

CHAPTER III
AFFECTED ENVIRONMENT

A. INTRODUCTION

This chapter describes the environment affected by the alternatives displayed in Chapter II. The chapter describes the physical and biological setting, the economic and social setting, and provides a summary of the current situation and demand trends for the Forest resource, support and protection elements.

B. PHYSICAL AND BIOLOGICAL SETTING

The Forest occupies almost two million acres, and stretches for about 170 miles across southern Utah. The largest National Forest in Utah, it straddles the divide between the Great Basin and the Colorado River.

Elevations vary from 2,800 feet near St. George, Utah, to 11,322 feet at Blue Bell Knoll on the Boulder Mountain. The southern rim of the Great Basin provides spectacular scenery. Colorado River canyons are made up of many colored cliffs and steep walled gorges.

High altitude forests in gently rolling hills characterize the Markagunt, Paunsaugunt, and Aquarius Plateaus. Boulder Mountain, one of the largest high elevation plateaus in the United States, is dotted with hundreds of small lakes 10,000 to 11,000 feet above sea level.

The Forest has many climatic extremes. Precipitation ranges from 10 inches in the lower elevations to more than 40 inches per year near Brian Head Peak. At the higher elevations, most of the annual precipitation falls as snow. Thunderstorms are common during July and August and produce heavy rains. In areas, August is the wettest month of the year.

Temperature extremes can be impressive, with summer temperatures exceeding 100° F near St. George and winter lows exceeding -30° F on the plateau tops.

The vegetation of the Forest grades from sparse, desert-type plants at the lower elevations to stands of low growing pinyon pine and juniper dominating the mid-elevations. At the higher elevations, aspen and conifers such as pine, spruce, and fir predominate.

C. ECONOMIC AND SOCIAL SETTING

1. Zone of Influence

The Dixie National Forests Primary Zone of Influence consists of the communities and counties in southcentral and southwestern Utah within and adjacent to the Forest that are influenced by Forest policies and decisions. It is comprised of six counties: Washington, Iron, Kane, Garfield, Piute, and Wayne. The State of Utah organizes counties into multi-county planning districts. The Primary Zone of Influence is located in two of these districts:

- The Five County Association of Governments (FCAOG), which includes Washington, Iron, Kane, Garfield, and Beaver Counties.

- The Six County Commissioners Organization (SCCO), which includes Piute, Wayne, Juab, Millard, Sanpete, and Sevier Counties.

Details on the population, economics, lifestyle, and community cohesion in the Primary Zone of Influence are included in Appendix B.

TABLE III-1
ECONOMIC INDICATORS, PAST TRENDS, AND BASELINE PROJECTIONS
FOR PRIMARY ZONE OF INFLUENCE

	1960	1970	1977	1980	1983	Baseline Projections		
						1985	1990	1995
Pop. (M pers.)	30,474	34,474	45,877	54,351	61,050	67,810	76,924	83,403
Income (MM\$)		82.2	210.1	343.1	434.8			
Employment (M pers.)								
Agricult.		1973	1802	1792				
Lumber		253	291	252				
Retail		2156	3326	3449				

D. RESOURCE ELEMENTS

1. Recreation

The Dixie National Forest has unique recreation opportunities. The Forest is adjacent to or surrounds three National Parks and one National Monument. The parks and monument draw people into the area from throughout the United States and from other countries. Once in the area, the people often visit many areas on the Forest and use the campgrounds.

Major population centers within one hour of the Forest are Cedar City, St. George, Panguitch, Enterprise, Hurricane, and Escalante. The combined population of these and other smaller communities within the hour driving time is approximately 100,000 people. Many parts of the Forest are used by people from more distant communities, such as Las Vegas and Los Angeles. Private land adjacent to and within the Forest boundary has been developed and serves as summer home property.

The Recreational Opportunities Spectrum (ROS)* is highly diversified and includes camping, picnicking, driving for pleasure, downhill skiing, cross-country skiing, snowmobiling, hiking, hunting, and fishing.

a. Developed Recreation - Public

Cedar City and Pine Valley Districts, which are located adjacent to Interstate Highway 15, are the two most heavily used areas on the Forest. More than half of the use on these two districts comes from Nevada and California only 15 percent is from Utah.

Recreation use has increased steadily over the past 11 years. Some areas, such as along the Boulder-Grover Road, are expected to experience a greater increase in use. The Boulder-Grover Road recreation increase is due to the reconstruction of this road. This road will tie Bryce Canyon and Zion to Capitol Reef and other National Parks in southeastern Utah to passenger car traffic. The use on Cedar City and St. George Districts is expected to continue increasing, due to the continued development of summer homes on adjacent private land and the desire of people in large metropolitan areas to escape the crowds and heat. Some campgrounds are used in excess of their recommended capacity.

The number of major developed facilities, by ranger districts, is shown in Table No. III-2. Most use of developed facilities is during the summer months and fall hunting season. Some facilities along State Highway 12 to Bryce Canyon are used late into the fall and winter and early in the spring by visitors to Bryce Canyon.

TABLE III-2
NUMBER OF FACILITIES FOR DEVELOPED RECREATIONAL USE

Ranger District	Campground	Picnic	Overlook & Other
D-1 Pine Valley	7 (1)	3 (3)	3
D-2 Cedar City	10 (1)	1	6
D-3 Panguitch	2		1
D-4 Escalante	3	1	
D-5 Teasdale	4		
TOTAL	26	5	10

(Numbers in parentheses are group facilities.)

Most of the facilities on the Forest were constructed when tents were the major form of camping on the Forest. Since the trailer and motor home have evolved there has been resource damage due to the incompatibility of equipment being used with the facilities available at developed sites.

Some of the major campgrounds, roads, and spurs have been reshaped with to accommodate modern vehicles. Facilities such as tables, grills and pads need repair to meet the standards of roads and spurs. Across the Forest, vegetation has been badly trampled in developed sites. Compaction, loss of topsoil, development of trails, exposure of tree roots, and stream bank breakdown are all impacts degrading the appearance of picnic areas and campgrounds.

In recent years, operational levels of recreational facilities has declined because of reduced Forest Service budgets and the decline of human resource programs. The outlook for the next several years is for limited construction of recreational facilities. Current funding allows little more than minimal operation and maintenance.

The capacity of developed sites is measured in "people at one time" (PAOT). This is an estimate of the number of persons who can comfortably use a site at one time. Family camping and picnic sites are estimated to have a capacity of five persons per unit. The current capability of the Forest is shown in Table III-3.

TABLE III-3
PEOPLE AT ONE TIME CAPACITY OF DEVELOPED SITES

DISTRICT	CAMPGROUND	PICNIC	TOTAL
D-1 Pine Valley	1,005 (355)	390 (390)	1,395
D-2 Cedar City	2,790 (200)	20	2,810
D-3 Powell	680		680
D-4 Escalante	450	30	480
D-5 Teasdale	530		530
TOTAL	5,455 (555)	440 (390)	5,895

(Numbers in parentheses are group facilities.)

Developed recreation sites on the Forest contain old growth overstory with little understory vegetation. The overstory vegetation is susceptible to disease and insects due to its age. One area on the Cedar City District has recently lost most of its overstory aspen due to disease. Although the vegetation is coming back, the problem indicates a need to develop vegetative management plans for developed sites, to manage the vegetation to provide shade, and to increase the aesthetic appeal of the areas.

Other opportunities to improve developed recreation for the public include:

- Facilities resistant to vandalism.
- Limit use of developed sites to capacity.
- Attract visitors during mid-week, low-use periods.
- Rehabilitate substandard sites.
- Close and allow some sites to rest during slack periods.
- Emphasize development of new campgrounds and picnic areas.

More intensive use in the future will result in further overcrowding, additional site deterioration, greater wear on facilities, and increased social problems such as vandalism. The Forest expects to shift use to less crowded facilities at more remote locations and a small shift from weekend to weekday use. Projected use for developed sites is expected to exceed supply by about year 2010.

The projected use of developed recreation facilities on the Forest is shown in Table III-4. This use is based on these projected growth in population of the surrounding areas.

TABLE III-4
PROJECTED RECREATION USE BY DECADE

<u>PLANNING PERIOD</u>					
<u>1981-1985</u>	<u>1986-1990</u>	<u>1991-2000</u>	<u>2001-2010</u>	<u>2011-2020</u>	<u>2021-2030</u>
<u>339 MRVDs*</u>	<u>528 MRVDs</u>	<u>740 MRVDs</u>	<u>1205 MRVDs</u>	<u>1963 MRVDs</u>	<u>3197 MRVDs</u>

b. Downhill Ski Area

Brian Head is presently one of the fastest growing ski areas in Utah. It has grown from 33,400 skier visitor days in 1973 to 70,600 in 1983. The area is anticipating growth from nine to eleven lifts during the next few years. Crystal Mountain development is proposing to connect with Brian Head and increase the potential for expansion to 14 lifts.

Presently, the area is dependent on natural snow condition for the amount of use it receives.

Projected use for downhill skiing on the Forest from now until 2030 is shown in Table III-5. This use will exceed the existing capacity and the capacity for the proposed Crystal Mountain development by 1992 if the present growth rate continues. The growth rate will likely drop as the slopes become more crowded. The projected growth rate used for Table III-5 reflects the change in growth about 1995 from 28 percent to 5 percent per year.

Table III-5
PROJECTED USE IN THE PRIVATE SECTOR

<u>PLANNING PERIOD</u>					
<u>1981-1985</u>	<u>1986-1990</u>	<u>1991-2000</u>	<u>2001-2010</u>	<u>2011-2020</u>	<u>2021-2030</u>
<u>259 MRVDs</u>	<u>426 MRVDs</u>	<u>1294 MRVDs</u>	<u>1812 MRVDs</u>	<u>2952 MRVDs</u>	<u>4809 MRVDs</u>

Capacity of the downhill ski area on the Forest and its potential future capacity is shown in Table III-6.

TABLE III-6
PRESENT & PROJECTED CAPABILITIES FOR SKIERS
AT ONE TIME ON DOWNHILL SKI AREAS
1985-2030

<u>Area</u>	<u>Present Capacity</u>	<u>Additional Planned Within Boundaries</u>	<u>Potential Additional Outside Boundaries</u>	<u>TOTAL</u>
<u>Brian Head</u>	<u>3200 SAOT*</u>	<u>1324 SAOT</u>	<u>2390 SAOT</u>	<u>3714</u>

On most weekends during the peak season use of the ski area nears capacity. Holiday weekends are especially busy. Weekends are more popular because of work schedules, and also because of the distance involved for most of the users, who come from Nevada, California, and Arizona.

Brian Head, like most ski areas in Utah, is located up a narrow canyon. Access is often a problem during winter months when the road is snow packed. The State Department of Transportation is presently looking into possible solutions to the problem.

c. Developed Recreation - Private

Developed private recreation includes recreation residences, group organization camps, and other recreational opportunities provided by private enterprises under special use permit from the Forest Service. The following table summarizes private recreational activities on this Forest.

TABLE III-7
SPECIAL USE RECREATION SITES AND SITE USE

<u>Sites</u>	<u>1980 Visitor Days</u>	<u>7-Year Acreage Increase Percent</u>
2 Recreation Residence (43 residences)	5,600	N/A
2 Lodge Resorts	7,400	N/A
1 Organization Camp	5,500	N/A
4 Boat Marina	6,000	N/A

Recreation special uses paid fees of \$17,540 in fiscal year 1984. There have been no new permits issued for recreation residences on the Forest since 1959. Originally, they were used only in the summer. Snowmobiles and four-wheel drive vehicles now make year around access possible.

Recreation use in the private sector has not shown an increase other than in skiing during the last ten years. Private sector has been operating at their maximum capacity for some time without expansion and there is no accommodations for the use. On the other hand, private residences have increased greatly on private land within and adjacent to the Forest boundary.

Some organizational camps have deteriorated and need substantial rebuilding to bring them up to satisfactory condition.

d. Dispersed Recreation

Dispersed recreation is use away from developed sites. Driving for pleasure is the most popular dispersed activity, followed by camping, fishing, gathering forest products, viewing outstanding scenery, hunting, and hiking. With the increase in fuel and heating cost, gathering fuelwood has increased 115% over the last three years. Driving for pleasure is expected to become more popular over the whole Forest. State Highway 14, and Boulder-Grover Road are presently being considered for scenic highway status by the State. The added publicity will increase their use.

Dispersed recreation areas receive intensive use on weekends and holidays, with areas near water being the most popular. Different types of users, such as snowmobilers and cross-country skiers, often compete for use of the same recreation area. The most heavily used areas, especially for fuelwood and snow play, are on the Cedar City District. The capacity of the Forest for dispersed recreation is calculated by using the Recreation Opportunity Spectrum (ROS).

The number of acres in each ROS class was converted to recreation visitor days (RVD's)*.

TABLE III-8
CURRENT CAPACITY FOR DISPERSED RECREATION
DIXIE NATIONAL FOREST

ROS CLASS	TOTAL ACRES	WILDERNESS ACRES	AVAILABLE ACRES	RVD/ACRE CONVERSION FACTOR	MRVD CAPACITY
Primitive	83,000	83,000	83,000	.3	25.8
Semi-Primitive Non-Motorized	831,309		831,309	.9	748.2
Semi-Primitive Motorized	645,797		645,797	2.8	1,811.4
Roaded Natural	237,747		237,747	12.4	2,948.1
Rural	<u>10,869</u>		<u>10,869</u>	12.4	<u>134.8</u>
TOTAL	1,811,722	83,000	1,811,722		5,668.3

Capacity for dispersed recreation is directly related to ease of access and facilities. The easier the access and the more available the facilities, the more opportunity for dispersed recreation. The Forest estimates that for every mile of new road construction (which is not closed after use) 118 acres of land will change from its classification as Semi-Primitive Motorized (SPM)* or Semi-Primitive Non-Motorized (SPNM)* to a Roaded Natural (RN)* classification. This will increase the capacity from 1.1 MRVD's to 1.4 MRVD's, depending on the acres of SPNM and/or SPM that will change to RN with the addition of one mile of new road.

The projected use for all types of dispersed recreation was predicted to increase as follows:

YEAR	1990	2000	2010	2020	2030
MRVD'S	843.1	1129.9	1841.1	2953.9	4811.7

Demand for dispersed recreation will never exceed the supply unless some unforeseen population explosion takes place during the planning period.

The Forest expects the patterns of use to continue unless the economy changes. There will be some increase in the amount of use along the new high standard Forest Highway between Boulder and Teasdale. Use will continue to be high around Panguitch Lake, Navajo Lake, Duck Creek, Pine Valley, National Parks, and along major highways.

Timber sales and mineral development will increase use on Forest roads. Development will add additional miles to the Forest Road System. Some of these roads will be closed to motorized recreational use.

Heavily used dispersed campsites that continue to receive heavy use from hunters and fishermen will continue to deteriorate. Competition for choice sites will create social conflicts.

Opportunities for improving the dispersed recreation experience and reducing conflicts between user groups include:

- Developing a program for trailhead construction.
- Encouraging use at remote sites.
- Developing a program for all types of dispersed winter recreation.
- Providing adequate sanitation for both summer and winter use.
- Encouraging State and counties to provide parking and sanitation facilities for winter use.
- Develop a program to determine use in dispersed areas.

