Chapter 4: Environmental Consequences

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4.1 Introduction

This chapter provides a description of the environmental effects to resources that may occur from implementing each of the three alternatives: No Action, Proposed Action, and Modified Resource-based Alternative. Chapter 2 provides a full description of each alternative.

Although issuance a of lease also grants rights that could result in surface disturbing activities, location of specific activities are unknown at this time. Furthermore, the ROD for this EIS will not make site-specific exploration or production decisions, nor will it approve any surface disturbing activities. Any future oil and gas activities resulting in surface disturbance would require additional environmental review prior to implementing ground disturbing activities. That review and analysis will tier from this EIS.

Resources analyzed in Chapter 4 follow the same organization as Chapter 3. Descriptions of the environmental consequences of the alternative on each resource are organized into the following:

- **Introduction:** a brief description of methodology and measurement indicators used to analyze impacts.
- **General Effects:** a description of the impacts that connected actions would have on the resource. This description takes into account mitigation measures or BMPs that would be required at the APB and SUPO stage. BLM/USFS's *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (commonly referred to as the "Gold Book", [BLM/USFS 2006]), was used as guide for the type of mitigation measures or BMPs that would be required for exploratory drilling.
- **Effects of Lease Options:** a description of the impacts that would occur to the resource from applying SLT and lease stipulations.
- **Effects of the No Action Alternative:** a description of the impacts of applying the lease program of the the No Action Alternative.
- **Effects of the Proposed Action Alternative:** a description of the impacts of applying the lease program of the Proposed Action Alternative.
- **Effects of the Modified Resource-based Alternative:** a description of the impacts of applying the lease program of the Modified Resource-based Alternative.
- **Summary of Effects:** a summary comparison of each of the alternatives for each RFOGD, generally presented in table format.
- **Cumulative Effects:** a summary of past, present, and reasonably foreseeable future actions that would cumulatively affect resources under each alternative. Cumulative effects are also assessed in each resource section in greater detail.

4.1.1 Effects Terminology

Effects and impacts as used in this EIS are synonymous terms. Effects include ecological effects (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), as well as aesthetic, historic, cultural, economic, social, and health effects

— whether direct, indirect, or cumulative. Effects may also include actions which may have both beneficial and adverse consequences. Environmental effects that may occur as a result of implementing the alternatives were described using the following terms:

- **No or Negligible Effect:** A change to a resource condition, use, or value that is not measurable or perceptible.
- **Beneficial Effect:** An action that would improve the resource condition, use, or value compared to its current condition, use, or value.
- **Minor Adverse Effect:** A measurable or perceptible, localized degradation of a resource's condition, use, or value that is of little consequence or significance.
- **Moderate Adverse Effect:** A localized degradation of a resource condition, use, or value that is measurable and of consequence.
- **High Adverse Effect:** A measurable degradation of a resource condition, use, or value that is large and/or widespread and could have permanent consequences for the resource.
- **Short-term Effect:** An effect that would result in the change of a resource condition, use, or value lasting less than one year.
- **Long-term Effect:** An effect that would result in the change of a resource condition, use, or value lasting more than one year and probably much longer.
- **Direct Effect:** An effect which is caused by the action and occurs at the same time and place.
- **Indirect Effect:** An effect which is caused by the action and is later in time or farther removed in distance, but is still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

4.1.2 Area of Analysis

As described in Chapter 1, the area of analysis does not include designated wilderness areas, Strawberry Project lands, or non-NFS lands. These lands are not analyzed for any of the alternatives. Due to the lack of available GIS data, leasable acreages analyzed for the proposed action and modified resource-based alternatives may include split estate lands, which are not under UNF leasing jurisdiction. For example, the proposed action identifies approximately 739,500 acres being available for leasing while Chapter 4 identifies approximately 777,300 acres of leasable land (extra acreage comes from split estate lands). A summary of the area of analysis for each alternative is found below.

Please note that all acreages given in Chapter 4 are approximate (see Use of GIS Data below).

No Action Alternative

The area of analysis for the No Action Alternative are those lands that were analyzed in the WUB FEIS (approximately 197,000 acres). Throughout Chapter 4 this area is referred to as the WUB Analysis Area. The WUB Analysis Area includes portions of Currant Creek, Strawberry Reservoir, Diamond Fork, Upper Spanish Fork Canyon, Willow Creek, and White River MAs. See Chapter 2 for a map showing these areas and for acres available for lease in each MA.

No other MAs would have land available for leasing under this alternative and impacts to other MAs are not analyzed further for the No Action Alternative.

Proposed Action and Modified Resource-based Alternatives

As described in Chapter 1, the area of analysis does not include designated wilderness areas, Strawberry Project lands, or non-NFS lands. All other lands in the UNF were analyzed under the Proposed Action and the Modified Resource-based Alternatives.

For analysis purposes the UNF was divided into nine analysis groups, called reasonably foreseeable oil and gas development groups (RFOGDs). Groups were categorized according to geological resources, topography, and other general characteristics. For more information about RFOGDs see Chapter 1 and the RFDS. RFOGDs have been named American Fork, Currant Creek, Deer Creek, Diamond Fork, Payson, Spanish Fork Canyon, Strawberry, Upper Provo, and Vernon (see table 4.1). The following is a list of each group and associated management areas.

Table 4.1. MAs within each respective RFOGD.

RFOGD	MAs
American Fork	American Fork
Currant Creek	West Fork Duchesne, Currant Creek
Deer Creek	Deer Creek Reservoir, Lower Provo, Hobble Creek
Diamond Fork	Diamond Fork
Payson	Thistle, Payson, Mona, Nephi
Spanish Fork Canyon	Upper Spanish Fork Canyon
Strawberry	Strawberry Reservoir, Willow Creek, White River
Upper Provo	Upper Provo
Vernon	Vernon, West Sheeprock

Scale of Analysis

Analysis of resources was organized around RFOGDs as described above. Where possible, or if applicable, impacts were analyzed at the Management Area (MA) level. However, if impacts were the same throughout the RFOGD (e.g., there were no unique resources in a specific MA), then impacts were analyzed at the RFOGD level to avoid redundancy.

4.1.3 Analysis of Connected Actions

Resource specialists were asked to analyze the effects of connected actions of oil and gas leasing on their respective resource. CEQ guidelines define connected actions as those actions that are closely related and should be discussed in the same EIS.

The authorization of a lease also grants rights to explore for and develop oil and gas within the terms and stipulations of the lease. The exercise of these rights results in implementation of connected actions. However, authorization implies that oil and gas exploration and/or development may take place at a future time with identified restrictions. The regulations, 36 CFR 228.102 (c)(4), direct the USFS to consider the subsequent actions that would be authorized by a lease, as connected actions. Connected actions were identified in the RFDS and are summarized below.

In the context of this EIS, connected actions that are considered include:

- exploratory drilling
- abandonment activities
- development associated with exploratory drilling such as the building or upgrading of roads

The RFDS concludes that a discovery is possible, and therefore a full-field development or production could occur in the foreseeable future. The potential effects of a producing well are analyzed for each resource, and are described under Section 4.18: Cumulative Effects—Potential Commercial Discovery. If a commercial discovery were made, additional NEPA analysis would occur before production or full-field development could take place.

Connected actions (as listed above) are the basis of the environmental analysis from which the leasing decisions will be made. Decisions on the lands that will be administratively available, and the subsequent decision authorizing leases, are based upon analysis of the *likely* environmental effects of the connected actions. Connected actions associated with each alternative are summarized below.

No Action Alternative

One exploratory well is projected under this alternative. Possible location of this well is unknown. Table 4.2 summarizes activities causing ground disturbance under the No Action alternative.

Table 4.2. Summary of surface disturbance for the No Action Alternative.

Activity	Amount	Acres Disturbed
Exploratory Well Pad	1	2
Light Road Construction	1 mile	2.4
Heavy Road Reconstruction	0.7 mile	2.5
Total	NA	6.9

Source: WUB FEIS.

Proposed Action and Modified Resource-based Alternatives

The following description of connected actions will be applicable for both of these action alternatives.

For exploratory wells, the disturbance associated with the construction of each well pad is estimated at two acres. Well pad facilities would include the well head, drill rig, mud tanks, pipe racks, crew facilities (e.g., dog house, trailers, chemical toilets, etc.), water and fuel tanks, space

for support vehicle parking and turnaround, and a reserve pond for produced water. Additional facilities may be required for such post-well installation activities as formation fracturing, depending on individual drilling results. When factoring in associated infrastructure, primarily access roads, it is assumed that disturbance would be approximately 5 acres. This assumption is based upon one mile of new road construction and one mile of road widening per well. Drill rig mobilization is estimated to involve road construction as well as well pad construction. Roads that are not of sufficient current width will need to be widened to a width of 20 feet to allow drilling and related equipment to pass. New roads would need to be 20-feet wide as well.

The RFDS predicts oil and gas connected actions in only six of the nine RFOGDs. However, for purposes of analysis one exploratory well and approximately 5 acres of disturbance were assumed for RFOGDs without oil and gas potential (American Fork, Upper Provo, and Vernon Groups). For RFOGDS with oil and gas potential please use Table 4.3 as a guide.

Table 4.3. Summary of projected connected actions for RFOGDs with oil and gas potential.

RFOGD	Projected number of wells	Acres Disturbed
Currant Creek	2	10
Deer Creek	1	5
Diamond Fork	1	5
Payson	1	5
Spanish Fork	1	5
Strawberry	3	15
*American Fork	1	5
*Upper Provo	1	5
*Vernon	1	5
Total	**12**	**60**

** RFOGD without oil and gas potential.*

4.1.4 Analysis of Lease Options

In addition to analyzing the effects of the connected actions associated with oil and gas leasing, resource specialists were asked to analyze the impacts that the different lease stipulations would have on their respective resources. This analysis is based on the description of SLT and leasing stipulations as they are defined in Chapter 1. The following is a summary description of these terms and the environmental protections that are afforded under each.

Standard Lease Terms

SLTs give the lessee the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove, and dispose of all the leased resource in a leasehold subject to:

- stipulations attached to the lease
- restrictions deriving from specific, nondiscretionary statutes

- such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses or users not addressed in the lease stipulations at the time operations are proposed

To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year.

The following are the standard surface use requirements, as per CFR Sec. 228.108 Appendix A to Subpart E of Part 228, that would be applied to all leases. If these are insufficient to protect a resource then additional stipulations are applied.

a. General. The operator shall conduct operations on a leasehold on National Forest System lands in a manner that minimizes effects on surface resources, prevents unnecessary or unreasonable surface resource disturbance, and that is in compliance with the other requirements of this section.

b. Notice of operations. The operator must notify the authorized Forest officer 48 hours prior to commencing operations or resuming operations following their temporary cessation (Sec. 228.111).

c. Access facilities. The operator shall construct and maintain access facilities to assure adequate drainage and to minimize or prevent damage to surface resources.

d. Cultural and historical resources. The operator shall report findings of cultural and historical resources to the authorized Forest officer immediately and, except as otherwise authorized in an approved surface use plan of operations, protect such resources.

e. Fire prevention and control. To the extent practicable, the operator shall take measures to prevent uncontrolled fires on the area of operation and to suppress uncontrolled fires resulting from the operations.

f. Fisheries, wildlife and plant habitat. The operator shall comply with the requirements of the Endangered Species Act of 1973 (16 U.S.C.1531 et seq.) and its implementing regulations (50 CFR chapter IV), and, except as otherwise provided in an approved surface use plan of operations, conduct operations in such a manner as to maintain and protect fisheries, wildlife, and plant habitat.

g. Reclamation.

    1. Unless otherwise provided in an approved surface use plan of operations, the operator shall conduct reclamation concurrently with other operations.

    2. Within one year of completion of operations on a portion of the area of operation, the operator must reclaim that portion, unless a different period of time is approved in writing by the authorized Forest officer.

    3. The operator must:

i. Control soil erosion and landslides;

ii. Control water runoff;

iii. Remove, or control, solid wastes, toxic substances, and hazardous substances;

iv. Reshape and revegetate disturbed areas;

v. Remove structures, improvements, facilities and equipment, unless otherwise authorized; and

vi. Take such other reclamation measures as specified in the approved surface use plan of operations.

h. Safety measures.

1. The operator must maintain structures, facilities, improvements, and equipment located on the area of operation in a safe and neat manner and in accordance with an approved surface use plan of operations.

2. The operator must take appropriate measures in accordance with applicable Federal and State laws and regulations to protect the public from hazardous sites or conditions resulting from the operations. Such measures may include, but are not limited to, posting signs, building fences, or otherwise identifying the hazardous site or condition.

i. Wastes. The operator must either remove garbage, refuse, and sewage from National Forest System lands or treat and dispose of that material in such a manner as to minimize or prevent adverse impacts on surface resources. The operator shall treat or dispose of produced water, drilling fluid, and other waste generated by the operations in such a manner as to minimize or prevent adverse impacts on surface resources.

j. Watershed protection.

1. Except as otherwise provided in the approved surface use plan of operations, the operator shall not conduct operations in areas subject to mass soil movement, riparian areas and wetlands.

2. The operator shall take measures to minimize or prevent erosion and sediment production. Such measures include, but are not limited to, siting structures, facilities, and other improvements to avoid steep slopes and excessive clearing of land.

Controlled Surface Use

Under CSU, use and occupancy is allowed, but identified resource values require special operational constraints that may modify the lease rights. Constraints may be physical restriction or adaptation. For example, additional requirements regarding site design may be required to offset visual impacts. By applying a CSU stipulation to certain resources and management prescriptions, the Forest Service can require additional mitigation measures than what would be required under SLT.

SLTs only allow for moving a facility 200 meters, for some resources this may not be sufficient to protect the resource. Under CSU, a facility could be located to better meet Forest Plan resource goals, standards, and guidelines.

The objective of applying a controlled surface use stipulation is to minimize the adverse effects of oil and gas exploration and development by requiring that activities be located, designed, and reclaimed in a manner that is consistent with the goals, standards, and guidelines of the 2003 UNF Land and Resource Management Plan (see the 2003 LRMP discussion in Chapter 3).

No Surface Occupancy

The NSO does not allow use or occupancy of the land surface for fluid mineral exploration or development to protect identified resource values. Access roads and pipelines are allowed.

Timing Limitation

TL is generally a seasonal restriction and prohibits surface use during specified time periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient. Activities must be suspended during the time period given.

SLTs only require suspension of 60 days, and when this appears insufficient, a TL is attached to resources that may need additional protection.

Lease Notice

LN provide more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items the lessee should consider when planning operations, *but does not impose new or additional restrictions.*

4.1.5 Analysis of Cumulative Effects

CEQ regulations require that the cumulative effects of a program be considered when evaluating potential environmental impacts for an EIS. CEQ defines cumulative effects as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).

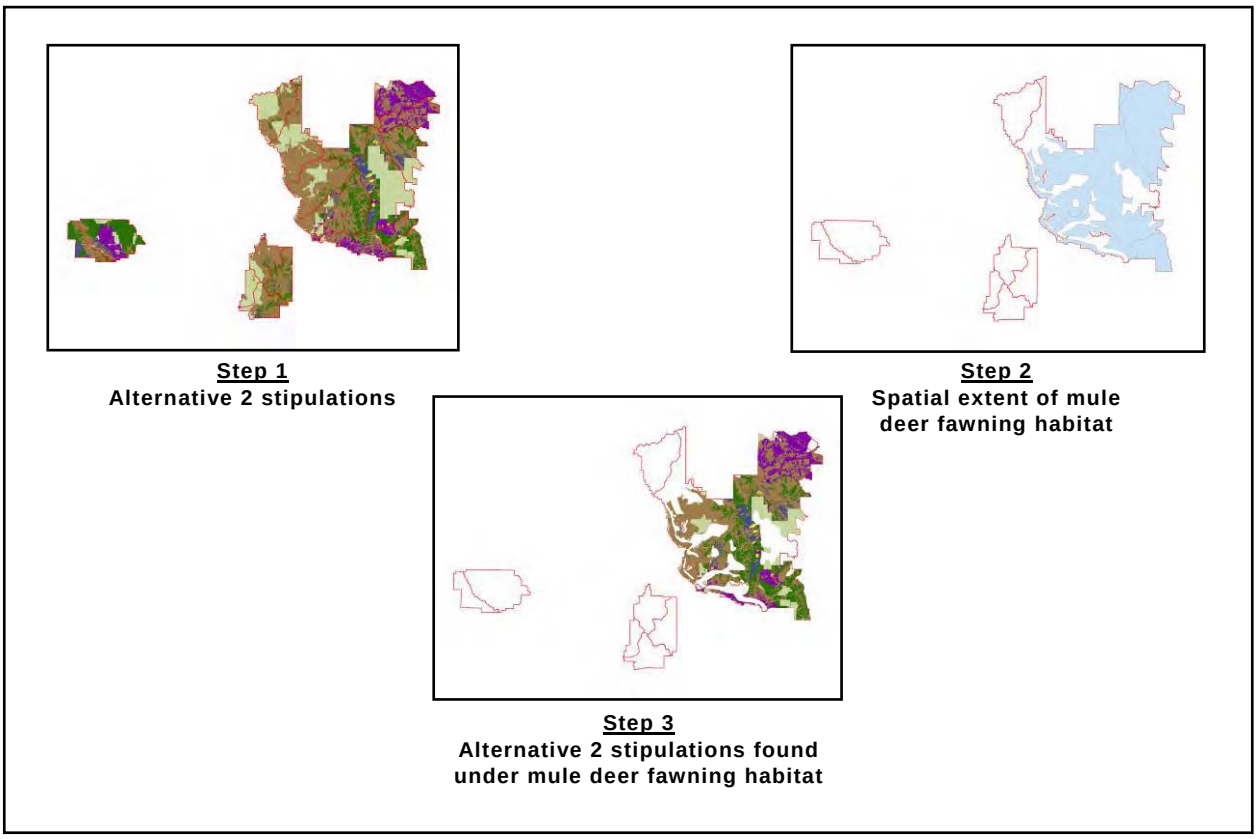
Cumulative effects most likely arise when a relationship exists between a proposed action and other actions expected to occur in a similar location during a similar time period. The geographic boundaries considered in the cumulative effects analysis will be limited to the UNF and when applicable (e.g. air resources and socioeconomics) the counties located within the UNF or surrounding the UNF, as well as water resources that are located downstream of the UNF. The timeframe considered in the cumulative effects analysis is 10–15 years.

Actions overlapping with, or in proximity to, the proposed action are most likely to have the potential to result in cumulative effects. Applicable past, present, and reasonably foreseeable future actions are described for each resource.

4.1.6 Use of GIS Data to Analyze Impacts

For the purpose of analyzing impacts to resources, GIS was used to select stipulations located in the spatial extent of particular resources. For example, steps 1-3 in figure 4.1 show the process of selecting stipulations located in mule deer fawning habitat. Acreages were then calculated by MA and RFOGD. Resource specialists used these numbers to determine the extent of impacts. These steps were used for select resources analyzed in Chapter 4.

Figure 4.1. Steps used to determine leasing stipulations acreages for select resources.



Multiple GIS layers and data sources were used to generate numbers for analysis purposes. Numbers and GIS data are not exact and may contain errors. These numbers are meant only to provide general ideas and approximations of potential impacts. **Throughout Chapter 4 all acreages given are approximate.**

4.2 Socioeconomic Resources

4.2.1 Introduction

This section provides a description of the potential impacts to socioeconomic resources (including environmental justice) in the study area that could result from implementation of the various alternatives. In general, impacts to socioeconomic resources from various oil and gas leasing alternatives would be minimal and short-term in nature.

Methodology

Sources of information on socioeconomic resources came from UNF Land and Resource Management Plan (USFS 2003), Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b), Economic Impact Analysis of the Drilling and Completion of a Natural Gas Well in the Uintah Basin (UEO 2004), the Utah Governor's Office of Planning and Budget (OPB 2006), the Utah Division of Oil, Gas, and Mining, and the U.S. Census Bureau.

Measurement Indicators

The following indicators will be used to measure the impacts that each alternative will have on socioeconomic resources:

Economics

- Change in jobs and income for oil and gas workers
- Expenditures in local economy related to oil and gas exploration and development
- Changes in revenues and disbursement to State, local, and Federal government from taxes and royalties
- Changes in jobs and income that may occur in other industries, particularly those related to UNF lands (e.g. tourism, guiding, recreation, agriculture, service)
- Sales of authorized lease parcels
- Comparative construction and maintenance costs

Social Values

- Changes in healthy functioning of ecosystems, on aesthetics, on game populations and hunting, and on the quality of recreational opportunities, measured in acres of surface disturbance resulting in loss of habitat
- Increased access for multiple use from construction of new roads, impacts of increased access includes increase in conflicts between uses, increased OHV use, and increased law enforcement needs

Environmental Justice

- Potential for land use impacts that may affect recreationists or residences within or near the UNF, cause displacement of communities, or affect existing uses where minority or low-income persons reside, work, or recreate

- Potential for conditions that pose a public health or safety risk for minority or low-income persons

4.2.2 General Effects

Under all of the alternatives, socioeconomic impacts have the potential to be both beneficial and adverse, but will likely be minor and short-term in nature due to the small number of exploratory oil and gas wells expected for any of the leasing alternatives (a maximum of 12 wells for both the Proposed Action and the Modified Resource-based Alternative, and only one projected well for the No Action Alternative).

In addition, the UNF is considered an urban forest, and many of the potential impacts (especially related to economics and population) would be very minor in relation to the large urban economies and populations adjacent to the UNF. It is important to note, however, that whatever economic effects do occur will have a larger effect if exploratory and/or production wells are drilled in more rural areas of the UNF farther from the denser populations along the Wasatch Front. As noted in Chapter 3, Section 3.2.1, in the Comprehensive Economic Analysis Area (CEAA) that includes all of the counties that the UNF is situated in, the total forest-related output is only six percent of the region's overall economy. However, in the Rural Economic Analysis Area (REAA) that excludes the urban parts of Utah County, the total forest-related output is more than double at 16 percent. Thus, any economic impacts will be felt to a greater degree in the REAA.

Potential beneficial impacts would be primarily economic in nature, and would include increased employment, income, indirect community spending, population growth, and tax revenue that would result from either the development of exploratory wells and/or production wells if recoverable amounts of oil and gas were discovered. Both the State of Utah and the counties where lease sales and drilling activities may occur would see increased revenue if exploratory and/or producing oil and gas wells were developed. Counties in Utah levy taxes on both the value of real property and the value of underground rights (the minerals severance tax) associated with oil and gas wells. The latter is based on the value of the proceeds from the sale of oil and gas production during the previous production period, less Federal, State, and Indian royalties, and windfall profit tax, if applicable. This tax is collected by the State, but a portion of the collection is returned to counties through redistribution from the general fund through a grant program.

The State also receives a split of all royalties, bonus bids, and other fees collected for use of Federally-administered lands in the State, under the provisions of the Mineral Leasing Act of 1920. For leased Federal lands, the royalty payment is 12.5 percent of the gross income of oil and gas production. The exact amount that may be paid to the State of Utah and the counties in the Analysis Area is impossible to determine at this time, due to the speculative nature of the exploratory activity that may occur in the future as a result of the leasing decision that will be made based on this study. However, as noted previously, these impacts will be relatively minor in nature due to the small number of projected exploratory wells.

Potential adverse impacts may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. These impacts may

include increases in conflicts between users of new roads constructed for drilling activities, increased Off-Highway Vehicle (OHV) use, and increased law enforcement needs. However, as noted above, these impacts are expected to be relatively minor in nature due to the small number of projected exploratory wells. In addition, the alternatives contain a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy) that will likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as to other land or users. In the Modified Resource-based Stipulations Alternative, these stipulations are more numerous and more restrictive in many locations, thus further reducing or eliminating any potential adverse impacts to these resources from drilling activities. A summary of all of the leasing stipulations is provided in table 2.6 in Chapter 2 of this DEIS.

There are no expected impacts related to Environmental Justice populations, as the counties that the UNF is situated in, as well as the recreational users of the UNF, have a nearly identical makeup to the population of the State of Utah as a whole. As noted in Chapter 2, Section 3.2.3, Utah is among the least racially-diverse States in the U.S., and the percentage of White residents in the analysis counties ranges from 92.6 to 98 percent (Table 3.2), and minorities account for only 1.5 percent of total visitation to the UNF. Utah has one of the lowest poverty rates in western U.S., and the State poverty rate is considerably lower than the national rate. There is nothing inherent in the activities associated with leasing and oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in counties that are within or surround the UNF.

4.2.3 Effects of Lease Options

This leasing option analysis describes the potential socioeconomic effects that lease options could have. Under all of the alternatives, the lessee must at a minimum follow standards and guidelines as expressed in the standard lease form (Form 3100-11; Offer to Lease and Lease for Oil and Gas) and other regulations.

No Lease: NL would result in an area not being available for oil and gas leasing and the subsequent activity related to the exploration and development of oil and gas resources would not occur. Opportunities for capital gains, effects on local revenues, housing, populations and employment would be foregone especially after existing leases expire. No adverse impacts would occur to recreational, visual, and ecosystem-health related resources.

No Surface Occupancy: NSO would require the operator to access oil and gas resources from outside the area. Directional drilling results in higher costs and a higher risk for missing the target formation. The costs and risks involved in directional drilling may preclude oil and gas exploration and development in those areas. Potential adverse impacts to recreational, visual, and ecosystem-health related impacts would likely be reduced.

Controlled Surface Use: Mitigations under CSU stipulations could result in higher road, exploration, well pad development, pipeline construction and other operating costs to the operator. In some cases, the mitigation requirements may increase costs to the point where the operator may chose not to drill in those areas. Potential adverse impacts to recreational, visual, and ecosystem-health related impacts would likely be reduced or eliminated if no drilling occurs.

Timing Limitation: TLs limit the time available for an operator to carry out exploration and development activities, which can interfere with project scheduling and the timely completion of activities, thereby spreading the project out over a longer period of time, which increases costs. A more compressed window for oil and gas exploration and development also means that the operator must employ a larger workforce for a shorter period of time, which can increase costs to the operator and cause wider fluctuations in employment. Potential adverse impacts to recreational, visual, and ecosystem-health related impacts would likely be reduced in some areas where drilling may occur.

Standard Lease Terms: SLT would have the least impact on the operating costs of oil and gas exploration and development. Mitigation measures as required in SLT may increase costs over that required when operating on non-Federal land.

4.2.4 Effects of the No Action Alternative

The effects of the No Action Alternative will generally be the same as the effects described for Alternative 3 in the Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b). Only one exploratory well is projected under this alternative, and the possible location of this well is unknown. Economically, if this well is drilled, there would be minor beneficial impacts wherever the well is drilled. The well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from the No Action Alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts will be minor as only one exploratory well is projected in the WUB FEIS Analysis Area. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as both the counties that the WUB FEIS Analysis Area is situated in, as well as the recreational users of the UNF, have a nearly identical makeup to the population of the State of Utah as a whole. As noted in Chapter 2, Section 3.2.3, Utah is among the least racially-diverse States in the U.S., and the percentage of White residents in the analysis counties ranges from 92.6 to 98 percent (Table 3.2), and minorities account for only 1.5 percent of total visitation to the UNF. Utah has one of the lowest poverty rates in western U.S., and the State poverty rate is considerably lower than the national rate. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the WUB FEIS Analysis Area, and as noted above only one exploratory well is projected under this alternative.

4.2.5 Effects of the Proposed Action Alternative

Under this alternative, there would likely be several minor beneficial and adverse impacts to socioeconomic resources. A total of 12 exploratory wells are projected to be constructed throughout the UNF in this alternative, with a total surface disruption of up to 60 acres. In addition, although not expected at this time, there may be the possibility that oil and gas discoveries will be made and development wells will be drilled. However, no specific estimate of the number and location of these wells can be made at this time. The following subsections discuss the potential impacts for each of the Reasonably Foreseeable Oil and Gas Development Groups (RFOGDs):

Currant Creek Group

There are two exploratory wells projected to be drilled in this group, although their exact location is not known at this time. Economically, if these wells are drilled, there would be minor beneficial impacts. Each well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $995,328 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664 x 2 wells = $995,328).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only two exploratory wells are projected in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Wasatch County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the UNF.

Deer Creek Group

There is one exploratory well projected to be drilled in this group, although the exact location is not known at this time. Economically, if this well is drilled, there would be a minor beneficial impact. The well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only one exploratory well is projected in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that

lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Utah County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in counties that are within or adjacent to the UNF.

Diamond Fork Group

There is one exploratory well projected to be drilled in this group, although the exact location is not known at this time. Economically, if this well is drilled, there would be a minor beneficial impact. The well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts will be minor as only one exploratory well is projected in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that will likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Utah County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the UNF.

