesting affecting genetic variability of plant or animal species (important to maintaining biodiversity; critically endangered, endangered or threatened communities are identified);
6. Projected harvesting affecting federal- or state-listed plant species of special concern, threatened, or endangered or their habitats (statewide 9, 7, and 37 species listed as endangered, threatened, or of special concern are projected to be adversely impacted by harvesting);
7. Changes in the susceptibility and vulnerability of cover types to forest health risks (important to community stability and productivity; largely dependent on age class structure and the amount and type of harvesting activity);
8. Projected harvesting affecting site nutrient capital, i.e., nutrient supplies present and/or actually available (important to sustainability of forest growth and yield; results indicate nutrient losses with certain types of harvesting on various types of soils, approximately 5 million acres are at risk for calcium loss);

9. Projected harvesting affecting soil physical structure (important to maintenance of forest growth; the actual area where significance criteria for compaction are exceeded is estimated at 330,000 acres plus haul road area);
10. Projected harvesting causing accelerated erosion from forest roads (important to site productivity and water quality; about 25,000 acres plus haul roads are estimated to be impacted with major concern in ecoregion 6);
11. Projected changes in the populations of forest dependent wildlife (by changes in amounts of habitat available; 46 species, about 25 percent of all wildlife species studied, were projected to be significantly impacted). Negative impacts are projected for the ringneck snake, beaver, northern flying squirrel, gray and fox squirrels, bobcat, lynx, as well as 39 bird species, for example, Cooper's Hawk, Great Gray Owl, Pileated Woodpecker, Eastern Bluebird, Ovenbird, Song Sparrow, Yellow Warbler and Hooded Warbler;
12. Projected harvesting affecting populations of endangered, threatened, or special concern species of animals (Red-shouldered Hawk and Louisiana Waterthrush are negatively impacted);
13. Projected harvesting affecting patterns of mature lowland conifer stands (important to wildlife habitat; many important patches of lowland conifer habitat may be lost with harvesting);
14. Projected harvesting affecting the availability of food producing trees (important to wildlife; particularly oaks and other mast producing species);
15. Projected harvesting in the absence of VMGs on visually sensitive areas (important to aesthetics and recreational use; visual aspects of landscapes and recreational settings are impaired);
16. Projected development of permanent forest roads in primitive (undeveloped) and semiprimitive nonmotorized areas (important to maintaining primitive or undeveloped recreational opportunities; harvesting leads to a loss of such areas); and
17. Projected harvesting affecting unique cultural and historical resources (important to the protection and integrity of these resources; disturbance from harvesting can effectively destroy these resources).

5.3 GEIS STRATEGIC PROGRAMMATIC RESPONSES

The DEIS assesses the sustainability of projected harvest levels for the build alternative in terms of the implementation of the GEIS Strategic Programmatic Responses, which is accomplished through the programs authorized by the Minnesota Sustainable Forest Resources Act (SFRA; Minn. Stat. Chapter 89A).

Final GEIS Section 5.7 identifies the strategies developed to mitigate significant impact, which were presented under these three categories: forest-based research; landscape-level responses; and site-level responses.

Forest-based Research: Strategies in this category are intended to obtain the information needed to undertake strategic and operational planning; to monitor changes at the landscape - and site-level; and to provide the basis for developing management and direction and planning tools. The responses considered here are:

- ❖ Monitor the age class and cover type structure of the state's forests
- ❖ Complete an inventory of the state's biodiversity features
- ❖ Conduct an inventory of old growth forests across all ownerships
- ❖ Develop and fund a research program to investigate the effects of timber harvesting and forest management activities on the tourism and travel industry in Minnesota
- ❖ Upgrade and maintain a listing of known archaeological, historical, and traditional use sites in the state.