The following table shows the eight major dispersed recreation activities on the Forest and the average increase in use per year over a three year period.

TABLE III-9
VISITOR DAYS USE FOR SELECTED DISPERSED
RECREATIONAL ACTIVITIES
DIXIE NATIONAL FOREST
1983 AND AVERAGE YEARLY INCREASE 1980-1983

ACTIVITY	1983 VISITOR DAYS (MRVD)	AVERAGE YEARLY INCREASE 1980-1983 (PERCENT)
Driving for Pleasure	201.8	0
Fishing Cold Water	106.9	4
Gathering Forest Products	84.6	5
Viewing Outstanding Scenery	66.7	3
Hunting Big-Game	59.8	2
Skiing	45.2	3
Hiking	52.4	3
Horseback Riding	34.1	1

e. Trails

The Forest has approximately 637 miles of trails. The trail inventory lists 175 miles as adequate, 462 miles as inadequate, and 40 miles as planned but not constructed. The majority of the trails were constructed for fire access or livestock distribution. Recreation use of these trails has pointed out the need for some relocation. Many of the trails have also been damaged by timber sale operations and are badly in need of repair. Most trail use has been in the summer, but snowmobiles and cross-country skiers are increasing winter use. Two Forest trails on the Forest have received National recognition and

status. Whipple Trail and Cascade Falls trails have both been designated as National Recreation Trails. There are no records of use for these two trails, but the use has increased over the past five years. Whipple Trail is one of the major access routes into the Pine Valley Mountain Wilderness.

f. Off-Road Vehicle Use

The Forest presently has 181,840 acres closed to all types of motorized vehicle use, 159,845 acres closed to motorized vehicle use except for snow machines, and/or on existing roads. These closures have been designated to protect an area from resource damage or wildlife habitat. Winter use on the Forest is becoming more popular as equipment becomes more available. The Markagunt Plateau which contains Brain Head ski area, and the Navajo Lake - Duck Creek recreation complex is one of the most popular areas on the Forest. Cabins in these areas are being used on a year around basis.

The development of the three and four wheeled All-Terrain-Vehicles is fast becoming a Forest concern. The development of these vehicles will likely increase the use of trails and general forested areas. Development of a plan to regulate use in critical areas is essential to prevent resource damage.

Cultural Resource

The lands administered by the Dixie National Forest, due to their general remoteness, have become a repository for much of the undisturbed evidence of the prehistoric and historic habitations in south central Utah. On the timbered ridges, and within the grass and sage-covered valleys of the Forest, the untold stories of ancient hunters, gatherers and farmers, as well as the tales of the pioneers, are silently awaiting an expression. To this end, cultural resource specialists are currently inventorying the thousands of archeological properties within the boundaries of the Dixie National Forest.

As directed by Executive Order 11593, all inventoried cultural resources are evaluated for eligibility for nomination to the National Register of Historic Places. Through December of 1984, 1,363 archeological sites have been recorded on 140,000 acres of Dixie National Forest system land. The occurrence of another 10,000 to 20,000 sites is projected for the remaining 1,740,140 acres of Forest.

Of the 1,363 archeological sites, three sites have been nominated to the National Register of Historic Places. They are the Mountain Meadows Massacre Site and Pine Valley Chapel and Tithing Office on the Pine Valley Ranger District and the Long Flat Prehistoric Quarry Site on the Cedar City Ranger District. In addition, two sites presently listed on the National Register are adjacent to the boundaries of the Forest. They are Old Irontown near the Pine Valley District and the Anasazi Indian Village State Historical Monument in Boulder, Utah.

In addition to sites formally listed on the National Register, many significant, potentially eligible prehistoric sites are found.

Significant and potentially eligible historic sites may be found among the Forest's various administrative facilities especially those from the Civilian Conservation Corps era. Candidates may include the following:

1. Vermillion Castle, Bear Valley, and Panguitch Lake guard stations; Cedar City Ranger District.
2. Aquarius and Wildcat guard stations; Teasdale Ranger District.
3. Dave's Hollow, Podunk and Jones Corral guard stations; Powell Ranger District.
4. Clayton and Jubilee guard stations; Escalante Ranger District.
5. Browse and Pine Valley guard stations; Pine Valley Ranger District.

According to the guidelines established by the USDA Forest Service (FSM 2361.02-2), 1990 has been established as the target date for the completion of the cultural resources survey and inventory of the Dixie National Forest. This target will not be met, as the complete survey of approximately 1,740,140 acres of Forest would take another 174 years based on a high annual survey average of 10,000 acres.

For the future, cultural resource inventories will continue to be conducted prior to any undertaking which could affect significant cultural values. As the rate of ground-disturbing activities (i.e., timber sales, fences, pipelines, chainings, etc.) increases or decreases, the rate of cultural resource survey and the recording and evaluation of new archeological properties will increase or decrease proportionately. Monitoring activities, which judge the effectiveness of site avoidance by project activity, should continue to be given a high priority.

The enhancement and protection of the Dixie National Forest's cultural resources, which is only minimally related to the degree of project work, should be pursued informally through the medium of public education. Cultural resource specialists, should take an active role in the development of an awareness by the public of the fragile and irreplaceable nature of their archeological resources. This can be accomplished by the presentation of slide talks to civic groups, the development of conservation programs for use with public school children, the publishing (i.e., newspapers) of the on-going accounts of area excavations, etc.

The Dixie National Forest has several opportunities to develop educational programs. The Escalante Ranger District enjoys close proximity to an established heritage center--Anasazi Indian Village State Historical Monument. Conceivably, the Dixie's cultural resource specialist could work with the curators at the Anasazi Indian Village to develop audio-visual (slide, video, etc.) programs for presentation to civic groups and school children in the towns where the Dixie National Forest has administrative offices.

The Supervisor's Office of the Forest is located in Cedar City, home of Southern Utah State College. The college, which has an established department of anthropology, offers a potential reservoir of candidates for cooperative student programs and/or volunteer projects. The cultural resource specialist should view the college as an available resource that could be, if nurtured properly, a mutually beneficial experience for the Forest and the student.

Student-oriented programs, for example, could be developed to aid in the stabilization and interpretation of the Anasazi dwellings in North Canyon on the Escalante Ranger District. Combining forces with interested local citizens, and guided by consultation with agencies such as the USDI National

Park Service, small scale projects could witness the stabilization of walls, the protective fencing of sites prone to vandalism and the establishment of interpretive signs.

The Forest's law enforcement program, which is formally charged with the protection of the cultural resources, operates on the premise that every Dixie National Forest employee has enforcement responsibilities. Ideally, the primary responsibility of the employee is to report any activity, initiated by the public or the agency, that is detrimental to cultural resources. And, in the past, cultural resource specialists have been informed of these activities.

At the notification of a cultural resource violation, the specialist then involves the appropriate Ranger District's law enforcement coordinator and the Forest's law enforcement officer.

Finally, the Forest has just recently introduced a new policy that would aid in the protection of significant cultural resources. When a property is nominated to and, subsequently, is accepted to the National Register of Historic Places, a plan of protection will be formulated within a year of the listing. This plan of protection may contain measures such as fencing, periodic patrolling and compatible multiple-use management.

Visual

The scenic beauty of the Forest is one of the major attractions to recreationists. Three National Parks and one National Monument surround or are found within the boundaries of the Forest. These areas are often the reason people come to southern Utah, however, many stay to see the Forests attractions and use the campgrounds.

An inventory of the visual resource on the Forest has been complete, using the visual management system outlined in "National Forest and Landscape Management - Volume 2."

The inventory showed the following acres in each visual management category:

	<u>Acres</u>
Preservation	83,000
Retention	854,000
Partial Retention	642,000
Modification	249,000
Maximum Modification	56,000

Special Areas

There are no scenic highways on the Forest at the present time. Highway 14 between Cedar City and Highway 89, and Boulder-Grover Road have been considered but no formal action has been taken. No research natural area have been designated. However, three potential areas are identified. These areas are: The Timbered Cinder Cone (640 acres), Table Cliff (1,235 acres) and Red Canyon (460 acres).

No streams meeting the criteria for wild scenic rivers as discussed in PL90-452 one located on the Forest.

The Forest evaluated four streams for possible designation as Wild & Scenic Rivers (PL 90-592). The streams evaluated were Deep Creek, Escalante River, North Fork of the Virgin River, and Paria River. The Paria and the Escalante start below the Forest boundary and a majority of the miles considered of the two remaining streams (Deep Creek and The North Fork of the Virgin River) are on private or BLM lands. Therefore, the Forest does not recommend any streams on the Forest for wild and scenic rivers status.

2. Wilderness

Prior to the Utah Wilderness Act of 1984, the Forest planning process had developed an inventory of lands that are essentially unroaded and undeveloped, meeting the minimum definition of wilderness, and qualified for wilderness evaluation per NFMA Regulation 219.17. The inventory contained 30 roadless areas, totalling 638,390 Forest-wide. This inventory and description of each area is filed with the Forest's planning records.

"The Utah Wilderness Act of 1984 designated 83,000 acres on the Forest as wilderness. It is estimated that these areas, in addition to areas that existed prior to the Act, will meet the anticipated demand for wilderness during the first planning period. At the end of this period, and during Forest Plan revision, the need for additional wilderness will be evaluated. The total acres that are estimated to be available at that time is shown in Chapter IV."

TABLE III-10
CURRENT CAPACITY FOR WILDERNESS RECREATION
DIXIE NATIONAL FOREST

<u>Area</u>	<u>Total</u>	<u>RVD/Acre Conversion Factor</u>	<u>MRVD Capacity</u>
Pine Valley Mountains	50,000	.32	16.0
Ashdown Gorge	7,000	.32	2.2
Box-Death Hollow	26,000	.32	8.3
<u>TOTAL</u>	<u>83,000</u>		<u>26.5</u>

TABLE III-11
PROJECTED DEMAND FOR WILDERNESS

Year	MRVD	Acres
1986-1990	8.0	83,000
1991-2000	10.3	83,000
2001-2010	17.6	83,000
2011-2020	28.7	83,000
2021-2030	46.8	83,000

Based on these calculations, the supply of wilderness will meet the demand until 2013.

3. Fish and Wildlife

More than 350 species of wildlife and fish inhabit the Dixie National Forest for all or a portion of their life cycle. Consumptive and non consumptive uses of many of these species are an important part of recreation on the Dixie National Forest.

a. Management Indicator Species*

The National Forest Management Act (NFMA) requires Forests to select a group of representative wildlife and fish species. By monitoring their populations and habitat relationships, we can see the effects of Forest Service management activities on all the fish and wildlife of the Forest. On the Dixie, we have selected a group of 12 of these Management Indicator Species (MIS) (Table III-12).

TABLE III-12
MANAGEMENT INDICATOR SPECIES
FOR THE
DIXIE NATIONAL FOREST

Species	Vegetation Type(s)
Mule Deer ^{a/}	Grass-forb, sagebrush, mountain brush pinyon-juniper, sapling-mature aspen, sapling mature conifer
Rocky Mountain Elk ^{a/}	Grass-forb, sapling-mature aspen, sapling-old growth conifer
Wild Turkey	Mountain brush, pole-mature aspen, mature-old growth conifer
Goshawk	Riparian tree, mature aspen, mature-old growth conifer
Common Flicker	Mature aspen, mature conifer

* Denote terms found in the glossary

Species	Vegetation Type(s)
Yellowbreasted Chat	Riparian shrub-tree
Bonneville Cutthroat Trout	Headwater streams
Resident Trout ^{a/} ; Rainbow, Brook, Brown, Cutthroat	Streams, rivers, lakes, reservoirs
Macroinvertebrates	Streams, river, lakes, reservoirs
<u>^{a/} High demand species.</u>	

Mule Deer. Mule deer are the most abundant big-game species on and adjacent to the Forest. Deer populations have been low in southern Utah for approximately ten years, but are now recovering strongly. It is estimated that with the current rate of deer population growth, and continuing current programs, the Utah Division of Wildlife Resources (UDWR) population objective of 53,500 deer summering on the Forest can be met by the year 2000. As shown in Table III-12, mule deer can be found in every habitat type on the Forest. Mule deer are valuable as a management indicator species because the distribution of forage and cover and other habitat factors required to maintain healthy deer populations will also insure provision of the habitat requirements for many other wildlife species.

Rocky Mountain Elk. Elk were selected as a Management Indicator species primarily because of the amount of public interest (both positive and negative) in them. There are three separate elk herds established on the Forest. There is also some "drift" of elk, on occasion, to other areas of the Forest:

- Boulder Mountain. This herd is currently estimated to contain approximately 600 animals. The herd was established in 1977-78 with a 2-year transplant program of 159 elk. The Forest Service and the UDWR are presently preparing an Elk Herd Management Plan for Boulder Mountain and the Forest Service has come up with a tentative population objective of 1,000 elk for Boulder Mountain.

- Mount Dutton. This herd was established with transplants in the 1930's. The herd currently contains approximately 600 animals. There are some distribution problems with this herd, in that there is a moderate amount of habitat available on the west side of Mount Dutton that the elk are only partially using, while some areas on the east side of the mountain are sometimes overused. The Forest Service estimate is that a 700 head elk herd will be maximum for this unit.

- Panguitch Lake. This herd became established through immigration from other herds. It currently has around 100 animals. The Forest Service estimate is that a herd of 300 head might be able to be established on this unit.

- Cedar Mountain. A relatively small area; (8 percent) of this herd unit is on the National Forest. Although this small herd has been established for about 20 years, evidence of elk use on the Forest is very limited. Few, if any, elk from this unit have ever been harvested on the Forest.

- Pine Valley Mountains. Elk and elk sign are occasionally observed on the east slopes of the Pine Valley Mountains. They probably drift there from the Cedar Mountain herd.

- Paunsaugant. A small herd of elk are occasionally observed on the Paunsaugant area. They probably drift to it from the Mt. Dutton area.

These figures indicate that there are approximately 1,400 elk using the Forest at the present time. The tentative UDWR population objective; taken from the Region 4 Wildlife and Fish Assessment Data Base (August 1981) is 2,900 elk by 1990. Firm population objectives will be developed in the near future (1985 or early 1986) when Elk Herd Unit Management Plans are completed.

Wild Turkey. Turkey have been transplanted on all Districts, with good populations existing until about 1973. Since that time, populations have declined, apparently being limited by periodic severe winters. The UDWR feels that in order to maintain a viable population, periodic transplants may be necessary. The most recent transplant was of 80 birds to the Pine Valley Mountains in February, 1983. The Forest's current turkey population is estimated at 230 birds. The UDWR population objective for the Forest is 500 birds. There is habitat for larger turkey repopulations than this objective implies. Turkeys were selected as an MIS because of their requirement for relatively undisturbed habitat containing old growth ponderosa pine. Even though the population is currently quite small, there is considerable public interest in the species.

