3.0 Chapter 3: Affected Environment

Chapter 3: Affected Environment succinctly describes the existing condition of the environmental resources within the Cayuga Project area that could be affected by the four alternatives if one were implemented.

This description of the existing condition in Chapter 3, combined with the description of the activities of Alternative 1: No Action, establishes the baseline conditions against which the decision-maker and the public can compare the potential effects if Alternative 2, 3, 4 or 5 were selected.

3.1 Project Area Location

The Cayuga project area is located northwest of Glidden, Wisconsin. The project is located entirely in Ashland County, Wisconsin. There is a total of 32,228 acres of National Forest System lands within the project area. The project area is located within T43N, R2W, Sections 6-7, 16-20, and 29; T43N, R3W, Sections 1-18, and 23-24; T43N, R4W, Sections 1-3, 10-23, and 27-33; T43N, R5W, Section 24; T44N, R3W, Sections 19-23 and 26-35 and T44N, R4W, Sections 23-27 and 34-36.

3.2 Description of Relevant Past, Present, and Reasonably Foreseeable Future Actions Not Part of the Proposed

3.2.1 Past Actions

Past actions were considered for all ownerships within and adjacent to the Cayuga Project Area. These included such actions as National Forest, Ashland County and private ownership timber sales, planting and other silvicultural activities, as well as past road construction and adjacent land development. Numerous images of the resulting landscape, along with stand history information, are located in the project record and were considered in this chapter. The most influential actions, which took place in the past 100 years or so, were extensive pine logging and slash fires prior to the turn of the century, followed by hemlock and hardwood logging and slash fires after the turn of the century until the mid 1930s. These post logging slash fires have resulted in a change of the composition in some areas from historically hemlock-hardwood dominated sites to stands that are now dominated by aspen-birch-fir or stands of even-aged, second growth northern hardwoods. Hemlock is much reduced compared to its former abundance. There is no evidence of past intensive logging in the lowland conifer forests, although it is likely that loggers harvested the best quality trees (particularly northern white cedar) from these areas.

USX Corporation owns approximately 6,000 acres of Forest Crop Law Land directly adjacent to the project boundary. According to the forester for this company, there have been some recent harvest activities in the past 3 to 4 years. Most harvest activities were implemented during the winter due to soil concerns. USX Corporation is managing these blocks of land primarily for long-term yield of northern hardwoods, and some aspen. There were several timber sales that have recently been completed adjacent to the project area south of FR 182.

In March 1999, a decision to approve forest-wide watershed improvement projects was signed by Forest Supervisor Lynn Roberts. This decision included the improvement of four stream crossings along FR 184. These include Edies and three tributaries to the Iron River. In July of 2000 the culverts were replaced and road reshaped.

3.2.2 Present Actions

There are presently no active timber sales on National Forest lands within the project area. However, there is one active timber sale adjacent to the project area south of FR 182. There are no known actions presently occurring on private lands that would result in a change of the existing condition of the composition or structure of the forested habitats within the analysis area.

3.2.3 Reasonably Foreseeable Future Acts

Reasonably foreseeable silvicultural activities on National Forest lands within the project area were limited to ten years into the future. While it is likely that such activities would take place in the analysis area beyond that point, it is unreasonable to predict their specific locations with much certainty. It is not considered feasible to predict alternative silvicultural prescriptions such as clearcutting the hardwoods and planting to conifer. It would be feasible, however, to predict that the silvicultural prescriptions proposed at this time for the harvested stands would be followed through into the next cutting cycle (selection, and improvement cuttings and thinnings).

3.3 Description of Relevant Affected Resources That Are Issues

3.3.1 Early Successional Management (Issue 1)

The Forest Plan direction for vegetation within Goal Area (GA) 1 emphasizes management of aspen for timber production and wildlife habitat. There are approximately 6,314 acres of aspen within GA 1. In GA 2 there are approximately 2,732 acres of aspen (see Figure 3.3.1a). Approximately 46% of the aspen stands within the project area are greater than 50 years of age with an average site index of 65 (see Photo 3.3.1a).

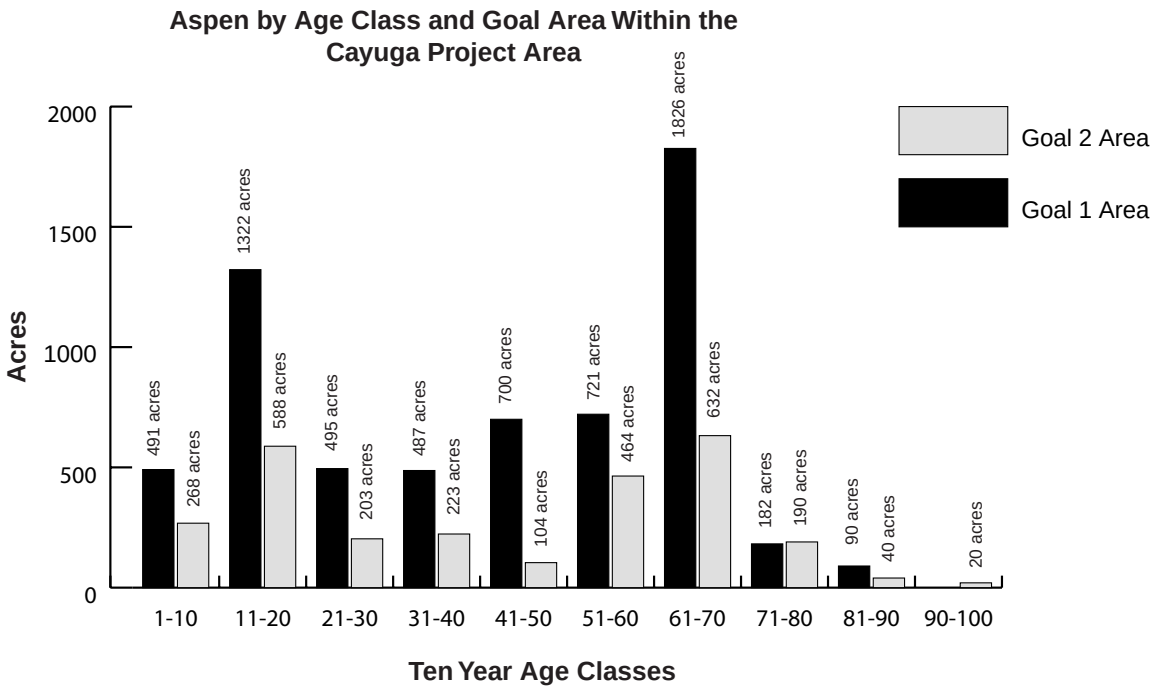


Figure 3.3.1a: Aspen age class distribution within the Cayuga Project Area

The Iron River Forest Plan Revision Inventoried Potential Wilderness Area (IPWA) contains approximately 8,503 acres, or 26% of the total Cayuga Project Area. Of these acres, approximately 3,064 acres are in the aspen forest type (see Figure 3.3.1b). As stated in the original "Purpose and Need" that was sent out for public review, "no decisions will be made that change the undeveloped character of this area until the evaluation under the Forest Plan Revision process is completed in the reasonably foreseeable future." Although there are no proposed management activities within the IPWA, the area is included in the analysis of cumulative effects.