Payson Group

There is one exploratory well projected to be drilled in this group, although the exact location is not known at this time. Economically, if this well is drilled, there would be a minor beneficial impact. The well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only one exploratory well is projected in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the counties that this group is situated in—Utah, Juab, and a small portion of Sanpete County—have a nearly

identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the UNF.

Spanish Fork Canyon Group

There is one exploratory well projected to be drilled in this group, although the exact location is not known at this time. Economically, if this well is drilled, there would be a minor beneficial impact. The well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only one exploratory well is projected in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Utah County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the UNF.

Strawberry Group

There are three exploratory wells projected to be drilled in this group, although the exact location of the wells is not known at this time. Economically, if these wells are drilled, there would be a minor beneficial impact. Each well would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $1,492,992 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664 x 3 wells = $1,492,992).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only three exploratory wells are projected in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Wasatch County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the

UNF, and as noted above only three exploratory wells are projected in this group under this alternative.

American Fork Group

While the RFDS did not cite this group as likely for exploration, this EIS considered all UNF lands as prospective. It is possible that lessees may decide to drill wells despite the current projection. Economically, for each well that may be drilled, there would be a minor beneficial impact. One potential well is analyzed, and would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only one exploratory well is analyzed in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Utah County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the UNF.

Upper Provo Group

While the RFDS did not cite this group as likely for exploration, this EIS considered all UNF lands as prospective. It is possible that lessees may decide to drill wells despite the current projection. Economically, for each well that may be drilled, there would be a minor beneficial impact. One potential well is analyzed, and would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only one exploratory well is analyzed in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Wasatch County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of

environmental justice populations that reside in the counties that are within or adjacent to the UNF.

Vernon Group

While the RFDS did not cite this group as likely for exploration, this EIS considered all UNF lands as prospective. It is possible that lessees may decide to drill wells despite the current projection. Economically, for each well that may be drilled, there would be a minor beneficial impact. One potential well is analyzed, and would likely employ 27 individuals at an average rate of $28.80/hr for 80 days, for a total wage payment of $497,664 (27 workers x $28.80/hr x 8 hr/day x 80 days = $497,664).

Potential adverse impacts from this alternative may include changes in the functioning of ecosystems, aesthetics, and the quality of recreational activities from the surface disturbance and other development associated with either exploratory or production oil and gas drilling activity. However, as noted above, these potential impacts would be minor as only one exploratory well is analyzed in this group. In addition, there are a number of lease stipulations (such as Controlled Surface Use and No Surface Occupancy restrictions) that would likely result in the reduction or elimination of these impacts in many potential well locations. These stipulations require that lessees must conduct operations in a manner that minimizes adverse impacts to land, air, water, cultural, biological, visual, and other resources, as well as other land or users.

There are no expected impacts related to Environmental Justice populations, as the county that this group is situated in—Tooele County—has a nearly identical ethnic makeup to the population of the State of Utah as a whole. There is nothing inherent in the activities associated with oil and gas drilling that would disproportionably affect the small number of members of environmental justice populations that reside in the counties that are within or adjacent to the UNF.

4.2.6 Effects of the Modified Resource-based Alternative

Under this alternative, there would likely be several minor beneficial and adverse impacts to socioeconomic resources. A total of 12 exploratory wells would be projected to be constructed throughout the UNF in this alternative, with a total surface disruption of up to 60 acres. However, these impacts are expected to be less than for the Proposed Action Alternative since additional and more restrictive lease stipulations would apply in many areas where wells may be drilled. In addition, although not expected at this time, there may be the possibility that an oil or gas discovery is made and a development drilled. However, no specific estimate of the number and location of such a well can be made at this time. The following subsections discuss the potential impacts for each of the Reasonably Foreseeable Oil and Gas Development Groups (RFOGDs):

Currant Creek Group

The Modified Resource-based Alternative would be expected to cause several minor beneficial and adverse impacts to socioeconomic resources within this group. The impacts of this alternative would be similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts will likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that would apply to areas not completely closed off to drilling. Of the 33,900 acres available for leasing in

this group, 68 percent would be subject to an NSO stipulation. The remaining 32 percent would be subject to TL or both CSU and TL stipulations.

Deer Creek Group

The Modified Resource-based Alternative would be expected to cause several minor beneficial and adverse impacts to socioeconomic resources within this group. The impacts of this alternative would be similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts will likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that would apply to areas not completely closed off to drilling. Of the 20,300 acres available for leasing in this group, 82 percent is subject to an NSO stipulation. The remaining 18 percent would be subject to TL or both CSU and TL stipulations.

Diamond Fork Group

The Modified Resource-based Alternative would be expected to cause several minor beneficial and adverse impacts to socioeconomic resources within this group. The impacts of this alternative would be similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts will likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that would apply to areas not completely closed off to drilling. Of the 11,700 acres available for leasing in this group, 70 percent is subject to an NSO stipulation. The remaining 30 percent would be subject to TL or both CSU and TL stipulations.

Payson Group

The Modified Resource-based Alternative would be expected to cause several minor beneficial and adverse impacts to socioeconomic resources within this group. The impacts of this alternative would be similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts will likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that would apply to areas not completely closed off to drilling. Of the 7,900 acres available for leasing in this group, 94 percent is subject to an NSO stipulation. The remaining six percent would be subject to TL or both CSU and TL stipulations.

Spanish Fork Canyon Group

The Modified Resource-based Alternative would be expected to cause several minor beneficial and adverse impacts to socioeconomic resources within this group. The impacts of this alternative would be similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts will likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that would apply to areas not completely closed off to drilling. Of the 15,740 acres available for leasing in this group, 50 percent is subject to an NSO stipulation. The remaining 50 percent is subject to TL or both CSU and TL stipulations.

Strawberry Group

The Modified Resource-based Alternative would be expected to cause several minor beneficial and adverse impacts to socioeconomic resources within this group. The impacts of this alternative would be similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts would likely be less due to the smaller number of

leasable acres available under this alternative, and the stricter resource stipulations that will apply to areas available for leasing. Of the 53,900 acres available for leasing in this group, 35 percent would be subject to an NSO stipulation. The remaining 65 percent would be subject to TL or both CSU and TL stipulations.

American Fork Group

There are no exploratory wells projected to be drilled in this group. The impacts of for this alternative are similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts would likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that will apply to areas available for leasing. Of the 7,600 acres available for leasing in this group, 92 percent would be subject to an NSO stipulation. The remaining eight percent would be subject to TL or both CSU and TL stipulations.

Upper Provo Group

There are no exploratory wells projected to be drilled in this group. The impacts of for this alternative are similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts would likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that will apply to areas available for leasing. Of the 26,770 acres available for leasing in this group, 44 percent would be subject to an NSO stipulation. The remaining 56 percent would be subject to both CSU and TL stipulations.

Vernon Group

There are no exploratory wells projected to be drilled in this group. The impacts of for this alternative are similar to those described for this group under the Proposed Action Alternative, with the exception that the impacts would likely be less due to the smaller number of leasable acres available under this alternative, and the stricter resource stipulations that will apply to areas available for leasing. Of the 54,050 acres available for leasing in this group, 13 percent would be subject to an NSO stipulation. The remaining 87 percent would be subject to TL or both CSU and TL stipulations.

4.2.7 Summary of Effects

Table 4.4. Comparison summary of effects: socioeconomic resources.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	N/A	No exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	No exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.
Currant Creek	One exploratory well may be located in this group. Beneficial employment, income, and population impacts are expected to be minor. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor. No environmental justice-related impacts are predicted.	Two exploratory wells are projected to be developed in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	Two exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Deer Creek	N/A	One exploratory well is projected to be developed in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	One exploratory well is projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.
Diamond Fork	One exploratory well may be located in this group. Beneficial employment, income, and population impacts are expected to be minor. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor. No environmental justice-related impacts are predicted.	One exploratory well is projected to be developed in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	One exploratory well is projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	N/A	One exploratory well is projected to be developed in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	One exploratory well is projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.
Spanish Fork Canyon	One exploratory well may be located in this group. Beneficial employment, income, and population impacts are expected to be minor. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor. No environmental justice-related impacts are predicted.	One exploratory well is projected to be developed in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	One exploratory well is projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Straw-berry	One exploratory well may be located in this group. Beneficial employment, income, and population impacts are expected to be minor. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor. No environmental justice-related impacts are predicted.	Three exploratory wells are projected to be developed in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	Three exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.
Upper Provo	N/A	No exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	No exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Vernon	N/A	No exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	No exploratory wells are projected to be drilled in this group. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.
Forest-wide	One exploratory well is expected to be drilled somewhere in the WUB FEIS Analysis Area. Beneficial employment, income, and population impacts are expected to be minor. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor. No environmental justice-related impacts are predicted.	Twelve exploratory wells are projected to be drilled forest-wide. Beneficial employment, income, and population impacts are expected to be minor, but likely larger than in the No Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely larger than in the No Action Alternative. No environmental justice-related impacts are predicted.	Twelve exploratory wells are projected to be drilled forest-wide. Beneficial employment, income, and population impacts are expected to be minor, but likely smaller than in the Proposed Action Alternative. Adverse impacts to the functioning of ecosystems, aesthetics, and the quality of recreational activities are expected to be minor, but likely smaller than in the Proposed Action Alternative. No environmental justice-related impacts are predicted.

4.2.8 Cumulative Effects

As described above, the small number of exploratory wells projected to be constructed for this project in each alternative would make a very small contribution to the cumulative effects occurring to socioeconomic resources in the study area. Any past or current activities affecting socioeconomic resources have been described in Chapter 3 and accounted for in this analysis. In addition, the UNF is currently in a “maintenance mode,” and thus no new development projects of any consequence are anticipated in the foreseeable future that would cause any measurable socioeconomic impacts.

4.3 Soils and Geologic Hazards

4.3.1 Introduction

This section provides a description of potential impacts to geologic and soil resources in the study area that could result from implementation of the various alternatives. In general, impacts to these resources within the UNF would be related to construction of temporary well pads and associated roads. Impacts would be minor to moderate and would be short-term in nature.

Methodology

Sources of existing information on soils resources came from the Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b); UNF Land and Resource Management Plan (USFS 2003a); The Vernon Ecosystem Management Plan for Vegetation (USFS 1996); and The White River Area Analysis (USFS 1996a), Strawberry Valley Area Assessment (USFS 1997), North Heber Ranger District Landscape Assessment (USFS 1999), and Diamond Fork Area Assessment (USFS 2000a).

Measurement Indicators

- Acres of surface disturbance

4.3.2 General Effects

Geology—Minerals: Exploration activities under any of the alternatives would have little or no direct impact, and no indirect impact, on other mineral development, including that associated with other leasable, locatable, or salable minerals. Any oil or gas leases and/or stipulations issued would be valid only for that resource and other mineral development could continue. Impacts would occur only if the same lands were to be developed and a first right would need to be established. Any access roads developed and maintained for oil and gas activities could provide access to areas of development for other minerals, which could facilitate their development.

Geology—Geologic Hazards: Exploration activities can create geologic hazards that could result in direct and indirect impacts to existing soil and geologic resources, affecting slope stability and the dynamic processes involved in the breakdown of rocks and the development of soils.

Mass-wasting can occur in the form of rock falls, expansion or movement of talus or scree deposits, landslides and slumps, earth, mud, and debris flows, or soil creep. Conventional construction activities on existing or potential areas of mass-wasting can remove stabilizing vegetation, add loading and vibrations of construction equipment, affect stability through conventional cut-and-fill construction, and can affect increased infiltration of destabilizing water into unstable soil/geologic material. Accelerated erosion of soil materials from disturbed areas could result from the removal of vegetation, exposure of unstable soil/geologic materials, and the creation of steeper cut or fill slopes in the unconsolidated slide material. Activation of new mass-wasting features or reactivation of an old feature could occur if the design and construction techniques used do not avoid, or mitigate, the hazards of unstable materials. Instability usually results from a sequence of events that ends with downhill movement. Mass-wasting occurs

because the forces creating movement (shear stress) exceed those resisting movement (shear strength). Factors that contribute to increasing shear stress (disturbing forces) include:

- Removal of lateral or underlying support by undercutting, by surface water or seepage erosion, or by man-made cuts and excavations.
- Increased disturbance forces of natural accumulations of surficial water, snow, or talus; and man-made pressures including weight and vibrations from heavy construction and operational equipment.
- Increased internal or subsurface water content and pressure on shear surfaces which can overcome the shear strength of the materials and allow the materials to move.

Cut-and-fill construction techniques across existing and potential areas of mass-wasting could remove support for materials and allow movement and possible loss of road access, facilities, equipment, and human lives. Movement and similar losses could also result from the improper drainage and retention of run-on waters concentrated on leveled roads and facility pads, and subsequent infiltration of potentially destabilizing water into unstable soil/geologic materials.

Canyon/valley bottoms additionally present two types of hazard to the construction and operation of oil and gas facilities:

- Sudden heavy precipitation events can produce significant debris flows. Damaging effects of debris flows on facilities located on the bottoms would likely be enhanced by the narrow width of the bottoms and the steep sides of the canyons. Well pads and access roads could be damaged or destroyed, which could release contaminants into soils and/or surface waters.
- Flow events in the narrow canyons could activate or expand gullies beneath or adjacent to facilities resulting in damage or loss of facilities.

Steep slopes: Construction and operation activities on steep slopes result in direct and indirect impacts, including removal of protective vegetative cover, excavation/disturbance of soil materials, distribution/exposure of soil materials on cut-and-fill slopes, compaction of soil materials, and capture of run-on and channelization of runoff waters. As areas of existing and potential mass-wasting are frequently associated with steep slopes, conditions for activation of significant, destructive mass-wasting events would be enhanced by oil and gas activities in such areas when combined with steep slopes.

Of particular concern on steep slopes is the loss of soil material due to disturbance where soil is exposed to the forces of water erosion. Oil and gas activities on steep slopes would contribute to accelerated erosion and loss of soil. The siting of well pads and access roads on steep slopes requires the use of cut and fill slopes to create somewhat level areas or benches to support the location of facilities. Use of cut and fill construction techniques increases the overall area of disturbance both above and below the leveled area. The steeper the slope, the more extensive the area of disturbance. Sidehill cuts and fills on slopes greater than 35 percent require extensive highwall cuts that may contribute to instability (mass-wasting) of the slopes above. Large volumes of unconsolidated soil and rock debris deposited as sidecast fill on slopes below the facility are particularly subject to accelerated erosion due to:

- Loss of structure and reduced resistance to forces of water erosion
- Steeper fill slope surface (angle of repose)
- Increased run-on from the facilities above due to compaction and steepened cut slope
- Channelized flows from releases of captured runoff from constructed facilities

Accelerated erosion would contribute to increased sediment loading of streams and reduced water quality.

Facilities located on steep slopes would create visible landscape scars. Reclamation of disturbed steep slopes would be constrained by loss of topsoil material (if not salvaged and stockpiled) and the accelerated erosion conditions created by construction and operations.

Soils: Oil and gas exploration activities could occur within areas of limited reclamation potential for the restoration of soil/vegetative productivity. This would cause direct and indirect impacts to the development area and surroundings, including:

- Loss of topsoil or soil materials in general due to sidecasting during grading and fill slope construction which places soil materials in irretrievable positions for reclamation and buries topsoils situated on slopes beneath the fill material
- Loss of topsoil/soil materials due to disturbance and subsequent wind or water erosion
- Loss of soil structure and increased compaction of soils caused by heavy equipment traveling across soils or moving soils for later reclamation use to allow construction of well pads and roads
- Disturbance in areas above timberline where soils are exposed to cold temperatures and windy conditions
- Disturbance in areas with soils which appear to be phytotoxic to many desirable plant species
- Disturbance in areas of extremely coarse-textured soils having limited water holding capacity and nutrient retention/availability

Soils occupying steep slopes or areas of existing or potential mass-wasting conditions are particularly sensitive to disturbance, accelerated erosion and soil loss, and subsequent long-term loss of soil productivity beyond the life of facilities and final reclamation.

4.3.3 Effects of Lease Options

Under all options, the lessee must at a minimum follow standards and guidelines as expressed in the standard lease form (Form 3100-11; Offer to Lease and Lease for Oil and Gas) and other regulations. These standards call for the operator to, among other requirements, construct and maintain access facilities to assure adequate drainage and to minimize or prevent damage to surface resources, control water runoff and soil erosion on roads, and close all newly constructed roads to public motorized use (with exceptions).

No Lease: NL stipulations would result in no oil and gas exploration or development activities/facilities beyond what is allowed under existing leases; therefore, no additional impact to, or removal of, current oil and gas resources would occur.

No Surface Occupancy: For NSO, directional drilling could take place from outside the study area or from other areas without a NSO stipulation, resulting in some removal of oil and gas resources. Preclusion of oil and gas activities in the study area would prevent activation or reactivation of landslides and acceleration of soil movement and erosion from these specific sources of disturbance. Frequency of landslides or accelerated rate of erosion over baseline levels would not be anticipated.

Preclusion of facilities construction in narrow canyon bottoms, particularly areas of alluvial fans, would reduce hazards to facilities from large precipitation events and associated debris flows or site undercutting and gullying.

Road building would still be allowed on NSO lands, which could cause impacts from erosion and/or sedimentation caused by the collection and channeling of water on roads, but USFS standards and guidelines for construction should prevent most potential impacts.

Standard Lease Terms: Under this management prescription, all Federal oil and gas minerals would be administratively available for leasing. Application of SLT to areas of geologic hazard, steep slopes, and erosive soils would result in the increased probability for slope failure and accelerated erosion on unstable slopes. Soil compaction would also be of concern and/or soil loss downslope to the extent that vegetative productivity is reduced in affected areas to unacceptable levels. However, an operator would be required to conduct operations using reasonable, prudent measures to protect the soil resource. In addition, an operator could be required to relocate proposed facilities by up to 200 meters, which should reduce placement of facilities in areas of geologic hazards/unstable soils. An operator may also be required to delay operation for up to 60 days, which could reduce impacts by precluding construction activities during periods of high soil moisture. Reclamation/revegetation may be required as a COA at the APD stage.

Controlled Surface Use: Under this leasing option, the Federal minerals on lands with geologic hazards, steep slopes and erosive soils would be administratively available for leasing; however, surface occupancy would be allowed only under controlled conditions designed to avoid or mitigate impacts to surface resources. The CSU stipulation would require that surface disturbing activities be located and designed to minimize the effects on unstable soils (36 CFR 228.108) and to ensure that the disturbed area can be reclaimed and slope stability maintained (36 CFR 228.108 (g)(3) and (j). Special road and well pad design by qualified geotechnical engineers or engineering geologists would consider drainage, backslope and fillslope ratios, and road grades and standards. It may not be possible in all cases to totally avoid steep slope or geologic hazard areas, and unavoidable impacts could still occur from the construction associated with oil and gas activity. Potential impacts include excessive soil disturbance, slope/surface destabilization, erosion, topsoil displacement and loss, slope failure, loss of vegetative cover, gullying, debris flows, and sedimentation of streams. CSU measures would not likely be effective for significant debris flows. It is expected that impacts from surface disturbing activities would be less than would occur under the SLT option because of the increased ability to avoid steep slopes and unstable areas and to mitigate impacts.

Timing Limitation: TL would not specifically be applied for geologic hazards, steep slopes, or unstable soils. TL stipulations for various wildlife resources would limit oil and gas construction activities to certain periods of time during the year. Impacts such as soil compaction and accelerated erosion, and landslide activation (particularly on steep slopes) would be avoided by precluding construction activities during periods of high soil moisture content in winter and spring.

4.3.4 Effects of the No Action Alternative

The following information applies to all MAs within the WUB Study Area, which would be Currant Creek, Diamond Fork, Upper Spanish Fork, Strawberry Reservoir, Willow Creek, and White River.

Under the No Action Alternative, management of the UNF with regard to oil and gas leasing would continue with the present direction. Current oil and gas leasing management on the UNF was determined in 1997 based on NEPA analysis outlined in the Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b). The Proposed Action (Alternative 3: Forest Intent) was the chosen alternative and currently dictates oil and gas leasing on the UNF (WUB FEIS ROD).

Considering the reasonably foreseeable development scenario under Alternative 3 in the WUB (USFS 1997b), 6.9 acres of vegetation would be disturbed for an exploratory well pad (2.0 acres), including 1.7 miles of new roads within the WUB Study Area. “Light” road reconstruction would occur on one mile of road (2.4 acres) and “heavy” road construction (i.e., new road construction) would occur on the remaining 0.7 miles (2.5 acres). The location of this well is unknown.

Steep slopes (>35°) and areas identified as geologic hazards/erosive slopes are covered by the NSO stipulation. No well pads or facilities could be placed within these areas. Road building would still be allowed on NSO lands, which could cause impacts due to erosion and/or sedimentation caused by the collection and channeling of water on roads. However, all new roads must be designed, constructed, and maintained by the operator in a safe and environmentally responsible manner, according to Gold Book standards and USFS Manual standards (BLM/USFS 2006 and FSM 2840). Any road that is constructed is required to be reclaimed once the well pad is removed. Existing roads that are upgraded to allow passage of drilling equipment may or may not be reclaimed after exploration.

Of the approximately 197,000 acres of leasable land in all the MAs covered by the WUB, 47 percent have a NSO stipulation. The remaining 53 percent is subject to SLT, TL, or CSU stipulations.

The direct adverse effects of 6.9 acres of disturbance required to construct one well pad and construct and improve associated roads would be short-term and minor. These effects would be as described in 4.1.3, General Effects, above. Indirect effects would also be described in 4.1.3, General Effects, above.

4.3.5 Effects of the Proposed Action Alternative

Under this alternative there are expected to be effects to soils resources as a result of oil and gas exploration activities. Adverse impacts would be short-term and minor. Areas identified with geologic hazards, unstable soils, or steep slopes (>35°) are covered by NSO stipulations and should in large part not be affected. Road building would still be allowed on NSO lands, which could cause impacts due to erosion and/or sedimentation caused by the collection and channeling of water on roads. However, all new roads must be designed, constructed, and maintained by the operator in a safe and environmentally responsible manner, according to Gold Book standards and USFS Manual standards (BLM/USFS 2006 and FSM 2840). Any road that is constructed is required to be reclaimed once the well pad is removed. Existing roads that are upgraded to allow passage of drilling equipment may or may not be reclaimed after exploration.

Based on the RFDS, direct impacts would include construction of up to twelve well pads and facilities of two acres each (24 acres total) and construction of up to three acres of access roads per well (36 acres total). Each well site would thus impact 5 acres.

Direct effects would be as described in 4.1.2 and 4.1.3 above. Indirect effects could include off-site erosion, loss of soil resources, channelized flows, instability, and mass-wasting, especially if roads were constructed on steep slopes. These are further described in 4.1.2 above.

Currant Creek Group

The Currant Creek Group includes the Currant Creek and the West Fork Duchesne MAs. There is potential for seismic surveys in this group and a projection of two possible exploration wells (see RFDS). Direct and indirect effects from ten acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Deer Creek Group

The Deer Creek Group is made up of Deer Creek Reservoir, Hobble Creek, and Lower Provo MAs. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Diamond Fork Group

This RFOGD is made up solely of the Diamond Fork MA. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Payson Group

This RFOGD is made up of the Payson, Mona, Nephi, and Thistle MAs and is located south of Utah Lake. There is ongoing seismic survey work in this group and a projection for one possible well (see RFDS). Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Spanish Fork Canyon Group

This RFOGD is made up solely of the Upper Spanish Fork MA. There is potential for seismic surveys in this group and a projection for one well (see RFDS). Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Strawberry Group

This RFOGD is made up of the Strawberry Reservoir, Willow Creek, and White River MAs. There is potential for seismic surveys in this group and a projection for three possible wells (see RFDS). Direct and indirect effects from fifteen acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

American Fork Group

The American Fork Group includes only the American Fork MA. While the RFDS indicates no potential for seismic surveys or exploration drilling within this group, for analysis purposes it is assumed that there could be one exploratory well in this group. Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Upper Provo Group

This RFOGD is made up solely of the Upper Provo MA. While the RFDS indicates no potential for seismic surveys or exploration drilling within this group, for analysis purposes it is assumed that there could be one exploratory well in this group. Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

Vernon Group

The Vernon RFOGD is made up of the Vernon and West Sheeprock MAs and is located in the Great Basin province, west of other portions of the UNF. While the RFDS indicates no potential for seismic surveys or exploration drilling within this group, for analysis purposes it is assumed that there could be one exploratory well in this group. Direct and indirect effects from five acres of disturbance would be as described in 4.1.2 and 4.1.3 above. Impacts to this RFOGD would be minor to moderate and short-term in nature.

4.3.6 Effects of the Modified Resource-based Alternative

As with the Proposed Action, areas identified with geologic hazards, unstable soils, or steep slopes (>35°) are covered by NSO stipulations under this alternative. The RFDS for this alternative is also the same as for the Proposed Action Alternative. As such, impacts to geologic and soils resources under the Modified Resource-based Alternative would be the same as described under the Proposed Action Alternative.

4.3.7 Summary of Effects

Table 4.5. Comparison summary of effects: Soils and geologic hazards.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	No leasing would occur. Not included in existing leasing EIS (WUB).	No wells are projected, but for analysis purposes one well is assumed. Five acres would be directly disturbed. This could cause localized sedimentation, erosion and scarring. Revegetation would be difficult. Effects are expected to be minor to moderate and short-term.	Same as the Proposed Action Alternative.
Currant Creek	The disturbance caused by road and pad building activities resulting from one projected well (which may or may not be located in this RFOGD) is estimated to be 6.9 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be minor and short-term	The disturbance caused by road and pad building activities resulting from two projected wells is estimated to be 10.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be minor to moderate and short-term.	Same as the Proposed Action Alternative.
Deer Creek	No leasing would occur. Not included in existing leasing EIS (WUB).	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 5.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be minor and short-term.	Same as the Proposed Action Alternative.
Diamond Fork	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 6.9 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be minor and short-term.	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 5.0 acres. This could cause localized sedimentation and erosion. Revegetation would be difficult. Effects could be minor to moderate and long-term.	Same as the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	No leasing would occur. Not included in existing leasing EIS (WUB).	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 5.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be moderate and short-term.	Same as the Proposed Action Alternative.
Spanish Fork Canyon	The disturbance caused by road and pad building activities resulting from one projected well (which may or may not be located in this RFOGD) is estimated to be 6.9 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulation and effects are expected to be minor and short-term.	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 5.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be moderate and short-term.	Same as the Proposed Action Alternative.
Straw-berry	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 6.9 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulation and effects are expected to be minor and short-term.	The disturbance caused by road and pad building activities resulting from three projected well is estimated to be 15.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulation and effects are expected to be moderate and short-term.	Same as the Proposed Action Alternative.
Upper Provo	No leasing would occur. Not included in existing leasing EIS (WUB).	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 5.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be minor and short-term.	Same as the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Vernon	No leasing would occur. Not included in existing leasing EIS (WUB).	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 5.0 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulations and effects are expected to be minor to moderate and short-term.	Same as the Proposed Action Alternative.
Forest-wide	The disturbance caused by road and pad building activities resulting from one projected well is estimated to be 6.9 acres. This could cause localized sedimentation and erosion. This would be minimized by following lease stipulation and effects are expected to be minor and short-term.	The disturbance caused by road and pad building activities resulting from 12 projected wells and one exploration well is estimated to be 61.2 acres. This could cause localized sedimentation, erosion and scarring on steep slopes. This would be minimized by following lease stipulations and overall effects are expected to be minor to moderate and short-term in almost all cases.	Same as the Proposed Action Alternative.

4.3.8 Cumulative Effects

Currently, there are approximately 197,000 acres open to leasing on the UNF, which is 22 percent of the total forest area of 897,400 acres. The Proposed Action Alternative would increase leasable lands to approximately 777,300 acres, which is 87 percent of the forest. The Modified Resource-based Alternative would increase leasable lands to 224,550 acres, which is 25 percent of the total forest area. The RFDS for Alternative 1 predicts one well on the forest affecting 6.9 acres including support systems such as roads. Alternatives 2 and 3 predict one well per RFOGD, except in Currant Creek (2 wells) and Strawberry (3 wells). Each of these wells would affect 5 acres including support systems, for a total disturbance area of 60 acres. These 12 wells would be spread over the 897,400 acres of forest, or 0.01 percent of the forest affected by this development. Therefore, considering past, present, and reasonably foreseeable actions on the Forest, the incremental impact of any of these alternative would be negligible.

Cumulative impacts may occur in areas with significant previous impact, such as Diamond Fork, under any of the Alternatives listed. The Diamond Fork has been significantly impacted by overgrazing in the early to mid 20th century, uncontrolled surface flows from irrigation water and construction of water control structures, and construction of more modern water conveyances. Combined with dry conditions and somewhat droughty soils, the cumulative effects of development here are more significant than in less brittle environments. However, the size of the proposed development (5 acres) compared to the size of the RFOGD as a whole is still minor and negative cumulative effects would be unlikely.