Goshawk. Goshawks will serve as a Management Indicator for old growth conifer and aspen. They typically nest in large diameter trees in dense conifer stands or in stands of tall (40-60') aspen. UDWR does not have a population objective for this species. Data concerning population trends for goshawks on the Dixie is lacking, but review of past and current management activities in relation to goshawk habitat requirements indicates a stable population.

Common Flicker. The common flicker is a primary cavity nester and will act as a Management Indicator of adequate habitat for other cavity nesting and snag using wildlife. The UDWR has no population objective for this species. As with the goshawk, it is estimated that the population trend for flickers is stable.

Yellowbreasted Chat. Chats prefer brushy riparian ecosystems. They will serve as a Management Indicator Species for riparian areas. The UDWR has no population objective for this species. The small amount of data available indicates a stable population trend (over the short term) for this species.

Aquatic Habitat Indicators. Because of the variety of aquatic habitats on the Forest, a combination of Indicator Species will be used. The native Bonneville cutthroat trout will be the MIS in those streams which contain native or transplanted populations. Rainbow, brown, brook, or cutthroat trout will be used in most streams and lakes on the Forest. The most common species in a particular water body will be the MIS in that area. If fish population data is not available for a particular water body, the macroinvertebrate biotic condition index (BCI)* will be used to assess fish habitat capability.

The Current, Minimum Viable* and Maximum Potential Population* levels of the various MIS have been estimated and are displayed in Table III-13. Minimum viable populations are estimated assuming adequate distribution of the animals so that reproduction can occur.

b. Diversity*

The Dixie National Forest is an inherently diverse area. Elevations range from 2,800 to above 11,000 feet. The Forest borders the Mohave Desert on the west (near St. George). Less than 25 miles away, at the top of the Pine Valley Mountains, you enter a subalpine coniferous forest. Similar habitat diversity occurs throughout the Forest. Much diversity is provided by the various vegetation types occurring on the Forest, and the successional stages of these types. Table III-14 displays the approximate acres within the vegetation types, and is further broken down by the existing and estimated optimum percent of each type within each successional stage. This table shows that several of the vegetation types on the Forest are dominated by advanced successional stages. Manipulation of these types to more closely approach the estimated optimum (Table III-14) mix of successional stages could increase production while improving diversity.

c. Vegetation Types

The dominant vegetation types on the Forest are discussed in terms of quantity and quality as they relate to specific habitats for the MIS. Total acres in each type and approximate percent in each successional stage is shown in Table III-14.

Aspen. This type is potentially one of the most productive of forage on the Forest. Of 183 species of forest dwelling birds and mammals, 164 of them (89.6%) use the aspen type. Much of the aspen on the Forest is in a mature to decadent condition with little regeneration evident. A significant amount of aspen is also being lost to conifer invasion. Small clearcuts, burning, and/or herbicide treatment would improve the aspen age distribution and improve wildlife habitat within the type. Management indicator species making heavy use of aspen are: mule deer, elk, wild turkey, goshawk, and common Flicker.

Mountain Brush. Increased diversity in this productive type could be achieved through various methods of vegetative manipulation. Although community composition would not change significantly, a mosaic of different aged stands would result in improved vertical and horizontal diversity and forage production. Management indicators for this type are: mule deer and wild turkey.

Spruce-fir. This vegetation type is dominated by contiguous areas of mature uneven aged stands characterized by a sparse understory. Diversity could be improved by coordinating wildlife needs with timber harvest to create well distributed, irregular shaped openings and some open stands with brushy understory vegetation. The MIS most closely associated with this type are elk and goshawk.

Mixed Conifer. Opportunity exists to increase diversity in this type because of high productivity and the abundant tree and understory species present. The type is currently composed of a high proportion of older age classes with

TABLE III-13
CURRENT, MINIMUM VIABLE AND MAXIMUM POTENTIAL POPULATION
AND ACREAGE ESTIMATES FOR MLS
DIXIE NATIONAL FOREST

Species	Indicator Habitat	Minimum Viable Population	Acres required for Minimum Viable Pop.	Existing Population	Acres Existing Habitat	Maximum Potential Population	Acres Potential Habitat	Habitat at 2030
Mule Deer	All	2,000	120,000	31,500	1,883,770	56,000	1,883,770	1,883,770
Rocky Mountain Elk	Aspen, Mixed conifer	360	230,676	1,200-1,300	800,960	3,000	1,019,346	910,000
Wild Turkey	Aspen, Ponderosa Pine	150	256,000	230	640,000	500	973,000	640,000
Goshawk	Mature timber	40 pairs	192,000	68 pairs	326,400	93 pairs	446,400	326,400
Common Flicker	Standing Dead	9,325 pairs	373,000	11,900 pairs	476,000	23,310 pairs	932,400	668,000
Yellowbreasted Chat	Riparian	726 pairs	5,900	1,210 pairs	9,800	1,815 pairs	14,666	9,800
Bonneville Cutthroat trout	Streams	4,000 fish	7	4,000 fish	7	2.5 MM fish	2,500	
Resident Trout	Lakes, Reservoirs above 10,000 Feet	8 lbs. per ac.	3,100	20 lbs. per ac. 1/	31,000	20 lbs/ac.	5,000	
	Lakes below 10,000 Feet	40 lbs per ac.		100 lbs. per ac. 1/		100 lbs/ac.		
	Reservoirs below 10,000 Ft.	20 lbs per ac.		50 lbs. per ac.		50 lbs/ac.		
	Streams in sedimentary materials	32 lbs per ac.	255	80 lbs per ac.	250		400	
	Streams in Volcanic Materials	24 lbs per ac.		60 lbs per ac.		120 lbs/ac.		
	Streams in granitic Materials	16 lbs per ac.		40 lbs per ac.		80 lbs/ac.		
Macroinvertebrates	Streams	BCI = 70				BCI = 100		

1/ Except lakes with known winter kill problems.

little regeneration. Treatment to benefit wildlife would be similar to that applied in the spruce-fir. Management indicators most closely associated with this vegetation type are elk and goshawk.

Pinyon-Juniper. Approximately 50,000 acres of this type has been manipulated by chaining and seeding over the last 20-25 years. These chainings provide diversity and much needed forage, especially in the spring for big-game species. Only a few thousand acres of pinyon-juniper remain where chaining would be feasible, although manipulation by burning could be done on several thousand more acres. Mule deer make more use of this type than any other MIS.

Sagebrush. Chaining, burning, and spraying projects have been conducted on several thousand acres of sagebrush range on the Forest. The situation here is similar to the pinyon-juniper treatments, providing diversity and forage for big-game animals. Mule deer make more use of this type than any MIS.

Ponderosa Pine. Wildlife habitat diversity could be improved by harvesting timber using methods sensitive to the requirements of wildlife. Wild turkeys are closely associated with this type (especially in mature stands).

Riparian. This type, more properly referred to as a habitat type, may occur as a relatively narrow (by definition a minimum of 200 feet wide) strip along streams or as small patches around seeps or springs or along the shoreline of lakes or ponds. Riparian areas in good condition are naturally diverse; artificial manipulation is not likely to improve upon good condition riparian or wet meadow areas. Many of the riparian areas on the Forest are not, however, in good condition. Manipulation in the form of replanting with native vegetation (willows, Carex, etc.) and protection from livestock would help many of the poor condition areas recover. These areas attract many species of wildlife. Wildlife species diversity in good condition riparian areas is probably greater than in any other habitat. The yellow-breasted chat is the Forest's management indicator for the riparian type. This large wood warbler prefers riparian ecosystems with relatively dense tangles of willows or other shrubby species.

TABLE III-14
DIXIE NATIONAL FOREST SUMMARY OF PERCENT OF LAND AREA
IN EACH SUCCESSIONAL STAGE OF EACH MAJOR VEGETATIVE TYPE

Vegetation Type	Range Type	Acres	Successional Stages ^{1/}							
			Existing				Desirable ^{2/}			
			Early	Mid	Mature	Over Mature	Early	Mid	Mature	Over Mature
Grass-Forb	1,2d, 2w,3	157,851	25	45	30	0	10	45	45	0
Sagebrush Mountain	4	221,662	10	15	75	0	10	15	65	10
Brush	5	136,254	1	0	99	0	20	20	50	10
Pinyon-Juniper	9	442,406	5	5	45	45	30	25	35	10
Aspen	10	105,792	5	5	45	45	30	25	35	10
Ponderosa Pine	6	209,672	25	30	35	30	40	25	25	10
Mixed Conifer	6	200,24t	10	10	40	40	40	25	25	10
Spruce-Fir	6	111,751	5	5	40	50	40	30	25	10
Riparian		19,000								

1/ Timber inventory data on the Forest does not include sufficient information to derive estimates on successional stages. Information displayed here is based on field observation.

2/ Early through Mature successional stages required for mule deer and elk. Mature and over mature stages constitute important habitat components for other MIS.

d. Aquatic Habitat

The Dixie National Forest provides habitat for trout in over 3,100 acres of lakes and reservoirs and 400 miles of streams. The average habitat condition for fishery streams on the Forest is estimated to be 65 percent of optimum. Stream habitat is presently degraded in some areas by lack of streamside cover, high sediment loads, poor bank stability, and lack of pools. The average fish production for lakes and reservoirs on the Forest is estimated to be 70 percent of potential. Fish production in Forest lakes is presently limited by winter kills, fluctuating water levels, excessive aquatic vegetation, low nutrient levels, and competition from nongame fish.

Habitat condition in a number of lakes and reservoirs on the Forest is declining due to accelerated eutrophication.* Of particular concern is the declining quality of two of the Forest's largest lakes. Panguitch Lake is the Forest's largest and presently its most productive lake. Continued deterioration of water quality could reduce fishing quality in the near future. Navajo Lake, the Forest's second largest lake, presently experiences frequent winter kills which reduce its fish production potential.

e. Threatened, Endangered and Sensitive Species

Mammals. The Utah prairie dog (Cynomys parvidens) is a federally listed "threatened" species (recently downlisted from endangered). The species historically occurred in 9 Utah counties, with the total population exceeding 95,000 animals. Habitat modification and extermination campaigns reduced the distribution to 5 counties.

The Forest is presently cooperating with UDWR and other federal agencies in an effort to re-establish sufficient populations of prairie dogs on public land so that the species can be delisted.* The Forest has designated 11 transplant sites for prairie dogs. Some of these sites are currently occupied; the others are historic prairie dog towns. No critical or essential habitat has been formally designated for the Utah prairie dog.

Birds. The bald eagle (Haliaeetus leucocephalus) is federally classified as "endangered" and occurs on the Forest during the winter months. Bald eagles are commonly seen in winter along many of the lower elevation streams on the Forest where suitable roost trees are available. Essential habitat has not been identified on the Forest.

The peregrine falcon (Falco peregrinus) may occur on the Forest in the spring and summer. Peregrines breed at Zion National Park and at Bryce Canyon National Park. Peregrines are almost certainly hunting on the Forest. Some could be nesting on the Forest.

Fish. The Bonneville cutthroat trout (Salmo clarki utah) has been classified by Region 4 of the Forest Service as a "sensitive" species. The species occurs as a genetically pure strain in three streams on the Forest at present. The UDWR is planning to use these populations to provide transplant stock for other suitable habitat areas on and around the Forest.

Plants. Table III-15 lists plants found on the Dixie which are federally classified. Only one species; Astragalus perianus is officially listed by the U.S. Fish and Wildlife Service (USFWS) as threatened. This species is found in the vicinity of Mount Dutton at elevations around 10,000 feet. It is associated with mixed grass-forb and spruce-fir communities and grows in very shallow, rocky soils.

TABLE III-15
THREATENED AND SENSITIVE PLANT
SPECIES ON THE DIXIE NATIONAL FOREST

Scientific Name	Common Name	Family	Threat- ened	R-4 Sensi- tive	Utah Native Plant Society Recog- nized
<u>Astragalus barnebyi</u>	Barneby milkvetch	Fabaceae		X	
<u>Astragalus lentiginosus</u> <u>var. ursinus</u>	Bear Valley milk- vetch	Fabaceae		X	
<u>Astragalus limnocharis</u>	Navajo Lake milk vetch	Fabaceae		X	

Scientific Name	Common Name	Family	Threat- ened	R-4 Sensi- tive	Utah Native Plant Society Recog- nized
<i>Astragalus perianus</i>	Rydberg milkvetch	Fabaceae	X		
<i>Castilleja aquariensis</i>	Aquarius paintbrush	Scrophulariaceae		X	X
<i>Castilleja parvula</i> var. <i>parvula</i>	Tushar paintbrush	Scrophulariaceae		X	X
<i>Castilleja parvula</i> var. <i>Reveal</i>	Reveal paintbrush	Scrophulariaceae		X	
<i>Cryptantha ochroleuca</i>	Yellow-white catseye	Boraginaceae		X	X
<i>Cymopterus minimus</i>	Cedar Breaks Bis- cuitroot	Apiaceae		X	
<i>Erigeron proselyticus</i>	Cliff daisy	Asteraceae		X	X
<i>Eriogonum aretioides</i>	Widtsoe buckwheat	Polygonaceae		X	X
<i>Gilia caespitosa</i>	Rabbit Valley gilia	Polemoniaceae		X	
<i>Heterotheca jonesii</i>	Jones golden aster	Asteraceae		X	
<i>Lepidium montanum</i> var. <i>neeseae</i>	Neese peppergrass	Brassicaceae		X	X
<i>Penstemon bracteatus</i>	Red canyon beard- tongue	Scrophulariaceae		X	X
<i>Penstemon parvus</i>	Small Beardtongue	Scrophulariaceae		X	
<i>Psoralea pariensis</i>	Paria breadroot	Fabaceae		X	
<i>Silene petersonii</i> var. <i>minor</i>	Red Canyon catchfly	Caryophyllaceae		X	
<i>Astragalus Henrimon- tanensis</i>	Dana Milkvetch	Fabaceae			X
<i>Festuca dasyclada</i>	Sedge fescue	poaceae			X
<i>Haplopappus zionis</i>		Asteraceae			X
<i>Hymenoxys helenioides</i>		Asteraceae			X
<i>Silene petersouii</i> var. <i>petersouii</i>	Plateau catchfly	Caryophyllaceae			X
<i>Sphaeromeria capitata</i>		Asteraceae			X

f. Wildlife Outputs (Demand)

Table III-16 displays the current and projected outputs in Wildlife and Fish User Days* (WFUDS), assuming continuation of current programs. The wildlife resource is primarily a recreation type output. The demand for wildlife related recreation has increased in line with other types of Forest recreation, and is expected to continue this increase throughout the planning period. Under the Current Program, however, availability of terrestrial wildlife (primarily consumptive use) may only be able to meet increasing demand up to a certain point. Beyond that, decreased hunt success and quality of the experience may cause a leveling off of the terrestrial WFUD outputs as hunters choose to go elsewhere where success is better.

Demand for fishing on the Forest is expected to increase as the area's population increases. Overall dispersed recreation demand which includes fishing is expected to increase by 250 percent by the end of the planning period. During this same time period fish production on the Forest is expected to decrease due to continued degradation of lake habitat.