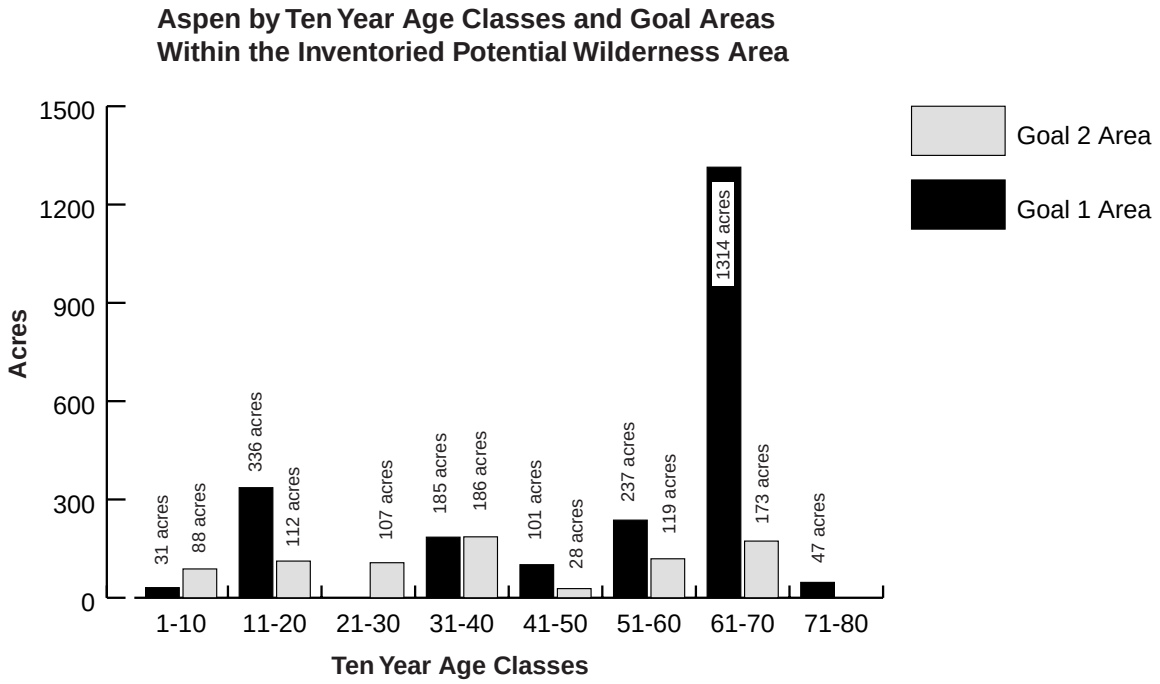


Figure 3.3.1b: Aspen age class distribution within the IPWA

Photo 3.3.1a: Mature aspen stand within the Cayuga Project Area

Approximately 46% of the aspen stands within the project area are greater than 50 years of age with an average site index of 65.

The project area lies within WDNR Deer Management Unit 6. This unit has an over-winter population goal of 12 deer per square mile; estimated numbers over the past 10 years have ranged from 14 to 32 deer per square mile, with the lower numbers resulting from two consecutive harsh winters.

There is substantial habitat within the project area for ruffed grouse and woodcock because of the acreage of aspen and lowland shrubs. A survey route located in the project area has been run for both species for a number of years. This past year's survey recorded 26 grouse drums in ten four-minute stops; the woodcock survey recorded three birds in a total of ten stops. Young-age aspen and other shrub/early successional habitats within the project area also provide nesting and foraging areas for a variety of non-game birds species, including black-billed cuckoo, indigo bunting, alder flycatcher, and chestnut-sided warbler.

A portion of the project area is within the designated elk "core range" as described in the Management Plan and Environmental Assessment for the Clam Lake Herd (WDNR; approved 6/28/2000). As part of the elk reintroduction effort, both a core range and a buffer range were established. The core range, which includes approximately half the project area, is centered on the release area and on the Navy's Extremely Low Frequency (ELF) site, and includes primarily National Forest ownership. The buffer range, which includes the remainder of the project area, surrounds the core range and includes a mix of federal, private, and county lands, and is intended to provide additional space for herd expansion. Currently all of the known elk concentration sites are south and southwest of the project area, although there have been scattered sightings of individual animals within the project area. The elk tend to concentrate activity in areas of aspen browse, especially in winter and early spring.

3.3.2 Wildlife Openings (Issue 2)

Currently there are approximately 231 acres within the project area typed as upland openings (approximately 0.7% of the project area). This includes some shrub type, generally areas that have not yet recovered from early logging and fire, including one 37-acre stand. Within this total, there are some areas that were created fairly recently, for a variety of purposes. Some sites were created specifically as managed openings, with wildlife habitat in mind, while others were cleared for such purposes as recreation sites or administrative sites associated with the Navy ELF project, and have been maintained for these purposes. There are other upland open areas that are generally termed "relict openings," which are remnants of earlier human activity, such as homesteads, camps, or logging activity, or in some cases are due to natural origin. These relict openings have often been maintained in the past to remove encroaching vegetation. Some openings in the project area have stayed open without maintenance for several decades, due to natural factors such as frost action, browsing, and sod competition.

Upland openings were traditionally thought of as a deer management tool, however they perhaps should be thought of as another part of biological diversity, with a large community of species utilizing them. These openings offer a variety of food resources and structural diversity generally not found in mature forest types, including dense sod cover, shrub patches, and fruit producing shrubs and brambles. Use by a wide variety of species has been documented, including a number of neotropical migratory bird species. Most of the wildlife species using small upland openings tend to be generalist species, including edge species, with no species

dependent on them. The project area openings are too small to attract true grassland bird species.

The two Management Indicator Species (MIS) that utilize upland openings include white-tailed deer and thirteen-lined ground squirrel.

Forest-wide, the Chequamegon has 18,529 acres typed as upland openings (report from Forest database on 11/14/2000). This represents approximately 2.2% of the total National Forest acreage in the Chequamegon. Management Area composition objectives for upland openings from the 1986 Plan are 3-5% of total acres for Management Area 1, and 4-6% of total acres for Management Areas 2, 3, 4, and 6. The remaining Management Areas do not have composition objectives for upland openings.

3.3.3 Vegetation Composition (Issue 3)

Vegetative cover within the project area (see map in Appendix A for existing forest types) is predominantly composed of these forest types: (**uplands**) mixed northern hardwoods (19%), aspen (18%), sugar maple (8%), aspen-spruce-fir (10%), red pine (3%), white spruce (2%); (**lowlands**) mixed swamp conifer (12%), lowland black spruce (5%), black ash (5%), lowland opening (7%). Of the 32,239 acres of National Forest lands within this project area, 20,725 acres (64%) are composed of upland forest while 8,905 acres (28%) are lowland forest and 2,499 acres (8%) are non-forest (upland and lowland opening).

Although the forest types are labeled with tree species names there can be a great variety of species within these forest types. The aspen forest type, for example, can have from 100% to less than 50% aspen as a component of the stand. Other species could include red maple, sugar maple, oak, balsam fir, white spruce, red pine or jack pine.

There are no accurate records of what occurred in the Cayuga Project Area during the logging era of the late 1800s and early 1900s. However, the age and composition of the existing forests suggest that many of the forests on the uplands were either clearcut or had the highest quality trees removed during this time. Old railroad grades and spurs still evident today suggest that the area was railroad-logged.

