Timber and Related Products

Special Forest Products

Current Condition and Current Management Direction

Collection of special forest products was not addressed in the 1986 Forest Plans. However, the growing interest in collecting special forest products stimulated the need to develop a Forest policy for special forest products collection. Forest policy was established in a Forest Service Handbook-Forest Supplement 2409.22-02-1 (September 19, 2001). The policy states that the collection of all plants and other products are prohibited in Research Natural Areas (RNA), Wilderness, administrative sites, and developed recreation sites except by written permission. All remaining areas— a total of 1,440,000 acres—are available for the collection of special forest products.

Currently, a permit is required for personal or commercial collection of special forest products. Collecting native plants listed on the Wisconsin State Species of Special Concern List or products derived from northern white cedar or hemlock is not allowed.

Little information was gathered during the current planning cycle on amounts of different products collected or the effects of collecting on various species. Improved monitoring is an emphasis area in the 2004 Forest Plan.

Proposed Changes and Range of Changes

In Alternatives 2-9 and the Selected Alternative, a permit would still be required for personal or commercial collection of special forest products. Collecting would also be prohibited in designated RNAs (MA 8E), Wilderness (MA 5), administrative sites, and developed recreation sites. However, the current policy would be revised to forbid commercial gathering in the following areas: candidate RNA's, wetlands; within 100 feet of trails with high scenic integrity; within 100 feet of perennial water bodies; Wilderness Study Areas (MA 5B); Semi-Primitive Non-Motorized (SPNM) Low Disturbance areas (MA 6A); Oconto River Seed Orchard (MA 8B); and the Riley Lake and Moquah Barrens Areas (MA 8C). Additionally, the restricted plant list will be changed to the Regional Forester Sensitive Species for the Chequamegon-Nicolet National Forests (current policy uses the Wisconsin State Species of Special Concern list). Alternative 1 maintains the current forest policy.

Direct and Indirect Effects

Effects on Special Forest Products from Management Area Allocation

The collection of special forest products is prohibited in existing RNAs, existing Wilderness areas, administrative sites, and developed recreation sites regardless of the alternative chosen. Approximately 1,440,000 acres are available for collection in Alternative 1.

In Alternatives 2-9 and the Selected Alternative, guidelines limit collection of special forest products in several additional areas, including:

- Candidate Research Natural Areas (MA 8E);
- Wetlands;

- Within 100 feet of trails of high scenic integrity;
- Within 100 feet of perennial water; and
- Oconto River Seed Orchard (MA 8B).

These areas total approximately 395,000 acres (Note: This number is slightly elevated because some features overlap). This leaves approximately 1,045,000 acres for collection in Alternatives 2-9 and the Selected Alternative.

In addition, management area guidelines for Wilderness Study Areas (MA 5B), SPNM Low Disturbance areas (MA 6A), and Riley Lake and Moquah Barrens Areas (MA 8C) prohibit the gathering of special forest products for commercial sale. In each of these management areas, collection of special forest products for personal use is permitted.

Allocation of MA 5B, MA 6A, and MA 8C varies across Alternatives 2-9 and the Selected Alternative. Table 3-58 displays the acreage available for special forest products collection by alternative.

Table 3-58. Acres Available for Special Forest Product Collection

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 9	SA
Acres	1,441,500	980,700	937,000	879,900	966,300	956,000	947,200	971,900	969,000

Land available for collecting special forest products ranges from a low of 879,900 acres in Alternative 4 to a high of 1,441,500 acres in Alternative 1. The Selected Alternative is within the range with collection allowed on 969,000 acres.

Timber Products

Current Condition

Both the Chequamegon and Nicolet National Forests are operating under the current Forest Plans approved in 1986. Both National Forests use commercial timber management, combined with reforestation activities, as a management technique for achieving desired forest composition and species age class distribution objectives. As a result of these timber management activities, both Forests are contributors to the total timber products output in Wisconsin.

According to Forest Inventory and Analysis (FIA) data, the Forests provided 7.5% of the timber harvested in Wisconsin between 1983 and 1995, so outputs from the National Forests are important to the industry. The forest products industry is the second largest employer in the State.

The Chequamegon and Nicolet National Forests have been managed as one administrative unit since 1998. The 2004 Forest Plan brings the two Forests under a uniform management plan.

Suited Forestlands

Suited forestlands are lands managed for timber production on a regulated basis. Determining forestland suitability is described in 36 CFR 219.3 and 219.14. The first step separates “forestland” from “non-forestland” like permanent openings and water. “Forestland” is then divided into: 1) lands withdrawn from timber management by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service; 2) lands which the Forests cannot assure restocking within 5 years; and 3) lands where irreversible damage to soil or watersheds would occur. The remainder is called “tentatively suited”

forestlands. Approximately 1,199,000 acres or 80% of the Chequamegon-Nicolet National Forests' land base is "tentatively suited" for timber management under the 1986 Forest Plans (Chequamegon LRMP, p IV-11; Nicolet LRMP, p 28).

In order to determine acres of "suited forestlands", the tentatively suited forestland is further reduced by land allocation decisions and site-specific issues made during the forest planning process. These reductions include Management Area designations, excessive road costs, designated recreation areas, and Threatened, Endangered & Sensitive Species habitat. The 1986 suited forestland is approximately 864,000 acres or 58% of the Chequamegon-Nicolet National Forests' land base (Chequamegon LRMP, p IV-11; Nicolet LRMP, p 29). However, due to volume-per-acre shortfalls, Chequamegon managers had to enter lands that were originally determined as not needed to meet timber demand. So, based on actual use, the current suited forestland for the two Forests is approximately 1,106,000 acres (Task Team 22 Report), or 74% of the land base.

Species Composition

Species composition is a result of numerous factors. The climate, glaciers of 10,000 years ago, the logging era of the early 1900s, planting done by the Civilian Conservation Corps, and management over the last 70 years have all had big impacts on today's species composition. Timber resource management can be handled in a variety of ways to affect future species composition. One role of the 2004 Forest Plan is to assemble goals, objectives, standards, guidelines, and management areas designed to shape future species composition to provide the best mix to achieve the greatest public benefit. Current Chequamegon-Nicolet National Forests' species composition is as follows:

Table 3-59. Existing Forest Type Composition in Acres and Percent of Uplands

Existing (2002) Forest Type Composition in Acres				Existing (2002) Forest Type Composition in Percent			
Forest type	**Chequamegon**	**Nicolet**	**Combined**	**Forest type**	**Chequamegon**	**Nicolet**	**Combined**
Aspen	201,245	134,838	336,083	Aspen	33%	26%	30%
Hardwoods[1]	271,072	261,908	532,980	Hardwoods[1]	44%	51%	47%
Red & White Pine[2]	85,567	78,431	163,998	Red & White Pine[2]	14%	15%	15%
Jack Pine	24,843	9,429	34,272	Jack Pine	4%	2%	3%
Balsam Fir	16,864	14,343	31,207	Balsam Fir	3%	3%	3%
Upland opening	17,365	12,222	29,587	Upland opening	3%	2%	3%
Total	616,956	511,171	1,128,127	Total	100%	100%	100%

Data from Spectrum output dated 8/19/02
Lowland openings, lowland hardwoods, and lowland conifers were excluded

[1] Includes paper birch, oak and hemlock
[2] Includes white spruce

Table 3-59 shows the species composition of the upland areas on the two landbases. Hardwood is the dominant type on both Forests with aspen and the red pine/white pine/white spruce group ranked second and third, respectively. The combination of hardwood and aspen acres amounts to 77% of the upland area on both Forests. However, the amount of hardwood is higher and aspen lower on the Nicolet compared to the Chequamegon.

In general, Chequamegon-Nicolet forestlands are immature to mature in the early successional species such as aspen, paper birch and jack pine. Later successional species on the Forests such as red pine, white pine, and northern hardwoods are generally middle aged (between 60-100 years old). Overall, the Chequamegon-Nicolet is 75% upland and

25% lowland. The Chequamegon has a higher representation of the lowland types (27%) compared to the Nicolet (21%). Lowland open/brush is the most common lowland type on the Chequamegon while the lowland conifer is the most common lowland type on the Nicolet.

Allowable Sale Quantity (ASQ)

Allowable Sale Quantity (ASQ) is the maximum timber volume permitted to be produced from suited forestland within the constraints of a Forest Plan over a decade. Only volume produced from timber harvesting on suitable forestlands contributes to ASQ. Timber harvesting may be used as a management tool on other forestlands, however, the volume removed does not contribute to meeting the ASQ.

On the Chequamegon the ASQ was set in the 1986 Forest Plan at 700 million board feet (MMBF) or 113.4 million cubic feet (MMCF) for the first decade. The Forest actually produced 696 MMBF (112.7 MMCF) or 99% of the ASQ. While the total output was close to the ASQ, the mixture of species/product groups and volumes-per-acre was a concern. The actual sawtimber output for softwood was only 66% of the plan projection while sawtimber output for hardwood was 38% of the plan projection. The shortfall was made up in lower valued pulpwood volume. The volumes-per-acre were also less than plan projections. This resulted in managers entering approximately 200,000 acres that had been determined as not needed for timber demand in the original projections.

On the Nicolet the ASQ was set in the 1986 Forest Plan at 970 MMBF for the first decade. The Forest actually produced 714 MMBF or 74% of the ASQ. The problem on the Nicolet was somewhat different from the Chequamegon. The estimated volume-per-acre produced on the Nicolet was accurate. However, the acreage treated was far short of expectations. A 1991 ASQ report identified the following reasons for the acreage shortfall: slow growth/high mortality as a result of drought and higher than normal insect/disease damage; unforeseen impacts of 1986 Forest Plan Standards and Guidelines; and the inclusion of Wild and Scenic River Corridors in suited acres.

Combined timber volume sold on the two Forests averaged 140 MMBF per year in the first decade. Timber offered since 1996 declined due to the reasons listed above, and in part due to time and expense required to complete the environmental analyses. The Forests averaged 102 MMBF annually from 1997 to 2002.

Insect, Disease and Other Damaging Agents

Insect and disease organisms are a significant component of forest ecosystems. These organisms contribute to many forest ecological processes including nutrient cycling, plant succession, and forest dynamics. In most cases, these organisms are recognized as integral forest components. However, organisms are referred to as pests when they cause unacceptable resource damage and loss, or if they adversely impact ecological, economic, or social values.

Forest pests respond to environmental conditions that predispose the trees to attack. Trees may be weakened by prior or present pest activity, drought, poor site conditions, or declines in predator populations such as birds. Weakened trees are then susceptible to “secondary” pests that potentially kill the trees.

Silvicultural treatments address insect and disease concerns by maintaining adequate growing space, nutrients, and light. Vigorously growing, healthy trees are less susceptible to insect and disease attacks.

While insects and disease cycle through the Chequamegon-Nicolet in any given year, very few are considered major pests warranting treatment within Forest boundaries. Gypsy moth treatments have been applied as part of the National "Slow the Spread" program along with localized suppression efforts. Localized oak wilt suppression treatments have also been applied to keep this disease in check.

Other damaging agents include wind, drought, fire, and flooding. Of the four, wind and drought had the greatest effect on the Chequamegon-Nicolet in recent years. Effects of a 1980s drought are still being noted on the Forests. This drought weakened trees, making them susceptible to other "pest" activity, eventually resulting in death or significant loss of growth.

Wind also played a key role in damaging the Forests' timber resources. Recent major windstorms on the Washburn, Park Falls, Medford, and Eagle River units damaged thousands of acres. While wind events add coarse woody debris to the ecosystem—a component that is often lacking in today's forests—excess down and damaged trees increase the likelihood of secondary insect and disease events.

Current Management Direction

The Chequamegon-Nicolet National Forests continue to work under their respective 1986 Forest Plans. However, since the approval of these two plans, new information has altered management to some degree. For example, following the release of the report of the Scientific Roundtable (Crow et al. 1994) there was increased sensitivity to landscape pattern when applying silvicultural methods. In the 1986 Plans, Forest management was primarily influenced by working toward desired conditions for species composition and age class distribution of forest cover types.

Species Composition

Current management direction is based on the 1986 Forest Plans and new information that become available since the plans were signed. Combined species composition for both plans, as well as separate figures for each land base, are shown in Table 3-60 and 3-61. Table 3-60 shows 1986 figures (start of plan) and a projection of 2136 figures (15th decade) in acres while Table 3-61 shows these figures in percent.

Table 3-60. Forest Type Composition in 1986 and Projected to 2136 in Acres

	Chequamegon landbase		Nicolet landbase		Combined landbases	
Forest type	**1986**	**2136**	**1986**	**2136**	**1986**	**2136**
Aspen	172,549	188,815	135,020	145,190	307,569	334,005
Hardwoods [1/]	254,584	229,280	261,470	261,100	516,054	490,380
Red Pine & White Pine [2/]	74,077	80,394	70,720	62,980	144,797	143,374
Jack Pine	39,160	34,948	13,830	13,130	52,990	48,078
Balsam Fir	37,064	30,121	18,830	17,480	55,894	47,601
Upland opening	15,190	28,835	11,776	15,000	26,966	43,835
Total	592,624	592,393	511,646	514,880	1,104,270	1,107,273

[1] Includes paper birch, oak and hemlock
[2] Includes white spruce

Figures are based on tentatively suited acres for the Chequamegon and on total forested acres on the Nicolet.
Data from page B-230 of the Chequamegon FEIS and page B-156 of the Nicolet FEIS.
Lowland openings, hardwoods and conifers were excluded from this comparison.

Table 3-61. Forest Type Composition in 1986 and Projected to 2136 in Percent

	Chequamegon landbase		Nicolet landbase		Combined landbases	
Forest type	**1986**	**2136**	**1986**	**2136**	**1986**	**2136**
Aspen	29%	32%	26%	28%	28%	30%
Hardwoods [1/]	43%	39%	51%	51%	47%	44%
Red Pine & White Pine [2/]	12%	14%	14%	12%	13%	13%
Jack Pine	7%	6%	3%	3%	5%	4%
Balsam Fir	6%	5%	4%	3%	5%	4%
Upland opening	3%	5%	2%	3%	2%	4%
Total	100%	100%	100%	100%	100%	100%

[1/] includes paper birch, oak and hemlock
[2/] includes white spruce

For comparison, the existing forest type composition is displayed in Table 3-59.

The 1986 Forest Plans proposed increases in aspen and upland openings and decreases in hardwoods, jack pine and balsam fir acreage over time. Red and white pine acreage was to increase on the Chequamegon and decrease on the Nicolet.

Actual composition showed increases in aspen and upland openings and decreases in jack pine and balsam fir during the current planning cycle. Red and white pine increased on the Chequamegon and decreased on the Nicolet as desired. However, hardwood acreage on both Forests increased rather than decreased. In general, both landbases are moving toward achieving the desired long-term species composition of the 1986 Plans.

Age Class Distribution

Species age class distribution is another area in which the two Forest Plans differ. Species age class distribution in 1986 (start of the current planning cycle), 2000, and the desired age class distribution range are shown in Table 3-62 for both Forest Plans. These tables are displayed in percentage of upland acres.