Past, Present, and Reasonably Foreseeable Actions

A total of 30 wells have been drilled on the Forest or within its boundaries in the past; all having been plugged and abandoned. Nothing in the available geologic information for the UNF suggests that oil fields or reservoirs similar to highly productive fields found in central Utah or Southwestern Wyoming/Utah are present beneath the UNF. However, future development cannot be ruled out. In the eastern part of the UNF, where Tertiary and Cretaceous rocks occur on the surface as they do in the Southwestern Wyoming/Utah fields, recent work by the Utah Geological Survey has postulated a trend or fairway in the Navajo/Nuggett and/or Twin Creeks Formations in the subsurface east of the Charleston-Nebo thrust system in Utah and Wasatch Counties (National Energy Technology Laboratory 2006 and Chidsey and Sprinkel 2005 in RFDS). This trend is highly speculative and is not supported by any drill hole stratigraphic or lithologic data, but instead appears to be aligned with the surface trace of major thrust faults that have been mapped in the region (see RFDS).

There is much uncertainty regarding future oil and gas development on the UNF. Nearly all of the UNF has been assumed to be prospective for oil and gas exploration. Potential for additional seismic surveys exists for the Currant Creek, Deer Creek, Diamond Fork, Payson, and Strawberry Groups. Interest in Overthrust Belt-related oil and gas exploration activities in the eastern Great Basin in Utah and Nevada may lead to seismic activity in the Vernon Group. No exploration drilling is anticipated to occur during the 10 to 15-year period on this group due to the lack of known oil or gas reservoirs in the eastern Great Basin of Utah. No seismic surveys or exploration drilling are anticipated to occur in the American Fork and Upper Provo Groups (see RFDS).

If commercial quantities of natural gas were to be found on the UNF, a gathering system and pipeline link to the nearest regional gas transmission line with available capacity would need to be installed. It is assumed that even if a natural gas discovery is made, commercial production would require multiple producing wells prior to pipeline construction, which may not occur during the 10-15 year period for which this evaluation is to apply (see RFDS).

If a commercial oil discovery was made, production could begin soon after completion and well testing. This would require installation of such facilities as product tanks, produced water tanks, separators, and flare pits, if required. Site restoration would also begin by drying the reserve pit, disposing of any contaminated soils in the pit, backfilling the pit, replacing salvaged topsoil, and revegetating the pit site. Product would be stored in on-site tanks and oil would be hauled by truck to a refinery. This would require widening access roads to 30 feet excluding cut and fill at each discovery location. The two miles of access road estimated for each exploration well would be widened by an additional 10 feet, resulting in an additional disturbance of 1.2 acres of road disturbance per producing oil well. This additional disturbance might be offset to some degree by reclamation of reserve pits and other parts of the well pad.

In addition to crude oil, produced water would also be trucked from the producing well site and transported to a commercial produced water management facility. Crude oil and produced water truck traffic could result in multiple trips per day, round the clock or as few as several trips per week, depending on well production rates. Well pads, facilities, and some roads would be reclaimed upon the end of well production (RFDS).

Cumulative Effects of the No Action Alternative

Road widening, construction, and well pad construction for one exploratory well covering a total of seven acres should have no effect on the forest as a whole in terms of soils and geologic resources as long as required stipulations and forest plan standards are maintained, except as noted under the introduction to this section.

It is unlikely that other mineral resources would be affected by the siting of a single exploratory well. If this well were to result in a commercial discovery, further analysis of newly available information would be required to determine the extent of impact due to full-field development.

Cumulative Effects of the Proposed Action Alternative

Seismic activities may take place in the Vernon RFOGD, but are unlikely to take place in the American Fork or Upper Provo RFOGDs during the life of this plan. Seismic activities, if they occur, would have no effect and no long-term impacts on soils on geological resources due to the brief time of impact, and low level of disturbance associated with modern seismic work.

Road widening, construction, and well pad construction for up to 12 exploratory wells should have no effect on the forest as a whole in terms of soils and geologic resources as long as required stipulations and forest plan standards are maintained, although some localized cumulative impacts would occur, as noted under the introduction to this section.

Although it is unlikely, other mineral resource development may experience minor adverse effects from the proposed exploratory oil and gas development if proposed activities overlie other mineral claims, sale, or lease areas. However, the prevalence of NSO and CSU stipulations that require more flexible well pad siting, and the option to move drilling pads 200 meters from the approved site should minimize any issues with competing development.

If any wells drilled resulted in a commercial discovery, further analysis of newly available information would be required to determine the extent of impact due to full-field development.

Cumulative Effects of the Modified Resource-based Alternative

Seismic activities may take place in the Vernon RFOGD, but are unlikely to take place in the American Fork or Upper Provo RFOGDs during the life of this plan. Seismic activities, if they occur, would have no effect and no long-term impacts on soils on geological resources due to the brief time of impact, and low level of disturbance associated with modern seismic work.

Road widening, construction, and well pad construction for up to 12 exploratory wells should have no effect on the forest as a whole in terms of soils and geologic resources as long as required stipulations and forest plan standards are maintained, although some localized cumulative impacts could occur, as noted under the introduction to this section.

Although it is unlikely, other mineral resource development may experience minor adverse effects from oil and gas development if proposed exploration activities overlie other mineral claims, sale, or lease areas. However, the prevalence of NSO and CSU stipulations that require more flexible well pad siting, and the option to move drilling pads 200 meters from the approved site should minimize any issues with competing development.

If any wells drilled resulted in a commercial discovery, further analysis of newly available information would be required to determine the extent of impact due to full-field development.

4.4 Transportation

4.4.1 Introduction

This section provides a description of potential impacts to the transportation system in the study area that could result from implementation of the various alternatives. In general, impacts on the transportation system and traffic levels within the UNF would be related to construction of temporary well pads and would be short-term in nature.

Methodology

Sources of existing information on transportation resources came from UNF Land and Resource Management Plan (USFS 2003a), Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b), Highway Freight Traffic Associated with the Development of Oil and Gas Wells (UDOT 2006), Traffic On Utah Highways (UDOT 2005), UNF Traffic Count Data (USFS 2006a), and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development Gold Book (BLM/USFS 2006).

To estimate traffic counts on highways within the management groups, traffic count data from the UNF and UDOT (see Chapter 3) were used. For UNF traffic counts, data from the time period during which oil and gas exploration is most likely to occur were chosen (i.e., summer months). The total number of days within that time period was divided by the total traffic counts for that time period to achieve an average daily traffic count.

Measurement Indicators

The following indicators were used to quantify and qualify the impacts that each alternative could have on the transportation system:

- Miles of roads constructed or maintained
- Changes in motorized traffic
- Seasonal restrictions in road access

4.4.2 General Effects

Under any of the alternatives, impacts to county and forest roads would primarily include construction or reconstruction of roads and increased levels of traffic using these roads. Impacts to county and forest roads may be either beneficial or adverse. Beneficial impacts would include improvement of existing roads (such as adding or improving drainage, grading, improving surface condition) and overall improvement of the transportation system (i.e., planning road locations and types efficiently to meet UNF access needs). Also, through the UNF roads analysis process, the UNF will determine if any potential temporary roads will have beneficial long-term uses. In such an event, beneficial temporary roads may be added to the NFS roads system when the process identifies the need. Adverse impacts would be related to additional surface disturbance, an increase in traffic volumes, and increased access to previously undisturbed areas.

If well pads are constructed, the disturbance associated with such construction is estimated at two acres per well. When factoring in associated construction and reconstruction of access roads,

it is assumed that disturbance could be approximately 5 acres per well. This assumption is based upon one mile of new road construction and one mile of road widening per well. Drill rig mobilization is estimated to involve road construction along with well pad construction. All new roads must be designed, constructed, and maintained by the operator in a safe and environmentally responsible manner, according to Gold Book standards and Forest Service Manual standards (BLM/USFS 2006 and FSM 2840). Roads that are not of sufficient current width would need to be widened to a width of 20 feet to allow drilling and related equipment to pass. New roads would need to be 20 feet wide as well. All new or widened roads would be fitted with culverts at stream crossings, drainage ditches, water bars, and surfaced with gravel or a hardened surface to reduce or minimize erosion.

The impacts of new roads would be short-term in nature. The sites and access roads for wells that do not result in a discovery and on which the wells are plugged and abandoned would be reclaimed, resulting in net zero disturbance after reclamation has been completed. Interim reclamation consists of reclaiming portions of the road not needed for vehicle travel. Wherever possible, cut slopes, fill slopes, and borrow ditches would be covered with topsoil and revegetated to restore habitat, forage, scenic resources, and to reduce soil erosion and maintenance costs. Final reclamation includes recontouring the road back to the original contour, seeding, controlling noxious weeds, and may also include other techniques to improve reclamation success, such as ripping, scarifying, replacing topsoil, placing waterbars, pitting, mulching, redistributing woody debris, and barricading. (BLM/USFS 2006)

In addition to surface disturbance and the construction of temporary access roads, increased traffic volume would also have an impact on transportation. Drilling a new exploration well involves the following steps and the amount of truck traffic volume associated with each step is summarized below (UDOT 2007):

- **Fresh Water:** Fresh water is an essential element in well drilling. Two large ponds must be constructed for each well. It usually takes at least 25 truckloads of water to fill these ponds initially. Depending upon the depth of the well, anywhere from 100 to 1,000 loads of fresh water would need to be trucked into the well site during the course of drilling. This water may come from a local stream, such as the Provo or Strawberry Rivers, or from wells that are in the area.

- **Waste Disposal:** Water used in drilling comes out of the well along with waste rock that is deposited into one of the two reserve ponds. This waste water/rock combination must be trucked to approved treatment and disposal sites. Between 50 and 100 truckloads of waste must be removed during the drilling process.

- **Drill Mud:** Between 10 and 20 loads of “Bar and Gel” is trucked to the drill site to be mixed with water to make drill mud. The “Bar” stands for barite and the “Gel” is made-up of bentonite from Wyoming. Drill mud is a fluid used for removing rock cuttings from the bore and may vary in make-up depending upon the depth of the well and the nature of the rock strata being penetrated.

- **Well Casing:** Once the well is drilled, well casing is brought to serve as the inner liner for the well. Well casing is very heavy and the average truck carries enough to line only 1,800 feet of well. Most wells have several casings of varying diameter placed one within another. Up to 10 truckloads of well casing may be needed per well.

- **Cement Powder:** Between two and 5 truckloads of cement are needed for each new well. Cement is forced into the drill hole to fill the gaps in the rock strata outside the well casing. This serves to anchor the casing in the hole and prevent gases from literally blowing the casing out of the well. Fly ash is also used in this process, being mixed with the cement, which involves two to four truckloads per well.

During the process of drilling each well, an average of 10 truckloads of equipment must be brought in to keep the drilling operations going. This involves loads containing fuel, pipe, replacement pumps and motors, etc.

Once the well is drilled, about 30 truckloads are needed to remove all of the equipment that has been brought in for that purpose.

Generally, the total number of truckloads required from setup to the removal of the drill rig and closure of the reserve pits would range from 287 to 1285 (UDOT 2007). The variance is largely due to the differing needs for truckloads of fresh water. Depending upon the depth of the well, anywhere from 100 to 1,000 loads of fresh water would need to be trucked into the well site during the course of drilling.

The average number of trucks needed per day of exploration activity would be about 53. This number could vary depending upon the depth of the well being drilled. Additionally, the number of truckloads per day would vary according to activities related to different phases of exploration. Table 4.6 shows a general breakdown of the average number of days needed to establish each well.

Table 4.6. Required truck usage.

Activity	Trucks	Days	Trucks per day per well
Setup	60	3	20
Drilling	800	14	57
Removal	190	3	63
Total/Average	**1,050**	**20**	**140**

Source: UDOT 2006.

Increased traffic volume from oil and gas exploration activities would have the most impact on roads that experience relatively small amount of traffic. In general, NFS roads would experience more impacts to traffic than County, State, or Federal roads.

4.4.3 Effects of Lease Options

Under all options the lessee must at a minimum follow standards and guidelines as expressed in the standard lease form (Form 3100-11; Offer to Lease and Lease for Oil and Gas) and other regulations. These standards call for the operator to, among other requirements, construct and maintain access facilities to assure adequate drainage and to minimize or prevent damage to surface resources; control water runoff and soil erosion on roads; and close all newly constructed roads to public motorized use (with exceptions).

No Lease and No Surface Occupancy: NL and NSO would result in no new well pad construction, but would allow new access roads to be built. Therefore, these stipulations may allow effects to roads or expansion of the existing transportation system from oil and gas leasing.

Standard Lease Terms: SLTs give the lessee the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove, and dispose of all the leased resource in a leasehold subject to:

- Stipulations attached to the lease
- Restrictions deriving from specific, nondiscretionary statutes
- Such reasonable measures as may be required by the authorized officer to minimize adverse impacts to other resource values, land uses, or users not addressed in the lease stipulations at the time operations are proposed

To the extent consistent with lease rights granted, such reasonable measures may include, but are not limited to, modification to siting or design of facilities, timing of operations (i.e., restricting road building activities during fawning periods for deer), and specification of interim and final reclamation measures. At a minimum, measures shall be deemed consistent with lease rights granted provided that they do not: require relocation of proposed operations by more than 200 meters; require that operations be sited off the leasehold; or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year.

Controlled Surface Use: This stipulation controls drilling and well pads, and only indirectly affects road management and operations. Road construction and operation are governed by decisions made at the APD phase, and must be congruent with the Forest Plan. Use and occupancy is allowed, but identified resource values require special operational constraints that may modify the lease rights. Constraints may be physical restriction or adaptation. For example, CSU stipulations related to well sites may indirectly affect road building activities that may disturb sensitive wildlife and plant species, Semi-Primitive Non-Motorized or Roadless areas, and areas with Retention and Partial Retention Visual Quality Objectives. By applying a CSU stipulation to certain resources and management prescriptions the USFS could require additional mitigation measures than what would be required under an SLT.

Timing Limitation: This stipulation also controls drilling and well pads, and only indirectly affects road management and operations. Road construction and operation are governed by decisions made at the APD phase, and must be congruent with the Forest Plan. Road building operations may also be affected during times when deer and elk are using an area for range, calving habitat, or fawning habitat. Management areas that have TL stipulations due to wildlife issues include Upper Provo, West Fork Duchesne, Diamond Fork, Upper Spanish Fork Canyon, Hobble Creek, White River, Mona, Nephi, Deer Creek Reservoir, Payson, Thistle, Strawberry Reservoir, Willow Creek, Currant Creek, and Vernon. There are no transportation-specific TL stipulations under any of the alternatives, but TL stipulations may result in temporary closure of roads during certain times of the year (i.e., spring thaw) when traffic would cause roadway deterioration. Operators may be allowed to rebuild or improve roads as an alternative to seasonal shutdowns. Other guidance for the design and location of roads are determined by stipulations applied to a lease for resources such as soils, water quality, and wildlife habitat.

4.4.4 Effects of the No Action Alternative

The effects of the No Action Alternative would generally be the same as the effects described for Alternative 3 in the Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b). Only one well is projected under this alternative. Possible location of this well is unknown. The disturbance caused by road building activities resulting from this well is estimated to be one mile of light road construction and 0.7 mile of heavy road construction, for a total of 4.9 acres of disturbed area. Road use would possibly be restricted in TL and CSU stipulation areas for resource protection during the APD review process. Maintenance of roads would be required where there is long-term use, but no long-term use is predicted in any of the alternatives.

Stipulation information for each of the MAs covered in the No Action Alternative is presented in table 4.7.

Table 4.7. Approximate acres of leasable land by MA, including stipulation breakdown.

MA	Acres of leasable land	% of leasable land with NSO stipulation	% of leasable land with SLT, TL, or CSU stipulations
Currant Creek	1,379	64	36
Diamond Fork	67,489	62	38
Upper Spanish Fork	39,887	50	50
Strawberry Reservoir	40,815	17	83
Willow Creek	23,111	58	42
White River	23,958	28	72

Of the approximately 197,000 acres of leasable land in all the management areas, 47 percent has NSO stipulation. The remaining 53 percent is subject to SLT, TL, or CSU stipulations. The potential effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

Traffic count information for the MAs affected by the No Action Alternative would be the same as described in the Proposed Action Alternative below.

4.4.5 Effects of the Proposed Action Alternative

Under this alternative, effects to the transportation system would result from oil and gas exploration activities. Twelve wells pads are projected to be constructed within the UNF. Each of these wells would require the construction of access roads. Any road that is constructed is required to be reclaimed once the well pad is removed. There would also be an increase in traffic on roads within the UNF as construction equipment is transported to and from the well site. Therefore, adverse effects are expected to result under this alternative, but these effects are expected to be short-term and minor.

Currant Creek Group

The Proposed Action is expected to have short-term minor adverse effects within the Currant Creek Group resulting from well pad construction and the accompanying construction of access roads. There is potential for seismic surveys in this group and a projection for two possible

exploration wells (see RFDS). Possible locations of the wells are unknown. If the wells are built they would require approximately two miles of new road construction and two miles of road widening, resulting in approximately six acres of road-related disturbance.

The two miles of new road projected to be built would be temporary in nature and would not greatly augment the 86 miles of classified roads already existing within the management group.

Wells in the Currant Creek Group could range from 15,000 to 20,000 feet in average depth. An average of 45 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections.

To provide an idea of how oil and gas exploration activities might adversely affect traffic on the roads within this group, Table 4.8 contains traffic count information for prominent roads in the area.

Table 4.8. Average daily traffic: Currant Creek.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (2 wells)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
Lake Creek	June 2002-August 2002	113	105	218	93
Utah 35 Duchesne/Wasatch County Line	2005	275	105	380	38

As table 4.8 shows, traffic on Lake Creek Road could experience a sharp, 93 percent increase. The large increase in traffic on Lake Creek road is due to its already relatively low average daily traffic count of 113. This large increase could result in adverse impacts to traffic in the area, however this increase in traffic would only occur over a short time period. The traffic on Utah 35 could experience a less drastic, 38 percent increase.

Of the approximate 83,700 acres of leasable land in this group, 63 percent has NSO stipulation. The remaining 37 percent is subject to SLT, TL, or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and Lynx Analysis Units. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Deer Creek Group

The Proposed Action is expected to have short-term adverse effects within the Deer Creek Group resulting from well pad construction and the accompanying construction of an access road. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. If the well is built it would require approximately one mile of new road construction and one miles of road widening, resulting in approximately three acres of road-related disturbance.

The two miles of road projected to be built would be temporary in nature and would not greatly augment the 157 miles of classified roads already existing within the management group.

Wells in the Deer Creek Group could range from 10,000 to 12,000 feet in average depth, and as shallow as 5,000 feet. An average of 10 to 15 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

To provide an idea of how oil and gas exploration activities might adversely affect traffic on the roads within this group, table 4.9 contains traffic count information for a prominent road in the area:

Table 4.9. Average daily traffic: Deer Creek.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (1 well)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
US Highway 189 Wasatch/Utah County Line	2005	9,230	53	9,283	1
Utah 92 Aspen Grove-Junction with Highway 189	2005	385	53	438	14

As table 4.9 shows, traffic on both US Highway 189 and Utah 92 could experience relatively insignificant increases of one percent and 14 percent, respectively. The insignificant increase expected on US Highway 189 is a result of its already high average daily traffic count of 9,230.

Of the approximate 167,400 acres of leasable land in this group, 88 percent has NSO stipulation. The remaining 12 percent is subject to SLT, TL, or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and critical deer winter range. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

Diamond Fork Group

The Proposed Action is expected to have short-term adverse effects within the Diamond Fork Group resulting from well pad construction and the accompanying construction of an access road. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. If the well is built it would require approximately one mile of new road construction and one mile of road widening, resulting in approximately three acres of road-related disturbance.

The one mile of new road projected to be built would be temporary in nature and would not greatly augment the 110 miles of classified roads already existing within the management group.

Wells in the Diamond Fork Group could range from 10,000 to 12,000 feet in average depth, and as shallow as 5,000 feet. An average of 10 to 15 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

Of the approximate 97,000 acres of leasable land in this group, 64 percent have NSO stipulation. The remaining 36 percent is subject to SLT, TL, or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and critical deer winter range. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

There are no traffic count data available for this group.

Payson Group

The Proposed Action is expected to have short-term adverse effects within the Payson Group resulting from well pad construction and the accompanying construction of an access road. There is ongoing seismic survey work in this group and a projection for one possible well (see RFDS). Possible locations of the well are unknown. If the well is built it would require approximately one mile of new road construction and one mile of road widening, resulting in approximately three acres of road-related disturbance.

The one mile of new road projected to be built would be temporary in nature and would not greatly augment the 103 miles of classified roads already existing within the management group.

Wells in the Payson Group could range from 10,000 to 12,000 feet in average depth, and as shallow as 5,000 feet. An average of 10 to 15 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

To provide an idea of how oil and gas exploration activities might adversely affect traffic on the roads within this group, table 4.10 contains traffic count information for prominent roads in the area:

Table 4.10. Average daily traffic: Payson.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (1 well)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
Mona Pole Road	July 2005 - September 2005	20	53	73	265
Salt Creek Road	May 2005- August 2005	143	53	196	37

As table 4.10 shows, Mona Pole Road could experience a substantial, 265 percent increase in traffic. This increase is due to the already relatively low average daily traffic count on this road of 20 vehicles per day. Salt Creek Road could experience a less significant, 37 percent increase in traffic due to its already existing average daily traffic count of 143.

Of the approximate 92,500 acres of leasable land in this group, 77 percent has NSO stipulation. The remaining 23 percent is subject to SLT, TL, or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and

critical deer winter range. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

Spanish Fork Canyon Group

The Proposed Action is expected to have short-term adverse effects within the Spanish Fork Group resulting from well pad construction and the accompanying construction of an access road. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. If the well is built it would require approximately one mile of new road construction and one mile of road widening, resulting in approximately three acres of road-related disturbance.

The two new miles of road projected to be built would be temporary in nature and would not greatly augment the 46 miles of classified roads already existing within the management group.

Wells in the Spanish Fork Group could range from 10,000 to 12,000 feet in average depth, and as shallow as 5,000 feet. An average of 10 to 15 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

To provide an idea of how oil and gas exploration activities might affect traffic on the roads within this group, table 4.11 contains traffic count information for a prominent road in the area:

Table 4.11. Average daily traffic: Spanish Fork Canyon.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (1 well)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
US Highway 6 @ Sheep Creek Road	2005	6,565	53	6,618	1

As table 4.11 shows, US Highway 6 at Sheep Creek Road could experience an insignificant, one percent increase in traffic. This small increase is due to the already high average daily traffic count of 6,565.

Of the approximate 44,300 acres of leasable land in this group, 53 percent has NSO stipulation. The remaining 47 percent is subject to SLT, TL, or CSU stipulations. The effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

Strawberry Group

The Proposed Action is expected to have short-term adverse effects within the Strawberry Group resulting from well pad construction and the accompanying construction of access roads. There is potential for seismic surveys in this group and a projection for three possible wells (see RFDS). Possible locations of the wells are unknown. If the wells are built they would require approximately three miles of new road construction and three miles of road widening, resulting in approximately nine acres of road-related disturbance.

The three miles of new road projected to be built would be temporary in nature and would not greatly augment the 280 miles of classified roads already existing within the management group.

Wells in the Strawberry Group could range from 10,000 to 20,000 feet in average depth. Depending on the depth of the well, an average of 10 to 45 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

To provide an idea of how oil and gas exploration activities might affect traffic on the roads within this group, table 4.12 contains traffic count information for prominent roads in the area:

Table 4.12. Average daily traffic: Strawberry.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (3 wells)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
COOP Creek	July 2005-November 2005	80	158	238	198
West Strawberry Road	July 2005-November 2005	475	158	633	33
US Highway 40 @ Daniels Summit	2005	4,135	158	4,293	4
US Highway 40 @ Road Right to Strawberry Camp	2005	2,765	158	2,923	6

As table 4.12 shows, COOP Creek Road could experience a substantial, 198 percent increase in traffic. This increase is due to the already relatively low average daily traffic count of 80. West Strawberry Road could experience a 33 percent increase in traffic. Due to their already relatively high average daily traffic counts, US Highway 40 at Daniels Summit and US Highway 40 at Road Right to Strawberry Camp could experience relatively insignificant traffic increases of four percent and six percent, respectively.

Of the approximate 114,700 acres of leasable land in this group, 38 percent has NSO stipulation. The remaining 62 percent is subject to SLT, TL, or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from March 1 through June 15 due to the presence of Greater sage grouse breeding habitat. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

American Fork Group

The Proposed Action is expected to have short-term adverse effects within the American Fork Group resulting from well pad construction and the accompanying construction of an access road. Currently, although the RFDS indicates no potential for seismic surveys or exploration drilling within this group, for analysis purposes it is assumed that there could be one exploratory well. Possible location of this well is unknown. If the well is built it would require approximately one mile of new road construction and one mile of road widening, resulting in approximately three acres of road-related disturbance.

The one mile of new road projected to be built would be temporary in nature and would not greatly augment the 53 miles of classified roads already existing within the management group.

Wells in the American Fork Group could range from 10,000 to 12,000 feet in average depth, and as shallow as 5,000 feet. An average of 10 to 15 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

To provide an idea of how oil and gas exploration activities might affect traffic on the roads within this group, table 4.13 contains traffic count information for prominent roads in the area:

Table 4.13. Average daily traffic: American Fork.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (1 well)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
Silver Lake Flat	August 2006-October 2006	227	53	280	23
American Fork	August 2006-October 2006	265	53	318	20

As table 4.13 shows, both Silver Lake Flat Road and American Fork Road could experience relatively low increases in traffic at 23 percent and 20 percent, respectively.

Of the approximate 32,800 acres of leasable land in this group, 91 percent has NSO stipulation. The remaining nine percent is subject to TL and CSU stipulations. The effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

Upper Provo Group

The Proposed Action is expected to have short-term adverse effects within the Upper Provo Group resulting from well pad construction and the accompanying construction of an access road. Currently, although the RFDS indicates no potential for seismic surveys or exploration drilling within this group, for analysis purposes it is assumed that there could be one exploratory well. Possible location of this well is unknown. If the well is built it would require approximately one mile of new road construction and one mile of road widening, resulting in approximately three acres of road-related disturbance.

The one mile of new road projected to be built would be temporary in nature and would not greatly augment the 126 miles of classified roads already existing within the management group.

Wells in the Upper Provo Group could range from 15,000 to 20,000 feet in average depth. An average of 45 truckloads of construction equipment must be brought in for each well at the outset of well site development. Additional truckloads that are needed to complete the drilling process are as described in the General Effects and Effects of Lease Options sections above.

Of the approximate 53,800 acres of leasable land in this group, 37 percent has NSO stipulation. The remaining 63 percent is subject to TL and CSU stipulations. The effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

There are no traffic count data available for this management group.

Vernon Group

The Proposed Action is expected to have short-term adverse effects within the Vernon Group resulting from well pad construction and the accompanying construction of an access road. Currently, although the RFDS indicates no potential for seismic surveys or exploration drilling within this group, for analysis purposes it is assumed that there could be one exploratory well. Possible location of this well is unknown. If the well is built it would require approximately one mile of new road construction and one mile of road widening, resulting in approximately three acres of road-related disturbance.

The one mile of new road projected to be built would be temporary in nature and would not greatly augment the 165 miles of classified roads already existing within the management group.

To provide an idea of how oil and gas exploration activities might affect traffic on the roads within this group, table 4.14 contains traffic count information for a prominent road in the area:

Table 4.14. Average daily traffic: Vernon.

Road	Time Period Used to Determine Average Daily Traffic	Average Daily Traffic	Average Daily Truck Traffic For Oil and Gas Exploration Activities (1 well)	Average Daily Traffic (including Oil and Gas Traffic)	% Increase
Main Canyon	July 2005-November 2005	68	53	121	78

As table 4.14 shows, Main Canyon Road could experience a large increase in traffic at 78 percent. This is due to its already relatively low average daily traffic count of 68.

Of the approximate 91,000 acres of leasable land in this group, 30 percent has NSO stipulation. The remaining 70 percent is subject to SLT, TL, or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from March 1 through June 1 due to the presence of Greater sage grouse breeding habitat. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section above.

4.4.6 Effects of the Modified Resource-based Alternative

Under this alternative there are expected to be effects to the transportation system as a result of oil and gas exploration activities. Twelve wells pads are projected to be constructed within the UNF. Each of these wells would require the construction of access roads. Because there are fewer leasable acres under this alternative than under the Proposed Action Alternative, MAs that have more than one well projected may have a higher density of new access roads, if wells are drilled within the same timeframe. Any road that is constructed is required to be reclaimed once the well pad is removed. There would also be an increase in traffic on roads within the UNF as construction equipment is transported to and from the well site. Therefore, adverse effects are expected to result under this alternative, but these effects are expected to be short-term and minor.

