

CHAPTER IV
ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This chapter describes the environmental consequences of implementing the Proposed Action or any of the alternatives described in detail in Chapter II. It forms the scientific and analytic basis for the comparison of the alternatives and the environmental consequences discussed in Chapter II.

Environmental Consequences (effects) can be either beneficial or adverse; direct or indirect. Effects vary in importance from negligible to those which are significant, and vary in duration from immediate and short-term (ten years or less) to long-term (over ten years). Environmental consequences are displayed in this chapter for resource and support elements by effects for the following decades:

Decade 1: 1986 - 1995	Decade 4: 2015 - 2025
Decade 2: 1996 - 2005	Decade 5: 2025 - 2035
Decade 3: 2006 - 2015	

Each alternative considered in detail is comprised of different combinations of management prescriptions. The amount of land assigned to each prescription area for each alternative is displayed in Chapter II, Table II-132 and on the alternative maps (separate). The environmental consequences of each alternative are based upon the results of implementing the different combinations of management prescriptions. Many adverse effects could be eliminated from all alternatives by applying general Forest Direction Management Requirements displayed in Chapter IV of the Forest Plan. The Management Requirements ensure that long term land productivity is not impaired by any alternative. The prescriptions for the management areas, including mitigation measures, are displayed in detail in Chapter IV of the Plan. Mitigations are also discussed under the appropriate resources in this chapter.

The environmental consequences are described in a narrative and displayed in tables. The alternatives, including the proposed action, are compared with the Current Program Alternative. The tables show the actual Current Program Alternative and show how the other alternatives differ from that Alternative.

In all tables, the alternatives are numbered in the same order as they are described in detail in Chapter II.

- Alternative A - Current Program (No action)
- Alternative B - Composite Action (The preferred alternative)
- Alternative C - Constrained Budget
- Alternative D - Current Budget
- Alternative E - Non-market Emphasis
- Alternative F - Market Emphasis
- Alternative G - 1980 RPA
- Alternative H - RPA High Productivity

Adjustments to the predicted consequences in future amendments to the plan and revisions will be based on information obtained from the monitoring program. The monitoring requirements are explained in Chapter V of the Forest Plan.

Activities having no significant effects on the environment are not discussed in detail. These activities are: monitoring, inventories, planning and research.

This chapter is organized as follows: Section B describes the direct and indirect environmental effects by resource elements such as range, recreation, or timber. Effects are discussed in subsections titled "Probable Effects of Implementing Alternatives," "Unavoidable Adverse Effects," "Short-term vs. Long-term Effects," and "Irreversible and Irretrievable Commitments of Resources." Section C discusses the economic effects and Section D discusses the social effects of each alternative. Possible conflicts between projected effects of the Proposed Action Alternative and the land-use plans and policies of other Federal, regional, State of Utah, and local governments are discussed in Section E. Section F discusses the energy requirements and conservation potential of the alternatives. Sections G, H, and I deal in summary form with "Irreversible and Irretrievable Commitment of Resources", "Adverse Environmental Effects That Cannot Be Avoided", and "Short-term Uses of Man's Environment and the Maintenance of Long-term Productivity". Section J reviews the "Natural or Depletable Resource Requirements," and Section K treats "Urban Quality, Historic, and Cultural Resources."

Priced outputs that contribute to net public benefits (NPB) are those outputs which can be valued in the economic efficiency analysis. These values can be administratively determined or determined in the market-place. Examples are timber, recreation, and livestock grazing. The resource outputs and their alternative contributions to the NPB are detailed in Chapter II of the DEIS.

Non-priced components or outputs that contribute to NPB are those outputs which cannot be assigned a value in the economic efficiency analysis, an example is visual quality. While these components do not contribute to NPB since they are not valued, they represent desirable attributes for which some amount of NPB is foregone in each alternative. Detailed information is in Chapter II.

Each alternative represents a certain combination of quantitative and qualitative benefits. Often a qualitative benefit is decreased as a quantitative benefit is increased. An example would be loss of visual quality as the level of timber harvest is increased, while in other alternatives the level of timber harvest is lowered to meet visual quality objectives. The environmental consequences of qualitative and quantitative emphasis are displayed in the benchmark and alternative writeups in Chapter II.

B. PROBABLE EFFECTS OF IMPLEMENTING ALTERNATIVES

1. Recreation

a. Developed Recreation Public

The current program would maintain the existing site capacity, as the demand increases the facilities would begin to deteriorate due to overuse and

vandalism. Maintenance would be done by volunteers and members of human resource programs. The Forest would become dependent on these programs, if they are eliminated, the agency would not be able to keep many of the existing sites open and available with the present funding. The hardening of five sites per year would only be 20 percent of the total lost to wear and tear. Demand will likely exceed the facilities available by 2010. Many visitors would become dissatisfied with the developed sites due to lowering of the experience quality and overcrowding, and move to dispersed areas. This will likely result in resource damage in the more popular dispersed areas.

Under the Composite Action Alternative, fee sites and heavily used developed sites would be managed at full service level and other developed sites at a reduced service level. This Alternative schedules reconstruction of existing facilities to keep up with 50 percent of the anticipated needs. New site construction would be located in areas where it would enhance dispersed recreation opportunities. Projected use would exceed the supply in 2015, heavy maintenance would be needed at this time to protect the original investment. Some of this maintenance would be done by Human Resource Programs and Volunteers. The remaining maintenance, approximately 10-20 percent, would be done by the Forest Service. Crystal Mountain Ski Area will be allowed to develop, resulting in the change of the physical environment on the west slope of Navajo Ridge. Dispersed recreation would continue to increase at 3-5 percent annually; however, the capacity for the Forest would not be exceeded by the end of the planning period. Trails and trailheads would be constructed and maintained to control and disperse the use, these would create some disturbance during their construction. However, the overall effect of the developments would be to protect the environment.

The Constrained Budget Alternative does not construct new facilities or reconstruct any of the existing facilities. Therefore, there is no damage to resource from these types of activities; however, damage would result from overuse and lack of maintenance. Most of the original investment in the campgrounds would be lost to use. Facilities would be worn out and the vegetation would be trampled until by the end of the period there would be little or nothing left of original investment or the site. Demand will likely exceed the facilities available by 2005. Eighty to ninety percent of the maintenance during this period would be by members of Human Resource Programs or volunteers. Dispersed recreation would occur throughout the Forest without control. The result would be roads and trails in areas where they are not wanted and where there would be potential conflicts with other resources. The popular dispersed sites would be worn out, and litter would increase across the Forest.

The Current Budget Alternative does not construct any new facilities, there would be three units reconstructed each year. This is approximately 2 percent of the reconstruction needed to keep up with normal deterioration. Human Resource Programs and volunteers would be relied on to do 60-70 percent of the maintenance work. Ten percent of the sites would be closed each year to allow the natural vegetation to become reestablished; however, the closing of these sites would put more pressure on the sites remaining open. Overcrowding in the existing sites would diminish the quality experience, create resource damage, and cause law enforcement problems. After the year 2005 the capacity for developed sites would be reached and more people would camp in dispersed areas creating overuse in the popular sites. The overuse would cause loss of

vegetation and soil. Trail and road maintenance would be done only on those areas that are more heavily used, concentrating the recreation use more and causing more damage to the popular areas.

The Non-Market Alternative proposes the construction of campgrounds where they would emphasize dispersed recreation use. Developed recreation use in the more popular sites would exceed the facilities available by the year 2020 and people would camp in the dispersed areas or off the Forest in private developments. The emphasis would be to encourage private developers to construct facilities to accommodate the increased demand. Up to half of the maintenance in developed sites would be done by members of Human Resource Programs or volunteers. The construction of the three new sites at Deer Lakes Trailhead, Cowpuncher, and Barker Lakes would be in new areas and would disrupt the natural forest ecosystem. The transfer of people from developed sites to dispersed areas in this alternative would have less of an impact than other alternatives due to construction of trails and trailheads that help disperse the people and prevents overuse in the more popular areas. The actual construction would have some immediate effect, but the long term effect would be lessened.

The Market Alternative proposes the construction of five new campgrounds and group areas, these in addition to the existing facilities would accommodate the projected demand to the year 2020. The new construction would impact the natural forest environment; however, use on the Forest would be more concentrated and in areas that would be designed to accommodate it. Maintenance would be done wholly by the Forest Service. There would be no dependancy on other agencies or programs. There would be no new construction for trails or trailheads; therefore, the impact on dispersed areas from construction would not be as great. However, there would be no maintenance on trails or cleanup of the general forest environment and the recreation use would likely have some effect on aesthetics.

The RPA 80 Alternative proposes to reconstruct and harden 344 units and construct 27 new units by the year 2000. The site hardening is approximately 15 percent of the total needed to keep up with depreciation. This would disrupt regular recreation activities during the actual construction phase; however, the hardening would help to keep people in designated areas, thus, preserving the vegetation around the existing sites. The new sites would help to spread the use over more area and prolong the life expectancy of existing sites. After 2000 this alternative proposes to construct 200 units which would mean the disruption of the natural environment in four areas, however; it would help preserve the existing sites. The projected use for developed sites would be accommodated until the year 2010, after this time much of the overuse would likely occur off the Forest or in dispersed areas on the Forest. The quality of the recreation experience in the developed sites would be diminished and law enforcement problems would develop. Ten percent of the existing trails on the Forest would be maintained to help accommodate the dispersed recreation. No new trails would be constructed. New road construction across the Forest would introduce motorized vehicles into new areas creating conflicts with off-road vehicles and other resources.

The High Productivity Alternative proposes to harden 3 sites per year. This is approximately 2 percent of the facilities that would be depreciated each year due to use. The continued use of the facilities after they have been used to

their fullest would result in vandalism and the loss of the original capital investment. The demand for developed sites would exceed the facilities available by the year 2005. The many new roads that would be constructed to remove the timber and other commodities would create conflicts between recreation vehicles and wildlife. Funding would not be available to mitigate this conflict or to control sporadic use of off-road vehicles. The existing trail system would not be maintained and new construction would replace many of the trails with roads. This would change the recreation use pattern on the Forest. The non-motorized recreation experience would be reduced or destroyed on the Forest.

Portions of some developed sites are located in 100-year flood plains. These sites, though not a hazard to human life, may receive some damage to facilities during flooding. Additional expenditures are necessary to protect facilities and notify the public of possible flooding. Table IV-1 displays the projected recreation demand and the capacity of facilities programmed by alternative.

TABLE IV-1
RECREATION PROJECTED USE IN PUBLIC SECTOR
COMPARED WITH FACILITIES CAPACITY FOR EACH ALTERNATIVE
IN MRVD'S

Time Period	Projected Use	Alternative							
		Facility Capacity by Alternatives							
		A	B	C	D	E	F	G	H
1981-1985	339	787	1180	787	787	787	1180	787	787
1986-1990	382	787	1180	787	787	1180	1180	787	787
1991-2000	554	787	1196	787	787	1196	1180	807	787
2001-2010	870	787	1205	787	787	1285	1518	807	787
2011-2020	1417	787	1305	787	745	1305	1639	877	787
2021-2030	2858	787	1343	787	708	1305	1743	960	787

b. Developed Recreation-Private

Use of recreational residence, lodges, resorts, supermarkets, marinas, organizational sites and ski areas, operated by the private sector is expected to increase under all alternatives.

*Projected use is based on projected population growth with a 3 percent increase per year through 1990 and 5 percent per year from 1991 to the end of the planning period. Projected use for ski areas is based on the growth of Brian Head over the past 5 years. This projection is questionable due to the unknown of when the demand for skiing would level off or peak out. None of the alternatives provide for the projected use as it is not known if the potential exist to accommodate the maximum use. Private industry would need to do a market analysis to determine what the true potential use is and then approach the Forest with a proposal based on their analysis. The Current Program, Constrained Budget, Current Budget, and High Productivity Alternatives, which do not provide the needed facilities in the public sector, would increase the demand on the private sector. The Composite Action Alternative would maintain existing recreational special uses except for the Brain Head and Crystal Mountain ski areas. Crystal Mountain would be permitted to developed and Brain Head would expand to join with it. The Composite Alternative would provide for

expansion of the existing ski area to its potential capacity. Crystal Mountain would be allowed to develop and expand after master plan approval. All master plans would incorporate mitigation measures to reduce impacts.

The Forest would favor expansions by the private sector on existing sites over new site development. New development would not be actively encouraged, however, the Forest would respond to proponent interest on an individual bases.

Construction of facilities allowed under recreation special use permits causes vegetative loss, soil disturbance, and displaces some types of wildlife. Human use of the facilities and their surrounding areas causes minor vegetation loss and disruption of wildlife. Increased capacity for the ski areas would place additional demands on utilities, water systems, roads, and other structures.

The capacity for developed recreation in the private sector, displayed in the chart below, is shown by alternatives. Also, shown is the projected use based on existing growth patterns for Brian Head Ski Area during the period from 1976 to 1984 and an expected growth pattern of 3 to 5 percent per year.

The Current Program, Constrained Budget, Current Budget, Non-Market, Market, RPA 80 and High Productivity Alternatives all have a constant capacity shown in the Table. This capacity may change under any of the alternatives if a valid proposal is submitted and approved through the proper channels. The Composite Alternative shows an increase in capacity with the development of Crystal Mountain Ski Area. None of the proposals meet the projected use due to the projected demand for ski areas. Most of this demand comes from outside the state and it is difficult to predict at what point it will level off.

TABLE IV-2
RECREATION PROJECTED USE BY THE PRIVATE SECTOR
COMPARED WITH FACILITIES CAPACITY FOR EACH ALTERNATIVE
IN MRVD'S

Time Period	Projected Use	Alternative							
		A	B	C	D	E	F	G	H
1981-1985	259	859	859	859	859	859	859	859	859
1986-1990	426	859	859	859	859	859	859	859	859
1991-2000	1294	859	1155	859	859	859	859	859	859
2001-2010	1812	859	1155	859	859	859	859	859	859
2011-2020	2952	859	1155	859	859	859	859	859	859
2021-2030	4809	859	1155	859	859	859	859	859	859

c. Dispersed Recreation

The Forest has the capacity to accommodate dispersed recreation demand in all of the alternatives discussed. In all alternatives except the Non-Market the anticipated use would result in damage to the resource in the more popular sites because of overuse. The Non-Market Alternative schedules money for construction of trails, trailhead and dispersed camping areas to regulate use and control resource damage. Information systems would be improved, present trails would be brought up to standard and new trails built. Trailhead facilities for both summer and winter use would be added at appropriate

locations. The Composite Alternative would provide trail maintenance to accommodate anticipated use. Trailheads would be constructed to accommodate use of wilderness and heavily used dispersed winter sports areas.

The Forest expects resource deterioration, such as soil and vegetation loss, to increase. Increased use of dispersed recreational area for overflow camping and greater crowding would increase user dissatisfaction. Greatest impacts would be felt in areas adjacent to water. Damage to resources from uncontrolled parking in the absence of developed trailheads is expected in all alternatives except the Non-Market Emphasis Alternatives, especially during the latter part of the planning period. The Forest also expects resource damage to increase from motorized vehicle travel off roads and trails. Table IV shows the expected output for each alternative in thousands of Recreation Visitor Days (MRVDS). A comparison of alternatives shown in this chart shows that the amenities in the Non-Market and Composite Alternatives would increase the use over the Current Program. The Constrained Budget Alternative would not maintain trails and roads and access becomes difficult, dispersed recreation would decrease. The Market Alternative would provide more access, however, physical attractions, such as, solitude and aesthetic qualities would decrease as would the use.

TABLE IV-3
PROJECTED RECREATION VISITOR DAYS
(In Thousands for Dispersed Recreation, by Alternatives)
FOR SELECTED YEARS, 1986-2030
FY 1986 - 810680 RVD'S

Alternative	1986	1990	2000	2010	2020	2030
A	811	815	1085	1727	2685	3643
B	811	820	1275	1718	2746	3774
C	811	758	1153	1368	2030	2693
D	811	814	1077	1722	2680	3637
-E	811	820	1275	1718	2746	3773
F	811	830	950	1643	2225	2806
G	811	644	699	747	998	1348
H	811	815	1085	1727	2685	3643

Table IV-4 indicates the amount of land that will be available for motorized use under each alternative. The Constrained Budget Alternative shows the most land available due to insufficient funds to administer closures. The Non-Market Alternative has the largest amount of land closed to motorized vehicles to protect wildlife habitat and other amenities.

TABLE IV-4
AREAS AVAILABLE FOR USE BY MOTORIZED VEHICLES
BY ALTERNATIVE AND BY CATEGORIES OF USE

Use Category	Estimate of M Acres by Alternatives							
	A	B	C	D	E	F	G	H
Vehicle Use Over Most of Area	1,516.3	1,478.1	1,800.7	1,516.3	976.3	1,621.9	1,516.3	1,516.3
Vehicle Use Prohibited or Restricted over Most of Area	284.4	322.6	0	384.4	824.4	178.8	284.4	284.4
Closed (Wilderness)	83.0	83.0	83.0	83.0	83.0	83.0	83.0	83.0
Forest Total Acres	1,883.7	1,883.7	1,883.7	1,883.7	1,883.7	1,883.7	1,883.7	1,883.7

d. Trails

The miles of trails on the Forest would increase in Composite, Non-Market, and RPA 80 Alternatives. The new trail construction would cause some damage to the visual resource and possibly some disturbance to wildlife. The increased miles of trail would enhance the dispersed recreation opportunity and increase the density of people. The remaining alternatives would not add new trails except possibly in the wilderness areas. Maintenance would only be done on the more popular trails, and there would likely be a loss in the original capital investment. The Constrained Budget Alternative does not provide for maintenance of trails; the result would be damage to the resource in the more popular areas, and the trails system would gradually disappear in areas that receive sporadic or infrequent use.

e. Visual Resource

Impacts on the visual resource is measured by changes from the landscape natural appearance. Management standards and guidelines protect the natural appearance in varying degrees by setting visual quality objectives (VQO's)* in keeping with other objectives of each alternative.

Visual quality on the Forest in some areas receives high priority. These areas are along major travel corridors between National Parks and Monuments and travel corridors leading to high use recreation areas and private property within the Forest developed into cabin sites. The Current Program, Composite, Non-Market and Market Alternatives place the most emphasis on maintenance of the visual resources. The Constrained Budget and Current Budget Alternatives has funding constraints which limit the rehabilitation of the visual resource. The RPA 80 and High Productivity Alternatives emphasize market items that would return dollars to the treasury, and amenity items, such as visual resources, would be treated as a incidental benefit.

f. Cultural Resources

Cultural resources, as the irreplaceable and non-renewable fabric of our Nation's history and prehistory, are identified, protected, preserved and interpreted according to a body of legislated mandates enacted since 1906. With the conception of a project, a field survey is conducted to identify the existing cultural resources within the proposed area of disturbance. If part or all of the identified cultural properties are evaluated as significant and eligible for inclusion on the National Register, as outlined in 36 CFR 60.4, then the effects of the proposed activity upon the significant resources must be determined.

Determinations of both significance and effect are made in consultation with the Utah State Historic Preservation Officer. Prior to any Forest undertaking, which may affect a cultural resource property, the property is evaluated for significance. The categories of significance are:

- Class I (significant)
- Class II (unevaluated)
- Class III (non-significant)

The categories of the effects of a Forest undertaking upon the cultural resource property are:

- No Effect
- No Adverse Effect
- Adverse Effect
- Beneficial Effect

Projects, which cause "no adverse effect" and "adverse effect" to significant or unevaluated properties, must be accompanied by a data recovery plan which would mitigate the effects of the undertaking upon the cultural resource. As with determinations of significance and effect, data recovery plans must be reviewed and concurred with by the Utah State Historic Preservation Officer.

Since 1975, over 95 percent of the projects conducted on the Dixie National Forest have been determined as causing "no effect" on the significant or unevaluated cultural resources. The large number of "no effect" determinations is consistent with the present direction of management that steers disruptive project actions away from significant or unevaluated cultural properties. For example, significant sites or unevaluated sites within proposed timber sale areas are simply flagged and avoided by harvesting equipment.

Most projects conducted on the Dixie National Forest possess sufficiently flexible boundaries as to allow for the avoidance of significant or unevaluated cultural resources. A notable exception to this statement is the land exchange which removes the protective umbrella of mandated legislation from the significant cultural resource property as it moves to private ownership. In the past, proposed land exchanges have been cancelled by management because of the costs associated with mitigating the effects of the action on the significant cultural resources.

The enacting of any one of the eight management alternatives would not significantly alter, change, accelerate or decrease the degree of direct project activity impacts to the cultural resources base. Under all alternatives, management direction would require the avoidance and/or mitigation of project effects upon significant or unevaluated cultural resources.

Indirect project activity impacts, in contrast, would significantly differ between alternatives. For example, alternatives that promote the construction of new roads into previously hard to access areas would indirectly contribute to increased vandalism. Improved access would also promote the presence of a greater number of vehicles in a given area. The presence of more vehicles can be damaging to certain types of cultural resource properties such as rock art panels that are susceptible to decay induced by carbon monoxide intentional or Alternatives A, B, D, E and H, which emphasize dispersed recreation, are potentially very disruptive to the cultural resource base. Dispersed recreationists, like other Forest users, impact cultural resources through intentional or unintentional vandalism. Intentional vandalism might include the use of petroglyphs for target practice or the collection of prehistoric artifacts from the surface of a site. An unintentional form of vandalism could witness the establishment of a modern camp within the boundaries of a cultural resource property. The degree of these impacts would increase or decrease according to the level of dispersed recreation. It should be stated that adverse effects associated with dispersed recreation are difficult to prevent or to mitigate.

Operating on the assumption that measurable and direct project activity impacts would not significantly differ between alternatives because of policy and procedure, the preferred alternative would determine, in a monumental fashion, the:

- Amount of acres surveyed annually and concurrently.
- The degree to which we expand our knowledge of the cultural resource base.

Generally, the more ground-disturbing a particular form of management activity, the closer the scrutiny by cultural resource specialists. Land exchanges, nonstructural range improvements, timber sales and certain types of nonstructural wildlife habitat improvements are the most disturbing types of management activity. Protective fuel breaks and treatments, which employ prescribed burning, herbicide spraying and seeding, are uniformly the least disturbing activities.

Land adjustment activities (exchange and purchase) on the Dixie National Forest would increase dramatically under Alternatives E, F, G and H. Under the first three alternatives, lands in the Brian Head area would be offered to generate the acquisition of trailheads, parking areas, rights-of-way into dispersed activity zones and winter sports areas. According to the provisions of Alternative H, land acquisition for the timber and range programs would be given priority. Under all eight alternatives, "selected" lands would need to be 100 percent surveyed. Significant sites must be mitigated prior to the exchange of parcels of National Forest System land.

Alternatives F, G and H, which emphasize non-structural and structural range improvements, would strive to improve the quality and intensity of grazing on 20,000 to 45,000 acres. Range projects, which are usually positioned within the high site density areas of the pinyon-juniper forest, are intensively surveyed.

Alternatives A, B, D, E, F, G and H, which maintain the timber program at or above the current level, would insure the continued vitality of the cultural resources program both in terms of acres surveyed, resources recorded and support dollars provided. Although timber sales are only 10 percent to 30 percent sample surveyed because of increasing ground obscurity and decreasing site density, large numbers of acres would be subjected to survey simply because timber sale areas involve large tracts of land. Concurrently, our ability to expand our knowledge of the cultural resource base would also increase.

The ability to increase our knowledge of the cultural resources base does not rest totally on our ability to survey large project areas. Alternative or complementing methods can include the following:

- The completion of a cultural resources overview.
- An approach to archeological document composition that emphasizes the synthesis of data and the encouragement of out-service (i.e., university, foundation) research.
- The initiation of systematic surveys, independent of project generated survey, which would allow for the testing of specific hypotheses and the investigation of all Forest micro-environments.
- The use of volunteers to conduct non-project research, survey and excavation.
- The submission of annual National Register nominations to meet Target #3 (FSM 2361.03-2).

And, in order to insure the continued viability of the cultural resources program and, concurrently, the cultural resource base, future needs must be considered. The projected needs of the program are basic:

- The employment of a forest archeologist and/or shared services archeologist and seasonal technicians.
- The initiation and maintenance of a public awareness program, in conjunction with continued law enforcement efforts, to curb the destruction of archeological properties.
- The enhancement of the cultural resources through audio-visual programs, lectures, interpretive signs and stabilization of significant architectural sites through cooperative programs involving volunteers and adjacent agencies of Government.

g. Unavoidable Adverse Effects

Reconstruction and construction of developed recreation sites would remove vegetation for roads and other facilities. Developed recreation sites preempt forage utilization by permitted livestock. Sites that receive heavy human use on holidays and weekends would suffer from loss of vegetation, soil compaction, and streambank damage unless the site is modified to prevent damage. This

overuse would be increased as the population increases. Some alternatives would construct new facilities to help alleviate the problem. Law enforcement to help control the problem would also be low under the low budget alternatives. Construction and reconstruction of support facilities for dispersed recreation such as trailheads, parking areas, and toilets would result in removal of vegetation.