Table 3-62. Species Age Classes in 1986, 2000, and Desired Age Class Distribution Range for 1986 Forest Plans

Desired Species Age Class Composition (Chequamegon)					Desired Species Age Class Composition (Nicolet)				
Species	Age Class	Percent in 1986	Desired percent range	Existing percent 2000	Species	Age Class	Percent in 1986	Desired percent range	Existing percent 2000
Aspen	0--9	14	10--20	12%	Aspen	0--9	22	15--25	10%
	10--19	18	10--20	20%		10--19	22	15--25	24%
	20--39	25	25--35	27%		20--29	1	15--25	25%
	40--59	36	25--35	23%		30--39	8	15--25	13%
	60+	7	3--5	19%		40+	47	15--25	27%
Jack pine	0--9	1	10--20	60%	Jack pine	0--9	5	13--23	19%
	10--29	4	25-35	12%		10--39	4	49--59	25%
	30--59	91	45--55	8%		40+	91	23--33	56%
	60+	4	0	19%					
Balsam fir	0--9	1	10--20	4%	Balsam fir	0--39	10	67--77	27%
	10--29	5	25-35	4%		40+	90	23--33	73%
	30--59	70	45--55	29%					
	60+	24	0	64%					
Red pine	0--9	8	5--10	3%	Red pine	0--19	15	21--31	12%
	10--29	39	10--20	23%		20--39	16	21--31	17%
	30--59	47	15--25	42%		40--59	55	21--31	25%
	60--89	5	15--25	30%		60+	14	17--27	46%
	90--130	1	25--35	2%					
	131+	1	3--5	0%					
White pine	0--9	6	5--10	5%	White pine	0--19	15	21--31	4%
	10--29	21	10--20	3%		20--39	16	21--31	1%
	30--59	47	15--25	11%		40--59	55	21--31	7%
	60--89	22	15--25	44%		60+	14	17--27	88%
	90--130	4	25--35	37%					
	131+	1	3--5	1%					
White spruce	0--9	6	5--10	2%	White spruce	0--19	15	21--31	6%
	10--29	21	10--20	18%		20--39	16	21--31	32%
	30--59	47	15--25	45%		40--59	55	21--31	20%
	60--89	22	15--25	35%		60+	14	17--27	42%
	90--130	4	25--35	0%					
	131+	1	3--5	0%					
Red oak	0--19	1	10--20	3%	Red oak	0--9	0	5--15	1%
includes	20-39	3	10--20	1%	includes	10--59	64	40--50	7%
paper birch &	40-69	82	15--25	26%	paper birch &	60+	36	40--50	92%
even-aged	70--109	14	25--35	69%	even-aged				
hardwoods	110--129	1	10--20	1%	hardwoods				
	130+	1	3--5	0%					

The expectations in the current Forest Plans were to achieve these age class distribution classes over the long term. Some progress was made in nearly every species category. Some of the species categories in the above table were combined in the 1986 Plans (i.e. Red Pine/White Pine/White Spruce was listed as one timber type in the Nicolet Plan (p 27)). They were separated into more specific groupings in Table 3-62 in order to compare Alternative 1 with Alternatives 2-9 and the Selected Alternative. Therefore, 1986 figures for red pine, white pine, and white spruce on the Nicolet landbase may be questionable. Also, paper birch will be discussed separate from even-aged hardwoods in the effects analysis for age class distribution.

Proposed Changes

The "change" for timber production involves the use of information gathered in the past 15 years to improve projections that accurately estimate ASQ. A second change is the focus on ecological restoration and achievement of landscape level biological diversity through timber harvest activity. Projected species/product outputs for the 1986 Plans were overestimated. This is evidenced by the Nicolet's 1991 ASQ report and by the fact that, in order to meet projected outputs, the Chequamegon had to enter lands originally determined "not needed to meet timber demand". While some of the output shortfall could be attributed to increased length of time required for environmental analysis, a good share of the shortfall resulted from the physical limitations of the land given the Standards and Guidelines applied to harvest treatments.

There are several approaches the Forests have taken to improve species product projections and the health and viability of forest ecosystems. Improvements were made in determining suitable forestland, growth and yield projections, and species product mix, as well as addressing the impacts of Alternative Management Areas, Ecological Reference Areas, and Standards and Guidelines.

Suited Forestland Determination

As described earlier, suited forestland determination is a step-by-step process. Determination of tentatively suited lands is identical for Alternatives 2-9 and the Selected Alternative. The tentatively suited forestland in the 2004 Forest Plan is 1,222,997 acres.

Generally, once the tentatively suited forestland is determined, the alternatives start to deviate from each other. However, when determining suitable forestland the Forests applied several other factors to Alternatives 2-9 and the Selected Alternative. These factors include all remaining hemlock and forested wetland acres and a projection of Threatened, Endangered or Sensitive (TES) species habitat needs. The hemlock and forested wetlands were removed due to lack of consistent success of regenerating these forest types. The projection of TES species habitat is based on the experience of the last several years regarding the protection of sensitive species. From this point on alternatives vary by management area designations. Table 3-63 shows the result of the suitable forestland acres determination for each of the alternatives.

Table 3-63. Total Suitable Forestland by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 9	SA
Acres	934,000	874,000	830,000	781,000	863,000	847,000	841,000	861,000	864,000

Note: Details of forestland suitability determination are located in Appendix M.

Suitable forestland ranges from a high of 934,000 acres in Alternative 1 to a low of 781,000 acres in Alternative 4. The suited forestland in the Selected Alternative is approximately 864,000 acres, slightly more than in Alternative 5 (Preferred Alternative). Modifications made to the Preferred Alternative which affected the suited forestlands in the Selected Alternative include: selection of a different set of proposed wilderness areas (MA 5B); shifting some MA 6A to MA 6B; and shifting some MA 6B to MA 6A.

Standards and Guidelines

Some Standards and Guidelines were developed on a forestwide basis while others apply only to specific Management Areas (MAs). Standards and Guidelines for MAs 5, 5B, 6A, and 8A-8G generally exclude timber management activities designed to produce timber outputs. In some cases, the Standards and Guidelines allow for vegetation management within these MAs in order to develop conditions desirable for specific MA goals. Timber harvesting would be the exception rather than the rule in these management areas and in no case would timber harvest occur in MA 5 or 5B.

Management Area (MA) Allocation

Allocation of Management Areas (MA) varies across the Forests in each alternative. MA allocation was used to develop the range of alternatives and was based on characteristics such as existing and potential species composition; existing and potential landscape pattern; desired objectives of the alternative; and Threatened, Endangered, and Sensitive species needs. Species composition objectives for each management area are the driving force for proposed silvicultural treatments and the resulting timber outputs available in each alternative. Table 3-64 displays an acreage summary of MA allocation by alternative.

Table 3-64. Management Area Assignment by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
1A	400,000	168,000	101,000	138,000	158,000	168,000	153,000	101,000	158,000
1B	0	86,000	74,000	27,000	33,000	81,000	31,000	78,000	38,000
1C	0	167,000	72,000	76,000	95,000	146,000	87,000	72,000	95,000
2A	0	195,000	30,000	161,000	225,000	128,000	271,000	180,000	175,000
2B	0	23,000	454,000	234,000	130,000	142,000	143,000	282,000	209,000
2C	422,000	354,000	165,000	206,000	294,000	303,000	222,000	215,000	262,000
3A	0	0	0	0	0	0	0	0	0
3B	0	1,700	23,900	6,400	1,700	6,400	10,900	11,900	10,900
3C	242,000	54,000	36,000	48,000	62,000	46,000	52,000	48,000	52,000
4A	171,000	117,000	112,000	125,000	152,000	114,000	140,000	124,000	138,000
4B	0	17,000	65,000	50,000	17,000	20,000	30,000	53,000	30,000
4C	0	10,000	13,000	13,000	13,000	10,000	13,000	13,000	13,000
5	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000
5B	0	6,300	7,600	45,200	12,300	22,600	18,100	11,700	11,700
6A	0	2,800	45,200	65,600	11,200	11,200	24,500	6,100	9,000
6/6B	69,000	56,000	108,000	83,000	56,000	48,000	73,000	81,000	48,000
8A	6,000	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500
8B	700	700	700	700	700	700	700	700	700
8C	13,000	20,000	20,000	19,000	20,000	20,000	20,000	20,000	20,000
8D	41,000	35,000	35,000	34,000	35,000	34,000	35,000	35,000	35,000
8E	2,500	35,200	35,200	35,200	35,200	35,200	35,200	35,200	35,200
8F	13,000	63,900	63,900	63,900	63,900	63,900	63,900	63,900	63,900
8G	67,600	85,500	91,000	92,600	85,500	91,000	92,600	92,600	85,500

NOTE:

All MAs in Alternative 1 were placed in a MA category as close to the intent of the 1986 Plans as possible.

St Peter's Dome is included in MA 8E and 8F in Alt 1 and MA 6A, 8E and 8F in Alt 2-9 and the Selected Alternative.

Mary Livingston Griggs Historical SMA, Mary Griggs Burke Scenic SMA, and Mary Griggs Burke Botanical SMA are included in MA 8F in Alts 1-9 and the Selected Alternative.

Only designated RNAs are included in MA 8E in Alt 1. RNA and CRNA acres are included in MA 8E in Alternatives 2-9 and the Selected Alternative.

MA 8G in Alt 1 represents the acreage which was allocated to old growth--not necessarily designated. Acres were prorated from MAs 1-4.

Acreage figures are all rounded.

Timber management is allowed in MAs 1A-4C and volume produced from these MAs is included in the ASQ. Timber management is generally not consistent with the objectives of MAs 5-8G. However, it is likely timber management will have a role in the management of MAs 8A-8D to help meet the objectives of these MAs. Any volume produced from MAs other than MA 1A-4C will not be included in the ASQ determination.

The Selected Alternative was developed by modifying Alternative 5 (Preferred Alternative). Compared to the Preferred Alternative, the Selected Alternative calls for more acres of MA 1B, 2B, 3B, and 4B and less of MA 2A, 2C, 3C, 4A, 5B, and 6A. Figures 3-66 through 3-70 display the management area subcategories within the major MA 1-4 categories for all the alternatives. Management Area 6B overlaps Management Area 1A to 4C silvicultural prescriptions and provides for desired recreational experiences, while timber volume harvested is included in the ASQ.

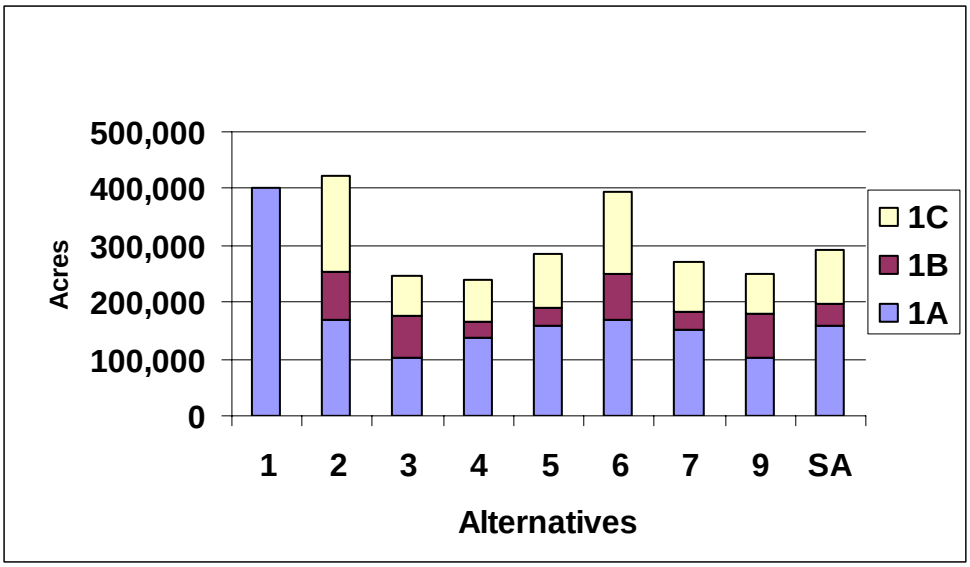

Figure 3-66. Management Area Subcategories within Management Area 1 by Alternative

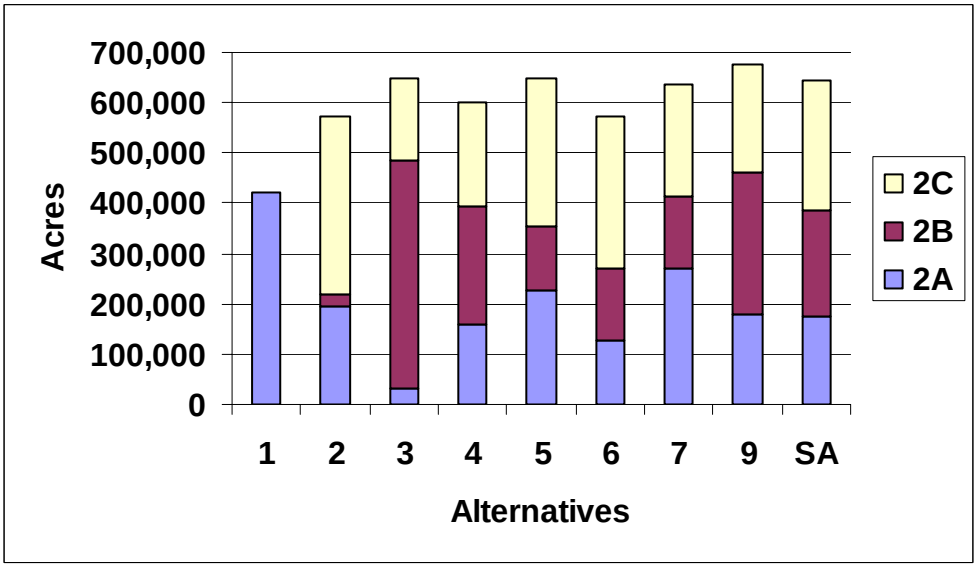

Figure 3-67. Management Area Subcategories within Management Area 2 by Alternative

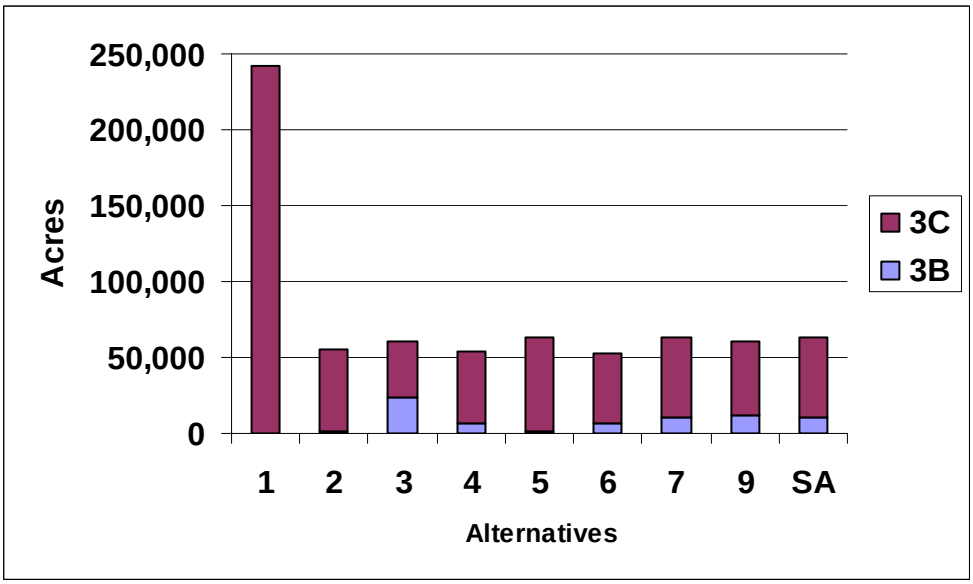

Figure 3-68. Management Area Subcategories within Management Area 3 by Alternative

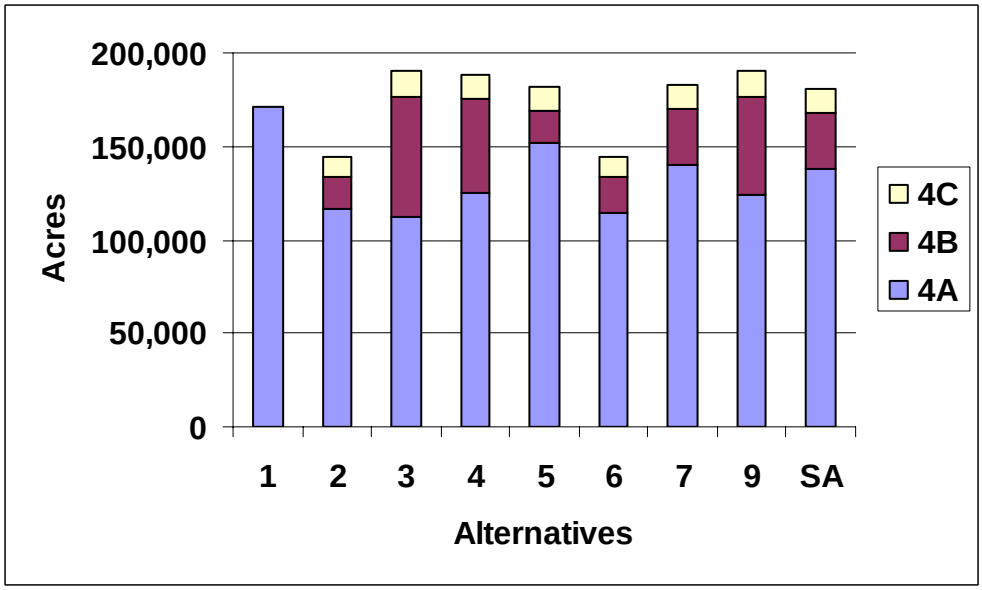

Figure 3-69. Management Area Subcategories within Management Area 4 by Alternative