Currant Creek Group

The Modified Resource-based Alternative is expected to have short-term adverse effects within the Currant Creek Group resulting from well pad construction and the accompanying

construction of access roads. There is potential for seismic surveys in this group and a projection for two possible wells (see RFDS). The impacts of these projected wells would be the same as those described under the Proposed Action section's description of the Currant Creek Group. However, the smaller number of leasable acres under this alternative would limit where the wells and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 33,900 acres of leasable land in this group, 68 percent has NSO stipulation. The remaining 32 percent is subject to TL or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and Lynx Analysis Units. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Deer Creek Group

The Modified Resource-based Alternative is expected to have short-term adverse effects within the Deer Creek Group resulting from well pad construction and the accompanying construction of an access road. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). The impacts of this projected well would be the same as those described under the Proposed Action section's description of the Deer Creek Group. However, the smaller number of leasable acres under this alternative would limit where the well and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 20,300 acres of leasable land in this group, 82 percent has NSO stipulation. The remaining 18 percent is subject to TL or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and critical deer winter range. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Diamond Fork Group

The Modified Resource-based Alternative is expected to have short-term adverse effects within the Diamond Fork Group resulting from well pad construction and the accompanying construction of an access road. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). The impacts of this projected well would the same as those described under the Proposed Action section's description of the Diamond Fork Group. However, the smaller number of leasable acres under this alternative would limit where the well and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 11,700 acres of leasable land in this group, 70 percent has NSO stipulation. The remaining 30 percent is subject to TL or CSU stipulations. It is anticipated that during any

potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and critical deer winter range. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Payson Group

The Modified Resource-based Alternative is expected to have short-term adverse effects within the Payson Group resulting from well pad construction and the accompanying construction of an access road. There is ongoing seismic survey work in this group and a projection for one possible well (see RFDS). The impacts of this projected well would be the same as those described under the Proposed Action section's description of the Payson Group. However, the smaller number of leasable acres under this alternative would limit where the well and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 8,000 acres of leasable land in this group, 94 percent has NSO stipulation. The remaining six percent is subject to TL or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would be enforced to restrict road building activities from December 1 through March 30 due to the presence of critical elk winter range and critical deer winter range. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Spanish Fork Canyon Group

The Modified Resource-based Alternative is expected to have short-term adverse effects within the Spanish Fork Group resulting from well pad construction and the accompanying construction of an access road. There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). The impacts of this projected well would be the same as those described under the Proposed Action section's description of the Spanish Fork Group. However, the smaller number of leasable acres under this alternative would limit where the well and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 15,700 acres of leasable land in this group, 50 percent has NSO stipulation. The remaining 50 percent is subject to TL or CSU stipulations. The effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Strawberry Group

The Modified Resource-based Alternative is expected to have short-term adverse effects within the Strawberry Group resulting from well pad construction and the accompanying construction of access roads. There is potential for seismic surveys in this group and a projection for three

possible wells (see RFDS). The impacts of these projected wells would be the same as those described under the Proposed Action section's description of the Strawberry Group. However, the smaller number of leasable acres under this alternative would limit where the wells and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 53,900 acres of leasable land in this group, 35 percent has NSO stipulation. The remaining 65 percent is subject to TL or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would provide a 2-mile buffer around Greater sage grouse breeding habitat in which road building activities would be restricted from March 1 through June 15. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

American Fork Group

Currently, there is no potential for seismic surveys or exploration drilling within this group (see RFDS). The impacts under this alternative would be the same as those described under the Proposed Action section's description of the American Fork Group. However, the smaller number of leasable acres under this alternative would limit where possible wells and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 7,600 acres of leasable land in this group, 92 percent has NSO stipulation. The remaining eight percent is subject to TL and CSU stipulations. The effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Upper Provo Group

Currently, there is no potential for seismic surveys or exploration drilling within this group (see RFDS). The impacts under this alternative would be the same as those described under the Proposed Action section's description of the Upper Provo Group. However, the smaller number of leasable acres under this alternative would limit where possible wells and accompanying access roads may be located. This may lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 26,700 acres of leasable land in this group, 44 percent has NSO stipulation. The remaining 56 percent is subject to TL and CSU stipulations. The effects of these stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

Vernon Group

Currently, there is potential for seismic surveys within this group but no exploration drilling is anticipated (see RFDS). The impacts under this alternative would be the same as those described

under the Proposed Action section's description of the Vernon Group. However, the smaller number of leasable acres under this alternative would limit where possible wells and accompanying access roads may be located. This may also lead to increased road densities if multiple access roads need to be built within a small area.

Of the approximate 54,000 acres of leasable land in this group, 13 percent has NSO stipulation. The remaining 87 percent is subject to TL or CSU stipulations. It is anticipated that during any potential APD review, timing limitations would provide a 2-mile buffer around Greater sage grouse breeding habitat in which road building activities would be restricted from March 1 through June 15. The effects of the other stipulations on roads and road building activities are as described in the Effects of Lease Options section.

Traffic count information for this group would be the same as described in the Proposed Action Alternative.

4.4.7 Summary of Effects

Table 4.15. Comparison summary of effects: transportation.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Currant Creek	Any impacts to the transportation system are expected to be minor. The disturbance caused by road building activities resulting from one projected well (which may or may not be located in this RFOGD) is estimated to be 4.9 acres. Traffic count information would be the same as described in the Proposed Action Alternative.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of two wells, the UNF road system would be expanded slightly, resulting in approximately six acres of disturbance for the reconstruction and/or construction of these roads. Traffic on Lake Creek Road could experience a sharp, 93 percent increase. The traffic on Utah 35 could experience a 39 percent increase.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of two wells, the forest road system would be expanded slightly, resulting in approximately six acres of disturbance for the reconstruction and/or construction of these roads. The smaller leasable area may result in increased road densities. Traffic count information would be the same as described in the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Deer Creek	NA	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic on both US Highway 189 and Utah 92 could experience relatively insignificant increases of one percent and 14 percent, respectively.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.
Diamond Fork	Any impacts to the transportation system are expected to be minor. The disturbance caused by road building activities resulting from one projected well (which may or may not be located in this RFOGD) is estimated to be 4.9 acres. Traffic count information would be the same as described in the Proposed Action Alternative.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. No traffic count information is available for this RFOGD.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	NA	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Mona Pole Road could experience a substantial, 265 percent increase in traffic. Salt Creek Road could experience a less significant, 37 percent increase in traffic.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.
Spanish Fork Canyon	Any impacts to the transportation system are expected to be minor. The disturbance caused by road building activities resulting from one projected well (which may or may not be located in this RFOGD) is estimated to be 4.9 acres. Traffic count information would be the same as described in the Proposed Action Alternative.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. US Highway six at Sheep Creek Road could experience an insignificant, one percent increase in traffic.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of one well, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Strawberry	Any impacts to the transportation system are expected to be minor. The disturbance caused by road building activities resulting from one projected well (which may or may not be located in this RFOGD) is estimated to be 4.9 acres. Traffic count information would be the same as described in the Proposed Action Alternative.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of three wells, the forest road system would be expanded slightly, resulting in approximately nine acres of disturbance for the reconstruction and/or construction of these roads. COOP Creek Road could experience a drastic, 198 percent increase in traffic. West Strawberry Road could experience a less substantial, 34 percent increase in traffic. US Highway 40 at Daniels Summit and US Highway 40 at Road Right to Strawberry Camp could experience relatively insignificant traffic increases of 3.8 percent and 5.7 percent, respectively.	Any impacts to the transportation system are expected to be minor adverse and short-term. Due to the projected construction of three wells, the forest road system would be expanded slightly, resulting in approximately nine acres of disturbance for the reconstruction and/or construction of these roads. The smaller leasable area may result in increased road densities. Traffic count information would be the same as described in the Proposed Action Alternative.
American Fork	NA	Any impacts to the transportation system are expected to be minor adverse and short-term. For analysis purposes one well is assumed. Therefore, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Both Silver Lake Flat Road and American Fork Road could experience relatively low increases in traffic at 23 percent and 20 percent, respectively.	Any impacts to the transportation system are expected to be minor adverse and short-term. For analysis purposes one well is assumed. Therefore, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Upper Provo	NA	Any impacts to the transportation system are expected to be minor adverse and short-term. No wells are projected, but for analysis purposes one well is assumed. Therefore, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road.	Any impacts to the transportation system are expected to be minor adverse and short-term. For analysis purposes one well is assumed. Therefore, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.
Vernon	NA	Any impacts to the transportation system are expected to be minor and short-term. No wells are projected, but for analysis purposes one well is assumed. Therefore, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Main Canyon Road could experience an increase in traffic at 78 percent.	Any impacts to the transportation system are expected to be minor and short-term. For analysis purposes one well is assumed. Therefore, the forest road system would be expanded slightly, resulting in approximately three acres of disturbance for the reconstruction and/or construction of this road. Traffic count information would be the same as described in the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Forest-wide	Any impacts to the transportation system are expected to be minor. The disturbance caused by road building activities resulting from one projected well is estimated to be 4.9 acres. Increased traffic volume from oil and gas exploration activities would have the most impact on roads that experience relatively small amount of traffic. In general, NFS roads would experience more impacts to traffic than County, State, or Federal roads.	Any impacts to the transportation system are expected to be minor and short-term. Due to the projected construction of 12 wells, the forest road system would be expanded slightly, resulting in approximately 36 acres of disturbance for the reconstruction and/or construction of these roads. Increased traffic volume from oil and gas exploration activities would have the most impact on roads that experience relatively small amount of traffic. In general, NFS roads would experience more impacts to traffic than County, State, or Federal roads.	Any impacts to the transportation system are expected to be minor and short-term. Due to the projected construction of nine wells, the forest road system would be expanded slightly, resulting in approximately 36 acres of disturbance for the reconstruction and/or construction of these roads. Increased traffic volume from oil and gas exploration activities would have the most impact on roads that experience relatively small amount of traffic. In general, NFS roads would experience more impacts to traffic than County, State, or Federal roads.

4.4.8 Cumulative Effects

The minimal amount of road construction needed for exploration activity projected in each alternative would not be a significant contribution to the cumulative effects occurring to the transportation system in the study area. The road building that occurs would be a short-term activity; after reclamation there would not be cumulative effects to roads. The roads that are built would exist for at least the life of the exploration activity and would then be reclaimed according to Gold Book standards or according to CSU standards for various resources. Costs of construction and maintenance of temporary roads or road widening would be the responsibility of the lessee and would not result in a cumulative effect on UNF's, local Counties', or the State of Utah's annual budget for road construction or maintenance.

Past, Present, and Reasonably Foreseeable Actions

The current condition of the Forest's transportation system, as described in this document and supporting literature, is a combined result of a substantial number of past and present activities. While every year a number of potential projects may slightly alter these conditions, road construction is offset partially or wholly by road decommissioning efforts. the UNF's current strategy of "maintenance" has kept the transportation system functions relatively static over recent years. This trend is anticipated to continue.

4.5 Inventoried Roadless Areas

4.5.1 Introduction

This section describes the potential impacts of implementing the three alternatives on inventoried roadless areas (IRAs).

Impacts to IRAs from oil and gas leasing and subsequent connected actions were raised as a concern early in the planning process for this EIS and also as a public concern during the scoping period. Public concerns that were raised regarded protection of IRA characteristics and values.

Methodology

The following reports and documents were referenced and used to help inform the determination of the effects of implementing the three different alternatives:

- Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b)
- BLM Gold Book (BLM/USFS 2006)
- Uinta National Forest 2003 LRMP (USFS 2003a)
- Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Minerals and Geology Specialist Report (USFS 2000)

Based upon information contained within the above reports and documents, measurement indicators were developed to help qualify and quantify impacts to IRA characteristics and values. These measurement indicators are:

- Miles of roads constructed or reconstructed
- Acres of surface disturbance
- Acres of IRA available for oil and gas leasing

4.5.2 Impacts to IRAs with the RACR in Effect

As of September 20, 2006, the RACR was reinstated (see Section 3.5). Under the RACR, road construction and reconstruction is not allowed in IRAs. This applies to all leases issued after January 12, 2001 and for any activities approved after May 13, 2005.

With the RACR reinstated, no direct impacts to IRAs would occur under any of the alternatives analyzed in this EIS. Indirect impacts may include loss of scenic value if there were to be a well pad or temporary access road constructed within view of an IRA. Indirect impacts would be reduced to negligible once reclamation was completed and roadless area characteristics would not incur long-term impacts. Indirect impacts would be minor, adverse, and short-term (see impact analysis for Visual Resources, Section 4.11). No other impacts would occur.

4.5.3 Impacts to IRAs if the RACR were not in Effect

Because of the uncertain nature of the long-term status of the management of IRAs, this EIS will also analyze the impact of the three alternatives on IRAs. If the RACR, for whatever reason, were to become ineffective, UNF's current Forest Plan would govern management of IRAs.

While no specific standards or guidelines exist for IRAs in the 2003 LRMP, road construction and reconstruction opportunities are managed under ROS Standard 6, which is summarized in table 4.16.

Table 4.16. Road construction opportunities by ROS class.

Allowable Activity	Recreation Opportunity Spectrum (ROS)					
	P	SPNM	SPM	RN	RM	R
Construction of temporary roads	No	No	Yes	Yes	Yes	Yes
Construction of new classified roads	No	No	No	Yes	Yes	Yes
Reconstruction or realignment of existing classified roads to address public safety and resource concerns	No	No	Yes	Yes	Yes	Yes

P = Primitive; SPNM = Semi-Primitive Non-Motorized; SPM = Semi-Primitive Motorized; RN = Roaded Natural; RM = Roaded Modified; R = Rural.

ROS Standard 6 will be used to determine where temporary roads associated with oil and gas exploration and development activities could be built. For effects analysis, GIS data was used to overlap IRAs with ROS classes. This analysis yielded the number of acres of IRAs that are available for lease that coincide with the different ROS classes. These numbers were used to determine how many acres of IRAs that in accordance with the 2003 LRMP would have allowable road construction or reconstruction activities.

4.5.4 General Effects

Potential impacts to roadless resources include effects to the wilderness attributes that are used to define and categorize roadless areas and their future eligibility for wilderness designation. Attributes that may be affected by land disturbing activities include natural integrity and appearance, opportunity for solitude, opportunity for primitive recreation, manageability/boundaries, and special features, which include ecological, geological, scenic and cultural features.

Natural integrity and appearance is the extent to which long-term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human-related change to an area. This change includes physical developments and human activity. Oil and gas exploration activities, including access roads and well pads would increase vehicular traffic and human activities, resulting in a temporary loss of natural integrity and appearance within roadless areas.

Solitude is defined as isolation from the sights, sounds, and developments of man. Oil and gas exploration could bring these types of effects into roadless areas and cause a loss in the opportunity for solitude provided by roadless areas.

Manageability/boundaries refers to the ability of the land managers (Forest Service) to maintain the wilderness attributes mentioned above in the roadless area and to maintain an area of at least

5,000 acres that retains those attributes. Exploration activities would impact the various roadless characteristics in some areas to the extent that the area could no longer be effectively managed as a roadless area, for as long as the activity continued.

The presence of roads, wellsites and other associated facilities could affect special features within roadless areas, particularly the scenic features.

4.5.5 Effects of Lease Options

No Lease: NL would result in no new leases being granted for oil and gas exploration and development within the study area. No additional acreage would be disturbed, and IRAs would be protected from oil and gas activities that could potentially affect the roadless area's future consideration for wilderness classification during the next Forest planning process. This would protect the various elements (e.g., semi-primitive recreation, opportunity for solitude) that are at least partially dependent on a roadless environment.

No Surface Occupancy: NSO would not allow well sites or production facilities from new oil and gas leasing to occur within IRAs. Not allowing the construction of well pads within IRAs would afford better protection for scenic values and naturalness of the area, which are important roadless characteristics.

The NSO stipulation does not apply to access roads which may be needed for access to well drilling areas. Construction of roads within roadless areas could result in a direct loss of the roadless character in areas surrounding newly constructed roads. However, roads would only be allowed if they met Forest Plan standards and guidelines. In addition, only exploration activities are projected and all access roads would be temporary. Once these access roads are reclaimed, IRAs would retain their characteristics.

Controlled Surface Use: Activities associated with oil and gas exploration include road building and well pad development. These activities would directly impact the roadless character and the unique environments that are dependent on it. CSU could require the proposed activity to be located and/or designed to minimize the effects on the roadless character and to facilitate the reclamation of the area back to a roadless state. Other CSU stipulations could include controlling road construction by not allowing roads to be built that would cause the remaining roadless area to be less than 5,000 acres, which is the smallest size allowable for an area to be considered for roadless or wilderness designation, and limiting road access with gates.

Since access and surface occupancy of the leasehold would be allowed if this leasing option were adopted, impacts to the roadless character could not be avoided. The short-term impacts to the sense of solitude, remoteness, and naturalness of the area could be reduced and the effects to the casual user of the roadless resource minimized. However, other effects on other values and resources, such as wildlife, that may be dependent on the roadless character would not be avoided.

Roaded access and oil and gas activities would adversely affect all or some of the values and uses of the roadless areas for the short-term. Activities within these areas would affect the natural integrity and appearance as well as the opportunity for solitude for the period of activity. Once the oil and gas activities ceased and the affected areas were reclaimed and returned to a natural state, the impacts would not be evident except to the practiced observer.

Timing Limitation: TLs would not mitigate the effects that could change the character of a roadless area. The presence of a road gives the user a different perception of the area and alters the roadless quality. TLs may mitigate some effects by restricting oil and gas activity during certain high-use time periods to lessen the impacts of a greater human presence.

Standard Lease Terms: There would be limited protection of the characteristics that define roadlessness and the associated resource values. Impacts would be similar to those discussed under General Effects, although under the SLT proposed well sites could be relocated up to 200 meters (656 feet) to avoid sensitive resources. Activities could also be delayed for up to 60 days, which would be used to reduce the effects to users of the roadless areas during peak recreational periods. Reducing the noise level and visibility during high use periods would reduce the adverse effects to the user's sense of naturalness, solitude, and remoteness.

4.5.6 Effects of the No Action Alternative

Under this alternative CSU stipulation would apply to IRAs within the WUB Analysis Area. Total IRA acres in the WUB analysis area is approximately 153,000 acres, of those acres approximately 133,900 acres are available for leasing. Because of overlapping resources, approximately 72,300 acres (54 percent) would have a NSO stipulation applied. The remaining 61,600 (46 percent) acres of IRAs would have a CSU stipulation applied. Impacts of applying a NSO or CSU stipulation are as described in section 4.5.5.

Forest-wide Impacts

Under this Alternative one exploration well is projected. The disturbance caused by road building activities resulting from this well is estimated to be one mile of light road construction and 0.7 mile of heavy road construction, for a total of 4.9 acres of disturbance related to road construction, including the well pad (2 acres), total disturbance is 6.9 acres.

Under this alternative, minor, adverse and short-term impacts would occur to IRAs. Reasoning for the determination of these effects is as follows:

- The relatively small area of disturbance would result only a small fraction (less than a hundredth of a percent) of IRAs being directly affected.
- The CSU stipulation that would apply to roadless areas would require reclamation to be extensive and to occur within a reasonably short time period.
- The CSU would also require that the lessee design roads and facilities to minimize impacts to roadless area characteristics.

Additionally any impacts would be reduced to negligible once reclamation occurs. Once reclaimed, the area impacted would retain its roadless area values. All impacts, indirect or direct, would be short-term; lasting only until reclamation was completed.

Impacts by MA

Table 4.17 is summary breakdown of leasable acres of IRAs and stipulations that would apply by MA. Impacts as described under Forest-wide impacts would be applicable to all MAs.

Table 4.17. **Impacts by MA.**

Management Area	NSO	CSU	Total Approximate Acres of IRA Available for Leasing
Currant Creek	20	50	70
Strawberry Reservoir	3,200	7,100	10,300
Diamond Fork	40,300	23,200	63,500
Willow Creek	5,200	13,200	18,400
Upper Spanish Fork Canyon	13,700	12,000	25,700
No Action Alternative Total	72,300	61,600	133,900

4.5.7 Effects of the Proposed Action Alternative

Under the Proposed Action Alternative, no specific stipulation is identified for IRAs, and SLT would apply. All IRAs would be available for leasing, with the exception of acres of IRAs located within Strawberry Project Lands (approximately 15,500) and a few acres in Mona MA (approximately 230). Of roadless acres available for leasing, 23 percent are in semi-primitive non-motorized ROS areas and road construction and reconstruction would be prohibited. The remaining 77 percent of leasable IRAs could have temporary access roads constructed within them under ROS Standard 6.

Forest-wide Impacts

Under this alternative 12 wells are projected, resulting 12 miles of temporary road construction. The total potential disturbance from these activities would include two acres per wellpad, 2.4 acres of temporary road construction, and 0.6 acres of temporary road widening for each site. While 12 sites with five acres of disturbance each is predicted forestwide, it is very unlikely that a significant amount of this activity would take place in the Forest's IRAs. However, these 60 potential acres of disturbance are considered a maximum acreage impact figure for exploration within IRAs. Temporary access road and well pad locations are unknown at this time.

Although SLT would be applied to IRAs under this alternative, because of overlapping resources, SLT would only apply to approximately 5,900 acres of IRA (or one percent of all leasable IRAs). The majority (70 percent) of leasable IRAs have an overlapping NSO stipulation (approximately 383,100 acres). The remaining 29 percent have either TL, CSU or a combination of the two. As noted above, application of NSO stipulation further reduces impacts to IRAs by limiting disturbance to access roads, reducing the impacts that well pad construction would have the overall naturalness, sense of solitude, and scenic values of the IRAs.

Although specific controls are listed under the CSU stipulation description in section 4.5.5, these controls would only apply if CSU is specifically applied to IRAs. Since the Proposed Action Alternative does not specify the stipulation of CSU for IRAs, these controls would not apply. However, CSU stipulations would apply for visual resources and recreation. Application of these controls would help reduce impacts to IRAs, through siting and other controls that would be implemented to conserve scenic values. These controls would help protect roadless area characteristics and further reduce impacts to IRAs.

Impacts from TL and SLT are as listed in section 4.5.5. Application of these stipulations would result in adverse effects to IRAs. However due to the small number of acres disturbed forest-

wide and the relatively low number and mileage of temporary access roads constructed, these effects would be minor. Localized impacts may be greater, but they would still be short-term and minor.

Additionally, temporary access roads would only be accessible by the lessee or operator and UNF personnel, and it is not anticipated these roads would be used by non-authorized users. User-created roads are not anticipated due to the short-term nature of access roads and their restricted use.

Overall, this alternative would result in minor, short-term adverse impacts. All new roads constructed would be temporary and would be reclaimed once active exploration activities had ceased. Once reclamation has occurred, IRAs would retain their roadless characteristics.

Impacts by RFOGD

In general, impacts to individual RFOGDs would be similar to those described under Forest-wide impacts and would be minor, adverse and short-term. Impacts may vary slightly among the RFOGDs depending on the following:

- number of IRA acres that would have allowable temporary road construction under ROS Standard 6
- number of acres that have a NSO stipulation applied
- number of temporary access road miles projected for construction
- known oil and gas potential

American Fork, Upper Provo, and Vernon RFOGDs do not have known oil and gas potential and road construction is unlikely. The remaining RFOGDs with known oil and gas potential are the most likely to be adversely affected by temporary road construction, and impacts would be as described under Forest-wide impacts and in sections 4.5.4 and 4.5.5.

Deer Creek and Payson RFOGDs have the lowest percentage of leasable IRAs that would allow temporary road construction, and IRAs may be less impacted in these RFOGDs. The remaining RFOGDs have high percentage of allowed temporary road construction and impacts to IRAs may be greater than to those with lower percentages. Regardless, because of the small number of miles projected, adverse impacts for all RFOGDs would be minor and short-term. Table 4.18 summarizes the available IRA acreages within each RFOGD.

Table 4.18. **Summary of impacts of the Proposed Action Alternative by RFOGD.**

RFOGD	Leasing Stipulations (acres)			IRA Available for Leasing (acres)	% of leasable IRAs with NSO	Leasable IRAs with allowable temporary roads under ROS Standard 6 (acres)	% of leasable IRAs with temporary roads allowed	Projected Temporary Roads (miles)
	NSO	CSU and/or TL	SLT					
Currant Creek	33,300	15,900	500	49,700	94	49,400	99	2
Deer Creek	131,000	16,000	30	147,030	67	69,300	47	1
Diamond Fork	54,300	30,600	500	85,400	89	77,300	91	1
Payson	64,800	19,800	30	84,630	64	66,000	78	1
Spanish Fork Canyon	16,700	11,500	400	28,600	77	28,400	99	1
Strawberry	27,700	31,600	1,500	60,800	58	60,100	99	3
American Fork	23,600	1,600	0	25,200	46	8,500	34	1
Upper Provo	11,300	15,700	0	27,000	42	24,500	91	1
Vernon	20,300	13,700	3,000	37,000	55	36,800	99	1
Forest-wide Total	383,000	156,400	5,960	545,360	70	420,300	77	12

4.5.8 Effects of the Modified Resource-based Alternative

Under this alternative, IRAs are not available for oil and gas leasing. No direct impacts would occur to IRAs under this Alternative. Connected actions of oil and gas leasing in areas that are in proximity to IRAs may have indirect adverse effects on the characteristics of IRAs. These effects may include loss of scenic value if construction of a well pad or access road were to occur within view of an IRA. Other indirect impacts that could occur include noise impacts, if the noise from traffic or well drilling activities were to carry into IRAs, thus impacting the sense of solitude that is an important roadless characteristic.

However, siting and noise abatement requirements would reduce indirect impacts to minor or negligible. Furthermore once reclamation occurs, roadless area characteristics would be retained. All indirect adverse impacts would be minor or negligible and short-term.

The effects described above would be applicable to all MAs within the UNF.

4.5.9 Summary of Effects

Table 4.19. Comparison summary of effects: inventoried roadless areas.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Currant Creek	1.7 miles of road construction, 6.9 acres of total disturbance resulting in minor adverse short-term impacts. CSU stipulation that would apply would require that design of roads and facilities minimize impacts. Extensive reclamation required. 70 acres available for leasing.	Minor adverse short-term impacts. Majority (99 percent) of IRAs have NSO further reducing impacts. Two exploratory wells causing 10 acres of disturbance are anticipated, along with two miles of road widening and two miles of temporary road projected. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 49,800 acres available for leasing.	No direct effects. Minor or negligible indirect short-term effects. Impacts include possible loss of scenic value or sense of solitude.
Deer Creek	NA*	Minor adverse short-term impacts. One exploratory well, five acres of disturbance, including one mile of road widening, and one mile of temporary road projected. Less than 50 percent of IRA acres could have temporary roads constructed. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 147,100 acres available for leasing.	
Diamond Fork	1.7 miles of road construction, 6.9 acres of total disturbance resulting in minor adverse short-term impacts. CSU stipulation that would apply would require that design of roads and facilities minimize impacts. Extensive reclamation required. 63,500 acres available for leasing.	Minor adverse short-term impacts. One exploratory well, five acres of disturbance, including one mile of road widening, and one mile of temporary road projected. Majority (91 percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 85,300 acres available for leasing.	

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	NA	Minor adverse short-term impacts. One exploratory well, five acres of disturbance, including one mile of road widening, and one mile of temporary road projected. Majority (78percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 84,600 acres available for leasing.	
Spanish Fork Canyon	1.7 acres of road related disturbance, 6.9 acres of total disturbance, resulting in minor adverse short-term impacts. CSU stipulation that would apply would require that design of roads and facilities minimize impacts. Extensive reclamation required. 25,700 acres available for leasing.	Minor adverse short-term impacts. One exploratory well, five acres of disturbance, including one mile of new road, and one mile of temporary road projected. Majority (99 percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 28,600 acres available for leasing.	
Strawberry	1.7 acres of road related disturbance. 6.9 acres of total disturbance. Minor adverse short-term impacts. CSU stipulation that would apply would require that design of roads and facilities minimize impacts. Extensive reclamation required.28,700 acres available for leasing.	Minor adverse short-term impacts. three exploratory wells, 15 acres of disturbance, three miles of new road, and three miles of temporary road projected. Majority (99 percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 60,800 acres available for leasing.	

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	NA	Minor adverse short-term impacts. 1exploratory well, five acres of disturbance, one mile of new road, and one mile of temporary road projected, but unlikely to occur because of lack of oil and gas potential. Less than 50 percent of IRA acres could have temporary roads constructed. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 25,200 acres available for leasing.	
Upper Provo	NA	Minor adverse short-term impacts. One exploration well, five acres of disturbance, one mile of new road, and one mile of temporary road projected, but unlikely to occur because of lack of oil and gas potential. Majority (91 percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 27,000 acres available for leasing.	
Vernon	NA	Minor adverse short-term impacts. One exploration well, five acres of disturbance, one mile of new road, and one mile of temporary road projected, but unlikely to occur because of lack of oil and gas potential. Majority (99 percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 37,000 acres available for leasing.	