Use of off-road vehicles damages vegetation and disturbs the soil. The noise from these vehicles may cause wildlife to move short distances. The Current Program, Composite and RPA 80 Opportunities Alternatives would allow the most adverse effects, and the Non-Market Alternative the least. These adverse effects would significantly affect a relatively small area and would require careful management to insure the protection of other resources. Occasionally site rehabilitation would be necessary to protect soil and water resources, and law enforcement would be necessary to insure compliance with regulations.

Implementation of the Composite, Non-Market, and Market Alternatives will cause some disruption of the physical environment with new construction and increased reconstruction. However, the Current Program, Constrained Budget, Current Program and High Production Alternative will likely have the greatest impact to existing facilities. These alternatives will allow extensive damage, as the facilities, become worn out from over use with no reconstruction. People would likely become dissatisfied with the facilities being in a state of disrepair and move to the dispersed area where more damage would occur.

h. Short-term Uses vs. Long-term Productivity

Developed recreation sites are long-term commitments for a particular piece of land. Maintenance work repeated periodically increases the long-term productivity of that land and helps to mitigate some impacts. While recreation use of dispersed areas may cause loss of soil and vegetation. Construction of facilities can help mitigate these impacts. Alternatives which do not provide for sufficient facilities in developed sites would result in the over use of many of the popular dispersed areas.

Construction of dispersed recreation facilities (ie., trails, trail heads, etc.) is a long-term commitment for the occupied area. The effects of these facilities would continue as long as human use continues. This human use is short-term, but has cumulative effects on areas of concentrated use which may have long term effects.

Most recreation special uses are long-term commitments of land for a specified use. The adverse effects continue as long as the special use remains. The major adverse effects of construction are short-term and can be mitigated or prevented.

Off-road vehicle travel is a short-term use. However, its cumulative effects may remain for many years. Proper management of ORV use can eliminate all but minor adverse effects on long-term productivity. Alternatives such as the Current Budget and Low Budget do not provide a strong management program and are most likely to allow long-term adverse effects on the land. The Composite and Non-Market Alternatives call for stronger management programs to protect the land.

Changes in visual quality caused by resource management activities are usually long-term effects if they include permanent structures, roads, major soil movement, or major changes in vegetation. Temporary installations or minor activities cause only short-term changes in visual quality.

Dedication of a site to cultural resource purpose is a long-term commitment. Destruction of a cultural resource without prior investigation permanently destroys its historical value.

Designation of Research Natural Areas is a long-term commitment, but does not reduce productivity of the land.

i. Irreversible and Irretrievable Commitment of Resources

Grading the soil and recontouring the land for road construction creates the most permanent change in the landscape and impact on soil and vegetation. Damage to soil and vegetation by human use takes a long time to heal naturally and the healing process would be extended if precautions are not taken to prevent overuse to contain it in designated locations. The impacts caused by various recreational uses can be restored by removing structures, reestablishing the contour of the land, revegetating, and closing the area to human use. Impacts that cannot be mitigated include sedimentation of streams due to erosion, or the loss of wildlife or plant species. No loss is expected of any wildlife or fish species as a result of recreational use under any of the proposed alternatives. Sedimentation would be minimal and within acceptable standards under any of the alternatives.

There will be no irreversible or irretrievable commitment of resources caused by off-road vehicles.

Loss of a cultural resource site is irretrievable and irreversible. The Composite Alternative would provide the most protection against site loss. The 1980 RPA, and Non-Market would also protect cultural resources against irretrievable and irreversible losses by increasing the inventory program.

Designation of Research natural Areas is reversible. However, alteration of a natural areas by human activities often is not reversible for scientific purposes. Once natural ecosystems are unnaturally altered, their value as a scientific baseline is diminished.

2. Wilderness

Wilderness designation allows uses specific in the Wilderness Act of 1964 including non-motorized recreation, construction and maintenance of trails, livestock grazing, and maintenance of existing water developments. Use of mechanized equipment is not allowed except for emergencies. Wilderness areas are closed to mineral entry subject to valid existing rights on the date of enactment.

The Pine Valley Mountain, Ashdown Gorge, and Box-Death Hollow Wildernesses would be managed to protect the wilderness resources. The Box-Death Hollow Wilderness is pristine and would be managed to maintain that condition, therefore, trails would not be constructed inside the boundaries. The Ashdown

Gorge would be managed for day hikes to compliment Cedar Breaks National Monument. Pine Valley Mountain would be managed with existing trails and include some reconstruction and relocation. The Forest has a total of 555,390 acres of land that met the minimum requirements for wilderness that were not included in the Utah Wilderness Bill. As shown in the following display, most of these acres would maintain their present qualities through the period until the first revision of the plan (20 to 15 years).

<u>Alternative</u>	<u>Est. Percent of Present Areas Meeting Minimum Wilderness Qualities After First Decade</u>
A	95
B	97
C	100
D	95
E	100
F	90
G	92
H	90

Irreversible and Irretrievable Commitment of Resource

As land becomes roaded or the vegetation becomes manipulated, it may no longer be considered for wilderness. For the entire 50 year planning period, the Non-Market, Constrained Budget and Composite Alternatives maintain the greatest amount of land available for wilderness designation. The Market, RPA 80, and High Productivity Alternatives offer the least amount of land to be available for wilderness designation.

Minerals development and some special land uses on the Forest are not scheduled and cannot be predicted as to their effect on wilderness qualities. Additionally, natural disasters could occur requiring rehabilitation that would alter the wilderness resource.

3. Fish and Wildlife

a. Habitat Capability For Management Indicator Species

Habitat capability for the various management Indicator Species (MIS) is summarized in Table IV-5. Habitat sufficient to maintain minimum viable populations (MVP) of all MIS would be available through the planning period under all alternatives.

Aquatic habitat capability is expected to gradually decline under all alternatives due to accelerated eutrophication of major lakes and impacts of other resource activities. In all alternative except the Constrained Budget, the Forest Service would coordinate with out-service agencies and private land owners in the Panguitch Lake area in efforts to reduce eutrophication. Only under the Composite, the Non-Market and the High Productivity Alternatives would funding be sufficient to improve fish habitat in the lake and on the Forest to counteract habitat degradation caused by eutrophication. As the result of this work, fish habitat capability will gradually rise after the third decade in these alternatives. It will not return to current (1984) levels until after 2035, however.

Habitat capability for Bonneville cutthroat trout is expected to increase at least slightly under all alternatives. Under the low budget alternatives any habitat improvement dollars available would be directed toward endangered, threatened and sensitive species such as the Bonneville cutthroat trout. Under alternatives with high wildlife budgets, there may be a significant increase in habitat capability for Bonneville cutthroat trout.

Habitat capability for macroinvertebrates is dependent upon impacts on aquatic habitat from other resources. Under the High Productivity, 1980 RPA, and Market Alternatives, increase in road construction, timber harvest, and livestock grazing could decrease habitat capability for macroinvertebrate by increasing sediment delivery and degrading riparian ecosystem condition. Under the Constrained Budget, Non-Market, and Current Budget Alternatives, habitat capability for macroinvertebrates is likely to increase as the result of reduced impacts from other resources.

b. Minimum Viable and Maximum Potential Populations

Minimum viable populations (MVP) of all MIS would be supported through the planning period under the alternatives.

The only alternative that closely approaches maximum potential populations is the Non-Market Alternative. With the exception of pounds of fish and elk numbers, estimated maximum potential populations (assuming proper distribution) of all MIS would be reached by 2030. Maximum potential populations of resident trout, Bonneville cutthroat trout and macroinvertebrates would not be reached under any alternative.

c. Habitat and Species Diversity

Wildlife species diversity (species richness) is generally a function of habitat diversity, the greater the variety of habitat factors (vegetation type and structure, water, topography, etc.) the more habitat niches* likely to be present, and conversely, the more wildlife species could theoretically inhabit the area. Much of the Forest's inherent diversity would be unchanged irrespective of which alternative is chosen. The estimated effects of the various alternatives on vegetative diversity is summarized in Table IV-5.

The high market output alternatives, Market and High Productivity, would provide considerable habitat diversity as a result of vegetative manipulation. The usefulness of this diversity would be limited, however, because of poor distribution of seral stages*. Most of the overmature timber (both hardwood and softwood) would remain only in withdrawn (wilderness, research natural) areas or on unproductive timberlands while the younger, more productive seral stages would be concentrated in the available, capable, and suitable timberlands. Diversity induced by these alternatives would be further limited because habitat effectiveness* would be decreased because of increased road densities and decreased wildlife cover associated with high timber and range outputs. Road densities in excess of two miles per square mile should be avoided under any alternative because of the negative effects on the wildlife.

The Non-Market Alternative provides the best mix of habitat diversity and habitat effectiveness. Most of the vegetative manipulation work done under this alternative would be for the sake of providing wildlife habitat

TABLE IV-5
SUMMARY OF MAJOR WILDLIFE OUTPUTS AND EFFECTS BY ALTERNATIVE

Alter- native	Mid-Point of Decade	WIFUDS			MIS Habitat Capability			MIS			Habitat			Moose			Tuckers			Fish												
		Terr.	Fish	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits
A	1990	14.8	5.9	494	50.8	1,530	68	17.2	1,210	275	214.9	1,210	275	214.9	1,210	275	214.9	1,210	275	214.9	1,210	275	214.9	1,210	275	214.9	1,210	275	214.9	1,210	275	214.9
Current	2000	15.8	6.3	526	53.5	1,800	68	17.2	1,210	280	209.3	1,210	280	209.3	1,210	280	209.3	1,210	280	209.3	1,210	280	209.3	1,210	280	209.3	1,210	280	209.3	1,210	280	209.3
Program	2010	15.8	6.2	524	53.5	1,800	68	17.2	1,210	305	203.1	1,210	305	203.1	1,210	305	203.1	1,210	305	203.1	1,210	305	203.1	1,210	305	203.1	1,210	305	203.1	1,210	305	203.1
(Cop-	2020	15.8	6.0	520	53.5	1,800	68	17.2	1,210	315	196.5	1,210	315	196.5	1,210	315	196.5	1,210	315	196.5	1,210	315	196.5	1,210	315	196.5	1,210	315	196.5	1,210	315	196.5
posite)	2030	15.8	5.8	511	53.5	1,800	68	17.2	1,210	325	190.0	1,210	325	190.0	1,210	325	190.0	1,210	325	190.0	1,210	325	190.0	1,210	325	190.0	1,210	325	190.0	1,210	325	190.0

Compare with mid.
viable pop. levels and
HAB. Habitat potential
This alternative provides
for habitat capability above
firm for big game species.
This alternative exceeds
minimum viable populations
(MVP) of all management
indicator species (MIS).
for elk would not be met
during the planning
period. 1/

Compare with UDWR
goals and objectives
Population goals are only
this alternative
will enhance existing
Bald Eagle. No negative
effects. Ash. No
negative effects. Bonn Cut.
Trout. No negative effects.
Sensitive plants. No
effects.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Compare with mid.
viable pop. levels and
HAB. Habitat potential
Alternative will provide
habitat capability above
that required for MVP of all
MIS and in most cases,
higher populations than
the Current Program Alt.

Compare with UDWR
goals and objectives
Alternative exceeds UDWR
deer population goal by
1990. The elk goal would
not be met during the
planning period.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Alter- native	Mid-Point of Decade	WIFUDS			MIS Habitat Capability			MIS			Habitat			Moose			Tuckers			Fish												
		Terr.	Fish	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits		
B	1990	14.8	7.0	514	50.8	1,530	68	17.2	1,210	275	215.7	1,210	275	215.7	1,210	275	215.7	1,210	275	215.7	1,210	275	215.7	1,210	275	215.7	1,210	275	215.7	1,210	275	215.7
Pre-	2000	15.9	8.5	569	53.5	2,000	72	17.6	1,350	300	212.6	1,350	300	212.6	1,350	300	212.6	1,350	300	212.6	1,350	300	212.6	1,350	300	212.6	1,350	300	212.6	1,350	300	212.6
ferred	2010	15.9	7.9	558	53.5	2,000	72	17.6	1,310	315	211.6	1,310	315	211.6	1,310	315	211.6	1,310	315	211.6	1,310	315	211.6	1,310	315	211.6	1,310	315	211.6	1,310	315	211.6
(Cop-	2020	15.9	8.5	569	53.5	2,000	74	17.6	1,450	325	212.2	1,450	325	212.2	1,450	325	212.2	1,450	325	212.2	1,450	325	212.2	1,450	325	212.2	1,450	325	212.2	1,450	325	212.2
posite)	2030	15.9	8.5	569	53.5	2,000	74	17.7	1,400	375	211.8	1,400	375	211.8	1,400	375	211.8	1,400	375	211.8	1,400	375	211.8	1,400	375	211.8	1,400	375	211.8	1,400	375	211.8

Compare with mid.
viable pop. levels and
HAB. Habitat potential
Alternative will provide
habitat capability above
that required for MVP of all
MIS and in most cases,
higher populations than
the Current Program Alt.

Compare with UDWR
goals and objectives
Alternative exceeds UDWR
deer population goal by
1990. The elk goal would
not be met during the
planning period.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Compare with mid.
viable pop. levels and
HAB. Habitat potential
This alternative provides
for habitat capability above
that required to support
minimum viable populations
of all MIS, but for most
species, populations will be
lower than under the
Current Program Alt.

Compare with UDWR
goals and objectives
Short of meeting the UDWR
population goal for 1990
for deer by 17% and for
elk by 47%. Populations
will be gradually increase
through out the planning
period so that deer are -90%
and elk are -88% in 2030.
community diversity.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Alter- native	Mid-Point of Decade	WIFUDS			MIS Habitat Capability			MIS			Habitat			Moose			Tuckers			Fish												
		Terr.	Fish	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits		
C	1990	11.1	5.7	407	41.4	1,530	68	17.2	1,150	275	216.6	1,150	275	216.6	1,150	275	216.6	1,150	275	216.6	1,150	275	216.6	1,150	275	216.6	1,150	275	216.6	1,150	275	216.6
Con-	2000	12.7	5.8	454	48.2	1,500	75	17.4	1,120	285	210.5	1,120	285	210.5	1,120	285	210.5	1,120	285	210.5	1,120	285	210.5	1,120	285	210.5	1,120	285	210.5	1,120	285	210.5
strain	2010	12.1	5.6	432	45.5	1,500	80	18.2	1,090	295	204.4	1,090	295	204.4	1,090	295	204.4	1,090	295	204.4	1,090	295	204.4	1,090	295	204.4	1,090	295	204.4	1,090	295	204.4
Budget	2020	12.1	5.5	430	45.5	1,500	80	18.5	1,090	300	198.6	1,090	300	198.6	1,090	300	198.6	1,090	300	198.6	1,090	300	198.6	1,090	300	198.6	1,090	300	198.6	1,090	300	198.6
	2030	12.1	5.4	428	45.5	1,500	80	18.8	1,060	300	192.9	1,060	300	192.9	1,060	300	192.9	1,060	300	192.9	1,060	300	192.9	1,060	300	192.9	1,060	300	192.9	1,060	300	192.9

Compare with mid.
viable pop. levels and
HAB. Habitat potential
This alternative provides
for habitat capability above
that required to support
minimum viable populations
of all MIS, but for most
species, populations will be
lower than under the
Current Program Alt.

Compare with UDWR
goals and objectives
Short of meeting the UDWR
population goal for 1990
for deer by 17% and for
elk by 47%. Populations
will be gradually increase
through out the planning
period so that deer are -90%
and elk are -88% in 2030.
community diversity.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Compare with mid.
viable pop. levels and
HAB. Habitat potential
This alternative is one of
the better alternatives for
nongame MIS. Population
levels of big game species
are considerably below those
of Current Program, but
well above MVP.

Compare with UDWR
goals and objectives
Deer population is 17%
below the 1990 population
goal and elk is 47% below
goal. Deer are 4%
below goal, while elk
is 38% below the goal
populations.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Alter- native	Mid-Point of Decade	WIFUDS			MIS Habitat Capability			MIS			Habitat			Moose			Tuckers			Fish												
		Terr.	Fish	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits	M4	Benefits		
D	1990	15.1	6.1	474	41.4	1,530	68	17.2	1,270	275	214.2	1,270	275	214.2	1,270	275	214.2	1,270	275	214.2	1,270	275	214.2	1,270	275	214.2	1,270	275	214.2	1,270	275	214.2
Current	2000	14.2	6.6	509	53.5	1,800	68	17.2	1,210	285	209.5	1,210	285	209.5	1,210	285	209.5	1,210	285	209.5	1,210	285	209.5	1,210	285	209.5	1,210	285	209.5	1,210	285	209.5
Budget	2010	13.8	6.5	497	51.7	1,800	69	17.5	1,210	295	203.3	1,210	295	203.3	1,210	295	203.3	1,210	295	203.3	1,210	295	203.3	1,210	295	203.3	1,210	295	203.3	1,210	295	203.3
	2020	13.8	6.3	491	51.7	1,800	70	17.8	1,210	300	197.3	1,210	300	197.3	1,210	300	197.3	1,210	300	197.3	1,210	300	197.3	1,210	300	197.3	1,210	300	197.3	1,210	300	197.3
	2030	13.8	6.1	488	51.7	1,800	72	18.0	1,210	300	191.2	1,210	300	191.2	1,210	300	191.2	1,210	300	191.2	1,210	300	191.2	1,210	300	191.2	1,210	300	191.2	1,210	300	191.2

Compare with mid.
viable pop. levels and
HAB. Habitat potential
This alternative is one of
the better alternatives for
nongame MIS. Population
levels of big game species
are considerably below those
of Current Program, but
well above MVP.

Compare with UDWR
goals and objectives
Deer population is 17%
below the 1990 population
goal and elk is 47% below
goal. Deer are 4%
below goal, while elk
is 38% below the goal
populations.

Plant and animal
diversity
Effects on
T.E.S.S. Species

Compare with mid.
viable pop. levels and
HAB. Habitat potential
This alternative is one of
the better alternatives for
nongame MIS. Population
levels of big game species
are considerably below those
of Current Program, but
well above MVP.

Compare with UDWR
goals and objectives
Deer population is 17%
below the 1990 population
goal and elk is 47% below
goal. Deer are 4%
below goal, while elk
is 38% below the goal
populations.

Plant and animal
diversity
Effects on
T.E.S.S. Species

UDWR and WPA 1980 elk population goal is 2,900 elk by the year 1990.
this is only an estimation, until elk plans are completed.

Compare with min. viable pop. levels and Max. habitat potential. This alternative provides for habitat capability to support near maximum populations of most MIS. All populations will be supported at levels well above minimum viable. Compare with UDWR goals and objectives. In 1990, the deer population is 4% above the UDMR goal, with elk 4% below. By the year 2030, the deer population exceeds the goal by 13% and the elk population is 2% below the goal.

Plant and animal comm. diversity will increase and resulting animal diversity in this alternative will be provided largely by habitat manipulation projects. Softwood timber harvest will be done compared to Alt. A. As per harvest will also be down, but will remain at levels adequate to improve habitat diversity.

Compare with min. viable pop. levels and Max. habitat potential. This alternative provides near maximum habitat capability for economically important species. All MIS will be supported at levels above minimum viable population levels. Compare with UDWR goals and objectives. Deer population is 4% above the 1990 population goal and elk is 4% below. By 2000 the deer population exceeds goal by 10%. Elk population is 4% below objective in 1990 and 34% below in 2030.

Plant and animal comm. diversity will provide diversity enhancement similar to Alt. A. Increased diversity due to wildlife projects will be higher under this alt because of higher budgets.

Compare with min. viable pop. levels and Max. habitat potential. This alternative provides for populations of all MIS above MVP levels, but considerably below the levels of the Current Program Alt. Compare with UDWR goals and objectives. This alternative falls short of the UDMR elk goals throughout the planning period. The deer population is 17% below and the elk population is 47% below in 1990 and in 2030 the deer population is 5% above and the elk population is 48% below.

Plant and animal comm. diversity will increase timber harvest and range revegetation activity will increase diversity however, increased road-building and activity to accommodate market outputs will limit habitat effectiveness in many areas.

Compare with min. viable pop. levels and Max. habitat potential. Production of commodities at levels prescribed by this alternative would almost certainly result in populations of some MIS below MVP at some date after 2035. Compare with UDWR goals and objectives. This alternative falls substantially below the UDMR objectives throughout the planning period 1990 to 2035. Deer and elk populations are 16% and 48% below.

Plant and animal comm. diversity will increase. Effects of this alternative on plant and animal diversity would be similar to those of Alt. F (grazing). Sensitive plants (grazing). Possible negative effects (grazing).

supp. Utah Prairie Dog

Alter- native	Mid-Point of Decade	MIS Habitat Capability				Pairs	Non-Turka	M Lbs Fish
		Moose	Deer	Elk	Goats			
E Non-Market	1990	51.7	58	17.2	1,390	300	230.8	
	2000	56.0	74	17.5	1,410	325	214.8	
	2010	56.0	74	17.9	1,430	375	216.0	
	2030	56.0	74	18.5	1,490	450	217.0	

Alter- native	Mid-Point of Decade	MIS Habitat Capability				Pairs	Non-Turka	M Lbs Fish
		Moose	Deer	Elk	Goats			
E RFA 1980	1990	51.7	68	17.2	1,150	275	214.9	
	2000	54.8	66	16.8	1,150	295	211.8	
	2010	54.8	65	16.6	1,150	310	210.5	
	2030	54.8	65	16.1	1,120	350	210.3	

Alter- native	Mid-Point of Decade	MIS Habitat Capability				Pairs	Non-Turka	M Lbs Fish
		Moose	Deer	Elk	Goats			
F Market	1990	41.4	68	17.2	1,150	275	214.3	
	2000	52.1	67	16.7	1,100	260	203.3	
	2010	52.1	65	16.4	1,090	250	203.8	
	2030	52.1	62	15.8	1,090	235	197.4	

Alter- native	Mid-Point of Decade	MIS Habitat Capability				Pairs	Non-Turka	M Lbs Fish
		Moose	Deer	Elk	Goats			
H RFA 1985	1990	43.0	68	17.2	1,120	230	213.0	
	2000	49.0	65	16.5	1,100	220	207.0	
	2010	48.0	60	16.0	1,090	210	200.4	
	2030	45.0	52	14.0	1,030	175	166.5	

diversity. Road densities would be kept to a minimum and wildlife cover would be retained.

The Current Program Alternative, the Composite Alternative, the Current Budget Alternative, and the RPA 1980 Alternative would all provide similar habitat diversity, vegetative manipulation, and therefore, induced habitat diversity*, would decrease in the latter part of the planning period under the Current Budget Alternative. Timber harvest is identical under the Current Program and Composite Alternatives. Induced diversity due to timber harvest would therefore be the same for these alternatives. Range management would receive somewhat more emphasis under RPA 1980 Alternative than under Current Program and Composite Alternatives. Induced diversity due to range revegetation activities would therefore be greater under RPA 1980.

The Constrained Budget Alternative would provide for less diversity enhancement than any other alternative. Budgets in timber, range, and wildlife would be so small that only highest priority projects could be funded.

d. Threatened, Endangered and Sensitive Species

Utah Prairie Dog. All alternatives except the Constrained Budget may affect the Utah prairie dog either positively or negatively. It is estimated that because of budget reductions called for under the Constrained Budget, no habitat improvements would be possible to allow prairie dog population increases. The Forest would probably discourage additional transplant efforts. Areas where prairie dogs currently exist, however, would receive sufficient protection from grazing, to preserve current populations.

The Current Program, the Current Budget, and the RPA 1980 alternatives would have no negative effects on prairie dogs, and probably would have some beneficial effects. The transplant program would continue under all three alternatives. Under Current Program and RPA 1980, money should be available on a regular basis for habitat improvement work. Under Current Budget, money would probably be available on an occasional basis for habitat improvement.

Under the Composite and Non-Market alternatives, effects on prairie dogs would be beneficial. The transplant program would continue and a regular program of habitat improvement could be planned and accomplished.

Under the Market and High Productivity Alternatives, it is likely that some habitat loss would occur as a result of maximization of grazing. Current populations would be protected, however.

Bald Eagles. The Constrained Budget, the Market, and the High Productivity Alternatives would have no effect, either positively or negatively on bald eagles. Currently occupied habitat would be protected from disturbing management activities, but no habitat enhancement projects would be planned, either because of lack of funding (Constrained Budget), or redirection of priorities (Market and High Productivity).

The Current Program, the Composite, the Current Budget and the RPA 1980 alternatives would have no negative effects on bald eagles and could possibly have some beneficial effects. Currently occupied habitat areas would be protected and habitat enhancement could be accomplished on an occasional

basis. Lower levels of timber harvest and grazing (than under Market and High Productivity) would also lessen the chances that the eagle's hunting habitat would deteriorate.

