CHAPTER 2. EXISTING VEGETATION – FOREST SCALE

Uncompahgre Plateau

Current Vegetation

Vegetation mapping for the Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forests is generated primarily from aerial photo interpretation, with periodic updates resulting from field verification, management activities and natural disturbances (i.e., wildfires). Vegetation is classified by cover type. Cover type is determined by the dominant cover or species present at the time of classification. As a result, cover type classifications are more simplified than conditions that actually occur on the ground. (For example: Spruce/fir cover type includes areas where Englemann spruce and/or subalpine fir tree species are the majority of the vegetation. Aspen tree species may or may not be present as subdominant species.)

Current vegetation cover type distribution on NFS lands within the Uncompahgre Plateau Geographic Area is shown in Figure 1. A map of current vegetation is shown in Figure 2.

Figure 1. Distribution of Current Vegetation Cover Types on NFS lands within the Uncompahgre Plateau Geographic Area

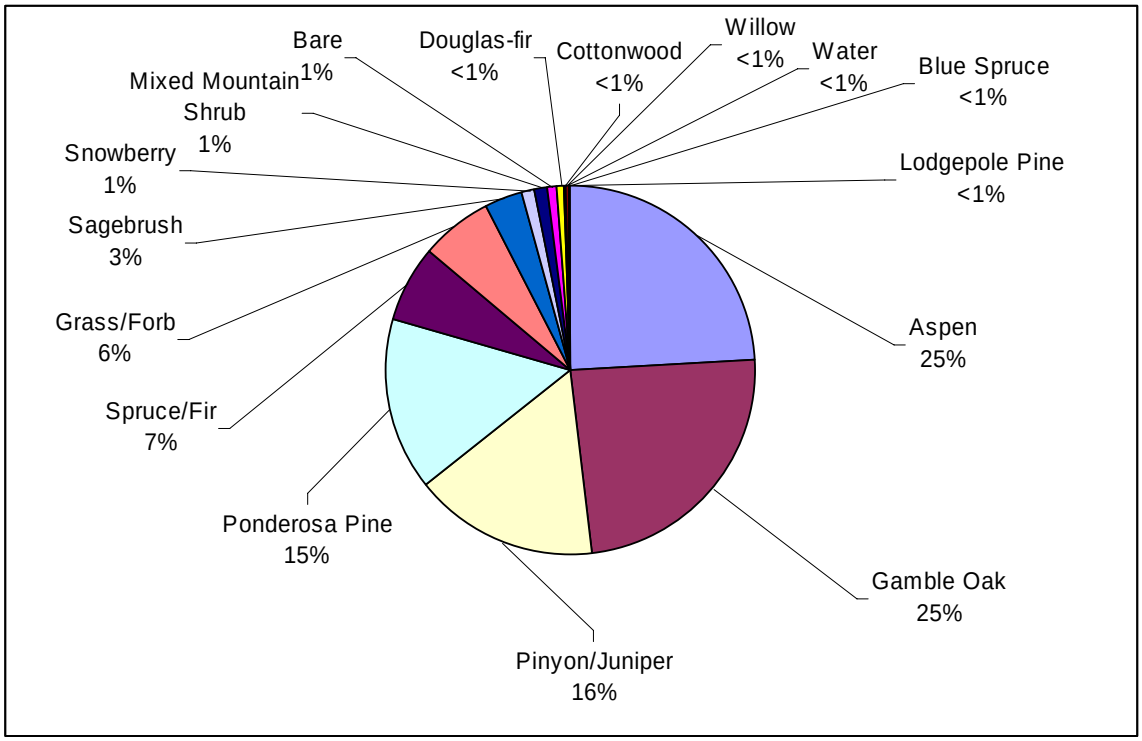
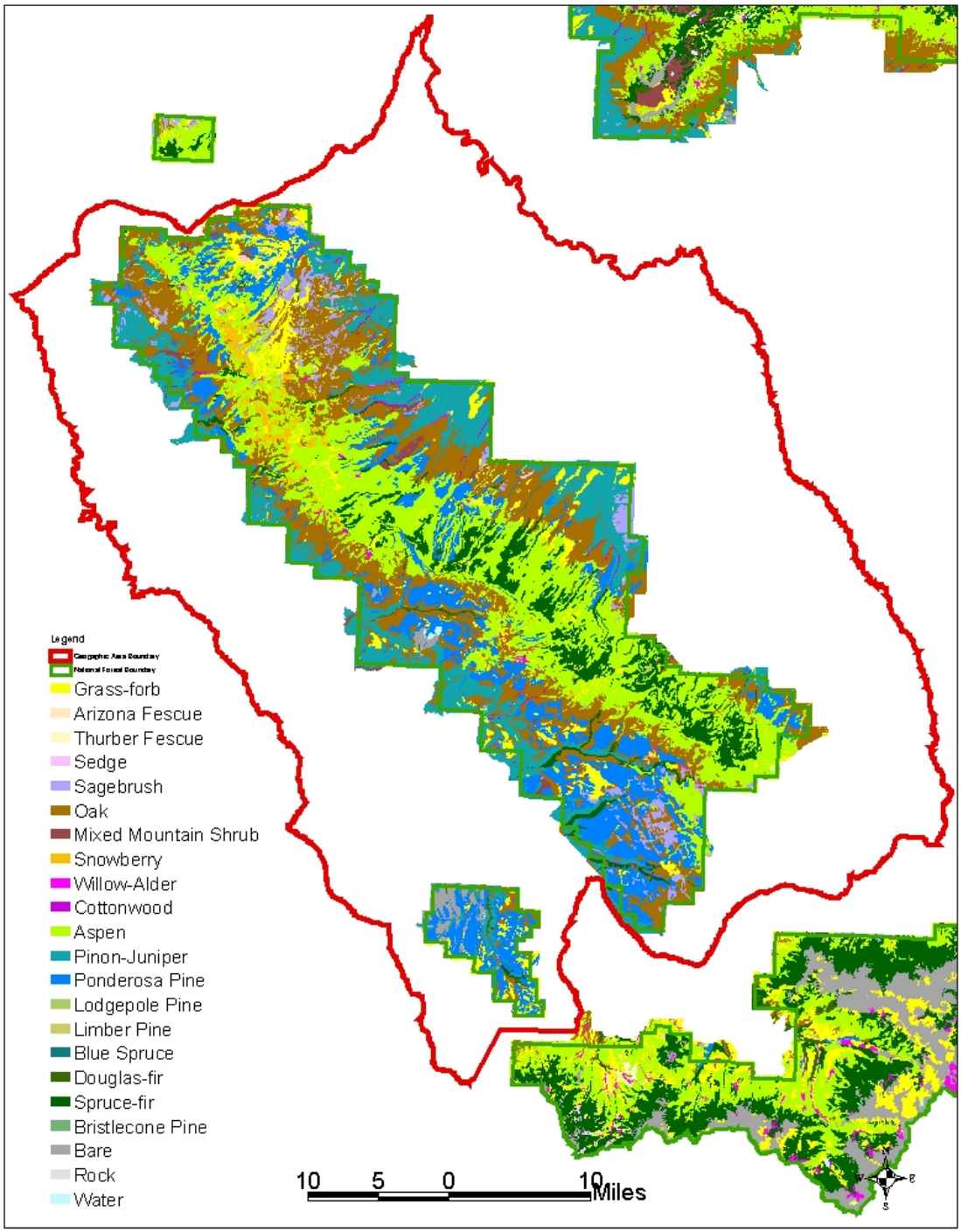


Figure 2. Map of Current Vegetation



Habitat Structural Stages

Vegetation is also characterized by structure. Structure is described by habitat structural stages. Habitat structural stages are defined by size class, tree diameter, and canopy

closure (or canopy density measured as crown cover percent). Table 1 displays habitat structural stage definitions (Hoover and Wills, 1987).