Past timber harvest includes extensive pine logging and slash fires prior to the turn of the last century. This was followed by hemlock and hardwood logging slash fires after the turn of the century until the mid 1930s. Post-logging slash fires have changed the composition of some areas from sites historically dominated by hemlock-hardwood to stands that are dominated by aspen-birch-fir or small stands of even-aged second growth northern hardwoods. Hemlock is much reduced compared to its former abundance.

There is no evidence of past intensive logging in the lowland conifer forests, although it is likely that they were entered by loggers and the best quality trees, particularly cedar, were removed.

The more recent harvest activities show the project area has been actively managed for timber production. Records indicate 45 timber sales were sold within the project area as far back as 1973. There were timber sales

that go back farther than this date; however, that information is somewhat limited.

There are 60-year-old stands of jack pine and red pine located within the Day Lake Campground and along the entrance to the Day Lake Boat Launch and Picnic Area. Most of the red pine stands were planted. The Civilian Conservation Corps (CCC) established many of these plantations and almost all have been commercially thinned within the last 20 years. Red pine is a long-lived species. After 200 years, red pine still has a constant rate of basal area increase (see Photo 3.3.3a)

Photo 3.3.3a: 60-year-old stands of jack and red pine

These stands are located within the Day Lake Campground and along the entrance to the Day Lake Boat Launch and Picnic Area.

Jack pine is an inherently short-lived species, does not respond favorably to thinning and is difficult to maintain as intact stands much past 50 years. Jack pine cones hold viable seed for several years. Plantation establishment is facilitated when burning creates a seedbed. Direct seeding is an option which, when combined with mechanical soil disturbance or prescribed fire, could assure that these favorable sites remain in jack pine cover. Jack pine has adapted to fire by releasing seeds in response to the heat. The trees themselves however, are fire intolerant and even light under-burning would likely kill mature stands.

The white spruce cover type is predominantly spruce with a component of aspen, paper birch, balsam fir and red maple. Most of this type on the district is plantation origin and fairly pure spruce. Maintenance of the white spruce type requires even-aged management (including clearcut). Treatment is usually suggested when high stocking levels slow tree growth, trees have reached maturity, or insect/disease problems warrant salvage (see Photo 3.3.3b).

Photo 3.3.3b: White Spruce.

The white spruce cover type is predominantly spruce with a component of aspen, paper birch, balsam fir, and red maple.

Hardwood forests represent the dominant forest type within the project area and include mixed hardwoods, northern hardwoods and hardwood-hemlock stands. Hardwood species tend to have strong root systems. The major species that characterize this group are red maple, sugar maple, yellow birch and basswood (see Photo 3.3.3c).

Photo 3.3.3c: Hardwood forests

Hardwood forests such as this one represent the dominant forest type within the project area. The major species are red and sugar maple, yellow birch, and basswood.

Vegetation composition, stand age and structural features, are important influences, on wildlife species occurring in the area. Many of the species known to inhabit the Great Divide Ranger District can be found within the Cayuga project area, due to its relatively large geographic coverage, and due to the variety of forest and non-forest types it contains. Species found within particular stands and communities vary due to, among other things, differences in food resources and habitat conditions. Some species might forage on insects found in hardwood foliage, or in the rich humus layer, while others forage on the seeds produced by mature conifer trees. Species associated with early successional forests were discussed earlier in section 3.3.1; some other examples of habitat associations follow.

Conifer forests attract various needle-eating caterpillars, which in turn attract a variety of birds ranging from warblers to thrushes. The seeds produced by cone-bearing trees attract bird species such as crossbills, as well as rodents such as red squirrels and meadow voles. Deer will browse on various conifer seedlings, and are attracted to the protection offered by dense lowland conifer forests in harsh winters. Mature conifer forests that have been killed by beaver flooding, fire, or other disturbance will quickly be found by the black-backed woodpecker, which feeds on insects in the decaying trunks.

The diversity of species found in mature hardwood forests can vary greatly depending on the overall structure of the stand. In general, bird species diversity increases with habitat complexity, especially vertical stratification or layering. Many of the hardwood stands within the project area are even-aged, with a dense canopy and relatively sparse understory. Stands with features such as canopy gaps, dense understory, and dead and dying trees can support substantially more bird species than even-age stands. Other species groups respond in a similar way to an increase in structural features. Abundant woody debris in particular is a good indication of habitat quality for pine marten within mature hardwood stands.

There is a variety of wetland vegetation types within the project area which support a diversity of species, from the bitterns and muskrat of shallow marsh and sedge meadows, to the beaver, mink, water shrew, and yellow warbler of riparian areas, to the bog lemming and four-toed salamander of sphagnum bogs.

A total of five stands within three different compartments have been surveyed for breeding birds in the last decade, giving an idea of the variety of species found within the project area. Species observed have included blue-headed vireo, Connecticut warbler, hermit thrush, sedge wren, gray jay, scarlet tanager, blackburnian warbler, and sandhill crane. The large number of "boreal" type bird species observed is an indication of the significant areas of lowland and upland conifer.

3.3.4 Fragmentation (Issue 4)

Fragmentation within the project area is confined primarily to differences in forest types and ages. The project area is essentially forested with only small areas being in a permanent open condition, such as upland openings and road clearings. This type of fragmentation is generally thought to be less of an impact to animal populations than that which occurs when forested areas are permanently converted to agricultural or urban areas. This fragmentation occurs primarily from management of early successional types by clearcutting. The southern portion of the project area has been subject to more of this activity than the northern portion, and could therefore be considered more fragmented by this definition.

A GIS analysis of the project area compared amounts of edge and areas of interior forest, by alternative. The existing condition includes approximately 457 miles of "edge," defined as the border between mature forest and regenerating forest stands, upland openings, lowland openings, improved roads, and private ownership boundaries. The existing condition includes approximately 10,272 acres of "interior" habitat (what remains

after all edges are given a 100-meter buffer). This total includes 5,301 acres of interior mature hardwood.

3.3.5 Roads (Issue 5)

Roads bordering the Cayuga Project Area include: Forest Road (FR) 182 & 195, State Highway 13, County Highway GG and M, and State Highway 77. FR 183 and 184 traverse the project area from north to south and east to west respectively (see map in Appendix A.).

There are approximately 141.0 miles of system and non-system roads within the project area including those roads that border the project area (see Table 3.3.5a). This represents a road density of approximately 2.80 miles of road per square mile. Only 50% of the boundary road lengths were used for road density calculations.

Table 3.3.5a: Forest System Roads in Project Area

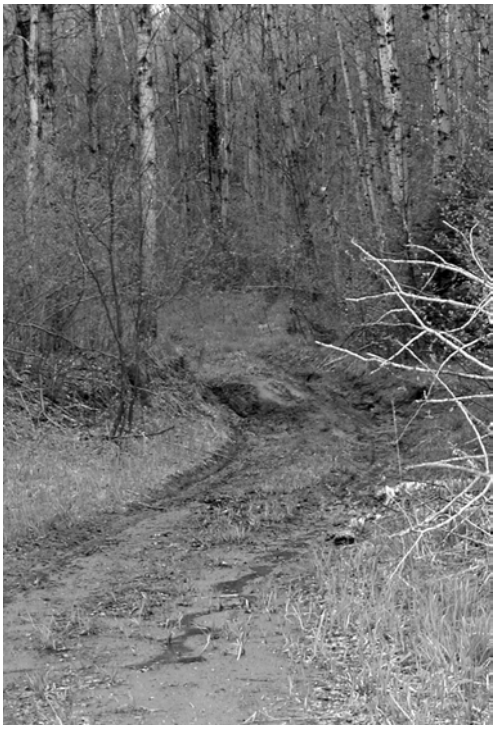
Traffic Service Level	Miles	Road Characteristics	Remarks
A	13	Double-Lane Blacktop	All TSL A road miles on boundary of project area
B	12	Double-Lane Gravel	Some TSL B road miles on boundary of project area
C	24	Single-Lane Crowned/Ditched	Some TSL C road miles on boundary of project area
D	92	Single-Lane, Two-Track Slight Crown/Flat Native material/gravel	TSL D roads are the primary roads within the project area

Photo 3.3.5a: A Traffic Service Level (TSL) B road

Photo 3.3.5b: A functioning TSL D road

This is a functioning low service TSL D road within the Project Area. It provides public access with minimal impacts to surrounding resources.

