Forested Vegetation and Fire and Fuels Specialist Report

Motorized Travel Plan
Dixie National Forest

Prepared by Lew Jump

May 2008

Chapter 3. Affected Environment - Vegetation 2
3.1 General 2
3.1.1 Vegetation Uses 2
3.1.2 Vegetation Composition 2
3.1.3 Vegetation Classification 6
3.2 Assessment of Motorized Travel Routes within the Suitable Timber Land Base 8
3.2.1 Pine Valley Ranger District 8
3.2.2 Cedar City Ranger District 9
3.2.3 Powell Ranger District 10
3.2.4 Escalante Ranger District 11
3.2.5 Teasdale Ranger District 11
3.3 Summary 12
Chapter 4. Environmental Consequences 13
4.1 Forested Vegetation and Fire and Fuels 13
4.1.1 Introduction 13
4.1.2 Issues 13
4.1.3 Analysis Design 13
4.1.4 Effects Common to All Alternatives 13
4.1.5 Alternative A, No Action 15
4.1.6 Alternative B 16
4.1.7 Alternative C 17
4.1.8 Alternative D 17
4.1.9 Alternative E 18
4.1.10 Summary 19
4.1.11 Conclusions 20
References 21

Chapter 3. Affected Environment - Vegetation

3.1 General

National forests were designated by Congress to retain public lands with unique combinations of vegetation, geology, scenery, watersheds, and wildlife habitat to be available for public use and to contribute to local, state, and national economies. Vegetation is a primary component of national forests. It is visually most apparent and has many uses. The following descriptions of existing vegetation will help establish the physical setting for the Dixie National Forest Motorized Travel Plan.

3.1.1 Vegetation Uses

National forest vegetation consists of trees, shrubs, grasses, and forbs. Collectively, these types of vegetation form forest landscapes that are popular with millions of national forest visitors every year. Public enjoyment of open spaces, spectacular vistas, forested landscapes, and forest-based recreation such as camping, hiking, fishing, and winter sports contribute more to local economies than any other use.

Forest vegetation cover protects the soil from erosion during rain and snowmelt. Soil and watershed protection are of primary importance when considering use of all vegetation types, to ensure sustained soil productivity and clean water. Forest vegetation collectively offers habitat for many species of wildlife, including big game species such as deer and elk; small animals such as squirrels, rabbits and birds; and down to insects and spiders.

Forest vegetation on the Dixie National Forest has specific uses in addition to the collective uses described above. The following list displays the most common uses of each vegetation element.

- Conifers and aspen. Saw timber, mine timbers and props, fence material (poles and posts), house logs, firewood, Christmas trees, cones, and seed. Fuelwood is collected from dead trees.
- Shrubs. Deer and elk forage, limited livestock forage, ornamentals, and berries (for wildlife and humans).
- Grass and forbs. Elk and livestock grazing, and seeds (wildlife food source).

Public use and Forest Service administration of these vegetation uses requires an appropriate motorized travel network to access areas for recreational enjoyment and to manage vegetation resources for the benefit of the land and the people that use it. Fuelwood collection is an important consideration as wood is a common heating source for homes located in rural areas in and near the Dixie National Forest. Motorized access is required for fuelwood collection. Chapter 4 will discuss how alternatives may affect fuelwood collection. This EIS, with input from interested publics, will decide on the motorized transportation system most appropriate to serve the needs of the land and people that use the Dixie National Forest.

3.1.2 Vegetation Composition

Each ranger district (RD) on the Dixie National Forest has a unique mix of vegetation types. These range from large expanses of sage, grass, and brush land on the western part of the Pine Valley RD, to mid-elevation pinyon/juniper woodlands on all districts, to higher elevation ponderosa pine, mixed conifer, aspen, and spruce-fir forests. The following sections describe

distribution and acreage of vegetation cover types on each ranger district. Acreages listed include all land ownership within the Dixie National Forest boundary. Acreages in this section were obtained from the Dixie National Forest GIS, based on Bayer and Ferguson (1992).

3.1.2.1 Pine Valley RD

This district is at the southern end of the Dixie National Forest and is dominated by lower elevation vegetation types such as grass, sage, and shrubs. Large areas of pinyon/juniper woodland occupy mid-elevations throughout the district. The Pine Valley Mountains dominate the southeast part of the district. Shrub land below leads abruptly to very steep, rocky slopes with occasional small stands of ponderosa pine near springs. The Pine Valley Mountain tops are dominated by mixed conifer (ponderosa pine, white fir and Douglas-fir). The Pine Valley Mountain Wilderness Area, where motorized travel is prohibited, covers most of the Pine Valley Mountains. The following list displays acres of each major vegetation or land cover type on the Pine Valley RD.

Table 1. Major Vegetation or Land Cover Type, Pine Valley RD

Type	Acres
Aspen	721
Gambel oak	46,105
Mixed conifer	32,831
Pinyon/juniper	243,376
Ponderosa pine	4,421
Sage	21,731
Shrub	121,764
Rock	12,372
Total	483,321

3.1.2.2 Cedar City RD

This district is located north of the Pine Valley RD and just east of Cedar City, Utah. Very complex vegetation mosaics are represented here. Large aspen groves and mixed conifer stands dominate the steep western slopes leading up to Cedar Breaks National Monument and the Markagunt Plateau. The Plateau dominates the central part of the district. Elevations here are commonly between 9,000 and 10,500 feet. Brian Head Peak, 11,307 feet in elevation, is located on the west edge of the Plateau. Brian Head Resort, known mostly for downhill skiing, is located here. Concentrated motorized travel is associated with this resort and accompanying access. A spruce-fir and aspen mosaic is most common on the Plateau, with large lava flows interspersed. Bristlecone pine, known to live more than 3,000 years, are widely scattered along the Plateau rim.