Table 1. Habitat Structural Stage Definitions

Habitat Structural Stage	Size Class	Diameter	Crown Cover Percent
1T[1]/1M[2]	Grass-Forb	Not applicable	0 – 10%
2T[1]/2S[3]	Shrub-Seedling	< 1 inch	0 - 10%
3A	Sapling-Pole	1 – 9 inches	11 – 40%
3B	Sapling-Pole	1 – 9 inches	41 - 70%
3C	Sapling-Pole	1 – 9 inches	71 - 100%
4A	Mature	9+ inches	11 – 40%
4B	Mature	9+ inches	41 - 70%
4C	Mature	9+ inches	71 - 100%

1 Opening in forest cover type created by some type of disturbance
2 Natural meadow
3 Shrub cover type

Habitat structural stages can be used as indicators for:

- *Wildlife habitat* - Different wildlife species have different habitat requirements. For example, species that require large diameter trees in dense stand conditions find habitat in areas with 4B and 4C habitat structural stages.

- *Potential risk for future fire, insect and/or pathogen activity* - Trees growing in dense stands can be stressed by competition for water, nutrients and sunlight, making them more *susceptible* to insect attack.

- *Time since disturbances (fire, harvest, etc.) affected an area*. Age of vegetation is not directly linked to habitat structural stage; however, relative stages of succession can be implied. Early stages of succession are shown as habitat structural stages 1 or 2; later successional stages are usually in habitat structural stage 4A/ 4B/4C. Sometimes structural stages 3A/3B/3C may be the same age as 4A/4B/4C.

Current habitat structural stages for NFS lands within the Uncompahgre Plateau Geographic Areas are shown in Figure 3. Please note, on this map natural meadows in grass-forb cover types are shown as structural stage 1M, and shrub cover types are shown as structural stage 2S.

Figure 3. Current Habitat Structural Stages, Uncompahgre Plateau Geographic Area

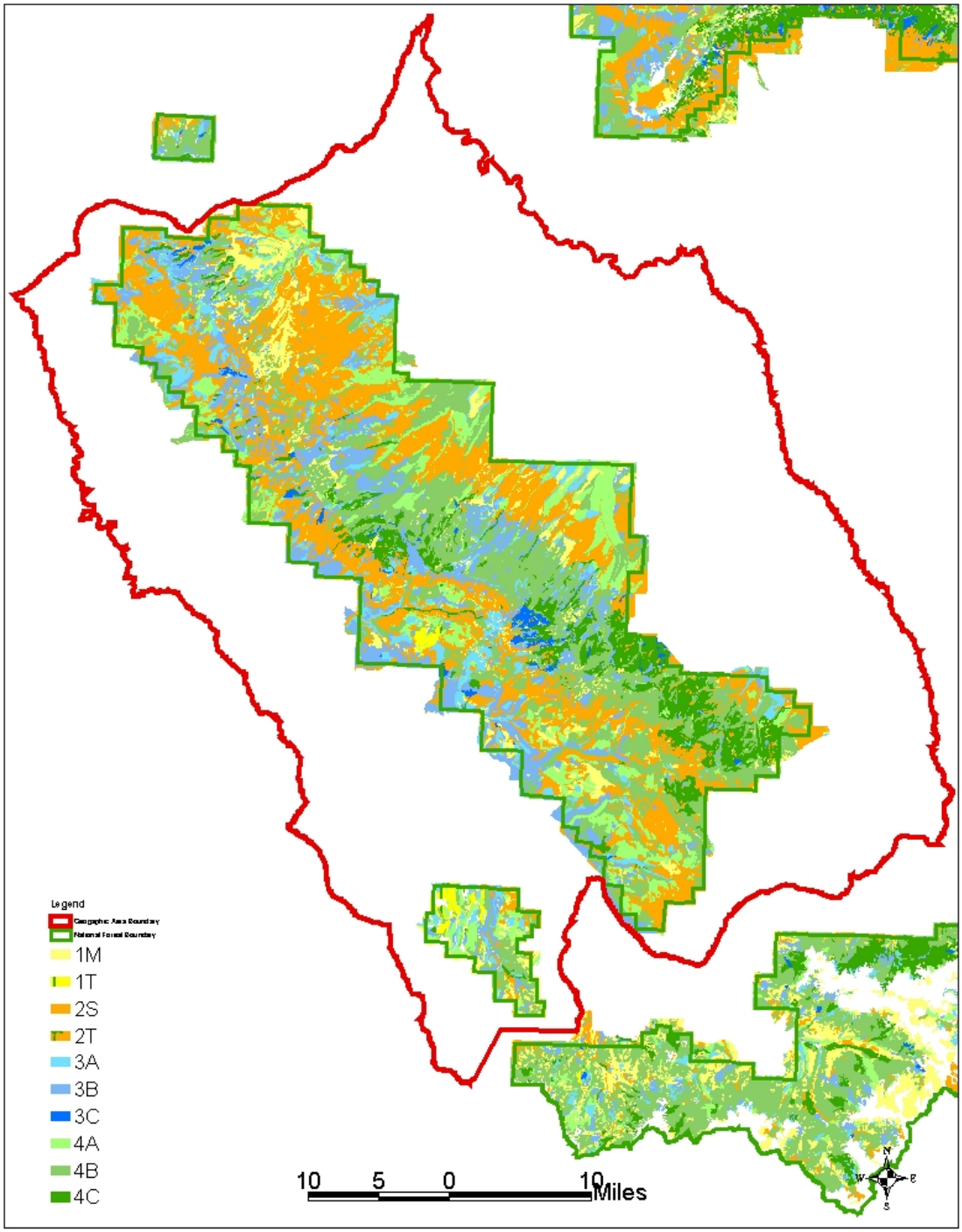
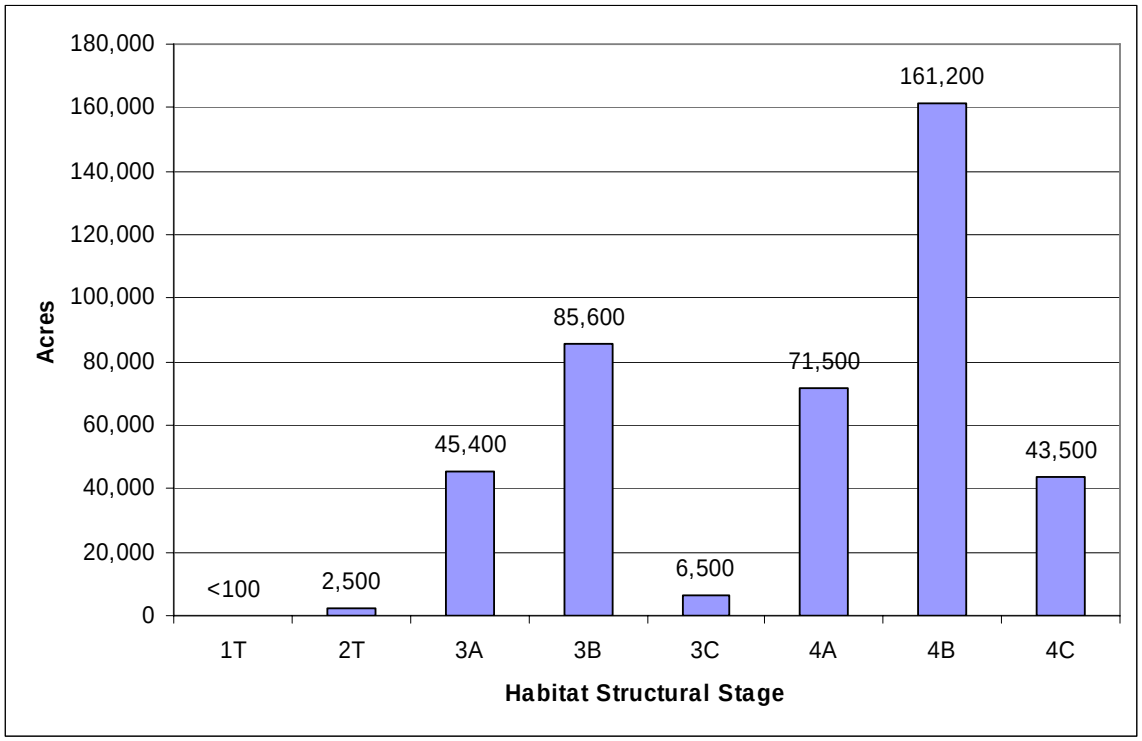