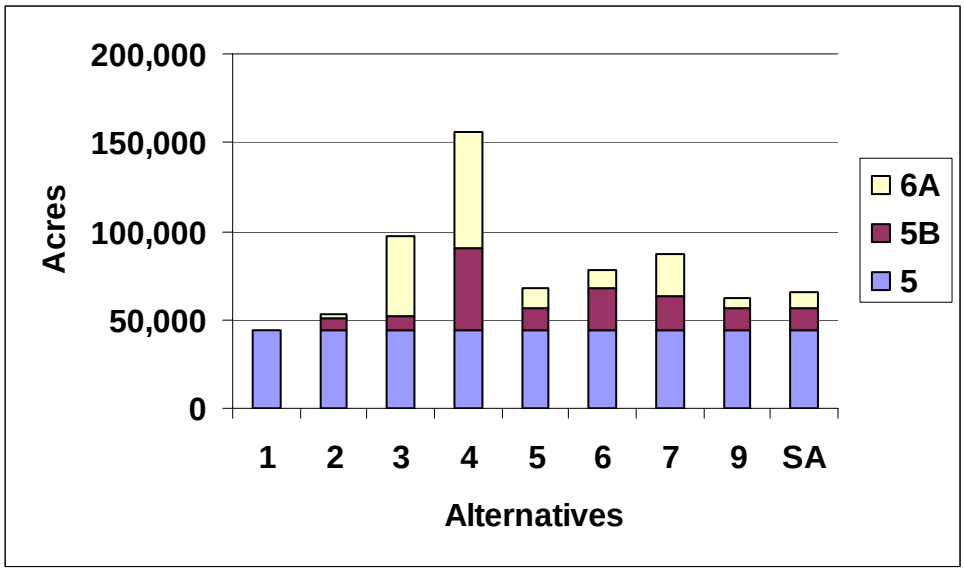

Figure 3-70. Management Area 6A and Subcategories within Management Area 5 by Alternative

Figure 3-71 displays the management area emphasis within Management Area 6B areas for each of the alternatives. MA 6B areas are designated as MA6B-1B, 6B-2A, etc. Management of MA 6B is accomplished by specific guidelines for 6B as well as guidelines for the associated vegetation management areas 1 through 4. Standards and guidelines for both Management Areas are applied; when they conflict the more restrictive Standards or Guidelines prevail. The silvicultural systems used range from even-aged to uneven-aged management, but generally less intensive than MA 1. Forest stands within MA 6B reflect the variety of composition and structure found within MAs 2, 3, and 4. Within-stand tree species diversity is moderate, with efforts made to maintain or restore regionally less common species such as yellow birch, hemlock, and white pine (Chapter 3, 2004 Forest Plan).

The acres displayed in this chart for MA 1-4 are already displayed in the other management area charts.

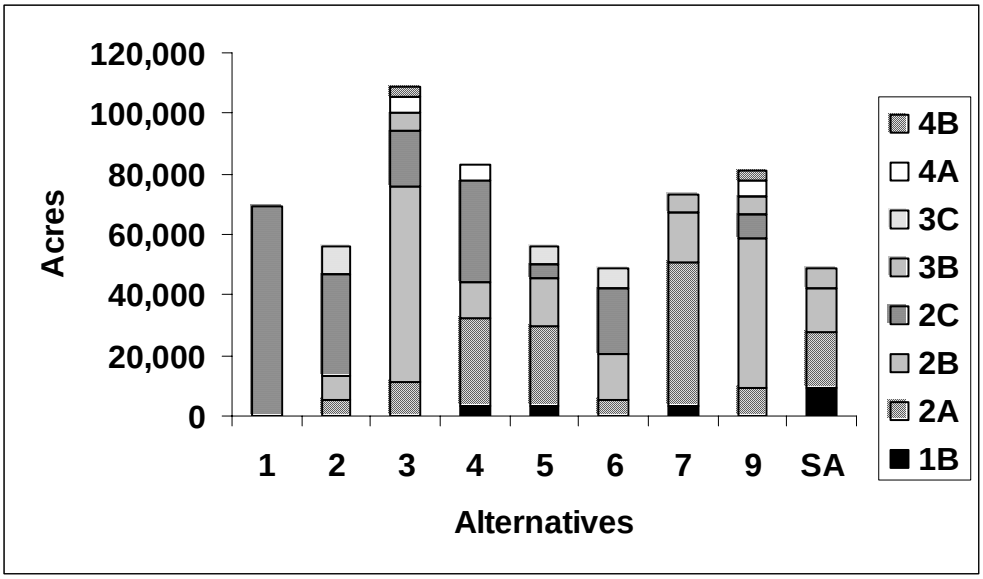

Figure 3-71. Management Area Emphasis within Management Area 6B by Alternative

Alternative Management Areas (AMAs)

The objective of AMAs (MAs 2B, 3B, 4B, and 4C) is to provide a higher level of ecosystem restoration within areas that are also managed for timber production. Management Area Standards and Guidelines provide for higher levels of ecosystem restoration as compared to present. Components typically found in old growth systems will be more common in AMAs than other areas of the forest managed for timber production, though not to the same levels as designated old growth (MA 8G). These components include older trees, larger diameter trees, more coarse woody debris (snags and down logs), and larger patches with lower fragmentation. Ecological processes occurring after disturbance events (wind, fire, etc.) are more often allowed to proceed naturally in AMAs. This approach to management could slightly reduce the productivity, quantity, and quality of the timber that could be potentially produced. MA 4C is different from the other AMAs in that the intent is to provide large temporary openland conditions (surrogate pine barrens), requiring a higher level of timber management intensity compared to the other AMAs. Table 3-65 and Figure 3-72 display AMA allocation by alternative.

Table 3-65. Alternative Management Areas by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
2B	0	23,000	454,000	234,000	130,000	142,000	143,000	282,000	209,000
3B	0	1,700	23,900	6,400	1,700	6,400	10,900	11,900	10,900
4B	0	17,000	65,000	50,000	17,000	20,000	30,000	53,000	30,000
4C	0	10,000	13,000	13,000	13,000	10,000	13,000	13,000	13,000
Total	0	51,700	555,900	303,400	161,700	178,400	196,900	359,900	262,900

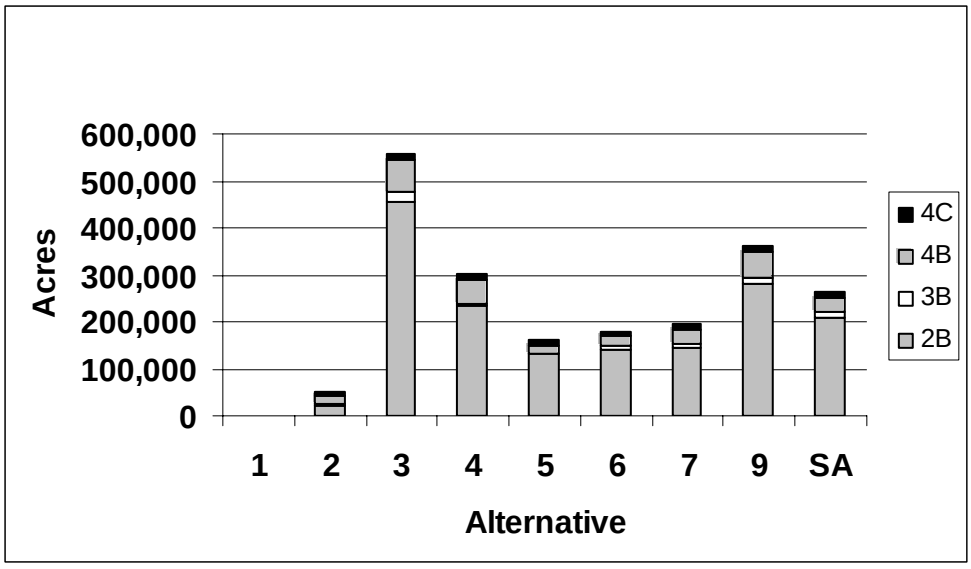

Figure 3-72. Acres of Alternative Management Area (AMA) Allocation by Alternative.

The acreage of AMAs ranges from a high of 555,900 in Alternative 3 to zero acres in Alternative 1. As described above, allocation of management areas was one of the most significant changes between Alternative 5 (Preferred Alternative) and the Selected Alternative. An additional 101,200 acres of AMAs (79,000 acres MA 2B, 9,200 acres MA 3B, and 13,000 acres MA 4B) were added to the Selected Alternative. No additional acreage was added to MA 4C in the Selected Alternative because no additional areas met the criteria for MA 4C management.

Ecological Reference Areas (ERAs)

The term "Ecological Reference Areas" refers to candidate and existing Research Natural Areas (RNA), Special Management Areas (SMA) and Old Growth & Natural Feature Complexes (MAs 8E, 8F, and 8G, respectively). These areas are the best known representatives of various vegetative communities on the Forests. Natural processes dominate in each area. Among other values, these areas serve as reference areas for comparison with other MAs which allow timber management.

Table 3-66 displays ERA assignments by alternative. There is no variation in MA 8E or MA 8F allocation across Alternatives 2-9 and the Selected Alternative. However, there is some variation in Old Growth & Natural Feature Complexes (MA 8G) allocation. Alternative 1 represents the current Forest Plans and has the least amount of these MAs.

Table 3-66. Ecological Reference Areas by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
8E	2,500	35,200	35,200	35,200	35,200	35,200	35,200	35,200	35,200
8F	13,000	63,900	63,900	63,900	63,900	63,900	63,900	63,900	63,900
8G	67,600	85,500	91,000	92,600	85,500	91,000	92,600	92,600	85,500
Total	83,100	184,600	190,100	191,700	184,600	190,100	191,700	191,700	184,600

The acreage assigned to ERAs range from a high of 191,700 in Alternatives 4, 7 and 9 to a low of 83,100 in Alternative 1. The Selected Alternative maintains the same level of ERAs as Alternative 5 (Preferred Alternative).

Species Composition

Desired species composition varies by alternative and is directly tied to management area (MA) allocation. Each MA has a unique set of species composition objectives or management objectives influencing the vegetative composition over time. Table 3-67 displays each MA description and the primary and secondary vegetative emphases that occur within them. This table is a simplification of the MA information listed in the Forest Plan (Chapter 3, 2004 Forest Plan).

Table 3-67. Primary Vegetative Emphasis within the Draft Management Areas

MA	Management Area Description	Primary Vegetative Emphasis	Secondary Vegetative Emphasis
1A	Early Successional: Aspen	aspen	hardwood/conifer
1B	Early Successional: Aspen, Mixed Aspen-Conifer & Conifer	aspen	conifer
1C	Early Successional: Aspen & Hardwood	aspen	hardwood
2A	Uneven-aged Hardwoods	maple	aspen/pine
2B	Uneven-aged Hardwoods: Interior Forest	maple	
2C	Uneven-aged Hardwoods: Mixed Forest	maple, ash, basswood	aspen/pine
3A	Even-aged Hardwoods: Mid-tolerant	ash, basswood, oak	maple/aspen
3B	Even-aged Hardwoods: Oak-Pine	oak	red/white pine
3C	Even-aged Hardwoods: Oak-Aspen	oak	aspen
4A	Conifer: Red-White-Jack Pine	red/white/jack pine	aspen/hardwood
4B	Conifer: Natural Pine-Oak	red/white pine	oak
4C	Conifer: Surrogate Pine Barrens	jack pine	openings
5	Designated Wilderness	natural succession	
5B	Wilderness Study Area	natural succession	
6A	Semi-Primitive Non-Motorized, Low Disturbance	natural succession	
6B	Semi-Primitive Non-Motorized, Moderate Disturbance	mixed species	late successional
8A	Argonne Experimental Forest	hardwood	
8B	Oconto River Seed Orchard	seed production	
8C	Riley Lake Wildlife and Moquah Barrens Area	openings	early successional
8D	Wild, Scenic and Recreational Rivers	late successional	
8E	Research Natural Areas	natural succession	
8F	Special Management Areas	natural succession	
8G	Old Growth and Natural Feature Complexes	natural succession	

The MA allocation within an alternative provides resource managers with an outline of how the desired Forest will look. In some cases, changes can occur relatively quickly, within a decade, while others occur over many decades.

Direct and Indirect Effects

Effects on Timber Product Outputs from Management Area (MA) Allocations

Species Composition

The three largest species groups are hardwoods/oak, aspen, and red/white pine; these groups tend to have the most significant changes in composition percentage over time. To some degree, these changes occur naturally as the forest ages. However, some of the changes result from the management direction set forth in individual MA descriptions and Standards and Guidelines.

The acreage of hardwoods/oak on the Forests is projected to increase in all alternatives. Forest aging has a big impact on the increase of hardwoods because as early successional species age and die, they are replaced by the more shade tolerant hardwood species in MAs that do not allow timber management. However, MAs that allow for timber management also provide a high level of change in hardwoods/oak. The increase in hardwoods/oak acreage under each alternative is best seen after 10 decades of management. The proportion of upland area projected to be forested with hardwoods/oak 100 years from now varies from a high of 59.4% in Alternative 3 to a low of 51.3% in Alternative 1. Current hardwood/oak proportion is 43.5%.

The acreage of red/white pine is projected to increase in all alternatives except Alternative 1. The proportion of upland area projected to be forested with red/white pine 100 years from now varies from a high of 14.2% in Alternative 2 to a low of 11.3% in Alternative 1. Increases are within the white pine type and in all cases the red pine acreage goes down slightly. The current red/white pine proportion is 11.4%.

The acreage of aspen is projected to decrease in all alternatives, in part due to the allocation of MAs that do not allow for timber management. For example, the Forests currently have aspen in existing Wilderness areas. These aspen acres are projected to be replaced naturally by hardwoods or pine over time. The proportion of upland area projected to be forested with aspen 100 years from now varies from a high of 23.4% in Alternative 1 to a low of 16.3% in Alternative 3. Aspen proportion currently is 29.8%.

Other forest types showing a downward trend include: balsam fir (except Alternative 1), jack pine, spruce and paper birch. Hemlock is projected to maintain its current composition percentage.

Tables 3-68a, 3-68b, 3-68c and 3-68d displays current species composition (2000) as well as projected composition after one decade and after ten decades for each alternative.

