APPENDIX H - FOREST PLAN DIRECTION/DESIRED CONDITION AND GENERAL BACKGROUND AND RESOURCE INFORMATION

Appendix B includes:

- White Mountain Forest Plan direction and desired condition applicable to the Tripoli East Vegetation Management Project;
- General background information; and
- General resource and effects information.

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A. FOREST PLAN DIRECTION

By law, National Forest Lands are managed to provide multiple benefits to all Americans in a sustainable way for present and future generations. The original management emphasis was identified as watershed protection (Creative Act, 1891) and a continuous supply of wood products (Organic Act, 1897). Over the years, management for wildlife and fish, outdoor recreation, wilderness, heritage resources, grazing, wild and scenic rivers, and roads were added to the Forest Service mission. General direction, for how the White Mountain National Forest is to be managed in a sustainable way for multiple benefits, is found in the Forest Plan.

The Forest Plan divides the White Mountain National Forest into different zones or "Management Areas (MAs)". In keeping with the National Forest Management Act, which emphasizes managing fish and wildlife populations and maintaining viable populations of existing native and desired non-native species in the planning area (forest wide) (36CFR219.19), the White Mountain National Forest Land and Resource Management Plan, as amended, established a Wildlife Habitat Management Unit (HMU) Strategy. This strategy is a means of evaluating existing habitat conditions and a guide to management activities used to move an area towards the desired habitat conditions necessary to maintain viable, forest-wide wildlife populations (Forest Plan, Appendix B, VIII-B-1 through VIII-B-28). Management areas and habitat management units have particular goals or desired conditions toward which all management activities are directed.

A.1 Forest Management Goals (Forest Plan, pp. III-2 & III-3)

Forest-wide goals and objectives provide the basis for overall direction regarding the type and amount of goods and services that the White Mountain National Forest will provide. These goals are concise statements describing a desired result to be achieved over the next 10-15 years through implementation of the Forest Plan. All goals are to be achieved in the most cost-effective manner. The following Forest-wide Management goals apply to the Tripoli East project area:

a. Conduct all management activities to protect soil and water.
b. Conduct all management activities with full recognition of the appearance of the Forest, realizing the importance to society of a natural landscape distinct from man-made environments in an otherwise dominant in the east (Forest Plan, Appendix G6 – Visual Quality Objective Guide/Even-Aged Management, pp. VII-C-17 through VII-C-19).
c. Recognize the demand for and the importance of day-use areas and driving for pleasure as part of the Forest's total recreation opportunity spectrum.
d. Use existing roads, trail, and utility corridors to the maximum extent possible. Plan and design access to serve multiple management purposes.
e. Design and build any new access, regardless of type, according to standards and criteria that focus on minimum impact.
f. Feature management for indigenous wildlife species including those using old-growth habitat, threatened and endangered, sensitive/unique species. Recognize the demand for non-consumptive uses of wildlife, including opportunities to observe.
g. Use timber management as one of the tools available to achieve the desired future condition and integrated resource objectives of certain management areas.
h. Feature northern hardwood management over softwood. Move toward the culturing of high quality hardwoods that are in demand for specialty products. Assure a stable, reliable source of this raw material to support community stability.

A.2 Management Areas

A.2.1 The Primary Purposes of MA 2.1 (Forest Plan, p. III-30) are to:

i. Protect and enhance visual quality (the visual resource will receive special consideration in the planning and application of projects in this management area, Forest Plan, Appendix G6 – Visual

Quality Objective Guide/Even-Aged Management, pp. VII-C-17 through VII-C-19).

j. Broaden the range of recreation opportunities, mainly those offering roaded natural opportunities.

k. Provide moderate amounts of high-quality sawtimber and other timber products on a sustained yield basis.

l. Provide a balanced mix of habitats for all wildlife species.

m. A mix of uneven-aged and even-aged silvicultural systems will be used. Even-aged management will be prescribed for both light demanding species and for visual enhancement of landscape diversity. Even-aged management will be practiced on about 50 percent of the area. Uneven-aged management will be considered on a site-by-site basis and generally will be applied on 50% of the management area. [Distribution of even- and uneven-aged management is for MA 2.1 lands as a whole across the Forest and is not expected to be prorated equally in individual projects. The selection of even-or uneven-aged silvicultural systems is guided by the land type capability and current species composition of each stand as well as social needs.]

A.2.2 The Primary Purposes of MA 3.1 (Forest Plan, p. III-36) are to:

n. Provide large volumes of high quality hardwood sawtimber on a sustained yield basis and other timber products through intensive management practices.

o. Increase wildlife habitat diversity for the full range of wildlife species with emphasis on early successional species.

p. Broaden the range of recreation opportunities, mainly those offering semi-primitive motorized experience opportunities.

q. Grow smaller-diameter trees for fiber production.

r. Even-aged management will be the most predominant silvicultural system used; uneven-aged management will be used to meet site-specific objectives. Size of openings will depend on the visual and silvicultural requirements and generally range from 3-30 acres. Uneven-aged management will be considered on a site-by-site basis and generally will be applied on 10-20 percent of the management area. [Distribution of even- and uneven-aged management is for MA 3.1 lands as a whole across the Forest and is not expected to be prorated equally in individual projects. The selection of even-or uneven-aged silvicultural systems is guided by the land type capability and current species composition of each stand as well as social needs.]

A.3 Habitat Management Units (HMUs) for Lands With Active Vegetative Management (MAs 2.1 & 3.1) (Forest Plan, pp. III-11 through III- 14, VII-B-3 through VII-B-16)

s. See Forest Plan, Appendix B – Wildlife Management Strategy – White Mountain National Forest, §B.1.a, pp. VII-B-4 & -5, for a discussion of the Habitat Management Unit Strategy.

Three hundred thirty-seven thousand (337,000) acres of the White Mountain National Forest have been identified as suitable and capable of vegetative management. Effects consist of changes due to timber harvest, habitat management activities, access, and human activity as well as from natural causes. The diversity of plant and animal communities will be greater than that expected in a natural forest setting. This conforms to 36CFR219.27(g) that states that diversity must be "at least as great as that which would be expected in a natural forest." In addition, because the majority of the wildlife species in the planning area have a primary or secondary requirement for regenerating or young vegetation, management activities must be directed toward supplying these habitats throughout the 337,000 acres in a manner that strives for a controlled distribution and even supply across space and time.

A.4. Desired Conditions

A.4.1 Management Areas (Map 3, Appendix A)

MA 2.1

The forest will be a mosaic of stands of predominantly hardwood trees providing habitat for game and non-game species. The stands will very in size, shape, height and species. Two different conditions will occur among the stands; some stands will consist of trees about the same age and size; other stands will consist of a mix of tree sizes and ages, ranging from seedlings to very large mature trees. In either case, openings will be interspersed in stands with shapes and sizes compatible with the surrounding landscape.

Along major road corridors, large diameter trees with a variety of bark and foliage characteristics will predominate. These trees will represent both shade tolerant and intolerant species. Numerous views of panoramic and ephemeral landscapes will be provided through moving and stationary vista sites.

Even- and uneven-aged management will be considered on a site-by site basis and generally will be applied on 50 percent of the management area. The selection of even-or uneven-aged silvicultural systems is guided by the land type capability and current species composition of each stand as well as social needs (see §**1.4.1.2**, below, for an explanation of how this applies to Habitat Management Units).

There will be noticeable human activity in those areas resulting from many uses. Evidence will usually be in harmony with the natural-appearing environment and consistent with good resource management.

Roads will provide access to meet land management objectives. Selected areas will be accessible for off-road motorized forms of recreation activities. Roads will generally be closed to public vehicular traffic. Generally, there will be 1-3 miles of road per square mile of area.