The Markagunt Plateau transitions more slowly to lower elevations on the east side of the district where mixed conifer with scattered aspen dominate the higher elevations. Ponderosa pine stands are most common on the eastern third of the district. Large lava flows also occur here. Motorized travel is concentrated in this area due to public attraction to Navajo Lake, Panguitch Lake, Duck Creek Village, and several year-round and summer communities scattered throughout this part of the district.

A pinyon/juniper, shrub, and sage complex is most evident at the north end of the district in the Bear Valley area. These vegetation types continue along the very east edge of the district. The following list displays acres of each major vegetation or land cover type on Cedar City RD.

Table 2. Major Vegetation or Land Cover Type, Cedar City RD

Type	Acres
Aspen	28,549
Gambel oak	4,192
Limber/bristlecone pine	149
Mixed conifer	74,410
Pinyon/juniper	35,093
Ponderosa pine	73,897
Sage	58,381
Shrub	51,231
Spruce-fir	36,745
Rock	26,351
Water	1,725
Total	390,723

3.1.2.3 Powell RD

This district lies in the central part of the Dixie National Forest east of Panguitch, Utah. The Powell RD is characterized by two very different forested areas separated by a large sage, rock, and pinyon/juniper complex. The north end of the district is fringed by a mosaic of pinyon/juniper and sage. Slopes rise abruptly to higher elevations with little transition from pinyon/juniper to a spruce-fir forest. The spruce-fir forest extends from Mount Dutton (11,400 feet) south to 2 miles south of Hancock Peak (9,990 feet). This area has very rugged terrain with few roads compared to the south end of the district.

The largest aspen grove on the district is located north of the spruce-fir area and stretches 8 miles to the district north boundary. Large stands of high-elevation mountain shrubs occur on south-facing slopes.

Vegetation changes quickly south of the spruce-fir forest with little transition to the rock and sage complex characteristic of the central portion of the Powell RD. Stands of ponderosa pine and pinyon/juniper are scattered along drainages.

The Paunsaugunt Plateau begins south of Highway 12, which bisects the district. This plateau is heavily dissected with drainages and forms the headwaters of the North Fork of the Sevier River. Vegetation is characterized by mixed conifer on the north-facing slopes. South-facing slopes are rocky and contain scattered stands of ponderosa pine. Ponderosa pine is also found in the flatter bottoms between ridges and more generally at the lower elevations at the north end of the Plateau just south of Highway 12. Long stringers of aspen are located along major creeks in the higher elevations of the south half of the Plateau. The following list displays acres of each major vegetation or land cover type on the Powell RD.

Table 3. Major Vegetation or Land Cover Type, Powell RD

Type	Acres
Aspen	11,823
Mixed conifer	38,048
Pinyon/juniper	56,911
Ponderosa pine	26,753
Sage	120,423
Shrub	24,700
Spruce-fir	35,525
Rock	74,242
Water	143
Total	388,568

3.1.2.4 Escalante RD

This district is located north and west of Escalante, Utah. It shares the eastern end of the Dixie National Forest with the Teasdale RD adjacent to the north.

The Escalante RD is characterized by distinct bands of different vegetation types as the landscape rises sharply from pinyon/juniper woodlands and large rock formations in lower elevations to spruce-fir forested areas on Griffin and Boulder mountains that form the Aquarius Plateau. A narrow band of ponderosa pine with a band of aspen groves above lies between the pinyon/juniper woodlands and the spruce-fir forest.

A small high-elevation plateau is located in the southwest part of the district, Table Cliff Plateau, known locally as Barney Top. Mixed conifer covers the lower slopes and spruce-fir stands are found on higher north-facing slopes and areas above 9,000 feet in elevation. The distinct band of ponderosa pine continues south along the east slopes of the Table Cliff Plateau and extends to the southern tip of the district near Canaan Peak. The following list displays acres of each major vegetation or land cover type on the Escalante RD.

Table 4. Major Vegetation or Land Cover Type, Escalante RD

Type	Acres
Aspen	43,731
Gambel oak	4,739
Limber/bristlecone pine	803
Mixed conifer	24,844
Pinyon/juniper	98,375
Ponderosa pine	76,841
Sage	52,886
Shrub	14,076
Spruce-fir	53,647
Rock	66,342
Water	270
Total	436,554

3.1.2.5 Teasdale RD

This district shares the east end of the Dixie National Forest with the Escalante RD and is located immediately south of Teasdale, Utah.

The Aquarius Plateau is the dominant land form and is covered with a mosaic of spruce-fir forest, aspen groves, high-elevation shrubs, grass, and rock outcrops. The Plateau is dotted with hundreds of small lakes. Elevations range commonly between 9,500 and 11,000 feet on the Plateau top. Bluebell Knoll on Boulder Mountain is at 11,322 feet in elevation. This area is one of the highest elevation spruce-fir forests in the world.

The east side of Teasdale RD has the same bands of vegetation as described on the Escalante RD. Pinyon/juniper woodlands grade upward into a belt of ponderosa pine below a band of aspen groves, leading up to the rocky rim of the Aquarius Plateau. There are also some stands of spruce-fir immediately below the Plateau rim.

The northwest part of the district has a more gradual transition to the Plateau top and vegetation bands are not distinct. Sage is dominant at the lowest elevations with stringers of aspen in the wetter drainages. A sage, aspen, and spruce-fir mosaic is found in the transition zone just below the Plateau rim, grading up to the spruce-fir forest. The following list displays acres of each major vegetation or land cover type on the Teasdale RD.

