CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social and economic effects related to the affected environment identified in Chapter 3. Details of how effects were derived are contained in the project analysis file. This chapter presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. All effects (direct, indirect, short and long term, and cumulative) are integrated into the discussions. Cumulative effects are those effects that could occur as a result of the action being taken now, combined with the past and reasonably foreseeable actions.

4.1 Past and Future Actions Contributing to Impacts

Most of the project area has had extensive management activities (road and trail development and maintenance, vegetation manipulation, etc.) within the last several decades. Road, trail, recreation site maintenance and water impoundment maintenance would be expected to continue under all alternatives. Some wildlife opening maintenance would continue. Other Forest Service projects that could occur in the project area and that are reasonably foreseeable are limited. There are no timber harvest and regeneration activities that have been planned for the project area and not yet implemented other than those described in the alternatives (Chapter 2).

In some cases, activities occurring on private land could contribute to cumulative effects. For the most part, private land within the project area boundary is scattered and limited in area. Most private land is used as part time or year round residence property or recreational property and it is not expected to be heavily managed for timber products. Private property on the east shore of Sailor Lake has been subdivided into lots. Development of recreational cabins could be expected though very little development has occurred to date. This potential development was considered in the cumulative effects on bald eagles.

Most of the effects that could result from the alternatives are limited in geographic area to the site itself or to within the project area. Where there are broader scale effects that could occur, they have been included in the effects analysis. Most of the cumulative effects from this project result from past actions in combination with the current actions being considered in this analysis.

4.2 Environmental Impacts

4.2.1 Federally Threatened and Endangered Species (Bald Eagle)

Within the Hoffman-Sailor West area, one federally listed species is known to occur (bald eagle). Bald eagles can be impacted by activities near their nest sites and by a change in habitat (removal of nest or perch trees) that could occur as a result of timber harvest. There is one recently established (2001) nest in the project area. Historically there have been eagles using Sailor Lake for feeding, but this is the first known nesting attempt. The nest was occupied in early spring of both 2001 and 2002, but no known reproduction occurred. Sailor Lake is a fairly small (170 acres) busy lake with fishing pressure and a campground located on its shores. There is a small amount of supercanopy white pine along the shores of Sailor Lake and within sight of the lake. Some of these are located on private land, which comprises about 50% of the shoreline. Recently, the shoreline on the east side of Sailor Lake (which has been undeveloped) has been subdivided into parcels with some development expected to occur.

Mitigation and design criteria for timber harvest activity result in maintenance of "perch" trees and future nesting trees near bald eagle feeding and nesting areas such as Sailor Lake. For potential timber harvest in areas close to the bald eagle nest site, seasonal restrictions prevent disturbance to the eagles while they are in the process of incubation and rearing young. Sailor Lake is managed primarily for fisheries. This management maintains the bald eagle feeding habitat (see section 1.4.5, Chapter 1) in the project area.

The boundaries of the effects analysis for bald eagle is limited to the area immediately surrounding Sailor Lake. Reasonably foreseeable activities that could contribute to impacts include shoreline development on private land.

> **Direct/Indirect Effects:** There is no direct or indirect effect on the bald eagle nest in any alternative. Timber harvest near the nest is restricted to times when the eagles are not rearing young.
>
> Existing supercanopy white pine and red pine trees on federal property would be left in all alternatives for nest habitat. Additionally, there will be white pine planting for future nesting and perching habitat in all alternatives except Alternative A (No Action). The amount of acres spot planted with white pine adjacent to Sailor Lake would be 13 acres in Alternatives B, C, and D.
>
> **Cumulative Effects:** There is no cumulative effect expected on the bald eagle nest because there is no direct or indirect effect.
>
> There could be some loss of current supercanopy white pine due to development and cutting of present trees by private landowners. Cumulatively, with the maintenance of existing and future supercanopy pine on federal land, nesting and perching habitat will remain present in Alternatives B, C, and D. The availability of future nest trees in Alternative A is unknown.

4.2.2 Management Indicator Species (White-Tailed Deer and Ruffed Grouse)

While many MIS species have habitat and are known to occur in the project area (see Appendix A), the proposed activities only have the potential to impact populations of white-tailed deer, ruffed grouse, brook trout, and bald eagle. Bald eagle is discussed in the previous section of this document (4.2.1). Brook trout is discussed in the subsequent section (4.2.3).

White-tailed deer and ruffed grouse both need early-successional habitat, and utilize aspen for foraging. Grouse also utilize mature aspen for winter feeding and spring drumming habitat. Optimum grouse habitat is 4 different age classes of aspen at 10-15 year age intervals, within close proximity of each other (100 yards). Small patch size (10-15 acres) is the ideal. Larger clearcuts spread out the basic requirements for grouse, making them sub-optimum for maximum grouse production. Similarly, white-tailed deer respond better to smaller clearcuts than larger ones. The amount of regeneration and slash could limit deer penetration of clearcut areas, with clearcut areas larger than 20 acres being less accessible to deer (Halls, 1984, White-tailed Deer Ecology and Management, pages 637-640).