TABLE III-16
WILDLIFE AND FISH USER DAYS (WFUDS),
CURRENT AND PROJECTED, ASSUMING CONTINUATION OF CURRENT PROGRAMS

Year or Decade	Terrestrial WFUDS Consumptive & Nonconsumptive	Aquatic WFUDS	Total WFUDS
1983	97,418	48,350	145,768
1984	107,932	48,350	156,332
1985	109,000	48,450	157,450
1990	122,314	48,760	171,074
2000	130,579	52,066	182,645
2010	130,579	51,240	181,819
2020	130,579	49,587	180,166
2030	130,579	47,934	178,513

g. Wildlife and Fish Habitat Improvement and Maintenance

Table III-17 shows the acres of habitat and number of structures that have been improved, constructed and maintained during the last 5 years. Accomplishments vary greatly from year to year, depending on funding available (PM, O&M, KV, etc.) each year. Lack of maintenance accomplishments from 1979 through 1981 is probably more a result of incomplete reporting than maintenance work not actually being done.

h. Wildlife Transplants* and Reintroductions*

A number of wildlife species have been established (or reestablished) on the Dixie by transplants or reintroductions. Rocky mountain elk and wild turkeys are the best examples. Mule deer have transplanted in some areas to supplement low existing populations. The Forest's pronghorn population on Parker Mountain is the result of an extremely successful transplant in 1964-1965, and that population is now the source for pronghorn transplant stock to other areas.

From time to time during the Planning Horizon, the opportunity to conduct transplants or reintroductions of certain fish or wild life species may occur. Some interest has been shown in the possible introduction (or reintroduction) of desert bighorn sheep in the Box-Death Hollow, the Canaan Mountain, and the Pine Valley Mountain areas. These proposals when submitted through formal channels will be acted upon on a case-by-case basis as per FSM 2640 and other appropriate sections of the Forest Service Manual.

TABLE III-17
WILDLIFE AND FISH HABITAT IMPROVEMENT
AND MAINTENANCE, FY 1979 THRU 1984

Year	Terrestrial	Terrestrial	Aquatic	Aquatic	Maintenance	
	Acres	Structures	Acres	Structures	Acres	Structures
1979	781	113	100	10		
1980	466	131	125			
1981	833	23	22	17		
1982	268	7	7	15	60	18
1983	542	17	5	25	410	25
1984	770	10	0	20	100	16

4. Range

There are 104 grazing allotments on the Dixie National Forest; 81 cattle and 23 sheep allotments. Approximately 20,000 head of cattle and their calves and 25,000 head of sheep and their lambs are permitted on the Forest. Table III-18 displays additional range management statistics.

TABLE III-18
RANGE MANAGEMENT STATISTICS, 1983
FOR THE DIXIE NATIONAL FOREST

Total Forest Acres	1,883,500
Suitable Range Acres in Allotments	685,793
<u>Suitable Range Acres Outside Allotments</u>	<u>0</u>
Good Condition Range Acres	262,090
Fair Condition Range Acres	312,992
<u>Poor Condition Range Acres</u>	<u>110,711</u>
Total Allotments	104
Cattle Allotments	81
<u>Sheep Allotments</u>	<u>23</u>
Permitted Cattle	20,000 + Calves
<u>AUM's*</u>	<u>97,000</u>
Permitted Sheep	25,000 + Lambs
<u>AUM's</u>	<u>18,000</u>
Total Grazing Capacity (AUM's)	115,000
<u>Actual Grazing Use (5 year average)</u>	<u>112,000</u>
Wildhorse Population	40-60 Head
<u>AUM's</u>	<u>350</u>
Recreation Use (Horses)	
<u>AUM's</u>	<u>500</u>

The Forest has only a portion of the livestock grazing that occurred during the late 1800's and the early 1900's. Severe overgrazing took place in many areas during that time. In the 1940's a program of livestock reductions, range reseeding and allotment management planning was begun.

Only a few downward adjustments in livestock numbers and/or season of use have been needed in the last ten years. In many cases, reductions have been avoided by accomplishing revegetation projects, developing additional water and/or modifying grazing systems. To date, approximately 142,000 acres of depleted rangeland on the Forest have been reseeded. For the most part, these seedings have been very successful and provide a large proportion of the forage consumed by livestock and big game on the Forest. Several hundred miles of fence have been constructed on the Forest boundary and within allotments to control livestock distribution. Hundreds of water developments have been constructed by the Forest Service to provide water to livestock and wildlife in dry areas.

Permitted use and Actual Use

Table III-18 displays the Permitted Use titled "Total Grazing Capacity (AUMs) and the Actual Grazing Use". Actual use over the last five years has average 112,000 AUMs; 3,000 AUMs below the permitted use. This has been primarily because of some permittee's taking non-use for personal reasons.

As of 1984, all of the 104 allotments on the Forest had an approved Allotment Management Plan (AMP). All of these plans are currently implemented. These plans have been, and will continue to be updated as the need arises. Range Analysis has been completed on all allotments. Table III-19 summarizes the Forest's range analysis data.

TABLE III-19
RANGE ANALYSIS DATA SUMMARY
DIXIE NATIONAL FOREST

<u>Condition Class</u>	<u>Acres</u>	<u>% of Total</u>
Good	262,090	38%
Fair	312,992	46%
Poor	110,711	16%

Suitable Acres by Trend

<u>Trend</u>	<u>Acres</u>	<u>% of Total</u>
Up	423,703	62%
Down	0	-
Stable	262,090	39%

Suitable Acres by Vegetation Type

<u>Vegetation Type</u>	<u>Acres</u>	<u>% of Total</u>
Grassland	129,205	19
Wet Meadow	4,781	1
Dry Meadow	10,820	2
Perennial Forb	568	1
Sagebrush	181,589	26
Browse	67,263	10
Conifer	126,649	18
Pinion-Juniper	70,377	10
Deciduous Trees	94,541	14
<u>Total</u>	<u>685,793</u>	

In addition to domestic livestock grazing, a wild horse herd of 40-60 animals grazed on the Forest for part of the year northwest of Enterprise, Utah. The herd moves between Forest Service and BLM administered lands, and a joint FS/BLM management plan has been prepared for the herd.

Noxious weed control on the Forest is directed primarily at Scotch Thistle (Onopordum acanthium) which has invaded southwestern Utah in the last few years. In addition, Musk thistle (Carduus nutans) and Canada thistle (Cirsium arvense) are also moving into the area.

The Forest management goal is to keep the range resource in an upward trend when it is in less than good condition, and in a static trend when it is in good condition. Maintaining this goal will result in continued improvement of the Forest's range resource. This does not mean that more AUMs will be produced, but that plant composition, ground cover, etc., will be improved. Livestock numbers, seasons of use and distribution will remain approximately the same throughout the planning period.

Demand Analysis

In terms of 1982 dollars the value of an AUM of grazing on the Dixie National Forest is \$8.06. Fees that National Forest permittees pay has ranged from \$1.35 to \$2.50 per AUM over the last few years.

At the present fee levels charged for livestock grazing, the supply is fully utilized. It is not anticipated that this situation will change during the planning period. There are thousands of head of additional cattle and sheep on ranches adjacent to the Forest that ranchers would be willing to graze on the Forest if the opportunity was available.

Table III-20 displays the AUM outputs for the planning period, assuming continuation of current programs. For comparison purposes, the table also displays the Regional (RPA 1980) objective for the Forest and the maximum AUMs that could be produced with no constraints* on range management methods and techniques.

TABLE III-20
ANIMAL UNIT MONTH (AUM) OUTPUTS UNDER CURRENT PROGRAM
RPA 1980 FOREST OBJECTIVE AND UNCONSTRAINED RANGE MANAGEMENT
(All outputs in M AUMS)

	1985	1990	2000	2010	2020	2030
Current Program	115	115	115	115	115	115
RPA 1980 Objective	116	119	121	121	122	123
Unconstrained	115	119	124	130	136	142

Current and Potential Capacity

The current capacity, as discussed earlier and presented in Table III-18 is 115,000 AUMs. The initial preparation of Allotment Management Plans is complete on the Dixie. Many of the Plans have been in effect for 10 or even 15 years or longer, with the older plans having gone through at least one update. All plans have been in effect since 1984. This history of allotment management and planning has allowed us ample time for a "firm-up" period. An annual grazing capacity of 115,000 AUMs has received considerable trial on the Dixie.

Potential capacity, as discussed in Forest Service Handbook 2209.21.4.43, would be dependent on the amount and extent of forage improvement and water development accomplished for livestock. Table III-20 displays outputs that could be expected under three alternatives. The Feasibility Analysis discussion below presents more information on potential capacity.

Feasibility Analysis

The grazing capacity has essentially been determined on the lands classified as suitable for livestock grazing on the Forest under present climatic conditions and in coordination with the other existing land uses. Therefore, if livestock use is to be increased significantly it would have to be done through practices such as:

- a. Climatic alteration - increasing precipitation on the arid rangelands.
- b. Introduction of new forage species that will greatly out produce the species currently growing on the suitable rangeland.
- c. Conversion of commercial timber producing lands to forage producing lands and making them suitable for grazing by developing water, etc.
- d. Developing an economical means of converting steep mountain brush types, currently classified as unsuitable for livestock grazing, to suitable forage producing rangelands.
- e. Changing classes of livestock from cattle to sheep on some of the allotments. (This proposal would be very unacceptable to many of the present cattle permittees.)

Since none of these practices are considered feasible or cost efficient at this time, the present and projected livestock grazing capacity for the Forest will need to remain as it is until there is a technical "breakthrough" in one or more of these items.

5. Timber

a. Land Suitability

Some 335,800 acres have been classified as available and tentatively suitable for timber production on the Dixie National Forest (Table III-21). This figure was determined in accord with regulations in 36 CFR 219.14 by the following procedure:

- Total net acres of the Dixie National Forest were classified as water acres and land acres.
- Land area was classed as either forest land (at least 16 percent currently stocked by trees or formerly stocked) or non-forest land.
- The initial regulations in 36 CFR 219.14 required that lands failing to meet the minimum biological growth standard of 20 cubic feet per acre per year set forth in the Draft Regional Plan be classified as unsuitable for timber production. This requirement was later dropped, and instead, these lands are now to be analyzed for their productive capability.

Some of the lands in question can produce marketable industrial products, but most cannot. These lands generally support unmarketable species or trees having poor form or they may have substantial areas of surface rock and rock cliffs. The value of products that could be sold is low, the cost of management would be high.

The shortage of time to judge growth response and obvious lack of economic productivity for most of these lands suggest that they should now be classified as unsuitable.

In lieu of immediate analysis, the Forest will gather information about the suitability of these low producing sites (less than 20 cubic feet of wood per acre per year) during the next scheduled Forest-wide timber resource inventory. After inventory data have been collected, land suitability will be analyzed in accord with 36 CFR 219.14. If the difference between the existing Forest Plan and the new analysis is significant, the Forest Plan may be revised in accord with 36 CFR 219.1 (g).

- Lands determined to be productive were judged for their availability for timber production. Lands "not available" are those potentially productive forest lands legislatively or administratively withdrawn from timber production. This classification includes wilderness, research natural areas, and administrative sites.

With the passage of the Utah Wilderness Act of 1984, some productive timber lands have become unavailable and appropriate acreage adjustments have been made.

TABLE III-21
LANDS AVAILABLE AND TENTATIVELY
SUITABLE FOR TIMBER PRODUCTION
DIXIE NATIONAL FOREST

Land Classification

<u>Classification</u>	<u>M Acres</u>
1. Non-Forest land (includes water)	1204.9
2. Forest land	678.8
3. Forest land withdrawn from timber production-(not available)	28.5
4. Forest land not capable of producing crops of industrial wood	236.6
5. Forest land physically unsuitable: irreversible damage likely to occur; not restockable within 5 years	82.5 0
6. Forest land - inadequate information <u>1/</u>	0
7. Tentatively suitable forest land (item 2 minus items 3, 4, 5, and 6)	331.2
8. Forest land not appropriate for timber production <u>2/</u> (display acres by management emphasis)	31.1
9. Unsuitable forest land (Item 3, 4, 5, 6, and 8)	378.7
10. Total suitable forest land (Item 2 minus item 9)	300.1
11. Total national forest land (items 1 and 2)	1883.7

1/ Lands for which current information is inadequate to project responses to timber management.

2/ Lands identified as not appropriate for timber production due to: (a) assignment to other resource uses to meet Forest plan objectives; (b) management requirements; and (c) not being cost efficient in meeting Forest plan objectives over the planning horizon.

b. Existing Situation

Description - Based on Approved 1975-85 Timber Management Plan. There are eight commercial timber species on the Forest. They are ponderosa pine, Douglas fir, white fir, Engelmann spruce, Colorado blue spruce, subalpine fir, limber pine, and aspen.

According to the 75-85 Plan, the Forest contains an approximate net board foot volume of 2,844,777 MBF*. An analysis was made of the commercial Forest land in the Forest to segregate acreages and volumes into standard*, special*, marginal*, and unregulated* components which generally reflect the influences of economics and associated resource protection constraints on management of the timber resource.

The 75-85 Plan shows the following data:

<u>Stand Size</u>	<u>% of Total</u>
Sawtimber	83
Poles	10
Seedlings/Saplings	6
Non-Stocked	<u>1</u>
	100%

Site Quality of Commercial Forest Land

<u>Site Class</u>	<u>Production</u>	
	<u>G.F.[%]/Ac./Yr.</u>	<u>% Of Total</u>
Excellent	225+	0
Good	165 - 225	0
Medium	85 - 165	29
Poor	50 - 85	69
Very Poor	20 - 50	<u>2</u>
		100%

Area Data

	<u>M Acres</u>
Net National Forest Land	1884.5
Total Forested Land	1457.1
Total Productive Forest Land	609.6
Productive Deferred	30.9
Productive Reserved	-
Commercial Forest	578.7
Standard	309.4
Special	77.2
Marginal	190.3
Unregulated	1.8

Growth and Mortality - All Productive Forest Land

<u>Gross Annual Growth (MBF)</u>	<u>Annual Mortality (MBF)</u>	<u>Total Net Growth (MBF)</u>
44,395	10,860	33,535

Potential Annual Yield 1/

	<u>MBF</u>
Standard Component	17,175
Special Component	2,211
Marginal Component	<u>10,040</u>
TOTAL	29,426

1/ Potential annual yield. The average annual amount of commercial timber harvested during the 10 year planning period and that could be sustained in perpetuity under a specified intensity of management.

Programmed Average Annual Harvest 2/

	<u>MMBF</u>
Standard Component	18.7
Special Component	0.8
Marginal Component (Dead Spruce)	0.6
Unregulated	<u>0.1</u>
TOTAL	20.2

2/ Programmed Average Annual Harvest. That portion of the potential yield that is actually scheduled for harvest expressed as an average annual volume per year for the next ten year period.