The Non-Market alternative would be beneficial to bald eagles. Currently occupied roosting and hunting habitat would be protected and enhanced where possible, and areas of potential habitat would be managed to encourage use by eagles. Market outputs would be managed to enhance eagle hunting habitat.

Astragalus perianus (Rydberg milkvetch). Constrained, Current Budget, Market, and High Productivity Alternatives could possibly have negative effects on A. perianus due to grazing. Under the Constrained and Current Budget adequate protection for the species could not be provided because of low budgets. Under the Market or High Productivity Alternatives the lack of adequate protection would be due to increased intensity of grazing.

The Current Program, the Composite and RPA 1980 alternative would have no negative effects on A. perianus. Grazing administration and intensity of use under these alternatives would be such that known populations of the species could be protected.

The Non-Market Alternative could enhance populations of A. perianus, since grazing intensity would be reduced.

Bonneville cutthroat trout. Presently confirmed occurrence on the Forest is limited to three streams; Water Canyon, Reservoir Canyon and Deer Creek. The Current Program, Current Budget, and the RPA 1980 alternatives are predicted to have no negative effects on the species. These alternatives could have beneficial effects should money be available for habitat improvement projects or if grazing were managed to protect the streams where the Bonneville cutthroat trout occur.

The Non-Market and Composite Alternatives would have beneficial effects on Bonneville cutthroat trout. Habitat enhancement projects would be accomplished in all streams where the fish presently occur. Inventory work would discover other populations of the species, or streams where the fish could be transplanted.

Bonneville cutthroats could be negatively impacted under the Constrained Budget, the Market, or the High Productivity alternatives. Most of the impacts would be a result of increased livestock activity in and around the streams.

Sensitive plants. Table III, Chapter III lists the plants which are currently officially classified as "sensitive" on the Dixie National Forest. The Constrained Budget, the Current Budget, the Market, and the High Productivity alternatives could negatively impact sensitive plant species. The negative impacts would be primarily as a result of market outputs; i.e., timber and grazing, and/or a lack of money to provide adequate protection for these species.

The Current Program, the Composite and the RPA 1980 alternatives are estimated to have no effect, either positively or negatively on sensitive plant species. Both programs would provide for administration of market output activities

sufficient to protect existing, known populations of sensitive species. Funds would not be available to allow for any appreciable habitat improvement for sensitive species.

Under the Non-Market alternative, sensitive species would benefit from increased protection, reduced market outputs and from project activities designed to enhance and increase habitat for these plants.

e. Wildlife Outputs (Projected Demand)

Estimated hunting and fishing and nonconsumptive wildlife and fish use under each alternative is summarized in Figure IV-1.

The high outputs of the Non-Market alternative, are a reflection of near maximum wildlife populations resulting from an intensive habitat improvement program and de-emphasis of market outputs which have the potential of adversely affecting wildlife habitats. Numbers of wildlife and fish user days (WFUDS) are considerably lower under all other alternatives.

Early in the planning period, the next best wildlife outputs are realized from the RPA 1980 alternative. After 2010, however, the outputs from the Current Program and Composite alternatives exceed those of RPA 1980. At the end of the planning period, the estimated outputs from the Composite would be slightly higher than those of the Current Program alternative.

After 2000, outputs from the Current Budget Alternative would begin to drop due to lowered populations of some wildlife species. This is a result of decreased habitat improvement and maintenance and fewer projects which would provide habitat diversity.

Outputs to be realized from the Market and the High Productivity alternatives are estimated to be the same, and would be lower than the Current Budget outputs. Although these alternatives provide considerable habitat diversity, it is concentrated and limited in usefulness. These alternatives emphasize market outputs at the expense of wildlife outputs.

The Constrained Budget alternative would have the lowest wildlife outputs. This is due in part to the lack of any direct wildlife habitat improvement program under this alternative and also to the fact that access to the Forest by recreationist would become more difficult as the road and trail network would deteriorate from lack of maintenance.

Fisheries outputs do not follow the same trend as wildlife outputs under all alternatives. The highest fisheries outputs would still be produced by the Non-Market Alternative followed by the Composite Alternative with the second highest level of outputs. Outputs from the 1980 RPA alternative would be slightly higher than present outputs. The 1985 RPA Alternative would have the lowest fisheries outputs with Current Program, Constrained Budget, Current Budget, and Market Alternatives also producing decreased fisheries outputs.

The difference between fisheries and wildlife outputs of the various alternatives is based on the fact that aquatic habitat is more sensitive to impacts from increased resource activity than is terrestrial habitat. Both aquatic and terrestrial habitat can be improved through improvement projects, but aquatic habitat can be degraded more rapidly by other resource activities under high commodity output alternatives.

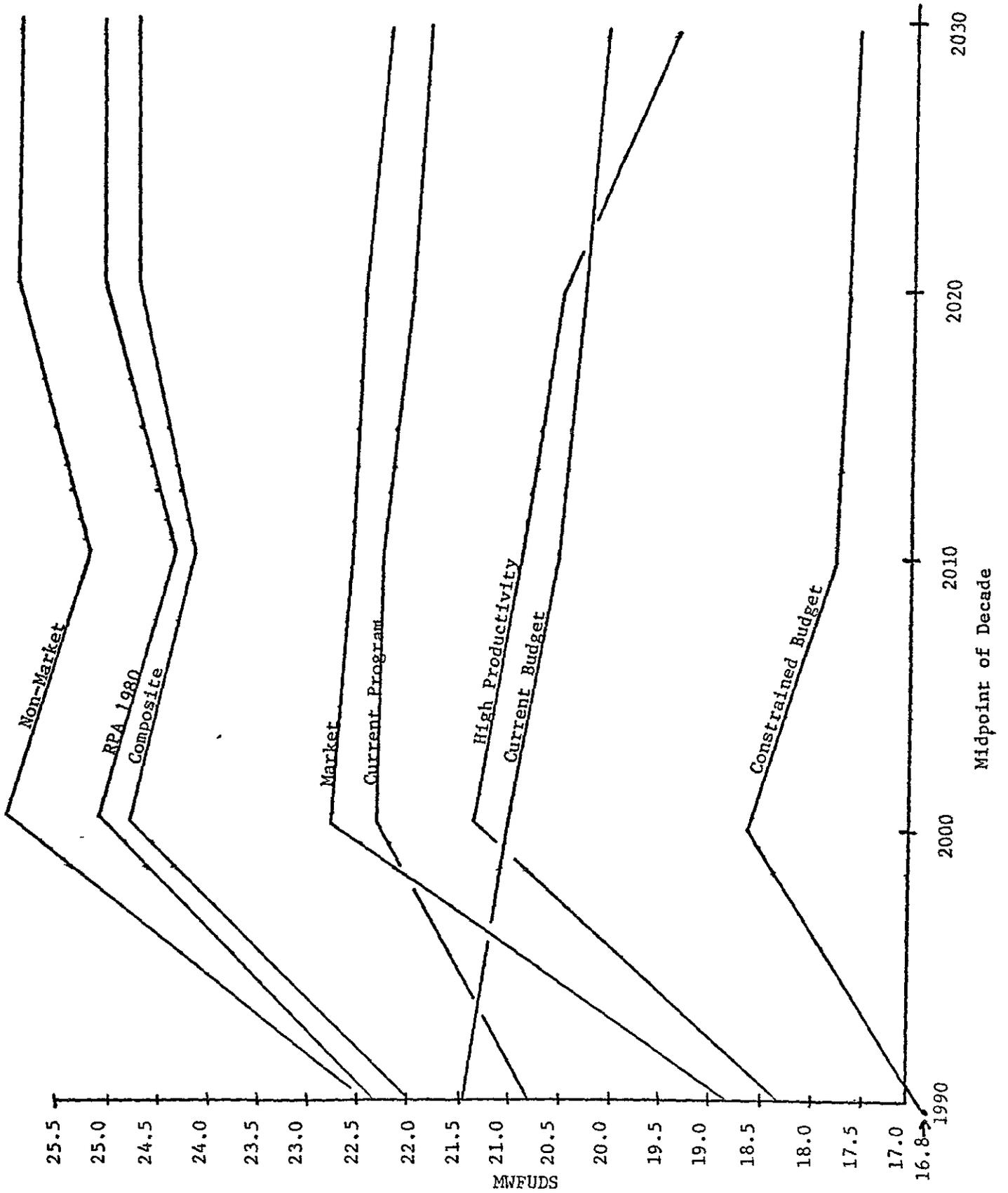


FIGURE IV-1
 COMPARISON OF WILDLIFE AND FISH USER DAY
 OUTPUTS BY ALTERNATIVE AND DECADE

Alternatives with large increases in wildlife outputs are the result of high budget levels for wildlife and fish habitat improvement. Projects accomplished under the various alternatives would be one of the main reasons that wildlife outputs increase. Tables IV-6 and IV-7 display habitat improvement work that would be accomplished under the various alternatives.

TABLE IV-6
FISH HABITAT IMPROVEMENT (Structures)
ESTIMATED TO BE ACCOMPLISHED UNDER THE VARIOUS ALTERNATIVES

Alternatives	1990	2000	2010	2020	2030
	Structures	Structures	Structures	Structures	Structures
A. Current Program	42	42	42	42	42
B. Composite	125	125	125	125	125
C. Constrained Budget	20	25	25	25	20
D. Current Budget	52	52	52	52	52
E. Non-Market Emphasis	125	125	125	125	125
F. Market	35	35	35	35	35
G. 1980 RPA	40	40	40	40	40
H. High Prod.	52	52	52	52	52

TABLE IV-7
TERRESTRIAL HABITAT IMPROVEMENT (Acres & Structures)
ESTIMATED TO BE ACCOMPLISHED UNDER THE VARIOUS ALTERNATIVES

Alternatives	1990	2000	2010	2020	2030
	Acres/ Structures	Acres/ Structures	Acres/ Structures	Acres/ Structures	Acres Structures
A. Current Program	830 10	830 12	830 12	830 12	830 12
B. Composite	900 15	900 17	950 17	900 18	900 18
C. Constrained Budget	50 2	50 2	50 2	50 2	50 2
D. Current Budget	800 10	775 10	750 8	700 6	600 5
E. Non-Market Emphasis	960 16	1255 26	1172 27	1187 32	1172 33
F. Market	830 10	750 10	700 10	650 10	600 10
G. 1980 RPA	830 15	750 15	700 15	650 15	650 15
H. High Prod.	830 17	750 17	700 19	650 21	600 21

f. Utah Division of Wildlife Resources Goals and Objectives

The Utah Division of Wildlife Resources (UDWR) only has population goals for big game species. None of the alternatives would meet the 1990 elk population goals as outlined in the Region 4 Wildlife and Fish Assessment Data Base (August 1981). Elk management plans are now being prepared at the field level which will provide elk population goals. These goals will be approximately what is displayed in Table IV-5. The Non-Market and RPA 1980 Alternatives, would meet the deer population goal by 1990. Table IV-5 summarizes how closely the various alternatives approach the deer and elk population goals. Forest objectives are displayed in Table IV-5.

g. Effects on Other Resources

Variations in the amount of wildlife habitat manipulation from one alternative to another are not likely to have a significant impact on any other resource. Most impacts would be related to temporary area closures to protect wildlife during important periods in the life cycle: breeding/spawning, fawning/calving; or seasonal closures i.e., winter range areas closed to vehicles. These closures would probably be applied regardless of which alternative was selected. Closures of certain areas on a more permanent basis, such as closure of a riparian area to grazing to allow recovery of vegetation on streambanks might occur under the Current Program the Composite, the Non-Market, or the RPA 1980 alternatives. A closure of this sort would be limited in extent and is not likely to cause reduction in total livestock use within an allotment.

h. Unavoidable Adverse Impacts

Alternatives which provide for high WFUD outputs also have the potential of causing resource damage from rutted roads, unwanted roads, damaged facilities, increased poaching*, etc. Mitigation of these types of damage would come largely in the form of increased law enforcement and/or emphasis on public education in the development of a sound conservation ethic. High market output alternatives, with their associated extensive road networks and range revegetation/timber harvest programs, would increase stream sedimentation and decrease big game habitat effectiveness in some areas. Mitigation of these impacts could include road closure, leaving vegetation screens along open roads, and leaving adequate unmanipulated buffer strips along streams. Some riparian areas would continue to deteriorate under the high market output alternatives due to increased livestock grazing pressure in these areas. This deterioration would also be experienced under the Constrained and Current Budget alternatives because of a lack of administration in these areas. Mitigation could take the form of fencing the riparian areas to exclude livestock, herding the livestock to keep them from over using the riparian areas, or changing the class of livestock. The low budget alternatives, with their attendant small programs of vegetative manipulation would allow a gradual progression toward old-growth habitats. This would adversely impact wildlife species that favor early successional habitats. Mitigation could include accomplishing some vegetative manipulation to create early successional stages using low cost methods i.e., burning.

i. Short-Term Uses vs. Long-Term Productivity

Long-term productivity would be improved by the Current Program, the Composite, the Non-Market, or the RPA 1980 alternatives, since they all include budgets that allow for at least some wildlife habitat improvement work. High intensity, short-term uses of the timber and range resources, such as would be experienced under the Market and High Productivity alternatives could impair the long-term productivity of some of the Forest's wildlife populations. It is unlikely that wildlife use under any alternative would reduce the long-term productivity of the Forest.

j. Irreversible and Irretrievable Commitment of Resources

Closure of certain areas to grazing or timber harvest to protect wildlife values would be an irretrievable commitment of resources. This would be likely to happen to a greater or lesser extent under the Current Program, the Composite, the Non-Market or RPA 1980 alternatives, but unlikely under any other alternative. There would be no irreversible commitment of resources associated with wildlife habitat treatment by prescribed burning could be an irretrievable commitment of resources.

4. Range

Under the Current Program, the Composite, and the Current Budget, animal unit month (AUM) outputs would remain constant at 115,000 AUMS annually. Under the Constrained Budget, AUM outputs would start at 110,000 in 1990 and gradually drop to 100,000 by 2030. Complete take over of improvement construction and maintenance by permittees could slow or stop this gradual reduction in AUMS. The Non-Market would have constant outputs of 90,000 AUMS annually throughout the planning period. Outputs under the RPA '80, Market and High Productivity would gradually increase throughout the planning period. Under the Market Alternative, we would be producing about 119,000 AUMS annually by 1990 and 123,000 by 2030. Under RPA 80 Alternative, we would produce 117,000 in 1990 increasing to 119,000 in 2030. Under the High Productivity Alternative, we would be producing 119,000 AUMS by 1990, increasing to 139,000 AUMS by 2030.

Table IV-8 displays the numbers of AUMs that will be produced during each decade of the planning period under the various alternatives.

TABLE IV-8
GRAZING CAPACITY (in thousands of AUMs)
ON THE DIXIE NATIONAL FOREST BY PLANNING ALTERNATIVE

Alternative	1990	2000	2010	2020	2030
Current (A)	115	115	115	115	115
Composite (B)	115	115	115	115	115
Constrained (C)	110	107	105	103	100
Current Budget (D)	115	115	115	115	115
Non-Market (E)	90	90	90	90	90
Market (F)	117	117	118	118	119
RPA-80 (G)	119	120	121	122	123
High Prod (H)	119	124	130	136	139

Allotment management plans have been prepared and are in effect on all allotments on the Dixie and the current grazing capacity of 115,000 AUMs has been more or less the same for the last ten years. Any increase in outputs as discussed in the RPA 1980, the Market, or the RPA 1985 Alternatives would require completion of additional range revegetation projects and increasing reliance on transitory range created by timber harvest. Also, because of the preference of cattle for riparian areas, they would be subjected to additional grazing pressure in order to meet the AUM output targets. Even though the high

output alternatives would include revegetation projects to increase range capacity, the increased use is likely to cause changes in range condition and trend. Table IV-9 shows the estimated change in the number of suitable acres by condition and trend.

TABLE IV-9
ESTIMATED RANGE ANALYSIS DATA SUMMARY
BY PLANNING ALTERNATIVE AND BY DECADE

Change in suitable acres (in thousands) in each condition class by alternative and by decade.

Alternative	1990			2000			2010			2020			2030		
	Good	Fair	Poor												
Current Program	263	324	100	263	346	78	274	357	56	282	371	34	295	380	12
Composite	268	318	101	272	337	78	278	365	56	289	365	33	292	384	11
Constrained Budget	258	318	111	257	319	111	255	320	112	250	325	112	240	335	112
Current Budget	263	318	106	261	330	96	260	341	86	258	353	76	255	366	66
Non-Market	269	322	96	277	344	66	285	366	36	295	386	6	340	347	0
Market	263	313	111	261	315	111	261	315	111	259	317	111	258	318	111
RPA 1980	263	313	111	263	313	111	263	314	110	263	314	110	263	314	110
High Prod.	260	316	111	255	321	111	250	326	111	245	330	112	237	339	112

Trend of suitable acres (in thousands) by alternative and by decade.

Alternative	1990			2000			2010			2020			2030		
	Up	Down	Stable												
Current Program	424	0	263	424	0	263	424	0	274	424	0	282	424	0	295
Composite	419	0	268	417	0	272	412	0	278	408	0	289	404	0	292
Constrained Budget	0	429	258	0	430	257	0	432	255	0	437	250	0	447	240
Current Budget	424	0	263	426	0	261	477	0	260	429	0	258	432	0	255
Non-Market	418	0	269	410	0	277	402	0	285	392	0	312	347	0	340
Market	424	0	263	426	0	261	426	0	261	426	0	259	428	0	258
RPA 1980	424	0	263	424	0	263	424	0	263	424	0	263	424	0	263
High Prod.	0	3	684	0	5	679	0	5	679	0	6	678	0	6	678

Acres within the various vegetation types will remain the same under all alternatives; as will the number of acres in each livestock suitability class.

a. Wild Horses

All alternatives provide for current use by wild horses (300 AUMS) annually.

b. Riparian

Riparian areas would be adversely impacted by the high output alternatives (RPA 1980, High Productivity, and Market) because of increase grazing in these areas.

Riparian area practices and grazing pressure would continue at current levels under Current Program Alternative. Under this alternative, funds would be available on at least an occasional basis for rehabilitation of selected riparian areas. More emphasis will be placed on the restoration of degraded riparian areas in the Composite Alternative. It is not likely that the Constrained Budget or the Current Budget Alternatives would contain any funding for riparian area rehabilitation.

Decreased AUM outputs as prescribed in the Constrained Budget and Non-Market Alternatives would reduce grazing pressure on riparian areas somewhat. Cattle prefer riparian areas however, and under the Constrained Budget Alternative, where funding for grazing administration would be limited, riparian areas might receive heavier use than under the high output alternatives. Under the Non-Market Alternative, deteriorated riparian areas would be protected from overgrazing by exclusion from the areas, by herding, by changing the class of livestock, or by a combination of these methods.

c. Threatened, Endangered, and Sensitive Plants

Table III-15, Chapter III, displays the federally classified and Region 4 sensitive plants that occur on the Dixie National Forest.

The Non-Market Alternative would lessen the likelihood of disturbance to threatened, endangered, and sensitive (T,E,& S) plants because livestock numbers on the Forest would be reduced. Conversely, the likelihood of disturbance of T,E,& S plants would be higher under the RPA 1980, the Market, and the High Productivity Alternatives because of increased AUM outputs. Under all alternatives, the Forest is legally obligated (FSM 2670.21 through 2670.32) to maintain viable populations of T,E,&S plants.

d. Noxious Weeds

As discussed in Chapter III, the only noxious weeds that are currently a problem on and adjacent to the Forest are Scotch thistle, musk thistle, and Canada thistle. The Constrained Budget and Current Budget Alternatives would not contain funding to control noxious weeds unless infestations were severe. Budgets in the other alternatives would be sufficient to keep these species under control, but under no alternative is it likely that Scotch thistle would be eradicated from the Forest.

e. Projected Public Use (Demand)

Livestock forage production in thousands of AUMs under each alternative is displayed in Table IV-8. Under the present grazing fee system, it is assumed that there is a local demand for all of the AUMs the Forest is capable of producing.

f. Effects on Other Resources

Wildlife. Range revegetation projects such as spraying, burning, or browse control could have an adverse short-term effect on deer winter range if critical forage or cover were destroyed. The high range output alternatives; Market, RPA 1980, and High Productivity would convert and maintain areas in grass to provide cattle forage. In some cases this would be done at the expense of browse or cover species used by wintering big game. In many instances the revegetation work would be beneficial, rather than harmful to some wildlife species. Water developments constructed for livestock are also available to wildlife.

Fences can have a long-term effect on wildlife. Of the big game species, pronghorn have the most trouble negotiating fences. They can also be obstacles for deer and elk, especially in fawning and calving areas. Alternatives in which range outputs are increased over current would have the largest increases in fence construction, and have the most potential of creating problems. Fortunately, there are a number of fence designs that minimize, if not eliminate the adverse impacts on wildlife.

There is some degree of competition between livestock and wildlife for forage. The diets of cattle and elk overlap considerably. There is also dietary overlap between sheep and mule deer. When populations of certain species, i.e. rabbits or prairie dogs, are high enough, they can consume a large amount of forage. The forage base on the Forest has finite limitations. In general, the larger the number of livestock using the Forest, the smaller the wildlife populations will be.

Riparian. Riparian ecosystems are important to many species of wildlife. Livestock, especially cattle, make maximum use of riparian areas for both grazing and resting. In both cases the main "attractions" are lush vegetation and availability of water. The RPA 1980, the Market, and the High Productivity Alternatives provide the highest range outputs, and as such, would put the most pressure on riparian areas. Wildlife species dependent on riparian ecosystems would be adversely affected to a greater or lesser extent by these alternatives.

Heavy livestock use of riparian areas decreases water quality when protective vegetation is trampled and grazed or browsed, resulting in increased sedimentation and higher water temperatures. Higher than normal nutrient loads are experienced in water bodies where livestock congregate and defecate. This decreased water quality would adversely affect fish populations and habitat, and could occur under any alternative, although it is most likely under the high range output alternatives (Market, RPA 80, or High Productivity).

Soils in riparian areas would be susceptible to compaction and erosion under all alternatives. Wet soils would be easily compacted by concentrated livestock use. Adverse effects to soils are most likely to occur under the high range output alternatives.

Timber. Some use of transitory range would occur under all alternatives. The most use would occur under the High Productivity Alternative, with slightly less under RPA 1980, and still less under the Market Alternative. The lower the AUM outputs of a given alternative, the less use it probably makes of transitory range. There would be very little or no use of transitory range under the Non-Market Alternative. Use of transitory range by livestock would adversely affect regeneration of trees because of trampling and browsing.

Recreation. Most developed recreation sites are fenced to exclude livestock, but they occasionally get in anyway. The more livestock on the Forest, the more likely this is to occur.

Dispersed recreation sites are seldom fenced to exclude livestock, and may be heavily used at certain times. Conflicts would need to be resolved on an individual case basis.

Soil. Livestock activity would have no overall positive effects on the soil. The degree of negative impact would vary with livestock numbers and how well those animals were managed. For example, even though livestock numbers would be lower under the Constrained Budget Alternative than under the Current, Composite, or Current Budget Alternatives, impacts on the soil are reckoned to be greater. Forest Service Management would be considerably less, with developments (water, fences) falling into disrepair. "Policing" of the permittees would decrease, allowing poor range management practices such as salting on water or bedding in the same area more than one night.

Water Quality. The quality of water would be affected much the same way as the soil resource. Increased livestock numbers and/or decreased management would result in heavier use of riparian zones and wet meadows and corresponding decrease in water quality.

Vegetation. If range revegetation projects are not taken into account, the effects of livestock grazing on vegetation are negative. Again, the degree of impact is directly related to the intensity of grazing.

Table IV-9A Summarizes the effects of the range management alternatives on the various resources. Possible mitigation of negative impacts which might occur under some or all of these alternatives has not been taken into account in the construction of this table.

TABLE IV-9a
EFFECTS OF RANGE MANAGEMENT ALTERNATIVES
ON OTHER RESOURCES

	Wildlife	Riparian Habitat	Timber	Recreation	Soil	Water Quality	Vegetation
Current (A)	+1	-1	0	0	-1	-2	0
Composite (B)	+1	-1	0	0	-1	-1	0
Constrained (C)	0	-3	0	-1	-2	-3	-2
Current Bud.(D)	0	-2	0	0	-1	-2	-1
Non-Mkt. (E)	+1	0	0	0	0	0	0
Market (F)	-4	-4	-1	-1	-2	-3	-4
RDA 80 (G)	-2	-3	-1	-1	-2	-3	-2
High-Prod. (H)	-5	-5	-1	-1	-3	-3	-4

Unavoidable Adverse Impacts. Localized overgrazing could occur under all alternatives. The probability is highest under the High Productivity Alternative, next highest under the RPA 1980 Alternative, and next highest under the Market Alternative. Because the Non-Market Alternative produces the fewest AUMs, it also provides the least opportunity for overgrazing. Mitigation of overgrazing problems could come in the form of temporary removal of livestock or decreasing the stocking on problem areas. Areas where vegetation had been damaged would be replanted or reseeded, assuming damage did not include severe soil loss.