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Forest-wide	1.7 miles of road related disturbance, 6.9 acres of total disturbance resulting in minor adverse short-term impacts. CSU stipulation that would apply would require that design of roads and facilities minimize impacts. Extensive reclamation required. .	Minor adverse short-term impacts. 12 exploration wells, 60 acres of disturbance, 12 miles of new roads, and 12 miles of temporary road projected. Majority (70 percent) of IRAs have NSO further reducing impacts. One production well could occur within this RFOGD, which would result in an additional 1.2 acres of minor long-term effects. 545,000 acres available for leasing.	

**NA= Not available for lease. These RFOGDs do not have land available for lease under the No Action Alternative.*

4.5.10 Cumulative Effects

Past, Present, and Reasonably Foreseeable Actions

Other activities on the UNF include vegetation management, Central Utah Project activities, and recreational activities. No new roads or facilities are anticipated at this time. Existing roads and facilities were taken into account in the 2002 Roadless Inventory was conducted, since that inventory no new roads or facilities have been built. The UNF is currently in maintenance mode and no new classified roads are expected to be constructed.

Cumulative Effects of the Alternatives

Cumulative impacts to roadless areas are not anticipated under any of the alternatives. Any roads or other facilities that would built in connection with oil and gas leasing would be temporary and once reclaimed would not result in long-term or cumulative impacts on roadless areas.

4.6 Watershed Resources, Including Wetlands, Floodplains, and Riparian Areas

4.6.1 Introduction

This section provides a description of potential impacts on watershed resources of the UNF that could result from the implementation of the various alternatives. This analysis includes impacts on wetlands, floodplains, and riparian areas. The impacts of wet meadows are also discussed as a subset of the impacts on wetlands. Wet meadows are considered wetlands and would receive the same stipulations as applied to wetlands. The acreage of wet meadows and riparian vegetation used in this section may overlap with RHCAs, leading to an overestimation of acreage as discussed below in methodology.

Methodology

Acres of wetlands, wet meadows, floodplains, and RHCAs were calculated using spatial data provided by the UNF, the National Wetlands Inventory (NWI), and the Federal Emergency Management Agency (FEMA). All acres are approximate, as mapped areas may overlap slightly or area boundaries may not touch. When mapped areas overlap, total acres are overestimated; when mapped areas do not touch, the space between boundaries is not counted and underestimates result.

The description of general effects were based on impacts known to occur from similar actions and the effects of each alternative were based on the amount of each resource to be impacted under the varying stipulations applied for resource protection. These effects are approximate as the exact amount and location of disturbance in a watershed in unknown.

Floodplains are not included in the MPs to which the various leasing stipulations were applied and floodplains are not well mapped as discussed in Chapter 3. As a result, detailed impact analysis on floodplains was not possible. However, smaller mountain streams, like those on the UNF, are often constrained by geology and have narrow floodplains that may be contained entirely within the riparian area (Gregory et al. 1991). As a result, they would generally be protected by stipulations applied to riparian areas and RHCAs. Class III RHCAs, which extend 300 feet from the edge of each waterbody, would provide the highest level of protection for floodplains.

Measurement Indicators

The following measurement indicators were used to address impacts to watershed resources:

- Acres of surface disturbance
- Miles of road constructed or maintained

4.6.2 General Effects

Under any of the alternatives, both direct and indirect impacts to wetlands, floodplains, and riparian areas can occur as a result of oil and gas exploration. Adverse impacts to these resource components can have a profound influence on the functioning of both terrestrial and aquatic

ecosystems. While these resources have many similarities and perform similar ecosystem functions, some impacts would be specific to each. As a result, general effects will be described separately for each resource.

Wetlands and Wet Meadows

The construction of well pads and access roads in wetland areas can result in the removal of wetland vegetation and the filling of wetlands with soil necessary for the construction of these facilities. The conversion of wetlands to upland habitat can reduce habitat and/or forage for wildlife, alter hydrology, and lead to a loss and/or degradation of the ecosystem functions described in Chapter 3. Changes in hydrology can include increased flooding, increased stream erosion, and decreased base flow during summer months. Additionally, as wetlands serve to purify water and trap sediment, impacts to these areas can also result in increased sediment delivery to streams and a decrease in water quality.

Oil and gas exploration and development on lands adjacent to wetlands can indirectly result in increased sedimentation of wetlands, the delivery of contaminants, and the alteration of surface and groundwater movement into or out of a wetland. The resultant effects on other resources would be similar to those described for direct effects. Adverse effects of an exploratory well that does not result in a discovery would primarily be short-term due the reclamation of facilities, including roads, at the end of the exploration period. However, any adverse impacts to hydrology, such as stream erosion, would be difficult to restore and would result in more long-term impacts. Adherence to UNF standards and guidelines identified in the LRMP and the standards and guidelines contained in the standard lease form should prevent this from occurring. The severity of the effects of an exploratory well depends upon the amount of wetlands impacted.

Under all alternatives, jurisdictional wetlands are protected under Section 404 of the Clean Water Act, which requires a permit for discharge of fill material into wetlands. However, an individual permit would not likely be required for oil and gas exploration. Activities associated with oil and gas exploration are likely to fall under one or more nationwide permits, which allow minor wetlands losses and disturbance to occur under specified conditions.

Floodplains

The construction of well pads and access roads would directly impact floodplains by removing vegetation, constricting flows, and reducing the connectivity between streams and their floodplains. The removal and/or degradation of floodplain vegetation and stream-floodplain connectivity would reduce rearing and foraging habitat important to fish and other aquatic organisms. Further, reduced floodplain connectivity can affect the amount of organic matter delivered to streams, which can affect productivity and fish populations. Also, the construction within or degradation of floodplains can reduce their ability to slow water velocities during high flow events, which can result in increased stream erosion.

The construction of oil and gas facilities on lands adjacent to floodplains could also indirectly increase sediment delivery to floodplain areas, which could result in impacts to vegetation and stream-floodplain connectivity that would be similar to those described above. As with wetlands, the effects of an exploratory well that does not result in a discovery would be short-term in nature. However, as with wetlands, failure to follow standards and guidelines could result in

impacts to hydrology that would be more long-term. The severity of the effects of an exploratory well depends upon the amount of floodplains impacted, as described above for wetlands.

Riparian Areas

Riparian areas form a transition, or ecotone, between terrestrial and aquatic habitats. As a result, the removal of riparian vegetation for the construction of well pads, access roads, and pipelines would directly impact both of these ecosystems. Riparian areas are most commonly impacted by roads, which, due to topography, are often built adjacent to streams and/or must cross streams. The removal of riparian vegetation for road construction would reduce wildlife habitat important to a variety of animals, particularly bird species.

Riparian areas, which collectively make up a less than one percent of the landscape in the western US and the UNF, support more species of birds than surrounding uplands (Knopf et al. 1988). In aquatic ecosystems, removal of riparian vegetation can decrease cover for fish and other aquatic organisms, reduce inputs of organic matter, and decrease shade levels, which can increase stream temperatures. Also, as riparian areas purify water, trap sediments, and buffer stream flows, impacts can translate to streams as described for wetlands. These impacts can include increased flooding, increased stream erosion, and decreased base flows. The effects of an exploratory well on riparian areas would primarily be short-term unless unlikely adverse impacts to hydrology occurred as already described for wetlands and floodplains. The severity of impacts also depends upon the amount of riparian area disturbed.

Indirect effects of oil and gas development on land adjacent to riparian areas would be minor compared to direct effects, but can include some degradation of vegetation due to dust from adjacent facilities. These effects would be very minor and short-term.

4.6.3 Effects of Lease Options

Under all options the lessee must at a minimum follow standards and guidelines as expressed in the standard lease form (Form 3100-11; Offer to Lease and Lease for Oil and Gas) and other regulations. Further, with this EIS, protective stipulations have been developed to protect wetlands, riparian areas, and RHCAs. No specific stipulations were developed for floodplains.

No Lease: NL would eliminate direct, site-specific effects to wetlands, riparian areas, RHCAs, and floodplains. As discussed in the general effects, adverse effects such as increased sedimentation, the release of contaminants, and changes in hydrology, can still result from oil and gas activities on adjacent areas where surface disturbance is permitted.

No Surface Occupancy: NSO would preclude the siting of well pads on wetlands, riparian areas, RHCAs, and floodplains. NSO does not apply to roads, and direct adverse effects to wetlands and riparian areas can still occur from road construction within areas of NSO. These effects include the removal of vegetation and the alteration of hydrology as mentioned in the general effects. However, UNF standards and guidelines for construction should help to minimize potential impacts. Also, as discussed above, adverse effects such as increased sedimentation, the release of contaminants, and changes in hydrology, can still result from oil and gas activities on adjacent areas where surface occupancy is permitted. Effects can be positive if adjacent, upstream activities result in the mitigation of degrading wetlands and riparian areas.

Controlled Surface Use: A CSU stipulation would require careful siting of facilities and operating practices to minimize adverse effects. If facilities could not be located completely out of wetland or riparian areas, potential impacts could include removal of vegetation and changes in hydrology. These impacts could further result in a loss of the functions of wetland and riparian areas described in the general effects, which include wildlife habitat, water purification/sediment trapping, flood control, shade, and nutrient cycling. Mitigation of these impacts could consist of reclamation/revegetation.

Timing Limitation: TLs have not specifically been proposed for wetlands, riparian areas, or RHCAs. However, other timing limitations, such as those for big game, would help restrict construction in wet soils in winter and spring, which would reduce direct effects of compaction and/or increased susceptibility to erosion in riparian and floodplain areas.

Standard Lease Terms: Under all options the lessee must at a minimum follow standards and SLT guidelines as expressed in the standard lease form (Form 3100-11; Offer to Lease and Lease for Oil and Gas) and other regulations. The guidelines provide for watershed protection and specify that the operator cannot conduct operations in areas subject to mass soil movement, riparian areas, and wetlands. Furthermore, it specifies that the operator shall take measures to minimize or prevent erosion and sediment production and can be required to relocate facilities up to 200 meters, which would protect smaller wetlands, riparian areas, and floodplains from most direct and indirect impacts.

4.6.4 Effects of the No Action Alternative

Effects of the No Action Alternative would generally be the same as the effects described for Alternative 3 of the Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b). Under this alternative, disturbance would consist of one exploratory well, which would affect approximately 6.9 acres, with disturbance consisting of the exploratory well pad (2 acres), light road construction (2.4 acres), and heavy road construction (2.5 acres). The possible location of this well is unknown and it is assumed that it could occur in any of the affected MAs, which include Currant Creek, Diamond Fork, Upper Spanish Fork, Strawberry Reservoir, Willow Creek, and White River MA, as authorized by the WUB FEIS ROD.

Under this alternative, wetlands, wet meadows, and riparian areas greater than 40 acres in size would be protected with a CSU stipulation. Furthermore, wetlands, wet meadows and riparian areas less than 40 acres would be protected from disturbance under the SLT, which would allow the UNF to move facilities by up to 200 meters.

While floodplains have not been mapped for any of the MAs, they would still be present along most streams and development could occur due to the lack of protective stipulations. However, most of these would be protected under SLT, as described for wetland and riparian areas smaller than 40 acres. Further, most floodplains in the area would likely be small and be contained within the riparian areas. However, as the WUB was completed prior to the designation of RHCAs, no specific stipulations are identified for these areas. Stipulations applied to other resources do overlap portions of the RHCAs in each MA. The number of acres covered by each stipulation is identified for each MA in table 4.20.

Table 4.20. Stipulations that apply to RHCAs under the No Action Alternative, by MA.

MA	Acres of RHCAs not available for leasing	Acres of RHCAs			
		NSO	CSU	TL	SLT
Currant Creek	19	59	2	0	20
Diamond Fork	210	4,909	1,962	32	15
Upper Spanish Fork	186	1,203	1,076	71	52
Strawberry Reservoir	4,717	1,260	1,280	10	158
Willow Creek	0	673	993	39	23
White River	345	833	764	39	4

Under the No Action Alternative, there is the potential for the disturbance of 6.9 acres of wetlands, wet meadows, and riparian areas, although these areas are protected under CSU and SLT as described in the beginning of this section. Also, while a large proportion of RHCAs under this alternative are protected by NSO, CSU, or a TL, disturbance could still occur as described for each of these stipulations. Further, indirect effects could result from development on land adjacent to these areas.

Given the small amount of disturbance expected (6.9 acres) and the protective stipulations, the adverse effects on wetlands, wet meadows, floodplains, and riparian areas would be minor. Effects would also be short-term since the length of activity on exploratory wells is expected to be 80 days. The No Action Alternative would have no known effect on wet meadows in the Diamond Fork, Upper Spanish Fork, Willow Creek, or White River MAs as there are no mapped wet meadows in these areas.

4.6.5 Effects of the Proposed Action Alternative

Under the Proposed Action Alternative, 12 wells are projected to occur on the UNF. Disturbance is estimated at five acres per well, for a total of 60 acres. This includes one mile of new road construction and one mile of road widening per well. Under this alternative, wetlands, wet meadows, and riparian areas greater than 40 acres would be protected by a NSO stipulation. In addition, RHCAs within primitive ROS class areas would have a NL stipulation. A NL stipulation would not allow surface disturbance and no direct effects would occur to RHCAs in these areas. RHCAs in all other ROS classes would be under NSO, which would apply to well pads but not to roads. The construction of roads within wetland and riparian areas would impact these areas as described in the general effects. However, adherence to standards and guidelines in the LRMP should help prevent adverse hydrologic changes from road construction. Furthermore, wetlands and riparian areas smaller than 40 acres would be protected from disturbance under SLT, which allows the UNF to require operators to move proposed facilities up to 200 meters. Floodplains, while not mapped, would likely be contained within the RHCAs and thereby protected by the NL and NSO stipulations. Any floodplains existing outside RHCAs would be protected by SLT as described for wetland/riparian areas smaller than 40 acres. Due to the protective NL and NSO stipulations, direct adverse effects on wetlands, wet meadows, and riparian areas under this alternative would be limited to road construction. Indirect effects of development on adjacent land could occur as described in the general effects. Adverse effects of this alternative would be primarily short-term since the length of activity on exploratory wells is expected to be 80 days.

Currant Creek Group

Two wells are predicted to occur within the Currant Creek Group. Disturbance is estimated at five acres per well, including roads, for a total of 10 acres. Wetlands and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of four miles of possible road construction. These effects would be minor and short-term. Direct adverse impacts to floodplains would also likely be minor and short-term as described in the general effects. Indirect effects from development on land adjacent to these areas could also occur. However, given the small amount of disturbance expected (10 acres), the adverse indirect effects would also be minor. There would be no known effect on wet meadows in the West Fork Duchesne MA, as no wet meadows have been mapped.

Deer Creek Group

One well is predicted to occur within the Deer Creek Group. Disturbance is estimated at five acres, which includes two miles of road construction. Wetlands and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands, wet meadows, and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. Indirect effects from development on land adjacent to these areas could also occur; however, given the small amount of disturbance expected (five acres) the adverse indirect effects would also be minor. There would be no known effect on wet meadows as no wet meadows have been mapped.

There are 268 acres of mapped 100-year floodplains within this Group, including 133 acres in the Hobble Creek MA and 155 acres in the Lower Provo MA. However, in the Hobble Creek MA mapped floodplains are within an area of NSO and direct impacts would largely be avoided. As NSO does not preclude the construction of roads, direct effects to floodplains could occur as described in the general effects. However, adherence to standards and guidelines in the LRMP should help prevent adverse hydrologic changes from road construction. As a result, the Proposed Action Alternative is likely to have minor adverse effects on floodplains. In the Lower Provo MA, the mapped floodplains are within an area not available for leasing and there would be no direct or indirect effects on floodplains.

Diamond Fork Group

One well is predicted to occur within the Diamond Fork Group. Disturbance is estimated at five acres, which includes two miles of road construction. Wetlands and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. There would likely be no effects to floodplains due to the limited extent of floodplains in this area (see Chapter 3) and the protections afforded by the RHCAs. Indirect effects from development on land adjacent to these areas could also occur. However, given the small amount of disturbance expected (five acres), the adverse indirect effects would also be minor. There would be no known effect on wet meadows as none have been mapped.

Payson Group

One well is predicted to occur within the Payson Group. Disturbance is estimated at five acres, which includes two miles of road construction. Less than one acre of wetlands has been mapped in the Payson RFOGD; however, wetland coverage was only mapped in a small portion and more acres likely exist. Riparian areas and any wetlands identified that are larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. Direct adverse impacts to floodplains would also likely be minor and short-term as described in the general effects. Indirect effects from development on land adjacent to these areas could occur. However, given the small amount of disturbance expected (five acres), the adverse indirect effects would also be minor. There would be no known effect on wet meadows as none have been mapped.

Spanish Fork Canyon Group

One well is predicted to occur within the Spanish Fork Canyon Group. Disturbance is estimated at five acres, which includes two miles of road construction. Wetlands were not mapped for this area; however, this is due to a lack of data and wetlands are assumed to occur. Riparian areas and any wetlands identified that are larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. Direct adverse impacts to floodplains would also likely be minor and short-term as described in the general effects. Indirect effects from development on land adjacent to theses area could also occur. However, given the small amount of disturbance expected (10 acres), the adverse indirect effects would also be minor. There would be no known effect on wet meadows, as none have been mapped.

Strawberry Group

Three wells are predicted to occur within the Strawberry Group. Disturbance is estimated at five acres per well, for a total of 15 acres. This includes six miles of road construction. Wetlands and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands, wet meadows, and riparian areas would consist of the six miles of possible road construction. These effects would be minor and short-term. Direct adverse impacts to floodplains would also likely be minor and short-term as described in the general effects. Indirect effects from development on land adjacent to these could also occur. However, given the small amount of disturbance expected (15 acres), the adverse indirect effects would also be minor. There would be no known effect on wet meadows in the Willow Creek and White River MAs, as none have been mapped.

American Fork Group

No oil and gas potential has been identified in the American Fork Group; however, one exploratory well could occur. Disturbance is estimated at five acres, which includes two miles of road construction. Wetlands and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. There are also approximately seven

acres of mapped floodplains along the northern boundary of the UNF (see Chapter 3). Floodplains in this area may not be protected under a stipulation other than SLT; however, given the small size of the mapped areas, they would be protected from disturbance under SLT and there would likely be no direct effects. Indirect effects from development on land adjacent to these areas could also occur; however, given the small amount of disturbance expected (five acres) the adverse indirect effects would also be minor. There would be no known effect on wet meadows as none have been mapped.

Upper Provo Group

No oil and gas potential has been identified in the Upper Provo Group; however, one exploratory well could occur. Disturbance is estimated at five acres, which includes two miles of road construction. Wetlands, wet meadows, and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. Direct adverse impacts to floodplains would also likely be minor and short-term as described in the general effects. Indirect effects from development on land adjacent to these areas could also occur; however, given the small amount of disturbance expected (five acres) the adverse indirect effects would also be minor.

Vernon Group

No oil and gas potential has been identified in the Vernon Group; however, one exploratory well could occur. Disturbance is estimated at five acres, which includes two miles of road construction. No wetlands, wet meadows, or floodplains have been mapped, although all would be expected to occur to some extent. Any wetlands, wet meadows, and riparian areas larger than 40 acres would be protected by NSO, with smaller areas protected by SLT. RHCAs would be protected by NL and NSO. As a result, direct adverse effects to wetlands and riparian areas would consist of two miles of possible road construction. These effects would be minor and short-term. Direct adverse impacts to floodplains would also likely be minor and short-term as described in the general effects. Indirect effects from development on land adjacent to these areas could also occur; however, given the small amount of disturbance expected (five acres) the adverse indirect effects would also be minor.

4.6.6 Effects of the Modified Resource-based Alternative

Disturbance under the Modified Resource-based Alternative would be the same us under the Proposed Action Alternative. Similarly, the stipulations would be identical for wetlands, riparian areas, and RHCAs. As a result, the direct effects to these resources under the Modified Resource-based Alternative would be identical to those described for the Proposed Action Alternative. Indirect effects could be different as stipulations for adjacent lands could be different under this alternative as opposed to the Proposed Action Alternative. However, as the exact location of each well is unknown, this difference would be impossible to predict at this time. Due to the small amount of disturbance predicted, it is assumed that indirect effects would be minor, as described for the Proposed Action Alternative.

4.6.7 Summary of Effects

Table 4.21. Comparison summary of effects: watershed resources.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Currant Creek	Minor, short-term impacts are possible from one well. A CSU stipulation would protect large wetland and riparian areas (>40 acres). Impacts to smaller areas can be avoided under SLT. RHCAs would not have a stipulation applied but two acres would be protected under CSU and 59 under NSO. Disturbance is estimated to be 6.9 acres, including 4.9 acres for roads.	Minor, short-term impacts are possible from two wells. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be 10 acres, with four miles of roads.	Same as the Proposed Action Alternative.
Deer Creek	NA	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.
Diamond Fork	Minor, short-term impacts are possible from one well. A CSU stipulation would protect large wetland and riparian areas (>40 acres). Impacts to smaller areas can be avoided under SLT. RHCAs would not have a stipulation applied but 1,962 acres would be protected under CSU, 32 under a TL, and 4,909 under NSO. Disturbance is estimated to be 6.9 acres, including 4.9 acres for roads.	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	NA	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.
Spanish Fork Canyon	Minor, short-term impacts are possible from one well. A CSU stipulation would protect large wetland and riparian areas (>40 acres). Impacts to smaller areas can be avoided under SLT. RHCAs would not have a stipulation applied but 1,076 acres would be protected under CSU, 71 under a TL, and 1,203 under NSO. Disturbance is estimated to be 6.9 acres, including 4.9 acres for roads.	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.
Strawberry	Minor, short-term impacts are possible from one well. A CSU stipulation would protect large wetland and riparian areas (>40 acres). Impacts to smaller areas can be avoided under SLT. RHCAs would not have a stipulation applied but 3,037 acres would be protected under CSU, 88 under a TL, and 2,766 under NSO. Disturbance is estimated to be 6.9 acres, including 4.9 acres for roads.	Minor, short-term impacts are possible from three wells. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be 15 acres, with six miles of roads.	Same as the Proposed Action Alternative.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	NA	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.
Upper Provo	NA	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.
Vernon	NA	Minor, short-term impacts are possible from one well. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be five acres, with two miles of roads.	Same as the Proposed Action Alternative.
Forest-wide	Minor, short-term impacts are possible from one well. A CSU stipulation would protect large wetland and riparian areas (>40 acres). Impacts to smaller areas can be avoided under SLT. RHCAs would not have a stipulation applied but 1,962 acres would be protected under CSU, 32 under a TL, and 4,909 under NSO. Disturbance is estimated to be 6.9 acres, including 4.9 acres for roads.	Minor, short-term impacts are possible from 12 wells. A NSO stipulation would protect large wetland and riparian areas (>40 acres). RHCAs would be protected by NL and NSO. Direct impacts to smaller areas can be avoided under SLT. Disturbance is estimated to be 60 acres, with 12 miles of roads	Same as the Proposed Action Alternative.

4.6.8 Cumulative Effects

This section describes other projects that may contribute to cumulative effects. Cumulative effects are the impacts on the environment which result from the incremental impact of the current action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Past, Present, and Reasonably Foreseeable Actions

Past Actions

Historical conditions for wetlands, floodplains and riparian areas on the UNF have been impacted by large projects, including water developments and grazing. Water developments, both on and off the UNF, were designed to transfer water from the upper Colorado River to the Wasatch Front for agriculture and municipal use. Water diversions have resulted in water losses for streams draining into the Colorado River System, with water diverted to streams in the Bonneville Basin. In the Strawberry, Diamond Fork, and Deer Creek Groups, water diversions have resulted in significant stream channel incision (USFS 2000 and 2004). Stream channel incision lowers the water table, which reduces available water for riparian vegetation, dries up wetland habitat, and reduces stream-floodplain connectivity. A Diamond Fork Area Assessment in 2000 indicated that many stream channels are incised and without properly functioning floodplains due to high flows from the release of irrigation water through the Strawberry tunnel and grazing (USFS 2000a).

Grazing has impacted many areas of the UNF, including the Diamond Fork and Strawberry Groups. Historical heavy grazing in these areas degraded riparian areas and removed vegetation. In many cases the removal of vegetation led to increased bank instability and channel incision. Also, in the Strawberry Group, native willows were removed using herbicides during the 1960's.

While many of the impacts of water transfers are ongoing, most projects in the recent past have been aimed at improving the condition of wetlands, floodplains, and riparian areas (USFS 2000 and 2004). These include improved range management practices, improved design of water transfer facilities, and habitat restoration projects. A list of these projects is presented below.

Habitat Improvement (1998): Restoration on 3.5 miles of stream habitat in the Payson Group. Habitat improvement included riparian shrub and tree plantings.

Habitat Improvement (1999): Restoration on 8.5 miles of 6th Water Creek in the Diamond Fork Group. Habitat improvement included riparian shrub and tree plantings.

Habitat Improvement (2000): Restoration of six miles of stream habitat on Trout Creek, Little Provo Deer Creek, and Diamond Fork in the Deer Creek Reservoir and Diamond Fork Groups. Habitat improvement included riparian shrub and tree plantings.

Strawberry River Restoration Phases I and II (2002 and 2004): These projects were conducted in coordination with the Utah Division of Water Rights (UDWR) to restore the natural channels, improve fish migration, stabilize banks, and re-establish riparian vegetation in the Strawberry Group.

Diamond Fork System Completion, the Tanner Ridge Tunnel and Upper Diamond Fork Pipeline (2004): These tunnels and pipelines were constructed to take irrigations flows from Syar Tunnel to the Diamond Fork Pipeline, and became operational in June 2004. This project resulted in some direct impacts on riparian habitats but will allow for a portion of the high irrigation flows to be diverted from the system allowing for restoration of riparian habitats.

Diamond Fork Campground Site (2004): Adversely impacted approximately 0.44 acres of riparian habitat for campground construction.

Three Forks Culvert Parking Lot Project (2004): Designed to mitigate and rehabilitate the floodplain areas adjacent to Diamond Fork.

Boreal Toad Habitat Protection Fence (2005): Fenced 0.15 miles of an unnamed stream on the west side of Strawberry Reservoir to protect Boreal Toad from grazing impacts. This project would subsequently protect wetland and riparian habitat.

Present and Future Actions

The UNF is in currently in "maintenance" mode and not planning any new construction of facilities or roads in the next 10 years. Present and future actions that have the potential to impact wetlands, floodplains, and riparian areas include oil and gas exploration activities and habitat improvement projects.

The majority of present actions that affect wetlands, floodplains, and riparian areas are aimed at habitat improvement. These projects include various watershed protection fencing and range improvement projects that all have elements for the purpose of improving riparian habitats. Other known projects that may affect wetlands, floodplains, and riparian areas include:

Boreal Toad Habitat Improvement Project: Expected to begin in fall 2007, this project would increase a pond by 1/8 acre to improve breeding and wintering habitat for the boreal toad, a Utah Species of Concern. Expansion would positively impact riparian and wetland areas surrounding the pond.

Strawberry River Restoration Phase III: Expected to begin in 2008, this project would restore natural channels, improve fish migration, stabilize banks, and re-establish riparian vegetation in the Strawberry Group.

Cumulative Effects of the No Action Alternative

Future oil and gas activity could result in adverse impacts to watershed resources as discussed above. However, the No Action Alternative would only continue leasing as already authorized and therefore the effects would not be additive to any current or future effects occurring as a result of ongoing oil and gas leasing. Further, the majority of more recent past, present, and future activities are designed to improve watershed conditions. In light of this and considering the minimal amount of impacts to wetlands, wet meadows, floodplains, and riparian areas expected under the N Action Alternative, there would not be a significant contribution to the cumulative effects occurring to watershed resources on the UNF. In addition, impacts that do occur would likely be short-term and would be reclaimed following exploration activities.

Cumulative Effects of the Proposed Action Alternative

Future oil and gas activity could result in adverse impacts to watershed resources as discussed above. However, the Proposed Action Alternative would apply more strict stipulations for the

protection of watershed resources to the areas where leasing is permitted than what is currently in place. Further, impacts resulting from oil and gas development under the Proposed Action Alternative in areas not currently open to leasing would be relatively minimal due to the small amount of disturbance and protective stipulations. Also, most projects in the recent past, present, and future are designed to improve watershed conditions. As a result, effects under the Proposed Action Alternative would not be a significant contribution to the cumulative effects occurring to watershed resources on the UNF.

Cumulative Effects of the Modified Resource-based Alternative

Cumulative effects would be the same as described for the Proposed Action Alternative.