MA 3.1

The forest on these management areas will be a mosaic of stands of American beech, sugar maple, balsam fir, hemlock, red and white pine, spruce, paper birch, red oak and aspen. These areas will provide habitat for game and non-game species. Three different conditions will occur:

1) The majority of stands will consist of trees of about the same age and size;
2) Other stands will consist of a mix of tree sizes and ages ranging from seedlings to very large mature trees; and
3) A lesser acreage of the forest will be comprised of individual stands of northern hardwoods, softwoods, paper birch, and aspen of the same age and size grown on a shorter rotation and having a diameter of 6-16 inches.

Uneven-aged management will be considered on a site-by site basis and generally will be applied on 10-20 percent of the management area. The selection of even-or uneven-aged silvicultural systems is guided by the land type capability and current species composition of each stand as well as social needs (see §**1.4.1.2**, below, for an explanation of how this applies to Habitat Management Units).

There will be openings of different sizes interspersed with the stands of trees. These intermixed stands will be of irregular size and shape and distributed so that the overall forest will generally be natural appearing.

There will be noticeable human activity in these areas resulting from many uses. Evidence will usually be in harmony with the natural-appearing environment and consistent with good resource management.

A network of gated/blocked roads and trails will provide access for various land management activities. Selected areas will be accessible for off-road motorized forms of recreation activities. Some roads will be open occasionally to provide opportunities for activities such as firewood gathering or hunting access. Generally, there will be 1-3 miles of road per square mile of area.

A.4.2 Habitat Management Unit Desired Composition Objectives (Map 2)

The proposed Tripoli East project area is located within HMUs 416 and 417. HMUs were:

> laid out using the proper aquatic types (wetland component for moose) as centers and then drawing 4,000-acre circles around them to approximate moose home ranges. These boundaries were then adjusted so that the coincided with compartment boundaries on each Ranger District. . . . due to boundary

adjustments, each HMU will contain varying amounts of land in vegetative management (Management Areas 2.1 and 3.1), but usually will contain at least 4,000 acres in this category. Many HMUs contain no management objective over and above the basic 4,000 acres. Only that portion of the HMUs in Management Areas 2.1 or 3.1 is addressed in the . . . discussion of composition objectives and indicator species selection. Lands within a given HMU that are not in Management Areas 2.1 or 3.1 are recognized as part of the mature, over-mature, and old growth habitats . . . and can be considered in the overall habitat use analysis for any given wildlife species within each HMU.

Since each of the HMUs is based upon diverse moose requirements, at least some of the community types required by the other wildlife species will be present. The remaining community types not represented by moose were added to the mix resulting in an "ideal" habitat mix on each HMU. The "ideal" vegetative community serves as a standard that should be repeated across the HMUs and against which each individual HMU can be measured to determine present condition and to direct management toward the desired objectives. Each HMU is composed of a varying assortment of ecological land types and, as a result, not all may be capable of reaching the "ideal" state (Forest Plan, p. VII-B-4 & 5.).

Each HMU is unique in the quantities of different ecological land types they contain. The result will be projects that may differ substantially from the "ideal" state, but when looked at from a landscape perspective more closely resemble the 'ideal" state.

B. GENERAL BACKGROUND AND RESOURCE INFORMATION

B.1 STATE AND WHITE MOUNTAIN NATIONAL FOREST BACKGROUND

New Hampshire is a primarily a forested state and has a long history of people living, working, and recreating in forested landscape. Prior to European settlement in the 1700s most of New Hampshire was forested. By the middle 1800s, the amount of forestland had decreased by about 50%, replaced by fields and pastures. Within 50 years, most of these farmlands were abandoned and replaced by forests. Mature northern hardwood, aspen/paper birch, pine, and spruce/fir forests dominate a state that is now 83% forested. The amount of existing mature forest statewide has increased by 1,000,000 acres over the past 50 years. Likewise, the amount of existing forest in the young age class has decreased by 600,000 acres as the trees get larger and taller. There has also been a statewide trend of conversion of forested land to urban developments. This has been labeled as "terminal harvesting" – productive forested ecosystems replaced by homes, housing developments, and shopping and industrial centers (USDA, 2002)

Many defining characteristics of forest cover change with age.

Young forest tends to have a uniform canopy. It is quite dense and prevents most light from penetrating its foliage. Crowns are touching. If there are any gaps in the canopy, they are quickly occupied by adventitious growth. Only a few of the most shade-tolerant plants can remain in the understory. Young forests grow rapidly. Each year, many trees die from competition with other faster-growing or better-established trees.

Mature forests continue to grow, but at a declining rate compared to young forests. Vertical diversity in the canopy begins to become pronounced, and canopy layers become defined. The fastest-growing, shade-intolerant trees occupy a dominant position in the canopy. Some, which are short-lived species, begin to decline and die. Intermediately shade-tolerant trees occupy most of the available space between the dominant and co-dominant trees. Shade-tolerant trees begin to become established in the midstory. There are gaps between trees caused by mechanical interference. This allows some light to penetrate the upper canopy. Much of this is absorbed by the midstory. However, some light reaches the ground and encourages the development of some understory vegetation.

Over-mature forests experience a reduction in overall stocking. Most individual trees continue to grow slowly while others die from a combination of factors including old age. Overall, the result is negative growth. Gaps in the canopy are created when trees die. This allows light to penetrate to and nurture trees in the midstory or encourage growth of vegetation in the understory. Vertical diversity becomes maximized as older trees die and younger trees develop in the understory or grow in the midstory.

The White Mountains region had a different history. Although most of the foothills of the White Mountains were converted to farm and pasture land, the mountains were too steep and rocky for these uses. From the 1870s until the 1940s, logging and natural regeneration shaped the landscape of this mountainous region. Today's forests are the result of regrowth following these extensive harvests.

These events have helped shape the White Mountain NF landscape we see today.

Maturing forests affect the wildlife habitats available at the White Mountain National Forest landscape-level. There is less diversity and more homogeneity of habitats. The trees become larger with fewer of them on an acre of land. Tree species that need direct sunlight to grow, such as paper birch and aspen, mature and die sooner than other species and do not regenerate under a dense cover of established trees. They are replaced by trees that survive under the shade, such as spruce, fir, and beech. There is little variation in the structure of the forest, and the canopy is even. This condition favors the ten percent of the native New England wildlife species that prefer mature, closed canopy forested habitat. Over ninety percent of native New England wildlife species are currently dependent upon young, 0-40 year old, forest conditions during parts of their life cycles. This uniformity of maturing forest is also showing up in the lack of seedling/sapling stands. On the White Mountain National Forest, there is only 50 percent of the seeding/sapling forested habitat desired in the Forest Plan (p. III-13).

Another part of diversity is over-mature forest. There are few remnant areas of old-growth forest on the White Mountain National Forest (forests that have never been cleared or harvested). For the most part, these areas have been identified and protected, and they often occur at steep, high elevation locations that could not be economically harvested. Although these remnant forests can never be recreated, the White Mountain National Forest Plan has developed a strategy for ensuring that there will be over-mature forests with old-growth characteristics in the future.

Approximately 55 percent of the White Mountain National Forest has been set aside for purposes other than timber management. These areas are now or will function as old-growth forest in the future. In addition, 10 percent of the managed land base is to be kept in an over-mature condition (Forest Plan, p. III-13). The White Mountain National Forest currently exceeds of the desired amount of over-mature forest in areas designated for vegetation management (MA 2.1 and 3.1 lands; Forest Plan, p. III-13).

Mature and over-mature forests are also more susceptible to insect and disease attacks than the younger forests, especially the birches and beech. Increased tree mortality, reduced wood quality, and lost fiber production occur in these over-mature stands. (A possible concern for MA 2.1 and 3.1 lands). However, as trees mature and die, they provide standing and downed woody debris that is an important habitat component for many wildlife species.

Forests are still an important part of the lives of New Hampshire residents. Increasingly urban development is moving into the forests of New Hampshire. People are building primary or secondary homes in what had previously been large tracts of forested land. This homebuilding is decreasing the size of private land holdings and moving people closer to where forestry practices are occurring. Some residents, with no direct economic dependence on timber management, prefer the peace and solitude of the forest environment, homogeneous landscapes, and a place for recreation.