Problem Situations Affecting Timber Harvest. A mountain pine beetle epidemic currently affects about 30,000 acres on the Forest. An accelerated harvest program is underway on the Escalante District to reduce the effects of this epidemic. A western spruce budworm outbreak affects about 45,000 acres on the Cedar City District. Other insect populations appear to remain at endemic levels. Dwarf mistletoe in Douglas-fir is an important disease problem occurring most seriously on the Powell Ranger District. Dwarf mistletoe causes significant losses to infected stands and eventual tree mortality. Dwarf mistletoe and limb rust occur in pockets of ponderosa pine scattered throughout the Forest. Recent surveys indicate that about 40% of all ponderosa pine stands on the Forest are infected with dwarf mistletoe. Porcupine feeding has created many unmerchantable and poor quality trees throughout the ponderosa pine type.

Until recent years, most timber harvesting was concentrated in the ponderosa pine type. Lesser amounts were harvested in the mixed conifer type. Early mixed conifer harvests were mainly selection and sanitation-salvage harvests with little emphasis on regeneration. Large areas of mature spruce-fir remain uncut. Seedlings, saplings, and poletimber are proportionately lacking in many areas of all timber types.

Policies, Silvicultural Systems, and Cultural Treatments. Dixie National Forest timber management policy is currently based on a broad classification of land use classes (LUC); Standard, Special and Marginal as described in the 75-85 Plan.

Commercial Forest Land (CFL) must have potential to produce 20 cubic feet per acre per year. If growth potential is lower, land is classed as non-commercial.

Timber is currently managed with moderate to fairly intensive in the Standard LUC to the extent that management practices are compatible with other resource values and funding levels. Management objectives in the Special LUC relate to values other than timber production (e.g., visual quality, etc.).

Timber harvest is constrained in the Special LUC for visual quality or other stated objectives. Timber harvest has been limited in the Marginal LUC because of inaccessibility (excessive development costs), slopes too steep for tractor logging, excessive regeneration costs, or inability to regenerate the area within five years of harvest. Nearly all harvested timber has been from the Standard LUC. Limited cable logging has occurred on Escalante and Teasdale Ranger Districts during 1983 and 1984.

Prescriptions for stand treatment on the Forest have been based on the species and the particular area involved. The principles of even-aged and uneven-aged management are being followed, therefore, harvest practices ranges from clearcutting to shelterwood to the selection system. Some intermediate cutting is desirable to improve stand condition, utilize timber which may be lost through mortality and to make economic sale offerings. The application of modified cutting practices has been necessary in some areas to meet management objectives for the specific area.

Reforestation is a continuing practice where final timber harvest has taken place. Historically, plantation survival for all species has averaged about 50 percent. Seedling survival has increased during the last few years as the result of better site preparation, planting techniques, use of containerized seedlings and plantation protection. Reforestation backlog is being accomplished on schedule.

Precommercial thinning is also a standard recurring practice, mostly in ponderosa pine. Many thinned areas have not responded as well as expected. In the absence of a small roundwood market, areas thinned before 1980 may need a second precommercial entry to produce sawtimber within a reasonable time frame. Recent thinning applications using wider tree spacing have shown improved gains in diameter growth. These applications have shown similar gains in the Englemann spruce type.

Past Production. Following is a table of recent 10 years' production from the Forest:

TABLE III-22
PAST TIMBER PRODUCTION

Year (FY)	Sawtimber (MBF)	Aspen Cordwood (MBF)1/	Posts & Poles (MBF)	Fuelwood Commercial	(Cords) Personal Use 3/
1972	26,836	456	415	NA2/	NA
1973	16,424	1,026	145	NA	NA
1974	21,088	582	109	482	NA
1975	17,401	83	79	1,361	NA
1976	14,384	541	103	709	8,351
1977	21,826	1,147	126	1,545	29,182
1978	20,255	90	223	665	22,965
1979	17,722	40	86	1,004	32,637
1980	21,604	373	157	1,057	32,061
1981	18,389	207	303	1,066	28,348
TOTAL	195,925	4,545	1,746	7,889	153,544
AVERAGE	19,593	455	175	986	25,591

1/ The cordwood production of the Forest has been primarily aspen used for excelsior. The demand for this product is now less than in earlier years.

2/ NA - information not available.

3/ These figures reflect permitted removal. Actual removal may be substantially less.

Other ownerships and other National Forests contribute insignificant volumes to local mills.

Adjacent Landowners. Most adjacent and intermingled lands that support productive forests are privately-owned and are devoted to non-timber uses such as livestock grazing or recreation, including mountain subdivisions.

There are minimal conflicts with adjoining land and timber production on the Forest.

c. Current Management Direction

The current timber management direction is expressed in the 1975-1985 Timber Management Plan. Management direction is also further defined in the various planning unit Land Use Plans. Briefly stated, current timber management direction is to:

- Obtain optimum use of the timber resources.
- Offer for sale the full potential yield of the standard and special components.
- Assure timber harvest is compatible with all other resource values.
- Reforest nonstocked areas and increase stocking on understocked areas.

- Improve the quality and/or growth rate of immature timber stands through timber stand improvement work.

d. Future Conditions if Current Direction is Continued

Long range objectives for timber management in the 75-85 Plan include achieving a balance in the distribution of age classes. However, if current direction is continued, this balance would not be reached until the year 2216, for ponderosa pine and mixed species in the Standard Component and the year 2056 for aspen in the Standard Component.

The following tabulation shows information from the 75-85 Plan on size class distribution within all the Commercial Forest Land acres:

<u>Size Class</u>	<u>Year 1975</u>	<u>Year 2030</u>
Seedlings/Saplings	6%	14%
Poles	10%	29%
Sawtimber	83%	57%
Non-Stocked	<u>1%</u>	<u>-</u>
TOTAL	100%	100%

By the year 2030, under current management direction, many acres of Commercial Forest Land would remain unharvested - including essentially all of the marginal component.

The following is the likely flow of timber outputs to the year 2030 if current direction (from the 75-85 Plan) is continued:

<u>FY</u>	<u>Average Annual Offerings (MMBF)</u>
1981	33.1
1982	28.8
1983	25.8
1984	25.4
1985	24.3
1986 - 1990	23.0
1991 - 2000	20.2
2001 - 2010	20.2
2011 - 2020	20.2
2021 - 2030	20.2

(Note: Offerings through 1990 reflect accelerated sale efforts to control mountain pine beetle in ponderosa pine.)

e. Demand Analysis

Discussion. All of the sawtimber from the Dixie National Forest is purchased and manufactured locally. The local communities - Panguitch, Escalante, and a few smaller communities largely depend on the forest products for their economic base. Market areas served by local manufacturers include southwest

markets and areas as far east as Pennsylvania. The Forest has offered a steady supply of forest products to provide for economic and social stability in these dependent communities. Receipts from timber sales returned to the counties have aided in programs such as schools and roads.

The present slump in the building industry nationally has resulted in a temporary decline in timber demand. Wholesale values for manufactured wood products from the mills are down, and labor and fuel costs are increasing.

Long term growth of population and the economy in the regional marketing area should sustain an increase in the demand for Dixie National Forest sawtimber. Within reasonably expected output levels, there will be a demand for Dixie National Forest sawtimber in excess of supply.

The Forest does not have a roundwood market for paper production. Aspen is being sold periodically by the cord for the manufacture of excelsior. This limited demand is expected to fluctuate and possibly decrease. Aspen has been harvested on a very limited basis by Kaibab Industries and a couple of smaller mills as sawtimber. The current demand for aspen is significantly below the potential yield. An opportunity exists for utilization of aspen and conifer roundwood for flakeboard, waferboard or similar products.

There is a demand from local ranchers and residences for some posts, poles, rough-sawn corral boards, and cabin logs. The demand for posts, poles, and corral boards has been fairly constant over the past several years. The demand for cabin logs is increasing with the development of summer home areas in and around the Forest.

The demand for fuelwood showed a substantial increase in 1977. This was probably due to the sharp increase in fuel oil and electric rates. The impact of this demand was felt the hardest by the Cedar City and Pine Valley Districts. The demand centers are from Cedar City and St. George, Utah and Las Vegas, Nevada. There are a substantial number of people that travel from southern California to the Forest for a recreation experience and return home with a load of fuelwood. Figures for 1981 show a decrease in demand for personal use permits.

No significant differences are foreseen between Regional and Forest demand trends.

Estimated Mill Capacity. Two major purchasers of sawtimber on the Forest are Kaibab Industries and Escalante Sawmills. Several small purchasers operate on the Forest on a part-time basis. Local sawmills depend virtually completely for their sawlogs from National Forest land. The current maximum annual capacity is estimated to be:

Kaibab Industries	30 MMBF
Escalante Sawmills	20 MMBF
Small purchasers	<u>5 MMBF</u>
TOTAL	55 MMBF log scale

Currently, local sawmills are operating well below their maximum capacity.

Historical Cash Flow Analysis of Timber Sales. Recently an issue has surfaced concerning the economic implications of National Forest System timber sales in which receipts do not recover costs (below cost sales). To study the "Cash Flow" of the forest's timber sale program a comparison was made of those years in which the sum of timber sale receipts (selling value(1), high bid) were less than the sum of the related costs.

As discussed in Chapter II of this document, there are many anomalies associated with the traditional Forest Service financial accounting system, for example, joint costs and benefits, capital investments amortization, and nonmarket values. To compensate for these anomalies the study did not include all direct costs, as defined in 36 CFR 219.14(b)(2). Specifically, the study examined timber sale-related costs, excluding road construction and general administration costs.

The results of the study is displayed below:

DNF CASH FLOW ANALYSIS* 1980-1984						
	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>AVERAGE</u>
Timber Volume Offered (MMBF)	+22.0	+26.0	+31.0	+28.0	+29.3	+27.3
Timber Volume Sold (MMBF)	+18.1	+25.2	+10.6	+27.9	+29.3	+22.2
Value of Volume Sold (M\$)	+139.4	+146.4	+49.5	+349.1	+372.9	+211.5
Total Costs (M\$)	+335.7	+520.7	+447.6	+430.1	+584.7	+463.8
Cash Flow (M\$)	-196.3	-374.3	-398.1	-81.0	-211.8	-252.3

*All data from "Cut & Sold Report"
Expressed in 1982 dollars

The preceeding table is not an economic analysis. See Chapter II, page II of the D.E.I.S. for a discussion of economic criteria and other benefits used in evaluating alternatives.

6. Water

a. Water Quantity

Water from the Dixie National Forest represents one of the most valuable commodities in southwestern Utah. A significant portion of the water yield in this "water-poor" region of the state is produced in the high elevation areas of the Forest. However, the total water yield is low compared to other Forests in the region, amounting to an annual average of 481,000 acre-feet or about 3 inches per acre. Average water yields over 12 area inches occur on only four percent of the Forest. The Dixie National Forest is near equally divided between the Colorado River Basin and the Great Basin in both area and water production. Approximately 224,000 acre-feet of water yield occurs in the Colorado River Basin.

b. Water Quality

The quality of waters on the Dixie National Forest is an important management concern. Past water quality monitoring has not indicated any significant degradation of water quality due to management activities. However, many streams originating on the Forest have naturally high sediment concentrations by the time they reach the Forest boundary. This is especially true for those streams flowing through areas with highly erosive soils and outcrops of certain sedimentary rock strata. Most of the sediment load is delivered to the channel during flash flood events. These conditions, combined with often highly erratic flow regimes, limit the aquatic community development of many stream reaches. Most water quality monitoring has occurred in the higher value waters where potential for significant degradation from management activities exist. Although these reaches generally meet State water quality standards, there is still concern that sediment producing activities may degrade them below their biological potentials. Road construction, timber harvest and grazing in riparian areas all tend to increase the sediment loading to streams and lakes. Mitigating measures are employed in resource development activities to ensure that this degradation does not reach unacceptable levels. An exception to the general rule of no significant human-caused water degradation exists at Panguitch Lake. This heavily used recreational resource is experiencing an accelerated eutrophication* rate which may ultimately cause serious impairments of its fisheries and aesthetic values. This drainage which constitutes 20% of the total water yield on the Forest, is the only one on the Forest which cannot be shown to generally meet state water quality standards. A cooperative program is now underway to reduce the nutrient inputs to the lake.

c. Special Conditions and Situations

Hazard areas with potential to degrade water quality on this Forest are associated with erosion concerns. These hazards are described in the Soils Section of this Chapter. An additional hazard occurs in the East Fork of the Sevier River. Unstable streambanks in this drainage have resulted in excessive sedimentation and loss of fisheries values. This stream is sensitive to factors that promote further destabilization.

d. Flood Prone Areas

Intense thunderstorms, occurring from July through September, account for most of the summer precipitation in southern Utah. These summer storms can produce severe flash flooding in numerous dry washes, alluvial fans, and many perennial streams across the Forest. Few drainage bottoms on the Forest are immune to flash flooding. Some of the larger streams which originate in the higher elevations of the Forest (e.g., Santa Clara River, Panguitch Creek, Mammoth Creek, and the East Fork of the Sevier River) are subject to more extensive and prolonged flooding during the spring snow melt period. The primary flood hazard areas for this type of flooding are off-Forest in the communities and agricultural lands along the streams.

e. Water Storage and Transmission Facilities

Most of the water yield occurs during the spring and early summer months when the winter snowpack melts. Snow melt usually commences before the irrigation season. Stream flows are much reduced during the late summer. Consequently,

those drainages with storage facilities are capable of providing a more constant and reliable supply of water. The water resources of the Forest have been extensively developed through the construction of numerous storage facilities, diversion structures, and ditches. There are approximately 70 reservoirs on the Forest. Most of the streams on the Forest either have diversions or impoundments within the Forest boundary. None of the existing facilities are perceived as detrimental to the multiple use management of the Forest. However, there are currently at least two water transmission facilities with associated erosion problems needing correction. Some of the impounding structures on the Forest currently have structural deficiencies requiring correction to meet Federal or State safety standards.

f. Water Uses - Consumptive

Most of the consumptive water use occurs off-Forest. The primary uses are for irrigation and culinary water supply in the alluvial valleys below the forested lands. At present the amount used for mining and industrial operations is minor. This situation may change in the future if the considerable energy reserves of southern Utah are developed. Eleven communities in southern Utah obtain at least part of their municipal culinary water from spring sources within the Forest boundary. Municipal watersheds have been designated for seven of these community systems located on National Forest land. They are Brian Head, Enterprise, Escalante, Panguitch, Parowan, St. George, and Teasdale. Management emphasis in these areas is for protection of water quality at culinary sources. Federal consumptive uses on the Forest are minor in quantity but very important to the management of the Forest. Domestic use at administrative sites and in campgrounds, and livestock and wildlife watering are the primary consumptive uses.

g. Water Uses - Non-Consumptive

Instream flow represents an important non-consumptive use of water for the Dixie National Forest. Instream flow needs include maintenance of fisheries, riparian ecosystems, recreational uses and stream channel integrity. These instream uses generally do not conflict with other uses of the water since most consumptive uses occurs off-Forest. However, in recent years there has been considerable interest in diverting small streams on the Forest for small-scale hydropower projects. Although non-consumptive, this use often presents serious conflicts with the management of other resources dependent upon the availability of surface waters. The Forest has initiated a program to identify instream flow needs for multiple use purposes. This program has been completed on approximately 30 percent of the streams on the Forest. When environmentally compatible with management objectives for an area, new permits to divert surplus water may be issued. In all cases, weighing net public benefits of diversion or storage projects versus instream flow values will play an important role in the decision making process.

h. Riparian Areas

Riparian areas are recognized as unique, high value, hydrologic-biotic components of the Forest resource base. They are quite limited on the Dixie National Forest. Riparian areas account for only one percent of the total Forest land base. Management activities within these areas must comply with Executive Order 11990 on Protection of Wetlands. The condition of some

riparian areas is currently below potential due to overuse by permitted livestock. This situation represents some degree of difficulty to rectify; however, over the long term, conditions of the riparian areas should progressively improve.

i. Demand

In southern Utah, the demand for water currently exceeds the existing supply. No reduction in demand is foreseen for future years. However, the mix of water uses will probably change with agriculture use becoming less with more water going to municipal, industrial, and minerals development uses. Any increase in water yield from the Forest, now or in the future, would undoubtedly be utilized by the surrounding or downstream water uses. The opportunities to increase water yield are limited. The primary means to improve water yield on the Forest include vegetative manipulation and cloud seeding. Vegetative manipulation opportunities include emphasis on clearcut harvest in aspen and patch/strip clearcut in spruce-fir and mixed conifer stands. These activities could be carried out on a maximum of 61,625 acres of timberland to augment water yield by approximately 4,000 acre-feet per year when measured over the rotation age of the timber stands. This amounts to a 0.8 percent increase over current levels. A cooperative cloud-seeding program of the State of Utah and several local governments has been carried out in recent years in the mountains of southwest Utah. Preliminary results indicate a positive response to the cloud-seeding effort.