Degradation of water quality in some streams would continue. The amount of degradation and the likelihood of occurrence would be highest under those alternatives with the highest outputs or those with the lowest funding for program administration. Mitigation for this type of damage could include fencing of streams and/or providing livestock watering facilities away from the streams.

Under the high output alternatives, considerable problems could be encountered achieving adequate regeneration of harvested timber stands if these areas are used as transitory range. Fencing of regeneration areas would prevent livestock from damaging the young trees.

Short-Term Uses vs. Long-Term Productivity. Long-term range productivity would be improved by alternatives such as the Current Program, the Composite, RPA 1980, High Productivity, and Market since they would provide range management budgets adequate to accomplish and maintain range revegetation projects. Under the alternatives with reduced budgets, Constrained Budget and Current Budget, long-term productivity would suffer because of the Forest's inability to maintain range improvements. Long-term productivity of the range would be maintained under the Non-Market Alternative.

Irreversible and Irretrievable Commitment of Resources. Loss of soil on streambanks in areas where livestock concentrate and damage the riparian ecosystem would be irretrievable.

5. Timber

a. Probable Effects of Implementing Alternatives

Lands to be managed for timber production under each alternative were selected from the tentatively suitable lands. Lands classified as suitable are a function of the goals and objectives of the alternatives, so the number of suitable acres is different for each alternative, Table IV-10. Lands classified as not suitable were not selected for timber production.

TABLE IV-10
DISTRIBUTION OF LANDS CLASSIFIED AS SUITABLE FOR
PRODUCING TIMBER, BY ALTERNATIVE (THOUSAND ACRES)

Land Class	Alternative							
	Current Budget	Composite	Market	Non Market	High Prod.	RPA-80	Current Program	Constrained Budget
Available & Tentatively Suitable	331.2	331.2	331.2	331.2	331.2	331.2	331.2	331.2
Needed to meet Minimum Management Requirements	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
Timber Harvest Not Compatible w/ Alt. Goal	3.3	3.3	1.1	96.0	3.3	1.1	3.3	3.3
Tentatively Suitable Lands Available to FORPLAN	319.3	319.3	321.5	226.6	319.3	321.5	319.3	319.3
Assigned to No Harvest in FORPLAN, Not used in FORPLAN Solution	5.2	19.2	6.0	35.5	5.1	8.5	19.2	39.0
Lands Suitable For Timber Production	314.1	300.1	315.5	191.1	314.2	313.0	300.1	280.3

The number and distribution of stand age groups affects the long-term sustained yield calculation. The Forest should have approximately an equal acreage number of each age group. To obtain this age grouping and distribution it is important to regenerate harvested stands.

The primary means for achieving desired stand stocking and proper stand age distribution are timber sales, timber stand improvement, and reforestation. All alternatives provide for these treatments but at different levels. Site quality is inherent and will not change by alternative.

Allowable sale quantity varies with each alternative. The differences in yields are determined by the area suitable for timber production. Yield is also affected by the silvicultural activity used. Long-term sustained yield is the maximum sustained yield which can be expected once the Forest is in a fully managed state.

Alternative E, with the least amount of suitable land, has the lowest long-term sustained yield.

TABLE IV-11
ALLOWABLE SALE QUANTITY AND
LONG-TERM SUSTAINED YIELD CAPACITY
(Average Annual Output, MMCF)

Alternative	Long Term Sustained Yield	Time Period				
		1990	2000	2010	2020	2030
A Current Program	8.2	5,157	5,101	5,146	5,168	5,213
B Composite	8.2	5,157	5,101	5,146	5,168	5,213
C Constrained Budget	7.7	4,525	4,525	4,525	4,525	4,547
D Current Budget	8.3	5,499	5,432	5,499	5,499	5,499
E Non-Market	6.0	4,426	4,737	4,782	4,804	4,826
F Market	7.7	5,825	5,869	5,891	5,914	5,936
G RPA-80	7.5	6,469	6,812	6,087	5,537	5,239
H High Prod.	8.1	6,680	5,073	5,059	6,263	7,790

Table IV-13 displays the base sale schedule by alternative for 150 years.

TABLE IV-12
BASE SALE SCHEDULE
(Million Cubic Feet Per Decade)

Decade	Alternatives							
	Current Budget	Market	Non Market	Composite	Current Program	Constrained Budget	RPA-80	High Prod.
1	54.99	58.25	44.26	51.57	51.57	45.25	64.69	66.80
2	54.32	58.69	47.37	51.01	51.01	45.25	68.12	50.73
3	54.99	58.91	47.82	51.46	51.46	45.25	60.87	50.59
4	54.99	59.14	48.04	51.68	51.68	45.25	55.37	62.63
5	54.99	59.63	48.26	52.13	52.13	45.47	52.39	77.90
6	54.99	59.36	48.26	52.13	52.13	45.25	52.39	59.09
7	54.99	59.36	48.26	52.13	52.13	45.25	52.39	44.99
8	54.99	59.36	48.26	52.13	52.13	45.25	52.39	34.41
9	54.99	59.36	48.26	52.13	52.13	45.25	52.39	26.47
10	54.99	59.36	48.26	52.13	52.13	45.25	52.39	21.25
11	54.99	59.36	48.26	52.13	52.13	45.25	52.39	25.90
12	54.99	59.36	48.26	52.13	52.13	45.25	52.39	31.70
13	54.99	59.36	48.26	52.13	52.13	45.25	52.39	38.96
14	54.99	59.36	48.26	52.13	52.13	45.25	52.39	48.04
15	54.99	59.36	48.26	52.13	52.13	45.25	52.39	59.38

By the end of the planning horizon each alternative would have improved stocking levels and stand age distribution. Timber sales would be designed and laid out on suitable timber land which had timber management as its objective. Timber sales would also be designed and laid out on suitable timber land which had wildlife habitat improvement, range improvement and water yield improvement as their objectives.

Table IV-13 shows the average annual number of acres treated by silvicultural method for each decade. The acres treated are through commercial harvest only.

TABLE IV-13
HARVEST METHOD
(Average Annual Acres Treated)

Alternative	Decade	Inter- mediate Cut	Combined Removal		Aspen CC	Shelter- wood		TOTAL
			Removal Cut	Intermed- iate Cut		Regen. Cut	Conifer CC	
Current Budget	1	0	6279	980	1153	0	698	9110
	2	0	5899	1556	1715	0	263	9433
	3	0	2849	3801	0	0	304	6950
	4	412	315	1251	708	1841	652	5179
	5	408	2293	264	0	1494	883	5342
Market	1	0	6390	602	1757	172	887	9809
	2	0	6203	1801	1443	0	163	9610
	3	0	3570	3621	370	0	244	7805
	4	0	249	1092	0	4278	639	6258
	5	182	3631	0	0	1103	730	5646
Non-Market	1	0	5837	439	700	0	500	7476
	2	0	3481	645	1451	0	224	5801
	3	0	1159	2171	700	0	448	4478
	4	0	2190	627	700	1143	366	4326
	5	0	1061	0	0	2530	381	3472
Constrained Budget	1	0	5847	447	1480	0	231	7995
	2	0	4064	957	1270	0	537	6820
	3	0	974	4103	0	0	0	5077
	4	369	1862	1609	280	221	652	4993
	5	446	939	593	555	1211	597	4341
Current Program	1	0	4433	5000	20	514	558	10525
	2	0	6763	54	1697	0	300	8814
	3	864	1722	1769	1168	0	286	5809
	4	0	1222	628	690	2550	731	5821
	5	334	2731	250	0	860	744	4919
Composite	1	0	4433	5000	20	514	558	10515
	2	0	6763	54	1697	0	300	8814
	3	864	1722	1769	1168	0	286	5809
	4	0	1222	628	690	2550	731	5821
	5	334	2731	250	0	860	744	4919
RPA-80	1	0	6326	3987	960	259	846	12378
	2	0	3205	4043	2616	0	165	10020
	3	2508	1388	3290	0	0	239	7425
	4	0	0	1138	0	4774	949	6861
	5	18	3643	0	0	970	1234	5866
High Produc- tivity	1	0	288	13261	1093	41	645	15268
	2	0	50	7121	2489	228	179	10067
	3	2655	2534	576	0	0	202	5967
	4	1504	0	0	0	3167	1252	5923
	5	507	3236	0	0	878	610	5231

The following table displays estimated timber production for each alternative by product classification.

TABLE IV-14
TIMBER PRODUCTION BY PRODUCT CLASS
AVERAGE ANNUAL VOLUME IN MILLIONS OF BOARD FEET

Alter- native	De- cade	Product Class					
		Softwood Sawtimber	Softwood Roundwood	Softwood Fuelwood ^{1/}	Hardwood Sawtimber	Hardwood Roundwood	Hardwood Fuelwood ^{1/}
Current Program	1	22.9	.3	7.7	2.8	.4	3.0
	2	15.7	.4	4.2	9.4	.5	4.2
	3	14.9	.6	4.3	10.3	.5	4.2
	4	17.4	.7	5.7	7.8	.5	2.3
	5	21.3	.8	7.1	3.7	.6	2.3
Composite ¹	1	22.9	.3	7.7	2.8	.4	3.0
	2	15.7	.4	4.2	9.4	.5	4.2
	3	14.9	.6	4.3	10.3	.5	4.2
	4	17.4	.7	5.7	7.8	.5	2.3
	5	21.3	.8	7.1	3.7	.6	2.3
Con- strained Budget	1	14.1	.3	2.7	7.9	.1	.4
	2	15.3	.3	2.7	7.8	.1	.4
	3	19.0	.3	4.7	5.0	.1	.8
	4	21.2	.3	4.5	2.9	.1	.8
	5	16.1	.4	4.5	6.2	.1	.7
Current Budget	1	19.7	.3	7.0	6.5	.5	1.0
	2	17.4	.4	4.9	10.6	.1	.8
	3	23.8	.3	4.9	4.6	.5	.8
	4	20.9	.3	4.9	7.2	.5	.8
	5	23.2	.3	4.9	7.2	.5	.8
Market	1	18.8	.3	6.9	9.1	.5	3.0
	2	19.8	.5	4.1	9.9	.5	3.0
	3	24.5	.6	5.2	6.0	.5	3.0
	4	25.5	.7	7.0	4.1	.5	.9
	5	23.4	.8	8.6	5.4	.5	1.0
Non- Market	1	15.5	.3	5.2	3.5	2.2	2.3
	2	11.4	.4	4.7	8.7	3.5	3.7
	3	13.7	.6	4.7	6.7	3.5	3.7
	4	14.5	.7	4.7	6.2	3.5	3.7
	5	15.5	.8	4.7	3.9	3.5	3.7
RPA-80	1	25.3	.3	8.0	6.7	.5	3.0
	2	18.5	.3	4.9	15.5	.5	4.2
	3	24.2	.6	4.8	6.8	.5	4.2
	4	25.9	.6	6.5	2.1	.5	2.3
	5	23.5	.7	8.0	2.5	.5	2.6
High Produc- tivity	1	31.3	.5	3.0	1.7	.2	4.0
	2	11.1	.7	2.1	13.2	.4	4.2
	3	20.9	.7	1.9	4.8	.4	4.2
	4	28.4	.7	1.0	2.6	.4	1.3
	5	34.2	.7	2.3	4.0	.5	2.6

^{1/} Includes all classes of fuelwood (personal use and commercial)

The President's revised statement of policy (Chief's Letter of 3/30/81) sets certain goals for various resources. The timber goals call for maintenance or enhancement of productivity to (1) minimize inflationary impacts of wood product prices, and (2) commercial lands will have to be brought to and maintained, where possible, at 90 percent of their potential level of growth consistent with the provisions of NFMA.

The R-4 Regional Guide states that for the proposed alternative in each Forest Plan, calculation of the rate of growth (cubic feet/acre/year) will be made for the year 2030. If the growth is less than 90 percent of the LTSYC of the proposed, then a description of the actions and costs required to achieve this growth is needed.

In the Dixie National Forest's array of alternative, growth at 2030 ranges from a low of about 30 percent of LTSYC to a high of 48 percent. The preferred alternative has a growth rate at 30 percent of LTSYC at 2030.

TABLE IV-15
GROWTH RATES TO YEAR 2030
(Net Merchantable Cubic Feet Per Acre Per Year)

	Alternative							
	Current Budget	Comp- osite	Market	Non Market	Current Program	Const. Budget	RPA- 80	High Prod.
Growth rate at long-term sustained yield.	34	40	34	46	40	31	36	29
Total combined growth rate in 2030.	13	12	13	15	12	15	12	12
Percent of long-term sustained yield.	38	30	38	33	30	48	33	41
Percent of acres regenerated.	31	34	38	33	34	25	42	35

A significant portion of the mixed conifer and spruce sawtimber on the Dixie National Forest is mature and/or diseased, and is putting on little, if any, net volume growth. Much of the ponderosa pine sawtimber is immature and in dense stands netting less than desirable volume increment. Small sawtimber offered in local markets is a negative factor in presenting viable timber sales. Regenerated stands are slow in establishing and typically take 60 to 80 years for viable commercial size to occur. Peak volume growth rates, especially in stands not intensively managed, are not achieved until age 90 or older. For reasons discussed by Verschoor ^{1/} (1982), the 90 percent growth constraint is neither feasible nor appropriate for the Dixie National Forest.

Table IV-17 displays fuelwood availability for the first decade. The annual supply of fuelwood would vary according to levels of timber harvest and precommercial thinning. Recent projections of fuelwood demand based on the personal free use program where the typical permit was for ten cords estimated 26,000 cords per year. Under the personal use charge program begun in 1983, the typical permit is for 3 1/3 cords, reducing demand to 8,700 cords per year, which is more realistic in terms of actual removal.

^{1/} Verschoor, Rudy J. 1982. Evaluating the 90 percent of LRSY Growth Constraint in Forest Planning. Bridger-Teton National Forest. Unpublished Paper.

TABLE IV-16
ESTIMATED FUELWOOD SUPPLY
(Average Annual Cords)

Alternative	Cords
Current Program	21,400
Composite	21,400
Constrained Budget	15,200
Current Budget	20,200
Market	19,800
Non-Market	12,200
RPA-80	22,000
High Productivity	14,000

Reforestation is necessary as a result of timber harvest in all alternatives. In order to better insure regeneration of harvested conifer stands, some work would be done at the time of the regeneration cut. The necessary work would be seed bed preparation to encourage natural regeneration. If natural regeneration is not expected to occur or does not occur, the area would be planted. No work is planned in aspen following harvest as natural regeneration from sprouting readily occurs in this timber type.

The amount of reforestation activity varies with each alternative, and is determined by the amount of suitable acres and the silvicultural treatment of these acres. Alternatives which would make regeneration cuts in the conifer types would have relatively high reforestation activity and alternatives which would make intermediate cuts in the conifer types would have low reforestation activity. Table IV-18 displays the reforestation acres by alternative.

TABLE IV-17
REFORESTATION
(Average Annual Acres Treated)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	1588	402	454	3353	1646
Current Budget	830	476	720	2641	2400
Constrained Budget	315	675	378	1092	1869
Non-Market	586	345	681	1627	2914
Market	1169	413	681	5051	1837
Composite	1588	402	454	3353	1646
RPA-80	1368	344	589	5855	2210
High Productivity	1545	809	517	4419	1492

Timber stand improvement (TSI) activities help increase growth rate, improve timber quality, maintain desirable species composition, prevent insect and disease attacks, and maintain vigorous timber stands. Table IV-19 displays the TSI schedule by alternative.

TABLE IV-18
TIMBER STAND IMPROVEMENT
(Average Annual Acres Treated)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	5000	54	1769	628	250
Current Budget	980	1556	3801	1251	264
Constrained Budget	447	957	4103	1609	593
Non-Market	37	645	2171	627	226
Market	365	1801	3621	1092	300
Composite	5000	54	1769	628	250
RPA-80	3585	4034	3290	1138	900
High Productivity	13261	7120	576	0	0

Levels of sawlog volumes offered by the alternatives would have effects on local timber purchasers and the level of sawmill operation. The current estimated sawmill capacity discussed in Chapter III of 55 MMBF per year is based on double shifts at the two large sawmills and collective historical purchased volume of the small sawmills.

None of the alternatives would supply the sawmills with enough timber volume to operate at maximum headrig capacity in any decade unless all the volume went to only one sawmill. This would not be feasible because of long haul distances (150 miles) across the Forest.

A more realistic comparison would be to describe the effects of Dixie National Forest sawlog outputs on a "bottom line" level of sawmill operation which would be one shift. Panguitch mill capacity would become 13 million board feet per year ^{L/} and Escalante mill capacity 10 million. Small mills combined would have a capacity of 2.5 million, totaling 25.5 million board feet per year for the Forest. Also, assuming that mills would be forced to close at less than bottom line levels of offered timber, the following effects would be estimated:

<u>Alternative</u>	<u>Effects</u>
Current Budget	Both major mills would operate at near bottom line levels. Significant aspen volumes are included, so mills may need to change their configuration and marketing objectives. Most small operations would stay in business, but some at reduced levels.
Average Annual	
<u>Decade</u> <u>Output, MMBF</u>	
1 26.2	
2 28.0	
3 28.4	
4 28.1	
5 27.4	
Market	Both major mills could operate at near bottom line levels, assuming they could accommodate significantly increased aspen volumes, if not, only one mill could remain open. Most small operators would survive, some at reduced levels.
Average Annual	
<u>Decade</u> <u>Output, MMBF</u>	
1 27.9	
2 29.7	
3 30.5	
4 29.6	
5 28.8	

^{L/} 10 MMBF from Dixie NF, 3 MMBF log transfer from Fredonia, AZ mill.

Alternative

Effects

Non-Market

<u>Decade</u>	<u>Average Annual Output, MMBF</u>
1	18.8
2	20.1
3	20.4
4	20.7
5	19.4

It is doubtful that either major mill could remain open under this alternative in any decade assuming present configurations and equal distribution of timber across the Forest.

Implementation of this alternative would probably result in several more small mills replacing two large mills.

Composite and Current Program

<u>Decade</u>	<u>Average Annual Output, MMBF</u>
1	25.7
2	25.1
3	25.2
4	25.2
5	25.0

Both large mills would operate at or near bottom line levels. Significant aspen volumes are included, so mills may need to change their configuration and marketing objectives to remain open. Most small operations would stay in business, but some at reduced levels.

Constrained Budget

<u>Decade</u>	<u>Average Annual Output, MMBF</u>
1	22.0
2	23.1
3	24.0
4	24.1
5	22.3

Both major mills would have to accommodate lower overall and increased aspen volumes in all decades to remain open.

Some small operators may shut down if both major mills could survive. Assuming current mill configurations, required conifer volumes and timber distribution, only one major mill would remain open in any decade.

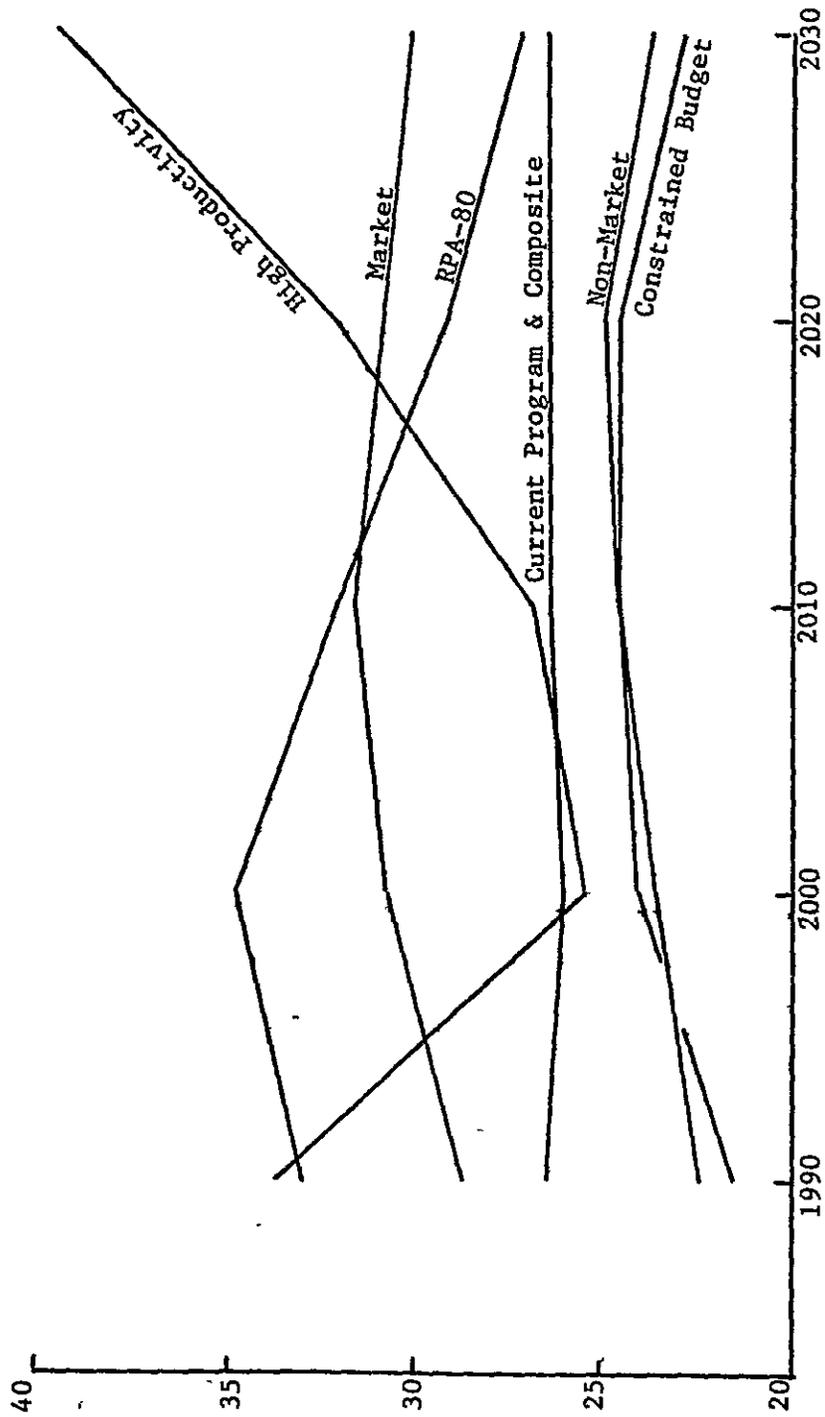
b. Effects on Other Resources

Existing recreation opportunities would be affected by timber management in all alternatives. Road construction would displace some Forest users. The impacts to dispersed recreation opportunities would be mitigated by maintaining visual quality and through road and travel management. Although the timber management impacts would be short-termed, the immediate change to the existing landscape would be undesirable to many Forest visitors. Visual quality objectives would provide the method for conducting timber management while protecting the visual resource. Treatments would be spaced and timed to minimize adverse visual impacts. Trails would be protected from incompatible timber management activities in all alternatives.

Timber management activities would impact wildlife in all alternatives. Timber harvesting might impact riparian areas. Potential effects include increased sedimentation and water temperature as a result of removing riparian cover. Adverse effects would be mitigated in all alternatives by shelterwood or other harvest methods.

Transitory range could be created by timber management. This effect is described in the preceding range discussion.

FIGURE IV-2
 COMPARISON OF AVERAGE ANNUAL TIMBER VOLUME OFFERED BY ALTERNATIVE AND DECADE



MMBF (Includes Roundwood)

Timber activities would impact the soil in all alternatives. Harvesting and site specific activities including yarding, dozer piling, burning, and scarification would affect the soil. In addition, road construction would provide the most significant source of soil loss. The effects of road construction on soil and other resources and associated mitigating requirements are discussed in the facilities section of this chapter.

Under all alternatives, dust raised by logging trucks would degrade air quality temporarily and locally and wildlife could be disturbed temporarily by logging traffic. Dust abatement requirements would be used to minimize impacts on air quality along timber haul roads.

Timber harvest volume and timber management opportunities would be foregone on some slopes over 40 percent under most alternatives. Market Emphasis, Current Program, Constrained Budget, Composite, RPA80 and High Productivity Alternatives allow for some cable harvesting.

Some timber volume would be lost to insects and diseases under all Alternatives. Losses would be considerably less in the Market Emphasis and RPA 80 Alternatives.