Figure 4 displays the distribution of habitat structural stages for the forest and woodland cover types (spruce-fir, aspen, Douglas-fir, ponderosa pine, blue spruce, cottonwood, lodgepole pine, pinyon-juniper) on the NFS portion of the Uncompahgre Plateau

Geographic Area. Note: Natural meadows and shrublands are not included in the chart below.

Figure 4. Habitat Structural Stage Distribution of Forest and Woodland Cover Types



This information can also be summarized by looking at the distribution of size classes (Figure 5) and densities or canopy closure (Figure 6) of forest and woodland cover types on NFS lands within the Geographic Area. Again, natural meadows and shrublands are not included in the data shown in Figures 5 and 6.

Figure 5. Size Class Distributions of Forest and Woodland Cover Types

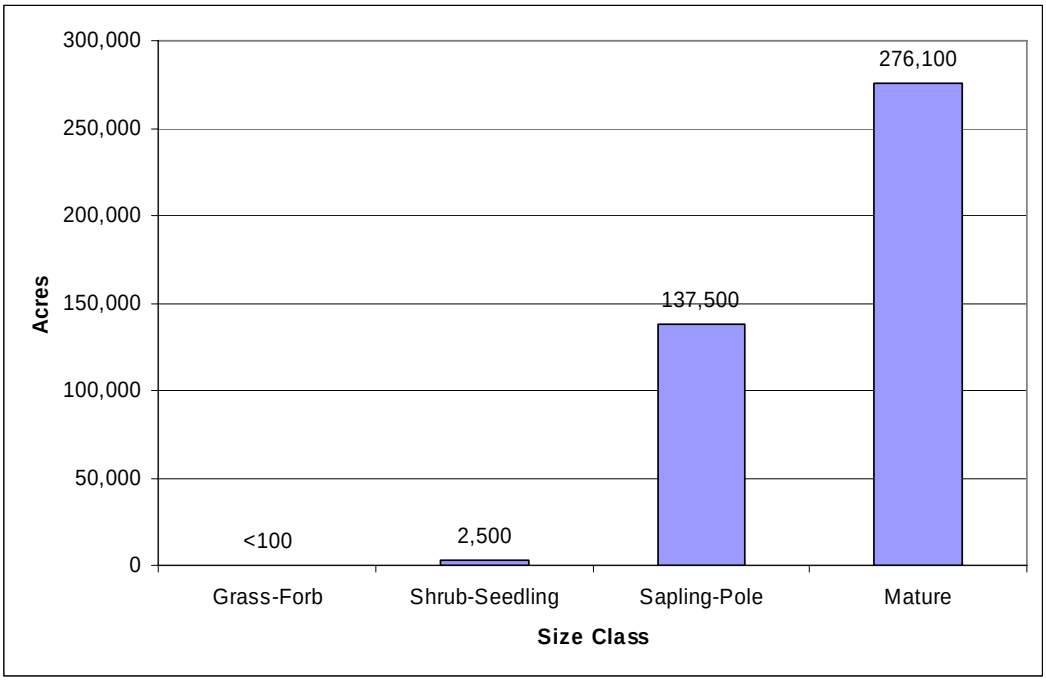
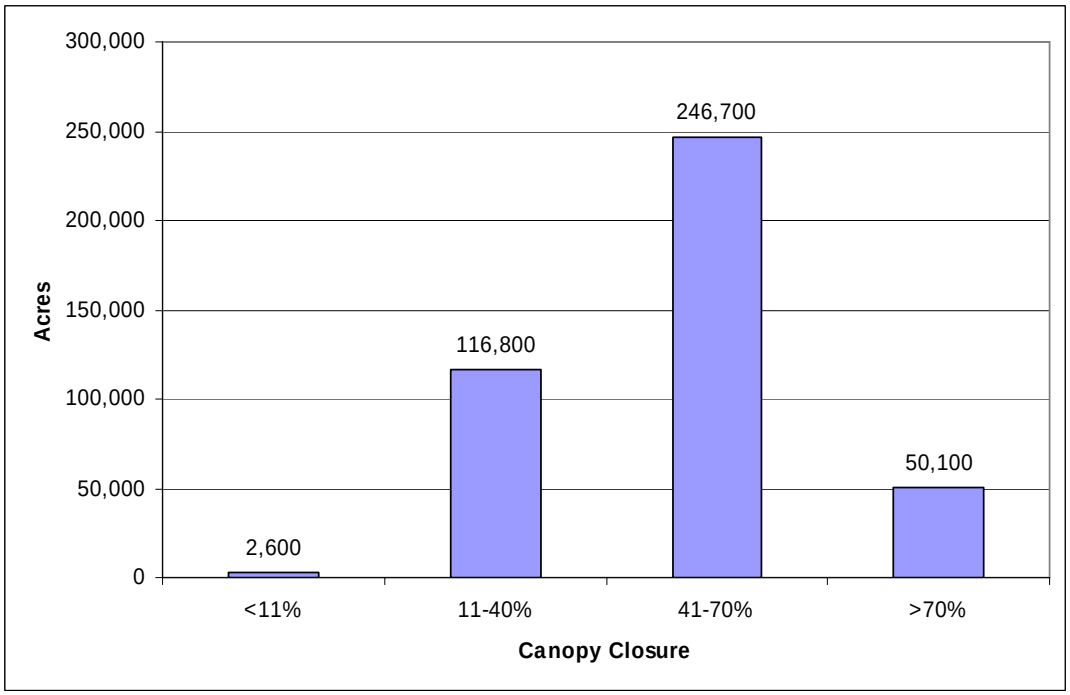


Figure 6. Canopy Closure Distributions in Forest and Woodland Cover Types



Characterization of Current Vegetation Conditions

Additional information on current conditions of different cover types is summarized in Table 2. (Also see timber, range and fire management sections.)