Except for County Highway GG and State Highway 13 and 77, most of the roads in the project area are gravel or native surface. Many of these are low-standard roads that receive intermittent use. However, some of the greatest use and greatest public use impacts to the roads within the project area, occur during the fall months due to hunting seasons and gathering of forest products (i.e., Christmas trees, boughs, twigs, and firewood).



Photos 3.3.5c: Poorly functioning TSL D roads

These low service level roads within the Project Area show a need for maintenance.

The project area is currently home to parts of up to three wolf pack territories. As of spring 2002, the following packs and wolf numbers were determined from tracking and radio-telemetry surveys: Torch River Pack (five

wolves, including several pups from 2001); Hellhole Creek Pack (five-six wolves); and Brush Creek Pack (seven wolves, including pups from 2001). Relatively low road densities in portions of the project area favor wolves and other large predators.

3.3.6 Water Quality (Issue 6)

The Cayuga Project area is located within three 5th level watersheds. These watersheds are the Upper Bad River, Marengo River, and West Fork Chippewa River. The eastern two-thirds of the analysis area are part of the Upper Bad River watershed, which drains into Lake Superior. The western one-third of the analysis area is part of the Marengo River watershed, which also drains into Lake Superior via the Bad River. Finally, the extreme southwestern one-sixth of the analysis area is within the West Fork Chippewa River watershed, which eventually drains into the Upper Mississippi River.

The Upper Bad River watershed includes the Iron River and its tributary streams, including Edies, Brush, and Squaw Creeks. There is also Hardscrabble, a tributary to Hardscrabble, Gravelly Brook, and several unnamed tributaries that flow through the analysis area and empty into the Bad River on the eastern edge of the project area boundary. The water quality of all these streams is generally good, with the exception of some sedimentation problems caused from frequent culvert washouts and road surface erosion. In July of 2000 culvert replacements along Forest Road 184 corrected some of the sedimentation problems. There are additional road sedimentation sites off Forest Road (FR) 183, 354, and 355 that need to be addressed. Brush Creek has water temperature problems that have limited its ability to support trout and other cold-water community species. With adequate riparian area habitat improvement and beaver management, portions of Brush Creek have the potential to be healthy cold-water communities.

The Marengo River watershed includes Camp Six, McCarthy, and Spider Creeks and the headwaters of the Brunsweiler River. The only known water quality problems in this watershed are unnaturally high water temperatures and sedimentation of McCarthy Creek, a stream fed by surface and groundwater. The water temperature problems are caused mainly by beaver, which dam up the streams. The sedimentation problems are caused by road surface erosion. These problems have limited its ability to support trout and other cold-water community species. With adequate riparian area habitat improvement and beaver management, portions of the McCarthy Creek system have the potential to be healthy cold-water communities.

The West Fork Chippewa River watershed includes the Day Lake Flowage, Mud Lake, East Twin and West Twin lakes, Dead Horse Slough, and Cranberry Lake. The only known water quality concerns in this watershed are mercury concerns in Day Lake and sediment deposition into a couple of unnamed tributary streams. Day Lake is a 625-acre flowage located on the West Fork Chippewa River. It is a darkly stained lake with a maximum depth of 20 feet, and was originally constructed in 1970 at the site of an earlier logging dam. The muskellunge population is characterized as high density but slow growing. There is a category 2 mercury advisory for muskellunge over 28 inches in size in Day Lake. The numbers are high enough that populations of

other fish species are being suppressed. The current management goal is to reduce the muskellunge population in order to increase populations of prey species.

East and West Twin Lakes are located just east of Day Lake. West Twin is 51 acres, with a maximum depth of 17 feet and medium stained water. Fish species include largemouth bass and pan fish, with the bass showing good growth. East Twin is 110 acres, with a maximum depth of 15 feet and very clear water. Fish species include musky, largemouth bass, and pan fish. A recommendation was made in 1983 to discontinue stocking of muskellunge and to start stocking bass instead.

The Chequamegon-Nicolet National Forest has conducted an Aquatic Ecological Classification and Inventory for the streams within the forest boundary. The ecological units, called valley types, are based on stream bank full width, alkalinity, maximum water temperature, and aquatic biota.

The streams within the Cayuga project area are healthy resilient systems that meet Clean Water Act standards. The majority of the streams in the project area are relatively small soft-water streams with warm or cool water. There are several stretches of trout water in the project area, but this habitat is limited and marginal in quality. The Iron River and its tributaries make up the primary watershed in the area. The Iron River itself starts near McCarthy Lake and flows into the Bad River. The upper parts of the river are influenced by the lake flow and by beaver, resulting in a Class III trout designation. The lower part of the river receives more groundwater and is considered a marginal Class II trout stream. This lower part of the river contains more fish species than the upper part, probably due to its larger size and the influence of the Bad River.

Tributaries of Iron River include Edies Creek, Brush Creek, and Squaw Creek. All are narrow streams of moderate alkalinity. Brush Creek is system as a Class II trout stream, but it is marginal trout water, with little groundwater influence.

McCarthy Creek is considered a Class II trout stream. This stream supports brook trout in addition to non-game forage fish species. The carrying capacity of McCarthy Creek is less than it could be for trout due to habitat changes primarily caused by beaver activity. The lower portion of the stream is more productive since it is influenced more by groundwater.

McCarthy Lake and Cedars Research Natural Area (RNA) are designated to protect a wilderness-condition shallow, soft-water drainage lake; three warm, slow, soft water streams; a large ericad bog; and a large, high quality cedar swamp.

Monitoring

Water quality data including temperature, alkalinity, pH, color, and width has continued to be collected for most of the streams within the Chequamegon-Nicolet National Forest since the Aquatic Classification and Inventory first began. This water quality data has enabled the Classification System to be refined and serves as monitoring data that can be used to detect changes over time.

A road/stream crossing inventory was conducted on the Chequamegon-Nicolet National Forest in 1997 and 1998. The purpose of the inventory was to obtain information to help with prioritizing watershed restoration projects. During the survey, each road/stream crossing was investigated to determine the general extent of erosion and sedimentation. A number of observations were made at each site including the road surface material, slope, length, drainage, culvert size and condition, evidence of road surface erosion, evidence of culvert failures or washouts, and condition of the embankments. Based on these observations each site was rated according to the apparent erosion and sedimentation that was occurring as either major, moderate, minor, and none. These ratings are one tool used to prioritize and schedule stream crossing replacement or restoration projects. Approximately 10 percent of the road/stream crossings within the Forest boundary were identified to be in need of some sort of improvement to minimize sedimentation of streams or lakes. This sedimentation is still far below the allowable thresholds by Clean Water Act standards.