Table 5. Major Vegetation or Land Cover Type, Teasdale RD

Type	Acres
Aspen	13,924
Gambel oak	3,681
Pinyon/juniper	59,431
Ponderosa pine	19,664
Sage	37,066
Shrub	37,624
Spruce-fir	57,580
Rock	24,367
Water	368
Total	253,705

3.1.3 Vegetation Classification

3.1.3.1 Vegetation Inventory

National forests are periodically inventoried to map, describe, and quantify existing vegetation. A national system, Forest Inventory and Analysis (FIA), is used throughout the Forest Service to accomplish this. The FIA program is administered by each Forest Service Regional Office. Updates are now on an annual basis for each Forest Service region. Various combinations of satellite imagery are used to map and describe vegetation by cover type. Although highly sophisticated remote sensing analysis is the basis for vegetation mapping, field verification is still a very important part of the process. Vegetation inventory plots are measured on the ground. A myriad of data is collected on these plots and the data are used to quantify and monitor forest tree growth, mortality, trends in insect and disease activity, and vegetation

change over time.[1] The most recent inventory publication for the Dixie National Forest was published in 1998 (USDA 1998)

A soil-vegetation mapping project, "Soil to Vegetation Correlation," was completed by Dixie National Forest personnel in 1992 (Bayer and Ferguson 1992). This project had more intensive field verification than FIA, and is therefore the reference used for vegetation acreage in this section.

3.1.3.2 Forest Health

Forest vegetation can also be described by various conditions of forest health. This typically includes tree growth loss and mortality caused by insects, disease, and fire. These conditions are observed, measured, and described as part of the FIA process referenced in the section above.

Dixie National Forest vegetation has been affected by elements of change during the last 20 years. Wildfire has burned over extensive areas of pinyon/juniper woodland. Prolonged drought has decreased forage regeneration and growth for wildlife and livestock, as well as causing tree growth loss and mortality from lack of available soil moisture during growing seasons. Otherwise healthy trees stressed during years of drought become susceptible to bark beetle attack. This has happened numerous times on the Dixie National Forest. Spruce beetle killed large areas of spruce on the Aquarius Plateau in the 1920s. Mountain pine beetle killed large areas of ponderosa pine on the Escalante RD in the 1980s. Most recently, another spruce beetle outbreak has killed large areas of spruce on the Cedar City RD (1988-2000). Spruce beetle mortality is currently increasing on the Escalante RD. Small pockets of current spruce beetle activity are also evident on the Powell and Teasdale RDs.

Forest tree diseases common on the Dixie National Forest include ponderosa pine limb rust and dwarf mistletoe (a parasitic plant). These are not readily apparent, but cause significant growth loss and mortality annually throughout the Forest. Root rots are common in older aspen groves and can also affect spruce.

Aspen groves throughout the Dixie National Forest have been declining in vigor for many years. Aspen is a short-lived species (about 80 to 100 years) dependent on natural wildfire cycles or clear-cut harvesting for regeneration. Decades of successful wildfire suppression have kept fire out of aspen groves. Low or absent demand for aspen wood products has resulted in minimal acres of aspen managed for regeneration. The Dixie National Forest has recently begun aspen restoration projects to regenerate decadent stands. Motorized access will be required in these areas for project completion and monitoring.

Forest Service management can anticipate these forces of nature and manage stands of trees to maintain them in a resilient condition so they have a good chance of surviving drought, fire, insects, and disease by periodically thinning stands that are too dense, salvaging larger dead trees, and treating accumulations of dead wood to reduce fuels. These operations require a reasonable level of motorized access.

3.1.3.3 Timber Suitability

The Dixie National Forest recently completed an analysis and mapping of Forest lands suitable for management of commercial timber species (conifers and aspen). Information and acreage

[1] More detailed descriptions of the processes and results can be found on the National Forest Inventory and Analysis website at http://www.fia.fs.fed.us.

concerning timber suitability were taken from this report and the corresponding GIS database layer (USDA 2007).

Vegetation types included in this analysis are ponderosa pine, mixed conifer, aspen, and spruce-fir. The following categories were eliminated from the suitable timber land base:

- Non-Forest Service ownership,
- Congressionally designated wilderness areas,
- Administratively withdrawn lands (research natural areas, Forest Service administrative sites),
- Economically and technologically infeasible lands (areas greater than 35 percent slope or more than 0.5 miles from an existing Forest Service road),
- Non-forested lands (roads, land with less than 10 percent tree cover),
- Lands developed for non-timber use (developed recreation sites),
- Irreversible impacts (sensitive soils), and
- Adequate reforestation not assured (low productivity soils, excessive rock).

Lands determined as suitable for timber management are therefore those areas of productive forest land that are compatible with desired conditions and management objectives. Timber suitability maps are available for viewing at the Forest Supervisor's Office in Cedar City, Utah, and are included in the project file.

Timber suitability assumes that motorized travel access exists adequate to perform all aspects of timber management such as timber harvest and administration, reforestation and associated site preparation, pre-commercial thinning, stand examination, and fuel reduction projects. The next section offers a summary assessment of suitable timber lands on each ranger district and of how well the existing road system serves the needs of timber management within the mapped suitable timber areas.

3.2 Assessment of Motorized Travel Routes within the Suitable Timber Land Base

Forest areas of suitable timber land by definition are located within approximately 0.5 mile of a Forest Service system road. Many road segments within the suitable land base were constructed concurrent with past timber harvesting but were never formally added to the transportation system database as Forest Service system roads. The Record of Decision for this EIS will stipulate which of these road segments will be added to the Forest Service system. Some are logically needed for management access and some are not. There may also be reasons to close or decommission existing Forest Service system roads. These will be addressed in the effects analysis section in the EIS.