The boundaries of the effects analysis for ruffed grouse are the project area boundary and the Squaw Creek Wildlife Management Area boundary. See the Special Management Areas Map for the location of the Squaw Creek Wildlife Management Area. The boundary of the effects analysis for white-tailed deer is the project area boundary. There are no reasonably foreseeable actions within the established

boundaries that could be expected to contribute to cumulative effects. The existing grouse and deer habitat is a result of past Forest Service actions and is incorporated into the analysis.

Direct/Indirect Effects and Cumulative Effects: White-tailed deer will benefit from an increase in the amount of aspen present in Alternatives B through D (see Table 4-1). From the existing condition, there would be approximately a 260 acre increase in aspen in Alternative B, a 490 acre increase in Alternative C, and a 570 acre increase in Alternative D. However, Alternatives C and D have an average clearcut size of around 50 acres, which is not optimal for deer utilization. Alternative B, with an average clearcut size of 26 acres, offers the better habitat utilization potential for deer. Alternative A provides no additional young forest for deer browsing habitat.

Table 4-1: White-tailed Deer Habitat by Alternative

			Alternative				
Species	**Effect Indicator**	**Unit of Measure**	**Existing Condition**	**A**	**B**	**C**	**D**
Deer	Average size of clearcuts	acres	20	0	26	53	51
	Aspen	acres	7600	7600	7860	8090	8170

In Alternatives A through D, deer foraging habitat is maintained at a level that would support target deer population density of 15 deer per square mile (Dhuey, B. and H.Arrowood. 2002. Wisconsin Wildlife Surveys – April 2002 – vol. 12, issue 2. page 23. WDNR, Madison, WI) over the next ten years. Alternatives B through D provide deer feeding habitat that is widely dispersed throughout the project area.

Grouse benefit from different age classes of aspen within proximity of each other. In Alternatives B through D, project design and mitigation measures call for leave tree islands within clearcut areas which will provide some habitat in the spatial design most beneficial to grouse. However, as with white-tailed deer, grouse respond better to smaller clearcuts, ideally less than 20 acres. Grouse will utilize larger clearcuts to a lesser extent. The existing average size of clearcuts within the project area and within the Squaw Creek Wildlife Management Area is shown in Table 4-2. Total acres of aspen within the project area and the Squaw Creek Wildlife Management Area, is also shown in Table 4-2 along with the age distribution of the aspen in each alternative.

Table 4-2: Ruffed Grouse Habitat by Alternative

			Alternative				
Species	**Effect Indicator**	**Unit of Measure**	**Existing Condition**	**A**	**B**	**C**	**D**
Grouse Project Area	Average size of clearcuts	acres	20	0	26	53	51
	Aspen	acres %	7600 36	7600 36	7860 37	8090 38	8170 38
	Aspen 0-20 years old	%	13	7	29	29	33
	Aspen 21-40 years old	%	41	15	14	14	14
	Aspen 41+ years old	%	46	78	57	57	53

Table 4-2: Ruffed Grouse Habitat by Alternative							
			Alternative				
Species	**Effect Indicator**	**Unit of Measure**	**Existing Condition**	**A**	**B**	**C**	**D**
Grouse Squaw Creek Wildlife Area	Average size of clearcuts	acres	11	0	21	21	24
	Aspen	acres %	1307 36	1307 36	1392 38	1371 37	1423 39
	Aspen 0-20 years old	%	15	9	27	26	32
	Aspen 21-40 years old	%	48	8	8	8	8
	Aspen 41+ years old	%	37	83	65	66	60

Alternatives B, C, and D will provide an increase in aspen acres (grouse habitat) over the current condition and Alternative A in both the entire project area and the Squaw Creek portion of the project area. While Alternative D has the largest increase in aspen, it has less desirable, larger average clearcut sizes. Alternative C also has larger average clearcut sizes when looking at the entire project area.

Within the entire project area, Alternative B maintains more suitable habitat than Alternatives A, C, or D. Alternatives C and D would maintain more suitable habitat than Alternative A. In Alternative A, young aspen (0-20 years old) would be lacking.

Within the Squaw Creek area, Alternatives B and D maintain more suitable habitat than Alternatives A or C. Alternative C would maintain more suitable habitat than Alternative A. In Alternative A, young aspen (0-20 years old) would be lacking.

4.2.3 Management Indicator Species (Brook Trout)

Dalrymple Creek is considered a Class II trout stream. Beaver can negatively affect Wisconsin trout steams by creating dams and cutting down trees adjacent to streams. Both of these actions can raise water temperatures and negatively affect trout and other cold water species. The condition adjacent to Dalrymple Creek is less than ideal for brook trout due to the amount of aspen adjacent to the stream. Aspen is the preferred food for beaver and can contribute to high beaver populations. Beaver populations are currently being controlled on Dalrymple Creek through trapping and removal.

The boundaries of the effects analysis for brook trout is limited to both sides of Dalrymple Creek . There is only limited private land adjacent to this creek (near the source) and management of that property would not substantially contribute to the amount of aspen adjacent to the creek. Past actions have contributed to the existing amount of aspen adjacent to the creek.