Monitoring of a variety of streams, which have under gone culvert replacement and/or stream channel restoration has taken place over several years and is planned to continue into the future. Data collected includes surveys of the stream channel profiles and cross-sections, water chemistry data, discharge levels, and fish species information. The data collected may be used for a variety of purposes including effectiveness monitoring, monitoring of changes over time, and comparisons of restored to un-restored stream system dynamics, to name a few.

The use and effectiveness of Best Management Practices (BMP's) for Water Quality were monitored by interdisciplinary and interagency teams across all land ownerships in Wisconsin, including the National Forest, during the years of 1995, 1996, 1997, and 2002. The field evaluations for monitoring conducted from 1995 to 1997, indicated that ninety-nine percent of the time no adverse impact to water quality occurred when a BMP was applied correctly where needed. They also indicated that the one percent of time that there was an impact, it was minor (WDNR 1999). Two sales on the Great Divide Ranger District that were monitored in 2002 were found to have followed BMPs and had no adverse effect on water quality. One of these sales was adjacent to a navigable perennial stream and the other adjacent to a small lake.

Timber sales outside of the national forest on private, state, county, and industrial lands were also monitored during this time frame. Internal water quality monitoring of timber sales has also occurred over the years as part of Forest Plan Effectiveness monitoring, as well as for District Timber Sale and Sale Administrator reviews. The majority of Forestry BMP monitoring relates to roads, skid trails, and landings.

Lake monitoring has also taken place across the Chequamegon-Nicolet National Forest. It has consisting primarily of dissolved oxygen and temperature profiles, pH and alkalinity levels, clarity, color, and fish species present. This information is useful for fish management, as a recreational pressure index, and for general comparisons of water quality trends over time. No negative trends have been identified to date. The WDNR has identified select lakes as having higher than normal mercury levels. In these cases, fish consumption advisories

are issued for the affected lakes.

3.3.7 Noxious Weed Species (Issue 7)

Currently there are nine documented noxious weed sites located within the Cayuga project area representing six different species, all of which are associated with open, disturbed sites. Several of these sites have multiple species associated with them. Of the six known species, only one (reed canary grass) poses a threat to undisturbed natural communities found within the project area (see Table 3.3.7a). Several other known noxious weeds from the project area, including leafy spurge and spotted knapweed, could be ecologically invasive in native communities found elsewhere on the National Forest including open barrens and pine savanna.

Table 3.3.7a: Noxious Weed species within the Cayuga Project Area

Plant Species	District Locations	Acres	Project Area Locations	Acres
Leafy Spurge	5 (all roadside)	1.5	4 (all roadside)	1
Spotted knapweed	13 (roadside & gravel pit)	16.3	2 (roadside & gravel pit)	0.3
St. John's-wort	8 (roadside & gravel pit)	3.4	4 (roadside & gravel pit)	1.4
Common tansy	7 (roadside & gravel pit)	2.25	1 (roadside)	1.0
Canada thistle	3 (gravel pit)	0.1	1 (gravel pit)	0.1
Reed canary-grass	1 (C204, S19)	0.2	1 (C204, S19)	0.2

Leafy spurge is native to Eurasia and was transported to the U.S. in the early 1800s (see Photo 3.3.7a). It can tolerate a wide range of habitats ranging from damp to very dry soils and occurs in disturbed as well as undisturbed areas. Leafy spurge displaces native plants resulting in a reduction in plant diversity and cover. There are several small infestations of leafy spurge, totaling <1 acre located off County Highway GG (see maps in Appendix A).

Photo 3.3.7a: Leafy Spurge.

It has greenish-yellow flowers (Mortensen, 2000).

3.3.8 Soils (Issue 8)

Summary

Ecological units at the landtype association level and below, best delineate the affected environment for soil resource issues. The soil resource within the project area is currently of high quality, with no evidence of reduced productivity from past events or activities. Impacts to the existing soil resource from the proposed activities in Alternatives 2-5 will be estimated based on the potential to cause: 1) erosion and displacement; 2) compaction and rutting; and 3) reduced productivity.

Glacial Geology and Soils

The glacial geology and soil resources of the Chequamegon-Nicolet NF are characterized within a hierarchical, ecological classification framework (Ecomap, 1993), which allows delineation of geographic areas with similar landform and association of soils. This system sets the context of the landforms, soil resources and potential natural vegetation of a project area, across land ownerships and within multiple scales. The Cayuga project area is within three Landtype Associations (LTAs) on the Great Divide Ranger District. At a landscape scale, LTAs are ecological units delineated based on similar patterns of glacial landforms, topography, soil complexes and associated patterns of vegetation and succession, within climatic regions.

Glacial deposits provided the parent material for the soils in northern Wisconsin. The integrated effects of climate and living organisms (plants and animals) on these parent materials, as conditioned by the slope and aspect components of topography over the last 10,000 years, has led to the development of the existing soil resource of the project area.

The inherent productivity of the soil in the project area has also evolved with disturbance. Windstorm, fire, drought, flood and erosion, occurred at various spatial and temporal scales, associated with climate and related plant community fluctuations and along with human disturbance, have affected soil physical, chemical, and biological properties. A succession of forest species, a random disruption, and a subsequent re-establishment of this succession by natural perturbations were the pattern before the advent of humans as a dominant ecological factor (Ahlgren and Ahlgren, 1983, p33). Natural disturbance patterns are described in the Forest's Terrestrial Ecological Unit Inventory LTA characterizations.

Ecological Unit Descriptions

The project area is comprised of land within three LTAs. LTAs are further subdivided into Ecological Landtypes (ELTs) and Ecological Landtype Phases (ELTPs) to map and define similar ecological conditions relating to soil moisture, nutrients, drainage, slope and other chemical and biological characteristics. Full LTA, ELT, and ELTP descriptions and maps are available at the Great Divide District offices. Brief LTA and ELT descriptions are

outlined in the paragraphs below. ELTPs are identified for each stand in the Stand Treatment Table in Appendix J.

Forest Habitat Types of Northern Wisconsin (Kotar et al 2002) have been correlated to ecological units at the LTA, ELT and ELTP levels of the hierarchy, for the Chequamegon-Nicolet NF land base. Habitat types provide information on potential natural vegetation and successional pathways for forest plant communities, including ground flora and shrubs. Abbreviations are commonly used to indicate names of component species for a given habitat type. Acer-Tsuga/Maianthemum or ATM has the complete scientific name of Acer saccharum – Tsuga Canadensis/Maianthemum canadense and the common name of Sugar Maple- Hemlock/Wild Lily of the Valley. Habitat types for individual stands have been identified in the Stand Treatment Table of Appendix J.

LTA Jc05, Valhalla/Marenisco (McDonald) Moraine, occurs on about 40 percent of the project area. Landscape pattern is primarily steep hummocky hills that have no specific orientation. ELTs GcV, Glacial Till Rolling (Valders), and McV, End Moraine Till (Valders), are included in this LTA. They make up the parent material consisting of coarse ground and end moraine glacial till. Surface soil textures range from fine sandy loam to loam on the red ground moraine, to loamy sand on the end moraine. Slopes range from 0 to 30 percent with steeper slopes on the end moraines. The soils are moderately-well to well drained. The till soils are very fertile and support the ATD vegetative habitat type. The end moraines have less fertile soils with ATM and AVVb habitat types.