B.2 Physical Environment

B.2.1 Soil Calcium

Research at Hubbard Brook Experimental Forest indicates a concern about the long-term depletion of forest soil calcium (Federer et al ,1989[1]). Hubbard Brook Experimental Forest is located in the White Mountain National Forest. Studies of nutrient cycling in small watersheds have occurred at Hubbard Brook since the early 1950s. It is a significant, long-term monitoring site.

The general nature of concern about calcium depletion is that there may be effects on forest

[1] See Literature Cited in the Tripoli EA for references.

productivity, health, or composition (Federer et al, 1989; DeHayes et al, 1999; Adams et al, 2000). There may also be effects on the long-term productivity of the soil (Federer et al, 1989). Calcium is a factor in cold tolerance of red spruce (DeHayes et al 1997), a pre-disposing factor in sugar maple multiple stress syndrome (Horsley et al 2002), forest litter decomposition (Ulrich and Matzner, 1986), and growth regulation. Foliar calcium has an important role in cell division, disease resistance, cell wall synthesis and cold acclimatization (NAPAP, 1998).

Acidic deposition generally causes stress to trees by interference with calcium nutrition and calcium-dependent cellular processes (DeHayes et al, 1999). Acidic deposition has been an important contributing factor in soil calcium depletion since the 1950s

Timber harvesting can also contribute to calcium depletion.

Change in soil calcium is a product of factors that contribute calcium (atmospheric deposition, mineral weathering) and factors that remove calcium (forest growth, acid deposition, forest harvesting and harvest–induced leaching) from the soil. At Hubbard Brook, estimates and measurements have been made related to these factors since the early 1950s (Likens et al 1996). In summary, these studies reveal that, up until about 1950, calcium supplied from atmospheric deposition and mineral weathering nearly balanced stream water losses. These studies also reveal that calcium loss from soil exchange sites (the source most readily available to plants) was about equal to net biomass accumulation (forest growth). This means that, overall, there was no net loss of calcium.

However, after the 1950s, and generally concurrent with the onset of acidic deposition, circumstances changed. Soil calcium depletion surpassed uptake by the trees, and stream water losses exceeded replenishment from atmospheric deposition and mineral weathering. In other words, there was an estimated net loss of soil calcium.

The 1970 Clear Air Act, as amended (1990), is contributing to a decline in acid (anion) deposition and calcium (cation) depletion. This will contribute to a recovery of soil calcium. Evidence (hysterises pattern in Ca^{++} vs. NO_3 + SO_4^{2-}) indicates a recovery process is possible (Likens et al, 1996). Since passage of the Clean Air Act, low acid-neutralizing capacity in stream water indicates a recovery to pre-industrial conditions is probably a long-term event (Likens et al, 1996).

Of the factors described above, mineral weathering is currently the main source for replenishing calcium supplies (Driscoll et al, 2001). Atmospheric deposition of calcium has declined significantly as a replenishing source (Likens et al, 1996). Atmospheric deposition used to be a significant replenishing source due to agriculture and road building activity, which emitted dust into the atmosphere that included calcium as part of its contents. Unfortunately, mineral weathering is "notoriously difficult to measure in the field" (Federer et al, 1989).

A model to estimate mineral weathering rates across the White Mountain National Forest is being developed. Bedrock lithology is being used to estimate mineral weathering rates, and areas sensitive to nutrient depletion. Verification of the current mineral weathering rates at Hubbard Brook, using Ca:Na ratios, is complete. (Bailey et. al, 2002, *In Press*). In the meantime, mineral weathering rates at Hubbard Brook are the best available information. There is mineral weathering information from nearby Cone Pond, which is one-eighth to one-third of measurements at Hubbard Brook (Hyman et al 1998). Observations about forest health, productivity, and composition, therefore, remain central considerations in discussing effects of soil nutrient depletion. In the future, soil Ca:Al ratios may be useful as a measure of the risk to forests (Cronan et al, 1995). However, such measurements are made of soil water, not an easy measure for field managers, and the assessment of risk is from seedling and pot cultures, not field sites. Application of this measure, therefore, requires further evaluation.

At Hubbard Brook, it is estimated, based on long-term watershed studies, that total soil calcium depletion from atmospheric deposition (acid rain) may lead to a loss of 11% of the total soil calcium over a 120-year period (Federer et al, 1989). The forest involved is a mature, northern hardwood forest. Total, not exchangeable, Ca^{++} was used to avoid debate about measurement of the "exchangeable pool". Clearcutting in the beginning of the 20th century (Goodale, 1999) plus acidic deposition since the 1950s (Federer et al, 1989) in the Tripoli project area are estimated to have led to a 8.6% depletion of total Ca^{++} since the early 1900s (Fay, Hornbeck, 1993). This estimate is based on the approach devised by Federer (1989). This estimate is consistent with other findings (Likens et al, 1996), even though it pre-dated them, and is not as sophisticated with respect to changes in depletion rates over time.

This estimate might diminish if efforts underway find that Ca-oxalate is an untapped source of calcium not considered in current calculations. Calcium-oxalate is found in plant matter, including leaves and stems, so it also ought to reside in litter-fall. It becomes soluble under acidic conditions such as those that occur immediately after clear-cut harvesting.

Most of Tripoli project area is northern hardwood forest.

Some authors report that they do not know of published data that indicates regional growth declines of hardwood tree species due to base cation losses (Adams et al, 2000). It has been reported that, "annual forest biomass accumulation at HBEF has declined unexpectedly to a small rate since 1987, perhaps because available Ca^{++} became limiting to forest growth (Likens et al, 1996)." This finding, however, is based on the results of the Jabawa model, not field measurement.

Field measurements in northern hardwood forest at the Bartlett Experimental Forest, and its vicinity, repeatedly reveal that biomass accumulation culminates at 80-90 years of age. The forest at Hubbard Brook is about 80 years old. A decrease in biomass accumulation, therefore, is expected. Examination of forest plots re-measured since 1934 at the Bartlett Experimental Forest reveal the same results (Nuegenkapian, 1999).

The Bartlett Experimental Forest is estimated to be low in soil calcium concentration compared to Hubbard Brook based on evidence embodied in a till source model. In general, soil calcium is greatest in the northeast portion of the White Mountain National Forest, and lowest in the southwest. This suggests evidence of impacts on forest health or mortality might be most evident at Bartlett. Analysis shows that biomass accumulation in northern hardwood forest of similar ages on a range of soils is not significantly different pre-and post-industrial revolution (Nuegenkapian, 1999). The same research shows that the variability in biomass accumulation cannot be statistically attributed to anthropomorphic factors. Differences are within the 6% range of measurement variability.

The National Acid Precipitation Assessment Report indicates that base cation depletion, including calcium, may affect the health of these systems. In general, however, the health of eastern hardwood forests has not shown adverse effects by acid deposition (NAPAR, 1998). There is evidence in northwest- and north-central Pennsylvania, however, that episodic dieback of sugar maple may result from base cation status on marginal soils where there has been severe mortality (Driscoll et al, 2001). However, other pre-disposing factors were involved (drought, insects). Soil mineralogy and landscape position make it more uncertain that acid deposition is the cause. Marginal soils include ridge-tops and upper slopes where calcium and magnesium availability is much lower than mid and low slopes (Bailey, 1999). The importance of landscape position is affirmed by studies at Hubbard Brook Experimental Forest where foliar, soil and stream chemistry generally indicate more calcium at mid- and lower slope positions (Johnson et al, 1998). Harvesting at Tripoli East is on these slope positions.

On the White Mountain National Forest, study plots indicate that sugar maple shows some branch dieback (Hallet, 2000). It is noteworthy that other species, such as American beech or yellow birch, do not show dieback, so there is no concern about the overall health of the forest. Forest Inventory and Analysis Data for New Hampshire indicates that gross growth and net growth for sugar maple is slightly down for 1997 compared to 1973-83; however, mortality is slightly less. We are unaware of any evidence that forest health is declining at the Hubbard Brook Experimental Forest.