Direct/Indirect Effects: Alternative A will not change the existing condition of aspen along the trout stream. Dalrymple creek is approximately 3.3 miles long (or 6.6 miles of shore). Alternative B will have .4 miles of the stream shore improved with tree planting and conversion from aspen, while Alternatives C and D will have .6 miles of improvement (or about .2 miles more than Alternative B). See Table 4-3.

Table 4-3: Brook Trout Habitat Improvement							
			Alternative				
Species	**Effect Indicator**	**Unit of Measure**	**Existing Condition**	**A**	**B**	**C**	**D**
Brook Trout	Improvement along Dalrymple Creek	miles	0	0	.4	.6	.6
		%	0	0	6	9	9

Cumulative Effects: Brook trout will benefit from stream improvements in all action alternatives (B-D). The improvements consist of converting aspen acreage along Dalrymple Creek to tree species less desired by beaver such as red pine, red oak, white spruce, white pine, and hemlock. Overall, Alternatives B through D reduce the amount of aspen along the creek by about 10% (Table 4-3). This could limit the amount of trapping needed to keep beaver populations low. In Alternative A, trapping would continue to be needed at regular intervals to minimize impacts to trout.

4.2.4 Forest Vegetation Composition

Vegetation composition can be used as an indicator of some of the aspects of overall biodiversity within the area. Forested vegetation composition will change within the area as a result of project implementation.

The boundary of the effects analysis for forest composition is the project area boundary. There are no reasonably foreseeable actions affecting vegetation composition within the established boundaries that could be expected to contribute to cumulative effects. The existing forest vegetation is a result of past actions and is incorporated into the analysis.

Information for Tables 4-4, 4-5, and 4-6 was compiled from detailed stand information located in the project record. Tables D-1 through D-3 in Appendix D contain site-specific forest type information for each stand being treated in each action alternative.

Direct/Indirect Effects: Table 4-4 shows the changes (in acreage) in vegetation composition for the project area for the 3 specific type groups identified in the Forest Plan for Management Prescription (MP) 1 areas by alternative.

Table 4-4: Vegetation Type Change by Alternative (Acres)				
	Alternative			
Vegetation Type	**A**	**B**	**C**	**D**
Aspen	0	265	494	574
Conifer	0	131	144	144
Permanent Upland Openings	0	-10	-72	-24

Within the next 10 years, there would be no vegetation type changes in Alternative A. In Alternatives B, C, and D, there would be about 250 to 550 more acres of aspen than the current condition. This increase in aspen is primarily from stands currently typed as paper birch that

have an aspen component. Once harvested, the expected regeneration would be primarily aspen from root sprouting. In Alternatives B, C, and D, there would be about 130 to 140 more acres of conifer than the current condition. This conifer increase is primarily from removing the overstory tree cover of areas with an understory of white spruce. Permanent openings that would be maintained stay about the same in Alternatives A and B. Maintenance of permanent wildlife openings would decrease in Alternative D. In Alternative C, almost all of the existing openings would be allowed to reforest. This process would take longer than 10 years.

Cumulative Effects: Table 4-5 shows the cumulative changes (in % of all acres in the project area) in vegetation composition for Management Prescription (MP) 1 areas by alternative.

Table 4-5: Existing and Desired Vegetation Type (% of all acres)

Vegetation Type	Goal for MP1	Aternative			
		A	B	C	D
Aspen	35-65	35.7	36.9	38.0	38.3
Conifer	10-20	14.3	14.9	15.0	15.0
Permanent Upland Openings	3-5	0.3	0.3	0.3	0.3
Other	up to 49	49.7	47.9	46.7	46.4

Within the next 10 years, aspen will increase in Alternatives B through D. Alternative B would result in about a 1% increase within the project area. Alternatives C and D would result in about a 2% increase. Alternative A would leave the area with the same amount of aspen as the current condition. All alternatives are at the low end of the desired 35-65 percent aspen for MP1 areas. Conifer slightly increases in Alternatives B through D. The amount of conifer in Alternative A remains the same as the current condition. Conifer falls within the desired range in all alternatives. Percent of permanent upland openings does not vary by alternative.

There was some public concern related to increases or decreases in the aspen component on a Forest wide scale with all the projects occurring across the Forest. An analysis was conducted for this with the following results (see project record file: Cumulative Effects Review of Foreseeable Vegetation Management on Desired Forest Composition on the Chequamegon National Forest):

Table 4-5a: Cumulative Forest Type Change in MP1 on the Chequamegon

Vegetation Type Goal for MP1 on Chequamegon	Hoffman-Sailor	Cayuga	Sunken Moose	Cumulative Change
Aspen	+ 265 acres	-234 acres	+115 acres	+146 acres
Conifer	-16 acres	+24 acres	-25 acres	-17 acres
Permanent Upland Openings	0 acres	+16 acres	0 acres	+16 acres
Other	-249 acres	1+94 acres	-90 acres	-145 acres

The Hoffman-Sailor West project, the Cayuga project and the Sunken Moose project are the 3 environmental analyses that are being conducted or have recently been conducted on the Chequamegon side of the Chequamegon-Nicolet National Forest. Table 4-5a shows that the largest cumulative acreage change that is occurring in MP 1 on the Chequamegon is an increase of about 146 acres in the aspen type. Since the MP1 area on the Chequamegon is about 308, 800 acres, the increase in aspen is less than 1/10 of a percent. There is no substantive cumulative effect on forest composition in MP 1 as a result of implementing any or all of the 3 projects identified above.