Table 2. Current Vegetation Characterization for NFS lands on Uncompahgre Plateau Geographic Area

Cover Type[1]	Composition of GA[1]	Age Distribution[2]	Habitat Structural Stages[1]	Canopy Conditions[1]	Past Activities (1955 – 2003) [3]	Effects of Roads/Trails[4]
Spruce-fir	43,100 acres 7% of NFS lands 7% of total GA 91% of spruce-fir is on NFS land.	Most spruce is between 80–140 yr. old Most subalpine fir is between 40-120 yr. old.	1%-3A 7%-3B 3%-3C 4%-4A **47%-4B** 37%-4C	54% - single-storied 46% - multi-storied 92% - continuous canopies	39% of type has been affected by timber harvest	94% of type is within ½ mile of an existing road or trail. Includes: 130 miles roads 37 miles trails
Aspen	160,100 acres 25% of NFS lands 4% of total GA 71% of aspen is on NFS land.	Most aspen is between 80-120 yr. old.	1%-2T 9%-3A 25%-3B 3%-3C 2%-4A **44%-4B** 16%-4C	65% - single-storied 35% - multi-storied 86% - continuous canopies	6% of type has been affected by timber harvest	91% of type is within ½ mile of an existing road or trail. Includes: 330 mile roads 168 miles trails
Mixed Conifer (Douglas-fir, blue spruce, lodgepole pine)	3,000 acres <1% of NFS lands <1% of total GA 84% of mixed conifer type is on NFS land.	Most Douglas-fir is between 80-140 yr. old.	4%-3A 18%-3B 11%-4A **42%-4B** 26%-4C	29% - single-storied 71% - multi-storied 88% - continuous canopies	17% of type has been affected by timber harvest	86% of type is within ½ mile of an existing road or trail. Includes: 3 miles roads 4 miles trails
Ponderosa Pine	102,500 acres 15% of NFS lands 9% of total GA 79% of ponderosa pine type is on NFS land.	Most ponderosa pine is between 100-140 yr. old.	<1%-2T 8%-3A 10%-3B <1%-3C 38%-4A **42%-4B** 1%-4C	39% - single-storied 61% - multi-storied 93% - continuous canopies	38% of type has been affected by timber harvest.	93% of type is within ½ mile of an existing road or trail. Includes: 312 miles roads 54 miles trails
Pinyon-Juniper	106,000 acres 16% of NFS lands 34% of total GA 16% of pinyon-juniper type is on NFS lands	Age data not available	21%-3A **30%-3B** 1%-3C 24%-4A 24%-4B 1%-4C	68% - single-storied 32% - multi-storied 95% - continuous canopies	11% of type has been affected by mechanical treatments. 2% of type has been treated with fire.	69% of type is within ½ mile of an existing road or trail. Includes: 120 miles roads 56 miles trails

Cover Type[1]	Composition of GA[1]	Age Distribution[2]	Habitat Structural Stages[1]	Canopy Conditions[1]	Past Activities (1955 – 2003)[3]	Effects of Roads/Trails[4]
Cottonwood	1,500 acres <1% of NFS lands <1% of total GA 37% of this type is on NFS lands.	No age data available.	7%-3A **61%-4A** 32%-4B	69% - single-storied 31% - multi-storied 88% - continuous canopies	None recorded.	60% of this type is within ½ mile of an existing road or trail. Includes: <1 miles roads <1 miles trails
Gamble Oak – Mixed Mountain Shrub	173,100 acres 27% of NFS lands 16% of total GA 60% of these shrub types are on NFS lands.	No age data available.	100% 2S Oak: 55% large (>6.5') 43% med. (2.5-6.4') 2% small (<2.5') Mixed Shrub: 19 % large 73% medium 7% small	Oak: 23% - single-storied 77% - multi-storied 75% - >40% cover 25% - <= 40% cover Mixed Shrub: 53% - single-storied 47% - multi-storied 50% - >40% cover 50% - <= 40% cover	6% of these types have been mechanically treated. 20% of these types have been treated with fire.	86% of these types are within ½ mile of an existing road or trail. Includes: 335 miles roads 159 miles trails
Sagebrush	21,800 acres 3% of NFS lands 9% of total GA 13% of this type is on NFS lands.	No age data available.	100% 2S 43% med. (2.5-6.4') 57% small (<2.5')	57% - single-storied 43% - multi-storied 50% - >40% cover 50% - <= 40% cover	2% of this type has been mechanically treated.	86% of type is within ½ mile of an existing road or trail. Includes: 98 miles roads 14 miles trails
Willow	1,500 acres <1% of NFS lands <1% of GA (Cannot determine percent of willow in GA that is on NFS lands.)	No age data available	100% 2S 28% large (>6.5') 71% med. (2.5-6.4')	53% - single-storied 47% - multi-storied 50% - >40% cover 50% - <= 40% cover	None recorded.	93% of these types are within ½ mile of an existing road or trail. Includes: 3 miles roads 5 miles trails

Cover Type[1]	Composition of GA[1]	Age Distribution[2]	Habitat Structural Stages[1]	Canopy Conditions[1]	Past Activities (1955 – 2003) [3]	Effects of Roads/Trails[4]
Grass/Forb	42,200 acres 6% of NFS lands 10% of total GA 19% of these types are on NFS lands.	No age data available.	100% 1M	Not applicable	2% of this type has been mechanically treated.	87% of these types are within ½ mile of an existing road or trail. Includes: 171 miles roads 45 miles trails.

1 Common Vegetation Unit/R2VEG database
2 Stand exam data for Grand Mesa Geographic Area.
3 RMACT database
4 INFRA transportation data related to R2VEG data. Includes all inventoried roads and trail, not just routes open to public use.

Comparison of Current Conditions to Historic Conditions

Environmental factors such as soils, slope, aspect, climate, and elevation determine the plant communities that potentially can grow on a given area. The stable plant community that establishes in the absence of any disturbances (i.e., fire, insect/pathogen mortality, windthrow, drought, harvest) is called the climax plant community. The area where a given climax plant community can grow is classified as a Potential Natural Vegetation (PNV) type, and is named for the climax plant community. For example, spruce-fir forests are the climax plant community at elevations from 10,000 to 12,000 feet, in the subalpine climatic zone (30-40 inches of precipitation annually, 50-70 frost free days, 30-40ºF mean annual air temperature) (Johnston et al. 2001). Areas where spruce-fir is the climax plant community are classified as the spruce-fir PNV type.

Draft PNV type classification has been completed for this Geographic Area. The PNV type composition on NFS lands within the Uncompahgre Plateau Geographic Area is shown in Figure 7. (PNV types with <0.1 percent composition are not included in Figure 7.) A map of PNV for the Uncompahgre Plateau Geographic Area is shown in Figure 8.

Figure 7. Distribution of Potential Natural Vegetation Types on NFS lands within the Uncompahgre Plateau Geographic Area