Table 3-68a. Species Composition - Percent of Forest Species Types on Upland Acres (current and 10 years) by Alternative

Forest Species Type	Current	Alternatives 1	2	3	4	5	6	7	9	SA
Aspen	29.8%	29.7%	29.2%	29.2%	29.0%	29.4%	29.3%	29.3%	29.1%	29.2%
Balsam Fir	2.8%	2.7%	2.6%	2.6%	2.6%	2.5%	2.6%	2.5%	2.5%	2.6%
Hardwoods	39.7%	39.9%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Red Pine	9.5%	9.6%	9.5%	9.6%	9.5%	9.5%	9.5%	9.5%	9.5%	9.4%
White Pine	1.9%	1.9%	2.2%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%
Hemlock[1]	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Jack Pine	3.0%	3.0%	2.9%	2.9%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Spruce	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Paper Birch	2.9%	2.7%	2.6%	2.5%	2.8%	2.4%	2.5%	2.5%	2.7%	2.4%
Oak	3.8%	3.9%	4.5%	4.8%	4.8%	4.7%	4.6%	4.8%	4.8%	4.8%
Openings	2.6%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.5%

[1] *Assumed to be the same thru the planning cycle*

Table 3-68b. Species Composition - Percent of Forest Species Types on Upland Acres (current and 100 years) by Alternative

Forest Species Type	Current	Alternatives 1	2	3	4	5	6	7	9	SA
Aspen	29.8%	23.4%	21.9%	16.3%	16.6%	20.0%	20.3%	18.6%	17.9%	19.2%
Balsam Fir	2.8%	3.5%	2.7%	2.6%	2.6%	2.6%	2.6%	2.5%	2.7%	2.7%
Hardwoods	39.7%	47.1%	47.8%	53.6%	53.4%	50.2%	50.0%	51.6%	51.5%	50.7%
Red Pine	9.5%	8.6%	9.5%	9.2%	9.4%	9.4%	9.5%	9.4%	9.4%	9.4%
White Pine	1.9%	2.7%	4.7%	4.1%	4.1%	3.8%	4.2%	3.8%	4.2%	3.8%
Hemlock[1]	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Jack Pine	3.0%	2.8%	2.1%	1.9%	2.1%	2.1%	2.1%	2.1%	2.1%	2.4%
Spruce	3.1%	1.9%	1.8%	2.0%	1.7%	2.0%	1.9%	1.8%	1.9%	2.0%
Paper Birch	2.9%	1.5%	1.3%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.0%
Oak	3.8%	4.2%	5.0%	5.8%	5.7%	5.5%	5.0%	5.7%	5.8%	5.7%
Openings	2.6%	3.4%	2.5%	2.5%	2.4%	2.3%	2.4%	2.3%	2.3%	2.3%

[1] *Assumed to be the same thru the planning cycle*

Table 3-68c. Species Composition - Acres of Forest Species Types on Upland Acres (current and 10 years) by Alternative

Forest Species Type	Current	Alternatives 1	2	3	4	5	6	7	9	SA
Aspen	336,100	334,700	329,500	329,800	327,100	331,600	330,900	330,200	328,000	330,000
Balsam Fir	31,200	30,300	29,000	29,200	29,000	28,400	28,900	28,400	28,500	29,500
Hardwoods	447,500	449,700	450,900	451,200	451,200	451,100	451,100	451,100	451,500	451,000
Red Pine	107,600	108,600	107,600	107,900	107,600	107,600	107,600	107,600	107,600	106,400
White Pine	22,000	22,000	24,400	22,000	22,000	22,100	22,600	22,000	22,000	24,100
Hemlock[1]	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Jack Pine	34,300	34,200	33,200	33,000	33,500	34,000	33,600	33,700	33,600	33,300
Spruce	34,400	34,900	34,400	34,400	34,400	34,400	34,400	34,400	34,400	34,400
Paper Birch	33,100	30,900	29,700	28,200	31,200	26,900	28,700	28,500	30,200	27,000
Oak	43,400	43,600	51,000	53,900	53,600	53,600	52,000	53,700	53,800	54,100
Openings	29,600	30,500	29,600	29,600	29,600	29,600	29,600	29,600	29,600	28,300

[1] *Assumed to be the same thru the planning cycle*

Table 3-68d. Species Composition - Acres of Forest Species Types on Upland Acres (current and 100 years) by Alternative

Forest Species Type	Current	Alternatives 1	2	3	4	5	6	7	9	SA
Aspen	336,100	263,900	246,800	183,500	186,900	226,100	228,900	209,500	202,100	216,200
Balsam Fir	31,200	39,700	30,400	29,700	29,200	29,000	29,600	28,800	30,100	30,500
Hardwoods	447,500	531,700	539,600	604,800	602,800	566,500	563,700	581,600	580,600	572,500
Red Pine	107,600	97,500	106,700	103,900	106,600	106,300	106,700	106,400	106,500	106,400
White Pine	22,000	30,700	52,800	45,900	46,600	42,300	47,000	43,300	47,900	42,400
Hemlock[1]	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
Jack Pine	34,300	31,900	23,800	21,000	23,900	23,700	23,800	23,700	24,100	27,100
Spruce	34,417	21,601	20,000	22,100	18,800	22,400	21,900	20,800	21,900	22,200
Paper Birch	33,136	46,922	15,000	13,800	13,300	14,500	14,600	14,200	14,300	11,700
Oak	43,388	47,422	56,100	65,900	64,700	62,100	55,900	64,600	65,200	68,800
Openings	29,602	38,770	28,100	28,800	26,500	26,400	27,200	26,400	26,400	25,400

[1] *Assumed to be the same thru the planning cycle*

Table 3-69 shows the lowland species cover types which currently exist on the Forests. For planning purposes it is assumed these species remain constant through time.

Table 3-69. Total Acreage and Percentage of Lowland Species[1]

Species	Acres	%
Lowland Open	137,023	37.8%
Lowland Conifer	182,184	50.3%
Lowland Hardwood	42,975	11.9%
Total	362,182	100.0%

[1] *Assumed to be the same thru the planning cycle*

The modifications made to the amount of suited forestland in the Preferred Alternative combined with the shift in management area allocation has had an effect on the future species composition projections for the Selected Alternative. The most significant increases between the Preferred Alternative and the Selected Alternative are in hardwood, oak and jack pine while the most significant decreases are in aspen and paper birch. Generally, these changes in species composition are a result of the increased acreage of Alternative Management Areas and the desired composition objectives for management areas. Species trend information is best seen in projections for 100 years (see Table 3-68b or 3-68d). A comparison between the existing condition and the alternatives is displayed in Figure 3-73 below.

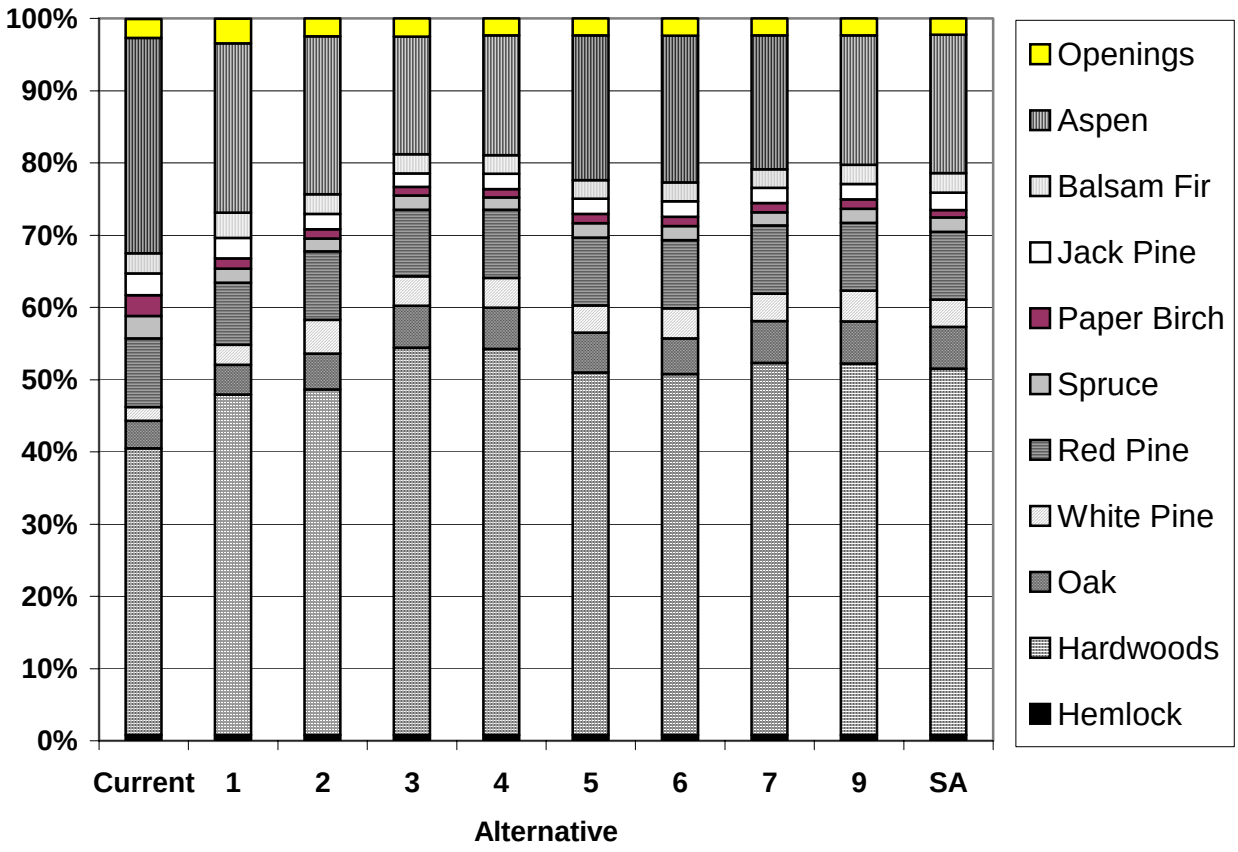

Figure 3-73. Projected Upland Species Composition at 100 Years, by Alternative

Age Class Distributions

Age class diversity for tree species managed under an even-aged management scenario helps maintain critical habitat for a variety of plant and animal species. Age class diversity for tree species is also important in maintaining a flow of timber products over time while limiting fluctuations within species or product groups.

Desired age class distribution for species managed through even-aged management and size class distribution of uneven-aged hardwoods are displayed in the forestwide Standards and Guidelines in Chapter 2 of the 2004 Forest Plan. Achieving age class

distribution helps maintain an even flow of timber products, improve forest health, and provide habitat for a variety of plant and animal species. The species of greatest interest are aspen, paper birch, red oak, red pine, jack pine, balsam fir, and white pine.

Each age class for a given species has a range built around the desired percentage which provides some flexibility in achieving and maintaining the desired age class distribution over time. There could be fluctuations in the age classes due to project level concerns, imbalance of existing age classes, poor markets, budget limitations, and natural disturbances, among others. The desired age class distribution is achievable if ASQ is reached. Project-level decisions will strive to achieve the desired age class distribution as opportunities arise.

In Table 3-70**,** the existing age class distribution, desired range of age classes and projections at the end of the first and tenth decade are displayed for species managed in even-aged stands. The percentages reflect only the suited forestland acres.

Table 3-70. Age Class Breakdown for Species Generally Managed Under Even-aged Silvicultural Techniques at Present, 10 years and 100 years by Alternative

Aspen

	Age Class-1st Decade					Age Class-10th Decade			
	0-9	**10-19**	**20-44**	**45+**		**0-9**	**10-19**	**20-44**	**45+**
Desired %	20	20	50	10	**Desired %**	20	20	50	10
Existing %	12	23	36	29	**Existing %**	12	23	36	29
Alternative					**Alternative**				
1	14	13	42	31	**1**	18	20	52	10
2	13	12	50	25	**2**	17	17	49	17
3	14	13	49	24	**3**	22	19	44	15
4	14	13	51	22	**4**	19	17	47	17
5	13	12	50	25	**5**	19	17	47	17
6	13	12	50	25	**6**	20	17	47	16
7	14	13	50	23	**7**	19	17	46	18
9	13	12	50	25	**9**	19	17	46	18
SA	13	12	50	25	**SA**	20	17	47	16

Paper Birch

	Age Class-1st Decade					Age Class-10th Decade			
	0-19	**20-39**	**40-59**	**60+**		**0-19**	**20-39**	**40-59**	**60+**
Desired %	25	25	25	25	**Desired %**	25	25	25	25
Existing %	4	17	7	72	**Existing %**	4	18	7	71
Alternative					**Alternative**				
1	39	1	22	38	**1**	25	54	15	4
2	30	1	20	49	**2**	20	22	29	29
3	8	2	23	67	**3**	30	19	22	29
4	8	1	20	71	**4**	29	19	24	28
5	16	2	24	58	**5**	23	22	25	30
6	28	1	22	49	**6**	20	22	28	30
7	14	1	23	62	**7**	22	20	28	30
9	10	1	20	69	**9**	28	19	25	28
SA	43	2	24	31	**SA**	30	30	20	20

Red Oak

	Age Class-1st Decade					Age Class-10th Decade			
	0-19	**20-59**	**60-79**	**80+**		**0-19**	**20-59**	**60-79**	**80+**
Desired %	19	38	19	24	**Desired %**	19	38	19	24
Existing %	2	2	72	24	**Existing %**	2	2	72	24
Alternative					**Alternative**				
1	1	1	30	68	**1**	15	38	28	19
2	21	1	21	57	**2**	15	35	21	29
3	24	1	20	55	**3**	18	34	18	30
4	24	1	20	55	**4**	18	34	18	30
5	24	1	20	55	**5**	15	35	21	29
6	21	1	21	57	**6**	15	35	20	30
7	24	1	20	55	**7**	18	32	20	30
9	24	1	20	55	**9**	19	34	17	30
SA	24	1	20	55	**SA**	15	34	20	30

Red Pine

	Age Class-1st Decade					Age Class-10th Decade			
	0-19	**20-59**	**60-99**	**100+**		**0-19**	**20-59**	**60-99**	**100+**
Desired %	15	30	30	25	**Desired %**	15	30	30	25
Existing %	15	48	37	0	**Existing %**	16	48	37	0
Alternative					**Alternative**				
1	5	51	42	2	**1**	19	46	35	0
2	3	45	50	2	**2**	15	39	16	30
3	3	46	50	1	**3**	14	40	15	32
4	3	46	50	1	**4**	16	38	15	31
5	3	46	50	1	**5**	16	39	14	31
6	3	45	50	2	**6**	16	39	14	31
7	3	45	50	2	**7**	16	39	14	31
9	3	45	50	2	**9**	16	39	15	30
SA	3	45	51	2	**SA**	16	39	13	31

Jack Pine

	Age Class-1st Decade					Age Class-10th Decade			
	0-9	**10-29**	**30-49**	**50+**		**0-9**	**10-29**	**30-49**	**50+**
Desired %	16	32	32	20	**Desired %**	16	32	32	20
Existing %	52	17	4	27	**Existing %**	52	17	4	27
Alternative					**Alternative**				
1	24	72	3	0	**1**	10	41	49	0
2	24	67	6	3	**2**	15	23	42	20
3	12	68	6	14	**3**	18	27	40	15
4	13	67	6	13	**4**	15	24	42	19
5	22	66	6	6	**5**	16	25	43	16
6	23	67	6	3	**6**	17	24	42	19
7	16	67	6	11	**7**	15	22	41	22
9	14	67	6	13	**9**	15	22	42	21
SA	4	67	6	23	**SA**	15	22	43	19

Balsam Fir

	Age Class-1st Decade					Age Class-10th Decade			
	0-9	**10-29**	**30-44**	**45+**		**0-9**	**10-29**	**30-44**	**45+**
Desired %	20	40	30	10	**Desired %**	20	40	30	10
Existing %	7	10	6	77	**Existing %**	7	10	6	77
Alternative					**Alternative**				
1	63	6	3	28	**1**	20	30	32	18
2	14	13	6	67	**2**	17	40	23	20
3	7	13	6	74	**3**	15	35	27	23
4	6	15	6	73	**4**	17	39	23	21
5	3	14	6	77	**5**	18	40	23	19
6	7	14	6	73	**6**	17	40	23	20
7	3	14	6	77	**7**	17	39	23	21
9	3	14	6	77	**9**	16	39	23	22
SA	21	13	6	60	**SA**	20	35	25	20

White Pine

White Pine	Age Class-1st Decade				**White Pine**	Age Class-10th Decade			
	0-19	**20-59**	**60-119**	**120+**		**0-19**	**20-59**	**60-119**	**120+**
Desired %	12	24	36	28	**Desired %**	12	24	36	28
Existing %	8	12	77	3	**Existing %**	8	12	77	3
Alternative					**Alternative**				
1	5	4	84	7	**1**	2	27	57	14
2	20	5	70	5	**2**	11	37	32	20
3	6	5	82	7	**3**	13	40	20	27
4	5	5	83	7	**4**	12	44	19	25
5	6	5	82	7	**5**	12	46	17	25
6	10	5	79	6	**6**	14	48	18	20
7	6	5	82	7	**7**	12	45	16	27
9	5	5	83	7	**9**	13	43	20	23
SA	19	5	71	6	**SA**	11	36	28	25

The alternative which best meets desired age class distributions varies by species and timeframe selected. The effects on age class distribution for each alternative are best seen in the 10th decade (see right side of Table 3-70). Two species which draw the most attention (as far as age distribution) are aspen and jack pine. Figures 3-74 and 3-75 below summarize the age class distribution for aspen and jack pine at 100 years for each of the alternatives.