Some respondents to the scoping notice sent out for this project are concerned about how actions taken now could affect the desired condition of the project area under Forest Plan revision alternatives. There is some concern that options for future management of an area will be foregone if actions are taken now. The following table lists the Forest Plan revision draft alternative goals for the project area. All Forest Plan revision alternatives developed to date have identified the project area as a management prescription 1a or 1b area. This type of management is very similar to the current Forest Plan designation for the project area. Vegetation management has a heavy emphasis towards early successional forest in both the Forest Plan revision alternatives as well as the current Forest Plan. Table 4-6 shows the Forest Plan revision vegetation goals for the area as well as what the vegetation would be in each of the alternatives. The primary difference in Forest Plan revision MP1a and MP1b is that MP1b would put more emphasis on management of red and white pine and less emphasis on aspen management than MP1a.

Table 4-6: Forest Plan Revision – Vegetation Type Comparison by % of Upland

Vegetation Type	Plan Revision MP1A	Plan Revision MP1B	Alternative				Effects to Revision Options
			A	B	C	D	
Aspen	50-75	35-55	61	63	65	66	minor
Balsam fir	0-10	0-10	2	1	1	1	none
Paper birch	0-5	0-5	14	11	9	8	none
Jack pine	0-2	0-10	0	0	0	0	none
Red/White pine	5-15	5-30	5	5	5	5	none
N. hardwoods	5-20	5-15	12	12	12	12	none
Oak	0-5	0-5	0	0	0	0	none
Permanent Upland Openings	1-4	1-4	1	1	1	1	none
Other	0-5	0-10	6	7	7	7	minor

All alternatives are consistent with Forest Plan revision vegetation goals for MP1a. If the project area became an MP1b area through the Forest Plan revision decision, there would still be the opportunity to increase the red and white pine components by under planting aspen stands at that time. None of the alternatives for Hoffman-Sailor West decrease the red and white pine component from its current condition (5% of the project area). Since there are no effects to Forest Plan revision options as a result of the activity planned for this area, there are no Forest wide cumulative effects on Forest Plan revision options.

4.2.5 Landscape Pattern

The existing landscape pattern of the project area is determined by glacial geology and ecological potential influenced by historic events. This pattern is one of small patches of upland forest and wetland. Almost 50% of the landscape is wetlands. Historical logging and fire produced an upland landscape dominated by early successional forest (primarily aspen, paper birch, and some balsam fir). Since establishment of the early successional forest, management for early successional habitat has continued. The structure of the existing forested upland landscape is predominantly a pattern of dispersed age and size classes with small patch sizes. The upland forest has a wide range of vertical structure and many areas of forest are less than 30 years old. Soft edges of this type (forested edges rather than the type of edge formed between forest and agricultural land or urban areas) do have some effect on the overall functioning of the area for some species of neotropical migrant songbirds (NTMB). Stands that have vertical structure, suitable cavity trees, large conifer, or an understory of shrub, conifer or other tree species, tend to be more productive habitat, although young forest is more important to other NTMB species. Alternatives C and D were developed to determine if the amount of interior forest could be increased to benefit wildlife and NTMB associated with that kind of habitat, given the management direction for the area (early successional habitat), the existing patchiness of the landscape, and the actual landscape pattern of upland mixed with lowland grass and brush vegetation.

The boundary of the effects analysis for landscape pattern is the project area boundary. There are no reasonably foreseeable actions within the established boundaries that could be expected to contribute to cumulative effects. The existing landscape pattern is a result of inherent landscape features and past actions and is incorporated into the analysis. Private land vegetation type and age both within and surrounding the project area was considered early in the analysis and was not found to have substantial potential to contribute to the cumulative effects for this issue. The project record contains the information collected from private land.

Harvest for Windows, Timber Harvest Simulation Model, Version 6.0 was used to estimate patch size, edge and interior forest habitat for each of the alternatives and into the future. The project analysis file contains the User's Guide for this model (Gustafson, Eric J. and Luke V. Rasmussen. 2002. HARVEST for Windows: User's guide. Published on the Internet by the USDA Forest Service, North Central Research Station, St. Paul, MN. URL: http://www.ncrs.fs.fed.us/4153/harvest/v60/Harv60) as well as detailed model runs and the assumptions and data used for each. The project file also contains an age and interior map for each of the model runs.

Direct/Indirect and Cumulative Effects: Table 4-7 shows the average number of forested patches and the average size of forested patches in the project area for the patches that will be in the 0-10 year age class following project implementation. Also shown is the total number and average size of patches for all forested habitat (all 10 year age classes). This would represent past actions as well as the actions proposed in the alternatives.