There is very limited opportunity to meet significant demands for non-consumptive water uses such as hydroelectric power generation. Most of the economically justifiable reservoir sites have already been utilized. The remaining unimproved streams on the Forest are small. It would be difficult to economically develop these streams for hydropower purposes without seriously impacting other multiple use values.

7. Minerals and Energy

Minerals exploration and development activities are directly related to the interest generated by the general public and industry. Management of this resource is responsive to these public interests along with industry interest in coordination with various other public agencies and resources. For these reasons, the minerals resource poses programming and scheduling problems that are not common with management of other resources.

Satisfying demand for locatable minerals is the responsibility of the mining industry. Public domain land is available for mineral exploration and development under all applicable laws and regulations. For leasable minerals the Department of Interior leases tracts for development by the mining and oil and gas industries. Saleable minerals are the only type of mineral commodity for which the Forest Service can directly affect the supply by selling common variety mineral materials to individuals and private industry. The Forest Service uses some common varieties for In-Service use.

a. Acres Available, Capable, Suitable

Availability. In accordance with the Federal Land Policy and Management Act of 1976 (FLPMA), the Forest Service must consider that all National Forest System

lands are available for mineral exploration and development unless they are withdrawn from mineral entry and leasing.

The Dixie National Forest contains lands which restrict minerals activity by formal land classification. These restrictions are shown in the following Table No. III-23.

Valid existing leases can still be developed in the three Dixie National Forest Wilderness, but establishment of new leases is prohibited.

Congress withdrew from mineral entry approximately 5,000 acres of National Forest system lands on adjoining areas outside the official Box-Death Hollow Wilderness boundary. However, these same lands were left open to carbon dioxide leasing.

Existing withdrawals will be reviewed for continuation, modification or revocation prior to 1991, as directed by FLPMA. The review schedule may be found in the Appendix section of the Forest Plan.

In summary, 1,781,779 acres are presently available for mineral leasing and 1,773,319 acres are available for mining entry. This is 95 percent and 94 percent of the Forest, respectively.

Capability. The Forest Service does not determine which areas are capable of mineral or energy production. This determination is largely a function of private sector interest and pursuit. The entire Forest is recognized as an attractive resource, for mineral and energy potential. However, the dynamics of economical and technological factors limit the development of predictions beyond the recognition of this resource potential.

Suitability. All of the legally available land on the Forest is suitable for exploration and development of minerals provided that those activities can be limited by protective clauses and requirements to protect other resources.

Land management planning encourages or discourages minerals/energy activity by imposing restrictions on access to public lands. These restrictions are expressed through stipulations to mitigate potential adverse effects to other resources. These range from total withdrawal from leasing, through No Surface Occupancy lease stipulations, special lease restrictions, down to the most permissive case which contains standard lease stipulations. The mix of acres in each category of restriction will change according to the Forest Plan alternative being considered.

Development of oil and gas and other minerals may be further restricted by limitations in permits to drill, and approved operating plans. Such restrictions can be imposed to protect wildlife, soil, steep slopes, water quality, visual and cultural resources and other environmental factors.

Another consideration relating to suitability is the provisions of the Surface Mining Control and reclamation Act (SMCRA). This Act provides for the application of Department of Interior criteria to determine suitability of certain National Forest coal lands for surface mining. These criteria were applied to 39,980 acres of coal lands on the Dixie National Forest these acres were determined to have high or medium coal development potential or be under

existing preference right lease applications (6). The results: ten acres were classified as suitable/available for coal strip mining, and the rest of the studied area classified as available for coal leasing (where surface operations and impacts are considered incident to an underground coal mine). Any leasing of potential coal lands outside of the study area will require application of the standard USDI criteria prior to leasing.

A special management situation was created under authority of 522 (c) and (d) of SMCRA by a Secretary of the Interior decision December 16, 1980. Effective that date, certain lands adjacent to Bryce Canyon National Park were declared unsuitable for all types of surface coal mining operations, including some land on Dixie National Forest. The decision classifies 27,781 acres of National Forest lands adjacent to the Park as being unsuitable for surface coal mining, including surface impacts incidental to underground mining which would be visible from the Park. Another 7,782 acres of National Forest lands northeast of the Park were classified by the same decision as unsuitable only for mining by surface methods.

b. Current Management Direction and Situation

General Direction. The current management direction is to integrate the exploration and development of mineral and energy resources within the National Forest System with the use and protection of other resource values. Accordingly, mineral resources are treated as a resource on the Dixie National Forest. A basic difference however, is that, contrary to other resources, mineral development is initiated and carried forth by private interests. Minerals considered a non-renewable resource, is treated with special consideration for rehabilitation of disturbed areas. Current direction regulates mineral activity in sensitive areas where other values and uses must be recognized and protected.

All minerals owned by the United States available for exploration and development are subject to disposal under one of these three categories--locatables, leasables or saleables.

For Locatable Minerals, any person proposing to conduct operations that might significantly disturb a surface resource must file a Notice of Intent with the District Ranger.

Permits, licenses, or leases for Leasable Minerals (i.e. oil, gas, coal, geothermal on all Federal lands and hardrock minerals on acquired lands) are issued by the Department of Interior. The Forest has opportunity to perform environmental analysis, recommend action, list stipulations, and propose requirements for rehabilitation. For coal, geothermal, and all minerals on acquired lands, the Forest Service has authority to consent to or deny permits, licenses, and leases. For oil and gas proposals, on public domain lands, the Forest Service has the authority to make recommendations to the USDI which has the ultimate responsibility for a decision on leasing.

Saleable Minerals are managed by the Forest Service. Permits are issued for use of these materials in accordance with Forest Service policy, and are kept on file at the Supervisor's Office.

Current Situation.

Locatables. Approximately 5000 claims exist on the Forest. Assessment work is kept up on many of these; but, there is only minor exploration and development of locatable mineral resources at this time. Because of a depressed market there is little production. An operating plan to remove 20,000 tons per year was received for an open pit gypsum mine on the northside of Boulder Mountain, and mining began in 1984. A gold strip mine is being developed on private land within the Forest near New Harmony, with 22 lode and placer claims being located on adjacent NFS lands. A road-use permit to cross NFS lands provides access to the operation. The Forest Service, State of Utah, local communities and miners are cooperating to ensure orderly development occurs. A comprehensive plan reflecting the concerns of these interests will be prepared should the operation expand to NFS land. A Notice-Of-Intent to Operate has been received for work on silver claims in the Leeds area. Throughout the Forest other claims have been located for uranium, limestone, iron, silicasand, building stone, and jasper; however, there has been no recent activity outside of annual assessment work.

Leasables. The Dixie National Forest has been rated for potential development of oil and gas, coal, and geothermal resources. Data used to determine geologic potential was furnished by industry, the Department of the Interior, and the Forest Service. The potential for oil and gas ranges from low on the west side of the Pine Valley District to high on all of the Escalante and Teasdale District.

About 800 oil and gas leases exist on 75 percent of the Forest. Annually, 100 to 200 new applications for oil and gas leases are processed, between 10 to 30 geophysical prospecting permits are issued, and one or two wildcat exploration wells are drilled. Currently, the rate of geophysical prospecting is low, but drilling wildcat wells and leasing is increasing. Increased use of improved seismograph techniques and equipment throughout the Forest during recent years has yielded better quality data than was obtained in the past. This improved data stimulated extensive drilling in Southern Utah along the Overthrust (overthrust belt passes through the Forest), in the Hingeline, in the Kaiparowits Region, and along key faults and anticlines. Many of the dry wells drilled showed oil present, but not in economically attractive quantities or quality. Exploration recently was conducted at a high rate between Antimony and the Tropic Reservoir area for oil and gas.

The Forest has a producing oil field at Upper Valley. This field, developed in 1964, currently has 23 oil wells which produce in excess of 1300 barrels of oil per day. About 21 million barrels were produced through the end of 1985. This field also has nine injection wells and one temporary shut-in well. Two more oil wells were drilled in the field in 1985. The field has been stimulated to an unknown degree of success, by using recovery-enhancing polymers. The production records seem to fluctuate, possibly as a function of supply and demand and the price of oil. The oil field operator worked cooperatively with the BLM and USFS in late 1983 and early 1984 to prepare a comprehensive surface protection and reclamation plan for Upper Valley Oil Field. The BLM estimates the field has about 20 years of life left.

Through the cooperation of the oil company an abandoned oil well drilling site on the Teasdale Ranger District was converted to a developed trailhead for recreationists in 1984.

Carbon dioxide (CO₂) has been discovered on National Forest System land in several locations.² A well drilled in the Sand Creek drainage, on the Escalante Anticline, in 1983, yielded 124 million cubic feet of CO₂ gas per day at 100 lbs per square inch. The operator/lessee estimated the total CO₂ resource in the field to be 1.3 trillion cubic feet, possibly the largest CO₂ field on the continent. In 1984, one additional well was drilled in Sand Creek, and it, too, yielded CO₂. In late 1984, a third well was drilled for CO₂ on Antone Ridge between the Box-Death Hollow drainages. The third well was said to be needed to confirm the volume of CO₂ in the field, and to determine whether the CO₂ field is economically feasible for development. At this writing, that well has been completed, and the company is analyzing the data obtained. If the project is economically feasible, then the concerned lessees will probably unitize and submit a comprehensive plan for full development of the CO₂ field. A market for CO₂ may exist in either CO₂-enhanced oil recovery in depleting oil wells, and/or in coal-liquified CO₂ slurry pipelines. There is a possibility CO₂ from the Escalante Anticline area could be used in the depleting Upper Valley Oil Field for enhanced oil recovery, or in the transportation of coal from Kaiparowits and Alton coal fields.

Coal resources extend onto the Forest in four fields. Much of the coal is covered by more than 3000 feet of overburden, making it unavailable. In addition, much of it is of a quantity or quality that makes it uneconomical for industrial development. Commercial opportunities on the Forest exist in the Alton and Kaiparowits fields, where the quality of the coal is generally very good. Interest in coal development has been restricted by lack of market and isolation of the resource. On the Forest there is one existing 40-acre coal lease and 3 old coal mines, but no mining has taken place since the 1960's. The Forest has six preference right coal lease applications (PRLAs) pending on the Escalante District. These involve approximately 20,000 acres of National Forest land. During 1983, a study was completed which employed the Department of Interior's coal unsuitability criteria for the high and medium potential coal lands (technical data was furnished by USDI) to determine which National Forest lands can be made available for surface coal mining. The results of that study can be found in the Appendix. Upon completion of the Coal Unsuitability Study, two environmental assessments were prepared by the Forest for the six preference right coal lease applications. These were in the draft stages when the BLM stopped all work on an EIS being prepared for all Preference Right coal lease - application areas in Utah. The EIS preparation was suspended by the BLM because the Appropriations Act prohibits leasing activity in a Wilderness Study Area; one of the areas involved was a WSA on BLM lands.

There have been a variety of proposals to develop the two billion ton Alton field and 15 billion ton Kaiparowits field. These proposals have stimulated considerable controversy due to their proximity to Bryce Canyon National Park.

Development of all coal is in a dormant stage now. However, large companies (primarily) have leased much of the commercially developable coal on Federal, State and private lands. Since removing large volumes by truck from the

Kaiparowits-Alton fields is impractical, the coal will have to be transported by rail or pipeline. When that development occurs, it is unlikely the coal will be utilized in the immediate area because of the extremely sensitive scenic and air quality values.

In the event USDI conducts a regional competitive lease coal sale in the area, it is possible industry may express interest in bidding on coal resources which were not included in the Forest's Coal Unsuitability Study. If this occurs, the USDI criteria will be applied to the unstudied area before the coal can be leased.

The potential exists for discovery of geothermal resources on the west side of the Forest. Thirty-six applications for lease were received on the Cedar City District, and eight on the Pine Valley District. All were withdrawn just prior to completion of Forest Service environmental assessments. A competitive-bid lease area (Known Geothermal Resource Area) exists at Navajo Lake, because applicants inadvertently overlapped to create a competitive bid situation. Geothermal interest on the Forest has dropped because of the current economic condition. Exploration and development continue in the Escalante Desert north of the Pine Valley District, where the potential for discovery is greater and where there are existing surface expressions of a geothermal resource. A moderate temperature geothermal - heated greenhouse industry has developed at Newcastle adjacent to the Pine Valley Ranger District. The Forest is the recharge area for desert warm water aquifers.

Common Variety Mineral Materials. Common variety mineral materials are made available throughout the Forest by commercial sales and free use. Many common varieties are used for Forest Service projects. The west side of the Forest has several good deposits of cinders which have been utilized extensively. Sand and gravel has been developed in numerous areas on all Ranger Districts.

Some of the pits are under special use permit and the use is exclusive to the permittee. Other pits are of a community-type. Depending on the case, charge-type or free-type permits are issued upon request. An operating plan is issued with each permit. The Pine Valley and Cedar City Districts have prepared comprehensive management plans for each community-pit. In 1984 the Powell District completed a comprehensive management plan for common varieties covering the entire District. Surface protection and reclamation practices are on-going at all areas.

A seven-year history (1977-1983) of common variety mineral materials disposal on the Forest can be found in the AMS of this Plan. This history shows the average amount of common varieties (sand, gravel, cinders, and rock) disposed to be:

Sold	4,698 tons/year
Given Away Free	60,241 tons/year
Used by the Forest Service	87,233 tons/year

TOTAL = 152,165 tons/year

(The estimated value at the present on-site rate charged by the Forest Service, $152,165 \times \$0.30/\text{ton} = \$45,650/\text{year}$.)

c. Expected Future Condition

Future technology, change in economic conditions, new discoveries, and changing needs will determine to a large extent where, when, and which minerals are developed. When this occurs special stipulations and operating procedures are included in federal leases, licenses, permits, and operating plans to coordinate with other resources as required. These protective stipulations and procedures may exclude surface occupancy, require special provisions, and/or may result in increased operating costs.