The following sections will summarize existing motorized travel routes within the suitable timber land base of each ranger district and highlight areas where Forest Service system roads may be inadequate, if any, and where non-system roads may need to be retained. Acreages in this section came from the report, "Timber Suitability", Dixie Forest Plan Revision, 2006.

3.2.1 Pine Valley Ranger District

This district has very little suitable timber as most of the conifer and aspen are located within the Pine Valley Mountain Wilderness Area. The area of suitable timber by vegetation cover type is illustrated in the following table.

Table 6. Suitable Timber by Vegetation Cover Type, Pine Valley RD

Type	Acres
Ponderosa pine	1,497
Mixed conifer	12
Total	1,509

This area of suitable timber is located around the perimeter of a small residential community (private land) between the Forest Service Pine Valley Work Center and the Pine Valley Recreation Area. The area is very heavily used by the local public nearly year-round. Forest Service system roads provide adequate access for any management need that may arise.

The existing road system density is very low in the central and west portions of the district, but is basically adequate to serve management and public access needs which are mainly associated with grazing permit administration. Classification of scattered segments of non-Forest Service system roads will be decided by this EIS process.

3.2.2 Cedar City Ranger District

This district has a significant suitable timber land base, but motorized access road density varies widely between different parts of the district. Acres of suitable timber by vegetation or land cover type are illustrated in the following table.

Table 7. Suitable Timber by Vegetation Cover Type, Cedar City RD

Type	Acres
Ponderosa pine	55,627
Mixed conifer	43,201
Aspen	23,081
Spruce-fir	30,566
Total	152,475

Although suitable timber land is partially defined as being within 0.5 mile of a Forest Service system road, activities requiring use of heavy equipment typically need access within 0.25 mile of a road. Much of the aspen and spruce-fir suitable lands on the Cedar City RD would need numerous temporary road spurs constructed for timber harvesting. About 8 square miles of mixed conifer on the west side of the district above Yankee Reservoir and Round Meadow are also in this category. Individual project NEPA decisions will be used to specify construction of minor access road spurs, if and when the need arises.

The area of recent spruce mortality around Sidney Valley has Forest Service system roads in place basically adequate to serve the needs of timber salvage and related activities. Individual projects may propose construction of additional road spurs if needed in this area.

The suitable mixed conifer area south of Duck Creek Village and north and east of Strawberry Point has been well-roaded in the past, but most road segments not needed for general access

have been closed or decommissioned. General resource management access is adequate in this area.

The suitable area of ponderosa pine on the east side of the district between Harris Flat near State Highway 14 and Houston Flat 7 miles to the north has the highest road density on the district. Roads in this area not needed for general access have also mostly been closed or decommissioned by the 2002 Duck Creek-Swains Travel Management Project decision. The Forest Service system road network remaining in this area is adequate for general management access.

The area of suitable ponderosa pine and mixed conifer on the east side of the district between Mahogany Hill and 10 miles north to South Canyon has many unauthorized road segments. Most of these roads were built in conjunction with timber harvest but were not formally added to the Forest Service road system, closed, or decommissioned. Decisions need to be made about which of these road segments to add to the Forest Service road system or designate as non-system roads. The current transportation system appears adequate for most vegetation management needs.

3.2.3 Powell Ranger District

This district has a significant suitable timber land base, but extreme differences in road density from one end of the district to the other. The Mount Dutton area on the north end of the district has very limited access, while the East Fork mixed conifer suitable area is well-roaded. Acres of suitable timber by vegetation cover type are illustrated in the following table.

Table 8. Suitable Timber by Vegetation Cover Type, Powell RD

Type	Acres
Mixed conifer	33,265
Ponderosa pine	20,432
Aspen	11,413
Spruce-fir	1,721
Total	66,831

The large area of spruce-fir forest around Mount Dutton has few roads, steep slopes, and is relatively remote. Most of this area, 11,123 acres, was classified as unsuitable for timber management for adverse economic and technology reasons. The cost of harvesting timber and associated timber management practices (road construction, fuel reduction, reforestation, thinning, etc.) here currently far exceed the value of timber that could be harvested. The large area of suitable aspen north of Mount Dutton is fairly well roaded, but contains a number of non-Forest Service system road segments. Some of these lead out into the sagebrush below the aspen groves.

Non-Forest Service system road segments are common in the central part of the district across the sagebrush flats. Additional non-Forest Service system road segments are concentrated in suitable ponderosa pine stands in the east-central part of the district, north and south of Highway 12.

Non-system routes are addressed in various ways across the alternatives in response to issues. The number of system routes and their effect on the vegetation and fire and fuels resource will

be discussed in chapter 4 of this report. For more information on the disposition of all non-system routes, see the Transportation Specialist Report.

The suitable mixed conifer areas in the south end of the district have an adequate network of Forest Service system roads to manage vegetation resources. Non-Forest Service system road segments are scattered throughout this end of the district.

3.2.4 Escalante Ranger District

This district has a large suitable timber land base that is quite varied. Acres of suitable timber by vegetation cover type are illustrated in the following table.

Table 9. Suitable Timber by Vegetation Cover Type, Escalante RD

Type	Acres
Mixed conifer	15,036
Limber/bristlecone pine	494
Ponderosa pine	48,662
Aspen	13,531
Spruce-fir/aspen	244
Spruce-fir	40,131
Total	118,098

Ponderosa pine dominates the lower elevations of suitable lands around Canaan Mountain, slopes on the east side of Table Cliff Plateau, and west of Powell Point and Pine Lake. Mixed conifer suitable areas dominate the north-facing slopes of Canaan Mountain, and east and west slopes just below spruce-fir stands on Barney Top (higher elevations of Table Cliff Plateau). Forest Service system roads are basically adequate to serve current timber management needs in these areas. Scattered segments of non-Forest Service system roads are located in these areas.