Table 4-7: Forest Patchiness by Alternative (after project implementation)

		Alternative				
		Existing	**A**	**B**	**C**	**D**
0-10 Year Age Class	# patches	35	0	80	39	53
All 10 Year Age Classes	# patches	395	395	459	416	418
0-10 Year Age Class	ave. patch size	20	0	26	53	51
All 10 Year Age Classes	ave. patch size	37	37	32	35	35

In Alternative A, there would be no new patches created in the 0-10 year age class. This would be fewer than currently exist. In Alternative B, there would be about 80 forested patches in the 0-10 year age class. In Alternative C, there would be about 39 patches and in Alternative D there would be about 53 patches. Cumulatively, the number of patches in all age classes does not vary substantially by alternative although Alternative B does result in more forested patches than the other alternatives.

Average patch size in the 0-10 year age class varies by alternative. Alternative A has no patches in that age class. Alternative B patch size is about 26 acres and the patch size for the 0-10 year age class in Alternatives C and D is double that in Alternative B. Cumulatively this does not carry over to any substantial differences between alternatives for the average patch size of all age classes. The existing condition and all alternatives result in average patch sizes of around 35 acres.

The Harvest model is meant to predict forest patchiness and interior/edge habitat over a long period of time and several harvest cycles, and under variable management scenarios. Each of the alternatives was used as a management scenario and the harvest model was run to predict patchiness after 4 repeated harvest cycles (total of 40 years from the present). While repeated harvest every 10 years is not a reasonably foreseeable action, this type of projection into the future can give an indication if management of the forest will eventually result in a different level of forest patchiness and amount of forested interior and edge habitat.

Table 4-8 shows the number of patches and the average patch size expected after repeated harvest cycles in each alternative. Parameters for Alternatives B, C, and D were set by the actual average patch size for harvest areas proposed. In Alternative A, some other assumptions were made. In Alternative A, no harvest is occurring. That is why Table 4-7 shows 0 for the number of patches and patch size for Alternative A. While that may be an appropriate assumption for the next 10 years, older aspen stands and paper birch stands will start decomposing the future. This would result in some new patches forming in the younger age classes in the no action alternative (Alternative A). Over a 40 year period, Alternative A may have the most patches with Alternative B following that. Alternatives C and D have a similar predicted number of patches and they have the least number for all alternatives. The actual average patch size does not vary substantially by alternative, but is largest in Alternatives C and D.

Table 4-8: Forest Patchiness by Alternative (after repeated harvests)

		Alternative				
		Existing	**A**	**B**	**C**	**D**
All 10 Year Age Classes	# patches	395	718	624	488	509
All 10 Year Age Classes	ave. patch size	37	20	23	30	28

Table 4-9 shows the interior and edge forest habitat in the project area by alternative immediately following alternative implementation and over the long term with the assumption that 4 harvest cycles have occurred with similar parameters to the existing alternatives.

Table 4-9: Forest Interior and Edge Habitat by Alternative				
	Alternative			
	A	B	C	D
Interior Habitat (Acres)				
After Implementation (10 years)	3960	2820	2878	2722
After Repeated Harvest Implementation (40 years)	2518	3095	3412	3157
Edge Habitat (Acres)				
After Implementation (10 years)	9385	8325	8229	7752
After Repeated Harvest Implementation (40 years)	8306	9384	8742	8907
Interior/Edge Ratio (Acres)				
After Implementation (10 years)	1 / 2.3	1/3	1/3	1/3
After Repeated Harvest Implementation (40 years)	1/3	1/3	1 / 2.5	1/3
Current/Existing Interior Acres	3314			
Current/Existing Edge Acres	9290			
Current/Existing Interior/Edge Ratio	1/3			

- All upland and wetland forested acres on National Forest System land were used in the analysis.
- Brush and sedge wetlands, water, and private land were excluded.
- Openings persist for 30 years and anything from 1-30 years old is not considered interior or edge.
- Roads and streams (linear corridors that could produce edge) were not considered in the analysis.
- A different data set was used for each of the Alternatives. The Harvest model was then used for each alternative projecting the harvest scheme used in that alternative.
- As an example: in Alternative B, cuts in future decades were kept a smaller size than in Alternatives C and D.
- Only clearcuts were used in the harvest runs.
- Interior Buffer Distance was 100 meters.
- In Alternative A, the no action alternative, it was assumed that after 1 decade, there would be little die off of the older, even-aged, aspen and paper birch in the project area. .
- In future decades, an assumption was made that some of the very old aspen and paper birch would be in decline or dead and create open conditions.
- An assumption was made for Alternative A that the openings created in the future would be relatively small and scattered throughout the project area based on age.
- Addition information on how figures in the table were derived is included in the project record.

Overall, the interior to edge ratio varies only slightly between alternatives. On an average, it stays around 1 acre of interior forest for every 3 acres of edge forest. Increasing the size of openings created by harvest in Alternatives C and D, even if repeated over a long period of time (40 years), does not appear to substantially change this ratio. Total acres of non forested habitat and its dispersion through the landscape in the project area appears to be a factor in the overall amount of interior forest habitat that can exist in any alternative.