LTA Xa01, Glidden Drumlin, occurs on about 50 percent of the project area. Landscape pattern is primarily cigar-shaped drumlin hills surrounded by washed till and outwash from old glacial drainage ways. Many wetlands (bogs, swamps, and wet mineral soils) can be found in the LTA as well.

The cigar-shaped hills are part of the ELT GcC, Glacial Till Rolling (Cary) and are oriented in a northeast to southwest direction. Slopes range from 0 to 5 percent on the tops of the drumlins and 5 to 15 percent on the side slopes. Soil textures are generally a fine sandy loam, loam to sandy loam surface over sandy to loamy sand glacial till. Drainages are predominately well drained on slopes greater than 5 percent and moderately well drained on the flatter sites. The drumlins are very fertile with ATD and AOCa vegetative habitat types.

The old glacial drainage-ways and wetlands are part of the ELT G/0, Ground Moraine Washed Till and Outwash Complex. This ELT is comprised of hummocky hills of water-worked till and outwash soils. Many depressions occupied by wetlands occur within this landform. Slopes range from 0 to 10 percent. Soil textures are sandy loam or loamy sand overlying loamy sand washed till or outwash sands and gravels. Soil textures range from well to moderately well drained on the uplands to moderately well to poorly drained in the depressions. ATM is the most common habitat type on this ELT.

LTA Xa03, Chequamegon Washed Till & Outwash (old glacial drainage ways), occurs on about 10 percent of the project area. ELTs G/0 and GcV are found within this LTA and are described above.

Generally, the landform is a rolling collapsed moraine and outwash plain complex with loamy soils over loamy sand debris-flow (water worked till) or outwash sediments. Slopes range from 0 to 15 percent, and drainages from well to very poorly. While vegetative habitat types range from PArV to AOCa, ATM and PArVAa are the most common.

Current Conditions

Existing information used to assess the current condition and trends of the soil resource within the project area, in addition to those listed above, include:

Chequamegon-Nicolet NF Ecological Classification and Inventory mapping, interpretations and characterizations for the LTA, ELT and ELTP scales (includes soil/landform/potential vegetation information) of the National Hierarchy of Ecological Units;

The Chequamegon land-base detailed soil resource inventory;

Ecological reference area data collection plots (1979-1980);

Detailed soil descriptions that serve as the basis for map unit characterizations and interpretations have been made at more that 2000 representative field locations within the Chequamegon-Nicolet land-base by Forest Service, NRCS and University soil scientists, as part of the National Cooperative Soil Survey program and the FS Ecological Classification and Inventory program. Representative sites within this project area that are proposed to have ground disturbing activities, have been field checked by a soil scientist

Landtypes where soil quality may have been impaired by historical activities have been re-vegetated naturally or through tree planting. Ground cover and organic matter accumulation has halted erosion and nutrient levels have been restored over the last 70-100 years. Old woods roads and railroad beds have grown up and adversely compacted soil is not evident. In many cases the old road locations are used in the existing transportation system.

Field monitoring of the soil impact indicators (listed in section 1.4.3.8) for the Cayuga project area has shown no long-term impairment of the soil resource from recent activities. Current conditions for key soil properties affecting ecosystem health such as porosity, organic matter content and nutrient availability are representative of the natural range soil conditions inherent to the Chequamegon-Nicolet National Forest (USDA Forest Service, 1998, p6). There are healthy population of soil microorganisms such as bacteria and fungi in the forest litter and soil surface layers.

Storage of carbon in vegetation and the soil was reduced on these land types after exploitive harvesting, wildfires, and conversion to agriculture or brush land. Grigal and Ohmann (1992, p937) found most terrestrial carbon in the Lake States is stored in the upper meter of mineral soil (55%) and the forest floor (9%). These values are very similar to those estimated for carbon storage in the average U.S. forest, with 59% in the mineral soil and 9% in the forest floor (Birdsey and Heath, 1997, p 81). Thus, the physical soil resource is an important factor in the global, regional and landscape scale carbon budget.

Carbon in the atmosphere is currently increasing primarily from fossil fuel burning and terrestrial ecosystem land use changes. The major terrestrial source is believed to be destruction of tropical ecosystems through land clearing. While more study of the global carbon cycle is needed, recent studies show the non-tropical terrestrial ecosystem roughly in carbon balance. Some analysts suggest that forest ecosystems in the temperate regions may be a sink rather than a source (Armentano and Ralston, 1980, Schimel et al 1994). This is attributed to increasing total forest biomass, soil carbon and forest floor carbon-sequestering litter. USDA Forest Service timber inventories for the past 4 decades indicate a continuous increase in net timber volume on federal lands (growth in biomass exceeds removal). Birdsey and Heath (1997, p82) also note that U.S. forests have been a significant carbon sink since 1952, and that additional carbon will be sequestered through 2040, but at a slower rate.

USDA- Natural Resource Conservation Service 1995 summary report of National Resources Inventory for the years 1982-1992 indicates an increasing trend in forested lands in the United States, Lake States and Wisconsin primarily due to conversion from pastureland and cropland to forest. A substantial volume of harvested timber stores large amounts of carbon in long-lived solid wood and wood fiber products, adding another terrestrial carbon sink to the temperate region.

Soil Resource Impact Indicators

Ground disturbing activities are proposed in Alternatives 2-5 that have potential to impact the soil resource. The extent, intensity and duration of impacts to soil quality will be estimated using two main indicators.

- Soil erosion and displacement potential
- Soil compaction and rutting potential
- Estimates of potential impacts will be based on:
- applicable research;
- site-specific soil properties;
- design features and mitigation measures proposed;
- past monitoring of the same type of activities on similar soils;
- professional judgement of a soil scientist and other resource specialists.

3.3.9 Floodplains and Wetlands (Issue 9)

There are a total of about 11,209 acres of wetland occurring on National Forest lands within the Cayuga project area. This accounts for approximately 35% of the project area. Wetlands include lowland black spruce, cedar, tamarack, mixed swamp conifer, black ash, mixed lowland hardwoods, and treeless wetland types.

Most of these wetlands are located in the southern third of the project area. There are also small isolated wetlands dispersed over the landscape of the entire project area. These small wetlands vary in average size from 1/10th to 10 acres and can be found within and adjacent to stands. Floodplains are those areas adjacent to streams where water overflowing the banks flows during high water events. They may be wetlands or poorly drained mineral soils. Species most commonly growing on floodplains include marsh grasses, sedges, tag alder, and black ash. Most of the streams within the project area have some sort of floodplain associated with them, varying in width from 1 to 100's of feet.