Fire is used as a management tool to reduce "activity-created" fuel, such as right-of-way and timber harvest slash. The alternatives with the largest timber harvest would require the most activity fuel treatment. The treatment of slash created by timber harvest is necessary to reduce insect and disease problems and to reduce the possibility of uncontrolled wildfire. As more roads are developed and areas accessed, the potential for man-made fires would increase, especially with concentrated use such as firewood gathering in areas where activity fuels have not been burned. Treatment of activity fuels over time and increased access would reduce the potential for uncontrolled wildfires.

The creation of activity fuels and their treatment by fire would increase smoke and particulate matter released into the atmosphere. Alternatives which harvest the most acres would generate the most smoke and particulate matter. Smoke would be mitigated by use of clearing index guidelines associated with burning prescriptions.

Other impacts associated with timber harvest could create subsoil exposure, organic matter loss, leaching, microsite effects and compaction. Those acres that have dry, shallow, and infertile soils, along with those soils that have become compacted may prove difficult to regenerate, thereby impacting vegetative productivity to some degree. Intensive site preparation, which displaces litter and surface soil, or includes hot burns, could result in decreased soil productivity for a number of years and could increase rotation length. This relationship is not well documented. The Market Emphasis Alternative would have the greatest potential for impacting soil productivity and the Constrained Budget Alternative would have the least potential impact. Forest-wide standards and guidelines provide for maintaining or improving long-term soil productivity in all alternatives.

A significant proportion of the vegetative treatment on the Forest is accomplished through the timber program. Past experience has demonstrated that an integrated timber sale program is an effective method of managing the Forest to meet multiple resource objectives. Since no universally accepted method for cost allocation exists, different perceptions of the below cost sales issue will prevail. Some reviewers will view timber program financial data as indicating that the program is not highly profitable and should, perhaps, be reduced. Other reviewers will view the same data as indicating that the profitability of the program is reduced as other resources are taken into consideration. These reviewers would likely recommend that program profitability be enhanced by de-emphasizing these other resource considerations. Fire is also used to accomplish other resource objectives, such as improving wildlife habitat increasing range forage, and preparing a seed bed for new crops of trees. Fire is generally prescribed when it is demonstrated to be the most effective method for reaching resource objectives.

Frequently a commercial timber sale is the most effective manner of achieving these other resource benefits. Vegetative management is a primary purpose of these sales. Some timber sales, for example, are designed primarily to improve the quality of the residual timber in an area, an investment in long-term future timber growth. Salvage sales prevent the waste of timber killed by fire and insects or disease damaged trees. Such sales are intended to reduce fire hazards, facilitate reforestation and other long-term benefits while providing immediate monetary returns which are sometimes below costs. Timber stand improvements such as thinnings, release, and weeding help the growth and quality of the remaining stands but usually do not realize a short-term positive cash flow. In these situations timber sales lose money, or are "below cost". Yet, these sales may be very important to the future productivity of National Forest timber.

Other timber sales are designed more for protection of non-timber resources, rather than maximize returns from timber production. For example, sale layout and design costs are increased if harvest units are made smaller and more dispersed in order to protect wildlife and visual resources. In addition, timber program profitability may be reduced due to longer rotations, controlled access, and differing silvicultural practices. Because of concern for multiple use, additional cost will be incurred by a timber sale in order to derive some larger overall Net Public Benefit. For example, the costs associated with providing a firewood program are included in the commercial timber sale costs. Also, roads constructed in conjunction with timber sales provide access for firewood cutting and general recreational use.

Still another important consideration is the role of National Forest timber in homebuilding, jobs, and the economy in general. Sustained Yield management of National Forest timber helps give stability to communities, especially those whose industrial base depends upon timber. In the east portion of the Dixie's ZOI this steady flow of timber exerts a stabilizing influence in dependent communities which include Panguitch, Tropic, Henrieville, Cannonville, Escalante, and Bicknell.

Timber from the National Forests is vital to meeting the homebuilding industry's needs for lumber. On an average, 25 percent of softwood sawtimber used in homebuilding is supplied from the National Forests. Typically, timber increases in "value added" several times between the stump and delivery of the finished product to the final consumer. That is, even "below cost" timber sales generate additional economic activity. These additional benefits must be taken into consideration in managing the National Forest timber sale program.

c. Unavoidable Adverse Effects

Soil disturbance as a part of road construction for access to timber harvest areas temporarily increases sedimentation in streams. The amount of soil disturbance varies depending upon the miles of road constructed or reconstructed.

Timber volume would be foregone on at least some steep slopes (over 40 percent) in all Alternatives. The Constrained Budget Alternative would harvest no timber harvest on slopes over 40 percent. The Market Emphasis, Composite, Current Program, High Productivity and RPA 80 alternatives would allow varying amounts of cable logging on steep slopes.

Some volume would be lost to insects and diseases in all alternatives but these losses would be considerably less in the Market Emphasis alternative.

Under all alternatives, dust raised by logging trucks would degrade air quality temporarily and locally wildlife could be disturbed temporarily by logging traffic.

Slash burning for hazard reduction and site preparation would cause temporary and local reduction of air quality.

d. Short-term Uses vs. Long-Term Productivity

Timber harvesting practices would maintain the long-term productivity of the land under all alternatives. Productivity of the timber resource would be highest under the Market Emphasis Alternative and lowest under the Constrained Budget Alternative. Timber harvesting would not affect State water quality standards. Site productivity (soil loss), wildlife habitat, visual qualities, or any other resource value would not be reduced to unacceptable levels in any alternative.

e. Irreversible and Irretrievable Commitment of Resources

Building roads into areas included in the timber harvest base (available and suitable acres) would be an irreversible commitment of a resource because of the long time required for roaded areas to revert to an undisturbed appearance. All alternatives would call for road building to access previously unharvested timber, and would, therefore, irreversibly commit those unroaded areas to becoming roaded.

The decision to manage areas without harvesting productive timber (in all alternatives) would result in an irretrievable loss of timber production. These areas include varying amounts of suitable acres on slopes over 40 percent in all alternatives.

6. Water

a. Probable Effects of Implementing Alternatives (Direct Effect)

Water Quantity. The current average water yield from watersheds on the Dixie National Forest is 481,000 acre feet. This is the lowest water yield of any Forest in the Intermountain Region. The potential to significantly increase

long-term water yield across the Forest is very limited. A maximum increase of less than 2 percent is postulated through the use of vegetation manipulation - primarily timber harvest. Since the harvested lands will be regenerated to provide for future fiber production, the induced water yield increase associated with any particular project will eventually decline toward pre-project levels. The postulated maximum possible increase declines to less than a 1 percent increase when figured over the rotation age of the timber stands. The water yield figures in Table IV-19 represent the projected actual water yield increases over natural levels for each given year. These figures include increases already induced by previous timber harvest activities. This existing increase over natural levels amounts to 2,900 ac-ft. The average increase over the current water yield for the 50 year planning period varies from 2,400 acre-feet for the Non-Market Alternative to 4,400 acre-feet in the RPA-80 alternative. These figures represent a 0.5 percent and 0.9 percent increase, respectively, over existing levels. Of the projected increases in water yield, approximately 26 to 33 percent would occur in the Colorado River Basin depending on the alternative (Table IV-20). The remainder would occur in the Great Basin. (For a more detailed discussion of projected water yield figures, see Appendix B.)

TABLE IV-19
WATER YIELD OVER NATURAL LEVELS
(M Acre Feet) - Forest-Wide

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	4.3	8.3	8.1	6.7	6.0
Current Budget	4.8	7.6	6.9	7.0	7.0
Constrained Budget	4.6	6.0	5.2	5.2	6.4
Market	5.5	7.7	7.3	7.3	8.0
Non-Market	3.9	5.7	5.6	5.7	5.4
RPA-80	5.1	9.7	8.0	6.3	7.5
High Productivity	4.4	9.06	7.3	6.0	7.4
Composite	4.3	8.3	8.1	6.7	6.0

TABLE IV-20
WATER YIELD OVER NATURAL LEVELS
(M Acre Feet) - Colorado River Basin

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	1.2	2.7	2.6	2.1	1.9
Current Budget	1.1	2.0	2.0	2.2	2.5
Constrained Budget	1.2	1.6	1.3	1.6	2.2
Market	1.4	2.0	2.1	2.4	2.9
Non-Market	0.9	1.4	1.4	1.6	1.9
RPA-80	1.3	3.3	2.7	1.9	2.6
High Productivity	1.1	2.7	2.1	1.8	2.7
Composite	1.2	2.7	2.6	2.1	1.9

Although increases in water yield are generally viewed as a positive result, there are areas on the Dixie NF where the benefits of increased water yield are outweighed by its negative impacts. Prime examples are the East Fork of the Sevier River drainages. The East Fork and several of its tributaries have very unstable streambanks. A significant increase in water yield in these drainages could further destabilize the channels resulting in increased erosion. Minimum management restrictions and standards and guidelines designed to prevent significant water yield increases in the East Fork of the Sevier drainages were incorporated in each of the alternatives.

Water Quality. No violations of State water quality standards are foreseen for any of the alternatives. No point sources of pollution to surface waters are anticipated in any alternative. Non-point sources of sediment will be controlled to the extent feasible through implementation of best management practices identified in the Forest Plan and in individual project plans. All alternatives should comply with regulations of the State of Utah regarding "anti-degradation" stream reaches. However, there would be variations in general water quality over time and between alternatives. All of the alternatives would present some degradation of water quality as a result of increased sedimentation by the 2nd decade. This would be due to the need to harvest timber stands on steeper slopes, on more erosive soils, and on more difficult to access areas. Although measures would be taken to minimize erosion, an overall increase in sedimentation would occur, even in those alternatives with high budget levels. In the Non-Market Alternative the increase should be more than offset by reductions in erosion on rangelands, improvement in riparian area condition, and improved streambank stability. This would be accomplished by reductions in livestock numbers and more intensive management of livestock in riparian areas. The Constrained Budget and Current Budget Alternatives would result in increased sediment production from rangelands and riparian areas despite declines in livestock numbers. Reduced service levels of livestock management would be responsible for the declining conditions. The high range level alternatives, especially the High Productivity Alternative, could show significant increases in sedimentation from rangelands.

It is assumed that the eutrophication* problems in Panguitch Lake would be addressed by a coordinated multi-agency lake rehabilitation program. We assume that this program would be successful in improving or at least arresting the decline in water quality conditions. However, the Constrained Budget Alternative would not allow the Forest Service to sustain a pivotal role in the rehabilitation effort. Consequently, water quality parameters in the lake would improve at a slower pace than in other alternatives and not reach State standards until after the 50 year planning horizon. This situation is reflected in Table IV-21 which presents the Forest's ability to meet State water quality standards. The two percent of water yield not meeting State standards is that amount in the Panguitch Creek watershed.

TABLE IV-21
WATER YIELD MEETING STATE
WATER QUALITY STANDARDS (Percent)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	98	98	98	100	100
Current Budget	98	98	98	100	100
Constrained Budget	98	98	98	98	98
Market	98	98	98	100	100
Non Market	98	98	98	100	100
RPA-80	98	98	98	100	100
High Productivity	98	98	98	100	100
Composite	98	98	98	100	100

Flood Prone Areas. None of the alternatives would have a significant impact on flood potential on the Forest.

Water Uses and Facilities. Most of the dams and water transmission facilities that would be on the Forest by the end of the planning period are probably already in place. This would not change by alternative. There would be some additional diversions on the Forest under all alternatives. These would generally be small in scale and would allow for instream flow needs to maintain fisheries, riparian ecosystems and stream channel stability. However, under the Market Emphasis Alternative, there would be some loss of riparian ecosystems. This would be due to new water diversions where values associated with off-Forest water development would be favored over riparian and fisheries value. All alternatives would allow for correction of the existing erosion problems associated with water transmission facilities.

Consumptive water uses for management purposes would increase slightly in all alternatives. This increase would be greatest in the Market Emphasis Alternative, due to increases in the number of developed recreation sites and in the number of permitted livestock.

Riparian Area Condition. Riparian area acreage should remain nearly static in all but the Market Emphasis Alternative. There would be some loss of riparian ecosystem in this alternative, due to new permitted diversions which would dry up some stream reaches. The condition of riparian ecosystems should remain static or improve in all of the alternatives except Constrained Budget, Current Budget, 1980 RPA, and High Productivity. In these alternatives, reduced livestock management levels or more intensive use of riparian areas by livestock would cause some noticeable declines in riparian ecosystem condition.

Effects on Other Resources (Indirect Effects). The watershed program would have a beneficial impact on other resources in all alternatives. (See Soils Section of this Chapter.)

c. Adverse Environmental Effects That Cannot be Avoided

There are no unavoidable adverse environment effects of the watershed program in any alternative.

d. Short-Term Uses versus Long-Term Productivity

(See Soils Section of this Chapter.)

e. Irretrievable and Irreversible Commitment of Resources

(See Soils Section of this Chapter.)

7. Minerals

a. Direct and Indirect Environmental Effects

Demand for access to National Forest System lands for the purposes of mineral exploration and development is expected to increase over the long term. Most National Forest System lands are available for mineral activities, and requests for access must be processed in an efficient, timely, and cooperative manner. Proposals involving mineral activities are processed as prescribed by applicable laws, regulations, policies and interagency agreements. (See Minerals in the AMS of the Forest Plan for more details.)

Management requirements for minerals are based on statutory and regulatory direction for locatable, leasable, and saleable minerals. Also considered are statutory and other management criteria for surface protection appropriate to the lands involved to prevent or control adverse environmental impacts. The mineral-related management requirements are presented in three categories to cover environmental impacts typically associated with exploration and development operations for the various mineral commodities.

The first category is Mining Law Compliance and Administration for locatable minerals. Access to lands open to operations under the General Mining Laws is a statutory right granted by Congress. The Forest Service reviews proposed plans of operations to ensure that operations will meet Federal environmental protection standards. These standards include those for air and water as prescribed by Federal and State laws and regulations. In addition, the plan of operation must provide for prompt reclamation and restoration of disturbed lands, to the degree practicable, for the planned uses of the area. Mineral activity on mining claims is not expected to vary significantly between alternatives.

The remaining two categories are leasable minerals and saleable minerals. For these two categories, reasonable access to Forest lands is also guaranteed once the discretionary decision is made to issue a lease, permit, or license allowing surface use and occupancy. Permits are issued by the Forest Service for initial geophysical prospecting (seismic operations for oil and gas, shallow drilling for geothermal temperature gradient measurement, and geologic investigations for solid minerals). Permits are for the land uses only and grant no rights to the permittees to the minerals involved. The Forest Service has total discretion for disposal of common (saleable) varieties of mineral materials. The BLM issues all other leases, licenses, or permits for exploratory drilling and production of valuable leasable minerals.

BLM proposals to issue a license, permit, or lease for leasable minerals in National Forest System lands are forwarded to the Forest Service asking whether or not the lands are available for mineral exploration and development. If the lands are determined by the Forest Service to be available, standard and special stipulations necessary for the management of the surface resources are identified. Management direction for leasable minerals as to availability ("lease" or "no lease"), and surface resource management requirements are identified through the NEPA process by the National Forest.

Recommendations as to availability of lands for mineral leasing are based on whether development activities of the leasable mineral could be implemented on National Forest System land and still meet the management requirements for minerals in the Forest Plan. Those mineral management requirements reflect surface resource protection and restoration needs.

Secondary mineral processing, other than concentration (milling), and energy conversion facilities will be prohibited in wilderness. Special areas, such as research natural areas and cultural resource areas, can only be recommended for leasing without surface occupancy since disturbance of the surface resources would damage the special characteristics of the land for which they were classified.

One of the main directives in the Forest Service Regional Guide for the Intermountain Region (dated January 1984), concerning minerals, is that a maximum land base be provided for minerals/energy prospecting, leasing, and development through conservative use of withdrawal authority, use of overly restrictive surface use stipulations, and constraining management direction.

A formal review of existing withdrawals will be conducted by the Forest between 1985 and 1988. The result may be more National Forest land made available for entry under the mining laws.

Minerals activity and oil and gas production would remain about constant through the planning period under all alternatives. Coal production would begin on a modest scale about the second decade and gradually increase until the end of the planning period. Regional direction for licenses, leases, permits, etc., would be met under all alternatives. There would be significant problems for management and industry under the Constrained Alternative. More disturbed area would occur under the RPA 80 and High Productivity Alternatives, in that order.

b. Effects on Other Resources

Oil, gas, coal, and geothermal resource exploration and development involve the construction and use of roads, pipelines, drill pads, and the ancillary facilities necessary for development, production, and transportation. The major on-site physical and biological impacts of these activities are soil erosion, water pollution, and air pollution.

Other mineral and mineral materials exploration, development, and production would also have impacts associated with the construction and use of roads, powerlines, and other necessary ancillary facilities, overburden and waste removal and placement for surface or underground mining, and concentrating mills. The major potential on-site physical and biological environmental impacts of these activities would be soil erosion and air and water pollution.

Should operations be approved in wilderness, there would be impacts upon the wilderness characteristics of solitude and on the pristine character of the land. The impact on solitude would be limited to the duration of the mineral exploration and development activities. The duration of the impact upon the pristine character of the lands would last until natural vegetation and appearance are restored. There are existing oil and gas leases in all three newly established wildernesses. Exploration and development of the leased

areas on the Escalante Anticline, in and around the Box-Death Hollow Wilderness, appears imminent at this writing. The effect would be the same under all alternatives, except a constrained budget could seriously hamper minerals management of this sensitive area.

Some adverse impacts can be expected from minerals exploration, regardless of the alternative implemented but the RPA 80 and High Productivity Alternatives would generate the most disturbed acreage. These impacts may include road or trail construction for access to valid claims, vegetation disturbance during exploration or development, degraded air quality, reduced water quality, and wildlife disturbance. Environmental assessments for specific projects would consider the protection of surface resources and would be tiered to the proposed Plan and Final EIS.

Positive impacts include the fact that local roads are currently being constructed primarily in conjunction with timber and mineral resource activities. These local roads access areas that are compatible with multiple resource and management uses. Roads are also discussed in the Facilities section of this chapter.

A federal mineral leasing charge is assessed on oil and gas leases. Fifty percent of this money is paid to the State and redistributed to county and local governments. Minerals exploration and development provides primary and secondary employment to the local and regional economy.

Operating plans would include provisions to minimize adverse environmental impacts on surface resources in all alternatives. The requirements for air quality, water quality, solid waste disposal, scenic values, fisheries and wildlife habitat, roads, and reclamation would also be incorporated. Reasonable conditions for protection would be imposed.

c. Irreversible and Irretrievable Commitments of Resources

Implementation of the RPA 80, Market and High Productivity Alternatives would result in the most irreversible and irretrievable commitments of resources because of increased activity. The Composite Alternative commits less than those listed above, and the Current, Constrained, Current Budget and Non-Market Alternatives commit the least.

Extraction of mineral or energy resources is itself an irreversible and irretrievable commitment. Removal of mineral resources is permanent. Once removed, minerals cannot be replaced.

Major soil loss due to erosion or mass soil movement is an irreversible degradation of productivity. Soils with high erosion potential and steep slopes should be avoided.

Should a wildlife or fish population be lost due to cumulative impacts, the action may be irreversible. If suitable habitat can be restored, the loss may be mitigated by transplanting from other populations.

Capital improvements to communities to accommodate increased populations are irretrievable commitments.

Major mineral activity in wilderness could cause the irreversible loss of the wilderness resource.

Loss of a cultural resource site due to mineral activity is irreversible.

Mineral impacts to vegetation, visual conditions, and recreation opportunities are not expected to be irreversible or irretrievable.

d. Unavoidable Adverse Effects

Most mineral or energy developments require an access road and are likely to involve some site excavation. Road construction and the potential for some unwanted travel may cause impacts that cannot be avoided. The impacts of road construction and development excavation cannot be avoided, but most of them can be adequately mitigated. The types of impacts are much the same for all alternatives, but their severity is determined by the amount of activity. The noise, visual impact, and dust of mineral activity cannot be avoided but is usually temporary. Soil would be disturbed. If disturbances are on highly sensitive soils, they may erode and be lost from the site. Most mineral activity requires the clearing of vegetation and removal of soil, loss of livestock forage, and wildlife habitat. Impacts to water that cannot be avoided include minor increases in runoff from cleared areas and increased sediment. These cannot be totally mitigated. The likelihood of oil or other pollutants spilling may be reduced by a well-devised spill plan. Most adverse impacts on wildlife and fish habitat can be mitigated or accommodated by the animals' adaptability, but vegetation clearing, sedimentation, and disturbance create some adverse impacts. Usually this impact can be avoided on key wildlife habitats such as elk calving areas.

Mineral activity would change recreation opportunities and may cause unavoidable impacts to cultural resources. Mineral activity in wilderness unavoidably impacts that resource temporarily and permanently.

Social effects on local communities follow increased mineral and energy development.

e. Short-Term Uses versus Long-Term Productivity

Impacts of mineral and energy development are usually short-term because adequate technology and planning safeguards exist to return disturbed sites to their former productivity. The mineral extraction process is a short-term activity, however, once removed, minerals cannot be replaced.

Land Ownership and Leasing. Leases are issued for 10 years or a short-term, but mineral claims are long-term commitments and can result in a land patent and transfer of land to private ownership.

Vegetation Resource. Most vegetational cover can be rehabilitated in a short time, but sensitive species with small localized populations may be lost permanently. Removal of sensitive types of vegetation would have a long-term adverse effect, especially in high alpine zones.

Soil Resource. If vegetation is removed from a high precipitation area, serious soil erosion may result. Exposure of highly sensitive soils can result in erosion or mass soil movement. This would be a long-term effect because it would take many years to replace the soil.

Hydrology and Water Quality. A minor increase in runoff is expected under any alternative. This runoff may add sediment to the streams, a short-term effect. There is a slight chance of an oil or chemical spill, which could have a long-term effect. Both effects can be held to a minimum if proper procedures are followed.

Cultural Resources. These resources are not expected to be affected unless an unintentional disturbance occurs. If unintentionally disturbed, damage would be a long-term effect.

Wilderness/Primitive Area Impacts. Where development is allowed, wilderness values would be lost until such time as natural conditions could be restored. This would be a long-term or permanent effect.

Wildlife and Fish Habitat. Most impacts on wildlife and fish are short-term. Site rehabilitation can usually restore the long-term productivity of these habitats. If cumulative impacts create loss of wildlife or fish populations, the impact would be long-term.

Recreation. Noise, air pollution, and visual intrusion create short-term impacts that cease to exist following termination of the activity. Impacts on recreation opportunities are generally short-term unless roads remain open which alters the type of recreation opportunities available over the longer-term.

Range. Impacts on livestock operations are short-term and insignificant.

Social. Change brought by mineral development usually creates short-term, but abrupt impacts to establish social regimes. Communities then gradually adjust over a period of time followed by long-term suitability until the end of mineral production which again causes a short-term abrupt social change. This social phenomenon is generally referred to as "boom-bust".

8. Human and Community Development

Human resource programs on the Forest are affected more by the budgetary restrictions of other agencies than the resource management alternative selected. Implementation of any alternative provides an opportunity to contribute to human and community development programs. These include activities that provide youth with resource conservation work and related learning experiences. Examples of these activities include the Youth Conservation Corps (YCC) and the Young Adult Conservation Corps (YACC). Adult employment and training programs, such as the Senior Community Service Employment Program (SCSEP) and the Comprehensive Employment Training Act (CETA), are also provided. These programs help ensure equal employment opportunities for women, minorities, the elderly, and the handicapped.

9. Lands

a. Probable Effects of Alternatives

Management efficiency will improve with land adjustment for all program and activity supporting alternatives. All of these alternatives function effectively with a minimum of conflict and impact (with other resource practices). The exception to this statement involves the Constrained and Current Budget Alternatives which do not offer program support (at an accomplishment level) longer than the first decade of the analysis period.

Rights-of-way activities will benefit various resources at levels directly dependent upon respective alternative funding levels. All alternatives create little or no impact except for the Constrained and Current Budget Alternatives which offer minimal program support beyond the end of the initial decade of the analysis period.

Occupancy trespass, title claims, and Small Tracts Act activities are functional to landline location program activities. These activities are influenced directly by funding. The Constrained and Current Budget Alternatives would not offer adequate funding after the first decade. In all alternatives exhibiting reduced funding, land disturbance and associated impacts would increase in frequency and severity. The nature of these impacts is one of conflict and would, in most likelihood, be difficult to mitigate.

Demand for special use permits, including those for small hydropower projects, is anticipated to remain the same under all alternatives, but administration of existing permits and evaluation of new applications would vary according to funding levels inherent with each alternative. The level of impact is a function of this influence. The quantity and quality of permit processing and adjustments, inspections, and fee adjustments would be impacted the most by constrained funding under the Constrained and Current Budget Alternatives while the High Productivity Alternative offers the least constraint. Support levels to special use administration would determine the intensity of resource impacts.

All alternatives would affect the administration of the interchange program, but not to levels causing significant impacts to Forest resources.

b. Unavoidable Adverse Effects

Land adjustment activities under constrained funding level alternatives do not meet demand. This would create varying levels of adverse impacts to water, soil, wildlife, and recreation resources both on and adjacent to the Forest.