The suitable ponderosa pine belt that begins on the north side of Highway 12 and extends eastward close to the Teasdale RD boundary has an adequate system of Forest Service roads to manage this area. Only a few widely scattered non-system roads occur here. The narrow aspen belt just above the ponderosa pine has few roads and is classified mostly unsuitable for timber management.

The suitable spruce-fir areas on Griffin Top and adjacent Aquarius Plateau have a good network of Forest Service-system roads adequate to manage this area. A few short spur roads may be needed for salvaging spruce recently killed by bark beetles. Road density is much lower in the north one-third of Griffin Mountain where there is more of a suitable spruce-fir and aspen mosaic. Non-system roads are present in this area.

3.2.5 Teasdale Ranger District

This district has a suitable timber land base and associated road system similar to the Escalante RD, but on a somewhat smaller scale. Acres of suitable timber by vegetation cover type are illustrated in the following table.

Table 10. Suitable Timber by Vegetation Cover Type, Teasdale RD

Type	Acres
Ponderosa pine	17,629
Aspen	12,579
Spruce-fir/aspen	3,057
Spruce-fir	50,312
Total	83,577

The ponderosa pine and aspen belts on the east side of the district have a basic Forest Service road system in place, but road density is low. Segments of non-Forest Service system roads are scattered throughout this area. Some of these may need to be added to the Forest Service road system to support viable projects. Timber harvest in these belts would require additional temporary road spurs. Spruce-fir stands below the Aquarius Plateau rim are in a similar condition as the ponderosa pine and aspen belts.

The Teasdale RD portion of the Aquarius Plateau has a mosaic of suitable spruce-fir stands and grass/shrub areas on the east side. Road density is low here and many old roads have been decommissioned. The Plateau center, with only a very basic road system in place, is dominated by areas of shrubs and grass with scattered stands of sparse spruce-fir. Spruce-fir stands below the west Plateau rim also have low road density with only a few scattered segments of non-system roads.

The road system on the Teasdale RD is only basically adequate to manage the timber resource at a low intensity.

3.3 Summary

The Dixie National Forest has a very complex vegetation mosaic that varies tremendously between ranger districts and with changes in elevation. Topography, plateau rims, lava flows, sensitive soils, and the remote nature of much of the Forest have presented challenges to road construction and vegetation management. Most roads in suitable timber areas were constructed in conjunction with timber harvest. This has resulted in relatively high road densities where timber has been harvested and low road densities elsewhere.

The Dixie National Forest has a Forest Service system road network that is adequate in most areas to serve the needs of currently appropriate vegetation management intensity.

Chapter 4. Environmental Consequences

4.1 Forested Vegetation and Fire and Fuels

4.1.1 Introduction

Motorized travel route designation does not directly affect forested vegetation, but it does affect access to vegetation for resource uses and management, primarily timber harvest and salvage and Forest Service access for vegetation management project work, as described in Chapter 3. Effects indicators for forested vegetation are the change in:

1. Opportunity for management of forested vegetation on suitable lands, and
2. Public opportunity to collect fuelwood and other forest products.

4.1.2 Issues

There are no issues specific to vegetation use or management, or to fire and fuels.

4.1.3 Analysis Design

Each alternative defines a different area of suitable timber land within a half-mile of an open road. The Forest's Geographic Information System (GIS) was used to map these areas by buffering open roads for each alternative by one-half mile, then adding the buffer line to maps so relative locations of planned projects and other features such as vegetation and roads could be spatially analyzed. Each planned vegetation management project location was compared to proximity of open roads, for example, to see if the planned project was reasonably accessible under a given alternative. Effects of each alternative on forested vegetation, then, were determined by this method of spatial analysis using maps combining features of open roads, vegetation, planned vegetation management projects, ranger district boundaries, Forest boundary, and other appropriate map references.

Effects of alternatives on wildfire suppression were determined by intuitive reasoning and cause and effect relationship experience, as wildfires are unplanned events in somewhat random locations and cannot be quantified relative to motorized travel. Effects of alternatives on fuels management are also generalized, as fuels management is typically applied as one type of vegetation management project. Fuels management projects are included in the vegetation management projects mapped as part of the spatial analysis described above.

4.1.4 Effects Common to All Alternatives

4.1.4.1 Forested Vegetation

Suitable timber lands have existing arterial and collector road access to the general forest in most areas of the Dixie National Forest. Reconstruction of these roads or construction of temporary roads is sometimes needed to facilitate access to the immediate area in need of silvicultural or other treatment. Management actions can often be readily and cost-effectively implemented from a well-designed transportation system. Additional temporary roads may be needed to facilitate vegetation management activities as needs and opportunities are identified. Road access adds value to any timber that might be harvested in the future (i.e., accessible timber has more net value than timber without motorized access). Individual project analysis

conducted according to the National Environmental Policy Act (NEPA) will evaluate needs for existing road reconstruction and construction of temporary roads.

There are 467,870 acres of lands suitable for timber management on the Forest. All acreage and road mileage values in this analysis were obtained from the Dixie National Forest's GIS database. GIS metadata documentation, available from the Dixie National Forest Supervisor's Office in Cedar City, Utah, provides original sources for this information. For this analysis, only those suitable lands within one-half mile of roads designated as open in each alternative were considered. There are scattered areas of suitable timber beyond one-half mile of the existing road system; however, these areas will not likely need to be accessed for management within the foreseeable future so will not be considered in this analysis.

Ongoing monitoring must be conducted across the Forest to assess the condition and health of forested vegetation. Existing motorized travel routes contribute to access for monitoring and management of forest stands. These activities would be much more expensive or difficult to accomplish without road access, as Forest personnel would have to hike long distances to accomplish monitoring activities without road access.