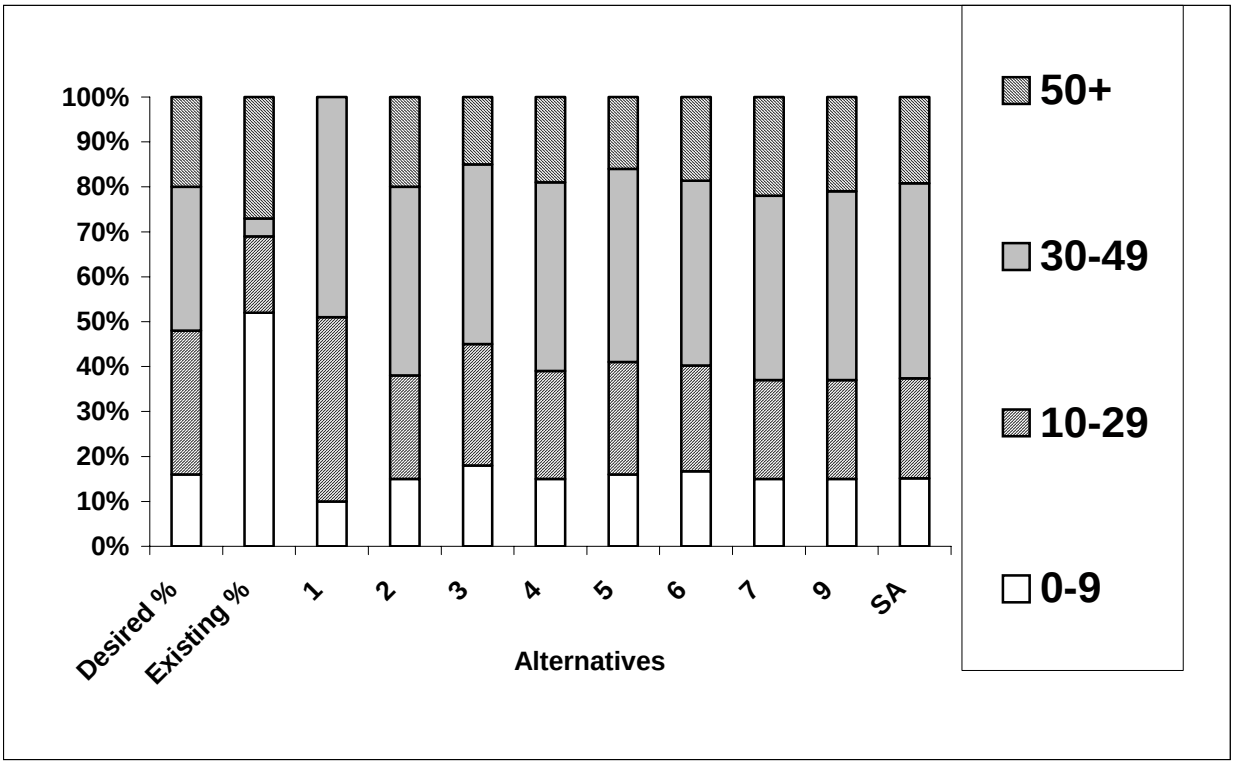

Figure 3-74. Age Class Distribution (Desired, Existing, and by Alternative) for Aspen at 100 Years

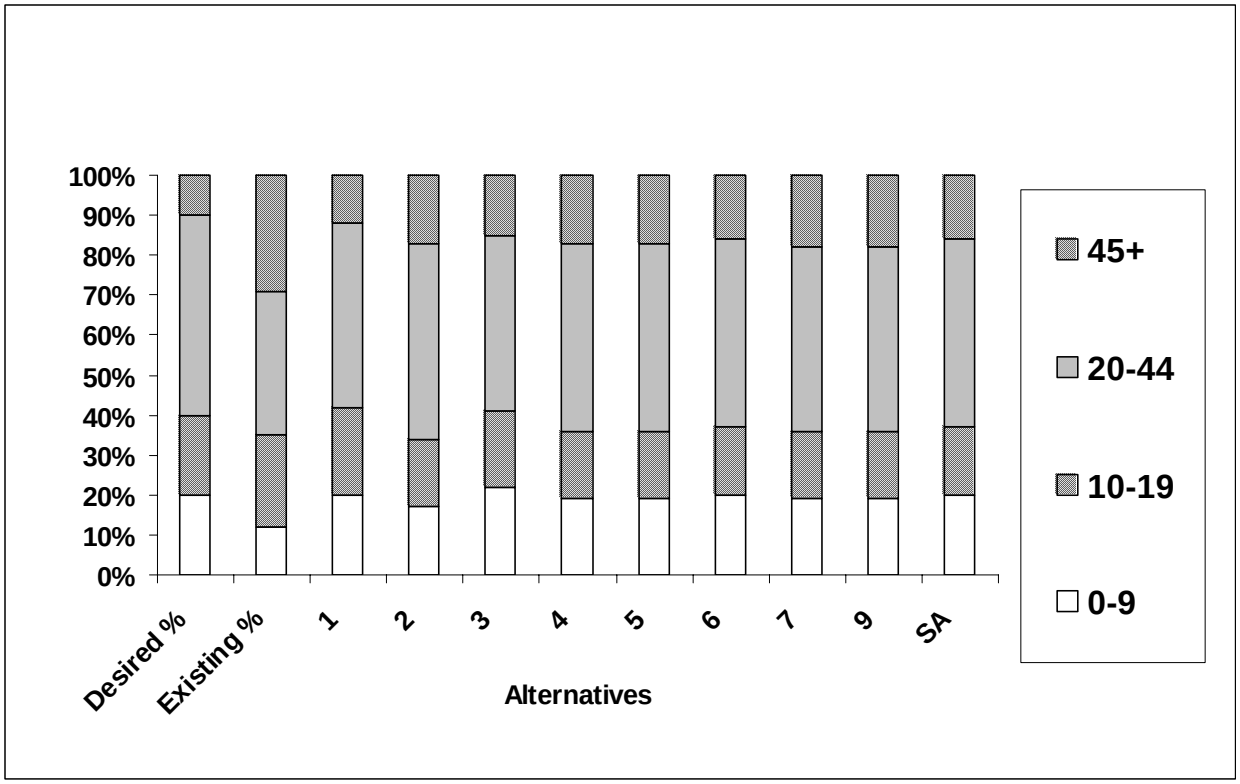

Figure 3-75. Age Class Distribution (Desired, Existing, and by Alternative) for Jack Pine at 100 Years

Projected Silvicultural Treatments

The amount of timber management activities which take place in any alternative is directly related to the species composition and age class objectives on suited forestland. These factors are determined by the management area allocation process which is used to move the Forests towards the desired conditions (see Forestwide Goals and Objectives, Chapter 1, 2004 Forest Plan). Standard and guidelines (both forestwide and Management Area-specific) provide the "sideboards" for this movement towards the desired condition.

A number of activities are needed in order to meet species composition, species age class distribution, and other Forestwide Goals and Objectives for landscape pattern, visual quality, and riparian areas. These activities involve manipulating vegetation through timber harvest, site preparation, reforestation, and timber stand improvement. In order to address the objectives of each alternative, the combination and amount of these activities varies by alternative. These activities are displayed in Tables 3-71a, 3-71b, 3-71c and 3-71d by alternative for decades 1, 5, 10 and 15, respectively.

Table 3-71a. Projected Silvicultural Treatments in the 1st Decade

	Projected Annual Acreage by Treatment for Each Alternative								
Treatment Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
Intermediate cuts	5,870	7,150	6,720	6,780	7,040	7,030	6,980	7,100	7,100
Selection cuts	9,580	7,770	6,990	6,590	7,540	7,290	7,250	7,370	7,530
Shelterwood cuts	960	1,260	1,130	1,060	1,050	990	1,050	1,070	1,490
Clearcuts	5,010	4,410	3,640	3,580	3,960	4,260	3,780	3,730	3,980
Site Prep for Planting	340	770	630	610	700	670	640	630	640
Planting	350	1,070	1,130	1,090	1,180	1,050	1,120	1,130	1,050
Underplanting	0	230	10	10	10	60	10	10	200
Site Prep for Nat Reg (chainsaw)	4,320	3,500	3,350	3,250	3,290	3,360	3,280	3,310	3,490
Site Prep for Nat Reg (scarify/burn)	1,440	860	260	270	500	760	390	330	720
Release	350	1,300	1,140	1,100	1,190	1,110	1,130	1,130	1,250
Pruning	0	230	10	10	10	60	10	10	200
Seedling Protection	0	230	10	10	10	60	10	10	200

Table 3-71b. Projected Silvicultural Treatments in the 5th Decade

	Projected Annual Acreage by Treatment for Each Alternative								
Treatment Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
Intermediate cuts	4,760	6,310	6,190	6,010	6,230	6,230	6,180	6,270	6,270
Selection cuts	11,180	11,190	10,080	9,850	11,270	10,990	10,810	10,870	11,020
Shelterwood cuts	1,460	1,250	1,310	1,210	1,100	1,040	1,090	1,150	1,380
Clearcuts	5,820	6,050	4,990	5,060	5,710	5,770	5,460	5,430	5,480
Site Prep for Planting	1,390	1,040	1,160	1,020	1,060	1,120	1,060	1,100	1,070
Planting	1,340	990	1,080	870	960	970	950	990	970
Underplanting	90	100	170	300	200	300	220	230	200
Site Prep for Nat Regen (chainsaw)	4,070	4,550	3,400	3,620	4,160	4,250	3,880	3,830	4,160
Site Prep for Nat Regen (scarify/burn)	1,110	880	830	830	860	830	790	890	780
Release	1,430	1,090	1,240	1,170	1,160	1,270	1,170	1,220	1,170
Pruning	90	100	170	300	200	300	220	230	200
Seedling Protection	90	100	170	300	200	300	220	230	200

Table 3-71c. Projected Silvicultural Treatments in the 10th Decade

	Projected Annual Acreage by Treatment for Each Alternative								
Treatment Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
Intermediate cuts	5,940	5,740	5,430	5,310	5,550	5,530	5,440	5,610	5,850
Selection cuts	14,890	14,290	11,700	11,710	13,670	13,320	13,060	12,890	13,380
Shelterwood cuts	1,050	940	1,430	1,220	960	1,030	1,040	1,270	1,250
Clearcuts	5,420	4,700	4,560	4,270	4,980	5,030	4,700	4,590	4,820
Site Prep for Planting	940	800	710	720	770	750	740	790	750
Planting	920	680	600	630	680	640	660	680	670
Underplanting	90	220	200	190	170	220	170	210	170
Site Prep for Nat Regen (chainsaw)	4,500	3,940	3,810	3,440	4,030	4,250	3,700	3,710	3,990
Site Prep for Nat Regen (scarify/burn)	1,020	770	1,340	1,220	1,030	950	1,090	1,230	1,230
Release	1,010	910	810	810	850	860	830	890	840
Pruning	90	220	210	190	170	220	170	210	170
Seedling Protection	90	220	210	190	170	220	170	210	170

Table 3-71d. Projected Silvicultural Treatments in the 15th Decade

	Projected Annual Acreage by Treatment for Each Alternative								
Treatment Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
Intermediate cuts	4,829	5,750	5,320	5,590	5,650	5,670	5,720	5,890	5,560
Selection cuts	17,110	16,750	14,420	14,160	16,310	15,900	15,620	15,600	16,040
Shelterwood cuts	960	580	1,060	800	740	790	790	760	810
Clearcuts	8,320	5,160	4,550	4,720	5,410	5,640	4,800	5,020	5,650
Site Prep for Planting	1,310	980	1,060	1,020	1,000	940	1,020	1,000	1,110
Planting	680	900	950	930	910	900	920	930	1,030
Underplanting	0	150	210	180	180	80	200	130	170
Site Prep for Nat Regen (chainsaw)	6,220	4,020	3,520	3,690	4,250	4,560	3,650	3,920	4,130
Site Prep for Nat Regen (scarify/burn)	1,550	970	1,140	950	1,070	1,180	1,100	1,040	1,100
Release	680	1,050	1,160	1,110	1,090	980	1,120	1,060	1,200
Pruning	0	150	210	180	180	80	200	130	170
Seedling Protection	0	150	210	180	180	80	200	130	170

The projected timber harvest acres for the first decade are displayed in the following chart for all alternatives. Acreage figures have been slightly modified from those in the draft EIS due to correction of an error in the SPECTRUM model related to visual and trout stream corridors and "Best Management Practices" (BMPs). These modifications are reflected in Tables 3-71a, 3-71b, 3-71c and 3-71d and Figure 3-76 below.

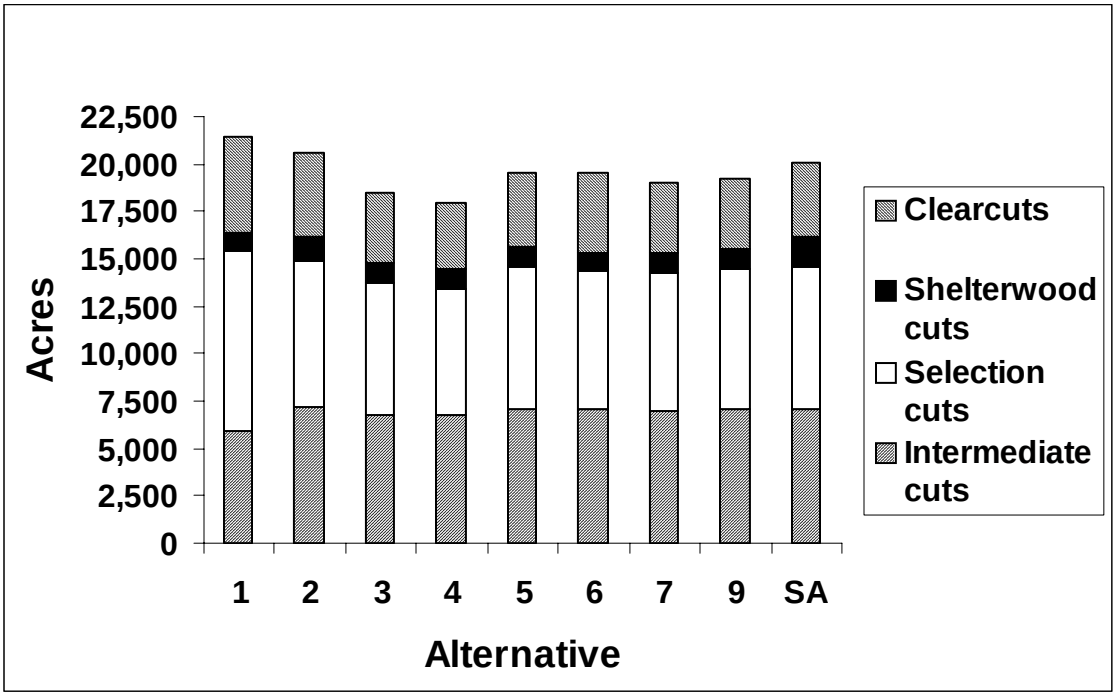

Figure 3-76. Projected Acres of Timber Harvest for the First Decade of Plan Implementation by Alternative

After the draft plan and EIS were published, it was determined that the SPECTRUM model was not projecting progress towards white pine restoration at a high enough rate early in the long-term planning horizon (150 years). To better reflect Forest Plan goals and objectives, a modeling constraint was added to increase the rate of underplanting white pine in the first few decades for the Selected Alternative. Table 3-71a and Figure 3-77 reflect this change.

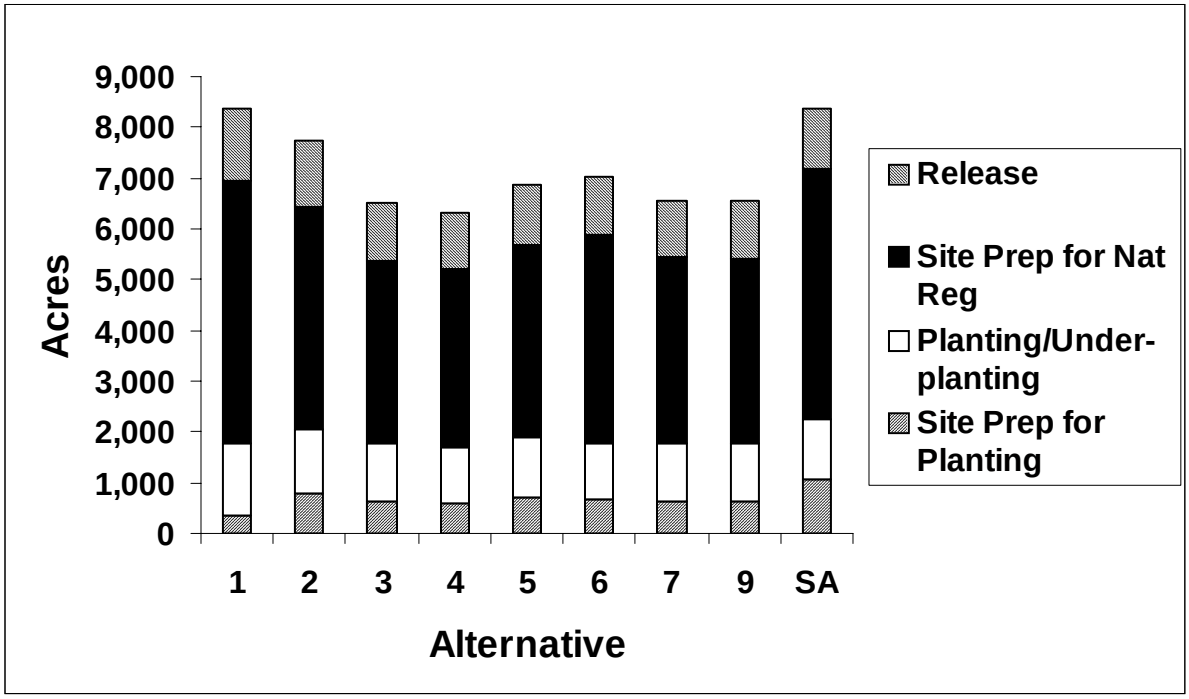

Figure 3-77. Projected Annual Regeneration Acres by Treatment Method in the First Decade by Alternative

It should be noted that the treatment acres displayed are projections of the SPECTRUM model and that the actual treatment acres are likely to vary from these projections. These projections do, however, give the reader a sense of the level of treatment needed to meet Forest Plan goals and objectives. Timber harvest activity is typically highest in Alternative 1 and lowest in Alternative 4.