4.7 Water Resources Including Culinary and Municipal Water Systems, Surface Water, and Ground Water

4.7.1 Introduction

The authorization of oil and gas leases implies that exploration and development activities may eventually occur. If they do occur, these activities could directly, indirectly, or cumulatively impact surface water and groundwater resources, including impaired waterbodies (i.e., 303(d) listed) and culinary water sources. This section predicts the resultant impacts. Impacts are described both in general terms, and specific to each alternative and each RFOGD.

Methodology

Various published sources provide information on the types of impacts that oil and gas exploration activities can have on water resources. Several of these were consulted while preparing this section, including: the LRMP and Forest Plan FEIS (USFS 2003a and 2003), Western Uinta Basin Oil and Gas Leasing DEIS and FEIS (USFS 1996b, 1997b), Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development Gold Book (BLM/USFS 2006), and State of the Forest Reports (USFS 2003b, 2005, 2006).

The types of impacts discussed in those documents were examined in the context of the proposed action and alternatives described in Chapter 2. These Chapter 2 descriptions also include various stipulations that were taken into account during impact assessment. The water resources existing environment descriptions contained in Chapter 3 provided a basis for impact assessment. Those descriptions included information about water sources and culinary and municipal water supplies; geologic and hydrologic factors important to the analysis; historic human uses; and historic oil, gas, and mineral developments. Much of this information was provided by UNF GIS spatial data. All of this information was taken into account while predicting impacts, based upon a set of pre-determined measurement indicators, which are described in the following subsection.

Measurement Indicators

The following indicators were used to quantify and qualify the impacts that each alternative could have on water resources:

- Acres of surface disturbance
- Potential of oil and gas activities to occur in Drinking Water Source Protection Zones

4.7.2 General Effects

The direct ground disturbing activities associated with exploration activities (well pad construction, road construction or improvement, and drainage control features such as culverts or ditches) would increase the erosion potential for the lands on which the disturbance occurs. This has the potential to occur with any type of construction activity: vegetation is removed, soils are compacted and disturbed, and natural drainage patterns are disturbed. If this occurs over a great

enough area, over a long enough time period, or in close proximity to streams, water quality can be impacted.

Increased erosion, in turn, would have the potential to indirectly impact surface water quality due to increased sediment loading. However, this potential is considered to be minimal due to the small size of surface disturbance (approximately five acres per site) and the Best Management Practices that would be applied during construction.

Similarly, these kinds of construction activities would result in increased runoff from uplands, particularly in areas with steep slopes and less permeable soils, at least at an incremental level. On a local level, and/or where the impacted acreage represents a higher percentage of the watershed area, the increased runoff volumes could trigger accelerated streambank erosion in receiving streams and new gully development; and further exacerbate any previously existing deteriorated or vulnerable streambanks or gully conditions. These effects could also indirectly affect water quality due to sediment loading. However, this potential is considered to be negligible due to the small size of surface disturbance (approximately five acres per site).

Releases of channelized flows from run-on and runoff diversion systems, such as ditches and culvert release points, could directly result in increased sediment loads in streams. These are likely to be minimal and very localized.

Increased sediment loads, whether due to increased upland erosion, increased runoff, or increased channel erosion, would most likely occur during and immediately after construction. Impacts would be short-term and reduced to minimal after successful reclamation occurs (after a 1-3 month period of exploration). In addition, numerous measures to minimize these types of impacts, such as sediment control, drainage control, etc., would essentially reduce the level of impacts that could be expected.

Further, due to the very small acreages associated with the direct disturbances (6.9 acres for the No Action Alternative, and five acres per well—60 acres total—for the Proposed Action and Modified Resource-based Alternatives), the likelihood of significant surface water quality impacts can be considered generally small. Last, while the likelihood of surface water quality impacts due to sediment loading would be small, the actual level would also vary with proximity to surface water streams: the closer the stream, the greater the impact would be should erosion occur. Essentially, erosion may not result in sedimentation in a stream, if it occurs at a distance from a surface stream.

Thus, if construction activities (either pad building or road work) result in uncontrolled erosion in close proximity to surface streams, water quality impacts could occur, at least in a very localized and short-term aspect. Overall, this potential can be considered minimal.

These direct ground-disturbing activities would not have the potential to affect groundwater quality.

In addition to water quality impacts related to sediment, other potential contamination of surface or groundwaters could come from inadvertent releases of pollutants such as:

- Spills of fuels or lubricants from field maintenance of vehicles or equipment, storage facilities, and vehicle or equipment accidents
- Drilling fluids, including chemical additives, which can contain toxic substances

The potential for this type of release and its level of impact would be considered minimal (at least in regard to water quality), but as described in other resource sections it could be greater as an indirect impact to stream biota. Should it occur, this type of direct impact to surface water would be short-term in nature. However, the closer that such spills occur to surface streams, the greater the level of impact. Because the locations of facilities would not be known until individual NEPA analysis is completed for proposed well sites, this cannot be fully analyzed in this EIS.

Such releases would not be likely to affect groundwater, except in the case where a spill occurred over an important recharge area and was not sufficiently mitigated. If so, it could represent a longer term impact, however this is considered to have a minimal potential to occur.

Introduction of sediment, fuels, lubricants, or drilling fluids to surface and/or groundwater systems that alter water quality could affect down-gradient groundwater uses, including culinary and municipal ones—those areas defined by Surface Water Protection (SWP) Zones or Groundwater Protection (GWP) Zones, and CUP uses. The majority of those water quality impacts are described above as having a low potential to occur, to be at a minimal level, and of short-term duration. These descriptions would also generally apply to the indirect impacts to water users that would result from potential water quality degradation. Again, the level of impact would also be related to the proximity to surface streams; this would have to be assessed at the site-specific analysis stage. Additionally, since riparian areas have specific stipulations applied for their protection, it is unlikely that such spills would occur in close proximity to streams or other surface water bodies.

Another way that either sediment-related impacts or produced water releases could indirectly affect water uses would be through the physical disruption of water distribution or storage systems. Increased stream erosion caused by sedimentation, increased runoff, or a produced water release could cause damage to pipelines, weirs, irrigation diversion structures, and the like. Such impacts would likely be very temporary, assuming that operators would be required to immediately correct the problem. Such impacts would also be minor, considering the small acres of disturbance that are projected to occur.

In general, oil and gas activities are not expected to have a specific impact to CUP facilities or operations. According to the 1999 CUP FEIS, proposed development and/or modification of diversion structures on the CUP would not prohibit energy resource exploration including transportation, “other than as needed to protect the project features,” inferring that oil and gas exploration and the CUP can co-exist without negative impacts on each other.

These general types of anticipated impacts would have a greater or lesser chance of occurring, depending upon the various leasing options that may be applied under each alternative. These are discussed below. Further, if USFS rules and standards are followed, including those associated with the leasing stipulations that would be applied, spills and erosive run-off should be kept under control. There would likely be no effect (normal operating procedures) to minimal or moderate adverse effects (spill or erosion that is not immediately checked, which is unlikely) associated with surface waters from oil and gas exploration.

4.7.3 Effects of Lease Options

The only stipulations that directly deal with water resource impacts are NSO and LN. These would apply to Drinking Water Source Protection Zones (depending upon alternative) and CUP lands and infrastructure. NSO and LN are described below.

No Surface Occupancy: For the NSO lease option, well pads would not be placed, but directional drilling could take place from outside the stipulation area, and roads could still be constructed within the stipulation area. USFS mitigation measures and BMPs for construction still apply and should prevent most potential impacts.

Acreage covered by NSO lease options would generally protect ground and surface water quality from oil and gas activities; however, surface water quality could be affected by activities on adjacent, upstream surface-occupied areas or by roads within the NSO areas. Effects could be beneficial if activities resulted in improved retention and more controlled release of runoff than is currently in place with the existing environment.

Other NSO stipulations that are proposed to protect watershed resources, such as would apply to areas with geologic hazards/unstable soils, steep slopes, and riparian/wetlands areas would indirectly also serve to reduce water quality impacts and protect water users.

Depending upon the alternative, this stipulation would substantially minimize the potential to impact culinary/municipal water users and the CUP.

Lease Notice: A lease notice provides more detailed information concerning existing limitations, regulations, or orders, or addresses special considerations. AN LN does not impose new restrictions on oil and gas activities. Thus, in regard to water resources, an LN could reduce potential impacts by making the lessee aware of the need to comply with specific local, State, or Federal requirements, such as Utah Safe Drinking Water Act.

Standard Lease Terms: Under the SLT scenario, no special stipulations would apply. Mitigation of impacts to other resources would be based on other local, State, and Federal regulations, including the Clean Water Act.

For resources that are not protected by law, mitigation would be based on the SLT and 43 CFR 3101.1-2 which provides clarification of reasonable mitigation as used in Section 6 of the SLT (delaying activities for up to 60 days, or moving a well location up to 200 meters). The Clean Water Act would provide some protection to water quality, primarily through storm water and wastewater discharge requirements such as permits or stormwater BMPs. However, this might not be adequate to prevent hazardous materials from reaching surface and groundwater in the event of a spill or leak. Spills would have the greatest potential for adverse impacts to water quality.

Further, requirements for minimizing surface disturbances and completing reclamation are included in SLT. These would help to reduce sediment-related impacts to surface water.

Timing Limitation: TL for big game winter and calving ranges would protect water quality from potential adverse effects by restricting activities during vulnerable times, such as during high spring runoff.

No Lease: NL would eliminate direct, site-specific effects (disturbance) to water resources. Impacts could still occur from oil and gas activities in adjacent or upgradient areas.

4.7.4 Effects of the No Action Alternative

The No Action alternative leaves the existing lease program in place, which is essentially Alternative 3 of the WUB FEIS. The WUB Analysis Areas included the following MAs: Currant Creek, Diamond Fork, Upper Spanish Fork, Strawberry Reservoir, Willow Creek, and White River. The American Fork, Upper Provo, West Sheeprock, Vernon, Mona, Nephi, Payson, and Thistle MAs were not considered for leasing in that EIS and would remain unavailable for leasing, thus resulting in no impact to water resources in those areas.

This plan originally allowed leasing on approximately 197,000 acres (or 22 percent) of the UNF of the forest. Currently, only approximately 4,000 acres of this amount are still available for leasing. However, under this Alternative, only one well and associated road construction would occur, with a total ground disturbance of 6.9 acres. In addition to the MAs listed above that would not be available for leasing under this alternative, there are no areas available within the Currant Creek MA.

Neither the 2003 Forest Plan nor the WUB FEIS contain specific standards for protecting SWP Zones, GWP Zones, or elements of the CUP. However, the 2003 Forest Plan Forest-wide Goal 1 states that “Soil, air, and water resources [will] provide for watershed health, … and meet applicable laws and regulations.” Sub-goal 1-11 provides specific guidance by stating that “All activities on the Forest [will] comply with State and Federal clean water standards and applicable permitting processes.”

To the extent practical through management of activities on the Forest, water chemistry [is to be] maintained in all surface water where the alkalinity will not be reduced more than 10 percent of baseline, and “Management activities [will] not cause exceedances of State of Utah water quality standards (this monitoring is required by law) or increases in the listing of 303(d) streams.”

Therefore, pollution of municipal, culinary, or transient-non community drinking water sources that can be traced to oil and gas activities would be subject to Utah Safe Drinking Water standards written in Utah Rules R309-100 through R309-705.

De facto protection of surface and groundwater quality, and thus municipal and culinary uses, is provided in those areas closed to leasing and those areas covered by NSO limitations (see watershed and soils analyses), unless leasing is allowed upstream of the closure.

Given the nature of water resources, it is not possible to quantify acreages associated with them: essentially 100 percent of an area includes either land directly associated with a stream channel or with its watershed. One exception is for Drinking Water Source Protection Zones; acreages for SWP zones are given in table 4.22. While this Alternative does not provide stipulations directly for these zones, stipulations applied for other resources would provide some additional level of protection; thus table 4.22 shows the types of stipulations that would apply due to other resource concerns. In addition, it shows that approximately 68,400 acres of SWP Zones within the Strawberry MA would not be available for leasing.

Table 4.22. **No Action Alternative: acreage within SWP zones.**

MA	Leasing Stipulation					Total Acreage
	NSO	TL and CSU	TL	CSU	SLT	
Currant Creek	900	0	0	100	400	1,400
Diamond Fork	70	0	0	300	40	410
Spanish Fork Canyon	60	0	0	90	0	150
Strawberry	27,600	200	600	60,600	3,300	92,300
Willow Creek	6,700	0	200	16,200	700	23,800
White River	13,300	0	300	9,400	80	23,080
Total Acres Available for Leasing						**141,140**

In any case, development of only a single well, with a disturbance area of 6.9 acres would most likely result in only negligible or minimal localized impacts of a short-term nature. The types and nature of these impacts were described above in General Effects.

4.7.5 Effects of the Proposed Action Alternative

The Proposed Action Alternative would allow leasing on approximately 777,300 acres of the UNF (87 percent). Total disturbance within this area would be about 60 acres.

This alternative includes water quality protection standards based on Utah's Safe Drinking Water Act (USDWA) classifications. There would be NSO stipulations in place for oil and gas activities occurring within GWP Zones 1-4 and SWP Zone 1. A Lease Notification with language addressing water quality concerns would be required for oil and gas activities occurring within SWP Zones 2 through 4. Other stipulations related to other resources would also be included and may be more restrictive than just LN.

The NSO stipulations associated with GWP Zones 1-4 for the Proposed Action would protect groundwater within at least a two-mile radius, and in some cases the entire aquifer, from virtually all direct and most indirect impacts of oil and gas activity, except in the most unlikely situation described under General Effects for a spill over a high-value recharge area (no impacts to groundwater protection zones related to sedimentation or erosion are expected due to construction activities such as road building). The NSO stipulations would protect SWP Zone 1 areas, and any oil and gas activities within SWP Zones 2-4 would require a Lease Notice to address specific concerns about water resources. In addition, much of this land is covered under other, more restrictive, resource stipulations. These stipulations are shown in table 4.23.

For this alternative, acres of surface disturbance would be greater than under the No Action Alternative (6.9 acres versus 60 acres). However, these disturbances may be less likely to occur in close proximity to streams, CUP infrastructure, or culinary/municipal watersheds due to NSO stipulations.

Overall, the types and levels of impacts that could occur under this alternative are as described under General Effects.

Table 4.23. Proposed Action Alternative: acreage within SWP zones.

RFOGD	Leasing Stipulation					Total Acreage
	NSO	TL and CSU	TL	CSU	SLT	
American Fork	29,600	1,200	1,900	0	0	32,700
Currant Creek	59,000	20,200	8,000	10	4,700	91,910
Deer Creek	79,700	1,400	11,800	0	1,500	94,400
Diamond Fork	70	10	300	0	30	410
Payson	0	0	0	0	0	0
Spanish Fork Canyon	20	30	100	0	0	150
Strawberry	48,100	14,800	40,400	2,500	15,200	121,100
Upper Provo	22,600	36,300	0	0	0	58,900
Vernon	0	0	0	0	0	0
Total Acres Available for Leasing						**399,470**

Currant Creek Group

This EIS assumes that two exploratory wells with 10 acres total surface disturbance could be drilled in this RFOGD. The entire RFOGD is within an SWP Zone, and thus would be covered at a minimum by an LN to protect water quality. The majority of the area is covered by SWP Zone 4, with smaller areas located in other SWP Zones. In addition, in certain areas, stipulations set forth for other resources would also serve as de-facto protection for SWP Zones where otherwise only an LN would apply, as can be inferred from table 4.23. Also, approximately 11,800 acres within Surface Water Protection Zones would not be available for leasing.

There are several elements of the CUP located in the Currant Creek RFOGD, including the Rhodes Tunnel; the West Fork Pipeline; the Vat Diversion Dam and Tunnel; Open Channel # 1; the Currant Pipeline and Tunnel; the Layout Siphon, Diversion Dam, and Tunnel; and the Water Hollow Diversion Dam and Tunnel. Everything downstream of the Layout Creek Tunnel is in areas closed to leasing. Everything upstream is open to leasing under NSO and CSU status with small areas of SLT status south of Currant Creek Reservoir. No impacts or minor adverse impacts to CUP facilities would be expected, and would be of short duration if they occurred.

In general, if exploratory oil or gas wells were drilled in this RFOGD, impacts to surface and groundwater quality for culinary and municipal systems would be as described above under the General Impacts section.

Deer Creek Group

This EIS assumes that one exploratory well (with five acres surface disturbance) could be drilled in this RFOGD.

There are numerous established SWP or GWP Zones in this RFOGD. Much of the RFOGD is protected by SWP Zone 4 to protect water supplies coming from the Provo River. All Provo River tributaries are protected by other SWP Zones. Under this alternative, these zones are subject to LN stipulations.

Regarding GWP Zones, there is only one area along the foothills just east of Springville that is not delineated as within a zone. Additionally, in certain areas, stipulations set forth for other resources would also serve as de-facto protection for SWP Zones where otherwise only an LN would apply, as can be inferred from table 4.23. Last, approximately 25,200 acres within SWP Zones would not be available for leasing.

The Provo River canyon carries CUP water from Deer Creek Reservoir to the Salt Lake Aqueduct and the Alpine Aqueduct Reach 1. On its way, water passes through the Deer Creek Power plant, Olmstead Diversion Dam, Alpine Tunnel, and Murdock Diversion Dam. Approximately 90 percent of this passage is closed to leasing, while the other 10 percent has NSO stipulations on it. This level of protection is adequate to protect CUP facilities from seismic and drilling impacts. No impacts to CUP facilities would be expected.

In general, if exploratory oil or gas wells were drilled in this RFOGD, impacts to surface and groundwater quality for culinary and municipal systems would be as described above under General Impacts.

Diamond Fork Group

This EIS assumes that one exploratory well (with five acres surface disturbance) could be drilled in this RFOGD.

No SWP Zones exist in this RFOGD. The only GWP Zones in the RFOGD are two overlapping Transient Zone 4 areas. Additionally, in certain areas, stipulations set forth for other resources would also serve as de-facto protection for SWP Zones where otherwise only an LN would apply, as can be inferred from table 4.23.

Of more significance are CUP features. The Strawberry-Syar Tunnel and Diamond Fork Tunnel system is covered by a mix of CSU and NSO stipulations for this area. The tunnels, outflows, and flow control structures are protected by SWP Zone 1 standards (NSO stipulations).

In general, if exploratory oil or gas wells were drilled in this RFOGD, impacts to surface and groundwater quality for culinary and municipal systems would be as described above under General Impacts.

Payson Group

This EIS assumes that one exploratory well (with five acres surface disturbance) could be drilled in this RFOGD.

While none of this RFOGD is within a SWP Zone, there are several GWP Zone areas delineated at the north end of the RFOGD in the Payson MA, and six Transient Zone areas. These developments are covered by NSO stipulations. Additionally, in certain areas, stipulations set forth for other resources would also serve as de-facto protection for SWP Zones where otherwise only an LN would apply, as can be inferred from table 4.23.

There are no CUP facilities on this RFOGD.

If an exploratory oil or gas well is drilled in this RFOGD, impacts to surface and groundwater quality for culinary and municipal systems would be as described above under General Impacts.

Spanish Fork Canyon Group

This EIS assumes that one exploratory well (with five acres surface disturbance) could be drilled in this RFOGD.

There are no SWP or GWP Zones in this RFOGD.

There are no constructed CUP facilities in or adjacent to this RFOGD, therefore there should be no impact to CUP facilities from oil and gas development in this RFOGD.

Impacts to water quality would be as described above under General Impacts.

Strawberry Group

This EIS assumes that three exploratory wells (with 15 acres total surface disturbance) could be drilled in this RFOGD.

The entire RFOGD is considered an SWP Zone, most under Zone 4 with the Strawberry Reservoir and its tributaries considered Zone 1-3 for SWP. In addition, the headwaters of Willow Creek and the Right Hand Fork of the White River are considered Zone 3 for SWP.

There are ten Transient GWP Zones within the RFOGD, and all but one are adjoining Strawberry Reservoir. The outlier is located to the northwest near Harry's Reservoir, which is not within a SWP Zone.

The majority of the GWP Zones in this RFOGD would be closed to leasing (Strawberry Lands). The SWP zones are protected with LNs. However, when other Resource values are considered, lands along Willow Creek are NSO with surrounding upland areas covered by CSU and TL-CSU stipulations. Lands along the White River are covered by NSO and CSU stipulations. Approximately 71,250 acres within SWP Zones would not be available for leasing.

There are several CUP facilities and structures located within this RFOGD. These are the Syar Tunnel and Strawberry-Syar Tunnel that divert water out of Strawberry Reservoir, and the Water Hollow Tunnel that brings water into Strawberry Reservoir. The first two are protected by NSO stipulations and the Water Hollow Tunnel is in an area closed to leasing. Because of these protections it is expected that there will be no impacts to these CUP facilities and structures.

If exploratory oil or gas wells are drilled in this RFOGD, impacts to surface and groundwater quality for culinary and municipal systems would be as described above under general impacts.

American Fork Group

This EIS evaluates the effects of one exploratory well (with five acres surface disturbance) for the American Fork RFOGD. Impacts would generally be as described in the General Effects section.

The entire American Fork RFOGD is within an SWP Zone, predominantly Zone 4, which must be protected, at a minimum, by Lease Notification. The RFOGD also contains many GWP Zones that would also protected by NSO stipulations. In addition, in certain areas, stipulations set forth for other resources would also serve as de-facto protection for SWP Zones where otherwise only an LN would apply, as can be inferred from table 4.23. Approximately 29,150 acres within SWP Zones would not be available for leasing. In short, virtually all these Zones would either be protected by stipulations or not available for leasing.

There are no elements of the CUP located within the American Fork RFOGD.

Upper Provo Group

While no exploration drilling is anticipated to occur in this RFOGD during the 10 to 15-year analysis period, this EIS evaluates the effects of one exploratory well (with five acres surface disturbance). Impacts would generally be as described in the General Effects Section.

There are 13 GWP Zones located fully or partially within this RFOGD. Further, there are three surface water streams (Soapstone Creek, South Fork of the Provo, and Little South Fork of the Provo River) that would be protected by SWP Zones 1-3 and the remaining surface area is protected by SWP Zone 4. Additionally, in certain areas, stipulations set forth for other resources would also serve as de-facto protection for SWP Zones where otherwise only an LN would apply, as can be inferred from table 4.23. Approximately 2,840 acres within SWP Zones would not be available for leasing.

There are no CUP facilities within this RFOGD, therefore no impacts to CUP facilities are expected.

If an exploratory oil or gas well is drilled in this RFOGD, impacts to surface and groundwater quality for culinary and municipal systems would be as described above under general effects.

Vernon Group

One exploratory well (with five acres surface disturbance) is evaluated for this FROGD. Impacts would generally be as described in the General Effects Section.

There is one GWP Zone 4 within the RFOGD located along the Experimental Pasture road and just west of Lower Vernon Creek. It protects a water source located to the north of the UNF border. This GWP Zone is protected by NSO stipulations and the land around it is protected by TL and CSU stipulations.

The landform on which the GWP Zone is located is a bajada or outwash plain with high permeability. If a drilling rig were located within the limits of this bajada and upgradient of the GWP Zone it is possible that a significant spill of hydrocarbons or process water could pollute the source. Without more information about the underlying geology it is not possible to predict whether there would be no significant impacts, or if impacts could be moderately adverse or significant adverse. If a spill were to pollute groundwater, impacts could be very long-term.

There are no CUP facilities within or adjacent to this RFOGD.

4.7.6 Effects of the Modified Resource-based Alternative

The Modified Action Alternative would allow leasing on approximately 224,500 acres of the UNF, or 26 percent of the forest. Actual acreage of disturbance would be the same as under the Proposed Action Alternative. As with the Proposed Action Alternative, this alternative would provide similar stipulations to protect water quality using the USDWA classifications. All Groundwater Zones would require NSO stipulations, while Surface Water Zones 1 and 2 would require NSO stipulations, and only Surface Water Zones 3 and 4 would have a Lease Notification. Thus, the only difference between the Proposed Action Alternative and the Modified Resource-based Alternative for water-related stipulations is that Surface Water Zone 2

would have the same NSO stipulation as Zone 1; thus this alternative is slightly more protective in that regard. However, when other resource stipulations are taken into account, Surface Water Protection Zones 3-4 would be afforded more protection. Table 4.24 summarizes the SWP acres under each lease option in each RFOGD.

Table 4.24. Modified Resource-based Alternative: acreage within SWP zones.

MA	Leasing Stipulation					Total Acreage
	NSO	TL and CSU	CSU	TL	SLT	
American Fork	6,900	600	0	30	0	7,530
Currant Creek	27,700	7,400	0	3,400	0	38,500
Deer Creek	20,000	1,400	0	1,500	0	22,900
Diamond Fork	10	100	0	30	0	140
Payson	0	0	0	0	0	0
Spanish Fork Canyon	20	50	0	0	0	70
Strawberry	20,100	19,500	0	15,600	0	55,200
Upper Provo	14,700	15,000	0	0	0	29,700
Vernon	0	0	0	0	0	0
Total Acres Available for Leasing						**154,040**

The types of impacts under this alternative, for each RFOGD, would be the same as under the Proposed Action Alternative. The differences would primarily related to the fact that a higher percentage of Surface Water Protection Zones 3-4 would be covered by various stipulations, that either directly or indirectly serve to protect water quality and municipal and culinary users. Additionally, a higher percentage of both Ground Water and Surface Water Protection Zones would not be available for leasing, resulting in no impacts. In fact, the amount of these zones available for leasing is reduced by more than half from the Proposed Action Alternative to the Modified Resource-based Alternative. A comparison of Table 4.2 and 4.3 demonstrates these differences. In reality, however, the actual impacts of well pad and access road construction would be the same for the two alternatives, since it is not known where within an RFOGD oil and gas exploration activities could occur.

For this alternative, acres of surface disturbance is projected to be approximately 60 acres, taking into account wells added for analysis purposes in RFOGDs without oil and gas potential. Total acres of disturbance could total 60 acres with one production well added. However, these disturbances are unlikely to occur in close proximity to streams, CUP infrastructure, or culinary/municipal watersheds due to NSO stipulations applied under this Alternative. Potential for surface disturbance to occur in municipal watershed or in the vicinity of CUP infrastructure is the same as described under the Proposed Action Alternative. However, under this alternative, surface disturbance is slightly less likely to occur in close proximity to a stream, given the NSO stipulation in Zone 2 surface water protection zones.

Overall, the impacts of implementing the Modified Resource-based Alternative would be as described under the Proposed Action Alternative and in the General Effects section. Impacts would be short-term, minor, and adverse. Protections afforded through leasing stipulations and

notifications, the temporary nature of disturbance, and the small acres of disturbance that could potentially occur all result in negligible to minor adverse effects.

4.7.7 Summary of Effects

Table 4.25. Comparison summary of effects: water resources.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Currant Creek	There would be no lands available for leasing, thus there would be no potential impact to water resources.	Up to 10 acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to 10 acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.
Deer Creek	There would be no lands available for leasing, thus there would be no potential impact to water resources.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.
Diamond Fork	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils and for steep slopes would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems. .

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	There would be no lands available for leasing, thus there would be no potential impact to water resources.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.
Strawberry	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils and for steep slopes would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to 15 acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to 15 acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.
American Fork	There would be no lands available for leasing, thus there would be no potential impact to water resources.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.
Vernon	There would be no lands available for leasing, thus there would be no potential impact to water resources.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to five acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Forest-wide	Up to 6.9 acres of disturbance could occur. The stipulations for geological hazards/unstable soils and for steep slopes would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to 60 acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.	Up to 60 acres of disturbance could occur. The stipulations for geological hazards/unstable soils, for steep slopes, and for DWSPs would provide significant protection against stream erosion and for maintenance of water quality, thereby also protecting culinary and municipal water systems.

4.7.8 Cumulative Effects

Past, Present, and Reasonably Foreseeable Actions

Primary activities taking place or planned in the UNF that have the potential to affect water resources can be grouped into two categories. One is the surface-disturbing activities associated with construction, prescribed burning, etc. The other is related to mitigation of CUP-related impacts and other watershed/water quality improvement projects.

Regarding surface-disturbing activities, the UNF is in “maintenance” mode and not planning any new construction of facilities or roads in the next 10 years. Other surface disturbance activities that could possibly affect water quality that have been occurring and are ongoing throughout the UNF include existing roads and prescribed burning and thinning.

Burning and clearcutting in three of the past four years have encompassed 6,136 acres on the UNF. These areas may also be sources of water quality degradation until surface stabilization has occurred.

CUP mitigation activities have occurred over several RFOGDs, to restore damages from original project development and operation. These were briefly described in Chapter 3 and would have a beneficial effect on water quality and culinary and municipal uses. Further, streams have been included on 303(d) lists, and will eventually be the subject of TMDL development or have a TMDL developed, which would also have a beneficial effect on water quality and culinary and municipal uses.