Plot data and stand examination at Tripoli East did not indicate any unusual mortality in hardwoods, other than the natural aging of paper birch (Wingate, 2002). White Mountain National Forest re-stocking surveys done after clearcutting (conventional harvesting) do not indicate any failure at re-stocking (Hagan, 2002). In the 2001 and 2002 summer field seasons, 40 permanent field plots were established in northern hardwood forests greater than 60 years old at ridge-, mid-, and toe-slopes across rich to poor mineralogy on the White Mountain National Forest (Fay, 2002). While the purpose is to monitor long-term change in soil base cations, no evidence of unusual mortality or forest health was observed (Fay, 2002).

Since 1991, the National Acid Precipitation Assessment Program Report (1998) includes a continuing concern about base cation depletion, including calcium. It reports "mortality and decline of red spruce at high elevations in the Northeast are the only cases of significant forest damage in the United States for which there is strong evidence that acid deposition is a primary cause". This concern, of course, is related to calcium nutrition. There are no such sites proposed for harvesting in the Tripoli project area.

In an examination of calcium status of red spruce forests in the northeastern United States, it is reported that site variations in calcium availability was explained more by local differences in soil mineralogy than spatial variations in acid deposition (Lawrence et al, 1997). This study also affirmed earlier findings that there has been a regional decline in calcium availability in red spruce forests. Sites studied included Crawford Notch, Bartlett and Hubbard Brook Experimental Forests, and Cone Pond on the White Mountain National Forest. There is a discussion in the 2000 White Mountain National Forest Monitoring Report further summarizing evidence related to forest health and growth, including discussion of forest species composition and forest-wide, hyper-spectral estimation of forest growth (WMNF Monitoring Report, 2002).

B.2.2 Watershed

B.2.2.1 Watershed Features

Watershed features are important to maintaining watershed health. These features include the physical attributes of watershed such as hydrology and soil, which, in turn, influence the biological aspects of a landscape.

B.2.2.2 Hydrologic Features

<u>**Streams and Riparian Areas**</u>

Streams are important because they are pathways that transport water, sediment, and nutrients through the landscape. As such, these areas are the focal points for water with the potential to concentrate runoff and infiltration. Riparian areas in the project area are associated with the streams found in the proposed treatment areas and vary in size and character. A riparian area is a term used by the Forest Service that includes stream channels, lakes, adjacent riparian ecosystems, flood plains, and wetlands. The White Mountain National Forest uses a riparian classification system that is grouped into three associations to simplify the determination of minimum riparian widths (Forest Plan VII-E-1).

<u>**Floodplains (Executive Order 11988)**</u>

The term "floodplain", in the context of the Executive Order 11988 refers to the:

> lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year" (Executive Order No. 11988,May 24, 1977, 42 F.R. 26951).

This corresponds to the 100-year flood event. Executive Order 11988 was established in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. This executive order is generally applied to perennial streams where flooding can occur.

B.2.2.3 Water Quality Standards

Surface waters in Eastman Brook watershed are designated as Class B by the State of New Hampshire. This classification indicates that these waters are considered acceptable for fishing, swimming, and other recreational purposes and, after adequate treatment, for use as water supplies.

Surface waters in the project area are not currently used for municipal purposes. Recreationists who camp along Tripoli Road may use the streams as a water source. At present, there are no surface waters listed as not meeting water quality standards in the Eastman Brook watershed.

New Hampshire antidegradation provisions apply to all new and increased point and non-point source discharges of substances, including all hydrologic modifications and all other activities that would lower water quality or affect the existing surface waters of the State. Under these antidegradation provisions, waters of the National Forest are designated as "Outstanding Resource Waters" and shall be maintained and protected (NHDES, 2001). Some limited point and nonpoint source discharges may be allowed providing that they are of limited activity that results in no more than temporary and short-term changes in water quality. "Temporary and short term" means that degradation is limited to the shortest possible time. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses in the ORW. Such temporary and short-term degradation shall only be allowed after all practical means of minimizing such degradation are implemented.

B.2.2.4 Water Quantity

Water quantity in streams in the proposed area is largely related to the amount of precipitation that occurs throughout the year. Even though each summer evapotranspiration largely leaves the soil in variable stages of water content, the rains in the fall usually completely replenish this water. At Hubbard Brook, 62% of the precipitation becomes streamflow (Likens and Bormann, 1995) and most of the rest is lost to evapotranspiration. Some water probably makes its way to deep cracks. Nonetheless, evapotranspiration has the greatest effect on streamflow from the June through September, the growing season. Changes in evapotranspiration are largely the result of changes to vegetation. Changes to vegetation result in changes to streamflow during their low flow periods, in the summer, and the magnitude depends on the extent of change to the vegetation (Hornbeck, et al 1993). Streamflow is lowest from August to September.

Hornbeck, Martin, and Eagar (1997) summarize that at least 20-30% of the basal area must be cut to generate detectable increases in annual water yield, water yield increases usually diminish within 3-10 years, and peak flows are often increased during the growing season immediately after cutting but not of an extent to cause flooding.

B.2.3. Air Quality

B.2.3.1 Airshed Characteristics

There are air quality monitors operated by a variety of agencies, institutions, and groups near the White Mountain National Forest. The Forest Service monitors air quality at the Class I wilderness areas at the IMPROVE (Interagency Monitoring of Protected Visual Environments) site at Camp Dodge. AMC (Appalachian Mountain Club) operates ozone monitors at the summit of Mount Washington and at Camp Dodge. In addition, there are various types of air quality monitoring sites at Conway and Hubbard Brook.

There are six major federally regulated air pollutants called National Ambient Air Quality Standards (NAAQSs). They are ozone, carbon monoxide, nitrogen dioxide, particulate matter, sulfur dioxide and lead, along with several toxic air pollutants regulated by Department of Environmental Services (DES).

The closest non-attainment area is for ozone and is located in the southern counties of New Hampshire, Merrimack, Cheshire, Hillsborough, Rockingham, and Strafford Counties. For the White Mountain National Forest, the closest non-attainment area for any of the National Ambient Air Quality Standards (NAAQSs) is Merrimack County for ozone. It can be seen from occurrence maps, that ozone appears to originate around large urban centers and migrates northward to the White Mountain region during times of high temperature and air stagnation. The project area is about 45 miles from the closet point of Merrimack County.

Table 1 summarizes the status of air quality in New Hampshire as discussed in the 2000 Annual Air

Quality Report (EPA, 2001). Each of the parameters listed is one of the national ambient air quality standards (NAAQs) that are used to quantify components in air pollution. The data used in this table was generated across the state and is used as an indicator of existing air quality in New Hampshire.

Table 1: EPA Summary of NH Air Quality (2000 Annual Report on Air Quality, EPA, 2001).

Parameter	Status in NH
Carbon Monoxide (CO)	In 2000, there were no exceedances or violations of the 8-hour or 1-hour NAAQSs at either of the two carbon monoxide monitoring (CO) sites in the state. The ten-year graphs of CO levels show significant year-to-year fluctuations.
Lead (Pb)	In 1996 New Hampshire discontinued lead (Pb) monitoring, because air quality levels were well below the NAAQS and approaching minimum detection levels.
Nitrogen Dioxide (NO_2)	In 2000, nitrogen dioxide (NO_2) monitoring was conducted at three sites. The Manchester site measured the maximum NO_2 annual average of 11 ppb or 22%of the NAAQS. There have been no significant trends for NO_2 in the last ten years.
Ozone (O_3)	None of the thirteen ozone (O_3) sites operating in New Hampshire reported violations of the 1-hour NAAQS in 2000. For the 8-hour ozone standard in 2000, none of the thirteen O_3 sites reported a fourth high day of at least 85 ppb.
Particulate Matter (PM10)	None of the thirteen Particulate Matter (with a mass mean diameters of less than 10 microns) (PM10) sites in New Hampshire had any exceedances or violations of the annual or 24-hour NAAQS for PM10 in 2000,1999,1998 or 1997. The highest 24 hour values were reported at Berlin with a highest second maximum value of 72 ug/m3 or 48%of the daily standard. The maximum annual average was also recorded in Berlin with a reported concentration of 28 ug/m3 or 56%of the NAAQS. Over the past ten years, all the New Hampshire PM10 monitoring sites have recorded particulate matter concentrations below the annual and the 24-hour NAAQS. Yearly variability in the data is common, in part determined by meteorology, transport of particulate matter from distant sources, and changes in the emission strength of local sources.
Sulfur Dioxide (SO_2)	There were no exceedances or violations reported at any of the ten sulfur dioxide (SO_2) sites in 2000. Statewide, the SO_2 ten-year data showed no significant trends."