4.2.6 Visual Quality

Visual quality (primarily within recreation areas and along traveled corridors including lake shore) is an important aspect of managing the Chequamegon-Nicolet National Forest. Some areas of the Forest are classed as more visually sensitive than others.

Project prescriptions, design and mitigation measures (see Table 2-2, Chapter 2) limit the impacts to visual quality within the project area. However, even with these measures in place, management activities (primarily temporary openings resulting from timber harvest) could be more noticeable in Alternatives C and D which contain harvest activity that will create temporary openings that are larger than 40 acres in size. Areas with visual quality objectives (VQO) of retention and partial retention would be the areas of primary concern since these are areas where management activities should be less noticeable.

Recreation areas and corridors classified as retention within the project area are Highway 70 and Sailor Lake Campground and picnic area. Roads and trails that are classed as partial retention that could be visually impacted by the proposed activities include Forest Road (FR) 136, FR 139, FR 138, Forest Trail (FT), 102(motorized trail), and FT 121(motorized trail). Sailor Lake also falls in this visual sensitivity category.

Another aspect of visual quality is the amount of temporary openings within areas with a recreation opportunity spectrum of semi-primitive, motorized. Most of the project area has a recreation opportunity spectrum of roaded, natural. In a roaded, natural (RN) setting management activities are more evident than in a semi-primitive, motorized (SPM) setting. There are 2 sections of the project area that are considered semi-primitive, motorized. By varying the size and amount of temporary openings that would be created in each alternative, management activities could be more or less noticeable. A temporary opening is defined as a visual change to the landscape when most trees in an area are completely removed (a clearcut or final harvest cut of a shelterwood). These harvest activities result in an area of the forest that is in the process of regeneration. Trees within these areas grow and once they are within a certain percentage of the height of the surrounding forest, they are no longer considered openings. In this analysis, only clearcuts were considered temporary openings. The temporary openings that would result from the second cut of the shelterwood harvests being proposed in the action alternatives would only occur when surrounding stands were not considered temporary openings.

The boundary of the effects analysis for visual quality is the area within the project boundary that has a VQO of retention or partial retention and areas that are semi-primitive, motorized. There are no reasonably foreseeable actions within the established boundaries that could be expected to contribute to visual effects in these areas.

Detailed information used to calculate visual quality effects is contained in the project record. Also included are more detailed location maps of temporary openings occurring within areas with a visual quality concern.

Direct/Indirect Effects: There are two Forest Plan guidelines related to the size of temporary openings allowed within areas with a VQO of retention and partial retention. One is the actual length or distance of opening along a travel way, and the other is the actual size or acres of the opening anyone can see from any point along the travel way.

Project design measures break up the length of temporary openings so they do not exceed a maximum length of 900 feet. The other guideline refers to a maximum size of temporary openings. Forest Plan guidelines say that the seen area of a temporary opening within areas with a VQO of retention and partial retention should not exceed 25 acres. However, the size or acreage of the temporary openings that can still be seen from the travel way or use area would vary due to terrain (hills, valleys, curves in the road, etc.), shape of the temporary opening (such as narrow in front, width in back, and depth from the road), and mitigation measures which break

up opening length. The actual seen area of temporary openings is estimated with the actual size of the stand being treated. The actual seen area is expected to be less than the actual stand acreage.

The average temporary opening size, along travel corridors with a VQO of retention and partial retention, for Alternative A is 0 acres. Alternative B is about 19 acres and Alternatives C & D is about 38 acres. This indicates that the size of temporary openings that will be seen in Alternatives C and D is substantially larger in Alternatives C and D than in Alternatives A and B. Due to project design and terrain features of the landscape, there is a high probability the viewer's site will be restricted and unable to see more than 25 acres of a temporary opening in any of the alternatives. There is still a possibility that a viewer could see a temporary opening greater than 25 acres. This could only occur in Alternatives C & D.

Cumulative Effects: Forest Plan guidelines for visual quality also dictate the total amount of temporary openings that could occur at any one time within retention, partial retention and SPM areas. Guidelines suggest that no more than 7% of retention, partial retention and SPM areas be in temporary openings. The percent of temporary openings that could occur in these areas is estimated in Table 4-10.

Table 4-10: Percentage of Temporary Openings by Alternative

		Alternative			
		A	**B**	**C**	**D**
Temporary Openings in SPM Areas	Acres	0	594	605	692
	Percent	0	7	7	8
Temporary Openings in Retention and Partial Retention	Acres	0	484	601	779
	Percent	0	6	7	9

The total amount of temporary openings may (depending on timing of harvest between adjacent stands) exceed 7% in semi-primitive, motorized areas in Alternative D and would exceed 7% in Retention and Partial Retention in Alternative D. In Alternatives A, B, and C, temporary openings would not exceed 7%.

Combining the percent of temporary openings along road corridors with a VQO of retention and partial retention along with the percent of temporary openings within semi-primitive, motorized areas provides an average visual impact within the project area. Overall, temporary openings (management activity) will be most noticeable to the casual forest visitor in Alternative D. Also, the size of temporary openings will appear largest in Alternatives C and D.