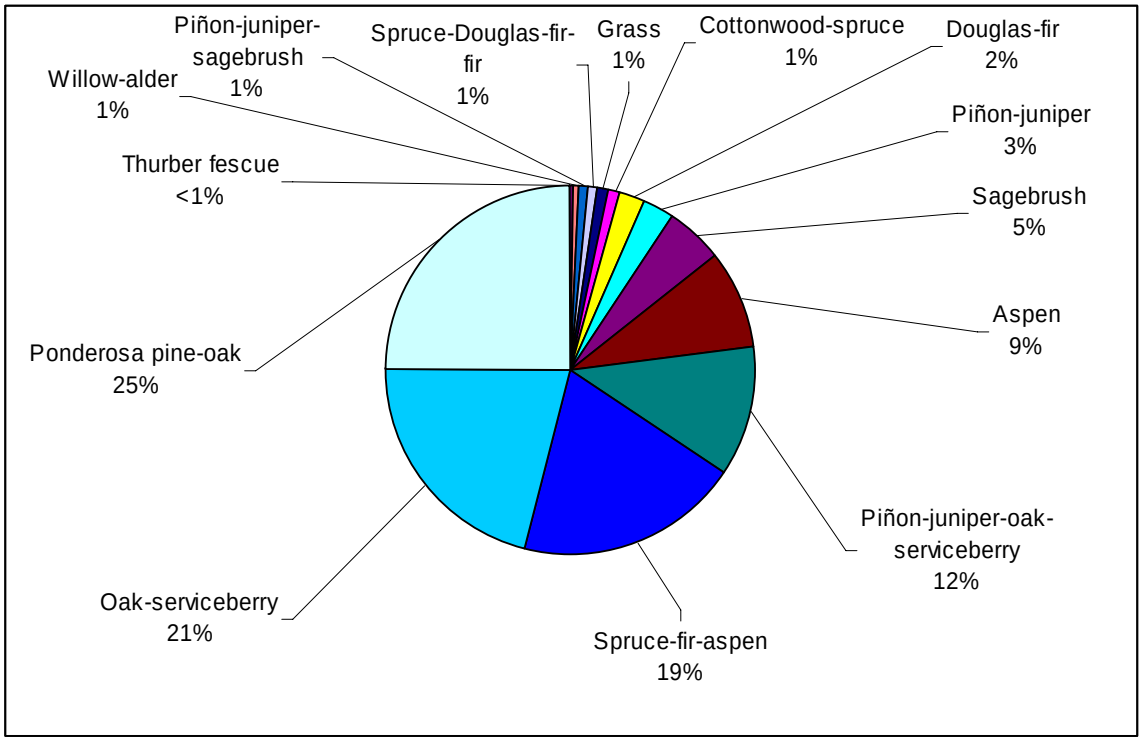
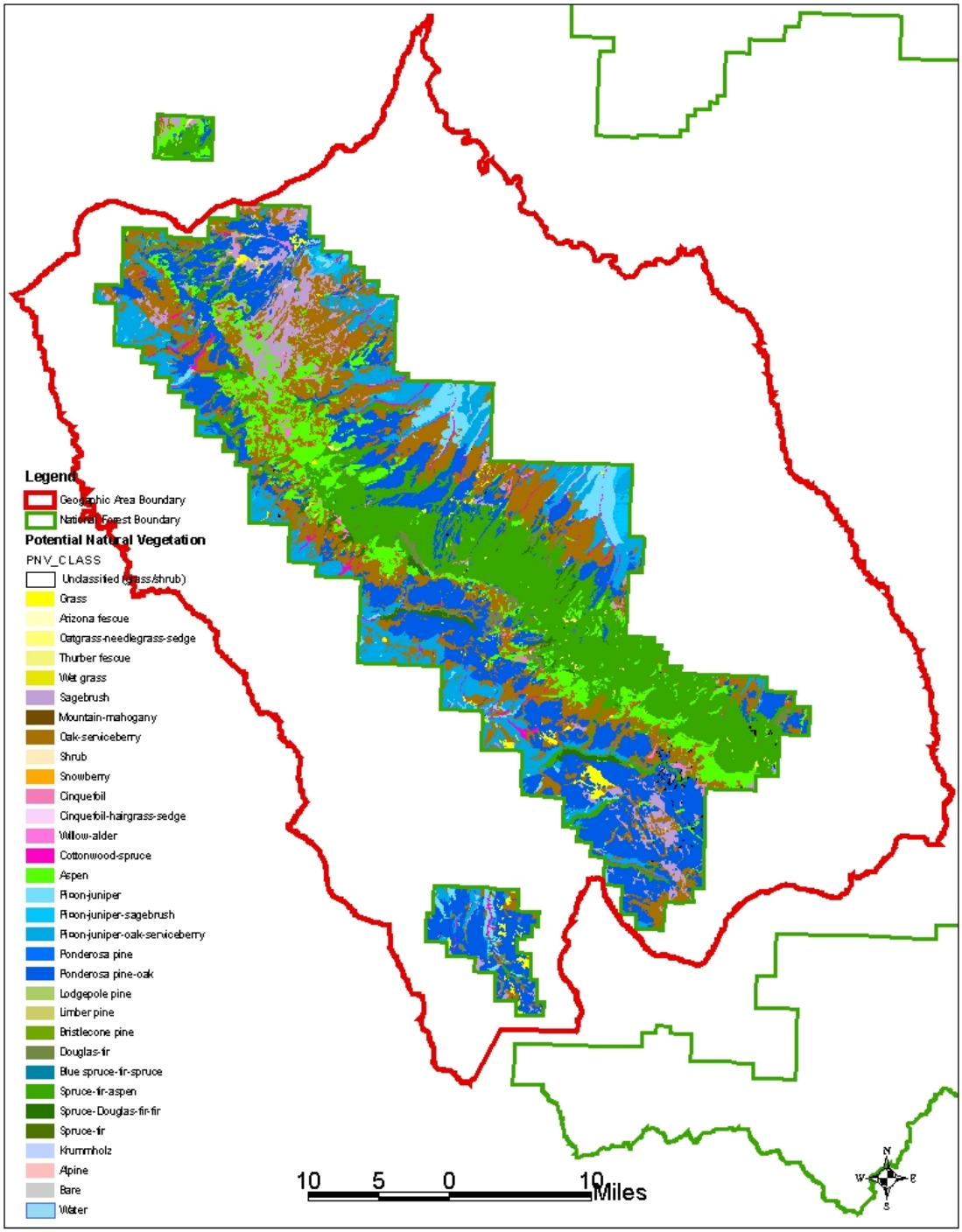


Figure 8. Map of Potential Natural Vegetation



Historically, for any given PNV type, natural disturbances (i.e., fires, insect outbreaks) occurred at characteristic intervals and intensities, called regimes. When a disturbance was intense enough to change the existing plant community (e.g., some or all of the overstory was killed), the remaining vegetation followed a natural progression, or

succession, of plant communities that changed over time. If no further disturbances occurred, an area eventually returned to the climax plant community. However, if multiple disturbances occurred on the same area earlier seral plant communities would be perpetuated on a site for extended periods. The natural disturbance regimes and succession cycles resulted in shifting mixtures (or ranges) of different seral plant communities (or stages) within any given PNV type at any point in time.

The Vegetation Dynamics Development Tool (VDDT) (Beukema et al. 2003) was used to model the expected range in seral conditions that would have existed under historic disturbance regimes for forest, woodland and shrub PNV types. The results displayed in the following tables are conditions that would have been distributed across an entire PNV type on the Geographic Area. Results are scale dependant. For example, if a large fire burned an entire watershed, all of a given PNV type in that watershed could be set back to an early seral condition. However, when the watershed is considered as part of the Geographic Area, the mixture of seral conditions for that PNV type would be within the expected ranges. Both situations would have occurred naturally.

The next sections include comparisons of current conditions to historic conditions for the most common PNV types on the Uncompahgre Plateau Geographic Area, to see where differences occur. This information can be used to identify future management opportunities.

Spruce-Fir-Aspen PNV Type

The spruce-fir-aspen PNV type is mapped on 19 percent of the Uncompahgre Plateau. The climax community in this PNV type includes Englemann spruce and subalpine fir as the dominant overstory species with aspen occurring in all seral stages. The spruce-fir-aspen PNV type is comprised of the current spruce-fir cover type, and approximately 48 percent of the current aspen cover type.

Table 3 describes the seral stages and timeline for succession in the spruce-fir-aspen PNV type. This table also displays a comparison of the modeled historic range of seral conditions to the current seral conditions (as percentages) within the spruce-fir-aspen PNV type.

Table 3. Succession (Seral Stages) in Spruce-Fir-Aspen PNV Type

	Early	**Early-Mid**	**Late-Mid**	**Late**
Seral Stage Descriptions*	New stand of aspen seedlings/suckers with grass and forb understory lasting 30-50 years	Dense pole-sized aspen, grass and forb understory, lasting up to 100 years	Mature aspen overstory with conifer trees growing in the understory. May take 100 to 200 years for conifers to dominate stand.	Mature conifer, scattered mature aspen in overstory. New trees can become established in gaps in canopy. Lasts until next stand replacing disturbance
VDDT Modeled Range of Seral Conditions	13-19%	22-29%	13-16%	35-49%
Current Seral Conditions	3%	45%	52% (Limited age data makes it difficult to differentiate between late-mid and late seral conditions.)	