Utility and nonrecreational special use construction and operation would disturb vegetation and soils. Scenic qualities might be altered and other uses of National Forest system lands may be adversely impacted at various levels on a site-specific basis. The greatest potential for these impacts exists under the Constrained and Current Budget Alternatives. Alternatives C and D could result in inadequate administration, thereby causing increased trespass related impacts on water, soil, wildlife, and recreation resources.

c. Short-Term Uses versus Long-Term Productivity

Most land activities have the same short-term and long-term impacts, once any construction phase is completed. This would be true for land adjustment and rights-of-way.

Special uses have mixed effects. Some, such as the "construction of a storage permit" have short-term effects and some, such as a "power line permit" have long-term. The long-term use permit is predominate in the special use program.

d. Irreversible and Irretrievable Commitment of Resources

Land adjustment activities are normally an irretrievable action. The need for the offered land, in most cases, is tied to long-term Forest needs and objectives, seldom would that land, once received, become land available for trade. In contrast, often the selected land once traded is put to uses (expansion of a subdivision area, for example) that are incompatible with National Forest use.

Rights-of-way activities are normally long-term if not irretrievable. Very few temporary road or easements occur in this program. Rights-of-way needs originate from long-term road system objectives or trail and/or trailhead needs.

Occupancy trespass, title claims, and Small Tracts Act activities that are carried to the point of conveyance take on the same characteristics as discussed in the land adjustment statement above.

Special use activities in most cases are long-term, but usually are not irreversible and/or irretrievable. There are, of course, some that come very close to that status (road permits, for example).

There may be some small scale hydropower facilities utilizing streams on the Forest during the planning period in all alternatives.

e. Research Natural Areas

All of the alternatives would designate establishment of three new research natural areas.

Short Term Uses vs. Long Term Productivity. Designation of Research Natural Areas is a long-term commitment, but does not reduce productivity.

Irreversible and Irretrievable Commitment of Resources. Designation of Research Natural Areas is reversible. However, alteration of natural areas by human activities often is not reversible from a scientific perspective. Once natural ecosystems are unnaturally altered, their value as a scientific baseline is diminished.

10. Soil

1. Probable Effects of Implementing Alternatives (Direct Effects)

a. Watershed Condition

Watershed condition is a measure of soil productivity, hydrologic condition and water quality. The condition of the watershed may be rated as maintained, improved, or declining.

Improved watershed condition is the result of watershed improvement projects. Both declining and maintained watershed condition acres may be improved. Watershed improvement projects decrease soil erosion, improve water quality and maintain or improve site productivity.

Declining watershed condition are acres of land that are continuing to decline in watershed condition or soil productivity due to past management activities or natural disaster. At the start of the planning period for all alternatives there are 725 acres of large size projects and 1515 acres of smaller projects that require watershed restoration. In addition there are 110,000 acres of poor condition range, which are not back to their potential yet. Table IV-25 shows by alternative the acres of (1) soil and water resource improvement, (2) maintained watershed condition, and (3) declining watershed condition.

Under the Non Market Emphasis and Composite Alternatives, aggressive action would be taken to treat the backlog watershed restoration acres. The large projects would be completed by 1993 and the smaller projects by 2009. In addition, under the Non-Market Alternative the reduced number of AUM's, fencing of selected riparian areas and better livestock distribution would result in improving the poor condition range to fair or better condition. The overall results of the alternative would be no declining watershed condition acres by the end of the planning period.

Under the 1980 RPA Alternative, aggressive action would be taken to treat the backlog watershed restoration acres. Treatment would be completed on both the large and small scale projects by 2004. However, the increase in grazing numbers would result in the poor condition range remaining in poor condition. There would be significant acreage in declining watershed condition by the end of the planning period.

Under the High Productivity and the Market Emphasis Alternative, moderate action would be taken to treat the watershed restoration backlog. The large projects would be completed by 2001 and the smaller projects by 2021. In addition, 16 acres per year would be treated with K.V. funds in timber related projects. These alternatives would have a significant increase in livestock numbers and timber outputs. Poor condition range would not be improved under these alternatives and additional acres of forest and range land would decline in watershed condition. There would be a significant acreage in declining watershed condition by the end of the planning period.

Under the Constrained Budget Alternative, only the small watershed restoration backlog acres would be treated. The larger project acres would remain untreated and continue to degrade. Also, funds would not be available to

improve poor condition range to fair or better condition. The end result would be the highest amount of acres in declining watershed condition by the end of the planning period of all the alternatives.

Watershed restoration on the backlog acres would progress at moderate rates under the Current Program Alternative. The larger projects would be completed by 2001 and the smaller projects by 2021. Most of the poor condition range would be improved to fair or better condition by the end of the planning period.

Under the Current Budget alternative, the larger watershed backlog acres would be treated by 2004, however, the smaller projects would not be completed within the planning period. Livestock numbers and timber harvest would be reduced under this alternative. Approximately one-half of the poor condition range would be improved to fair or better condition by the end of the planning period.

TABLE IV-22
SOIL AND WATER RESOURCE IMPROVEMENT
(Acres)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	51	63	80	63	38
Current Budget	43	46	68	68	47
Constrained Budget	33	33	33	33	33
Market	63	75	92	75	50
Non-Market	85	138	35	20	20
RPA-80	101	162	39	19	19
High Productivity	63	75	92	75	50
Composite	85	138	35	20	20

TABLE IV-22 (Con't)
MAINTAINED WATERSHED CONDITION
(Acres)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	1,780,543	1,803,191	1,825,963	1,848,756	1,870,937
Current Budget	1,775,665	1,786,048	1,796,546	1,807,175	1,817,721
Constrained Budget	1,771,619	1,771,899	1,772,179	1,772,459	1,772,739
Market	1,771,659	1,772,137	1,772,755	1,773,400	1,773,843
Non Market	1,783,835	1,814,872	1,845,805	1,872,130	1,884,423
RPA-80	1,771,862	1,773,016	1,774,034	1,774,350	1,774,730
High Prod.	1,771,610	1,771,988	1,772,506	1,773,053	1,772,898
Composite	1,780,543	1,803,191	1,825,963	1,848,756	1,870,937

TABLE IV-22 (Con't)
DECLINING WATERSHED CONDITION
(Acres)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	101,651	78,991	56,206	33,421	11,260
Current Budget	107,761	97,366	86,846	76,216	65,691
Constrained Budget	112,811	112,531	112,251	111,971	111,691
Market	112,736	112,246	111,611	110,976	110,551
Non Market	97,539	66,449	35,609	10,223	0
RPA-80	112,496	111,281	110,376	110,041	109,661
High Prod.	112,786	112,396	111,861	111,326	111,501
Composite	101,311	77,901	55,566	33,211	11,250

b. Soil Erosion

On the Dixie National Forest, natural soil erosion rates are very high due to a significant amount of erosive geologic formations such as the Navajo sandstone and Wasatch limestone. The erosive features that characterize Zion National Park, Cedar Breaks National Monument and Bryce Canyon National Park were formed in these formations. It was determined that measuring sediment would have little value as an environmental indicator of Forest land management due to the very high background levels in the streams as they leave the Forest. Instead, on-site soil erosion was chosen as the measure. On-site soil erosion is a measure of site productivity.

For the alternatives evaluated, on-site soil erosion over natural levels was used to measure the difference in site productivity. Table IV-25 shows by alternative the on-site soil erosion over natural levels. Minimum management requirements and standards and guidelines have been developed for all the alternatives to ensure that long-term soil productivity is protected. The minimum management requirements can be found in Appendix B of the EIS. Standards and guidelines are found in the prescriptions in the Forest Plan.

Logging and associated road construction are the major earth disturbing activities on the Dixie National Forest. All alternatives have the greatest amount of on-site soil erosion over natural levels from available, capable and suitable forest lands in the first two decades. On-site soil erosion decreases significantly in the latter three decades. On the average, for the planning period, the Non-Market and Constrained Budget Alternatives have the least amount of erosion while the RPA 80 and High Productivity Alternatives have the greatest amount.

TABLE IV-23
ON-SITE SOIL EROSION (M TONS)
OVER NATURAL LEVELS

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	19.4	20.9	12.2	10.4	8.2
Current Budget	23.3	18.7	12.8	7.9	7.1
Constrained Budget	19.3	15.	8.1	6.7	7.2
Market	25.9	18.2	12.4	8.0	8.4
Non-Market	17.0	12.6	8.0	5.0	4.4
RPA-80	28.7	22.0	11.4	8.7	8.5
High Productivity	31.2	21.3	10.1	8.2	8.0
Composite	19.4	20.9	12.2	10.4	8.2

c. Soil Productivity

Long-term soil productivity is an indicator derived from soil horizon loss/productivity relationship measured as a percentage of Forest and rangeland productivity in relation to sustained full production potential.

Acres not maintaining long-term soil productivity are the sum of (1) acres identified as part of the soil and water resource improvement backlog, (2) acres permanently taken out of productivity such as, roads, facilities, etc., and (3) acres where established soil loss tolerance values are exceeded. Acres in declining watershed condition are assumed to be exceeding soil loss tolerance values.

Based on the emphasis of the various alternatives, there would be differences in amount of watershed restoration acres treated, differences in acres of declining watershed condition, and differences in amount of acres taken out of production of roads, etc.

TABLE IV-24
SOIL PRODUCTIVITY MAINTAINED
(Percent)

Alternative	Decade				
	1990	2000	2010	2020	2030
Current Program	93.8	95.0	96.1	97.2	98.3
Current Budget	93.5	94.0	94.5	95.0	95.5
Constrained Budget	93.3	93.3	93.2	93.2	93.2
Market	93.2	93.2	93.2	93.1	93.0
Non Market	94.1	95.6	97.2	98.5	99.0
RPA-80	93.2	93.2	93.2	93.2	93.1
High Productivity	93.2	93.2	93.2	93.1	93.0
Composite	93.8	95.0	96.1	97.2	98.3

2. Effects on Other Resources (Indirect Effects)

Soil and water restoration is the major project in the soil and water program that would have an effect on other resources. Soil and water restoration projects would have a beneficial effect on other resources such as, timber and range from the standpoint of increasing productivity, maintaining soil stability and decreasing erosion and sedimentation. There would be a beneficial effect on the wildlife and fish resource from the standpoint of improving streambed stability and riparian ecosystem condition. Silt reduction and improved water quality and flow conditions would improve fish spawning habitat.

The amount of beneficial effect would vary by alternative with the amount of soil and water resource improvement that would be accomplished.

Watershed support to other resource elements in the environmental analysis and assessment process would have a beneficial effect from the standpoint of resource protection. Except for the Constrained Budget Alternative, the alternatives provide a sufficient amount of watershed management support to the other resources. This could be used to identify mitigating requirements for resource protection.

3. Adverse Environmental Effects that Cannot be Avoided

There are no adverse environmental effects of the watershed program on other resources. Some alternatives (Constrained Budget and Current Budget) are slower than others in treating the backlog of watershed acres needing

treatment. These untreated areas would continue to erode until treated. The resulting erosion, sediment, and loss of soil productivity are adverse environmental effects that cannot be avoided.

4. Short-Term Uses vs. Long-Term Productivity

Soil and water resource improvement projects would improve long-term productivity by reducing on-site soil erosion and sedimentation, improving streambank stability and improving water quality. Treated areas would be returned to producing resource outputs such as, livestock and wildlife forage of wood fiber.

5. Irretrievable and Irreversible Commitment of Resources

Except for large scale watershed rehabilitation structures, there would be no significant irretrievable and irreversible commitment of resources. Only the structure itself such as, rock gabions, etc., would take any lands out of production. Most watershed restoration projects would result in the entire treated area returned to production.

11. Facilities

a. Probable Impacts of Implementing Alternatives

Administrative Sites and Buildings. Current Program, Current Budget and Composite alternatives do not include an adequate program for the repair and maintenance of buildings. Under these alternatives, buildings would be minimally maintained. Due to a lack of preventive maintenance, the condition of facilities would continue to decline, requiring premature replacement.

Non-Market Emphasis, Market Emphasis, Market Emphasis with Timber Departure, 1980 RPA Program, and High Productivity Program alternatives include programs for preventive maintenance and repair that would increase site usefulness and prolong life.

The Constrained Budget alternative program would reduce the number of buildings substantially. The buildings left would be very minimally maintained with no preventive maintenance. Buildings would deteriorate, their function would be lost, and the capital investment would be lost.

Transportation. Under the Current Budget, Current Program and Composite alternatives, the road system would be maintained as it is now. That is, one-fifth of the road system would be maintained each year. Roads would be maintained on a priority basis depending on use. Arterial and collector roads would be minimally maintained to handle traffic volumes. Signing of roads would not be up-to-date. Local roads would be maintained to Level 2. Arterial and collector roads would gradually deteriorate. Local roads would deteriorate, become unsafe, and contribute to resource damage. As local roads become impassable, they would be closed, or new routes could be pioneered by users and use would be limited to four-wheel drive vehicles.

Under the Constrained Budget alternative, only roads absolutely essential for Forest activities would be maintained. These roads would be minimally maintained and would gradually deteriorate. Signing on these roads would be provided only where absolutely essential for the safety of the users. All other roads not used would not be maintained. These roads would deteriorate, become unsafe, and contribute to resource damage.

The Non-Market Emphasis, Market Emphasis, 1980 RPA Program, and High Productivity alternatives would develop and maintain an efficient, safe and

environmentally sound arterial and collector road system. Local roads would be maintained at Level 1 if open and Level 2 or 3 depending on uses. Arterial and collector roads would be reconstructed on a continuing basis.

Under the Current Program and Current Budget, bridges would receive minimal maintenance. The six bridges that do not meet Utah State Standards would not be replaced. Under the Constrained Budget alternative, bridges would deteriorate and be removed from service. No bridges would be replaced. Under the Non-Market Emphasis, Market Emphasis, Market Emphasis with Timber Departure, RPA 1980 Program, and High Productivity Program, bridges would be adequately maintained and the six sub-standard bridges could be replaced.

TABLE IV-25
PROJECTED OUTPUTS (Miles) OF ROAD MAINTENANCE
AND CONSTRUCTION AND RECONSTRUCTION OF COLLECTOR
AND LOCAL ROADS BY ALTERNATIVES
AND SELECTED YEARS, 1985-2030

Road Maintenance (Miles)

Alternative	1985	1986	1988	1990	2000	2010	2020	2030
Current Program	2170	2215	2305	2427	2635	2771	2951	3173
Current Budget	2170	2215	2305	2427	2635	2771	2951	3173
Const. Budget	2123	2161	2196	1579	1604	1616	1628	1643
Market	2170	2214	2303	2423	2667	2827	2976	3131
Non-Market	2160	2194	2261	2359	2591	2740	2891	3040
RPA-80	2170	2215	2305	2427	2688	2832	3020	3253
High Prod.	2170	2215	2305	2427	2635	2773	2951	3175
Composite	2170	2215	2305	2444	2689	2857	3069	3327

Collector Road Construction & Reconstruction

Alternative	1985	1986	1988	1990	2000	2010	2020	2030
Current Program	1	4	12	2	1	1	1	1
Current Budget	1	4	12	2	1	1	1	1
Const. Budget	1	3	11	1	0	0	0	0
Market	1	4	12	2	1	1	1	1
Non-Market	1	4	12	2	1	1	1	1
RPA-80	1	4	12	2	1	1	1	1
High Prod.	1	4	12	2	1	1	1	1
Composite	1	4	12	2	1	1	1	1

Local Road Construction & Reconstruction

Alternative	1985	1986	1988	1990	2000	2010	2020	2030
Current Program	45	45	45	28/32	18/34	15/21	11/22	7/22
Current Budget	45	45	45	28/22	18/34	15/21	11/22	7/22
Const. Budget	18	18	18	15/33	18/23	17/15	17/13	10/16
Market	44	44	44	15/38	28/26	20/17	12/20	6/25
Non-Market	34	34	34	11/31	19/19	11/15	7/18	5/18
RPA-80	45	45	45	17/40	27/27	24/17	9/26	5/28
High Prod.	45	45	45	24/46	28/25	15/27	9/30	5/28
Composite	48	48	48	31/55	28/25	134/22	5/26	5/27

Dams and Canals. Dams would be routinely inspected and maintained under the Current Program, Composite, Current Budget, Non-Market Emphasis, Market Emphasis, 1980 RPA Program, and High Productivity alternatives. Under the Constrained Budget alternative, maintenance would be provided only to correct serious safety items. Under this alternative, dams would deteriorate and be taken out of service by breaching. The impact of this action is loss of use and loss of return on capital investment.

All canals on the Dixie National Forest are owned and maintained by special use permittees. Maintenance on the canals would be carried out by the special use permittees, regardless of alternative.

Energy Transportation and Utility Corridors/Windows. The potential corridors/windows as listed in Chapter III, would not change by alternative.

These corridors/windows are identified as follows, with types of utilities suitable to each and width of the corridor/window area shown:

TABLE IV-26
SUITABLE TYPE OF UTILITY

Corridor/Window	Over-Head	Under-Ground	Over the Surface	Width
<u>Corridors</u>				
1)Utah Power & Light Co. 138 kV X transmission line from Cedar City west substation to St. George, UT, via Newcastle and Central, UT		X		Existing right-of-way width only (50 feet) for portions outside of Newcastle-Veyo Window area.
2)Garkane Power Assn. Inc.'s 69 X kV transmission line from Boulder Hydroelectric Plant to Escalante substation		X		Existing right-of-way width (100 feet).
3)Garkane Power Assn. 69 kV X Transmission Line from Henrie Substation to Escalante Substation.	X	X	X	Part of Johns Valley/Upper Valley/Main Canyon Window of variable width - 0.5 - 15 miles.
4)Intermountain Power Project X 500 kV DC transmission line from Newcastle to Veyo, UT	X	X		Within a window of avail- able width (from 1.0 to 3.0 miles).
5)Utah Power & Light Co. 230 kV X transmission line in South Johns Valley and Cedar Fork		X	X	Within a window of vari- able width (0.5 to 15.0 miles). (Part of Johns Valley/Upper Valley/Main Canyon Window.)

<u>Corridor/Window</u>	<u>Over- Head</u>	<u>Under- Ground</u>	<u>Over the Surface</u>	<u>Width</u>
<u>Corridors</u>				
6)Utah State Road 18, from line, same as 500 kV DC Transmission.				
7)U.S. Highway 89, Long Valley Junction area	X	X		Existing right-of-way width (132 feet). Three separate segments of NF land.
8)Utah State Road 12, from Utah State Road 63 to Escalante, UT. Same as UP&L 230 kV transmission line				
<u>Windows</u>				
9)Newcastle to Vevo, UT	X	X		Variable 1.0 to 3.0 miles.
10)Interstate 15	X	X	X	Variable 0.1 to 1.5 miles.
11)Three Creeks (Two separate segments on NF lands)	X	X	X	0.25 mile.
12)Hillsdale Canyon-Alhstrom Hollow	X	X		Variable 0.25 to 0.5 mile.
13)Johns Valley to Main Canyon via Upper Valley (two segments)	X	X	X	Variable 0.5 to 15.0 miles.
14)Main Canyon to Widtsoe	X	X		Variable 0.5 to 1.0 miles.
15)Escalante, UT to Antimony, UT via Davis Flat Junction	X	X		Variable 0.5 to 6.0 miles.

The principle consequences of energy transportation and utility construction would be adverse effects on soils, water, land stability, and scenery. Another problem associated with this is management of off-road vehicle use on energy transportation and utility rights-of-way.

There would be limited effects to timber, grazing, and mineral resources. Typically, only a few acres would be affected, since rights-of-way would be narrow, resulting in a low acreage per mile of linear facility.

See Appendix D for detailed discussion on types of facilities allowed in corridor/window avoidance areas, and mitigation measures.

b. Unavoidable Adverse Effects

Forest roads can lead to big game disturbance by supporting increased traffic in remote areas. The amount of disturbance varies as to type of road, type of topography, location, and habitat sensitivity.

Road construction and reconstruction would temporarily increase soil movement, but this effect would be reduced as slopes and ditches revegetate and stabilize. Construction and reconstruction of local roads would alter scenic quality. When roads are constructed in semi-primitive, motorized or semi-primitive, nonmotorized the Recreational Opportunity Spectrum (ROS) classification changes to roaded-natural area.

Utility corridor access roads can create disturbances to big game if vehicular useage increases. This impact can be coupled to the attractive browse found in utility corridors. The net impact to big game is yet undetermined. During the construction of the corridors short term would occur, soil movement. The corridors would also decrease the visual quality of an area.

c. Short-Term Use Versus Long-Term Productivity

Roads do not affect long-term productivity of the Forest, because the average road density in timbered areas is only three to four miles per square mile. This means that less than two percent of each square mile is taken out of production.

d. Irreversible and Irretrievable Commitments of Resources

Facilities such as administrative sites (usually buildings) and roads may cause irretrievable resource losses to the immediate area they occupy although they may be removed and restored over time. The success of this reestablishment is a function of technological and budgetary commitment.

12. Protection

a. Fire and Fuels Management

The Level II Fire Analysis will be used as the basis for program levels in all alternatives. The analysis will be maintained annually as necessary to implement the fire management program, and identify changes in forces, activities, and expected outputs.

The purpose of the Level II Analysis is to document the Forest's most efficient fire management program. With minor refinements, the current Level II Analysis is applicable to the Forest's Current Program, Non-market, RPA, Market, and Composite Alternatives.

The number of man-caused fires and acres burned is expected to increase over time due to an increase in the number of Forest users. The resource values lost through wildfire is also expected to increase with an increase in the number and size of fires and the higher values associated with continued resource management and real estate development.

Should Constrained Budget and Current Budget alternatives provide for less than optimum budgeting for initial attack, the result would be larger fires, more

resource damage, and more FFF dollars spent in suppression. For example, fire analysis indicates that reducing the 1978 initial attack budget by 20% (\$34M) increased the acres burned by 432 acres, cost an additional \$23M to suppress, and resulted in \$23M additional unrecoverable timber loss should the net effect of a budget reduction result in a reduced fire program, there would be a loss in economic efficiency and adverse environmental impacts. A long term implication of reduced budget dollars might be an increase in the annual number of fires through a reduction of dollars spent on fire prevention. In addition, a constraint on the dollars spent on fire detection would likely increase fire size upon discovery, and the number of fires that reach large fire status.

Selection of a high timber activity alternative, for example, the Forest's High Productivity or market emphasis alternatives, would increase the capital investment on a significant number of the Forest's acres. An appropriate fire protection response would be to include additional initial attack forces on the Forest to protect these investments, or to reposition initial attack forces to be responsive to changing values.

Current policy calls for fire management strategies to be responsive to direction in the Forest Plan. There may be a conflict between funding levels and the plans desire to implement the most cost effective program based on Level II Fire Management Analysis. If this disparity lasts very long, an adjustment in resource outputs may be necessary due to a loss in productivity.

b. Forest and Rangeland Pest Management

Though the short term grazing capability of the Forest is not expected to change significantly by alternative, the Forest's ability to respond to losses caused by rangeland pests (labops, grasshoppers, Mormon crickets) would change according to funding. Thus, low budget alternatives (ex. Constrained, Current Budget Alternatives) would seriously hamper the Forest's ability to control rangeland pests. Rangeland pests historically have not been considered a significant threat, Forest budget levels at Current Program levels should be sufficient to provide adequate rangeland protection.

Timber losses and control effectiveness for insects and diseases affecting the timber resource would vary by alternative. In general, higher harvest level alternatives, by placing a greater number of acres under management, would provide the most effective control for mountain pine beetle, Douglas-fir beetle, Engelmann spruce beetle, western spruce budworm, and dwarf mistletoe. The higher budget levels associated with these higher harvest alternatives would also provide the most latitude in developing new approaches to insect control problems. More funds would be available to anticipate and plan for potential outbreaks, rather than reacting to existing infestations.

A lack of data on root rots affecting the Forest makes prediction of their impact difficult. Presently, thousands of acres of spruce fir have extensive mortality caused by a bark beetle/root rot complex. Management initiatives and surveys are in progress to assess the extent and significance of the problem, and formulate management direction. The emphasis on timber outputs in the Forest's high production alternatives and the correspondingly higher timber budget levels, ensure that management and control efforts would be more likely to be succeed.

c. Air Quality

Probable Impact of Implementing Alternatives. None of the alternatives would significantly degrade air quality. Uncontrolled wildfire would produce the most air pollution on the Forest. This source is recognized being occasionally unavoidable, relatively short in terms of duration, and constitutes a temporary impact to affected airsheds.

Slash burning produces minor air pollution. Burned areas are scattered throughout the Forest and are burned at different times and under weather conditions favorable for smoke dispersal. Even with slash burning resulting from the larger volume harvested under the Market Emphasis Alternative, the smoke could be dispersed without adverse effect upon the airshed.