The policy and procedures set forth in the Interagency Agreement (IA) effective June 19, 1984, between the BLM and the Forest Service covering mineral leasing, will be followed whenever a proposal is received by the Dixie National Forest. This IA will be followed in respect to the processing of authorizations, such as licenses, permits, and leases, that grant rights to federally owned minerals in the National Forest System and in adjoining lands with Federal minerals (split estate lands). A copy of the IA may be found in the Appendix section to this Plan.

8. Human and Community Development

The Forest is currently operating six major manpower programs which provide employment, skill training, experience, and education for a wide range of age groups interested in natural resource management. Manpower programs provide a valuable service to the Forest and at the same time fulfill a U.S. Department of Agriculture commitment to serve the unemployed, underemployed, minorities, and economically disadvantaged youth and elderly through related forestry activities. The following programs exist on the Forest:

- Youth Conservation Corp (YCC). Funding changes has necessitated a cut back in this program. Over the years it has played an active and important role.

- Senior Community Service Employment Program (Older American). The Older American Program, being very active on the Forest, employs part-time elderly persons whose incomes are within poverty level standards.

- Volunteers. Because individuals participate in this program without compensation numbers of volunteers actively participating at any one time varies substantially. Campground host duties are popular volunteer projects on the Forest.

- Comprehensive Employment and Training Act (CETA). This program has been reduced. It is doubtful the Forest will be able to host the enrollees of the various titles of the Act.

- College Work Study (Coop. Ed.). This cooperative program is one which the Forest has supported within the limits of its funding capacity.

- Student Volunteer Program - With Southern Utah State College nearby, the Forest has an excellent opportunity to use students, especially in the Business Management area.

All participants benefit from the manpower programs. The enrollee receives income and training or employment opportunities that are not otherwise available.

b. Demand Trends

The outlook for manpower and youth training programs on the Forest is not encouraging. Many of the programs are Federally funded, with monies coming from other Federal agencies.

E. SUPPORT ELEMENTS

1. Landownership and Land Uses

a. Ownership

The Dixie National Forest has a gross acreage of 1,967,187 with 1,883,734 acres of National Forest System administered lands and 83,453 acres in other ownership. The major portion of the Forest was reserved from public domain when the Forest was established. Factors affecting acreage are 31,754 acres of exchange, 68 acres of donation, 10,724 acres transferred from other agencies, and 1,191 acres of reserved lands (unsurveyed submerged areas).

b. Classification

Special classifications of land often restrict resource uses and may effect objectives for land acquisition or disposal. The following tables indicate these lands which are withdrawn, classified or designated for a special purpose:

Wilderness

Pine Valley	50,000 acres
Ashdown Gorge	7,000 acres
Box-Death Hollow	<u>26,000 acres</u>
	83,000 acres

Withdrawn From Mineral Entry

Administrative Sites	3,109 acres
Recreation Sites	<u>5,351 acres</u>
	8,460 acres

The Federal Land Policy and Management Act directed that all withdrawals be reviewed for continuation or revocation prior to 1992.

F.E.R.C. (F.P.C.) Withdrawals	500+ acres
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These lands are not being used for the purpose for which they were withdrawn, no action has been taken on them. The Forest proposes to remove these from the records through revocation of the withdrawals.

Some of these special classifications apply to the same acreage, therefore acreage figures are duplicated in some instances. Effects of these classifications on land adjustment activities cannot be generalized as each allows and/or restricts specific activities.

The land adjustment activities on the Forest consist of purchase, exchange, and donation. A lack of funds for purchase limits opportunities to block Federal ownership in those areas suitable for National Forest management. The only funding for purchase on the Forest is the Land and Water Conservation Fund Act of 1964. While the Forest has had approved tracts, there has never been any funds for purchase made available. The exchange program has been the land adjustment vehicle for the Forest. While the exchange program has been in effect for years, an active program was initiated in 1975. The Asset Management Program limited the activities for a couple of years, but it is anticipated that an active program can be reestablished. The exchange program can be characterized as, trading on a value basis certain lands with limited benefits to the National Forest (selected lands) for private lands (offered lands) that would better meet the needs and objectives of the Forest. In recent times this program has resulted in a small net loss in National Forest acreage as lower valued Forest lands were used in exchange for higher valued private lands, however, such results are strictly a result of the lands used. The donations received originate from landowner initiative rather than a program, and they have typically been of small acreage and low value.

Since land adjustment activities are normally conducted only with willing parties there is an inherent degree of uncertainty when forecasting changes and accomplishments. Improvements in landownership pattern are expected in the future as the land adjustment activities are carried out. A pattern of mixed ownership will prevail on the Forest with the land adjustment activities following a variety of resource needs and objectives.

Interchange is a land adjustment activity that does not involve the private sector. Interchange involves the exchange of Federal lands between one or more Federal agencies. The objectives of such activities are similar to those outlined in the land adjustment discussion. The Forest, in the interest of improved management, has explored this option in the past and will continue to look at opportunities to improve management by interchange activities.

Rights-of-way activities on the Forest involve road and trail rights-of-way usually in the form of easements. While the Forest has access in many locations due either to dedicated public or acquired rights, such rights do not begin to meet the need. There are rights-of-way needed for Forest system roads not yet developed, and there are rights-of-way needed for existing roads and trails not covered by deeded rights. This last group of needed rights-of-way consist of prescriptive rights developed by the public through past prescriptive use for roads and/or trails. These prescriptive rights perfected by the public need to be carried forward to formal rights when they will serve the needs of the public and National Forest.

Again the right-of-way activities are normally conducted only with willing parties, therefore, there is an inherent degree of uncertainty when forecasting changes and accomplishments. The rights-of-way activities are expected to improve the public access to the Forest and assist in the utilization of the resources.

The amount of private land boundaries adjacent to and inside the Forest creates a high priority for landline location and boundary marking. This program has a significant amount of work backlogged from earlier times when a limited program was in effect. Each mile of line established usually produces some type and degree of trespass. With the more active landline program in recent times a sizeable backlog of cases has developed and grows with the landline program. These cases generated by the landline program generally call for action under one of the following classifications trespass, title claims, or the new Small Tracts Act of 1983.

The nonrecreation special use program continues to grow at a fairly constant rate. Every effort is made to respond to applications for new permits as quickly as possible. The program involves a considerable investment in time both in permit processing and field inspections pre and post permit. The requirement of annual fee determination and billing also represents a sizeable investment in time. A listing of permits as of fiscal 1984 and fees collected from them are listed below.

TABLE III-23
PERMITS ISSUED IN FISCAL YEAR 1984 AND FEES COLLECTED

Use	Annual Fee	Miles R/W Length	Acres Permitted Area	Charge	Number of Cases Free	Cases Other Agency	Total
Agriculture	69.50	1.7	611.7	8	2	0	10
Community	0	0	14.0	0	6	0	6
Industrial	2,539.40	0	48.6	81	8	0	89
Public							
Information	25.00	0	.2	1	1	0	2
Research Study							
And Training	50.00	0	562.0	2	1	0	3
Transportation	419.60	80.5	492.2	6	25	1	32
Utilities and							
Communication	17,531.99	248.8	1,508.9	39	29	6	74
Water	2,513.00	133.3	3,149.0	85	30	2	117
TOTAL	\$40,688.49	464.3	6,773.5	291	105	9	405

d. Hydropower

There is one existing hydropower complex on the Dixie NF, operated under License of the Federal Energy Regulatory Commission, near Boulder, Utah, by Garkane Power Association (an REA).

The Forest has other drainages which are suitable for small scale pipeline-fed hydroelectric power generating facilities. Such facilities are generally intended to supplement power generation during peak electricity useage periods, and in conjunction with irrigation and culinary water diversion and transport facilities.

Through early FY 1985, three such proposals were received, and six inquiries made. Garkane has declared it will expand its Boulder Hydropower plant in the future, when market conditions are right.

e. Research Natural Areas (RNA's)

The Forest has identified three areas for further consideration as Research Natural Areas:

Table Cliff - about 1235 acres in Sections 4, 5, 8 and 9, T. 36 S., R. 1 W. The area contains undisturbed vegetative and geologic conditions that are unique.

Timbered Cinder Cone - about 640 acres in Sections 29, T. 37 S., R. 8 W. The area contains undisturbed vegetative and geologic conditions that are unique.

Red Canyon - about 460 acres in Sections 10 and 15, T. 35 S., R. 4 W. The area contains unique species of plants.

2. Soils

The Dixie National Forest is located primarily in the Colorado Plateau Province where topography consists of broad plateaus bounded by receding escarpments and dissected by vast canyons. The extreme southwest portion of the Forest occurs in the Basin and Range Province noted for its internal drainage characteristics and steep mountain ranges rising abruptly out of the valleys.

The complex geology of the area accounts for an intricate variety of soil types. The interbedded sedimentary rocks, including limestone, sandstone, shale, conglomerate and gypsum have been modified by faulting, folding and uplifting. The Pine Valley mountain laccolith consists of quartz monzonite porphyry. Extrusive igneous rocks consisting of latities, dacites, ignimbrites, breccia and tuffs, andesite and basalt occur over much of the area. Glacial morain and outwash are associated with the highest elevations. Landslides and landflows have altered the topography, especially below the plateau rims. Some geologic formations are especially susceptible to land movements.

Vegetation varies from desert shrub types at the lower elevations to alpine meadows at the higher elevations. A very complex pattern of soils has developed, because of the combined effects of differences in geology, geomorphology, climate, vegetation and aspect.

A number of special soil limitations have been identified on the Forest that affect management practices and resource uses. These include areas of low soil productivity, high erosion hazard, and geologic contact zones subject to slumping. Methods of timber harvest, road location and design must be altered to accommodate these hazards.

a. Watershed Condition

Watershed conditions have improved dramatically across the Forest since the 1940's. Prior to this time overgrazing had seriously depleted ground cover and increased soil erosion. Large reductions in livestock numbers and

implementation of modern range management techniques have allowed most of the upland areas to recover to good condition. There are, however, numerous areas on the Forest where structural measures are needed to combat accelerated erosion. These areas usually have advancing gully networks or unstable stream channels. A recent watershed improvement needs inventory catalogued 725 acres of high priority watershed restoration projects needing work. There are an additional 1515 acres of smaller projects that require watershed restoration. In addition, there are 110,000 acres of poor condition range which are has not yet been brought back to satisfactory condition.

b. Soil Erosion

Several areas of extremely high soil erosion rates exist on the Forest, such as the pink cliffs (Wasatch/Cedar Breaks/Claron Formations) on the plateau sideslopes and blue shales above the Paria River and Henrieville Creek. Erosion rates from these unvegetated escarpments are difficult or impossible to significantly reduce. Other areas exist with high soil erosion hazard, but which are vegetated and can be managed for multiple resource outputs (e.g., areas with soils derived from the Claron and Carmel formation). On these areas greater restrictions are called for in timber harvest, grazing intensity, road construction, vegetation manipulation and other activities which might decrease protective ground cover.

c. Soil Productivity

Soil productivity varies considerably across the Forest with differences in elevation, precipitation, temperature, geology, vegetative cover, aspect, soil depth, texture, rock fragment content, slope, and drainage.

Generally, the lower elevation areas with pinyon-juniper vegetative cover types on steep slopes have shallow droughty soils with low productivity potential.

Sagebrush valleys and gently sloping areas of pinyon-juniper have moderately high productivity potentials. Many of these areas have been chained and seeded to increase the forage production for livestock and wildlife.

Plateau lands with ponderosa pine and mixed conifer vegetative cover types have moderately deep and deep soils. These have a moderate to high productivity potential. Generally, soils derived from basalt or andesite parent materials are the most productive timber producing soils.

Shallow droughty soils on steep slopes with south aspects derived from limestone parent materials typically have very low productivity potential for producing commercial timber. Soil erosion rates are typically high and regeneration success is poor.

High elevation plateau lands with spruce fir vegetation typically have moderately deep soils with low to moderate productivity due primarily to short growing seasons and cold temperatures. Regeneration success has generally been poor.

The extreme elevation and climate of 11,000 foot Boulder Mountain has produced soils of low productivity potential for both timber and rangeland.

d. Geologic Hazards

Geologic hazard areas identified on the Forest include potentially active fault zones and slump zones. Varying degrees of resource management implications are associated with each of these hazards.

Seismic hazard zones on the Forest have been identified and mapped. These zones extend approximately 1.25 miles from faults active in Recent or Quaternary times. These zones represent areas where there is a potential of rupture or shaking damage from earthquakes associated with fault slippage. Potential seismic hazards will be considered when designing buildings, dams, transmission facilities and other structures in these zones.

Slump zones commonly occur in broad bands along plateau sideslopes on the eastern portion of the Forest. The Wasatch-Kaiparowits contact zone is an especially important area of soil mass movement. Slump zones present special problems for those management activities involving road construction or other earth moving activities. Road cuts and other excavations frequently will initiate large scale soil mass movements which are difficult or impossible to control. Careful attention must be given to proper road location and design in these areas to minimize the incidence of slumping and associated resource costs.

e. Soil Resource Inventory

Detailed soil information is needed to provide information to resource managers to mitigate soil and geologic hazards. At present, an uncorrelated Land Systems Inventory has been completed for the entire Forest, however, the mapping units are quite broad, therefore, the data is often inadequate for specific project planning.

Detailed soil information has been collected on approximately 800,000 acres of the Forest (Order 2 and 3 soils survey). Currently, approximately 50,000 acres are inventoried annually. Current direction is to continue the soil resource inventory at an Order 3 level on the productive forest and rangeland, and an Order 4 level on lower producing lands.

Approximately 46,200 acres of timber land were removed from the timber base in this planning period, due to the lack of adequate soil and geologic information. The Forest will determine whether or not irreversible resource damage would occur if logging were allowed on these acres. It is important to collect this inventory information prior to the next Forest Planning update, in order to accurately determine the resource potential of these areas.

3. Facilities

The Dixie National Forest has numerous facilities including roads, bridges, administrative sites, buildings, dams and water systems. They require considerable time and money for operation and maintenance. There has been large investment in these facilities to enable the development, protection, and use of forest resources.

The Forest's Transportation System, including roads, bridges, and major culverts, provides access for forest users. The system serves this function,

but many miles of the Forest's road and trail systems are below the standard actually needed to support land management. All bridges and major culverts are usable, but six bridges do not meet Utah State Standards.

Most administrative sites and buildings on this Forest are old. An aggressive program of maintenance and reconstruction is required.

The Forest has 28 water systems, used by both the public and forest employees. Many of these water systems need major maintenance or reconstruction.

The Forest has responsibility for inspection of both special use and forest-owned dams, canals, and pipelines.

The trail system is described in the recreation section.

a. Transportation (Roads)

The Forest has over 2,100 miles of Forest Development Roads on inventory. This includes 527 miles of arterial roads, 615 miles of collector roads, and 984 miles of local or terminal roads. The Forest is in the process of an on-the-ground review of the roads system. There are many roads that exist and are utilized as a transportation network that are not yet inventoried.