Species Product Mix

The species product mix is affected by management area allocation and differences in desired species composition, rotation lengths, and diameter guidelines of these management area assignments. This species product mix is an important aspect of ASQ. Individual lumber and paper producing companies generally utilize one or two components of the species product mix. Providing too much or too little of any component affects the industry and the Forests' species composition objectives, growing space, and age class structure. With the Forests providing an average of 7.5% of Wisconsin timber products, the industry in the state can likely adjust its acquisitions to compensate for changes in species product mix on the Forests. However, on a local basis (county or region) the ability to adjust is not as great and could have a negative impact on local economies. In response to the local situation and to meet requirements for non-declining even flow of timber products, the Forests' projections reflect an attempt to

maintain an even flow of species product groups. While the trend in total timber volume goes up for all alternatives due to increased productivity, over time the Forests try to keep large fluctuations in any species/product group in check.

To facilitate analysis, the Forests combined species and products into five groups: hardwood sawtimber, softwood sawtimber, hardwood pulpwood, softwood pulpwood, and aspen pulpwood. The outputs are displayed for each alternative in Million Cubic Feet (MMCF) and Million Board Feet (MMBF) for the first, fifth, tenth and the fifteen decades in Table 3-72.

Table 3-72. Annual Projections of Species/Product Outputs for the 1st, 5th, 10th and 15th Decade in MMCF and MMBF

MMCF Average Annual Volume Projections

Projected Average Annual Outputs of Hardwood Pulp (MMCF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	9.6	8.3	7.8	7.4	8.2	8.0	8.0	8.0	8.6
5	6.5	6.5	5.6	5.7	6.4	6.2	6.1	6.2	6.3
10	6.7	6.5	5.9	5.6	6.2	6.1	6.1	6.2	6.3
15	9.4	8.9	7.2	7.6	8.7	8.8	8.4	8.2	8.2

Projected Average Annual Outputs of Hardwood Sawtimber (MMCF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	1.5	1.3	1.1	1.1	1.2	1.2	1.2	1.2	1.2
5	5.0	4.9	4.3	4.3	4.9	4.8	4.7	4.7	4.8
10	8.6	8.0	6.0	6.3	7.5	7.3	7.1	6.8	7.2
15	7.8	9.4	6.7	7.4	8.6	8.2	8.5	8.0	8.4

Projected Average Annual Outputs of Softwood Pulp (MMCF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	5.6	5.1	4.8	5.2	5.1	5.1	5.3	5.5	4.8
5	5.9	5.3	4.6	4.7	5.3	5.2	5.2	5.1	5.1
10	5.0	4.8	4.5	4.2	4.6	4.6	4.5	4.7	4.7
15	5.6	3.6	3.3	3.2	3.3	3.4	3.2	3.4	3.8

Projected Average Annual Outputs of Softwood Sawtimber (MMCF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	1.7	1.5	1.4	1.4	1.5	1.5	1.5	1.5	1.4
5	7.3	5.5	6.0	5.1	5.4	5.4	5.4	5.5	5.5
10	4.9	4.1	4.2	4.2	4.3	4.2	4.2	4.2	4.4
15	6.6	6.8	7.0	6.7	6.9	6.9	6.9	6.8	7.0

Projected Average Annual Outputs of Aspen Pulp (MMCF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	5.4	5.3	4.8	4.8	5.0	5.1	4.9	5.0	5.1
5	4.2	5.2	3.9	4.2	4.9	4.8	4.6	4.5	4.7
10	4.2	4.1	3.9	3.6	4.3	4.4	3.9	3.9	4.1
15	5.9	4.1	3.5	3.6	4.3	4.5	3.7	3.9	4.2

Projected Average Annual Total Volume (MMCF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	23.7	21.6	20.0	19.8	21.1	20.9	20.8	21.2	21.2
5	28.8	27.4	24.5	24.0	26.9	26.5	25.9	25.9	26.5
10	29.4	27.5	24.5	24.0	26.9	26.5	25.9	25.9	26.7
15	35.3	32.7	27.6	28.5	31.9	31.8	30.8	30.3	31.5

MMBF Average Annual Volume Projections

Projected Average Annual Outputs of Hardwood Pulp (MMBF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	58	51	48	46	51	49	49	49	53
5	40	40	35	35	40	39	38	38	39
10	41	40	36	35	39	38	38	38	39
15	58	55	45	47	54	54	52	51	51

Projected Average Annual Outputs of Hardwood Sawtimber (MMBF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	9	8	7	7	8	7	7	7	8
5	31	30	27	26	30	29	29	29	30
10	53	49	37	39	46	45	44	42	45
15	48	58	41	46	53	51	52	49	52

Projected Average Annual Outputs of Softwood Pulp (MMBF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	34	32	30	32	32	31	33	34	30
5	35	32	29	29	33	32	32	32	32
10	31	30	28	26	29	28	28	29	29
15	34	22	20	20	21	21	20	21	23

Projected Average Annual Outputs of Softwood Sawtimber (MMBF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	10	10	9	9	9	9	9	9	9
5	45	34	37	32	34	34	33	34	34
10	30	25	26	26	27	26	26	26	27
15	41	42	43	42	43	43	43	42	43

Projected Average Annual Outputs of Aspen Pulp (MMBF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	33	33	30	30	31	31	30	31	31
5	26	32	24	26	30	30	28	28	29
10	26	26	24	22	26	27	24	24	25
15	37	26	22	23	27	28	23	24	26

Projected Average Annual Total Volume (MMBF)

Decade	Alternative								
	1	2	3	4	5	6	7	9	SA
1	146	134	124	122	130	129	129	131	131
5	178	169	151	148	166	164	160	160	163
10	182	170	151	148	166	164	160	160	166
15	218	202	171	176	197	196	190	188	196

*MMBF Equivalents (ccf *0.618/1000)*

In general, Alternative 1 produces the most volume in each species/product class at each decade (exceptions are aspen in Decade 5, hardwood sawtimber and hardwood pulp in Decade 15). Alternatives 3 and 4 share the lowest volume outputs across the species/product classes through time (the only exception is that softwood sawtimber in Decade 10 is lowest in Alternative 2). The Selected Alternative follows the same trend as the rest of the alternatives, with the majority of volume being pulpwood and an 8-9% component of sawtimber in the first decade. By Decade 5, the amount of sawtimber in the mix of products is approaching 40%. By the Decade 15 the amount of sawtimber is approaching 50% for most alternatives including the Selected Alternative.

The species mix within the sawtimber component is close to being evenly split between hardwood and softwood. This trend holds true through time. The mix of pulpwood does fluctuate some through time. Generally, the amount of aspen and pine pulpwood outputs decline slightly while hardwood pulpwood outputs decline between Decade 1 and Decade 5 but rebound to Decade one levels by Decade 15.

Effects of Specific Management Area Allocations on Allowable Sale Quantity

As described earlier, the projected 1986 Allowable Sale Quantity (ASQ) from MA allocation was nearly achieved on the Chequamegon during the first decade of plan implementation. However, in order to achieve the projected ASQ, managers had to enter approximately 200,000 acres originally determined not needed for timber demand in the analysis for the Forest Plan. The problem was traced to an over-estimation of volume-per-acre during the planning process.

On the Nicolet, volume per acre was accurate for treated acres, but the acres reaching harvestable stage during the planning period were over-estimated. In addition, land actually suited for timber harvest was less than originally calculated. Some of the reasons behind the discrepancy included inadequate assessment of Standard and Guideline impacts, lower than expected growth due to drought and insects, and the inclusion of area within Wild and Scenic River Corridors (MA 9.2) as suitable lands.

The ASQ varies among alternatives. This variation is a result of the land allocation to the different management areas as well as Standards and Guidelines that affect the quantity of land available for treatment and the intensity of that treatment. ASQ is based on the volume produced from treatments on suited and appropriate forestland acres. Suited and appropriate forestland is within the following set of MAs: 1A, 1B, 1C, 2A, 2B, 2C, 3B, 3C, 4A, 4B, 4C, and 6B. Timber harvest may also occur in other MAs, but it is not included in the ASQ and is not intended to be part of long-term timber production.

Table 3-73a displays the average annual ASQ for the alternatives in both MMCF and MMBF in the first, fifth, tenth, and fifteenth decade, as well as an average of the fifteen decades. Tables 3-73b and 3-73c show the average annual ASQ for the Chequamegon and Nicolet landbases for the same time period. It should be noted that Allowable Sale Quantity is actually calculated by the decade. These tables represent average annual ASQ figures which were determined by dividing the ASQ for the decade by ten.

Table 3-73a. Chequamegon-Nicolet NF Average Annual ASQ in the 1st, 5th, 10th & 15th Decades & the 150 Year Average

Timber Volume By Decade	Unit of Measure	Maximum Projected Annual Output by Alternative								
		1	2	3	4	5	6	7	9	SA
1st Decade	MMCF	23.7	21.6	20.0	19.8	21.1	20.9	20.8	21.2	21.2
5th Decade	MMCF	28.8	27.4	24.5	24.0	26.9	26.5	25.9	25.9	26.4
10th Decade	MMCF	29.4	27.5	24.5	24.0	26.9	26.5	25.9	25.9	26.8
15th Decade	MMCF	35.3	32.7	27.6	28.5	31.9	31.8	30.8	30.3	31.7
150 Year Average	MMCF	28.9	27.6	24.3	24.1	26.8	26.5	25.9	26.0	26.7
1st Decade	MMBF	146	134	124	122	130	129	129	131	131
5th Decade	MMBF	178	169	151	148	166	164	160	160	163
10th Decade	MMBF	182	170	151	148	166	164	160	160	166
15th Decade	MMBF	218	202	171	176	197	196	190	188	196
150 Year Average	MMBF	179	171	150	149	166	164	160	161	165

Table 3-73b. Chequamegon Landbase Average Annual ASQ in the 1st, 5th, 10th & 15th Decades & the 150 Year Average

Timber Volume By Decade	Unit of Measure	Maximum Projected Annual Output by Alternative								
		1	2	3	4	5	6	7	9	SA
1st Decade	MMCF	13.5	11.9	12.3	11.4	12.7	11.8	12.8	12.2	12.8
5th Decade	MMCF	16.0	15.5	14.0	14.2	14.6	13.7	14.5	13.9	14.9
10th Decade	MMCF	16.0	14.9	13.8	13.7	14.3	13.9	14.1	14.0	15.1
15th Decade	MMCF	19.2	15.9	14.9	14.7	17.5	17.4	15.0	15.7	16.2
150 Year Average	MMCF	16.0	15.0	13.6	13.1	14.6	14.4	14.1	14.1	14.4
1st Decade	MMBF	83	73	76	70	79	73	79	76	79
5th Decade	MMBF	99	96	86	87	90	85	89	86	92
10th Decade	MMBF	99	92	85	85	88	86	87	86	93
15th Decade	MMBF	118	98	92	91	108	108	93	97	100
150 Year Average	MMBF	99	93	84	81	90	89	87	89	89

Table 3-73c. Nicolet Landbase Average Annual ASQ in the 1st, 5th, 10th & 15th Decades & the 150 Year Average

Timber Volume By Decade	Unit of Measure	Maximum Projected Annual Output by Alternative								
		1	2	3	4	5	6	7	9	SA
1st Decade	MMCF	10.2	9.8	7.7	8.5	8.3	9.0	8.0	9.0	8.4
5th Decade	MMCF	12.8	11.9	10.5	9.8	12.3	12.8	11.4	12.0	11.5
10th Decade	MMCF	13.4	12.6	10.7	10.3	12.6	12.6	11.8	11.9	11.7
15th Decade	MMCF	16.1	16.9	12.7	13.9	14.4	14.3	15.8	14.7	15.5
150 Year Average	MMCF	12.9	12.6	10.8	11.0	12.2	12.1	11.9	11.9	12.3
1st Decade	MMBF	63	60	48	52	51	56	50	55	52
5th Decade	MMBF	79	73	65	61	76	79	71	74	71
10th Decade	MMBF	83	78	66	63	78	78	73	74	72
15th Decade	MMBF	100	104	79	86	89	89	98	91	96
150 Year Average	MMBF	80	78	67	68	75	75	74	74	76

The ASQ is highest in Alternative 1 and lowest in Alternative 4 in all timeframes, except Alternative 3 is lowest in decade 15. The total ASQ for the Forests for the Selected Alternative is in the middle of the range for the first decade and when projected over 150 years. When compared to the range of alternatives, the Selected Alternative produced the lowest level of ASQ in the first decade from the Nicolet landbase and the highest ASQ

from the Chequamegon landbase (Figure 3-78). When projected over 150 years, both the Chequamegon and Nicolet ASQ average annual projections are in the middle of the range (Table 3-73a).

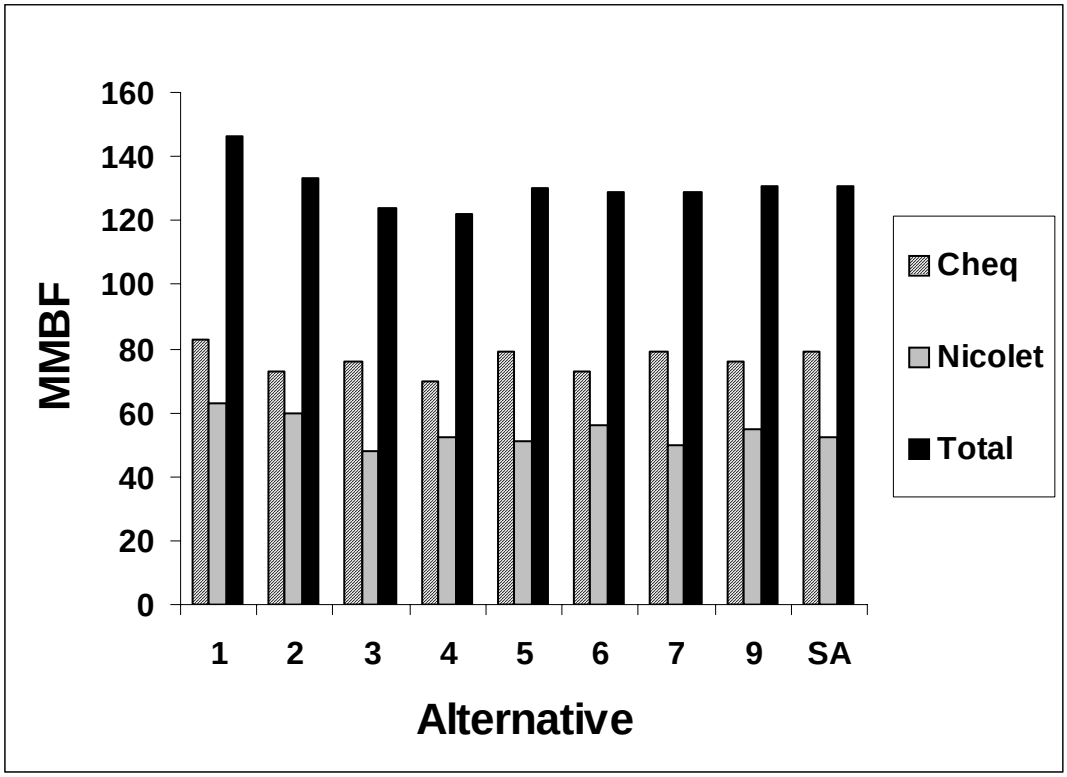

Figure 3-78. Average Annual Allowable Sale Quantity (million board feet; MMBF) in the First Decade by Alternative

Long Term Sustained Yield (LTSY)

Long-Term Sustained Yield (LTSY) is the highest uniform wood yield from suited forestlands sustained under specific management intensity consistent with an alternative's objectives. LTSY is displayed for the alternatives in Table 3-74.