Landscape-level Responses: These are typically long-term or broad-based solutions that require coordinated planning and/or implementation to identify and achieve the intended objectives of developing regional or statewide responses. A key to the success of these responses is to provide direction and coordination across ownerships. The responses considered here are:

- ❖ Measures to reduce the area of forests converted to other land uses
- ❖ Balancing age class and cover type structure
- ❖ Riparian corridors
- ❖ ERF
- ❖ Protection of sensitive sites for plant species
- ❖ Landscape-based road and trail plan
- ❖ VMGs
- ❖ IPM strategies

Site-level Responses: Strategies in this category are intended to modify operational procedures used in the planning and execution of timber harvesting and forest management activities on an individual site or local scale. The responses considered are:

- ❖ Modifications to harvesting practices and equipment
- ❖ Modifications to silvicultural practices
- ❖ Protection of sensitive sites for wildlife
- ❖ Increasing the wood fiber productivity of timberlands

See Final GEIS Sections 5.7.1 through 5.7.3.

The Minnesota Legislature adopted the Sustainable Forest Resources Act (SFRA) in 1995; see Minn. Stat. Chapter 89A. The Act is the state's response to the recommended mitigations identified in the Final GEIS. It is the policy of the state to:

1. Pursue the sustainable management, use, and protection of the state's forest resources to achieve the state's economic, environmental, and social goals.
2. Encourage cooperation and collaboration between public and private sectors in the management of the state's forest resources.
3. Recognize and consider forest resource issues, concerns, and impacts at the site and landscape levels.
4. Recognize the broad array of perspectives regarding the management, use, and protection of the state's forest resources, and establish processes and mechanisms that seek and incorporate these perspectives in the planning and management of the state's forest resources.

The SFRA establishes the Minnesota Forest Resources Council whose principal charge is to develop recommendations to the governor and to federal, state, county, and local governments with respect to forest resource policies and practices that result in the sustainable management, use, and protection of the state's forest resources. The policies and practices must meet a series goals, including addressing the environmental impacts and implement mitigations as recommended in the GEIS.

The SFRA also establishes:

- ❖ The Minnesota Forest Partnership
- ❖ Voluntary timber harvesting and forest management guidelines
- ❖ Landscape-level forest resource planning and coordination
- ❖ Monitoring
- ❖ A research advisory committee
- ❖ An interagency information cooperative
- ❖ Continuing education and certification

Because a purpose of the SFRA is to implement the recommendations of the GEIS, the DEIS analysis considers the programmatic activities being undertaken in compliance with the Act and its provisions.

5.4 GEIS REPORT CARD STUDY

The DEIS incorporates by reference the findings of the GEIS Report Card Study, which: 1) evaluated the status of implementation of the GEIS Strategic Programmatic Responses, and 2) assessed the accuracy of the GEIS's first-decade forest condition projections.

Part 1 of the Study assessed the degree to which the GEIS recommendations have been implemented since completion of the GEIS. The Study:

- ❖ Reviewed enacted state legislation and changes in land management policies since GEIS completion
- ❖ Conducted a mail-back survey and follow-up interviews with personnel of public and private organizations with mitigation implementation strategies
- ❖ Reviewed agency-specific monitoring data on historic and current management practices

This work resulted in a report card that describes the degree to which the state's forest management and timber harvesting policies and practices have responded to the GEIS recommendations.

Part 2 of the Study assessed the GEIS's accuracy in predicting changes in the state's forest resource condition for the first 10-year study period of the GEIS. The analysis provides a current understanding of the degree to which the GEIS' projected environmental impacts from timber harvesting continue to be valid.

The DEIS relies on the GEIS Report Card Study in two principal ways. First, it provides an assessment of the current status of the implementation of the programmatic mitigations authorized under Minn. Stat. Chapter 89A for consideration in the project-specific review. Second, it provides information on the accuracy of the GEIS's first decadal projections through comparison with the most recent Forest Inventory and Analysis (FIA). Although neither of these two study products are direct products of the GEIS proper, both reflect current, available information relative to the foundation of knowledge established by the GEIS.

See Appendix H of the DEIS for the GEIS Report Card Study Executive Summary.

The GEIS Report Card Study is incorporated by reference into the DEIS as per Minn. Rules part 4410.2400.

6.0 REFERENCES

Final GEIS Executive Summary (Appendix H)

Final GEIS Sections 1.2.1, 1.2.2, 1.2.3, and 5.1-5.7

Final Scoping Decision Document (Appendix B)

GEIS Report Card Study