The additional vehicle travel under some of the alternatives would add only a very minor volume of additional exhaust fumes and dust to the air. These impacts are temporary and insignificant.

The Air Quality Classification of the Forest would remain as Class II in all alternatives.

Unavoidable Adverse Affects. Under any alternative, smoke from wildfire or slash burning will occasionally accumulate in valley bottoms.

Short-Term vs. Long-Term Effects. None of the short-term uses (wildfire, slash burning, vehicle use) is expected to degrade the quality of the airshed over the Forest over the long term.

Irreversible or Irretrievable Commitment of Resources. None of the alternatives would have any irreversible or irretrievable effect upon the Forest's air quality.

Law Enforcement. The Dixie National Forest user groups include publics from local communities, other Utah cities and communities, and other states. The size of the public drawn to the Dixie, coupled with a population growth in these areas, has resulted in an increased use and on the Dixie National Forest. This increased demand by a variety of Forest users is expected to increase law enforcement activities in all alternatives.

The responsive or "support" nature of law enforcement, coupled with changes in management direction by alternative, makes determination of workloads difficult. However, the nature of the law enforcement needs would shift by alternative. For example, under the Forest Non-Market Alternative, the majority of the law enforcement workload would likely be centered on road closures, campground compliance, and activities associated with dispersed recreation. Under the Market Alternative law enforcement activities would likely shift to permit compliance and administrative related problems. Similar shifts in law enforcement focus might be needed for each of the considered alternatives.

C. ECONOMIC EFFECTS

The planning process specified in the NFMA regulations requires consideration of economic efficiency as a basic principle of planning (36 CFR 219.1(b)(13)), in the formulation of alternatives (36 CFR 219.56(f)(1)(v)), in estimating the effects of alternatives (36 CFR 219.5(g)(9)), and in evaluating the alternatives (36 CFR 219.5(h)).

In addition to the NFMA requirements, the Congressionally revised Resource Planning Act Statement of Policy states that ". . . forest and rangeland, in all ownerships, should be managed to maximize their net social and economic contributions to the Nation's well being, in an environmentally sound manner. . ." Further, "The Secretary of Agriculture shall continue his efforts to evaluate the cost-effectiveness of the renewable resource program."

The main criterion used in the economic efficiency analysis is present net value. It is defined as discounted benefits less discounted costs, including only those outputs that can be assigned monetary values. The optimum alternative is the one that maximizes net public benefits (NPB), defined as the overall value to the nation of all benefits less all associated inputs and costs, regardless of whether or not they can be quantitatively valued.

Examples of such benefits include public safety, visual quality, concern for future generations, and diversity of resources. Much of the difference in PNV of the various alternatives is an indication of how a particular alternative provides qualitative and nonquantifiable benefits. Differences from maximum PNV may be considered the opportunity cost of having or achieving greater net public benefits. PNV is not the only criteria used in selecting the preferred alternative. It does, however, measure economic efficiency. The lower PNV of same or the alternatives compared to others can be attributed to either higher costs, lower benefits, or a combination of the two. These lower PNV values represent the opportunity cost of not selecting the option with the highest PNV. There is an inverse relationship between PNV and opportunity costs. As economic efficiency becomes less, (i.e., lower PNV); opportunity costs become greater. Opportunity costs, as the name implies, are the costs of not selecting the opportunity or option to maximize economic efficiency. Indirectly, it is the price paid for the intangibles associated with attaining net public benefits and should not necessarily be considered undesirable.

The economic parameters shown in Tables II-21, 22, and 23 reflect only the monetary portion of the analysis used to evaluate alternatives. Decision makers consider public benefits in addition to economic efficiency in the final analysis.

Some resources produced on the Forest were valued explicitly in the planning process, others were valued implicitly, and some were not valued at all. The benefits shown in the Tables are the result of placing specific dollar values on timber, livestock grazing, recreation, wilderness, wildlife, and increased water yield and minerals. These are the outputs that were explicitly valued in the planning process. Timber values were calculated using timber sale bid prices for timber sold during the period. All other output values were derived from data used in the 1980 RPA and the Regional Guide. All values are in 1978 dollars adjusted to 1982. Appendix B contains a more thorough discussion on the economic analysis.

TABLE IV-27
DISCOUNTED BENEFITS AND COSTS, 4% DISCOUNT RATE MM\$
(1978 Dollars, Inflated to 1/1/82)*

	ALTERNATIVES									
	MIN. LEVEL	MAX. ASSIGN.	PV CURRENT PROGRAM/A	B	C	D	E	F	G	H
Present Net Value, PNV (Benefits)	230.30	458.81	402.34	419.10	342.86	379.57	416.74	373.66	236.10	324.88
Present Net Value, PNV (Receipts)	-15.47	-74.21	-94.84	-123.18	-58.06	-90.13	-112.15	-126.79	-134.98	-112.35
Present Value of Benefits, PVB	246.62	555.18	529.34	575.53	437.10	500.63	558.96	534.84	402.85	469.75
Present Value of Receipts, PVR	.85	22.16	32.16	33.25	26.18	30.93	30.07	34.39	31.77	32.52
Present Value of Costs, PVC	16.32	96.37	127.00	156.43	94.24	121.06	142.22	161.18	166.75	144.87
PVB by Output										
Recreation	114.17	326.49	290.47	326.90	216.07	260.45	318.48	294.50	166.16	240.11
Range	0	18.74	20.19	20.19	18.74	20.19	15.79	20.53	21.10	22.62
Timber	0	11.95	23.12	23.12	20.77	23.83	22.60	23.41	23.79	23.10
Wildlife (WFLD's)	92.97	130.82	122.59	132.30	115.43	123.23	130.81	122.82	126.60	120.06
Water Yield	0	2.27	8.11	8.11	6.69	8.02	6.33	8.61	9.02	8.26
Minerals	39.02	64.45	64.40	64.45	58.45	64.45	64.45	64.51	55.72	55.14
Other	.46	.46	.46	.46	.46	.46	.46	.46	.46	.46
PVR by Output										
Recreation	.28	7.39	6.08	7.16	2.64	4.10	5.03	7.92	4.87	6.11
Range	0	2.34	2.52	2.52	2.34	2.52	1.99	2.57	2.64	2.83
Timber	0	11.72	22.82	22.82	20.49	23.56	22.32	23.13	23.51	22.83
Wildlife (WFLD's)	0	0	0	0	0	0	0	0	0	0
Water Yield	0	0	0	0	0	0	0	0	0	0
Minerals	.11	.25	.28	.29	.25	.29	.27	.31	.29	.29
Other	.46	.46	.46	.46	.46	.46	.46	.46	.46	.46
PVC, by Program Component										
Timber	0	9.16	42.91	42.91	31.00	42.18	28.05	43.22	50.38	38.54
Recreation	3.37	16.22	15.36	23.69	10.87	16.03	44.70	28.72	26.75	11.55
Wildlife	0	4.81	2.81	7.58	1.18	2.61	5.67	3.17	3.55	3.88
Range	0	5.09	8.31	12.37	5.09	6.53	6.07	12.07	11.01	15.28
Protection	4.14	14.91	6.43	7.60	7.60	6.53	7.61	16.72	15.10	10.37
Other	8.81	46.18	51.18	62.28	38.50	47.18	50.12	57.28	59.96	65.25
Total Forest Budget	16.32	95.48	123.29	152.72	91.37	117.58	139.75	157.50	162.63	140.96
O&M	16.32	82.11	85.46	105.71	64.09	78.51	101.97	108.88	105.66	100.79
Investment	0	13.37	37.83	47.01	27.28	39.07	37.78	48.62	56.97	40.17
Non-Forest Service Costs	0	.89	3.71	3.71	2.87	3.48	2.47	3.68	4.12	3.91
Returns in Treasury	.85	22.16	32.16	33.25	26.18	30.93	30.07	34.39	31.77	32.52

*Direct comparisons of benefits and costs displayed for individual resource outputs provide general indications of relationships but may be misleading because some outputs in multiple use management have common costs of production that cannot be easily separated and attributed to individual resources.

TABLE IV-28
DISCOUNTED BENEFITS AND COSTS, 7 1/8% DISCOUNT RATE MM\$

	BENCHMARKS		ALTERNATIVES							
	MIN. LEVEL	MAX. PNV CURRENT ASSIGN. PROGRAM/A	B	C	D	E	F	G	H	
Present Net Value, PNV (Benefits)	145.31	263.28	229.85	234.53	210.34	225.82	243.71	218.35	209.29	190.75
Present Net Value, PNV (Receipts)	-9.63	-47.22	-61.36	-80.02	-42.08	-56.25	-70.98	-75.45	-85.12	-69.06
Present Value of Benefits, PVB	155.48	322.77	312.08	335.78	269.92	302.96	334.12	316.03	316.32	281.75
Present Value of Receipts, PVR	.54	12.27	20.87	21.23	17.50	20.89	19.43	22.23	21.91	21.94
Present Value of Costs, PVC	10.17	59.49	82.23	101.25	59.58	77.14	90.41	97.68	107.03	91.00
PVB by Output										
Recreation	59.40	179.62	160.48	179.94	127.72	149.40	182.32	162.75	96.76	133.98
Range	0	11.99	12.78	12.78	11.99	12.78	10.00	13.01	13.31	14.12
Timber	0	6.63	15.58	15.58	14.13	16.48	15.03	16.31	17.19	16.60
Wildlife (WFUD's)	61.32	81.83	77.34	82.56	74.39	78.36	81.82	77.86	79.70	76.93
Water Yield	0	1.59	4.87	4.87	4.13	4.83	3.84	5.22	5.50	4.96
Minerals	24.47	40.82	40.74	39.76	37.27	40.82	40.82	40.88	35.37	34.87
Other	.29	.29	.29	.29	.29	.29	.29	.29	.29	.29
PVR by Output										
Recreation	.18	3.85	3.40	3.77	1.60	2.54	2.89	3.99	2.77	3.28
Range	0	1.50	1.59	1.59	1.50	1.59	1.24	1.63	1.67	1.76
Timber	0	6.48	15.40	15.40	13.96	16.29	14.84	16.12	17.00	16.43
Wildlife (WFUD's)	0	0	0	0	0	0	0	0	0	0
Water Yield	0	0	0	0	0	0	0	0	0	0
Minerals	.07	.15	.19	.18	.15	.18	.17	.20	.18	.18
Other	.29	.29	.29	.29	.29	.29	.29	.29	.29	.29
PVC, by Program Component										
Timber	0	5.21	29.37	29.37	19.51	26.90	17.61	26.87	32.89	24.77
Recreation	2.08	10.35	9.54	14.63	6.77	10.22	28.79	15.30	15.60	7.07
Wildlife	0	2.93	1.74	4.88	.74	1.68	3.44	2.00	2.23	2.42
Range	0	3.25	5.25	7.65	3.25	4.20	3.88	7.55	6.80	9.78
Protection	2.62	9.45	3.88	4.89	4.83	3.93	4.84	10.61	9.59	7.20
Other	5.47	28.30	32.45	39.83	24.48	30.21	31.85	35.35	39.92	39.76
Total Forest Budget	10.17	58.03	79.71	98.73	57.79	74.95	88.87	95.37	104.26	88.31
O&M	10.17	51.03	54.07	67.21	40.78	49.89	65.33	67.34	65.39	63.16
Investment	0	7.00	25.64	31.52	17.01	25.06	23.54	28.03	38.87	25.15
Non-Forest Service Costs	0	.46	2.52	2.52	1.79	2.19	1.54	2.31	2.77	2.69
Returns in Treasury	.54	12.27	20.87	21.23	17.50	20.89	19.43	22.23	21.91	21.94

*Direct comparisons of benefits and costs displayed for individual resource outputs provide general indications of relationships but may be misleading because some outputs in multiple uses management have common costs of production that cannot be easily separated and attributed to individual resources.

The economic efficiency of each alternative is summarized in Table IV-29 and IV-30 for a 4 and 7-1/8 percent discount rate, respectively.

PNV is not the only criteria used in selecting the Preferred Alternative. It does, however, measure economic efficiency. The lower PNV of the different alternatives, compared to the Composite Alternative (B), can be attributed to either higher costs, lower benefits, or a combination of the two. These lower PNV values represent the opportunity cost of not selecting the option with the highest PNV. There is an inverse relationship between PNV and opportunity costs. As economic efficiency becomes less, (i.e., lower PNV); opportunity costs become greater. Opportunity costs, as the name implies, are the costs of not selecting the opportunity or option to maximize economic efficiency. Indirectly, it is the price paid for the intangibles associated with attaining net public benefits and should not necessarily be considered undesirable.

D. SOCIAL EFFECTS

1. Effects on Economic Indicators

Forest Service policy states: "Economic Impact Analysis for appropriate areas shall be included in the analysis of programs and activities which could have significant economic impacts. . ." (FSM, 1972). Accordingly, "appropriate areas" on the Forest were identified and an impact analysis was completed where the potential for "significant economic impacts" was indicated. The economic and social effects analyzed were potential changes in income, employment and population.

The Forest identified and selected two separate impact areas based on (1) location of Forest outputs, (2) affected industries, and (3) population areas. The "West" impact area encompasses the corridor of the economically connected communities along Interstate 15 from Parowan through St. George. The "East" encompasses the east side of the Cedar City Ranger District and the Escalante, Teasdale, and Powell Ranger Districts.

The objective of the impact analysis is to compare the socioeconomic variables for alternative programs. The comparison is between the current base impact and the projected impacts on income, employment, and population for eight alternative programs, including the projected current program. The socioeconomic response of the two impact areas to the alternative management programs is presented in the following tables.

In accord with Forest Service policy, socioeconomic impacts were projected for the years 1990 and 1995. The Forest Service's IMPLAN, an input-output modeling system, was utilized to estimate these impacts. Two input-output models were built corresponding to the two impact areas described above. The Forest interdisciplinary team decided that an employment, income, or population response to a management decision had to be plus or minus five percent or more to be considered significant. Several of the alternative programs are "significant" based on this criterion.

Table IV-31 shows the current Base output levels for the Dixie National Forest and the East and West zones of the Forest. It indicates that range output is somewhat more important in the East zone than in the West. There is no timber output in the West zone. Developed recreation is much more important in the west. Dispersed recreation is of about equal importance in both zones.

Tables IV-32, IV-33, and IV-34 show the projected output levels for the Dixie National Forest, the East zone, and the West zone, respectively, for the eight alternatives for the years 1990 and 1995. Current represents the "current direction" of the Forest. Table IV-32 indicates that range output declines under Constrained Budget and Non-Market Alternatives, particularly under the latter. Outputs increase under the other alternatives, with the greatest increases projected for High Productivity. Timber output is projected to decrease under all alternatives with the largest decrease forecast for the Non-Market. Developed recreation is projected to increase under all alternatives except the Constrained Budget, with the largest increase forecast for the Market Emphasis. Dispersed recreation is projected to increase under all alternatives except RPA 80 and Market Emphasis, with the largest forecast for Composite.

Tables IV-33 and IV-34 show that the changes in range output projected for the eight alternatives are about equally divided between the East and West zones. Alternatives C and E show decreases. Alternatives F, G and H show increases. Alternatives A, B, and D show no change. With regard to developed recreation, output changes are much greater in the West in terms of MRVD's. However, in percentage term the changes are about equal in both zones. Only Alternative C would experience a decline in developed recreation. With regard to dispersed recreation, output changes are about equally divided between East and West. Only Market and RPA 80 experience a decline which would occur in both zones. Timber output, which is confined to the East zone, is projected to decrease under all alternative, with major reductions occurring under the Constrained Budget and Non-Market alternatives.

Tables IV-35, IV-36, and IV-37 show the 1995 projected impacts on income, jobs, and population for the Dixie Forest, the East Zone, and the West Zone, respectively, for the eight alternatives, and the percentage changes from the 1985 BASE. Impacts on income, jobs and population of the 1985 BASE output levels. For the Dixie Forest as a whole (Table IV-35), four alternatives show overall impacts that exceed plus or minus five percent. Composite and High Productivity alternatives show increases that are significantly greater than five percent, Constrained Budget and RPA 80 alternatives show decreases that are significantly greater than five percent, particularly the latter.

The picture changes considerable when the East and West zones are viewed individually. In the East zone (Table IV-36) five of the alternatives shows projected declines in income, jobs, and population that exceed five percent, particularly Constrained Budget, Market and RPA 80. No alternative shows overall increases. In the West zone (Table IV-37), four of the eight alternatives project increases that significantly exceed five percent. Constrained Budget and RPA 80 forecast declines in excess of five percent.

These projections indicate that the current direction of the Forest and most of the alternatives being considered would bring significant changes in the relative economic impacts of the East and West zones on the regional economy. The major factors responsible for these projected changes are the anticipated declines in timber output under all alternatives in the East zone (there is no timber output in the West).

Table VI-38 shows the relative impacts of a unit change in range, timber, developed recreation and dispersed recreation on income, employment and population. For example, a one unit change in timber output (in terms of MMBF) combined with a one unit change in each of the other outputs, split equally between East and West zones, would yield the following results: 63.1 percent of the resulting change in income for the Dixie National Forest would be attributable to timber, 25.37 percent to range, 8.77 percent to dispersed recreation, and only 2.73 percent to developed recreation. It is clear that a unit change in timber output dominates a unit change in each of the other outputs in terms of economic impact, which largely accounts for the outcomes analyzed above.

Table VI-39 shows the direct change in output by industrial sector per/unit of Forest output. The table indicates, for example, that a one unit change in range output (in terms of MAUM) would generate a \$49,000 change in the "meat animals and miscellaneous livestock" sector of the local economy. Timber output has a direct effect on "saw and planing mills" and developed and dispersed recreation directly affects eight sectors, as indicated.

Table VI-40 provides more detail regarding the projected economic and population impacts of the eight alternatives. It separates projected income into two categories: wages/salaries and rental income. The projections are made for both 1990 and 1995 (half of the total change from the 1985 BASE is assumed to occur by 1990). Economic and population changes from the 1985 BASE are given for both the East and West zones and the net change is given for the Dixie National Forest as a whole.

2. Effects on Indians, Other Minorities, and Women

Forest policy and management practices encourage equal use and employment opportunities for everyone. The Forest is accessible to low income groups, senior citizens, women, physically handicapped persons, and other minority groups for a wide variety of jobs. This policy is expected to continue under all eight proposed management alternatives. Management's emphasis on the Affirmative Action Program would be about the same for each alternative. Marginally increased job opportunity and results would likely occur under Composite and Non-Market alternatives for the Dixie National Forest as a whole. Significantly reduced opportunity and results would likely occur under Constrained Budget and RPA 80 alternatives. From the perspective of the two zones of influence, significantly reduced job opportunity and results would likely occur under all alternatives in the East zone, whereas significantly increased opportunity and results are likely to result in the West zone under all alternatives but two: Constrained Budget and RPA 80. The 1980 Census data on numbers of minorities for the two zones show:

	Spanish Origin	Not of Spanish Origin	
		Black	Other Races
East Zone	123	4	147
West Zone	537	29	810

3. Lifestyle, Attitudes, Beliefs, and Values

Utah's family-oriented way of life is very outdoor related and access to the National Forest is important. Many groups enjoy picnics or family reunions on Forest lands. Recreational activities, such as skiing, constitute income resources as well as major winter recreational outlets. Although it is a metropolitan area, there is still a strong parochial social environment prevailing.

Many residents have maintained their pioneer heritage and background. The dominant religion of the State, the Church of Jesus Christ of Latter Day Saints, provides many social activities. Many residents of Utah are descended from families who originally settled the area and feel a real affinity for the State.

The overall planning process masks the impacts on individuals. It should be recognized that the Low Budget, Current Budget, Non-Market, and Preservation and Protection Alternatives could have significant negative effects on individuals associated with the timber and grazing industries.

TABLE IV-29
CURRENT BASE OUTPUT LEVELS
FOR DIXIE NATIONAL FOREST
AND EAST AND WEST ZONES

	Softwood			
	Range	Sawtimber	Dev/Rec	Dis/Rec
	<u>MAUM</u>	<u>MMBF</u>	<u>MRVD</u>	<u>MRVD</u>
East Zone	67.0	25.6	91.5	410.4
West Zone	<u>48.0</u>	<u>0.0</u>	<u>313.1</u>	<u>441.0</u>
<u>TOTAL</u>	<u>115.0</u>	<u>25.6</u>	<u>404.6</u>	<u>851.3</u>

TABLE IV-30
DIXIE NATIONAL FOREST OUTPUT LEVELS
FOR
THE EIGHT ALTERNATIVES: A-H
TOTAL DIXIE NATIONAL FOREST

	Range	Softwood	Dev/Rec	Dis/Rec				
	MAUM	Sawtimber	MRVD	MRVD				
		MMBF						
Current 1985--A Base	115.0	25.6	404.6	851.3				
	New	New	New	New				
	Output	Output	Output	Output				
	Change	Change	Change	Change	Level	Level	Level	Level
Current 1990--A	0.0	115.00	-3.1	22.5	74.5	479.1	33.4	884.70
Current 1995--A	0.0	115.00	-6.3	19.3	149.1	553.7	66.8	918.10
Composite 1990--B	0.0	115.00	-3.1	22.5	78.7	483.3	124.6	974.90
Composite 1995--B	0.0	115.00	-6.3	19.3	157.4	562.0	176.7	1,028.00
Constrained								
Budget 1990--C	-3.0	112.00	-5.5	20.1	-65.8	338.8	38.4	889.70
Constrained								
Budget 1995--C	-6.0	109.00	-10.9	14.7	-131.6	273.0	76.7	928.00
Current								
Budget 1995--D	0.0	115.00	-3.5	22.1	31.2	435.8	43.4	894.70
Current								
Budget 1995--D	0.0	115.00	-7.0	18.6	62.4	467.0	86.7	938.00
Non-Market 1990--E	-12.5	112.50	-6.1	19.5	39.5	44.1	87.8	939.20
Non-Market 1995--E	-25.0	90.00	-12.1	13.56	78.9	483.5	175.7	1,027.00
Market								
Emphasis 1990--F	1.0	116.00	-3.2	22.4	78.9	483.5	-65.5	785.80
Market								
Emphasis 1995--F	2.0	117.00	-6.3	19.3	157.8	562.4	-131.1	720.20
RPA-80 1990--G	2.0	117.00	-1.9	23.7	17.8	422.3	-145.1	706.20
RPA-80 1995--G	4.0	119.00	-3.7	21.9	35.5	440.1	-290.2	561.10
High								
Productivity 1990--H	5.5	120.50	-2.2	23.4	75.3	479.9	28.8	880.20
High								
Productivity 1995--H	11.0	126.00	-4.4	21.2	150.6	555.2	57.7	909.00

TABLE IV-31
DIXIE NATIONAL FOREST OUTPUT LEVELS
FOR
THE EIGHT ALTERNATIVES: A-H
EAST ZONE

	Range		Softwood		Dev/Rec		Dis/Rec	
	MAUM		MMBF		MRVD		MRVD	
	67.0		25.6		91.5		410.4	
	New		New		New		New	
	Output		Output		Output		Output	
	Change Level		Change Level		Change Level		Change Level	
Current 1985--A Base	0.0	67.0	-3.1	22.5	16.8	108.4	16.1	426.50
Current 1990--A	0.0	67.6	-6.3	19.3	33.7	125.2	32.2	442.60
Current 1995--A	0.0	67.0	-3.1	22.5	17.3	422.4	42.6	453.00
Composite 1990--B	0.0	67.0	-6.3	19.3	35.6	127.1	85.2	495.60
Constrained								
Budget 1990--C	-1.7	65.3	-5.5	20.1	-14.9	76.6	18.5	428.90
Constrained								
Budget 1995--C	-3.5	63.5	-10.9	14.7	-29.8	61.7	37.0	447.40
Current								
Budget 1995--D	0.0	67.0	-3.5	22.6	7.1	98.6	21.0	431.4
Current								
Budget 1995--D	0.0	67.0	-7.0	18.6	14.1	105.6	41.9	452.30
Non-Market 1990--E	-7.3	59.7	-6.1	19.5	8.9	100.4	42.3	452.80
Non-Market 1995--E	-14.6	52.4	-12.1	13.5	17.8	109.3	84.7	495.10
Market								
Emphasis 1990--F	0.5	67.5	-3.2	22.4	17.8	109.4	-31.6	378.8
Market								
Emphasis 1995--F	1.1	68.1	-6.3	19.3	35.7	127.2	-63.2	347.20
RPA-80 1990--G	1.2	68.2	-1.9	23.7	4.0	95.5	-69.9	340.50
RPA-80 1995--G	2.3	69.3	-3.7	21.9	8.0	99.5	-139.9	270.50
High								
Productivity 1990--H	3.2	70.2	-2.2	23.4	17.0	108.6	13.9	424.30
High								
Productivity 1995--H	6.4	73.4	-4.4	21.2	34.1	125.6	27.8	438.20