B.2.3.2 General White Mountain National Forest Air Quality Cumulative Effects

Many of the cumulative effects to air quality occurring in the White Mountain National Forest come from downwind, thousands miles away in the Midwest. Some large sources within the state also contribute to these effects. Large coal burning plants and other industrial emission sources contribute oxides of sulfur and nitrogen that have resulted in acid rain. This in turn has led to the acidification of ponds and streams across the forest where the buffering capacity is low. In addition, effects to soil have occurred. These are discussed in the soil report under soil productivity. Effects to water quality are also evident on the White Mountain National Forest. There are advisory across the entire state of New Hampshire for the consumption of fish due to a risk of mercury levels. Aluminum and nitrogen compounds are found in the surfaces water across the forest at elevated amounts as the result of leaching of the soil from acid rain. Trends of the emissions that cause these effects have been reduced in recent years (EPA, 1999). However, this trend may be reversed in the future. The current administration has called for more coal burning plants in the future to assist in meeting the nation's energy needs. Ninety-four such plants are proposed in areas that would continue to contribute to air quality and atmospheric deposition in the White Mountains (DOE, 2002) through long-range transport of pollutants and atmospheric deposition.

Another pollutant of concern for cumulative effects is ground level ozone. Ozone has its origin in automobile and industrial emissions. Strong sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. Ozone concentrations can vary from year to year. Changing weather patterns (especially the number of hot, sunny days), air stagnation, and other factors that contribute to ozone formation make long-term predictions difficult.

The Forest Service monitors ozone at two locations within the White Mountain National Forest. Forest Service screening criteria used for the Prevention of Significant Deterioration (PSD) program developed by Adams, et al, 1991, uses the second highest hourly ozone concentration as a measure. A 'green line' indicates the level at which no significant change is expect in an ecosystem if ozone is below the green line, although some leaf damage may occur. The 'red line' value is set a 120 ppb where concentration above this values are expect to cause reduced plant growth and competitive availability of many species. The 'red line' values have been exceeded twice within a 14-year period at Mount Washington. At Camp Dodge, the green line values have been exceeded every year except for 1989, 1995, 1996, and 2000. According to this data, some leaf damage is expected to occur at all of the sites and the most prominent impact is expected to occur at or near the summit of Mt Washington. In addition, the 1999 White Mountain National Forest Monitoring Report states that 'this monitoring effort shows that ambient ozone continues to be a pervasive air pollutant during the growing season at concentrations high enough to cause foliar plant injury'.

B.2.4 Vegetation

B.2.4.1 General Effects of Timber Management

Timber stands that are regenerated using even-aged management systems progress through vegetative cycles. When stands are young, they contain a substantial amount of herbaceous vegetation that requires direct sunlight to grow. Young stands originate, only after significant disturbance, from dormant seed stored in the ground. As woody vegetation and trees develop and grow, they expand over the herbaceous vegetation and intercept sunlight. Eventually tree and shrub regeneration becomes so dense that there is not enough sunlight available to support shade-intolerant, herbaceous vegetation. As the stand matures, the individual trees grow at different rates. This creates variations in crown closure and density and increases the amount of sunlight available for the development of ground vegetation. When theses stands reach and exceed maturity, additional light, at the forest floor is created through natural tree mortality. The additional light stimulates the development of new, shade-tolerant vegetation. Intermediate treatments such as thinning can produce similar results.

The project area would develop a variety of understory conditions over time. Various compositions of herbaceous vegetation, shrubs, and trees would be present at any time. There would be representations of all development phases associated with disturbance. The majority of the area would be similar to immature or mature stands without disturbance.

Timber stands that are managed using uneven-aged, single-tree selection also supply more light to the forest floor and to herbaceous vegetation after the first cut. Over time, a mix of herbaceous and woody growth occupies the understory. Additional treatments over time tend to maintain a supply of light to the forest floor, and the woody portion of the understory tends to become dominant. That is, species such as beech, striped maple, and hobblebush tend to dominate the understory that was composed of ferns and herbaceous plants.

Stands managed using group selection cuts, uneven-aged management, develop through vegetative cycles similar to even-aged stands, only on much smaller areas. In addition, there is more shade effect around the small group openings both inside and outside of the cut area. The group effect provides a variety of herbaceous, shrub, and tree regeneration conditions within the larger stand.

B.2.4.2 General Cumulative Effects of Timber Management

Overall, a combination of even- and uneven-aged treatments creates cycles of understory effects. While management activities combined with natural disturbances tend to increase both herbaceous and woody vegetation, past treatment effects are diminishing. The trees in older cuts grow, and the expanding crowns intercept light causing the understory vegetation to become sparser. In total, herbaceous and woody vegetation increases with successive activities but also reaches a balance in which additional effects are equaled by the re-growth of stocking.

The practice of even- and uneven-aged management over time can also effect species composition. Even aged practices tend to favor shade intolerant vegetation. Therefore the clearcutting from past management and those proposed in this project will tend to have more aspen, paper birch, pin cherry, white ash and black cherry and less hemlock, sugar maple and beech. This effect accumulates with successive treatments over time.

Single-tree selection cutting, as practiced, tends to favor shade tolerant species like hemlock, sugar maple, and beech. Successive applications of this prescription will tend to increase the populations of those species and reduce the population of shade intolerants like aspen, pin cherry, paper birch, white ash, and black cherry.

Group selection produces the widest variety of results. Shade intolerants are favored in the centers of larger groups. Intermediates such as yellow birch, red maple, black birch, and red spruce may be favored in smaller groups or in the middle zone of larger groups. Shade tolerants could be favored around the margins of openings. Additional variation resulting from the viability of stored seed or germination characteristics of each species.

B.2.5 Community, Environmental Justice, & Economics

B.2.5.1 New Hampshire Timber Tax

The state of New Hampshire has a tax on the value of harvested timber. The tax is paid by the timber purchaser to the towns in which timber is harvested. The percent paid is based on the species cut. However, the tax averages ten percent (10%) of the value harvested. If the timber harvested is cut on lands in an unincorporated town such as Livermore, the timber tax is paid to the county (in this case, Grafton County).

B.2.5.2 25% Fund

Jobs and income in Coos, Carroll, and Grafton Counties in New Hampshire and Oxford County in Maine are affected by activities on the White Mountain National Forest through direct employment as well as through products and services that are generated from activities on National Forest system lands. Priced commodities (revenues) from the Tripoli East project would be timber sale receipts and revenues from the dispersed recreation permit on the Tripoli Road area. Twenty-five percent (25%) of the actual revenues generated forest-wide on National Forest system lands are returned through the four counties to their towns to be used to support roads and schools.

B.2.5.3 Payment in Lieu of Taxes (PILT)

The Forest Service pays no taxes on the lands it administers. Instead, the PILT Fund makes payments to the local counties based on the acres of county lands within the National Forest. In 2001, Grafton County received $50,276, based on 44,518 acres, of which the town of Thornton received $17,647, based on 15,626 acres.

Counties receive PILT Funds annually regardless of whether or not revenue-generating projects occur on federal lands. Therefore, under all alternatives, Grafton County would receive annual PILT Fund payments.