*Romme et al. 2003

Most of the spruce-fir-aspen PNV type is currently dominated by aspen (62 percent) which regenerated after extensive fire(s) in 1879. This is shown by the high percentage in mid seral stages (includes both early-mid and late-mid), above. Conifer is becoming more dominant in these stands and in the absence of disturbance, these stand will succeed back to spruce-fir dominated conditions (Smith and Smith, 2004). Currently 36 percent of this PNV type is dominated by spruce-fir (included in the late-mid to late percentage, above).

The historic fire regime for this type is very infrequent (200 years +), stand replacing fires affecting large areas, mixed with very small low intensity fires that occur at shorter intervals. Since 1971, 98 fires have burned in this PNV type, affecting 90 acres. Fifty-six percent of the fires were lightning caused, the rest were human-caused. Most fires affected less than ¼ acre. These fires have not altered the seral condition

The spruce-fir-aspen PNV type is also host to a variety of insect and pathogens (see Forest Health section). Insect and disease activity over the past eight years in this PNV type includes western spruce budworm (affecting 54,800 acres) and subalpine fir mortality (affecting 18,700 acres). The result has been a reduction of subalpine fir in the understories of much of this PNV type, which perpetuates many stands in mid seral conditions.

Approximately 18 percent of this spruce-fir-aspen PNV type has been treated with some type of silvicultural method since 1955. Clearcuts in spruce-fir affected approximately 2,300 acres in the 1960s-1970s. Clearcutting in aspen has affected 2,400 acres since the mid 1980s. Shelterwood harvests in spruce-fir have treated 14,800 acres between 1970 and the mid 1990s. An additional 1,600 acres have been treated with thinning, selection or salvage treatments, mostly in the 1980s. Harvest activities have occurred throughout the extent of the spruce-fir-aspen PNV type.

Earlier seral conditions exist in areas that were harvested by clearcuts. All the other silvilcultural practices used in this PNV type reduced stand density, but they did not alter the seral condition, because the age of the dominant overstory was not changed.

Aspen PNV Type

In the aspen PNV type, pure aspen is the climax plant community, with no conifer species present. The aspen PNV type is mapped on nine percent of the Uncompahgre Plateau. Approximately 29 percent of what is currently shown as the aspen cover type is included in the aspen PNV type. (The rest of the aspen cover type is seral to a conifer PNV type.)

Table 4 depicts the seral stages and timeline for this PNV type as well as a comparison of the modeled historic range of seral conditions to the current seral conditions (as percentages).

Table 4. Succession (Seral Stages) in Aspen PNV Type

	Early	**Early-Mid**	**Late-Mid**	**Late**
Seral Stage Descriptions*	New stand of aspen seedlings/suckers with grass and forb understory lasting 10 to 20 years	Dense pole-sized aspen, grass and forb understory, lasting 50 to 80 years	Mature aspen overstory, aspen regeneration in the understory where overstory gaps results from individual tree mortality, lasting up to 80 years	Stable multi-storied, multi-aged aspen stand, predominantly forb understory.Lasts until next stand replacing disturbance
VDDT Modeled Range of Seral Conditions	8-14%	23-26%	17-24%	23-43%
Current Seral Conditions	13%	41%	46% (Limited age data makes it difficult to differentiate between late-mid and late seral conditions.)	

*Romme et al. 2003

As with the previous PNV type, most of the aspen in this type regenerated after extensive fire(s) in 1879, and are in the late-mid seral condition. Very few areas of aspen were not affected by the 1879 fire(s).

Fire studies in aspen from the San Juan National Forest indicate a historic fire regime with fire intervals ranging from less than 70 years to 100 years (Romme et al. 2003). Fires were mostly surface, low intensity fires; however because aspen are such thin-barked the overstory was usually killed. Fires often burned into this PNV type from pondererosa pine-oak PNV type areas, below (Romme et al. 2003). Only 11 fires have occurred in this PNV type on the Uncompahgre Plateau Geographic Area since 1971. All but two were lightning starts, each affecting less than ¼ acre. One human-caused fire in 1991 burned 120 acres of this PNV type. These acres are accounted for in the early seral condition, above.

Approximately six percent of the aspen PNV type has been harvested using clearcuts since 1984. These areas are mostly in the early seral condition shown above, with some of the older clearcuts in the early-mid seral conditions. Aspen quickly moves out of the early into the early-mid stage (within 10 years).

Ponderosa Pine-Oak PNV Type

Ponderosa pine mixed with a Gambel oak understory is the climax plant community in this PNV type. The ponderosa pine-oak PNV type has been mapped on 25 percent of the NFS land on the Uncompahgre Plateau. This includes approximately 95 percent of the current ponderosa pine cover type. Table 5 depicts the seral stages and timeline for succession in this PNV type. This table also displays a comparison of the modeled historic range of seral conditions to the current seral conditions (as percentages) within the spruce-fir-aspen PNV type.

Table 5. Succession (Seral Stages) in Ponderosa Pine - Oak PNV Type

	Early	**Early-Mid**	**Late-Mid**	**Late**	**Fire-Maintained Open**
Seral Stage Descriptions*	Aspen and Gambel oak regeneration, grass and forb understory lasting 20 to 40 years	Pole-sized aspen, oak shrub, grass and forb understory, may include some ponderosa pine seedlings. Ponderosa pine seedlings eventually codominate with aspen, lasting up to 100 years	Mixed aspen and ponderosa pine overstory, , ponderosa pine regeneration in the understory where gaps results from individual tree mortality, lasting 100 to 200 years	Stable multi-storied, multi-aged mixed stands with ponderosa pine dominant, and remant mature aspens, oak, grass/forb understory. Conditions last until a disturbance kills a large percentage of the overstory.	Low density of large ponderosa pine trees. Dense ground cover in grass, forb with oak/serviceberry shrub understory. Open stands maintained by frequent low-intensity fires.
VDDT Modeled Range of Seral Conditions	14-16%	11-14%	2-10%	7-12%	48-65%
Current Seral Conditions	<1%	25%	55%	1%	19%

*Romme et al. 2003

Currently ponderosa pine dominates 62 percent, aspen dominates 17 percent and oak dominates 16 percent of this PNV type. Most of the ponderosa pine cover type is in the late-mid, late and fire-maintained open seral conditions. The aspen is in the early-mid seral condition, and the oak areas fall into both the early mid and fire-maintained open seral conditions.

The fire regime in this PNV type is frequent, usually low intensity fires (Romme et al. 2003). Under this historic fire regime a fifth seral stage usually developed and occupied

a large percent of the landscape. The current lack of fire-maintained open conditions on the Uncompahgre Plateau is the result of several factors. Heavy livestock grazing prior to the 1950's and active fire suppression efforts over the last 100 years have prevented frequent fires in this PNV type, allowing denser stands to develop than would have occurred historically.

Large diameter ponderosa pines were heavily harvested off the Uncompahgre Plateau before the National Forest was established in 1905, and this practice continued into the mid-1900s. Pine remaining after these harvests is currently in late-mid seral conditions.

Since 1955 approximately 26 percent of this PNV type has been harvested. Selection harvests were used mostly in the 1970s (2,300 acres, <2 percent of PNV type). Shelterwood harvests occurred in the 1980s (9,000 acres, <6 percent). A mountain pine beetle epidemic in the mid to late 1980s resulted in thinning harvests (10,000 acres, 7 percent) followed by sanitation and salvage harvests (17,600 acres, 12 percent) in the late-1980s to mid-1990s which also removed larger diameter trees. In some cases the majority of the overstory was affected and many of these sites have been planted to reestablish ponderosa pine. In other cases, overstories were just opened up and natural regeneration has occurred in the understory. These areas are currently in the early and mid seral conditions.