TABLE IV-32
DIXIE NATIONAL FOREST OUTPUT LEVELS
FOR
THE EIGHT ALTERNATIVES: A-H
WEST ZONE

	Range		Dev/Rec		Dis/Rec	
	MAUM		MRVD		MRVD	
Current 1985--A Base	67.0		25.6		410.4	
	New Output		New Output		New Output	
	Change	Level	Change	Level	Change	Level
Current 1990--A	0.0	48.0	57.7	370.8	17.3	458.20
Current 1995--A	0.0	48.0	115.4	428.5	34.6	475.50
Composite 1990--B	0.0	48.0	60.9	374.0	45.8	486.70
Composite 1995--B	0.0	48.0	121.8	434.9	91.5	532.40
Constrained Budget 1990--C	-1.3	46.7	-50.9	262.2	19.8	460.80
Constrained Budget 1995--C	-2.5	45.5	-101.8	211.3	39.7	480.60
Current Budget 1995--D	0.0	48.0	24.2	337.3	22.2	462.60
Current Budget 1995--D	0.0	48.0	48.3	361.4	44.8	485.70
Non-Market 1990--E	-5.2	42.8	30.5	343.7	45.5	486.40
Non-Market 1995--E	-10.4	37.6	61.1	374.2	91.0	531.90
Market Emphasis 1990--F	0.0	48.5	61.1	374.2	-33.9	407.00
Market Emphasis 1995--F	0.9	48.9	122.1	435.2	-67.9	373.00
RPA-80 1990--G	0.8	48.9	13.7	326.9	-75.1	365.80
RPA-80 1995--G	1.7	49.7	27.5	340.6	-150.3	290.60
High Productivity 1990--H	2.3	50.3	58.2	371.4	14.9	455.90
High Productivity 1995--H	4.6	52.6	116.5	429.6	29.9	470.80

TABLE IV-33
 THE 1995 IMPACTS ON INCOME, JOBS AND POPULATION
 FOR
 THE EIGHT ALTERNATIVES: A-H
 AND
 PERCENTAGE CHANGES FROM THE 1985 BASE
 TOTAL DIXIE NATIONAL FOREST

	Total Income (MM's)	Jobs	Population
Current 1985--A BASE	19.3980	1,325.61	6,981
Current 1995--A	19.6998	1,429.48	7,364
% Change from 1985 Base	1.56%	7.84%	5.48%
Composite 1995--B	21.0111	1,576.33	8,142
% Change from 1985 Base	8.32%	18.91%	16.65%
Constrained Budget 1995--C	17.7722	1,174.22	6,178
% Change from 1985 Base	-8.38%	-11.42%	-11.50%
Current Budget 1995--D	19.4802	1,399.60	7,275
% Change from 1985 Base	0.42%	5.58%	4.22%
Non-Market 1995--E	18.9251	1,418.50	7,320
% Change from 1985 Base	-2.44%	7.01%	4.86%
Market Emphasis 1995--F	17.4951	1,284.91	6,648
% Change from 1985 Base	-9.81%	-3.07%	-4.77%
RPA 80 1995--G	15.6690	1,050.92	5,525
% Change from 1985 Base	-19.22%	-20.72%	-20.85%
High Productivity 1995--H	20.2708	1,488.87	7,715
% Change from 1985 Base	4.49%	12.31%	10.51%

TABLE IV-34
 THE 1995 IMPACTS ON INCOME, JOBS AND POPULATION
 FOR
 THE EIGHT ALTERNATIVES: A-H
 AND
 PERCENTAGE CHANGES FROM THE 1985 BASE
 EAST ZONE

	Total Income (MM's)	Jobs	Population
Current 1985--A BASE	10.5388	672.03	4.032
Current 1995--A	9.9308	614.22	3,684
% Change from 1985 Base	-5.77%	-8.60%	-8.63%
Composite 1995--B	10.4888	692.82	4,186
% Change from 1985 Base	-0.48%	3.09%	3.06%
Constrained Budget 1995--C	8.9225	591.76	3,549
% Change from 1985 Base	-15.34%	-11.94%	-11.97%
Current Budget 1995--D	9.8522	645.64	3,873
% Change from 1985 Base	-6.51%	-3.93%	-3.96%
Non-Market 1995--E	9.0887	618.38	3,709
% Change from 1985 Base	-13.75%	-7.98%	-8.01%
Market Emphasis 1995--E	8.9712	571.40	3,427
% Change from 1985 Base	-14.87%	-14.97%	-15.00%
RPA 80 1995--G	8.5481	526.86	3,160
% Change from 1985 Base	-18.89%	-21.6%	-21.63%
High Productivity 1995--H	10.3657	669.79	4,018
% Change from 1985 Base	-1.64%	-0.03%	-0.03%

TABLE IV-35
 THE 1995 IMPACTS ON INCOME, JOBS AND POPULATION
 FOR
 THE EIGHT ALTERNATIVES: A-H
 AND
 PERCENTAGE CHANGES FROM THE 1985 BASE
 WEST ZONE

	Total Income (MM's)	Jobs	Population
Current 1985--A BASE	8.8592	653.58	2.949
Current 1995--A	9.7691	815.26	3,679
% Change from 1985 Base	10.27%	24.72%	24.78%
Composite 1995--B	10.5223	883.51	3,988
% Change from 1985 Base	18.77%	35.18%	35.22%
Constrained Budget 1995--C	8.8497	582.46	2,628
% Change from 1985 Base	-0.11%	-10.888%	-10.85%
Current Budget 1995--D	9.8522	645.64	3,873
% Change from 1985 Base	-6.52%	-3.93%	-3.96%
Non-Market 1995--E	9.8364	800.12	3,611
% Change from 1985 Base	11.03%	22.42%	22.46%
Market Emphasis 1995--E	8.5239	713.51	3,220
% Change from 1985 Base	-3.78%	9.1%	9.20%
RPA 80 1995--G	7.1209	524.06	2,365
% Change from 1985 Base	-19.62%	-19.82%	-19.79%
High Productivity 1995--H	9.9051	819.08	3,697
% Change from 1985 Base	21.91%	25.32%	25.36%

TABLE IV-36
RELATIVE IMPACT OF RANGE, TIMBER,
DEV/REC AND DIS/REC
OUTPUTS ON INCOME, EMPLOYMENT
AND POPULATION LEVELS

	East	West	Total
Total Income			
Range	9.66%	15.76%	25.37%
Timber	63.10	0.00	63.10
Developed Recreation	1.20	1.53	2.73
Dispersed Recreation	3.94	4.83	8.77
Jobs			
Range	7.333%	11.00%	18.54%
Timber	60.33	0.00	60.33
Developed Recreation	1.50	7.08	8.59
Dispersed Recreation	5.43	7.08	12.52
Population			
Range	7.53%	11.00%	18.54%
Timber	60.33	0.00	60.33
Developed Recreation	1.50	7.08	8.59
Dispersed Recreation	5.45	7.08	12.52

TABLE IV-37
DIXIE NATIONAL FOREST IMPACT
DIRECT CHANGE IN OUTPUT BY INDUSTRIAL SECTOR
FOR
PER/UNIT CHANGE OF FOREST OUTPUT

	Range MAUM (000's)	Softwood Sawtimber MMBF (000's)	Dev/Rec MRVSD (000's)	Dis/Rec MRVD (000's)	Total (000's)
Meat Animals & Misc. Livestock	\$49,100				\$49,100
Aggregate Agriculture					
Forestry & Fish Trades			\$0.389	\$0.390	0.779
Aggregate Beverage Processing 1/			0.169	0.170	0.339
Saw & Planning Mills 2/		\$256,000			256,000
Wholesale Trades			0.619	0.660	1.279
Aggregate Retail Trades			1.000	0.870	1.870
Hotels & Lodging Trades			0.169	2.070	2.239
Eating & Drinking Trades			0.369	4.259	4.628
Automobile Repair & Service			0.060	0.129	0.189
Aggregate Amusement & Recreation			0.299	0.449	0.748
Total Impacts	\$49,100	\$256,000	\$3,074	\$8,997	\$317,171
Percent Impact	15.48%	80.71%	0.97%	2.48%	100.00%

1/Aggregate Beverage Processing is only associated with the West Zone

2/Saw and Planning Mills are only associated with the East Zone

TABLE IV-38
CURRENT (Base)
AND
PROJECTED ECONOMIC AND POPULATION IMPACTS
OF
THE EIGHT ALTERNATIVES: A-H

	Wages & Salaries (MM'\$)	Rental Income (MM'\$)	Total Income (MM'S)	Number of Jobs	Population
Current 1985--A					
West Base	4.7116	4.1476	8.8592	653.58	2949
East Base	5.6724	4.8664	10.5388	672.03	4032
Total Base	10.3840	9.0140	19.3980	1325.61	6981
Current 1990--A					
West Change	0.3412	0.1138	0.4549	80.84	365
East Change	-0.1848	-0.1191	-0.3040	-11.63	-71
Total Change	0.1564	-0.0053	0.1509	69.11	294
Current 1995--A					
West Change	0.6823	0.2275	0.9098	161.68	731
East Change	-0.3696	-0.2383	-0.6080	-23.46	-142
Total Change	0.4127	-0.0109	0.3018	138.22	589
NET IMPACT CURRENT 1995	10.6967	9.0031	19.6998	1463.83	7570
Composite 1990--B					
West Change From Base	0.4904	0.3242	0.8147	114.96	519
East Change From Base	-0.0050	-0.0032	-0.0082	10.39	62
Total Change	0.4854	0.3210	0.8065	125.36	581
Composite 1995--B					
West Change From Base	0.9809	0.6485	1.62965	229.93	1039
East Change From Base	-0.0100	-0.0064	-0.0164	20.79	124
Total Change	0.9709	0.6421	1.6130	250.72	1163
NET IMPACT COMPOSITE 1995	11.3549	9.6561	21.0110	1594.75	8144

TABLE IV-38 (Con't.)

	Wages & Salaries (MM'\$)	Rental Income (MM'\$)	Total Income (MM'S)	Number of Jobs	Population
Constrained Budget 1990--C					
West Change From Base	-0.0033	-0.0014	-0.0047	-35.56	-160
East Change From Base	-0.4913	-0.3167	-0.8081	-40.13	-241
Total Change	-0.4946	-0.3182	-0.8128	-75.70	-401
Constrained Budget 1995--C					
West Change From Base	-0.0066	0.0028	-0.0094	-71.13	-320
East Change From Base	-0.9827	-0.6335	-1.6163	-80.27	-482
Total Change	-0.9893	-0.6364	-1.6257	-151.40	-802
NET IMPACT CONSTRAINED 1995	9.3946	8.3775	17.7722	1174.21	6178
Current Budget 1990--D					
West Change From Base	0.2314	0.1529	0.3843	50.19	227
East Change From Base	-0.2093	-0.1342	-0.3432	-13.19	-79
Total Change	0.0223	0.0187	0.0411	36.99	147
Current Budget 1995--D					
West Change From Base	0.4628	0.3059	0.7687	100.38	454
East Change From Base	-0.4181	-0.2684	-0.6865	-26.39	-159
Total Change	0.0446	0.0375	0.0822	73.99	295
NET IMPACT CURRENT BUDGET 1995	10.4286	9.0515	19.4802	1399.60	7276
Non-Market 1990--E					
West Change From Base	0.3175	0.1710	0.4885	73.26	331
East Change From Base	-0.4408	-0.2842	-0.7250	-26.82	-161
Total Change	-0.1232	-0.1132	-0.2364	46.44	169
Non-Market 1990--E					
West Change From Base	0.3175	0.1710	0.4885	73.26	331
East Change From Base	-0.4408	-0.2842	-0.7250	-26.82	-161
Total Change	-0.1232	-0.1132	-0.2364	46.44	169
Non-Market 1995--E					
West Change From Base	0.6351	0.3420	0.9771	146.53	662
East Change From Base	-0.8816	-0.5684	-1.4500	-53.65	-323
Total Change	-0.2464	-0.2264	-0.4728	92.88	339
NET IMPACT NON-MARKET 1995	10.1375	8.7875	18.9251	1418.49	7320

TABLE IV-38 (Con't.)

	Wages & Salaries (MM'\$)	Rental Income (MM'\$)	Total Income (MM'S)	Number of Jobs	Population
Market Emphasis 1990--F					
West Change From Base	-0.1424	-0.0251	-0.1676	29.96	135
East Change From Base	-0.6662	-0.1175	-0.7838	-50.31	-302
Total Change	-0.8086	-0.1426	-0.9514	-20.35	-167
Market Emphasis 1995--F					
West Change From Base	-0.2850	0.0502	-0.3352	59.92	271
East Change From Base	-1.3324	-0.2351	-1.5676	-100.63	-605
Total Change	-1.6174	-0.2854	-1.9028	-49.71	-334
NET IMPACT MARKET 1995	8.7665	8.7285	17.4951	1284.90	6647
RPA-80 1990--G					
West Change From Base	-0.6084	-0.2607	-0.8691	-64.76	-291
East Change From Base	-1.2135	-0.6509	-1.8644	-137.34	-436
Total Change	-1.2135	-0.6509	-1.8644	-137.34	-728
RPA-80 1995--G					
West Change From Base	-1.2168	-0.5214	-1.7383	-129.52	-584
East Change From Base	-1.2103	-0.7803	-1.9906	-145.17	-872
Total Change	-2.4271	-1.3018	-3.7289	-274.69	-1456
NET IMPACT RPA-80 1995	7.9568	7.78121	15.6690	1050.92	5525
High Productivity 1990--H					
West Change From Base	0.4476	0.0753	0.5229	82.75	374
East Change From Base	-0.1180	0.0315	-0.0865	-1.12	-7
Total Change	0.3296	0.1068	0.4364	81.63	367
High Productivity 1995--H					
West Change From Base	0.8952	0.1506	1.0459	165.50	748
East Change From Base	-0.2357	0.0627	-.1731	-2.24	-14
Total Change	.6595	.2133	.8728	163.26	734
NET IMPACT HIGH PROD. 1995	11.3196	8.9512	20.2709	1488.87	7715

E. POSSIBLE CONFLICTS

No conflicts have been identified between the objectives of other Federal, State and Local governments, adjacent landowners and Indian tribes and the proposed action. The process of identification of conflicts involved interviews, letters, news releases and state clearing house procedures.

F. ENERGY REQUIREMENTS

The production utilization and protection of forest resources requires the use of energy in the form of fuels and lubricants and in the form of power to convert raw materials to finished material. Conversely energy is produced from forest products in the form of fuel products produced, energy savings from substitute materials and from reduced needs for energy expenditure. This analysis describes the results of the trade off between energy used to obtain forest resources and energy gained from the resources from each of the alternatives. The alternative with the highest net gain of energy is Alternative H - High Productivity. The alternative with the lowest gain is Alternative D - Current Budget.

The following tables summarize the total yields of energy, the energy used and the net gain or loss:

TABLE IV-39
TOTAL YIELDS AND CONSUMPTION OF ENERGY FROM SELECTED FOREST
ACTIVITIES* UNDER PROPOSED MANAGEMENT ALTERNATIVES

Alternative	Yield	Consumption	Net Change
		Billion BTU's Per Year	
Current Program	34.133	1.726	32.407
Current Budget	34.148	1.779	32.369
Constrained Budget	33.940	1.491	32.449
Market	33.889	1.867	32.022
Non-Market	33.901	1.601	32.300
RPA-80	34.274	1.861	32.413
High Productivity	34.351	1.818	32.533
Composite	34.208	1.455	32.753

TABLE IV-40
TOTAL YIELDS (EXCEPTING MINERAL ENERGY ¹)
AND CONSUMPTION OF ENERGY FROM SELECTED
FOREST ACTIVITIES ² UNDER
PROPOSED MANAGEMENT ALTERNATIVES

Alternative	Yield	Consumption	Net Change
		Billion BTU's Per Year	
Current Program	1,772	995	777
Current Budget	1,831	1,048	783
Constrained Budget	1,579	760	819
Market	1,528	1,136	392
Non-Market	1,540	870	670
RPA-80	1,913	1,129	784
High Productivity	1,990	1,087	903
Composite	1,846	724	1,122

1 Coal, oil and natural gas.

2 Recreation, road construction and maintenance, timber, water, range, and fire management.

G. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The Plans and its management requirements provide direction to protect natural resources that could be irreversibly affected by management activities. Irretrievable resource commitments refer to resources that are renewable only over a long time period, such as soil productivity, or to depletable resources, such as cultural resources or minerals.

Gravel and rock extracted for road construction and reconstruction is an irreversible action. Mining and dam construction are also examples of activities that represent irreversible commitment of resources.

Extraction of depletable minerals and energy resources is irreversible since the minerals are no longer available in the future. The Forest Service's role is to manage the surface resources to minimize adverse environmental impacts while providing for the exploration and development of the mineral resources.

The irretrievable commitment of natural resources is the production loss or use loss of renewable resources, due to management decisions. This represents opportunities foregone for the time period that the resource cannot be used. Construction of arterial and collector roads, ski areas and developed recreation sites are irretrievable resource commitments because these activities will remove land from productivity. Resource development is foregone in established wilderness areas, while designation of eligible areas as non-wilderness can result in development that will forego further wilderness options.

The following table displays the acres involved with irreversible and irretrievable resource commitments:

TABLE IV-41

	Alternatives							
	A	B	C	D	E	F	G	H
New Road								
Const.	3606	3606	3300	3691	2503	3733	3691	3733
Gravel								
Pits	50	50	45	50	50	55	50	50
Mined								
Areas	700	700	650	700	700	750	700	700
Rec.								
Sites	1265	1352	1265	1265	1345	1365	1495	1265
Wilder-								
ness	83,000	83,000	83,000	83,000	83,000	83,000	83,000	83,000

H. ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

All activities that occur on the Forest will cause some degree of environmental impact. The degree or severity of the adverse effects are minimized through the Forest management requirements and the management area direction in the accompanying Plan. Some impacts cannot be avoided if management activities occur regardless of alternatives. These effects include:

- Intermittent decrease in air quality due to dust from road construction, maintenance, and use; mineral exploration and development activities; and from smoke due to campfires, prescribed burns, and wildfires.

- Short-term and localized increases in soil erosion and stream sedimentation due to land disturbing activities.

- Short-term changes in the landscape from silviculture and road construction that may be disturbing to Forest visitors.

- Some disruption or change in wilderness recreation opportunities due to mineral leases or activities under the mining laws in designated wilderness.

- Disruption of prehistoric or historic evidence of man's occupancy of the Forest.

- Elimination of small areas from vegetation production due to construction of permanent physical developments such as roads, trails, range structural improvements, and wildlife habitat structural improvements.

- Increased conflicts between recreation use and other land use activities related to commodity production.

- Solitude loss due to increased management and use activities in certain areas.

- Temporary wildlife disturbance in some locations because of increased human activity.

Mitigation measures are included in the Forest management requirements and management area direction. They will limit the adverse effects that cannot be avoided.

The alternatives most likely to produce unavoidable adverse effects are the Current Budget, Market Opportunities, Current Program and Proposed Action. The 1980 RPA, Non-Market and Constrained Budget alternatives would come closest to avoiding adverse effects.

I. SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

The relationship between the short-term uses of man's environment and the maintenance and enhancement of long-term productivity is complex. For this analysis, short-term uses are those that generally occur on a yearly basis on some part of the Forest. These include livestock grazing as a use of the forage resource, timber harvest as a use of the wood resource, and recreation and irrigation as uses of the water resource.

Long-term refers to longer than 10 years. Productivity refers to the capability of the land to provide market and non-market outputs and values for future generations. Soil and water are the primary factors of productivity and represent the relationship between short-term uses and long-term productivity. The land allocations and permitted activities must not significantly impair the long-term land productivity.

The Proposed Action (Composite) as well as all other alternatives studied in detail incorporates sustained yield of resource outputs while maintaining resource productivity. The specific direction and mitigation measures included in the Forest management requirements ensure that long-term productivity will not be impaired by the application of short-term management practices. Thus, in every alternative, the Forest's long-term productivity is assured.

The prescriptions and effects of Plan implementation would be monitored to provide data to assure that standards for long-term productivity would be met. Monitoring requirements and standards would apply to all alternatives and are included in Chapter IV of the accompanying Plan.

The Market Emphasis alternative has the highest level of short-term uses, as reflected by the number of acres of vegetative treatment for wildlife, range, and timber management. It results in higher levels of short-term adverse consequences, such as degraded air quality, increased visual impacts, fire hazard, soil loss, and degraded water quality. The Constrained Budget and Non-Market Emphasis alternatives have the lowest level of short-term uses and therefore the smallest number of short-term adverse consequences.

J. NATURAL OR DEPLETABLE RESOURCE REQUIREMENTS

Natural resource requirements for implementing the Proposed Action (Composite) or any of the other alternatives considered in detail require the basic soil and water resources and associated plant and animal communities that comprise the forest and rangeland ecosystems. Lands allocated to various management

prescriptions in this planning effort considered the multiple-use benefits and coordinating requirements necessary to conserve these resources. Mitigation measures to ensure resource conservation are included in the Forest and Management Area Direction of the Forest Plan.

Depletable resource requirements include the removal of nonrenewable resources such as minerals or the depletion of a basic resource such as soils. In the case of the mineral resources, once the mineral has been extracted it is gone. Conservation of these resources might be defined as the planned rate of removal. Mitigating measures involved in the location, development, and removal of these resources are considered and may be found in the Forest Plan. Soil depletion through natural or man-made disturbances is also considered and rehabilitation/conservation activities associated with the potential depletion of this resource is planned for in each alternative.

In addition, the extinction of a plant or animal species may also be thought of as depletion of a resource. Protection and improvement of threatened and endangered species habitat has been considered in all alternatives and management direction included in the Proposed Forest Plan.

K. URBAN QUALITY, HISTORIC, AND CULTURAL RESOURCES

Implementing the Plan would not result in the transfer, sale, demolition, or substantial alteration of eligible or existing National Register properties under Federal jurisdiction. Additionally, the Plan would not adversely effect non-federally owned districts, sites, buildings, structures, and objects of historical, architectural, or archaeological significance.

Research natural areas are non-disturbed areas that have values as benchmarks to gauge the effect of man's activities on similar areas.

All alternatives recommend the establishment of the following research natural areas:

-Timbered Cinder Cone	640 acres
-Table Cliff	1235 acres
-Red Canyon	460 acres

Cultural resources, both historic and prehistoric, are considered important, non-renewable resources to be preserved and protected for future generations. USDA Forest Service policy regarding cultural resources is guided by the Presidential proclamation and laws enacted by Congress. Thus, the Dixie National Forest is mandated by Federal legislation to identify, record, preserve and protect these resources.

With the conception of a project, a thorough field survey is conducted to identify existing cultural resources within the projected area of disturbance. If cultural properties are evaluated as significant and eligible for inclusion on the National Register of Historic Places (as outlined in 36 CFR 800), then the effects of the proposed activity upon the significant resources must be determined. The following adverse effects must always be considered.

- Destruction or alternation of the property.
- Isolation from or alteration of the surrounding environment.
- Deterioration or destruction of a property because of neglect.

- Transfer or sale without provisions to preserve and protect the property.
- Introduction of visual, audible or atmospheric elements that are out of character or alter the setting of the property.

Since the beginning of the cultural resources program in 1975, the vast majority (95 percent) of the projects conducted on the Dixie National Forest have been determined as causing "no effect" on the significant cultural resources. The large number of no effect determinations is consistent with principles of management that steer disruptive project actions away from significant cultural properties. For example, significant sites within timber harvest areas are simply flagged and avoided. Most projects conducted on the Dixie National Forest are sufficiently flexible to allow for the avoidance of significant cultural resources. An exception to this is the land exchange which removes the archeological protection from the Federal property as it moves into private ownership.

When a project will adversely effect a cultural property, the effect of the project must be mitigated. In consultation with the Utah State Historic Preservation Officer (SHPO), a plan is developed to salvage the unique characteristics and data that made the site eligible for inclusion on the National Register.

It should be noted that the enacting of any one of the eight management alternatives would not change the nature of the direct impacts to the cultural resource base. Management direction would continue to allow for the avoidance of significant cultural resources where possible. Mitigation plans would be initiated when avoidance is not possible.

Although the selected alternative would not affect cultural resource policy and procedure, it would influence the acreage surveyed annually and the degree to which we expand our knowledge of the cultural resource base. The RPA-80, High Productivity, and Composite alternatives, which emphasize the cutting of timber, reforestation and road construction, would subject a large area to the field survey while increasing our knowledge of the cultural resource base. The Current Program, Current Budget and Non-Market alternatives, which prescribe +2,000 acres a decade (average) of non-structural wildlife habitat improvement, would also increase the Forest's inventory of cultural properties. Habitat projects, consisting of prescribed burns and chaining, are normally conducted in the high site density zones of the pinyon-juniper forest.