Public motorized travel restrictions vary among alternatives. Opportunities to access major portions of the Forest, including suitable timber base lands, would continue under all alternatives. Effects of each alternative are dependent on amounts of road access eliminated by closing existing roads. Some travel routes are closed to the public, but have been retained as system roads for Forest Service administrative needs.

The current forest products program on the Dixie National Forest averages timber harvest on 1,500 to 2,000 acres annually. Commercial products harvested include saw logs and house logs, each accounting for about half of the annual 13 MMBF (million board feet) harvest. Tree seedlings are planted on about 500 acres annually across the Forest to replenish stands killed by bark beetles or fire, and a few stands receiving regeneration harvest (Eisenhauer 2007).

Collection of dead and down wood through use of personal use firewood permits will continue under all alternatives. Fuel wood can be found most anywhere from the pinyon/juniper vegetation type to the high elevation spruce-fir stands. Trees die somewhat randomly, so it is impossible to predict where fuel wood will be located. Fuel wood located near roads is preferred because it is most easily accessible. Some alternatives will provide greater opportunities to collect fuel wood than others. Relative opportunity to collect fuel wood is discussed in the individual alternative sections below. Fuel wood permits will specify areas open for collection and any associated motorized travel rules specific to the permit.

None of the alternatives are limiting to forested vegetation management projects planned for the next five years. All planned projects would remain reasonably accessible even under Alternative B, the most restrictive alternative in terms of motorized access.

Unforeseen needs for future motorized access for forested vegetation management, including rehabilitation of stands burned by wildfire or damaged by insect or disease outbreaks, would be assessed by NEPA analysis of each individual project.

Effects on vegetation below the commercial conifer zone (pinyon and juniper, shrub lands, and grasslands) can also only be considered in a relative sense. Alternatives offering greater motorized access may increase chances of damage to vegetation near roads and trails.

4.1.4.2 Fire and Fuels

Decades of forest fire suppression have allowed large, unnatural accumulations of fuel (dead trees, branches, twigs, needles, and leaves) in many forest stands. A natural "cool-burning" fire with a low rate of spread and short flame lengths could not be expected in areas of high fuel accumulation. The result is a general Forest Service policy of wildfire suppression to protect natural resource values as well as life and property near communities and Forest administrative sites (Abella et al. 2007). Most fire suppression relies on motorized access for engines and crews. Alternatives with fewer miles of open road could cause longer travel times and possibly larger fires due to the increased travel time for crews and equipment. However, fewer miles of road open for public access could offer less chance of human-caused fires to occur. These effects cannot be quantified due to the fact that wildfires are more or less random events, so analysis of them can only be relative in terms of motorized access. Any effects of lack of open roads on wildfire suppression are expected to be minimal since the roads in critical strategic locations for wildfire suppression within the Dixie National Forest remain open in all alternatives. Fuels management projects, including prescribed burning, require individual NEPA analyses where motorized access needs will be evaluated for each planned project.

The following sections summarize effects of each alternative on forested vegetation management and display acres of land suitable for timber management within one-half mile of open roads on each ranger district.

4.1.5 Alternative A, No Action

4.1.5.1 Forested Vegetation

All Forest acres determined to be suitable for timber management are reasonably accessible by the existing motorized transportation system. Approximately 3,717 miles of roads forest-wide would be open for all uses including timber harvest and hauling, accessing approximately 406,390 acres of suitable timber. The following table displays the areas of suitable timber within a one-half mile buffer of open roads.

Table 11. Alternative A: Acres Suitable for Timber Production

Area	Acres Within ½ Mile Buffer	Acres Outside ½ Mile Buffer	Total Acres	% of Acres Within ½ Mile Buffer
Cedar City	144,690	22,740	167,430	86%
Escalante	126,960	9,500	136,460	93%
Pine Valley	1,220	290	1,510	81%
Powell	64,290	2,540	66,830	96%
Teasdale	69,230	26,410	95,640	72%
Forest-wide	406,390	61,480	467,870	87%

All acres are rounded to the nearest 10 acres.

Compared to Alternative E with the largest suitable land base within one-half mile of open roads, Alternative A would have 4,840 fewer suitable acres within one-half mile of open roads. Alternative A is the only alternative that allows cross-country travel (allowed on the 61 percent of the Forest not closed through previous decisions), which could contribute to serious damage to vegetation in localized areas of frequent, heavy use. Alternative A offers the greatest

opportunity to collect fuel wood, since overland travel is allowed on a significant area of the Forest.

4.1.5.2 Fire and Fuels

Current wildfire ignitions and behavior are expected to continue as in the recent past, as there would be no changes in the road system in this alternative that could affect suppression actions. Natural fuels would continue to accumulate. Current fuel reduction projects would continue as planned.

4.1.6 Alternative B

4.1.6.1 Forested Vegetation

This alternative provides the fewest miles of roads open to motorized travel, responding to associated issues received during the scoping process. Approximately 1,640 miles of roads Forest-wide would be open for all uses including timber harvest and hauling, and providing access to approximately 343,710 acres of suitable timber across the Forest. The following table displays the areas of suitable timber within a one-half mile buffer of open roads.

Table 12. Alternative B: Acres Suitable for Timber Production

Area	Acres Within ½ Mile Buffer	Acres Outside ½ Mile Buffer	Total Acres	% of Acres Within ½ Mile Buffer
Cedar City	127,960	39,470	167,430	76%
Escalante	100,750	35,710	136,460	74%
Pine Valley	1,220	290	1,510	81%
Powell	56,040	10,790	66,830	84%
Teasdale	57,730	37,910	95,640	60%
Forest-wide	343,700	124.170	467,870	73%

All acres are rounded to the nearest 10 acres.