4.2.7 Pulpwood Production

One of the primary aspects of management of the project area is to provide an even flow of aspen pulpwood and other types of forest products (see Chapter 1). Alternatives vary in the amount of wood that will be harvested as well as vary in the age of the forest. In order to provide an even flow of pulpwood products primarily from aspen, the Forest Plan (page IV-114) identifies that about 30% of aspen types should be maintained in the 0 to 20 year age class.

The boundary of the effects analysis for pulpwood production is the project area boundary. There are no reasonably foreseeable actions within the established boundary that could be expected to contribute to cumulative effects on pulpwood production. The existing aspen age class structure is a result of past Forest Service actions and is incorporated into the cumulative effects analysis.

Detailed records for estimating volumes and age class distribution for Tables 4-11 and 4-12 are contained in the project file.

Direct/Indirect Effects: Table 4-11 shows the detailed volume estimates for each alternative by type of harvest method. Figures are shown in Mbf (one thousand board feet). On an average, about 4% of the volume in each alternative is sawtimber. The rest of the volume is pulpwood. Most of the volume is aspen and birch, with some hardwood and conifer. All aspen is considered pulpwood (regardless of size or diameter).

Table 4-11 Volume Estimates (Mbf) by Alternative

Harvest Type	Alternative			
	A	B	C	D
Clearcut	0	15305	16703	20343
Shelterwood	0	1672	1407	2470
Overstory Removal	0	1146	1238	1238
Selection	0	1573	1558	1558
Thinning	0	3192	3110	3110
Total Volume (Mbf)	**0**	**22888**	**24016**	**28719**
Pulpwood Volume	0	22,027	22,917	27,505
Sawtimber Volume	0	861	1,099	1,214

Alternative A will not produce any volume. Alternative B will result in about 23 million board feet (MMbf) of timber. Alternative C results in about 24 MMbf of timber. Alternative D results in about 29 MMbf.

Currently within the project area, about 11% of the aspen is less than 20 years old. In Alternative A, about 7 % of the aspen would be less than 20 years old. Alternatives B and C would result in about 29% of the aspen in the 0-20 year age class. Alternative D results in , about 33% of the aspen in the 0-20 year age class. Alternatives B and C fall closest to the desired 30% (see Table 4-12)

Cumulative Effects: Table 4-12 shows the details of the aspen age classes that exist now and that would exist under each alternative. Close to half of the aspen type is approaching maturity (over 40 years old). Aspen over 50 years old will be in some state of decomposition or start to have a loss in quality. Cumulatively, in Alternative A, about 80% of the aspen would be over 40 years old. This would result in a substantial loss of productivity and volume. In Alternatives B through D, aspen types over 40 years old would remain about the same as the current condition and aspen age is distributed more evenly across all age classes than in Alternative A.

Table 4-12: Age Class Distribution of Aspen Types by Alternative										
	Current		Alternative							
			A		B		C		D	
Aspen/Fir Age Classes	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
0-10 years	563	7	0	0	1719	21	1800	21	2236	26
11-20 years	473	6	563	7	637	8	637	8	637	7
21-30 years	680	9	473	6	473	6	473	6	473	6
31-40years	2510	32	680	9	680	8	680	8	680	8
41-50 years	1835	23	2510	32	2440	29	2432	29	2432	29
51+ years	1855	23	3690	46	2290	28	2386	28	2041	24

4.2.8 Economics

Detailed analysis files used for estimating the cost and revenue figures in Table 4-13 are contained in the project record. The boundary for the economic effects analysis is the project area and is specific to revenues and costs directly related to timber harvest in each alternative.

Direct/Indirect Effects: Table 4-13 Identifies direct costs and revenues (rounded to the nearest $1000) expected for each alternative for timber harvest activities. Costs and revenues were estimated using average District figures. Actual costs and revenues could fluctuate either up or down. Alternatives B and C result in the highest revenue/cost ratio. Alternative D is slightly lower. The lower ratio in Alternative D is a result of a slight increase in the amount of planting that would occur. Many seedlings require protection from deer browsing until they are well established. This was factored into the reforestation costs.

Table 4-13: Direct Costs and Revenue by Alternative for Timber Harvest				
	Alternative			
	A	B	C	D
Total Revenue (timber receipts)	**0**	**$1,284,000**	**$1,348,000**	**$1,591,000**
Sale Preparation and Administration Costs	0	$801,000	$841,000	$1,005,000
Reforestation Costs	0	$226,000	$236,000	$334,000
Total Costs	**0**	**$1,027,000**	**$1,077,000**	**$1,339,000**
Revenue/Cost Ratio	**0**	**1.25**	**1.25**	**1.19**

- Figures are estimated from acreage and volume estimates, combined with pricing tables such as stumpage values and reforestation costs.
- All costs/revenues are in today's dollars. No attempt was made to inflate or discount these dollars over 5-10 years.
- Costs such as running Forest offices, utilities, and other overhead costs are not included in the above figures. These are fixed costs and would remain the same in all alternatives.
- Revenue estimates are based on Medford-Park Falls Ranger District's Base Period Prices.