Table 3-74. Long Term Sustained Yield by Alternative

Unit of	Maximum Projected Annual Output by Alternative								
Measure	1	2	3	4	5	6	7	9	SA
MMCF	38.7	41.3	38.8	37.4	40.8	40.3	39.6	40.5	40.6
MMBF	239	255	240	231	252	249	245	250	251

The LTSY ranges from a high of 255 million board feet per year in Alternative 2 to a low of 231 million board feet per year in Alternative 4. The LTSY for the Selected Alternative is 251 MMBF, the same as Alternative 5 (Preferred Alternative). Figure 3-79 displays the LTSY for all the alternatives.

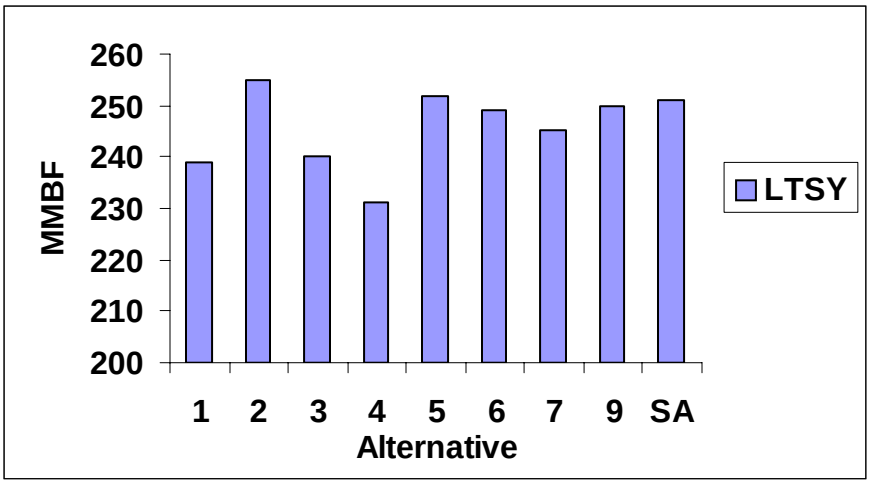

Figure 3-79. Long Term Sustained Yield (million board feet; MMBF) by Alternative

Effects of Management Area Allocation on ASQ

Timber may be harvested to improve stand conditions for the remaining trees or to create conditions suitable for tree regeneration. Timber products produced from these harvests are intended to meet some of society's needs. These products are also a part of the Allowable Sale Quantity (ASQ), which is the maximum timber volume capability of an alternative given its Management Area (MA) assignments. The only MA prescriptions suited for timber harvest that contribute to ASQ are 1A, 1B, 1C, 2A, 2B, 2C, 3B, 3C, 4A, 4B, 4C and 6B.

Timber harvest may be allowed in other MAs to meet vegetation management objectives such as hazard tree removal, fuel reduction, wildlife habitat maintenance and improvement, scenic vista creation, and ecosystem management. In addition, timber affected by natural mortality events such as fire, windstorms, or insect or disease infestations may be harvested under salvage sales to serve objectives other than commercial product offerings. Any harvest in these areas would not contribute to ASQ. Commercial products produced as a by-product of meeting resource objectives through timber management may be the most cost-efficient way of handling the treatment. Table 3-73a, b, and c displays the ASQ assuming no budget limitations for the 1st, 5th, 10th, and the 15th decades and the average over 150 years for each alternative.

Site-specific analysis based on on-the-ground implementation of Standards and Guidelines and may limit harvest volumes. Examples are water quality or Threatened, Endangered or Sensitive species Standards and Guidelines. Where possible, effects of Standards and Guidelines implementation have been taken into account in ASQ calculation. However, ASQ is a ceiling and certain conditions may arise in which volume may be limited by Standards and Guidelines.

In each alternative, the ASQ is directly related to the amount of suited forestlands, desired species composition, and intensity of timber management that can occur within the MAs allocated in the alternative. The suited forestland is displayed earlier in Table 3-63. Suited forestland ranges from a low of 781,000 acres in Alternative 4 to a high of 934,000 acres in Alternative 1. The desired composition objective and management

intensity are displayed in the descriptions and Standards and Guidelines for each MA that allows for timber management **(**see Chapter 3 of the 2004 Forest Plan). Generally, high intensity timber management means high ASQ because of shorter rotation lengths, more even-aged management, and more early successional species in composition objectives. High intensity timber management usually results in lower production costs and the potential for higher levels of both positive and negative resource impacts. Intensity of timber management is the lowest in Alternative 4 and the highest in Alternative 1.

Ecosystem Restoration

Ecosystem restoration refers to managing the land to enhance within-stand features and restore landscape patterns to a level closer to pre-EuroAmerican settlement (1850s) conditions. The alternatives address these conditions in a variety of ways. A key approach to addressing ecosystem restoration is by establishing Ecological Reference Areas (ERAs) consisting of MAs 8E (Research Natural Areas), 8F (Special Management Areas), and 8G (Old Growth & Natural Feature Complexes). While very little of the area assigned to these designations is entirely consistent with pre-settlement conditions, these areas are the best representative sites on the Forests. The designation of MA 8E and 8F is constant across alternatives other than Alternative 1. MA 8G designations, however, vary somewhat by alternative. The difference between alternatives is small (less than 8% difference between lowest and highest). Table 3-75 compares the acres of MA 8E, 8F and 8G by alternative.

Table 3-75. Ecological Reference Areas by Alternative.

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
8E	2,500	35,200	35,200	35,200	35,200	35,200	35,200	35,200	35,200
8F	13,000	63,900	63,900	63,900	63,900	63,900	63,900	63,900	63,900
8G	67,600	85,500	91,000	92,600	85,500	91,000	92,600	92,600	85,500
Total	**83,100**	**184,600**	**190,100**	**191,700**	**184,600**	**190,100**	**191,700**	**191,700**	**184,600**

ERAs are not part of the suited forestland determination so no volume is projected from the areas. Timber harvesting may only occur if it is required to maintain or to improve conditions for ecological functions. Any volume removed is not included in the ASQ calculation.

Another approach taken to address ecosystem restoration is the establishment of Alternative Management Areas (AMAs). The objective of AMAs is to provide higher levels of ecological components while providing timber products. Key aspects of AMAs include the following: extended rotation ages, larger trees, higher levels of snags/down woody debris, larger patches, higher retention of reserve trees, and improved wetland transition zones. AMAs consist of MAs 2B (Uneven-aged northern hardwood: interior forest), 3B (Even-aged hardwood: oak-pine) and 4B (Conifer: natural pine-oak). MA 4C (Conifer: surrogate pine barrens) is also an AMA but the emphasis is for large openland conditions through management of large jack pine stands. These areas are all included in the suited forestland determination and volume produced is included in the ASQ. On average, volumes produced on a per-acre basis are 22% less in AMAs than other suited forestlands. The largest reduction is within the sawtimber component.

The acreage of the AMAs is displayed in Table 3-76**.**

Table 3-76. Alternative Management Areas by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
2B	0	23,000	454,000	234,000	130,000	142,000	143,000	282,000	209,000
3B	0	1,700	23,900	6,400	1,700	6,400	10,900	11,900	10,900
4B	0	17,000	65,000	50,000	17,000	20,000	30,000	53,000	30,000
4C	0	10,000	13,000	13,000	13,000	10,000	13,000	13,000	13,000
Total	**0**	**51,700**	**554,900**	**303,400**	**161,700**	**178,400**	**196,900**	**360,900**	**262,900**

There are 262,900 acres of AMAs in the Selected Alternative, just over 101,000 acres more than Alternative 5 (Preferred Alternative).

Standards and guidelines deemed hemlock, lowland conifer, and lowland hardwoods not appropriate for suited forestlands. There is a disproportionately high percentage of Threatened, Endangered and Sensitive species sites found in these areas. Some of the tree species (such as northern white cedar and hemlock) have proven difficult to regenerate in a cost-efficient manner. There are approximately 68,000 acres of hemlock, lowland conifer, and lowland hardwood considered "tentatively suited" across all the alternatives, but this acreage was not included in suited forestlands in Alternatives 2-9 or the Selected Alternative.

The final approach to ecosystem restoration is provided by a new set of Standards and Guidelines for suited forestlands. The Guidelines include more reserve live trees and snag trees, especially in the larger size classes; increased protection of transition zones between uplands and wetlands; seasonal restrictions on harvest activities (MA 2B); and leaving some natural disturbance events unsalvaged.

Recreation Management

The designation of Management Area (MA) 6A (Semi-Primitive Non-Motorized: Low Disturbance) is the aspect of recreation management that has the largest effect on timber outputs. These areas are not part of suited forestland (only incidental harvesting would be done). Therefore, no volume is projected from these areas and volume is not included in the Allowable Sale Quantity (ASQ). The range of MA 6A allocation across alternatives is displayed in Table 3-77.

Additionally, the Forests developed another Management Area providing recreational benefits. MA 6B (Semi-Primitive Non-Motorized: Moderate Disturbance) allows for timber management, is included in suited forestland, and volume is included in the ASQ. The range of MA 6B allocation across alternatives is shown in Table 3-77.

Table 3-77. Semi-Primitive Non-Motorized Areas by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
6A	0	2,800	45,200	65,600	11,200	11,200	24,500	6,100	9,000
6B	69,000	56,000	109,000	83,000	56,000	48,000	73,000	81,000	48,000

Note: Those acres displayed in Alternative 1 as MA 6B represent the MA 6 areas within the existing plans.

The Selected Alternative reduced the amount of MA 6A management from Alternative 5 (Preferred Alternative) by approximately 2,200 acres and MA 6B management by approximately 7,500 acres. Acreages of MA 6A and MA 6B area displayed in Table 3-77 are less than those shown in the "Access and Recreation Opportunities" section of this

document because embedded Research Natural Areas, Special Management Areas, and Old Growth have been excluded.

Vegetation management in MA 6B is based on overlapping allocation to MA 1A-4C (see description of this management approach in the Standards and Guidelines for MA 6B in Chapter 3 of the Forest Plan). However, there are specific limitations on timber management to meet desired recreation opportunities. For example, no more than half of a specific area may be harvested in any one decade and clearcuts are limited to 10 acres. While the impacts of these Guidelines are fairly minor, growth potential of the area will be affected. The range of vegetative assignment of MA 6B for each alternative is displayed in Table 3-78.

Table 3-78. Vegetation Management within MA 6B (or MA 6 in Alt. 1) Acres by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
1B	0	0	0	3,000	3,000	0	3,000	0	9,000
2A	0	5,000	11,500	29,000	27,000	5,000	48,000	9,000	19,000
2B	0	8,000	64,500	12,000	15,500	15,500	16,500	49,500	14,500
2C	69,000*	34,000	18,000	33,500	4,500	22,000	0	8,000	0
3B	0	0	6,000	0	0	0	6,000	6,000	6,000
3C	0	9,000	0	0	6,000	6,000	0	0	0
4A	0	0	5,500	5,500	0	0	0	5,500	0
4B	0	0	3,000	0	0	0	0	3,000	0
Total	**69,000**	**56,000**	**108,500**	**83,000**	**56,000**	**48,500**	**73,500**	**81,000**	**48,500**

** Alt 1 does allow for timber management to occur in MA 6 and the management emphasis was approximately similar to MA 2C.*
NOTE: Due to variations in rounding, figures in Table 3-75 may not match those in Table 3-74.

The Selected Alternative reduced the amount of MA 6B management from Alternative 5 by approximately 7,500 acres.

Recommended Wilderness Study Areas

Timber harvesting is prohibited in areas recommended for Wilderness designation (Wilderness Study Areas; MA 5B), and these areas are not part of suited forestlands. Therefore, tentatively suited forestland acres assigned to MA 5B do not contribute toward potential timber volume for an alternative. The range of MA 5B allocation across alternatives (with embedded MA 8 E,F,G acres removed) is displayed in Table 3-79. Wilderness Study Area allocation in the Selected Alternative is slightly higher than the Preferred Alternative.

Table 3-79. Recommended Wilderness (MA 5B; Wilderness Study Areas) by Alternative

	Alternatives								
MA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**9**	**SA**
5B	0	6,300	7,600	45,200	12,300	22,600	18,100	11,700	11,700

Wild, Scenic and Recreational Rivers

The MA 8D designation indicates a river segment is either already designated or is eligible for designation as a Wild, Scenic, or Recreational River. Included in the designation is a quarter-mile wide land strip on each side of the rivers. This land is not suited forestland and timber volume removed from the corridors is not included in the ASQ. Therefore, tentatively suited forestland acres assigned to MA 8D do not contribute

to the potential timber volume for an alternative. The amount of land allocated to this designation varies very little from alternative to alternative. Slight differences are a result of assignment of the river segments to proposed Wilderness (MA 5B), which has a higher level of protection from human-caused disturbances. The total area in Wild, Scenic and Recreational River Corridors is approximately 35,000 acres for all alternatives except Alternative 1, which has approximately 40,000 acres. The difference between Alternative 1 and the rest of the alternatives is largely due to the amount of MA 8E, 8F, and 8G within river corridors. In Alternatives 2-9 and the Selected Alternative, acres of MA 8E, 8F, and 8G were subtracted from the MA 8D corridor acre determination.

Corridor Management

Corridor management is a group of unrelated Forestwide Guidelines having very similar effects on the potential timber volume outputs an alternative is capable of producing. They include trout stream corridor management, Best Management Practices (BMP) for water quality, and visual corridor management. A specific set of guidelines applied to selected trout streams (Class I, II, and III) prohibits aspen management within 300 or 450 feet of the stream bank. The objective is to reduce the influence of beavers on these streams. Somewhat related to this is the BMP guideline that requires maintaining 60 basal area within 100 feet of a navigable waterway in order to protect riparian values. Finally, visual corridor management involves prohibiting clearcutting or removal harvests within 200 feet of High Scenic Integrity (SIO) areas and within 100 feet of Moderate SIO areas.

The biggest effects these guidelines have on an alternative are the amount of aspen maintained as a cover type and the aspen volume an alternative can produce. Aspen is a fast growing high-density species producing high per acre volumes over time. The loss of volume is based on the loss of growth potential. Other species such as hardwood or white pine can be managed within these corridors but generally produce lower volumes per acre. However, species such as hardwood, oak, and pine sawtimber have a higher monetary value per unit of output than aspen. So, while the total volume output may be reduced, the value of the output is likely to be equal.

A number of these areas overlap with each other. The acreage is displayed in Table 3-80.

Table 3-80. Acres Affected by Best Management Practices, Trout Stream and Visual Corridors by Alternative

Corridor	Alternatives								
Type	1	2	3	4	5	6	7	9	SA
B	4,100	8,500	7,900	7,600	8,300	8,200	8,000	8,300	7,600
BT	3,700	4,100	3,700	3,600	4,100	4,000	3,900	4,000	3,600
BV	0	300	300	300	300	300	300	300	300
BVT	0	100	100	100	100	100	100	100	100
T	5,600	22,200	20,600	20,000	22,100	22,000	21,200	21,900	20,500
V	0	46,800	42,900	41,200	45,300	45,400	44,100	45,600	43,500
VT	0	600	500	500	500	500	500	500	500
Total	**13,400**	**82,600**	**76,000**	**73,300**	**80,700**	**80,500**	**78,100**	**80,700**	**76,100**

data from GIS query 08/15/02 and 1/13/04
B = Best Management Practices for Water Quality Corridor
T = Trout Stream Management Corridor
V = Visual Quality Objective Corridor

The range of corridor acreage varies from a high of 82,600 in Alternative 2 to a low of 13,400 in Alternative 1. The Selected Alternative has 4,500 fewer acres affected by corridor management than Alternative 5 (Preferred Alternative).