Compared to Alternative A, this alternative would have 62,690 fewer suitable acres, which could mean a proportionally smaller timber harvest in future years than the current harvest of 13 MMBF. Alternative B offers the least area for fuel wood collection, as this alternative has the lowest amount of open roads and overland motorized travel is prohibited. However, fuel wood collection will still be potentially available on a significant area of the Forest within the suitable timber areas, plus thousands more acres of pinyon-juniper.

4.1.6.2 Fire and Fuels

Alternative B has the fewest miles of open road among the alternatives so the potential for longer fire crew travel times and resulting larger fires would be the greatest under this alternative. However, human-caused fire ignitions could be less under this alternative because of fewer miles of roads open for travel. Planned fuel reduction projects would continue as in the past, since these project areas remain reasonably accessible by motorized travel.

4.1.7 Alternative C

4.1.7.1 Forested Vegetation

This is a mid-range alternative that allows for a somewhat higher level of motorized access than Alternative B. Approximately 1,810 miles of roads forest-wide would be open for all uses including timber harvest and hauling, and providing access to approximately 364,230 acres of suitable timber within one-half mile of open roads across the Forest. The following table displays the areas of suitable timber within a one-half mile buffer of open roads.

Table 13. Alternative C: Acres Suitable for Timber Production

Area	Acres Within ½ Mile Buffer	Acres Outside ½ Mile Buffer	Total Acres	% of Acres Within ½ Mile Buffer
Cedar City	135,770	31,660	167,430	81%
Escalante	107,530	28,930	136,460	79%
Pine Valley	1,220	290	1,510	81%
Powell	60,460	6,370	66,830	90%
Teasdale	59,250	36,390	95,640	62%
Forest-wide	364,230	103,640	467,870	78%

All acres are rounded to the nearest 10 acres.

Compared to Alternative A, this alternative would have 42,160 fewer suitable acres, which could mean a proportionally smaller timber harvest in future years than the current harvest of 13 MMBF. This alternative would have less area potentially available for fuel wood collection than Alternatives A, D, or E, but more area than Alternative B. Fuel wood collection will still be potentially available on a significant area of the Forest within the suitable timber areas, plus thousands more acres of pinyon-juniper.

4.1.7.2 Fire and Fuels

This alternative has fewer miles of open road than Alternatives A, D, or E, but more than Alternative B, so the potential for longer fire crew travel times and resulting larger fires could be somewhat greater under this alternative if fires start within areas of closed roads. However, human-caused fire ignitions could be less than in Alternative A because of fewer miles of roads open for travel. Planned fuel reduction projects would continue as in the past since these project areas remain reasonably accessible by motorized travel.

4.1.8 Alternative D

4.1.8.1 Forested Vegetation

This is also a mid-range alternative that generally allows a higher level of motorized access than Alternatives B and C, but fewer miles of roads open for motorized access than Alternatives A and E. Approximately 2,520 miles of roads would be open forest-wide for all uses including timber harvest and hauling, and providing access to approximately 398,220 acres of suitable timber within one-half mile of open roads across the Forest. The following table displays the areas of suitable timber within a one-half mile buffer of open roads.

Table 14. Alternative D: Acres Suitable for Timber Production

Area	Acres Within ½ Mile Buffer	Acres Outside ½ Mile Buffer	Total Acres	% of Acres Within ½ Mile Buffer
Cedar City	143,460	23,970	167,430	86%
Escalante	124,480	11,980	136,460	91%
Pine Valley	1,220	290	1,510	81%
Powell	63,030	3,800	66,830	94%
Teasdale	66,020	29,620	95,640	69%
Forest-wide	398,210	69,660	467,870	85%

All acres are rounded to the nearest 10 acres.

Compared to Alternative A, Alternative D would have 8,180 fewer suitable acres, possibly reducing the future timber harvest to slightly less than the current harvest of 13 MMBF.

4.1.8.2 Fire and Fuels

Effects of Alternative D on fire and fuels would be similar to that of Alternative C, since this alternative has fewer miles of open road than Alternative A or E, so the potential for longer fire crew travel times and resulting larger fires could be somewhat greater under this alternative if fires start within areas of closed roads. However, human-caused fire ignitions could be less than in Alternative A or E because of fewer miles of roads open for travel. Planned fuel reduction projects would continue as in the past since these project areas remain reasonably accessible by motorized travel. Alternative D will have a greater area potentially available for fuel wood collection than Alternatives B and C, but somewhat less than Alternatives A and E. Fuel wood collection will still be potentially available on a significant area of the Forest within the suitable timber areas, plus thousands more acres of pinyon-juniper.

4.1.9 Alternative E

4.1.9.1 Forested Vegetation

Alternative E allows the most miles of motorized access of any of the alternatives. This alternative incorporates additional open roads requested by scoping participants. Approximately 4,430 miles of roads forest-wide would be open for all uses including timber harvest and hauling, accessing approximately 411,230 acres of suitable timber across the Forest. The following table displays the areas of suitable timber within a one-half mile buffer of open roads.

Table 15. Alternative E: Acres Suitable for Timber Production

Area	Acres Within ½ Mile Buffer	Acres Outside ½ Mile Buffer	Total Acres	% of Acres Within ½ Mile Buffer
Cedar City	147,930	19,500	167,430	88%
Escalante	127,790	8,670	136,460	94%
Pine Valley	1,220	290	1,510	81%
Powell	64,580	2,250	66,830	97%
Teasdale	69,710	25,930	95,640	73%
Forest-wide	411,230	56,640	467,870	88%

All acres are rounded to the nearest 10 acres.