Cumulative Effects: Overall, the economic effects of the proposed action or alternatives for this analysis do not result in substantial changes to the economic conditions of the community

such as added or subtracted jobs or population supported by Forest activities. This is because the Forest Plan goals are broad in nature and meant to be accomplished over a period of decades. Implementation or non-implementation of any one project would not affect the economic conditions of the area. The direct revenues identified above will contribute to the overall timber receipts for the Forest over a period of several years.

4.2.9 Transportation System:

One of the purposes of the proposal is to develop and maintain a transportation system that is suitable for administration of the project area as well as one that reduces potential impacts to resources and provides adequate access (see Chapter 1). Alternatives differ in the type and amount of access provided in each alternative. One of the key issues raised during the transportation analysis conducted for this project was the amount of existing road travelways which are not currently classified Forest system roads. Many of these roads were old temporary logging roads that were left open instead of being decommissioned. These are unimproved travelways that could contribute impacts to water and other resources if they remain open to highway traffic. Other roads that are a part of the classified road system are currently open to highway traffic but are built to a standard that will not support heavy use without contributing to resource impacts or higher maintenance costs. The transportation analysis also identified that there was only limited need for new classified road construction. Temporary roads that would be immediately decommissioned would suffice for most of the proposed projects. The project area also includes a portion of semi-primitive, motorized recreational setting. In these areas, management activities, including roads should be less noticeable. The Forest Plan (page IV-116) sets road density goals for the semi-primitive, motorized recreation setting that are lower than for the remaining portion of the project area.

The boundary of the effects analysis for the transportation system is the project boundary and a subset of the project area (semi-primitive, motorized area). Roads crossing private land were considered in transportation planning (see the Hoffman-Sailor West Roads Analysis) but are not relevant to Forest Plan guidelines for road density. Additional information and maps on specific road lengths and locations can be found in the project record. Site-specific information used to develop Table s 4-14 and 4-15 is also on file.

Direct/Indirect Effects: Table 4-14 shows the miles of road projects in each alternative. Alternative B has the highest amount of road decommissioning and a slightly higher amount of temporary road construction than Alternatives C and D. In Alternative A, no road projects would occur.

Table 4-14: Road Project Miles by Alternative

Road Project		Alternative			
		A	B	C	D
Close (gate or berm)		**0.0**	**7.6**	**7.9**	**9.1**
Decommission	anytime	0.0	17.2	14.7	15.4
Decommission	following harvest	0.0	11.1	8.0	10.0
	Total	**0.0**	**28.3**	**22.7**	**25.4**

Table 4-14: Road Project Miles by Alternative					
Road Project		**Alternative**			
		A	**B**	**C**	**D**
Construct		0.0	0.1	0.0	0.1
Construct & Close		0.0	1.4	1.1	1.2
	subtotal	0.0	1.5	1.1	1.3
Construct/Temporary		0.0	2.5	1.8	2.0
	Total	**0.0**	**4.0**	**2.9**	**3.3**

Cumulative Effects: Table 4-15 shows the road miles and densities that would result from past actions as well as the actions proposed in each alternative. These were estimated for the project area as well as for the semi-primitive, motorized (SPM) portion of the project area. Miles and densities are for the total amount of roads and trails used as roads in the project area, not just the classified roads. Alternative A also represents the existing road system.

Table 4-15: Road Density by Alternative					
Project Area		**Alternative**			
		A	**B**	**C**	**D**
Open Roads	miles	78.8	47.3	46.5	45.6
Closed Roads	miles	27.6	32.3	38.3	36.7
	Total	**106.4**	**79.6**	**84.8**	**82.3**
Open Road Density	miles/square mile	2.3	1.4	1.4	1.3
Closed Road Density	miles/square mile	0.8	0.9	1.1	1.1
	Total	**3.1**	**2.3**	**2.5**	**2.4**
SPM Area		**A**	**B**	**C**	**D**
Total Roads	**miles**	**44.3**	**32.9**	**35.7**	**34.3**
Total Road Density	**miles/square mile**	**3.1**	**2.3**	**2.5**	**2.4**

- There is about 34 square miles within the project area.
- There is about 14 square miles within the project area that is considered to have a recreation opportunity goal of semi-primitive motorized (SPM).
- Forest Plan road density guide for the project area is a maximum of 3.6 miles of classified roads per square mile.
- Forest Plan road density guide for the SPM portion of the project area is a maximum of 2 miles of classified roads per square mile.

For the project area, total road density drops in all the action alternatives. Road density for the project area is within Forest Plan road density guides for all alternatives (3.6 miles per square mile). Road density for the SPM area in Alternatives B, C, and D moves towards the Forest Plan road density guides (2 miles per square mile) while Alternative A does not.

Within the project area, closed road densities stay about the same in all alternatives (about 1 mile/square mile). The open road density within the project area drops substantially in

Alternatives B through D. This drop is due to the miles of old logging roads and temporary roads (non-classified roads) that would be decommissioned in these alternatives.