Since 1971 there have been approximately 200 fires in this PNV type, 82 percent were lightning caused, and 93 percent affected less than 5 acres, each. However, 13,300 acres (nine percent) of this PNV type have been burned by larger fires, most occurring in 2002. The 2002 fires were larger and more intense than normally expected for this PNV type, due to uncharacteristically dense stand conditions described above. The burned areas are included in the early seral condition above.

Prescribed burning has been done on approximately 9,000 acres (six percent) of this PNV type since the early 1990s. These treatments have been designed to reduce understory fuels so that when natural fires occur, fires are less intense. Some of these treated areas are included in the fire-maintained open seral condition listed above.

Pinyon-Juniper PNV Types

Three different pinyon-juniper PNV types have been identified on the Uncompahgre Plateau: pinyon-juniper-oak-serviceberry (12 percent) is located in an elevational band below 8,000 feet all around the Uncompahgre Plateau; pinyon-juniper woodland (three percent) is located on steeper canyon areas, like Escalante, Roubideau, and tributaries to the Dominguez drainages; and pinyon-juniper-sagebrush (one percent) is located on areas with deeper soils. Table 6 displays the seral stages and timeline for the pinyon-juniper-oak-serviceberry PNV type.

Table 6. Succession (Seral Stages) in Pinyon-Juniper-Oak-Serviceberry PNV Type

	Early	**Mid**	**Late**
Seral Stage Descriptions*	Dominant shrubs re-sprout and form dense cover. Grasses and forbs occur in the understory. Persists from 50-70 years	Shrubs still dominate site but young pinyon pine and juniper trees become established. Persists from 100 to 150 years.	Dominated by mature, often dense pinyon and/or juniper trees, some shrubs present in the understory. Persists until next stand replacing disturbance.
VDDT Modeled Range of Seral Conditions	28-51%	39-43%	9-29%
Current Seral Conditions	3%	2%	95%

*Romme et al. 2003

The vast majority of the pinyon-juniper-oak-serviceberry PNV type is currently in late seral tree dominated conditions. This is partly a result of past fire suppression not allowing fires to periodically burn in this type. Heavy livestock grazing that persisted until the mid-1950s also contributed to the current tree dominated conditions by removing competing understory species, which allowed the woody overstory species to prosper (Manier et al. 2003). The limited amounts of mid and early seral conditions exist where chaining activities occurred in the 1960s and where many of these areas have been retreated with rollerchopping within the past ten years.

Pinyon-juniper communities experienced small fires every 10-30 years with larger fires every 150-450 years (Manier et al. 2003). Between 1970 and present, 55 fires have started in the pinyon-juniper-oak-serviceberry PNV type, and several additional fires have burned 3,800 acres of this type. As with the ponderosa pine-oak PNV type, most acres were burned in 2002.

The pinyon-juniper PNV types have been experiencing a large amount of mortality of pinyon trees over the past five years, caused by a combination of Ips beetle, drought and black stain fungus. Approximately 15,300 acres of pinyon-juniper PNV types on NFS lands within the Uncompahgre Plateau Geographic Area have been affected since 1997. The largest increase was seen in 2003 when approximately 94,100 acres in the total Geographic Area was inventoried, mostly on public lands managed by the BLM, and private land below the forest boundary. Approximately 12,900 acres of pinyon mortality occurred on NFS lands within the Geographic Area in 2003. The effect of this dieoff varies from 10-100 percent of the pinyon trees being killed within a given stand. Juniper trees are not affected. Pinyon mortality appears to be lower as elevation increases. The changes to seral conditions are not reflected in Table 6, above.

Oak-Serviceberry PNV Type

The oak-serviceberry PNV type has been mapped on 21 percent of NFS lands on the Uncompahgre Plateau. Table 7 compares current conditions in this PNV type to the modeled historic mix of seral conditions.

Table 7. Succession (Seral Stages) in Oak-Serviceberry PNV Type

	Early	Mid	Late
Seral Stage Descriptions*	Stands are dominated by resprouting shrubs with grasses and forbs in the understory. Persists to 20 or 30 years	Dense clumps of shrubs, usually < six feet high. Grassa and forbs between clumps. Persists from 30 to 40 years.	Shrubs > six feet high, more open canopy. Grass/forbs between and beneath shrub canopies. Persists until next stand replacing disturbance.
VDDT Modeled Range of Seral Conditions	30-70%	28-34%	0-36%
Current Seral Conditions	4%	48%	48%

*Romme et al. 2003

The majority of the oak-serviceberry PNV type is in mid to late seral conditions, indicating a lack of recent disturbances. Historically, fires occurred in this PNV type at frequent intervals (every 15-30 years). The dominant shrub species, Gambel oak and serviceberry, resprout following fire so areas quickly returned to shrubs. This type transitioned from one seral condition to another at approximately 30 year timesteps.

This PNV type has been treated with both mechanical (approximately 8,200 acres) and prescribed fire methods (approximately 31,800 acres). The majority of the prescribed burning occurred in the 1980s and 1990s. Mechanical treatments were used in the 1960s and areas were retreated in the last five years. The recent treatments are accounted for in the early seral conditions.

Since 1970, approximately 100 fires have burned in this PNV type. Over half of these fires burned less than ¼ acre. As with other PNV types with more frequent fire regimes mentioned above, the more recent fires have burned 4,400acres (three percent of this PNV type).

Sagebrush PNV Type

The Sagebrush PNV type is mapped on five percent of the NFS land on the Uncompahgre Plateau. Range management in the past (pre 1950s) altered much of this type by spraying to eradicate sagebrush, seeding non-native grass and forb species, and heavy grazing. This PNV type also historically had a frequent fire occurrence (15-30 year intervals).

Sagebrush currently occupies less area than it did historically, due to these past range treatments. Fire suppression has also removed the frequent disturbance interval that historically created patches of multi-aged stands. As shown in Table 2, the majority of the sagebrush on the Uncompahgre Plateau is in single-storied, single-aged stands.

Key Findings

- Gambel oak and mixed mountain shrub cover types currently occupy just over a quarter of the NFS lands.
- Aspen currently dominates a quarter of the NFS lands.
- Conifer forest and woodland cover types (pinyon-juniper, ponderosa pine, spruce-fir, Douglas-fir, blue spruce, lodgepole pine) combined make up 38 percent of the current vegetation cover on the Uncompahgre Plateau. Lodgepole pine does not naturally occur on the Uncompahgre Plateau, but was planted in the 1960s.
- Most of the spruce-fir, aspen, mixed conifer, ponderosa pine, Gambel oak and mixed mountain shrub cover types within the total Geographic Area occur on NFS lands.
- Most of the pinyon-juniper, cottonwood, sagebrush, willow and grass/forb cover types within the total Geographic Area occur off NFS lands on either BLM or private land.
- Current vegetation conditions are a result of the disturbance history on the Uncompahgre Plateau. Large fire(s) in 1879 burned over much of the Uncompahgre Plateau Geographic Area. The majority of the forest cover types regenerated following this fire event. This is reflected in the average age of all types (80 to 120 years old), their habitat structural stages (66 percent are in mature size class) and their current seral conditions (the majority of all forest types are in mid seral conditions).
- The lack of fire disturbance that has resulted from approximately 100 years of fire suppression efforts is also reflected in current vegetation conditions. Seventy-one percent of the forest and woodland cover types have dense canopy closures (> 40 percent canopy closure). There are very little early seral conditions in any cover type on the Uncompahgre Plateau. This imbalance is most pronounced in cover types that had a history of more frequent fires, such as ponderosa pine, oak-serviceberry and pinyon-juniper-oak-serviceberry types.
- When comparing the compositions of current vegetation cover types to PNV types (Figure 1 through Figure 7), it appears that aspen and oak currently occupy more area than would have been expected historically. This is somewhat misleading, however; because aspen and oak are both earlier seral stages to conifer dominated forest types (i.e., spruce-fir-aspen, ponderosa pine-oak), and given time, these deciduous cover types will succeed to conifer cover types.