The Forest does maintenance on approximately 570 miles of Forest road each year. This is about one-fifth of the total road system. Many miles of the Forest's road and trail systems do not meet the standard actually needed for land management needs.

The arterial system does not meet the standards necessary to support existing uses. The arterial roads were generally constructed as single lane with turnouts. Maintenance over the years has widened the travelway to a lane and a half width in most instances.

The collector road system is being increased each year by approximately four miles and an additional two miles is being reconstructed. The majority of this work is associated with the timber program. The collector system is being designed to accommodate all weather continuous use, with a single lane and turnout standard. It is anticipated the collector system will be in place by the end of the present ten year timber harvest program. The local and terminal system is being increased yearly at the rate of approximately 20 miles. The majority of the increase is the result of the timber sale program. The normal timber sale activity creates a road network density of approximately three to four miles of road per 640 acres. These roads will be used for future activities and will remain part of the Forest Development System. Roads not needed are closed for resource protection and/or improvement. This also eliminates the need for unnecessary expenditures for road maintenance.

The Forest has 46 bridges and 9 major culverts. Forty of the bridges meet Utah State Standards. The remaining six have been signed for loading capacity and may need to be repaired or replaced.

b. Administrative Sites, Buildings, and Support Facilities

There are 66 buildings used as offices, residences, and warehouses. Most of these buildings are over forty years old. The buildings are all included under a maintenance schedule. The Forest intends to place needed new buildings on the Regional Priority Construction List. Smaller facilities are constructed as feasible with available funds.

The Forest's 28 water systems serve administrative sites, recreational sites, and special use areas. Many of these water systems do not comply with Utah State Standards. The water systems that do not comply with Utah State Standards are being rehabilitated as funds permit.

Thirty-nine dams on the Forest are operated under special use permit. The Forest Service inspects these dams and requires permittees to perform necessary maintenance. The Forest owns and maintains four dams.

c. Highway Corridors

The following are the federal and state highways that provide access to the Forest:

- Interstate 15 - St. George thru Cedar City.
- Utah State Highway 18 - St. George to Enterprise.
- U.S. Highway 89 - from Orderville thru Panguitch to Richfield.
- Utah State Highway 143 - from Parowan thru Cedar Breaks to Utah Highway 14.
- Utah State Highway 56 - from Cedar City west to New Castle.
- Utah State Highway 14 - from Cedar City east to U.S. Highway 89.
- Utah State Highway 20 - from I-15 east to Utah State Highway 89.
- Utah State Highway 12 - from U.S. Highway 89 to Escalante.
- Forest Highway 41 - from Escalante to Teasdale.
- Forest Highway 17 - from Widtsoe east to Utah State Highway 12
- Cedar Breaks-Panguitch Lake Road - FS No. 30040 - this road goes from Cedar Breaks to Panguitch.
- Utah State Highway from U.S. 89 to Interstate 70.

d. Energy Transportation and Utility Corridors/Windows

The Dixie National Forest has analyzed existing and proposed energy transportation and utility needs as one of the key elements in the Forest Planning process.

This analysis is appended to this document as Appendix D.

Following is a summary of the most significant points from this analysis:

Existing Linear Rights-of-Way Evaluated as Potential Utility Corridors

Rights-of-way on National Forest land meeting standards for potential corridor designation have been identified (a corridor is defined as a linear strip of land having advantages over other areas for the present or future location of energy transportation and utility rights-of-way).

These rights-of-way are:

- Utah Power and Light Company's 138 kV transmission line from Cedar City west substation to St. George, Utah, via Newcastle and Central, Utah (Pine Valley Ranger District) a/.

- Garkane Power Association Inc's. 69 kV transmission line from Boulder Hydroelectric Plant to Escalante substation (Escalante Ranger District);

- Garkane Power Association's 69 kV transmission line from Henrieville substation to Escalante substation. a/

- Intermountain Power Project's 500 kV dc transmission line, from Newcastle to Veyo, Utah (Pine Valley Ranger District). a/

- Utah Power and Light Company's 230 kV transmission line in South Johns Valley and Cedar Fork (Escalante Ranger District). a/

- Utah State Road 18 from Enterprise to Central Utah (Pine Valley Ranger District). a/ b/;

- U.S. 89, Long Valley Junction Area (Cedar City Ranger District). b/ Three separate segments on National Forest land.

- Utah State Road 12, from the junction of Utah State Road 63 to Escalante, Utah (Escalante Ranger District). a/ b/

a/ These transmission lines and road rights-of-way are part of and within the Newcastle-Veyo and/or Johns Valley/Upper Valley Main Canyon planning Window areas. (See following discussion on these window areas.)

b/ State road routes are considered as portions of potential corridors or window for energy transportation facilities. These routes are not evaluated for the purpose of potential expansion or upgrading of Forest Highway systems.

Refer to Appendix D for the type of facilities permitted and the width of these potential corridors.

Window Areas

Seven areas on National Forest land have been evaluated as potential windows (these planning "window areas" are critical segments of terrain through which energy transportation and utility rights-of-way could pass in traversing the Forest.

These planning window areas are:

- Newcastle, Utah to Veyo, Utah (Pine Valley Ranger District).
- Interstate 15 (Pine Valley Ranger District).
- Three Creeks (Cedar City Ranger District: two separate segments).
- Hillsdale Canyon-Ahlstrom Hollow (Powell Ranger District).
- Johns Valley to Main Canyon via Upper Valley (Powell and Escalante Ranger Districts).
- Main Canyon to Widtsoe, Utah (Escalante Ranger District).
- Escalante, Utah to Antimony, Utah via Davis Flat Junction (Escalante Ranger District).

Refer to Appendix D for the type of facilities permitted and the width of these planning windows.

Exclusion Areas

Three areas on the National Forest have been identified as Exclusion areas. (These areas have statutory prohibition to rights-of-way for linear facilities on corridor/window designations.

These exclusion areas are:

- Pine Valley Mountain Wilderness (Pine Valley Ranger District);
- Ashdown Gorge Wilderness (Cedar City Ranger District);
- Box-Death Hollow Wilderness (Escalante Ranger District).

Avoidance Areas

Areas have been identified on the National Forest where environmental, statutory and/or technological effects from energy transportation and utilities would be difficult or impossible to mitigate. These areas include all Dixie National Forest lands not identified in the discussion above.

4. Protection

a. Fire and Fuels Management

From 1971 through 1979, the Forest averaged 81 fires per year, approximately 20% of which were man caused. The total area burned during this period was 8,917 acres.

In the June 5, 1984, Federal Register the Forest Service invited public comments on a proposed policy change to permit prescribed fires ignited by trained professionals to be used in wilderness areas. The purpose is to reduce the risk from wildfire and its consequences and to permit lightning-caused fires to more nearly play their natural ecological roles within wilderness. The Forest is currently developing Wilderness Plans detailing fire suppression strategies in the Forest's wilderness areas.

The Forest is developing Fire Management Plans to allow limited suppression for preplanned areas, under certain conditions. The intent is to permit less than full control if suppression costs and resource damage could be minimized by other suppression strategies.

Fuel management policy and direction requires a fuel treatment plan aimed at reducing fuels to near natural levels, or less than existed prior to an activity for each project that generates fuels or is undertaken to reduce existing fuel loading. Much of the fuels treatment on the Forest is expected to be accomplished with fuelwood programs and prescribed fire.

The Forest has completed a Level II Fire Analysis to document its most cost efficient fire management program. It considered the kind, number, location, timing, cost, and efficiency of fire management forces and activities at alternative budget levels under current management direction. The Analysis includes forces and resources available through Inter-Agency Cooperative Agreements, as well as resources available within the Forest Service through other Forests and Regions.

The hazard of wildfire on the Forest is increased significantly by the presence of summer homes, residence areas, and real estate developments on private land adjacent to the Forest, refuse dumps located near the Forest, seismic surveys involving the use of explosives, the public use of the Forest for recreation, and activities associated with logging and thinning. At special risk from these hazards are large areas of thinning existing on the Forest, recreation and aesthetic values, including values associated with National Parks and Monuments adjacent to the Forest, Forest capital investments, and the large number of summer homes and residences scattered on private holdings throughout the Forest.

b. Forest and Rangeland Pest Management

The principle insects and diseases affecting the Dixie National Forest timber stands are mountain pine beetle, pine limbrust, Douglas-fir beetle, Engelmann spruce beetle, western spruce budworm, dwarf mistletoe, and root rots. Labops, grasshoppers, and Mormon crickets are the principal insects affecting forage on the Forest. Pocket gophers and the porcupine are animals of significance affecting the timber resource.

Mountain pine beetle has caused extensive mortality in overmature, overstocked stands of ponderosa pine for several decades. Epidemic levels of the beetle, recorded since the 1950's have continued to cycle through the Forest, removing many of the larger diameter trees and up to 70 percent of the volume in infested stands. The most recent infestations began in the early 1970's, but accelerated in 1976 through the present. Infestation are continuing in the Cowpuncher and Grimes Creek areas of the Escalante Ranger District and are intensifying on other areas of the Escalante and Teasdale Districts. Mountain pine beetle will continue to have a significant impact in the future on overstocked and unmanaged stands of ponderosa pine.

A serious epidemic of Engelmann spruce beetle occurred on Boulder Top and part of the Aquarius Plateau in the 1920's. Another outbreak of Engelmann spruce beetle in 1948 caused severe mortality through 1963 despite control efforts. The most recent outbreak started in 1968 and was controlled in 1969 after logging 3 MMBF of infested timber. Spruce beetle populations have been at endemic levels since 1970.

Douglas-fir beetle has historically caused mortality in mature and overmature stands of Douglas-fir. The most significant outbreak occurred from 1954 to 1963, though small localized infestations have occurred since 1963. At present, beetle populations are at endemic levels.

Thousands of acres of spruce-fir have extensive mortality caused by a bark beetle/root rot complex. Significant mortality began in 1976 and has since accelerated. The casual agents appear to be a combination of root rots predisposing trees to the western balsam bark beetle. This mortality is expected to continue with progressive expansion of present root rot mortality centers. A root rot complex of 1300 acres in the Peterson Grove on the Aquarius Plateau is presently being studied.

Western spruce budworm has caused several thousand acres of moderate to severe defoliation in the Red Creek area on the Cedar City Ranger District. Defoliation of Douglas-fir, white fir, and subalpine fir is expected to

intensify over the next 4 to 5 years. About 15,000 acres were affected in 1983, expanding to 45,000 acres in 1984.

Dwarf mistletoe causes significant losses to infected stands, retarding growth and causing significant volume loss and eventual tree mortality. A survey of the Dixie NF in 1978 indicated that most of the Douglas-fir and about 40 percent of the ponderosa pine were infected.

Root rots caused by Fomes annosus, Armillaria mellea and Inonotus tomentosus cause mortality and growth loss in localized centers, and pose a threat to regeneration on infested sites. Damage from root rots can be expected to increase steadily unless control measures are undertaken.

According to the 1980 Timber Inventory, insect related mortality accounts for a 6.8 MMBF timber loss per year and disease related mortality accounts for 12.6 MMBF per year.

Pocket gophers have caused mortality to regeneration, especially where located near meadows or other natural openings. Damage caused by porcupines is severe in some stands. The porcupine's feeding activities can cause mortality by girdling the tree and affects tree quality. Damage most frequently occurs in pine and aspen stands. Small trees are most susceptible to porcupine caused mortality.

Black grass bugs (Labops hesperius) are found throughout the crested wheatgrass seedings on the Forest. These insects lower forage productions significantly if the grass stand is a monoculture. Control of this insect using pesticides has not proven to have any long term effects.

Infestations of grasshoppers and Mormon crickets periodically appear on various ranges of the Forest. Should sizeable areas be seriously affected by these insects, pesticide control measures are available.

Management direction for the Forest includes an Integrated Pest Management (IPM) program in which all aspects of a pest-host system are studied and weighed to provide the resource manager with information for decision making.

Current pest management practices include stand hazard rating to identify high-risk stands, monitoring insect and disease levels, and control measures such as harvest and thinning to reduce the potential for outbreaks. High value trees in developed and administrative sites may also need treatment with protective sprays.

A principle current method for minimizing the impacts of Forest pests is the conversion of unmanaged timber stands to managed stands in the shortest time feasible. This would involve harvesting many of the old growth timber stands which are sustaining the greatest loss to insects and disease.

Economics and timber demand will play a large part in the Forest's ability to manage these high risk stands. A good proportion of the remaining old growth is located on slopes over 40 percent, and require the use of cable or aerial systems for harvest. Stumpage value and locally developed technology are important factors in the feasibility of harvesting high risk stands on these areas.

c. Air Quality

The National Clean Air Act requires that airsheds be designated under one of three classes:

- Class I - Only minor air quality deterioration.
- Class II - Permitted moderate deterioration.
- Class III - Permitted deterioration up to National Ambient Air Quality Standards.

The entire Dixie National Forest is designated Class II. There are no non-attainment areas because of the lack of pollution sources. Class I areas at Zion, Bryce, and Capital Reef National Parks provide an umbrella of air quality protection over most portions of the Dixie National Forest.

Forest activities contribute very little to deterioration of air quality except for uncontrolled wildfire. This source is recognized by the State as unavoidable and occurs only occasionally.

The Forest burns by prescription about 200 acres per year and may expand the program in the future. By using the clearing index*, especially on burns below 6,500 feet, prescribed burning will not contribute additional pollutants to the non-attainment areas. Other sources of pollutants in the Forest are dust from unpaved roads and exhaust from motor vehicles.

No change in air quality conditions over the Forest is anticipated.

No serious problems of off-Forest pollution sources affecting the Forest are anticipated because of the close proximity of Class I National Park areas.

d. Law Enforcement

The Forest Service has certain statutory responsibility for law enforcement on National Forest Lands. The Dixie N.F., in cooperation with State, Local, and other Federal law enforcement agencies, maintains a law enforcement program that strives to ensure compliance with laws and regulations, protection of the public and their property, protection of Forest Service employees, and protection of Forest Service property and resources.

The following activities are existing and potential Law enforcement problems on the Dixie National Forest:

- Vandalism
- Fee deposit break-ins
- Theft of timber and Christmas trees
- Drug trafficking and growing of cannabis
- Misuse of motorized vehicles
- Threats, intimidation, assaults, and battery against Forest officers.
- Man-caused wildfires

The Forest's approach to meeting its responsibilities is to:

- Cooperate to the fullest extent possible with State and local agencies through the use of cooperative law enforcement agreements.
- Support a Shared Services Special Agent located in Salt Lake City.
- Train selected Forest Officers to investigate and initiate the limited law enforcement actions.
- Maintain at least one Level IV Law Enforcement Position on the Forest.

The Forest has five cooperative Law Enforcement agreements with State and local Law Enforcement agencies, at an annual cost of approximately \$13,000. National statistics and local trends indicate an increase in the Public's use of National Forest land, and a resultant increase in law enforcement activities. Therefore, there is an increasing need for law enforcement program emphasis to meet the Forest's statutory responsibility.