Comparison of Projected Harvest to Projected Net Growth

The Forests have limited projected harvest so that it is equal to, or less than, the projected net growth on suited forestlands. By doing so, the Forests ensure the inventory of timber volume is maintained or increased over time. The percentage of harvested net growth varies by alternative and within alternatives by decade. In the first decade, the percentage of harvested net growth ranges from 53% in Alternatives 3, 5, 6, 7, 9 and the Selected Alternative to 65% in Alternative 1. By comparison, Forest Inventory and Analysis indicated the Chequamegon-Nicolet harvested approximately 56% of net growth during 1983 -1996 (Haugen et al. 1998).

Over the long term (150 years), the percentage of harvested net growth ranges from 87% in Alternative 3 to 95% in Alternative 1. While achieving these high percentages is theoretically possible, it is also possible that these percentages would not be obtained. Budget constraints and related personnel shortages, spatial concerns, and National Environmental Protection Act (NEPA) requirements could impact the Forests' ability to achieve maximum harvest rates. Table 3-81 shows the relationship of projected maximum harvest to predicted total net growth by Alternative.

Table 3-81. Relationship of Harvest to Growth by Alternative

Alternative	Percent of Net Growth Harvested Decade 1	Percent of Net Growth Harvested Average for 150 years
1	65%	95%
2	56%	89%
3	53%	87%
4	54%	88%
5	53%	89%
6	53%	89%
7	53%	88%
9	53%	88%
SA	53%	88%
1983-1996[1]	**56%**	**Not applicable**

[1] ***Based on 1996 FIA data***

Cumulative Effects

The Cumulative Effects Area for "Timber and Related Products" is the State of Wisconsin. The Cumulative Effects discussion includes a history of the Forests and the State of Wisconsin, as well as trends in volume outputs, species composition, and species products mix over time. Future outputs for a variety of timber products are displayed in tables earlier in this section.

History

The northern Lake States were centers of timber production during the late 19th and early 20th centuries. First pines and then hardwoods were harvested over vast areas of Minnesota, Wisconsin, and Michigan (Webster and Vasievich 1997). By the time the Chequamegon and Nicolet National Forests were established in 1933, much of the northwoods were vast "stump pastures" that had been cut over, burned, converted to agricultural use, and abandoned. As the years passed, much of the area regenerated naturally to aspen, birch, and hardwoods. Reforestation in northern Wisconsin was aided by the efforts of the Civilian Conservation Corps (CCC) as well.

The forests of the northern Lake States have made a remarkable recovery from the abuses of the late 19th and early 20th centuries. Despite the obvious recovery and regrowth, the effects of past land use practices are still being documented. The legacy of that time period will continue to shape the future of Wisconsin's forests well into the next century.

The cumulative effects of past timber management and removals have created the forests of the Chequamegon-Nicolet. The species composition, age class distribution, and product outputs of today's Forests are all the results of past management activities. In essence, the forests of the Chequamegon-Nicolet seen today are the cumulative effects of the past 60 years of Forest Service management.

Changes in Species Composition Over Time

As Wisconsin's forests recovered from the land use practices of the logging era, early successional species became a much more important component than in pre-settlement times. Survey data suggests that dominant forest types in Wisconsin timberlands continue to change. These changes are the result of both natural forces like forest succession and human activities like timber harvesting.

As forests age, short-lived early successional species are gradually replaced with longer-lived late successional species. In general, early successional species are expected to decrease as a forest component unless maintained by natural disturbance or human activities. Understory species that are gathered as special forest products also change with changing overstory.

Figures 3-80, 3-81 and 3-82 show area of land by major forest type for the state of Wisconsin, the northeast survey unit (contains the Nicolet land base), and the northwest forest survey unit (contains the Chequamegon land base), respectively.

Understory species collected as special forest products are gathered on public lands other than National Forest, such as state, county and tribal lands, however, total acres available is not known due to variations in permitting systems and potential for unofficial collecting. It is likely that the National Forest will become more important for gathering special forest products in the future as the trend for this use continues to increase.

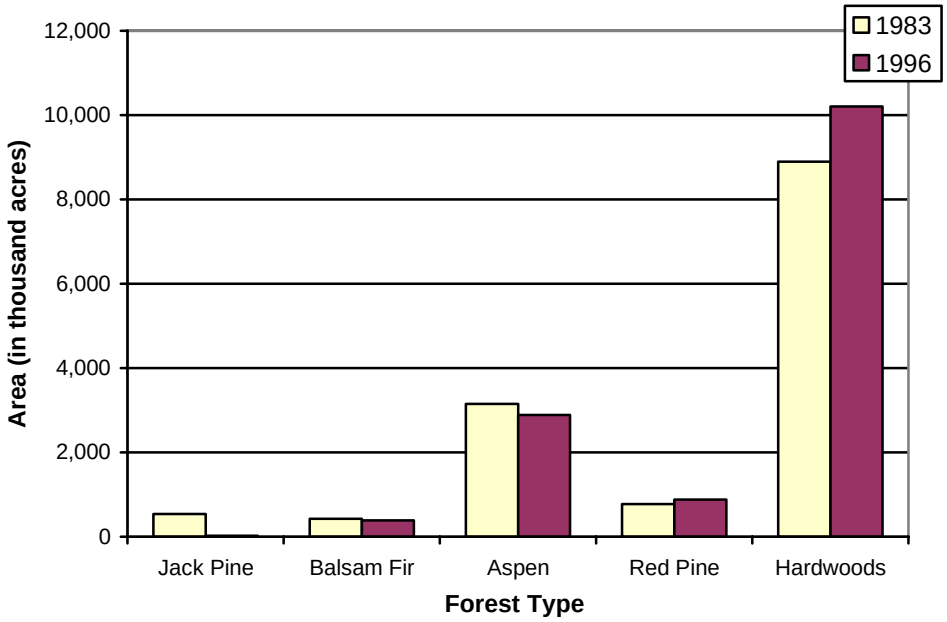

Figure 3-80. Area of Land Statewide by Forest Type, 1983 and 1996. NOTE: Red Pine includes white pine and white spruce. Northern hardwoods includes paper birch, maple-basswood, elm-ash-soft maple, and oak-hickory.

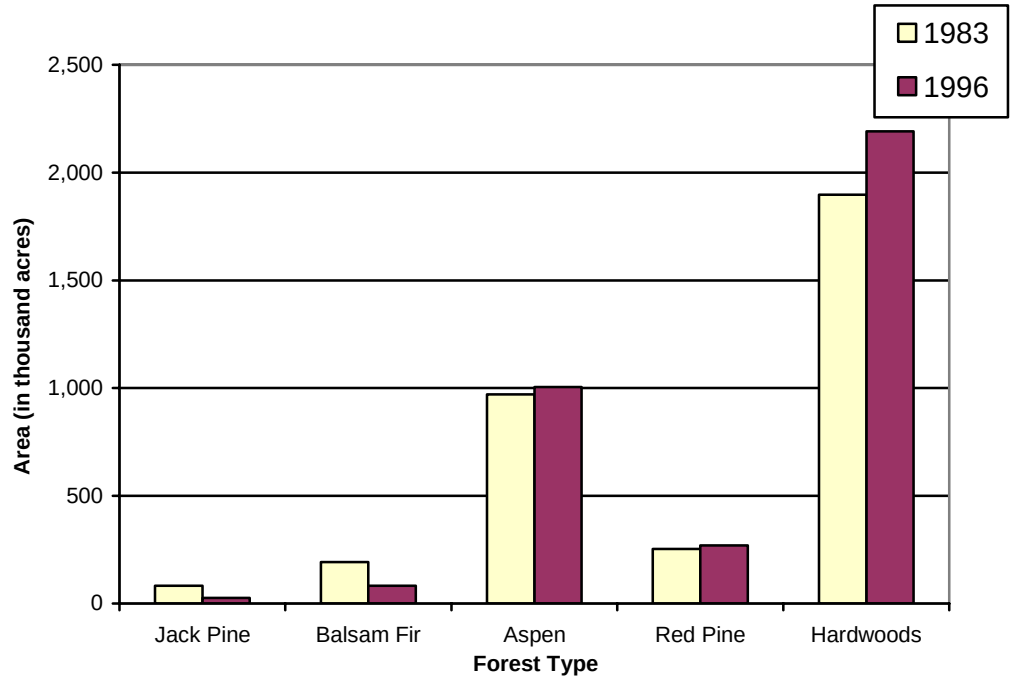

Figure 3-81. Area of Northeastern Forest Survey Unit (Contains Nicolet Land Base) by Forest Type, 1983 and 1996. NOTE: Red Pine includes white pine and white spruce. Northern hardwoods includes paper birch, maple-basswood, elm-ash-soft maple, and oak-hickory.

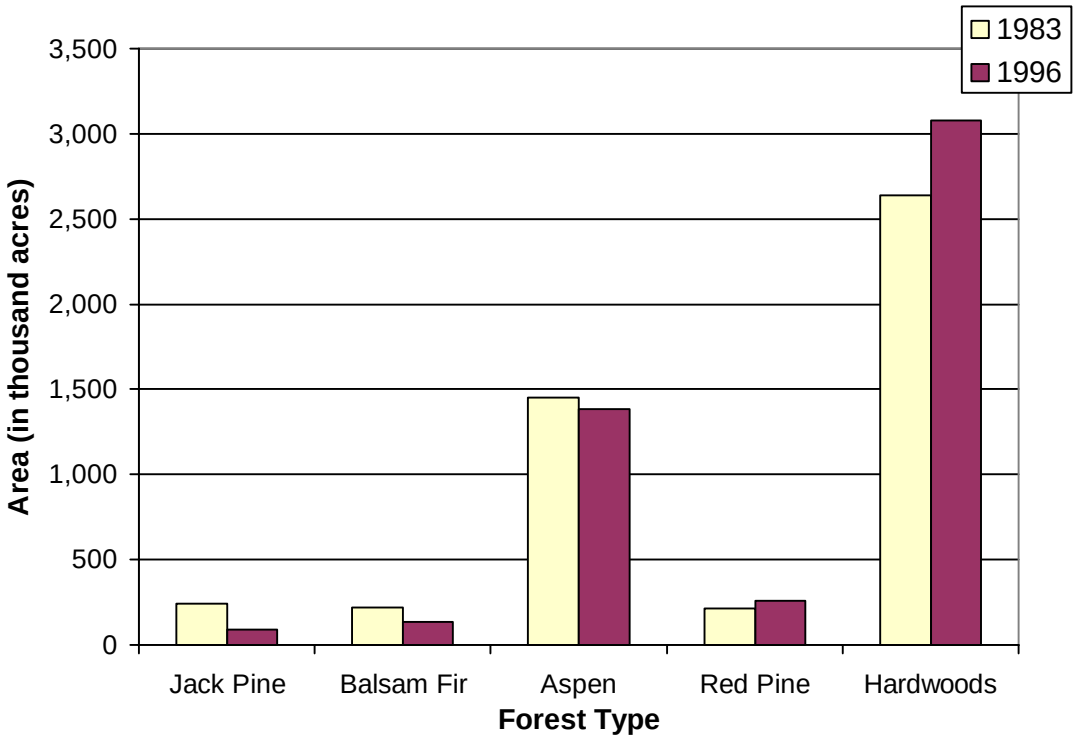

Figure 3-82. Area of Northwestern Forest Survey Unit (Contains Chequamegon Land Base) by Forest Type, 1983 and 1996. NOTE: Red Pine includes white pine and white spruce. Northern hardwoods includes paper birch, maple-basswood, elm-ash-soft maple, and oak-hickory.

As shown in Figure 3-80, statewide acreage for northern hardwoods (includes paper birch, oak-hickory, maple-basswood, elm-ash-soft maple) and red pine (includes white pine and white spruce) increased between 1983 and 1996, with the most significant change seen in the northern hardwoods forest type. Jack pine, aspen, and balsam fir decreased over the same time period with only a very slight change in area of balsam fir forest type.

For the northeast survey unit (Figure 3-81), area of aspen and red pine increased slightly from 1983 to 1996 while area of jack pine and balsam fir decreased. Area of northern hardwoods showed the most dramatic change on this unit, increasing more than 290,000 acres from 1983 to 1996. The northwest survey unit shows the same trends as seen statewide, with decreases in all forest types except red pine and northern hardwoods (Figure 3-82).

Changes in Volume Outputs Over Time

Today, timberlands occupy about 15.7 million acres in Wisconsin, or more than 44% of the State's total area (Schmidt 1997). The volume of growing stock on these lands has steadily increased from about 11.2 billion cubic feet in 1968 to 18.4 billion cubic feet in 1996 (Schmidt 1997). The Chequamegon-Nicolet National Forests manage 30% of the publicly owned timberlands in the State (USDA FS 1998b). According to Forest Inventory and Analysis (FIA) data, growth exceeds harvest both on the CNNF and on other forestlands in Wisconsin. On the CNNF, about 56% of net average annual growth on timberlands is removed (USDA FS 1998b).

Cut volume refers to the amount of timber products removed from the Forests each year. Historical trends in cut volume (million board feet; MMBF) on the Chequamegon-Nicolet are shown in Figure 3-83. Data for cut volume on the Chequamegon prior to 1986 were not available. However, historical trends on the Chequamegon were probably similar to those on the Nicolet.

As shown, cut volume peaked at 82 MMBF on the Nicolet (1990) and at 74 MMBF on the Chequamegon (2000). Since then, cut volume has decreased sharply on both Forests. The historical trends suggest that cut volume on the Forests is likely to continue to decrease in the future.

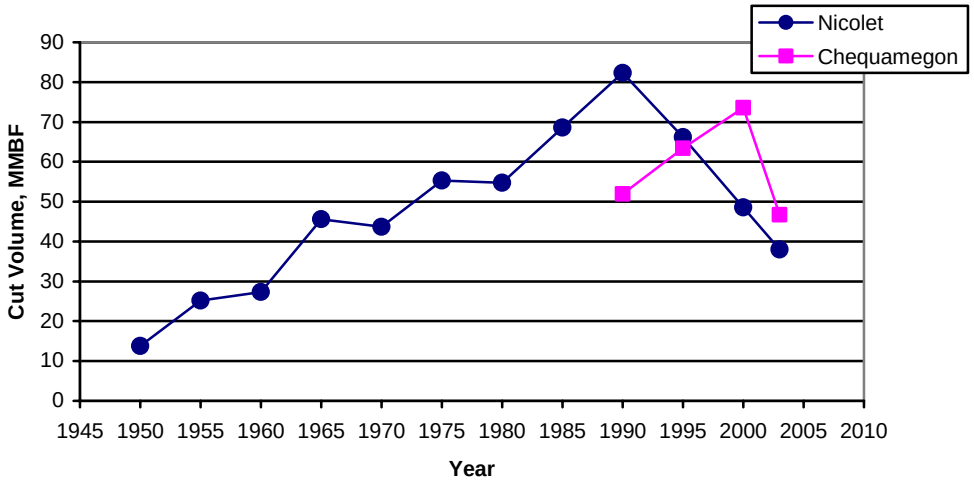

Figure 3-83. Chequamegon-Nicolet National Forests Cut Volume (MMBF) Over Time

Changes in Species Products Mix

Early successional tree species are generally smaller in diameter than late successional species. As discussed above, early successional species are gradually being succeeded by later successional species as the Forests age. Over time, this will lead to larger diameter trees on the Forests and, as a result, higher value timber products like northern hardwood sawtimber. Projections for species products outputs for the first, fifth, tenth, and fifteenth decades of plan implementation are shown in Table 3-72.

Data from a 1997 FIA report indicates that for the northwest and northeast survey units combined (an area containing the Chequamegon and Nicolet land bases), total harvest increased at an annual rate of about 1.8% between 1983 and 1996 (Schmidt 1997).

Harvest of both sawtimber and pulpwood in Wisconsin increased at an annual rate of about 3% from 1967 to 1992. Harvest of softwood sawtimber, softwood pulpwood, and hardwood pulpwood increased steadily during that time while harvest of hardwood sawtimber leveled off during the last five years. The largest increases in harvest occurred in red pine and paper birch, while the largest reductions occurred in ash, yellow birch, white pine, and hemlock (Blyth *et al* 1976; Blyth *et al* 1985; Hackett and Whipple 1995; May and Mace 1995). From 1981 through 1992, the biggest increase in pulpwood harvest occurred in pine, spruce, aspen, paper birch, and other hardwoods. The harvest of hemlock, cedar, and tamarack, which are relatively minor components of the pulpwood market, remained relatively stable over time (Hackett and Whipple 1995).