Cumulative Effects of the No Action Alternative

The cumulative impact of 6.9 acres of disturbance would be negligible, unless located within DWSP zones, where impact would be minimal.

Cumulative Effects of the Proposed Action Alternative

The cumulative impact of 45-61.2 acres of disturbance, within discrete 5-acre blocks would be negligible.

Cumulative Effects of the Modified Resource-based Alternative

The cumulative impact of 45-61.2 acres of disturbance, within discrete 5-acre blocks would be negligible.

4.8 Vegetation, Noxious Weeds, and Invasive Species

4.8.1 Introduction

Methodology

Acres of vegetation within each community type were calculated using spatial data provided by the UNF. All acreages are approximate, as mapped layers may overlap slightly or layer boundaries may not touch due to mapping/GIS error, differences in data origins, or repeated data manipulations. When mapped areas overlap, total acres are overestimated; when mapped areas do not touch, the space between boundaries is not counted under any vegetation type and underestimates result.

The majority of riparian vegetation is also counted as acres of RHCAs; RHCA impacts are presented in Section 4.6. Vegetation analyzed as "riparian" vegetation in this section includes silver sagebrush, all riparian types (herbaceous, willow/birch, and tree-dominated), and wet meadows (impacts covered in Section 4.6).

Sources of existing information on the impacts of oil and gas exploration activities on vegetation resources came from the LRMP and Forest Plan FEIS (UNF 2003a and 2003), Western Uinta Basin Oil and Gas Leasing FEIS (UNF 1996b), Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development Gold Book (BLM/USFS 2006), and State of the Forest Reports (USFS 2003b, 2005, 2006). Other sources are cited in the text.

Measurement Indicators

The following indicators were used to quantify and qualify the impacts that each alternative could have on vegetation resources:

- Acres of surface disturbance

4.8.2 General Effects

Vegetative Communities

Direct disturbance to vegetative communities would occur from the construction of 12 projected oil and gas exploration wells. Disturbance from each well is estimated at five acres, which includes a two-acre well pad with facilities (including drill rig, tanks, crew trailers, parking and turnaround space, and a reserve water pond) and access roads (assuming one mile of new road construction and one mile of road widening, to 20 feet). Within these disturbance areas, up to 60 acres vegetation would be absent for at least the time the well is operational (1-3 months).

If hydrocarbon reserves are found and the area is developed for production, the disturbance to vegetation would be long-term (up to 40 years; see Cumulative Effects). If no reserves are found, the well site and access roads would be decommissioned and reclaimed. Reclamation would involve replacing top soil, re-grading the soil and seeding with a native species mix that is similar in species composition to the existing vegetation. At this time, no development is projected in the next 10-15 years and all oil and gas activities are assumed to be temporary and related to exploration.

Site-specific impacts would result when disturbance occurs within common, well represented vegetation communities that are not at risk of losing structural or biological diversity (see Section 3.8). In addition to being confined to the immediate locale, these impacts would generally be short-term. After reclamation, these impacts would be negligible.

Population-level effects may occur if impacts to a vegetation community have impacts beyond the loss of individual plants in the immediate locale. The loss of many individuals at once would impact populations by reducing the number of individuals for reproduction and reducing gene flow within and between local populations. Structural diversity may also be reduced if disturbance removes a disproportionate number of young trees within a population. Many community types on the UNF are at risk of losing structural or biological diversity due to fire suppression and grazing, thus the loss of individuals from oil and gas-related surface disturbance may have population-level impacts.

Direct effects to common shrub (mountain brush or sagebrush), tall forb, and grass communities from ground disturbance would be site-specific, short-term, and negligible to minor. Less desirable species, including noxious weeds, may increase in number within these communities after reclamation. Mountain brush communities, which include oak, maple, and mountain mahogany, are the most relatively abundant on the UNF (29 percent of all vegetation) and are thus the most likely to be disturbed.

Direct effects to common forest communities (aspen, conifer, or pinyon/juniper) from ground disturbance would be negligible to minor, and long-term because forests take at least 50-100 years to reestablish. Structural diversity may be lost at a population or community scale because forest communities take longer to establish structure and have a relatively high level of current impacts (compared to other community types). Aspen communities are the most common forest type on the UNF (63 percent of all forest vegetation) and are thus the most likely to be disturbed. Under Alternatives 1-3, any vegetation communities on slopes > 35 percent would be protected by NSO.

Direct effects to riparian areas from ground disturbance would be short- to long-term, and minor to moderate, because these areas are relatively uncommon and small disturbances could have impacts on the structural diversity of riparian communities. Riparian areas >40 acres would be protected by either NSO or CSU. In addition, riparian areas are often covered by NSO or CSU stipulations for other resources. Section 4.6 discusses impacts to Riparian Habitat Conservation Areas, wetlands, and floodplains.

However, because of the small amount of disturbance projected Forest-wide, protections afforded to riparian areas and RHCAs, and because under SLT well pads and roads can be required to be moved up to 200 meters (656 feet), the probability of disturbance occurring within riparian areas is minor to none. Under all alternatives, impacts to riparian areas are considered to be minor and mostly indirect.

Any direct effects to alpine areas from ground disturbance would be long-term and major because alpine areas are unique, relatively rare, and are not likely to reestablish after disturbance. Recovery, if it occurs, would be extremely slow (>100 years).

The building of new roads to access exploration wells would increase motorized traffic during operations (see Section 4.4, Transportation) and thus increase the potential for the establishment of undesirable species.

Traditional Plant Gathering

Ground disturbance would cause direct effects to traditional plant gathering by the Northern Utes if areas containing important cultural vegetation resources are disturbed. Direct effects would be site-specific, short- to long-term (depending on the species), and minor. Willows and other riparian species within riparian areas >40 acres would be protected by NSO or CSU. For riparian areas less than 40 acres and in other community types utilized by the Northern Ute Tribe (e.g., aspen and forbs), the loss of vegetation from exploratory drilling and associated activities would reduce availability of these plants for traditional gathering. Access roads built for oil and gas exploration may have a beneficial indirect impact on traditional plant gathering, in that access may increase if the road is near a site of interest. Increased access may also cause adverse indirect impacts if the site were more vulnerable to vandalism or disturbance by non-gatherers. Indirect impacts would be site-specific, long-term, and minor.

Disturbance to archeological sites of historical plant gathering in the Vernon Group are unlikely to occur because cultural surveys would be conducted prior to surface disturbance. SLT or a CSU stipulation (if present) would allow operations to be moved 200 feet (or more under CSU) to avoid a sensitive site.

Noxious Weeds

The process of operations (i.e., movements of vehicles) and the building of access roads and other structures associated with oil and gas exploration may increase the spread of noxious weeds on the UNF, because weeds are spread by vehicles and generally establish well in disturbed areas. Musk thistle is the most common weed on the UNF and is the most likely to increase. Roads and riparian drainages are the locations where most noxious weeds are found; thus activities in these areas would have the greatest likelihood of spreading noxious weeds. NSO or CSU stipulations would prevent well pads from being established in riparian areas greater than 40 acres. Roads would be constructed regardless of the well location and it is assumed that noxious weed seed is present in most areas and would be spread if proper precautions are not taken. The spread of noxious and invasive weeds would have an adverse indirect effect on vegetation communities by taking up space and resources from native plants, thereby reducing the amount of native vegetation over the long-term. Indirect effects on vegetation communities from competition with noxious and invasive weeds would be long-term and minor.

4.8.3 Effects of Lease Options

Besides riparian areas >40 acres, no leasing stipulations are proposed specifically for vegetation communities, traditional plant gathering areas, or noxious/invasive weeds. The following describes how leasing stipulations for other resources would affect vegetation.

Standard Lease Terms: Under SLT, no special stipulations would be applied. At a minimum, and according to the standard surface use requirements attached to any lease, SLT would allow operations to be moved up to 200 meters and be delayed for up to 60 days if the authorizing officer deems it necessary to protect a resource. These allowances could be used to avoid

sensitive vegetation, traditional plant gathering sites, or times of noxious weed propagation if necessary. A site inspection survey would be conducted after the drilling application is filed to determine the status of resources within the project area. In general, disturbance to vegetation would be "minimized" under SLT, avoiding "unreasonable or unnecessary disturbances during construction of pads, access, and other facilities, and during operations." Disturbed areas would be reshaped and re-vegetated after use.

No Lease: NL would eliminate direct, site-specific effects (disturbance) to vegetation resources. Access to traditional plant gathering sites and noxious weed seed propagation could still occur from oil and gas activities in adjacent areas.

No Surface Occupancy: NSO would prevent well pads from being constructed but would not restrict the construction of access roads and auxiliary structures (i.e., pipelines or powerlines). Direct effects to vegetation, traditional plant gathering areas, and noxious weeds could still occur by disturbance from roads. Noxious weeds could spread along linear corridors if construction vehicles are not cleaned of seed before entering the UNF or project site. The magnitude of these latter effects would be reduced through adherence to BMPs.

Controlled Surface Use: Operations would be allowed, but with special operational constraints in place to protect or mitigate for impacts to vegetation. For example, the CSU stipulation may require avoidance of areas containing Forest sensitive plant species. Additional mitigation measures regarding re-vegetation (beyond SLT) may be required. Operations and structures may be moved more than 200 meters (200 = the maximum allowed under SLT) to protect vegetation resources. A survey would be required prior to surface disturbance to determine impacts to resources, including riparian areas, if applicable. Most importantly, all standards and guidelines within the UNF LRMP (USFS 2003a) would be followed, with modifications to the design or locations of operations being made if necessary. **MP-8.1-1 Guideline** states that "vegetation management should be limited to the removal of vegetation prior to mineral development, noxious weed control, and site reclamation/re-vegetation when mineral operations are completed."

Timing Limitation: A TL stipulation would preclude surface disturbance during sensitive periods, typically for wildlife (e.g., big game calving). Any sensitive period greater than 60 days (60 = the maximum delay allowed under SLT) would require a TL. The TL stipulation does not apply to the operation and maintenance of production facilities unless it is determined that project-specific mitigations are insufficient. A TL would delay surface disturbance to vegetation resources.

Lease Notice: An LN provides more detailed information concerning existing limitations, regulations, or orders, or addresses special considerations. An LN does not impose new restrictions on oil and gas activities.

4.8.4 Effects of the No Action Alternative

Vegetative Communities

The following information applies to all MAs within the WUB Analysis Area: Currant Creek, Diamond Fork, Upper Spanish Fork, Strawberry Reservoir, Willow Creek, and White River.

Under the No Action Alternative, management of the UNF with regard to oil and gas leasing would continue with the present direction. Current oil and gas leasing management on the UNF was determined in 1997 based on NEPA analysis outlined in the WUB FEIS (USFS 1997b). The Proposed Action (Alternative 3: Forest Intent) was the chosen alternative and currently dictates oil and gas leasing on the UNF (WUB FEIS ROD).

Considering the reasonably foreseeable development scenario under Alternative 3 in the WUB FEIS (USFS 1997b), 6.9 acres of vegetation would be disturbed for an exploratory well pad (2.0 acres), "light" road reconstruction on one mile of road (2.4 acres), and "heavy" road construction (i.e., new road construction) on the remaining 0.7 miles (2.5 acres).

Vegetation on the UNF within the WUB Analysis Area is primarily dry and low-elevation, dominated by oak, pinyon-juniper, mountain brush, sagebrush, and aspen. CSU would apply to riparian areas > 40 acres. No leasing stipulations apply specifically to any other vegetation type, thus the loss of 6.9 acres of any vegetation (except 40+ acre riparian) at any allowable location within the WUB Analysis Area can be expected under the No Action Alternative.

Direct impacts to vegetation resources from the loss of 6.9 acres of non-riparian vegetation on the UNF would be site-specific, short-term, and minor. Impacts would be site-specific because oak, pinyon-juniper, mountain brush, sagebrush, and aspen are common vegetation types on the UNF and the loss of 6.9 acres would not impact populations of these species on a population scale.

Disturbance to riparian communities would have a greater relative impact on riparian vegetation because these types are not as common and may have population-level impacts. Impacts to riparian communities (within areas ≤ 40 acres) would be short-term and minor, and could have population-level effects. The majority of riparian vegetation in the WUB Analysis Area is protected by NSO stipulation. The following is summary of stipulations that would be applied to riparian vegetation. For further discussion of the impacts to riparian vegetation, see section 4.6:Watershed Resources, which described impacts to RHCAs.

There are no riparian vegetation acres available for leasing in the Currant Creek MA. In both the Diamond Fork and Spanish Fork MAs, 76 percent (915 acres Diamond Fork; 185 acres Spanish Fork) are NSO; the remainders in both MAs are CSU. In the Strawberry Reservoir, Willow Creek, and White River MAs, a smaller relative proportion of the available riparian is NSO. In Strawberry Reservoir MA, 16 percent (172 acres) are NSO and 78 percent (830 acres) is CSU. In Willow Creek MA, 28 percent (238 acres) is NSO and 59 percent (495 acres) is CSU. In White River MA, 58 percent (212 acres) is NSO and 42 percent (153 acres) is CSU.

Traditional Plant Gathering

Direct effects to traditional plant gathering have the potential to occur from the loss of 6.9 acres of vegetation, if areas important to the Northern Utes are disturbed. No disturbance would occur in Strawberry Valley (Daniel's Canyon) because this area is outside of the WUB Study Area and not available for leasing. The loss of 6.9 acres within Currant Creek MA, Diamond Fork MA, Upper Spanish Fork Canyon MA, Willow Creek MA, or White River MA would have negligible effects on traditional plant gathering because these areas do not contain primary gathering sites for the Northern Utes. Direct effects on traditional plant gathering are unlikely to occur because important sites would not be disturbed.

Noxious Weeds

If weeds are not present, oil and gas exploration activities may lead to the spread of noxious weeds from elsewhere on the UNF onto the site if proper precautions are not taken. Indirect effects to plant communities under the No Action Alternative would be long-term and minor, if they occurred.

4.8.5 Effects of the Proposed Action Alternative

Most of the available riparian vegetation under The Proposed Action Alternative is covered by NSO stipulations regardless of size. In addition to these NSO stipulations for other resources, all riparian areas greater than 40 acres would be NSO. Vegetation within RHCAs would also be NSO; see Section 4.6 for additional discussion on the impacts to riparian areas.

Currant Creek Group: 2 wells

Development of the two projected exploration wells (total disturbance = 10 acres) within either of the most common vegetation communities in the Currant Creek Group (71 percent sagebrush and aspen) would be of negligible intensity, although disturbance within aspen would be long-term and could have population-level impacts. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Deer Creek Group: 1 well

Development of the projected exploration well (disturbance = five acres) within either of the most common vegetation communities in the Deer Creek Group (79 percent mountain brush and aspen) would be of negligible intensity, although disturbance within aspen would be long-term. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Diamond Fork Group: 1 well

Development of the projected exploration well (disturbance = five acres) within any of the most common vegetation communities in the Diamond Fork Group (83 percent sagebrush, mountain brush and aspen) would be of negligible intensity, although disturbance within aspen would be long-term. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Payson Group: 1 well

Development of the projected exploration well (disturbance = five acres) within any of the most common vegetation communities in the Payson Group (87 percent mountain brush, conifer, and aspen) would be of negligible intensity, although disturbance within aspen or conifer would be long-term. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Spanish Fork Canyon Group: 1 well

Development of the projected exploration well (disturbance = five acres) within either of the most common vegetation communities in the Spanish Fork Canyon Group (67 percent mountain brush and pinyon/juniper) would be of negligible intensity. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Strawberry Group: 3 wells

Development of the three projected exploration wells (disturbance = 15 acres) within either of the most common vegetation communities in the Strawberry Group (72 percent sagebrush and aspen) would be of negligible intensity although disturbance within aspen would be long-term. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

The traditional plant gathering areas in Daniel's Canyon are not available for leasing under Alternative 1.

American Fork Group: 1 well

Development of the projected exploration well (disturbance = five acres) within any of the most common vegetation communities in the American Fork Group (73 percent mountain brush, conifer, and aspen) would be of negligible intensity, although disturbance within aspen or conifer would be long-term. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Upper Provo Group: 1 well

Development of the projected exploration well (disturbance = five acres) within either of the most common vegetation communities in the Upper Provo Group (71 percent conifer and aspen)would be of negligible intensity, although disturbance within aspen or conifer would be long-term. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

Vernon Group: 1 well

Almost all (96,323; 98 percent) acres of the Vernon Group is covered by sagebrush, mountain brush, and pinyon juniper. Development of the projected exploration well (disturbance = five acres) within any of the most common vegetation communities in the Vernon Group (98 percent sagebrush, mountain brush, and pinyon juniper) would be of negligible intensity. Because the NSO stipulation applies to RHCAs and to riparian areas greater than 40 acres, impacts to riparian vegetation are unlikely.

4.8.6 Effects of the Modified Resource-based Alternative

Impacts to all vegetation communities except riparian would be the same under the Modified Resource-based Alternative as under the Proposed Action Alternative. For a description of these impacts by RFOGD, see section 4.8.5. NSO stipulations for riparian areas greater than 40 acres and for RHCAs would apply as under the Proposed Action Alternative. Most of the riparian vegetation is NSO because of stipulations applied to RHCAs and to riparian areas greater than 40 acres. More restrictive stipulations that would apply to other resources under this alternative, in general, afford greater protection to riparian vegetation. For all RFOGDs, the greater protections afforded by other resources results in minor to negligible, short-term adverse impacts to riparian vegetation. Adverse indirect and direct impacts would be as described under section 4.8.2: General Effects.

4.8.7 Summary of Effects

Table 4.26. Comparison summary of effects: vegetation.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	NA	negligible	negligible
Currant Creek	negligible	negligible	negligible
Deer Creek	NA	negligible	negligible
Diamond Fork	possibly long-term, minor	negligible	negligible
Payson	NA	negligible	negligible
Spanish Fork Canyon	possibly long-term, minor	negligible	negligible
Strawberry	possibly long-term, minor	possibly long-term, minor	negligible
Upper Provo	NA	possibly long-term, minor	negligible
Vernon	NA	negligible	negligible
Forest-wide	Short- to long-term, negligible to minor	Short- to long-term, negligible to minor	negligible

4.8.8 Cumulative Effects

Past, Present, and Reasonably Foreseeable Actions

Currently the UNF is in “maintenance” mode and not planning any new construction of facilities or roads in the next 10 years. Activities possibly affecting vegetation that have been occurring and are ongoing throughout the UNF include noxious and invasive weed control, prescribed burning and thinning, and other vegetation treatments. These activities have had and will continue to have both detrimental (loss of vegetation) and beneficial effects (restoration of vegetation) on vegetative communities.

In three of the past four years (2003-2005), 4,104 acres have been treated for noxious weeds, including 1,222 acres in 2003 (+ 93 acres for other invasives), 1,086 acres in 2004 (+ 1,493 for other invasives), and 1,796 in 2005 (+ 761 acres for other invasives). These activities have occurred in all RFOGDs and have likely had negligible to minor beneficial effects on vegetation communities.

Burning and clearcutting in three of the past four years have encompassed 6,136 acres on the UNF, including 2,279 in 2003 (79 acres aspen, 349 acres spruce-fir, 117 acres riparian, 1,366 acres oak/maple/mountain brush, 353 acres sagebrush/grass, and 15 acres grass), 3,530 acres in 2004 (39 acres aspen, 169 acres spruce-fir, 2 acres riparian, 2,497 acres oak/maple/juniper, 105 acres pinyon/juniper, 444 acres sagebrush/grass, and 274 acres grass), and 327 acres in 2005 (52 acres mountain brush, 145 acres oak/maple, 44 acres pinyon/juniper, and 86 acres sagebrush/grass). Prescribed burns included at least 3,153 acres in 2003 and 2,408 acres (mostly aspen) in 2005. Other vegetation treatments included at least 628 acres in 2004 (a 50-acre fuelbreak, timber sales, and other treatments) and 2,915 acres in 2005 (an 80-acre mechanical fuels project and other projects).

Upcoming or imminent projects are discussed at the RFOGD level. The majority of present and foreseeable future actions would have beneficial effects on vegetation. Noxious weed controls are in place during all projects and in many cases, managed areas are monitored after project completion for weed infestation. Areas are usually reseeded with desirable species after treatments.

Currant Creek Group

There are no present or foreseeable future actions in the Currant Creek RFOGD that may have a significant effect on vegetation communities.

Deer Creek Group

Present and foreseeable future actions within the Deer Creek RFOGD include reseedings (200 acres of aspen and a burn reseeding near Springville) and riparian fence construction (sheep exclosure at Springville Crossing).

Diamond Fork Group

Present and foreseeable future actions within the Diamond Fork RFOGD include a hazardous fuels reduction project (Little Diamond).

Payson Group

Present and foreseeable future actions within the Payson RFOGD include a 100-foot long trench excavation (Utah Valley State College earthquake research project, mouth of Picayune Canyon) and hazardous fuels reduction (Camp Koholowo).

Spanish Fork Group

Present and foreseeable future actions within the Spanish Fork RFOGD include juniper thinning (1,000 acres, Tank Hollow; 1,000-1,500 acres elsewhere).

Strawberry Group

Present and foreseeable future actions within the Strawberry RFOGD include hazardous fuels reduction, spruce bark beetle treatments, timber sales, and habitat restoration (Daniels Rehabilitation Project).

American Fork Group

Present and foreseeable future actions within the American Fork RFOGD include a fuels reduction project (Alpine Loop).

Upper Provo Group

There are no present or foreseeable future actions in the Upper Provo RFOGD that may have a significant effect on vegetation communities.

Vernon Group

Present and foreseeable future actions within the Vernon RFOGD include mormon cricket treatments (12,440 acres), pinyon/juniper thinning (40 acres; 600 additional acres of juniper), and sagebrush thinning (300 acres).

Cumulative Effects of the No Action Alternative

The cumulative impact of 6.9 acres of vegetation disturbance would be negligible unless disturbance occurred in riparian vegetation. Impacts from 6.9 acres of riparian disturbance could be minor and long-term.

Cumulative Effects of the Proposed Action Alternative

The cumulative impact of non-riparian vegetation disturbance would be negligible. Impacts from 61.2 acres of riparian disturbance would be minor to moderate and could be long-term. Disturbances are unlikely to occur within riparian vegetation under the Proposed Action Alternative, however, because riparian areas >40 acres and RHCAs would be under NSO, and NSO stipulations for other resources would cover many smaller areas (≤ 40 acres) of riparian vegetation.

Cumulative Effects of the Modified Resource-based Alternative

The cumulative impact of non-riparian vegetation disturbance would be the same as under the Proposed Action Alternative (negligible). Impacts from 61.2 acres of riparian disturbance would be minor to moderate and could be long-term. However, riparian areas >40 acres and RHCAs would be under NSO and fewer riparian acres are available for lease under this alternative.

4.9 Terrestrial and Aquatic Flora and Fauna, Including Threatened, Endangered, Sensitive, and Management Indicator Species

4.9.1 Introduction

Methodology

Impact assessments for wildlife species were made by considering life histories and known impacts from similar actions. Impacts to wildlife are described broadly because the exact location of exploratory drilling is not known. The most likely locations of drilling activities and of wildlife species are used to predict where and how impacts may occur. Locations of wildlife species and their habitats described in Chapter 3, including special status species, were determined by spatial data provided by the UNF or by inference from habitat preferences and knowledge of life histories, taken largely from the LRMP and Forest Plan FEIS (USFS 2003a and 2003), Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b), State of the Forest Reports (USFS 2003b, 2005, and 2006), Division of Wildlife Resources reports and data (big game), and peer-reviewed literature (cited in text).

Measurement Indicators

The following indicators were used to quantify and qualify the impacts that each alternative could have on wildlife resources:

- Acres of surface disturbance
- Changes in population numbers and trends
- Changes in noise levels
- Changes in public access to critical habitat

4.9.2 General Effects

Adverse impacts to wildlife from oil and gas exploration drilling include mortality, direct disturbance (loss) of habitat, and indirect disturbance of habitat from human presence.

Direct mortality to some small terrestrial or avian wildlife would occur in the initial stages of oil and gas exploration while vegetation is being cleared. Mortality to larger wildlife such as big game or predators may occur from vehicular collisions.

Direct disturbance to habitat would occur in the initial stages of well construction, as vegetation is cleared for the well pad, associated structures, and roads. Five acres of wildlife habitat surrounding each well (including roads) would be unavailable for the time that the well is operational (1-3 months). Impacts from habitat disturbance would be proportional to the percentage of habitat lost vs. available. In general, habitat disturbance forces wildlife to utilize adjacent areas or habitat that is less suitable. Increased competition in adjacent suitable habitat may lead to decreased reproductive rates. Decreased reproductive rates may also result from the stress of using less suitable areas. Direct disturbance to habitat would be short-term in shrub and

grassland vegetation, but may be long-term if shrubs take more than one year to reestablish after reclamation. Direct disturbance of habitat would be long-term (> 1 year) in forested habitats because forests would take more than one year to reestablish (see Section 4.8, Vegetation). Forest disturbance reduces many important components of wildlife habitat, including nest site availability and roosting cover for cavity-nesting birds and raptors, snags, and woody cover for reptiles and other small mammals.

Indirect disturbance to wildlife habitat would occur in adjacent habitat areas that are not directly disturbed. These areas may be unsuitable due to human presence and noise. Wildlife responses to human presence vary depending on the species, life stage, individual tolerance to humans, and location of the disturbance. In general, animals that avoid disturbances would be forced to utilize adjacent or less suitable habitat, similar to the effects of direct habitat disturbance. As for direct disturbance, decreased reproductive rates could result from increased competition or stress in suitable areas. Indirect disturbance from human presence and noise would be most significant in the initial stages of well pad, facility, and road construction and during active drilling.

Wildlife

Some wildlife species have associated leasing stipulations; these species include sage grouse, elk, mule deer, and special status species. These stipulations are listed in table 4.27 and in Chapter 2. Wildlife without associated stipulations may also be protected by those for sage grouse, elk, mule deer, and special status species, or stipulations for other resources (see table 2.7). The wildlife impacts discussed below take all leasing stipulations into account.

Table 4.27. Leasing stipulations for wildlife and special status species.

Resource Component	Leasing Stipulations		
	No Action Alternative	Proposed Action Alternative	Modified Resource-based Alternative
Critical sage-grouse habitat	TL: 1 Apr– 31 May	TL Vernon MA: 1 Mar–1 Jun TL Strawberry MA: 1 Mar–15 Jun	TL Vernon MA: 1 Mar–1 Jun (2-mile buffer) TL Strawberry MA: 1 Mar–5 Jun (2-mile buffer)
Critical elk winter range	TL: 15 Nov–30 Apr	TL: 1 Dec–30 Mar	TL: 1 Dec–30 Mar
Critical deer winter range	TL: 15 Nov–30 Apr	TL: 1 Dec–30 Mar	TL: 1 Dec–30 Mar
Critical elk calving range	TL: 1 May–30 Jun	TL: 15 May–15 Jul	TL: 15 May–15 Jul
Critical elk year-long range	TL: 15 Nov–30 Jun	TL: 15 Nov–30 Jun	TL: 15 Nov–30 Jun
Mule deer fawning (summer) range	TL: 15 May–15 Jun	—	TL: 15 May–15 Jul
Lynx Analysis Units	—	TL: 1 Dec–30 Mar	TL: 1 Dec–30 Mar
Threatened and Endangered Species	LN	LN	LN
Sensitive Species	CSU	CSU	CSU

Big game – elk and mule deer

Direct impacts to big game would occur if critical habitat was disturbed. These impacts would be short-term (for the duration of exploration activities). Road construction associated with the exploration well may increase public access (and human disturbance) to critical habitats for big game, depending on the well location. These indirect impacts would be short-term, lasting until the road is reclaimed.

Indirect effects to big game due to noise levels associated with exploration activities could also occur, depending on the well location. These indirect impacts would be short-term. Elk are known to avoid large areas near roads (USFS 2003b:274) and will move long distances to avoid human disturbance. When disturbed, elk will usually move to areas of dense cover away from roads and people (UDWL elk plan 2005). Because of their greater tolerance to human activities, collisions with mule deer may be more likely to increase on roads, relative to elk (USFS 1996b 4:27). It can reasonably be assumed that elk would be displaced at least 0.5 miles from the disturbance and deer would be displaced at least 0.25 miles.

Direct and indirect impacts to big game, particularly elk (USFS 2003b:274), are most likely to occur during wintering and calving periods. TL stipulations would preclude disturbance in critical habitat during wintering, elk calving, and mule deer fawning periods. Noise impacts would be short-term and similar in magnitude to those resulting from a loss of habitat. Impacts to big game critical winter and calving/fawning ranges are discussed below.