Vegetation Trends

- The trend across all vegetation cover types on the Uncompahgre Plateau is to continue successional progress predominantly with the absence of either natural or human-caused disturbances. Structural and compositional conditions in each cover type will progress along successional timelines. Forest and woodland cover

appears to be increasing at the expense of formerly, open shrub and grasslands (Manier et al. Draft 2003). A shift from aspen dominated forests to conifer dominated forests is also occurring as a result of successional changes (Smith and Smith 2004).

Vegetation Management Implications

Management implications of vegetation conditions relate to differences between current and historic vegetation conditions. Where landscape conditions are within the historic range of variability landscapes are more resilient following disturbances, suitable habitat is provided for all species that evolved there, and ecosystems are productive and sustainable over time. Where current conditions deviate from historic ranges, there are increased risks for natural disturbances to be of higher intensities and affect larger areas than in the past; some habitats may become very limited or lost, threatening species viability; and loss of productivity can result in both ecological and economic losses. Management activities that can include both human and natural disturbances can be used to alter vegetation conditions. Management implications for specific cover types are discussed below.

Spruce-Fir

- Current stand conditions (age, density, canopy structure) in the majority of the spruce-fir cover type are susceptible to outbreaks of various insects and pathogens. Outbreaks of western spruce budworm and subalpine fir decline have been increasing over the past decade. (See Forest Health section.)

- The spruce-fir cover type comprises the late-mid to late seral stages of the spruce-fir-aspen PNV types (approximately 52 percent of the PNV type). These late-mid seral conditions are ripe for fire and insect and pathogen outbreaks (see Forest Health and Fire Management sections). Because so much of the landscape is in the same condition, there is a high probability that large areas can be affected at the same time. Large scale disturbances (both fire and insect outbreaks) are the natural regimes for this PNV type. Management activities that increase diversity in age, size and seral condition, could be used to reduce the potential effects of natural disturbances.

- At endemic or low levels of insect/pathogen activity, individual trees killed by insects and diseases can provide a variety of habitats for different wildlife species (snags, downed logs). However, if a large outbreak should cause heavy mortality across a large area, the result would be a shift from mature spruce-fir forests to young aspen stands. It could take almost two centuries for mature spruce-forest conditions to return.

- Recent timber management activity in the spruce-fir cover type was the first step of a three step shelterwood silvicultural system. (See Timber Management section.) Second step entries typically follow at 30 year intervals. Many previously treated stands are nearing the time for this second entry. Second step shelterwood entries usually remove 40 to 60 percent of the volume present, which

would open up stand conditions, allowing for both aspen and spruce regeneration. The resulting changes in stand conditions would lessen the risk for future fire, insect and/or pathogen infestations.

Aspen

- The aspen cover type occurs in most of the conifer PNV types (i.e., spruce-fir-aspen, ponderosa pine-oak, Douglas-fir, as the early through mid seral conditions), and the aspen PNV type (all seral stages). Aspen is currently the most dominant forest cover type on the Uncompahgre Plateau.

- Aspen stands become very susceptible to cankers and root rots above the age of 110 years. A large percentage of the aspen cover type on the Uncompahgre Plateau is between the age of 80 and 120 years. An increasing amount of mortality caused by these agents is expected in the future.

- Over 60 percent of the aspen stands on the Uncompahgre Plateau include conifer species in the understory or as codominant species (Smith and Smith, 2004). In the absence of some disturbance, these stands will eventually succeed to conifer dominated cover types. A shift from an aspen cover type to various conifer cover types will change the types of habitat available on the Uncompahgre Plateau.

Ponderosa Pine

- The majority of the ponderosa pine cover type is mature (80 percent). These stands are the late-mid seral stages of the ponderosa pine-oak PNV type.

- Historic timber harvest practices in the late 1800s into the early 1900s removed most of the old, large diameter trees in the ponderosa pine type. The current overstory is much younger (an average age between 100 and 140 years) and smaller than would have existed in historic stands. Habitat is limited for species that require large diameter ponderosa pine.

- Fire suppression and grazing over the past 100 years interrupted the natural fire regime in ponderosa pine. The result has been an increase in understory vegetation. Current conditions increase the potential for high-intensity stand replacing fires when fire does occur in this type. Before fire can be reintroduced into many of these stands, the amount of vegetation may need to be reduced by some means other than fire.

- Thinning, sanitation and salvage harvests associated with the mountain pine beetle outbreak in the late 1980s have resulted in stand conditions that are more uniform in nature than would have existed historically. Stands are less dense (80 percent of the stands have < 70 percent canopy closure) than other forest types, and snags and downed woody material have been reduced as a result of salvage operations.

Pinyon-Juniper Woodlands

- A comparison of conditions between 1937 and 1994 (Manier et al. 2003) indicates that pinyon-juniper has expanded into areas formerly dominated by shrubland and grasslands only in localized areas; however, the density of pinyon-juiper stands has increased. These changes have caused a decrease in the amount of available forage for both wildlife and domestic livestock.

- Historically this cover type had a patchy distribution of different aged stands (see Table 6). Currently most of the pinyon-juniper on the Uncompahgre Plateau is in late seral conditions of continuous dense even-aged stands. These conditions will alter the effects of future natural disturbances on the landscape. There is a increased risk of stand-replacing crown fires that may burn larger areas. (See Forest Health and Fire Management sections.)

- Past mechanical treatments (i.e., chainings) done in the mid 1960s to increase forage for both livestock and wildlife changed the amount of habitat available for species like mule deer and elk. As trees have become reestablished in these areas, the type of habitat provided by these areas has changed from foraging areas to cover.

- The proximity of wildland-urban interface areas intensifies the risks associated with intense wildfires in the pinyon-juniper cover type. Increasing development on private lands within this cover type is increasing the risks.

- The ongoing pinyon pine mortality has the potential to remove most of the pinyon trees from this cover type. This will greatly alter the habitat available for wildlife species, especially for pinyon obligates (See Wildlife section.)

Gambel Oak and Mountain Shrubs

- Table 7 indicates that current conditions in the Gambel oak and mixed mountain shrub cover types have less patchiness and structural stage diversity than would have occurred historically. The result is current conditions are more susceptible to higher intensity fires that may affect larger areas of land than would have occurred in the past. There is also less diversity in the types of habitat provided by these cover types than would have been present.

Sagebrush

- Past range treatments and livestock grazing altered the understory species composition in this cover type. Lack of disturbance in the past 30 years allowed shrub density to increase, reducing understory vegetation. Structural stage diversity has become more uniform and less patchy across the landscape. These combined changes have altered the habitat that historically would have been provided by this cover type.

- Only 13 percent of the sagebrush cover type currently found in the Geographic Area is located on NFS lands. The importance of these areas on Forest for species

conservation may increase, depending on the condition and future management of this cover type off Forest.

Grass-Forb

- The species composition in grass-forb cover types on the Uncompahgre Plateau has been altered from historic conditions through livestock grazing, seeding of non-native species, and introduction of noxious weeds. These cover types may be candidates for future restoration efforts.

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