3.3.10 Visual Quality (Issue 10)

Visual Quality Objectives (VQO's) are established for all acres of National Forest Land. VQO's function as a measure of acceptable alteration of the landscape, and are the result of the interaction of 3 key elements, including variety class, sensitivity level, and distance zones. There are a number of scenic lakes and highways within the Cayuga Project area. According to the Forest Plan (p.IV-29-38), there are areas designated as sensitive areas for visual quality. Visual sensitivity levels represent the public's concern for visual quality. The sensitivity level classification is based on how many people see the area and how sensitive they are to visual aesthetics. A landscape can be divided into a number of separate viewing areas called distance zones, which are based on the premise that a viewer's sensitivity of a seen area can vary according to how close the viewer is to the seen landscape. The foreground distance zone ranges from 0 to 1/2 mile away from the viewer, and is termed sensitivity level 1. Sensitivity level 2 areas are those in the middle ground, or 1/2 to 5 miles from the viewer. Sensitivity level 3 areas are beyond 5 miles from the viewer. The following recreation areas, lakes and highways are within Sensitivity Level 1 areas according to the Forest Plan: East Twin Lake, Day Lake, County Highway GG (north), Highway 77 (Scenic By-way), County Highway M, and Highway 13, Day Lake Campground, East Twin Lake Campground, and Day Lake Picnic Area and Boat Launch (see Photo 3.3.10).

Photo 3.3.10: Day Lake

Day Lake is one of several areas designated as sensitive for Visual Quality.

Lakes and highways within an area designated Sensitivity Level 2 in the project area are Forest Roads 181 and 191.

The stands proposed for treatment along County Highway GG (north) have a mixture of aspen and hardwoods with 15 to 30 year old balsam fir and white spruce screening along portions of the road. The aspen within these stands are about 60-years old. Because older aspen is prone to wind damage it is likely that windstorms in the future would cause substantial blowdown in these stands. Treatment now would ease the eventual transition to other species. Because the terrain is fairly flat and densely forested, anyone viewing the stand from the road typically only sees the foreground (0- ¼ - ½ mile).

3.3.11 Recreation (Issue 11)

Within the Cayuga Project area there are two campgrounds (Day Lake and East Twin Lake), three boat landings (Day Lake, East Twin Lake, and Spillerberg Lake), three picnic areas (Day Lake, East Twin Lake, Spillerberg Lake), and two swim beaches (Day Lake Boat Launch and Picnic Area and Day Lake Campground). Under the Forest Plan, these recreational sites are designated as Sensitivity Level 1. Public use at the two campgrounds with boat landings is moderate during the summer. The swim beach and picnic area at Day Lake Boat Launch and Picnic Area also receives moderate use during the summer. Public use at Spillerberg Lake is low. The low to moderate use appears to be mainly related to the location of the facilities. The lakes and streams in the area have brown water rather than the clear water, which is most desired by visitors. The facilities are removed from areas of population such as Milwaukee, Chicago, St. Paul, and Minneapolis.

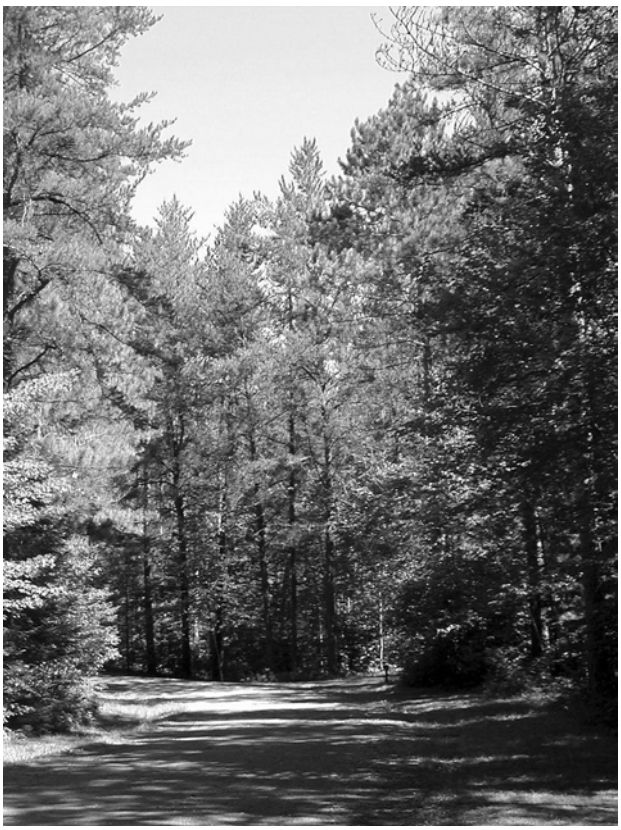


Photo 3.3.11a: Over-mature jack pine

This jack pine is within the Jack Pine Circle of the Day Lake Campground. These stands are mature and are approaching an age where deterioration will begin.

Day Lake Campground is located one half mile north of Clam Lake, WI on the east shore of the Day Lake flowage. The campground spreads across three timber types, with the stands having largely been established as pine plantations during the CCC era.

A small part of the campground (4 sites in the Jack Pine Circle and 4 sites in the Paper Birch Circle) is in a paper birch and white pine stand (Compartment

124, stand 18) adjacent to Day Lake. The Jack Pine Circle and a play area are located in a 29 acre, 62 year old jack pine stand (Compartment 124, stand 21). The rest of the campground is located in 57 year old red pine stands (Compartment 124, stands 19 and 20).

Due to age, the jack pine has become susceptible to environmental stressors. Approaching over maturity, the trees are at risk for insect attack and disease, as well as breakage from ice storms and high winds. This creates a potentially hazardous situation for campers. There is a need to reduce the potential risk and focus management on long-lived species to avoid perpetuating this situation. In addition, the campsites in stand 21 are excessively shaded. Basal area for the stand immediately adjacent to the campsites is about 160 square feet. This creates a closed-in feeling in the campsites. It also limits air movement, which is desirable to blow bugs away and keep the campsites dry. There is a need to create a more spacious feeling and to improve air flow in the campsites

In addition, there are approximately 26 acres (compartment 124 and stands 53 and 57) of jack pine along the entrance into the Day Lake Boat Landing and Picnic Area. These stands of jack pine are mature and are approaching an age where deterioration will begin. The growth of the jack pine is slowly decreasing.

Photo 3.2.11b: Over-mature jack pine stand

This stand of jack pine in the Day Lake Picnic area is approaching an age where deterioration will begin.

The red pine in stand 19 has been thinned several times, but the thinnings were considerably lighter adjacent to the campsites. While shading is not as extreme as in stand 21, it is enough to encourage moss growth on the blacktop in the Paper Birch Circle, an indication of moisture levels high enough to lead to premature deterioration of campground facilities. Again, there is a need to improve airflow in the campsites.

The red pine in the remainder of stand 19 and in stand 20 continues to be managed for big tree aesthetics, as well as for valuable pine timber. To encourage diameter growth these stands have been thinned approximately

every 10 years. They were last thinned in 1988 and have grown sufficiently to warrant thinning at this time.