B.3 CUMULATIVE EFFECTS AREAS

B.3.1 Management Area 2.1 and 3.1 Lands in Habitat Management Units 416 and 417 Cumulative Effects Area

The Forest Plan (pp. III-11 through III- 14, VII-B-3 through VII-B-16) provides direction and desired conditions for management of 2.1 and 3.1 lands within ideal habitat management units (Appendix H, §§**A.1.3 Habitat Management Units (HMUs) for Lands With Active Vegetative Management** and **A.1.4.2 Habitat Management Unit Desired Composition Objectives**, pp. H-3, H4 & H-5). Other management areas that lie within these HMUs (6.1, 6.2, 6.3, 7.1, 9.2) are not subject to vegetation management. Changes that occur in these management areas result from natural processes.

Because the Forest Plan only provides direction for vegetation management within management area 2.1 and 3.1 lands, the scope of the Management Area/HMU cumulative effects analysis will be the MA 2.1 and 3.1 lands within HMUs 416 and 417 (Map 4) and includes the adjacent Eastman West Project (completed in 2002) but does not include any private land. The timeframe will be from 1986 through the year 2012. No additional vegetation management activities are anticipated in HMU 416/417 MA 2.1 and 3.1 lands through 2012.

Table 2 displays the previous projects that have occurred in HMU 416/417 MA 2.1 and 3.1 lands since 1986. These activities contributed to the existing Habitat community distribution.

Table 2: Previous NEPA Decisions Affecting the Tripoli East Project Area since 1986

Decision Date	Project	Activities
1987	Russell Mountain Timber Sale	Harvest 119 acres
1991	Russell Pond Campground Vegetative Management	Remove hazard trees
1991	Tripoli Road Salvage	Harvest 84 acres; salvage commodity values
	Eastman West Vegetative Management	Harvest 2.5 MMBF on 514 acres

Table 3: Comparison of the Ideal Distribution of Even- and Uneven-Aged Management on MA 2.1 and 3.1 Lands to the Existing Distribution in HMUs 416 and 417

	MA 2.1 Lands		MA 3.1 Lands		Combined MA 2.1 and 3.1 Lands
Management System	**Desired Distribution**	**Existing Distribution**	**Desired Distribution**	**Existing Distribution**	**Existing Distribution**
Even-aged Management	50%	64%	85%	43%	61%
Uneven-Aged Management	50%	36%	15%	57%	39%

Table 18 compares the desired distribution of even-and uneven-aged management across MA 2.1 and 3.1 lands in an ideal HMU to the existing condition in MA/HMU cumulative effects area. Because selection of silvicultural systems is guided by land type capability, the current species composition of each stand, and social needs, it was not a goal of this site-specific project to manipulate stand-level silvicultural system allocations.across the cumulative effects area the distribution of even- and uneven-aged management lands is 61% and 39% respectively.

In general, lands in uneven-aged management (39% of the cumulative effects area) would be mature/over-mature, closed-canopy forest. Small pockets of regenerating trees would occur where natural disturbances or group selection management occur.

Table 4 compares the desired habitat community composition objectives for an ideal HMU for lands in uneven-aged management to the existing conditions in the MA 2.1 and 3.1 lands in HMUs 416 and 417 (39% of the cumulative effects area). No treatments proposed in Tripoli would change the habitat community composition in the cumulative effects area in the foreseeable future, and no additional vegetative management is proposed in the cumulative effects area in the foreseeable future. Therefore, there are no cumulative effects expected in the 2.1 and 3.1 lands in HMUs 416/417 managed in an uneven-aged manner.

Table 4: Desired Distribution of Habitat Communities in MA 2.1 and 3.1 Lands for an Ideal HMU Compared to the Existing Distribution of Community Types in MA 2.1 and 3.1 Lands in HMUs 416 & 417 as a Percent of the Lands in Uneven-aged Management (39% of the cumulative effects area)

Habitat Community	Desired Condition	Existing Condition
Northern Hardwoods	66%	91.6%
Spruce/Fir	22%	0.0%
Hemlock	5%	0.0%
Oak/Pine*	1%	2.2%
Permanent Openings/ Wetlands/Other	6%	6.2%

Even-aged management is intended to produce a mosaic of stands varying in size, shape, height, and species (Forest Plan, pp. III-30 & III-36). Ninety-seven percent (97%) of the even-aged lands in the cumulative effects area are forested.

Table 19 compares the desired habitat community objectives for an ideal HMU for lands in even-aged management to the existing conditions in the MA 2.1 and 3.1 lands in HMUs 416 and 417 (61% of the cumulative effects area). No treatments proposed in Tripoli would change the habitat community composition in the cumulative effects area in the foreseeable future, and no additional vegetative management is proposed in the cumulative effects area in the foreseeable future. Therefore, there are no cumulative effects to the habitat community composition expected in the 2.1 and 3.1 lands in HMUs 416/417 managed in an even-aged manner.

Table 5: Desired Distribution of Habitat Communities in MA 2.1 and 3.1 Lands for an Ideal HMU Compared to the Existing Distribution of Habitat Communities in MA 2.1 and 3.1 Lands in HMUs 416 & 417 as a Percent of the Lands in Even-Aged Management (61% of the cumulative effects area)

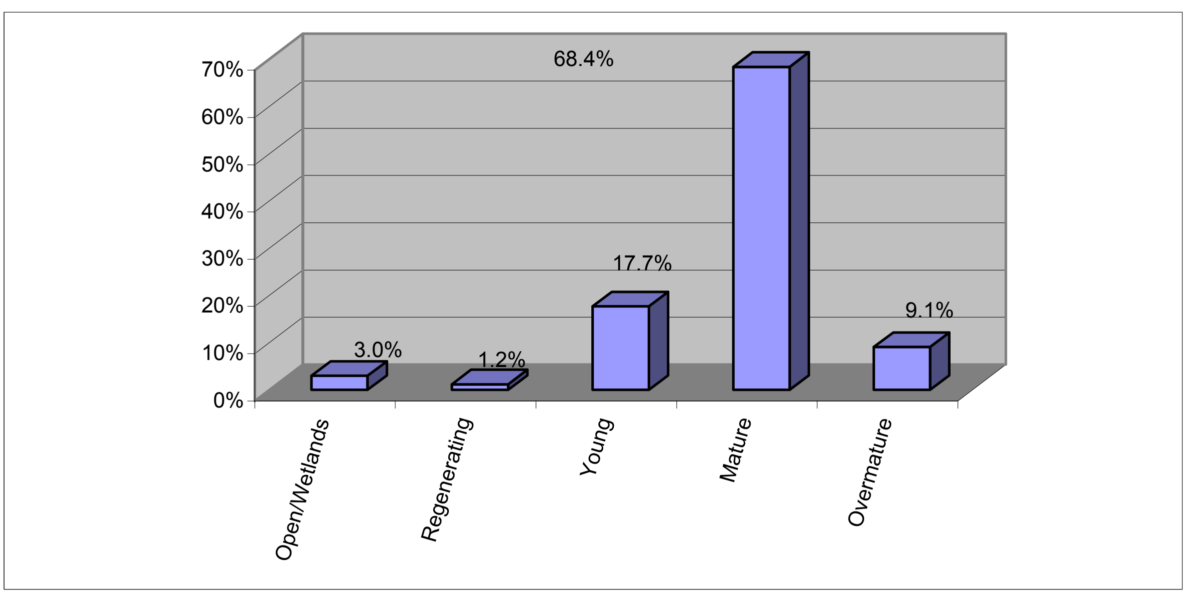
Habitat Community	Desired Condition	Existing Condition
Northern Hardwoods	51.0%	84.0%
Paper Birch	15.0%	9.9%
Aspen	7.0%	0.3%
Spruce/Fir	16.0%	2.7%
Oak/Pine	2.0%	0.0%
Permanent Openings/ Wetlands/Other	9.0%	3.0%

Table (and Figure 1 display the distribution of age classes across the 2.1 and 3.1 lands in HMU 416/417 cumulative effects area managed in an even-aged manner.