Alternative E has the most suitable acres accessible within one-half mile of an open road: 13,020 acres more than Alternative D, 4,840 acres more than Alternative A, and 67,530 acres more than Alternative B. A slightly larger timber harvest program would be feasible under this alternative than the current harvest of 13 MMBF since more suitable acres would be available within one-half mile of open roads. Alternative E offers a greater potential area for fuel wood collection than Alternatives B, C, or D, but less than Alternative A, since cross-country travel is prohibited under Alternative E.

4.1.9.2 Fire and Fuels

Alternative E provides the most miles of open roads and the largest land base accessed by motorized roads and trails. Fire crews and equipment would have shorter travel times to fires in these roaded areas, which means initial attack would begin sooner, possibly resulting in smaller fire sizes. However, more miles of open roads could contribute to a greater risk of human-caused fires starting since motorized access would allow travel to additional areas not available in other alternatives. Planned fuel management projects would continue as usual as all planned fuels management projects remain reasonably accessible under this alternative.

4.1.10 Summary

Table 6 displays miles of open roads and acres suitable for timber management by ranger district for each alternative.

Table 16. Summary of Open Roads and Suitable Acres Within One-half Mile of Open Roads

Area	Alternative									
	A		B		C		D		E	
	Miles of Roads	Acres of Suitable Timber	Miles of Roads	Acres of Suitable Timber	Miles of Roads	Acres of Suitable Timber	Miles of Roads	Acres of Suitable Timber	Miles of Roads	Acres of Suitable Timber
Cedar City	940	144,690	530	127,960	600	135,770	730	143,460	1,130	147,930
Escalante	650	126,960	330	100,750	350	107,530	390	124,480	910	127,790
Pine Valley	670	1,220	230	1,220	270	1,220	490	1,220	710	1,220
Powell	1,020	64,290	350	56,040	380	60,460	570	63,030	1,170	64,580
Teasdale	440	69,230	200	57,730	220	59,250	340	66,020	500	69,710
Forest-wide	3,720	406,390	1,640	343,700	1,820	364,230	2,520	398,210	4,420	411,230

All miles and acreages are rounded to the nearest 10.

4.1.11 Conclusions

4.1.11.1 Forested Vegetation

All alternatives would provide reasonable motorized access to all of the vegetation management projects planned on the Dixie National Forest for the next five years. All alternatives would also provide motorized access to major portions of suitable timber lands. Alternative E provides the greatest number of miles of open roads for these purposes and for general public access. Alternatives A and D also provide open public roads to most forested areas. Alternatives B and C offer the least amounts of motorized access. Some roads closed in these alternatives might need to be reopened in the future for Forest Service administrative needs to manage vegetation resources. While Alternatives B and C offer the least amounts of access to suitable timber lands, future timber harvests will probably not need to be significantly reduced from the current level of 13 MMBF, although the possibility does exist depending upon future forest product types and project economics.

Alternative A offers the greatest potential area for fuel wood collection, since cross-country travel is allowed on 61 percent of the Forest. Alternative E has the next greatest potential for fuel wood collection areas, followed by Alternatives D, C, and B.

The Motorized Travel Plan alternatives do not propose to construct or reconstruct any new roads. Decisions regarding access for timber management and other natural resource uses are deliberately deferred to appropriate project analysis or permit requirements. Therefore, there would be no conflicts in any of the alternatives with current laws, regulations, policy, or land use plans.

There are no cumulative, irretrievable, or irreversible effects to forested vegetation or forested vegetation management from any of the alternatives.

4.1.11.2 Fire and Fuels

Effects of the motorized transportation system on wildfire suppression cannot be quantified as fires begin in somewhat random locations. Where motorized access exists, it is logical to assume that fire crews and equipment can get to fires faster so fires will have less time to burn before initial attack begins. This should result in generally smaller fires where they are accessible by motorized travel. Alternatives A and E would therefore offer a somewhat lower risk of larger fires. Alternative B would offer the highest risk of larger fires since fewer miles of roads are open. Alternatives with more roads, however, offer additional areas accessible to people in vehicles and a corresponding higher risk of human-caused fires. Alternative B has the fewest miles of open road so would offer a somewhat lower risk of human-caused fires. Alternatives A and E have the most miles of open roads so would offer higher risks of human-caused fires.

None of the alternatives restrict motorized access to fuels management projects planned for the next five years.

The Motorized Travel Plan alternatives do not propose to construct or reconstruct any new roads. Decisions regarding access for fire suppression and fuels management projects are deliberately deferred to appropriate project analysis. Therefore, there would be no conflicts in any of the alternatives with current laws, regulations, policy, or land use plans.

There are no cumulative, irretrievable, or irreversible effects to fire suppression or fuels management from any of the alternatives.

References

Abella, S. R., W. W. Covington, P. Z. Fulé, L. B. Lentile, A. J. Sánchez Meador, and P. Morgan. 2007. Past, present, and future old growth in frequent-fire conifer forests of the western United States. *Ecology and Society* 12(2): 16. [online] URL: http://www.ecologyandsociety.org/vol12/iss2/art16/.

Bayer, J. and Ferguson, B. 1992. Soil to vegetation correlation. USDA Forest Service, Dixie National Forest. GIS data layer.

Eisenhauer, Phil. 2007. Facts in the paragraph above the citation were obtained from Phil Eisenhauer, Forest Silviculturist, Dixie National Forest, during a telephone conversation. October 26.

U.S. Department of Agriculture. Forest Service. 1998. Forest resources of the Dixie National Forest. Rocky Mountain Research Station. Prepared by Renee A. O'Brien and Susan S. Brown. August. Available at http://www.fs.fed.us/rm/ogden/publications/utah.shtml.

———. 2007. Timber suitability – Dixie and Fishlake National Forests. Prepared by Mark Loewen. Version 3.1. May 23.