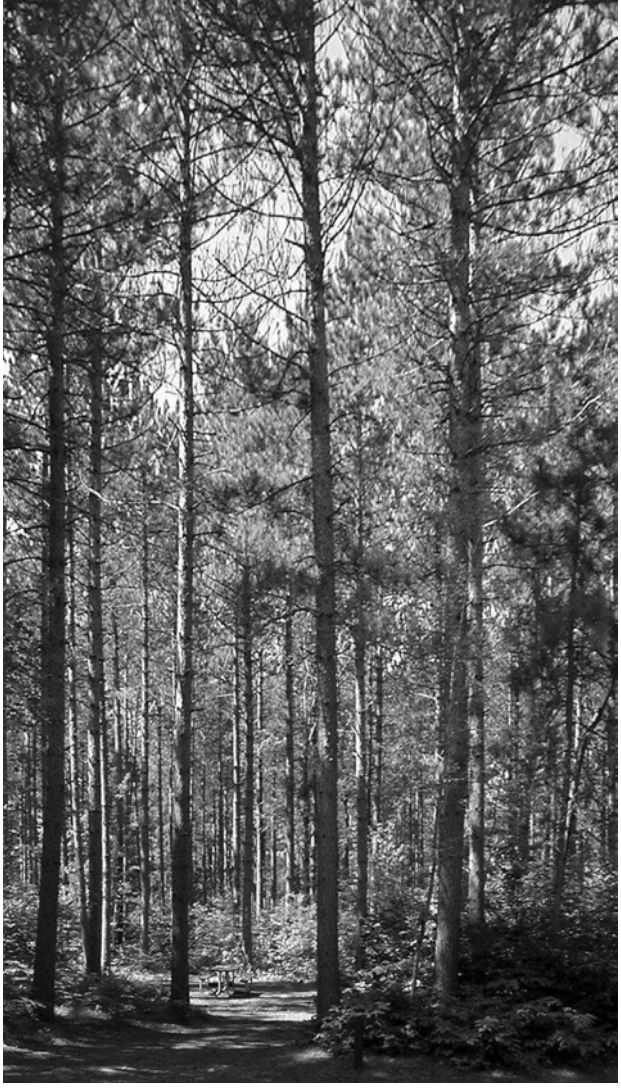


Photo 3.3.11c: Red pine in the Day Lake CG

Stands such as this one continue to be managed for big tree aesthetics, as well as for valuable pine timber.

The snowmobile trails that cross the Cayuga area receive heavy winter use. Snowmobile Trails 8 and 25 cross the Cayuga area in east-west and north-south directions. These two trails are important links in the Wisconsin Department of Natural Resources (WDNR) funded trail system. Snowmobile Trail 21 in the southeast corner of the project area is also funded by WDNR. This trail links Cayuga and Marengo with Glidden and Butternut. These trails appear to have some of the highest use rates on the Great Divide Ranger District.

Portions of Snowmobile Trails 8 and 25 are incorporated in the Dead Horse Run Motorcycle and ATV trail. This trail system receives low to moderate ATV and motorcycle use. The Township of Gordon has designated and signed township/Forest Roads 182, 183, 195, and 354 as ATV routes. In addition, ATVs are used on many old two-track roads within the National Forest for hunting and recreational riding.

There is one hunter-walking trail on the west side of Day Lake. This trail passes through young stands of aspen. It is fairly narrow and has not been mowed for several years. The use of this trail appears to be fairly low.

Hunting for game species such as white-tailed deer, woodcock, and ruffed grouse occurs throughout the Cayuga Project Area. Aspen can influence hunting pressure in an area. Grouse hunters particularly concentrate on larger sapling aspen because it provides a higher amount of dense cover for ruffed grouse. Woodcock hunters would also be likely to focus on sapling aspen types, although generally in lower, wetter areas than for grouse.

Hunters in general tend to look for areas that involve a variety of forest types and ages, rather than large areas of similar type, such as contiguous hardwood cover. Regardless of the age of aspen at a particular site, aspen management can help to provide diversity and attract more hunters.

3.3.12 Social and Economic (Issue 12)

The Cayuga Project Area is located entirely within Ashland County. Two of the primary sources for income in Ashland County are the wood products industry and the tourism industry. Many individuals and small businesses are involved in timber harvesting operations that harvest wood from federal, state, county, private and industrial lands in this county. There are also several small sawmills and wood processing plants in surrounding communities. Plentiful lakes and a large amount of public lands are draws for many tourists, both in the summer for camping, fishing, boating, hiking, etc. and in the fall/winter for hunting, snowmobiling and skiing.

A collaborative study was conducted with the Wisconsin DNR Bureau of Forestry and the University of Wisconsin-Madison/Extension (Marcoullier and Mace, 1999) to examine recreation and timber production in Wisconsin's forests by looking at extent, importance, performance and compatibility of these two uses. The study employed recreational use surveys, analysis of timber inventory data and regional economic modeling.

The study found that, "In the past, local residents, interested stakeholder groups and industry representatives have disagreed on the best use of forest resources. Traditionally, many have viewed the simultaneous use of forests for extraction and recreation as being mutually exclusive. In this report, evidence was put forward that supports a more compatible coexistence" (Marcoullier and Mace, p.i).

"In general, results of this study suggest that timber production and recreational use of forests were relatively compatible. This was more apt to be the case with hunters and motorized recreationists than with the broad category of "quiet" forest recreationists. Furthermore, recreationists generally felt that balanced use (for both timber and recreation) was an important component of local economic conditions for communities in forested regions and that forest land uses should account for these localized effects on rural populations" (Marcoullier and Mace, p. ii).

"Timber industry represents an important economic engine for the region and when combined with tourism, makes up a large part of this resource-dependent economy [of NW Wisconsin]" (Marcoullier and Mace, p.10). In Northwest Wisconsin almost 18% of the regional output is somehow tied to wood products (12%) and tourism sensitive (6%) businesses (Marcoullier and Mace, p.20). Annual timber removals from Federal forest land in NW Wisconsin in 1996 dollars were $5.279 million dollars (Marcoullier and Mace, p.13)."

The 25% Funds are equal to 25% of the gross receipts of the Forest and are distributed by the Department of Agriculture. PILT (Payment in Lieu of Taxes) funds are paid by the Department of the Agriculture to the state of Wisconsin that distributes them to the counties in which the Forest is located. Both funds are used by local school districts and for the improvement of county and town roads.

Since PILT funds are distributed by the Department of Agriculture and none of the alternatives would affect that funding they were not considered in this analysis.

Ashland County has approximately 180,156 acres of NFS land within its boundaries. In FY 2002, $177,839.22

was distributed through the 25% Fund and $99,599.00 was distributed through PILT to Ashland County. (25% Fund and Payment in Lieu of Taxes Information for Ashland County, USDA Forest Service, February 2003). The harvest in FY 1997 (October 1, 1996 through September 30, 1997) of 125.3 MMBF from the Chequamegon-Nicolet National Forest supported approximately 1,773 timber-related jobs and $108 million in employment-related incomes. In addition, about $16.1 million in federal income taxes was generated from this income. (Employment, income, and program level account for the Fiscal Year Ended September 30, 1997) The 1997 TSPIRS Report for the Chequamegon-Nicolet National Forest estimates that approximately 14.0 jobs/ million board feet of timber are created or sustained. These jobs are substitutional in nature when viewed from an area wide industry perspective. For example, individuals move from job to job as logging takes place. Employment in the logging industry fluctuates based on market and weather conditions. Other jobs result from indirect and induced impacts from the timber sale program. Benefits to local industry are subsequently filtered through the economy and have not been accounted for.

3.4 Description of Relevant Non-Affected Factors

The Cayuga Project area could be affected by fire or blowdown, two naturally occuring conditions. It is not possible to predict where or when these types of incidents could occur on the landscape, therefore they were analyzed in this EIS.

Fire

Lighting-caused fires occasionally occur within the project area. According to the district fire program manager (personal conversation, Lenny Kempf, 2002), only one fire was caused by a lighting strike within the past 5 years. Human-caused fires within the project area are also rare; none have occurred there in the past 5 years.

Blowdown

In the past three years, blowdowns have occurred within the project area. The district will evaluate each area that has downed timber after a natural occurrence. If sale units are affected, the district will also evaluate the need for salvage operations within these units at that time.