Table 6: Existing Distribution of Age Classes Across Even-Aged Management 2.1 and 3.1 Lands in HMUs 416 and 417

Age Class	Existing Distribution
Regenerating	1.2%
Young	17.7%
Mature	68.4%
Over-Mature	9.1%
Open/Wetlands	3.0%

Figure 1: Existing Distribution of Age Classes Across Even-Aged Management 2.1 and 3.1 Lands in HMUs 416 and 417



No vegetation management other than the Tripoli project is expected in the MA 2.1 and 3.1 lands in HMUs 416 and 417 during the next 10 years (2012). Harvesting activities proposed in the Tripoli Project are not expected to change the distribution of habitat communities.

Even-aged management is proposed to create a regenerating age class in the northern hardwoods and the paper birch habitat communities within the Tripoli project area. No even-aged management would take place in the other habitat communities. No additional regeneration treatments are planned in the Tripoli MA/HMU cumulative effects area between now and the next 10 years (2012).

The Forest Plan provides a desired composition of habitat communities (percent of total acres of that habitat community in the HMU) using even-aged management on MA 2.1 and 3.1 lands for an ideal HMU. Table 6A compares the desired age class objectives for northern hardwood and paper birch to the existing composition for those habitat communities within MA 2.1 and 3.1 lands in HMUs 416 and 417 (on the lands in even-aged management, 61% of the cumulative effects area). Table 6B displays the desired, existing, and cumulative changed condition of age classes (year 2012) by alternative of the northern hardwood habitat communities for MA 2.1 and 3.1 lands in HMUs 416 and 417 (on the lands in even-aged management, 61% of the cumulative effects area). Table 6C displays the desired, existing and cumulative changed condition of age classes (year 2012) by alternative of the paper birch habitat community for MA 2.1 and 3.1 lands in HMUs 416 and 417 (on the lands in even-aged management, 61% of the cumulative effects area).

Table 7A: Desired and Existing Age Classes of the Northern Hardwood and Paper Birch Habitat Community on MA 2.1 and 3.1 Lands Within HMUs 416 and 417 (on the lands in even-aged management, 61% of the cumulative effects area)

Habitat Community	Regenerating		Young		Mature		Over-Mature	
	Desired Condition	Existing Condition	Desired Condition	Existing Condition	Desired Condition	Existing Condition	Desired Condition	Existing Condition
Northern Hardwood	10%	1.5%	35%	19.4%	45%	71.5%	10%	7.6%
Paper Birch	10%	0.0%	45%	66.5%	35%	0.0%	10%	33.5%

Table 8B: Desired, Existing and Cumulative Changed Condition (Year 2012) of Age Classes By Alternative of the Northern Hardwood Habitat Community for MA 2.1 and 3.1 Lands in HMUs 416 and 417 (on the lands in even-aged management, 61% of the cumulative effects area)

Age Class	Desired Condition	Existing condition	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Regenerating	10%	1.5%	0.0%	3.2%	0.0%	2.3%	2.8%	2.3%
Young	35%	19.4%	20.9%					
Mature	45%	71.5%	58.1%					
Over-Mature	10%	7.6%	21.0%	17.8%	21.0%	18.7%	18.2%	18.7%

Table 9C: Desired, Existing and Cumulative Changed Condition of Age Class By Alternative of the Paper Birch Habitat Community for MA 2.1 and 3.1 Lands in HMUs 416 and 417 (on the lands in even-aged management, 61% of the cumulative effects area)

Age Class	Desired Condition	Existing condition	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Regenerating	10%	0.0%	0.0%	8.0%	0.0%	8.0%		
Young	45%	66.5%	66.5%					
Mature	35%	0.0%	0.0%					
Over-Mature	10%	33.5%	33.5%	25.5%	33.5%	25.5%		

No additional vegetative management is expected in the MA/HMU cumulative effects area through the year 2012. Therefore, any differences in age-class distribution would result from proposals in the Tripoli project. Between the present and the year 2012, trees would add ten years of growth. Some stands that are currently in one age class, would be in a different age class ten years from now.

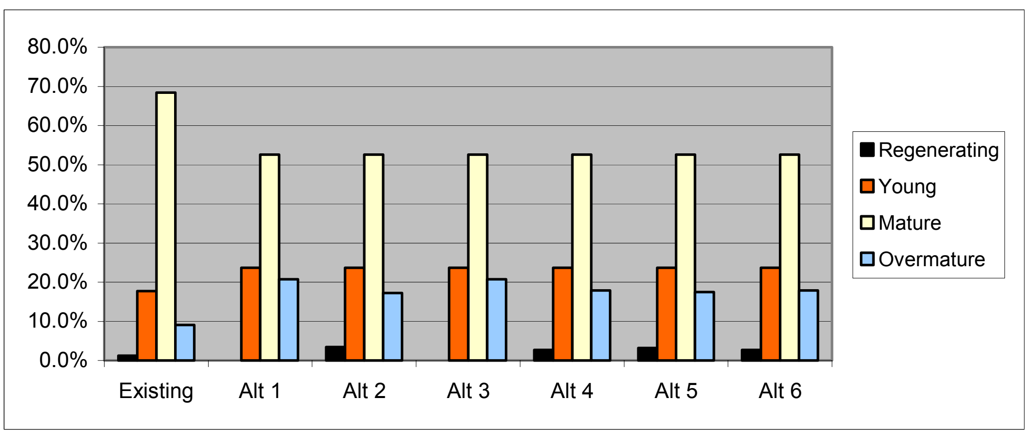
Under Alternatives 1 (no action) and 3 (only uneven-aged management), The current regenerating age class (1.2%) would become part of the young age class. There would be no activities to create additional regenerating age class. Unless natural causes create areas of new tree seedlings, there would be no regenerating age class in the even-aged management portion of the MA/HMU cumulative effects area at the end of the next decade.

The mature age class would decrease by 15.8%, and the young and over-mature age classes would increase by 6% and 11.6% respectively in the even-aged management portion of the MA/HMU cumulative effects area at the end of the next decade.

Under Alternatives 2, 4, 5, and 6, clearcuts are prescribed to create a regenerating age class ranging from 3.4% (Alternative 2) to 2.7% (Alternatives 4, and 6). At 3.2%, Alternative 5 would create slightly less regeneration than Alternative 2. Existing stands that would be clearcut to create a regenerating age class, are all stands that would be in the over-mature age classes if no management were to take place. Therefore, under all alternatives, the distribution of young and mature age classes in the even-aged management portion of the MA/HMU cumulative effects area at the end of the next decade would be the same. The change in distribution of the over-mature age class for Alternatives 2 and 4-6 would be a decrease corresponding to the increase in the regenerating age class for that alternative. The overall decrease would vary only by 0.7% between Alternatives 2-6.

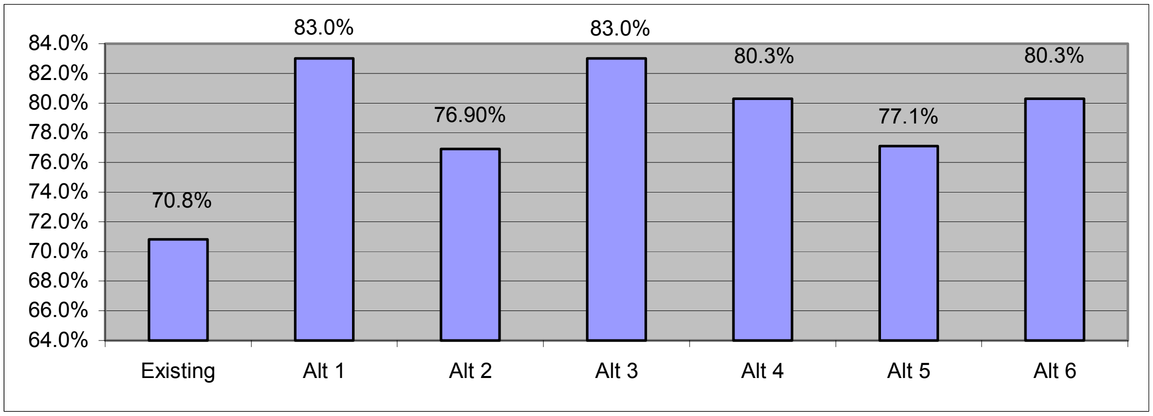
Figure 2, compares the existing distribution of age classes across even-aged management 2.1 and 3.1 Lands in HMUs 416 and 417 and the distribution in the year 2012 for each alternative proposed for the Tripoli project.

Figure 2: Existing Distribution of Age Classes Across Even-Aged Management 2.1 and 3.1 Lands in HMUs 416 and 417 Compared to Distribution by Alternative in the Year 2012



Overall, the lands in uneven-aged management and the mature and over-mature age classes on the lands in even-aged management provide a closed-canopy forest (mature/over-mature forest). Currently closed-canopy forest exists on 70.8% of the MA /HMU cumulative effects area. Regeneration treatments would have the effect of reducing the closed-canopy forest in the cumulative effects area. No additional regeneration treatments are anticipated in the cumulative effects area beyond what is proposed in the Tripoli project. If no natural disturbances create regeneration, the maximum that closed-canopy forest could be reduced by is 3.4% under Alternative 2. Figure 3 displays the available closed-canopy forest under existing conditions on management area 2.1 and 3.1 lands in HMUs 416 and 417 compared to the closed-canopy forest available by alternative in the year 2012.

Figure 3: Existing Closed-Canopy (Mature/Over-Mature) Forest On Management Area 2.1 And 3.1 Lands in HMUs 416 and 417 Compared to the Closed-Canopy Forest Available by Alternative in the Year 2012



B.3.2 Eastman Brook Subwatershed Cumulative Effects Area

The Eastman Brook subwatershed encompasses approximately 11,500 acres (ninety percent (90%) is federal land). The only private land in the watershed (10%) is the Thornton Gore area, located in the southwest corner (approximately 1,170 acres) and includes a few family residences and camps and small amounts of past forest management.

Comparison of the 1987 and the 1994 aerial photos show that small amounts of forest management and land clearing for home and camp construction occurred on the private land in the Thornton Gore area during that time. A field visit indicated that this is the current trend also (Wingate, 2002). There are no housing subdivisions or condominiums being built, and there is no current evidence of forest management in the area. It is expected that this trend towards minimal development and management of the private land in the cumulative effects area would continue in the future. The vegetation is primarily mature, closed-canopy forest.

Activities on the private land in the Thornton Gore portion of the Eastman Brook subwatershed cumulative effects area (past, present, or future) are not anticipated to have any cumulative vegetative effects when added to potential effects from the Tripoli Vegetation Management project (see §**3.2.1.4 Vegetation Cumulative Effects**).

Table 10 displays the miles of roads within the watershed by jurisdiction. The Interstate 93 corridor traverses the far western corner of the watershed.

Table 10: Miles of Road by Jurisdiction in the Eastman Brook Subwatershed Cumulative Effects Area

Jurisdiction	Miles of Road	Characteristics
Federal	0.7 Mi	I-93
Forest Service	17.1Mi	Gravel surfaced
State	0.5 Mi	NH Rt. 3
Local	1.5 Mi	
Total	19.8 Mi	

Road density in the watershed is 1.1 miles per square mile. No road construction is proposed in the Tripoli East project area and no road construction is anticipated on federal land within the next decade.

Comparison of the 1987 and the 1994 aerial photos show that less than a half-mile of road construction occurred in the Thornton Gore area during that seven-year period. The road construction appears to have been in conjunction with seasonal camp development. Based on the photo interpretation and a field visit (Wingate 2002), it is expected that any additional land development would continue in a similar manner, and that an additional mile of road may be developed in the private sector during the next 10 years. This could have the nominal effect of increasing the total road density in the watershed to 1.15 miles per square mile.

Table 11 displays the miles of streams found in the watershed.

Table 11: Streams within the Eastman Brook Subwatershed Cumulative Effects Area

Map #	Stream	Perennial/ Intermittent	Miles
1	Eastman Brook	P	8.0
2	Unnamed Tributary to Eastman Brook	I	0.5
3	Unnamed Tributary to Eastman Brook	I	0.5
4	Unnamed Tributary to Eastman Brook	I	0.7
5	Unnamed Tributary to Eastman Brook	I	0.7
6	Unnamed Tributary to Eastman Brook	I	0.9
7	Talford Brook	P	3.2
8	Unnamed Tributary to Talford Brook	I	0.6
9	Unnamed Tributary to Talford Brook	I	0.9
10	Unnamed Tributary to Eastman Brook	P	0.9
11	Unnamed Tributary to Eastman Brook		1.1
12	Mack Brook	P	1.9
13	Unnamed Tributary to Mack Brook	I	0.5
14	Unnamed Tributary to Mack Brook	I	0.9
15	Little East Pond Brook	P	1.8
16	Unnamed Tributary to Little East Pond Brook	I	0.5
17	Unnamed Tributary to Little East Pond Brook	I	0.7
18	Clear Brook	P	0.9
19	East Pond Brook	P	1.3
20	Unnamed Tributary to Eastman Brook	I	0.9
21	Unnamed Tributary to Eastman Brook	P	2.0
22	Unnamed Tributary	I	0.4
23	Unnamed Tributary	I	0.4
24	Unnamed Tributary to Eastman Brook	P	1.3
	Total		31.5

Recreation activities occurring within the watershed include: dispersed camping along approximately six (6) miles of the Tripoli road and adjacent roads (see Map 1), hiking, swimming, fishing, driving for pleasure, and snowmobiling in the winter. Table 26 displays the miles of hiking trails within the Eastman Brook subwatershed.

Approximately six (6) miles of the Tripoli Road from the gate at the southern end to the height of land is used during the winter as a snowmobile trail. The approximately two-mile road into Russell Pond Campground is also used for snowmobiling.

Dispersed camping occurs along the Tripoli Road and associated spurs in the Eastman Brook subwatershed. Some campsites (approximately 25) are located between the Tripoli Road and Eastman Brook on the lower terraces and some (less than 25) are located away from the brook on the upper terraces. In total, these sites represent less than six (6) acres along a six (6) mile stretch of the Eastman Brook. Some dispersed campsites along the Tripoli Road are proposed for rehabilitation and/or relocation to log landings on the upland side of the Tripoli Road. This work affects, on average, two and a half (2½) acres per year. This type of activity has been occurring along the Tripoli road over the past 8 years and is expected to continue through, at least, 2012. These activities on these acres represent less than 0.1 percent of the total area of the Eastman Brook watershed cumulative effects area.

Table 12 displays the hiking trails in the subwatershed. No additional activities are planed in the foreseeable future that would impact these trails.

Table 12: Miles of Hiking Trails Within the Eastman Brook Subwatershed Cumulative Effects Area

Hiking Trail	Miles
East Pond	2.1 Mi
Little East Pond	1.6 Mi
East Pond Loop	1.3 Mi
Mt Tecumseh	2.0 Mi
Total	**7.0 Mi**

Table 13 displays the vegetation management projects that have taken place within the subwatershed since 1986. No additional vegetation management is expected to occur in the watershed within the next ten years.

Table 13: Previous NEPA Decisions Affecting the Eastman Brook Subwatershed Cumulative Effects Area Since 1986

Decision Date	Project	Activities
1991	Tripoli Road Salvage	Harvest 84 acres; salvage commodity values; improve visuals; provide for public safety; reduce fire hazards; rehabilitate recreation and transportation facilities
1996 Completed 2002	Eastman West Vegetative Management	Harvest 2.5 MMBF on 514 acres; construct 0.3 miles of road, 1.5 miles of skid trails, and 3 landings; restore 1.5 miles of road