Winter range

Critical winter range habitat for elk and mule deer occurs within oak/maple, pinyon juniper, and low elevation brush and forested riparian habitats along the Wasatch Front. Impacts from the loss of critical winter range would be proportional to the percentage of total habitat lost vs. available range (total elk winter range = 108,786 acres; total deer winter range = 38,188 acres). If the habitat decrease is significant enough to cause increased stress, reproductive rates may decline.

Calving and fawning

Direct and indirect impacts to elk and mule deer would occur if calving/fawning areas (mule deer “fawning” = summer range habitat) were within or near the disturbance area for an exploration well. Displacement during calving/fawning would have impacts on big game, as movements during this sensitive time could cause a loss of calves/fawns. Displacement of mothers and calves/fawns into adjacent or less favorable habitat could have a significant impact on big game populations because calves/fawns are more likely than adults to die from predation, accidents, or disease.

Elk year-long range

Elk year-long range is an area that is suitable during both sensitive periods of the life cycle: wintering and calving. Effects of disturbance on year-long range would be the same as described above for winter and calving ranges.

Big game – moose, bighorn sheep, and mountain goats

Direct and indirect impacts to moose would occur from disturbance in riparian habitat. Riparian and wetland habitat greater than 40 acres would be protected by leasing stipulations (CSU or NSO). SLT (i.e., allowance to move operations up to 200 meters) may be sufficient to protect moose habitat because it occurs mainly in narrow corridors. Moose could also be disturbed

indirectly by noise; these impacts would be short-term. Direct disturbance of riparian habitat used by moose could be long-term if the riparian vegetation does not regenerate within one year.

Direct and indirect impacts to bighorn sheep and mountain goats would occur from disturbance in alpine habitats (see Section 4.8: Vegetation). Many alpine habitats on the UNF are not available for lease because they occur in wilderness areas (i.e., Lone Peak, Mount Nebo, and Mount Timpanogos). Other areas of alpine habitat that do not fall in wilderness areas may be protected by leasing stipulations for steep slopes (>35 percent NSO). If alpine habitat were disturbed the adverse impacts to bighorn sheep and mountain goats would be long-term.

Bats

Indirect impacts to bats would occur from disturbance near mines or caves, and to foraging habitat and prey. Disturbance near occupied mines or caves could be significant if reproductive rates decline in maternity colonies due to noise-induced stress. Disturbance in established feeding territories would increase competition in adjacent areas; these effects would be short-term and negligible to minor. Indirect effects from noise and proximity to humans are possible depending on the location of disturbance; these impacts would be short-term and minor.

Predators

Direct and indirect impacts to predators would occur as individuals are displaced due to direct disturbance of habitat and noise. Most predators are habitat generalists and are capable of moving relatively long distances, but may still become stressed by displacement if other conditions such as severe weather, disease, or other human disturbances (e.g., recreation activities) are occurring. Direct effects to predators from disturbance of habitat would be short- to long-term, depending on the habitat, and negligible to minor. Indirect effects due to noise levels in the undisturbed areas surrounding the exploration well and road would be short-term and minor. Indirect impacts to predators from the loss of prey habitat would be negligible.

Raptors/owls

Direct and indirect impacts to raptors and owls would occur from disturbance of birds or nests (“take”), disturbance of nesting/roosting habitat, human disturbance and noise near active nests, and disturbance of prey habitat. Because many raptors are attracted to roadkill, an increase in road traffic may increase the number of raptors killed by vehicle collisions.

Most raptors and owls are protected under the Migratory Bird Treaty Act (MTBA) and the Bald and Golden Eagle Protection Act (BGEPA), under which it is illegal to disturb or “take” active nests and birds. Surveys would be conducted prior to vegetation clearing to locate active nests and SLT may be sufficient to avoid impacts. Disturbance of forest and cliff habitats would have the most significant direct and indirect adverse habitat impacts on raptors and owls; these impacts would be long-term and minor. Raptors are generally sensitive to human presence and noise, thus noise or human disturbance within line of sight or in proximity to active nests could result in decreased reproductive rates if nests are abandoned or neglected. Predation on unprotected nests would increase if nests are left unattended. Noise impacts would be short-term and minor. Disturbances during the inactive season would reduce the amount of habitat available for foraging and nesting the following year. Disturbance in shrub and grassland habitats may decrease the prey base for raptors and owls. Direct impacts from the loss of prey habitat and nesting/roosting habitat during the inactive season would be negligible.

Sage grouse

Direct impacts to sage grouse would be significant if leks were disturbed. SLT may be sufficient to avoid direct disturbance to leks. Disturbance in the vicinity of a lek could still cause adverse indirect impacts because the lek would become less suitable due to human presence and noise. Indirectly disturbed leks may be abandoned and sage grouse may be forced into adjacent sagebrush. Within appropriate habitat, sage grouse (including lek) surveys would be conducted prior to exploration activities.

Critical sage grouse habitat

Disturbance of critical sage grouse habitat would have direct adverse impacts on sage grouse. Because sage grouse are closely tied to sagebrush habitat that contains the most suitable proportion of sage to grass and sagebrush canopy, abandonment of critical habitat could be a significant adverse effect. Sage grouse generally will not occupy sagebrush that is less suitable, and if forced to move into adjacent suitable habitat, may experience decreased reproductive rates.

Other upland game birds, woodpeckers, and migratory birds

No stipulations are proposed specifically for upland game, woodpeckers, or migratory birds. Although intentional “take” of birds and nests is illegal under the Migratory Bird Treaty Act (MBTA), undiscovered migratory bird nests could be destroyed by vehicles during the initial phase of construction (i.e., vegetation clearing; “unintentional take”). Surveys would be conducted before construction to avoid these impacts.

Direct impacts from disturbance within habitat for upland game birds, woodpeckers, or migratory birds (any habitat type) would be site-specific, short-term, and negligible. Disturbance in riparian habitat would have the greatest impact on migratory birds. Forests (aspen, conifer, pinyon/juniper, and oak/maple) are also important to migratory birds. Disturbance in shrublands, riparian, oak, pinyon/juniper, or conifer may impact upland game birds. Direct and indirect impacts to woodpeckers would occur if disturbance occurred in Douglas fir/white fir conifer habitats or in stable aspen. Disturbance to dead trees in particular would directly reduce nesting habitat. Impacts to birds from habitat disturbance would still be negligible because disturbance from oil and gas exploration would represent less than one percent of the total acres available in each habitat type.

Reptiles

Direct impacts to reptiles could occur during well construction if individuals are killed by vehicles. Reptiles often seek thermal heating or cooling on roads and may suffer relatively high mortality rates on roads. Increased traffic could increase reptile mortality. Direct impacts to reptile populations would be short-term and minor.

Fishes

Guidelines contained in the LRMP (USFS 2003a) limit oil gas exploration to areas outside of aquatic habitat and riparian habitat conservation areas (RHCAs). Thus, direct impacts to aquatic ecosystems, fish habitat, and fish populations would not occur from well pad construction.

Direct impacts to fish populations could occur from associated road construction and road crossings, which could create barriers to movement (Trombulak and Frissel 2000). Habitat fragmentation as a result of barriers created by road crossings can isolate fish populations, reduce

genetic diversity, and increase their susceptibility to population decline. This is particularly true for the migratory salmonid fishes, including sensitive species of cutthroat trout, which now are more or less limited to small, isolated, headwater streams (Quist and Hubert 2004). These impacts would be short- to long-term and moderate. Fish may also be directly or indirectly affected by hazardous material spills associated with exploration. Roads can reduce the water quality of nearby surface waters through the delivery of silts, clays, heavy metals, salts, organic molecules, and nutrients that are associated with road use and maintenance (Trombulak and Frissel 2000). Properly implemented BMPs would avoid impacts to water quality that may affect fish.

Indirect impacts to fish populations could occur through habitat degradation and the loss of ecosystem function as a result of the construction of well pads and access roads. Construction of these facilities can impact aquatic ecosystems by increasing surface water runoff and channelization. Increased runoff can accelerate streambank erosion, stream channel incision, and stream channel widening. These processes can have significant impacts on key components of fish habitat such as water temperature, stream bank vegetation, large woody debris, and floodplain habitat. Further, increased runoff and accelerated erosion can deliver large quantities of sediment to nearby streams. Sediment reduces habitat complexity and impacts many fish populations by reducing access to clean spawning gravel. Clean spawning gravel, which should include a minimal amount of fine substrate less than 6.35 mm in diameter (Harig and Fausch 2002, Chapman 1988, Magee et al. 1996), is a key habit component for most salmonid fishes, particularly sensitive (and other) species of cutthroat trout. While well pad construction can impact aquatic ecosystems and fish habitat as described above, the majority of impacts come from road construction and use. Roads are often located closer to streams then are well pads, and are more likely to result in increased erosion and sediment delivery. Under all alternatives, indirect impacts from habitat degradation would be long-term and minor.

Special Status Species

Impacts to threatened, endangered, and sensitive species would be the same under all alternatives because leasing stipulations are identical.

Threatened and Endangered Species

A Lease Notice (LN) would be applied in areas where a Threatened and Endangered species may occur (see table 2.7). The LN would outline compliance requirements of the Endangered Species Act (ESA). Leasing activities would be cleared for TE species occurrence prior to disturbance at the operational stage on a case-by-case basis in consultation with the Fish and Wildlife Service, via a Biological Assessment (BA).

Sensitive Species

A Controlled Surface Use (CSU) stipulation would apply to areas where a Sensitive species may occur (see table 2.7). CSU stipulations are intended to protect the viability of sensitive wildlife. CSU stipulations would require that a survey be conducted after a drilling proposal is submitted and before surface disturbing activities, and that operations be located in such a manner as not to jeopardize the viability of a sensitive species.

4.9.3 Effects of Lease Options

Standard Lease Terms: Under SLT, no special stipulations would be applied. According to the standard surface use requirements attached to all leases, SLT would allow operations to be moved up to 200 meters and be delayed for up to 60 days if the authorizing officer deems it necessary to protect a resource. These allowances could be used to avoid special status species or other fish and wildlife if necessary. In general, operations under SLT would be conducted in "such a manner as to maintain and protect fisheries, wildlife, and plant habitat." Disturbed habitat would be re-vegetated within one year of the completion of operations. Federally listed species would be protected under ESA, sensitive species would be protected under Forest regulations, and migratory birds would be protected under the MBTA.

No Lease: NL would eliminate direct effects (disturbance) to fish and wildlife and their habitats in the immediate vicinity. Disturbance to fish and wildlife could still occur from oil and gas activities in adjacent areas that allow leasing.

No Surface Occupancy: NSO would prevent well pads from being constructed but would not restrict the construction of access roads. Direct effects to wildlife and wildlife habitat could still occur.

Controlled Surface Use: Operations would be allowed, but with special operational constraints in place to prevent or mitigate for impacts to wildlife. A survey would be required prior to surface disturbance to determine potential impacts to resources protected under CSU, including sensitive wildlife and plant species. Under CSU, operations may be moved more than 200 meters (the maximum under SLT) to protect the viability of a sensitive species, or other resource. In addition, all standards and guidelines within the UNF LRMP (USFS 2003a) would be followed under CSU, with modifications to the design or locations of operations being made if necessary.

The following standards and guidelines would apply to wildlife:

MP-3.3-5 (Standard): Road density and design will be compatible with watershed and habitat objectives.

MP-3.3-6 (Guideline): For streams identified as conservation and persistence streams for Bonneville and Colorado River cutthroat trout, total soil resource commitment should be limited to no more than four percent of the riparian area acreage within this prescription within the watershed.

MP-3.3-8 (Guideline): Surface disturbances should receive prompt revegetation efforts using native species desirable for wintering big game.

MP-3.3-19 (Guideline): Remote monitoring of mineral and energy development sites and facilities should be encouraged to reduce snow compaction.

Timing Limitation: A TL stipulation would preclude surface disturbance during certain times, with the intent of avoiding or minimizing impacts to wildlife during critical periods of a species' life history. Any sensitive period greater than 60 days (the maximum under SLT) would require a TL. The TL stipulation does not apply to the operation and maintenance of production facilities unless it is determined that project-specific mitigations are insufficient.

Lease Notice: An LN provides more detailed information concerning existing limitations, regulations, or orders, or addresses special considerations. An LN does not impose new restrictions on oil and gas activities.

4.9.4 Effects of the No Action Alternative

Under the No Action Alternative, management of the UNF with regard to oil and gas leasing would continue under current management, which was determined in 1997 based on NEPA analysis outlined in the WUB FEIS (USFS 1997b). The WUB Analysis Area encompasses the majority of the Diamond Fork and Strawberry RFOGDs and the Upper Spanish Fork Canyon MA. Also included is a small portion of the Currant Creek MA. The remaining portions of the UNF would not be administratively available for oil and gas leasing under the No Action Alternative.

Disturbance that would occur under the No Action Alternative, assuming a reasonably foreseeable development scenario of one exploration well and an access road, includes 2.0 acres of disturbance associated with the well, 2.4 acres of disturbance associated with light road reconstruction (1 mile) and 2.5 acres of disturbance for heavy road construction (i.e., new road construction; 0.7 miles). In all, 6.9 acres of reasonably foreseeable disturbance would occur within the WUB Analysis Area at an unknown location. These disturbances would be a direct loss of habitat for wildlife and depending on the location of disturbance, special status species.

Because the 6.9 acre disturbance area is small (1 percent or less) relative to total available habitat for wildlife and most special status species within the WUB Analysis Area, and considering the protection of various leasing stipulations specifically for wildlife and for other resources (NSO for steep slopes, RNAs, riparian areas, wetlands, campgrounds, and visual retention areas; see table 2.7), effects to all wildlife and special status species would be negligible to minor under the No Action Alternative. Effects would be similar to general effects described in Section 4.9.2, and are described in more detail with regard to resources, below.

Winter Range

There are approximately19,110 acres of elk winter range available for leasing under the No Action Alternative. A TL would apply from 15 November to 30 April for both elk and mule deer. For elk, approximately 8,410 acres would be covered under an NSO stipulation because of other resources (table 4.28). For mule deer, 3,940 acres (out of 8,640 available for leasing) would be covered by NSO (table 4.29). Both elk and mule deer winter range occurs in the Diamond Fork, Spanish Fork, and White River MAs.

Table 4.28. Acres of critical elk winter range under each leasing stipulation by MA.

MA	Leasing Stipulation			Acres available for leasing
	NSO	CSU + TL	TL	
Diamond Fork	1,000	1,100	100	2,200
Upper Spanish Fork	7,400	8,500	1,000	16,900
White River	10	0	0	10
Total	**8,410**	**9,600**	**1,100**	**19,110**

Table 4.29. Acres of critical deer winter range under each leasing stipulation by MA.

MA	Leasing Stipulation			Acres available for leasing
	NSO	CSU + TL	TL	
Diamond Fork	1,600	1,000	100	2,700
Upper Spanish Fork	2,300	3,000	600	5,900
White River	40	0	0	40
Total	**3,940**	**4,000**	**700**	**8,640**

Calving and Fawning

No elk calving areas are available for lease under the No Action Alternative.

There are 162,900 acres of mule deer fawning habitat available for leasing under the No Action Alternative. A TL would apply from 15 May to 15 June and nearly half (43 percent; 70,200 acres) would be NSO for other resources (table 4.30). Mule deer fawning habitat occurs within all six MAs in the WUB Analysis Area.

Table 4.30. Acres of deer fawning range under each leasing stipulation by MA.

MA	Leasing Stipulation			Acres available for leasing
	NSO	CSU + TL	TL	
Currant Creek	900	100	400	1,400
Diamond Fork	31,500	20,600	200	52,300
Upper Spanish Fork	12,000	9,100	600	21,700
White River	13,300	9,400	400	23,100
Strawberry Reservoir	7,100	32,300	2,700	42,100
Willow Creek	5,400	16,000	900	22,300
Total	**70,200**	**87,500**	**5,200**	**162,900**

Elk Yearlong Range

There are approximately 5,040acres of elk year-long range available for leasing under the No Action Alternative. A TL would apply from 15 November to 30 June; 64 percent (3,230 acres) would be covered by NSO (table 4.31), mainly for steep slopes. The remainder would be covered under CSU or SLT outside of the TL period. Elk year-long range occurs in the Spanish Fork and White River MAs.

Table 4.31. Acres of critical elk year-long range under each leasing stipulation by MA.

MA	Leasing Stipulation			Acres available for leasing
	NSO	CSU + TL	TL	
Upper Spanish Fork	30	10	0	40
White River	3,200	1,700	0	4,900
Total	**3,230**	1,710	**0**	**5,040**

Sage Grouse

There are approximately 6,400 acres of critical sage grouse habitat available for leasing under the No Action Alternative. A TL would apply from 1 April to 31 May, and 15 percent (1,000 acres) would be covered by NSO for other resources (table 4.32). Sage grouse habitat occurs only in the Strawberry MA. No leks are currently known to occur there.

Table 4.32. Acres of critical sage grouse habitat under each leasing stipulation by MA.

MA	Leasing Stipulation			Acres available for leasing
	NSO	CSU + TL	TL	
Strawberry Reservoir	1,000	5,300	100	6,400

Special status and other species

Sensitive fish species (Colorado or Bonneville cutthroat trout) occur within all MAs under the No Action Alternative. Bonneville cutthroat occurs in Diamond Fork, Upper Spanish Fork, and Strawberry MAs; Colorado cutthroat is abundant in White River and Willow Creek. No direct impacts to sensitive fish species would occur under SLT. CSU stipulations would apply to riparian >40 acres, and would provide some protection to fish, in addition to other riparian species such as Columbian spotted frog (Diamond Fork), migratory birds, including bald eagle, and beaver (MIS). Wintering bald eagles (Diamond Fork canyon, White River) may also be protected in part by TL stipulations on elk and deer winter range (1 December – March 30). Surveys would be required under CSU for sensitive species such as flammulated owl, goshawk, and three-toed woodpecker (occurring in Strawberry Reservoir MA). Other special status species are discussed under individual MAs.

MAs

Currant Creek MA

Under the No Action Alternative, three percent of the Currant Creek MA is administratively available for leasing. All of the area (approximately 1,400 acres) is deer fawning (summer) range, and approximately two thirds (64 percent; 880 acres) is covered by NSO.

Diamond Fork MA

Under the No Action Alternative, 70 percent (approximately 67,500 acres) of the Diamond Fork MA is administratively available for leasing. Approximately 62 percent of the available area is NSO, including almost half (45 percent) of the 2,300 acres of available elk winter range and over half (58 percent) of the 2,700 acres of available deer winter range. Disturbance in Ute ladies' tresses habitat would require a BA and compliance with the ESA (Lease Notice).

Upper Spanish Fork MA

Ninety percent (approximately 39,900 acres) of this MA is administratively available for leasing under the No Action Alternative. Fifty percent of the MA that is available for leasing is NSO, including forty (44 percent) percent of the approximate 16,900 acres of available elk winter range and about 40 percent of the approximate 6,000 acres of available deer winter range. Disturbance in clay phacelia habitat (Spanish Fork drainage) would require a BA and compliance with the ESA (Lease Notice). Bats occurring in the Spanish Fork MA may be affected by noise if disturbance occurs near an occupied mine or cave. Noise abatement measures as described in Section 4.13 would be applied, reducing impacts to bats.

Strawberry Reservoir MA

Thirty two percent (approximately 40,815 acres) of this MA is administratively available for leasing under the No Action Alternative. All 6,400 acres of available critical sage grouse habitat under the No Action Alternative lie within this MA. Seventeen percent is NSO; most (77 percent) is CSU. Surveys for Garrett's bladderpod would be required in suitable habitat under CSU.

Willow Creek MA

Ninety six percent (approximately 23,100 acres) of this MA is administratively available for leasing. None of the area overlaps big game ranges or sage grouse critical habitat.

White River MA

Ninety three percent (approximately 23,960 acres) of this MA is administratively available for leasing. Only seven acres of elk winter range within this MA are available; all are NSO. All but 40 acres of available deer winter range are covered by NSO. Most (99 percent) of the elk year-long range under the No Action Alternative occurs in this MA. Over 60 percent of the 5,000 available acres are covered by NSO.

4.9.5 Effects of the Proposed Action Alternative

Disturbance that would occur under the Proposed Action Alternative, assuming a reasonably foreseeable development scenario of 12 exploration wells and associated access roads and auxiliary structures, includes 2.0 acres of disturbance per well pad, 2.4 acres of disturbance per road (1 mile), and 0.6 acres of additional road widening (1 mile). The approximate amount of disturbance is five acres per well, including all associated roads and auxiliary structures. In all, 60 acres of reasonably foreseeable disturbance would occur within the UNF at unknown locations. These disturbances would be a direct loss of habitat for wildlife and depending on the location of disturbance, special status species.

Because 60 acres of disturbance is small (1 percent or less) relative to total available habitat for wildlife, including special status species, and considering the protection of various leasing stipulations specifically for wildlife and for other resources (i.e., NSO for geologic hazards, steep slopes, riparian areas, drinking water sources, RNAs, campgrounds, and CUP lands; see table 2.7), effects to all wildlife and special status species would be negligible to minor under the Proposed Action Alternative. Effects would be similar to general effects described in Section 4.9.2. Effects under the Proposed Action Alternative are described in more detail with regard to resources, below.

Winter Range

There are approximately 81,000 acres of elk winter range available for leasing under the Proposed Action Alternative. A TL would apply from 1 December to 30 March, and 63,600 acres would be covered under an NSO stipulation for other resources (table 4.33).

For mule deer, 24,900 acres of critical winter range (out of approximately 31,480 available for leasing) would be covered by NSO in addition to the TL (table 4.34). Both critical elk winter range and critical deer winter range occur in all RFOGDs except Vernon.

Table 4.33. Acres of critical elk winter range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	1,400	1,300	0	2,700
	RFOGD Total	**1,400**	**1,300**	**0**	**2,700**
Deer Creek	Lower Provo	4,400	0	0	4,400
	Hobble Creek	14,700	300	0	15,000
	Deer Creek Reservoir	2,700	700	40	3,440
	RFOGD Total	**21,800**	**1,000**	**40**	**22,840**
Diamond Fork	Diamond Fork	7,200	1,300	50	8,550
	RFOGD Total	**7,200**	**1,300**	**50**	**8,550**
Payson	Mona	800	10	0	810
	Nephi	11,100	4,300	10	15,410
	Payson	6,000	300	0	6,300
	Thistle	1,500	700	0	2,200
	RFOGD Total	**19,400**	**5,310**	**10**	**24,720**
Spanish Fork	Spanish Fork	9,600	8,400	100	18,100
	RFOGD Total	**9,600**	**8,400**	**100**	**18,100**
Strawberry	White River	500	900	0	1,400
	RFOGD Total	**500**	**900**	**0**	**1,300**
American Fork	American Fork	3,700	0	0	3,700
	RFOGD Total	**3,700**	**0**	**0**	**3,700**
Forest-wide Total		**63,600**	**18,210**	**200**	**81,010**

Table 4.34. Acres of critical deer winter range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Deer Creek	Lower Provo	5,700	0	0	5,700
	Hobble Creek	5,400	60	0	5,460
	RFOGD Total	**11,100**	**60**	**0**	**11,160**
Diamond Fork	Diamond Fork	6,600	1,700	200	8,500
	RFOGD Total	**6,600**	**1,700**	**200**	**8,500**
Payson	Mona	400	40	0	440
	Nephi	700	400	0	1,200
	Payson	1,200	0	0	1,200
	RFOGD Total	**2,300**	**440**	**0**	**2,740**
Spanish Fork	Spanish Fork	2,800	4,100	0	6,900
	RFOGD Total	**2,800**	**4,100**	**0**	**6,900**
Strawberry	White River	0	40	0	40
	RFOGD Total	**0**	**40**	**0**	**40**
American Fork	American Fork	2,000	0	0	2,000
	RFOGD Total	**2,000**	**0**	**0**	**2,000**
Upper Provo	Upper Provo	100	40	0	140
	RFOGD Total	**100**	**40**	**0**	**140**
Forest-wide Total		**24,900**	**6,380**	**200**	**31,480**

Calving and Fawning

There are 25,200 acres of elk calving range available for leasing under the Proposed Action Alternative. A TL would apply from 15 May to 15 July, and 6,400 acres would be covered under an NSO stipulation for other resources (table 4.35).

Mule deer fawning (summer) range would not have a TL stipulation under the Proposed Action Alternative; 272,300 acres (59 percent) out of 458,900 total would be NSO for other resources. Elk calving range occurs mainly within the Upper Provo RFOGD, and a small portion occurs within the Currant Creek RFOGD; mule deer fawning (summer) range occurs in all RFOGDs except American Fork, Payson, and Vernon.

Table 4.35. Acres of critical elk calving range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	1,600	1,600	0	3,200
	RFOGD Total	**1,600**	**1,600**	**0**	**3,200**
Upper Provo	Upper Provo	4,800	17,200	0	22,000
	RFOGD Total	**4,800**	**17,200**	**0**	**22,000**
Forest-wide Total		**6,400**	**18,800**	**0**	**25,200**

Table 4.36. Acres of deer fawning range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	24,000	17,200	0	41,200
	Currant Creek	29,500	8,600	4,200	42,400
	RFOGD Total	**53,500**	**25,800**	**4,200**	**83,600**
Deer Creek	Lower Provo	24,300	40	0	24,300
	Hobble Creek	48,300	4,200	400	53,000
	Deer Creek Reservoir	23,300	11,200	1,500	36,000
	RFOGD Total	**95,900**	**15,500**	**1,800**	**113,200**
Diamond Fork	Diamond Fork	49,900	25,100	2,300	77,300
	RFOGD Total	**49,900**	**25,100**	**2,300**	**77,300**
Spanish Fork	Spanish Fork	14,000	10,800	200	24,900
	RFOGD Total	**14,000**	**10,800**	**200**	**24,900**
Strawberry	White River	10,000	15,700	0	25,800
	Strawberry Reservoir	22,000	21,500	17,700	61,300
	Willow Creek	8,000	14,300	10	22,300
	RFOGD Total	**40,000**	**51,600**	**17,800**	**109,400**
Upper Provo	Upper Provo	19,000	31,600	0	50,600
	RFOGD Total	**19,000**	**31,600**	**0**	**50,600**
Forest-wide Total		**272,300**	**160,300**	**26,400**	**458,850**

Elk Yearlong Range

There are 7,460 acres of elk yearlong range available for leasing under the Proposed Action Alternative. A TL would apply from 15 November–30 June (covering wintering and calving), and 3,400 acres would be covered by NSO for other resources. The remainder would be covered under CSU or SLT outside of the TL. Elk yearlong range occurs within the Currant Creek, Deer Creek, Spanish Fork, and Strawberry RFOGDs.

Table 4.37. Acres of elk yearlong range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Deer Creek	Lower Provo	80	0	0	80
	Deer Creek Reservoir	1,100	200	0	1,300
	RFOGD Total	**1,180**	**200**	**0**	**1,380**
Spanish Fork	Spanish Fork	10	30	0	40
	RFOGD Total	**10**	**30**	**0**	**40**
Strawberry	White River	2,200	3,800	0	6,000
	RFOGD Total	**2,200**	**3,800**	**0**	**6,000**
Forest-wide Total		**3,390**	**4,060**	**0**	**7,420**

Sage Grouse

There are 52,730 acres of sage grouse critical habitat available for leasing on the UNF. Sage grouse critical habitat would be under a TL stipulation from 1 March to 1 June (Vernon MA) or 15 June (Strawberry MA). Over 7,250 acres (12 percent) would be NSO for other resources; most (86 percent) would be CSU outside of the TL. Sage grouse habitat occurs within the Strawberry, Vernon, and Currant Creek RFOGDs.

Table 4.38. Acres of sage grouse habitat under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	90	1,000	0	1,090
	Currant Creek	700	600	0	1,300
	RFOGD Total	**790**	**1,600**	**0**	**2,390**
Strawberry	Strawberry Reservoir	1,600	5,100	40	6,740
	RFOGD Total	**1,600**	**5,100**	**40**	**6,740**
Vernon	Vernon	4,800	38,500	40	43,340
	West Sheeprock	60	200	0	260
	RFOGD Total	**4,860**	**38,700**	**40**	**43,600**
Forest-wide Total		**7,250**	**45,400**	**80**	**52,730**

Lynx

There are 95,300 acres of Lynx Analysis Units (LAUs) available for leasing under the Proposed Action Alternative; about half (46 percent) are NSO (table 4.39). A TL stipulation would apply from 1 December to 30 March.

Table 4.39. Acres of LAUs under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	24,100	17,500	0	41,600
	RFOGD Total	**24,100**	**17,500**	**0**	**41,600**
Upper Provo	Upper Provo	19,500	34,200	0	53,700
	RFOGD Total	**19,500**	**34,200**	**0**	**53,700**
Forest-wide Total		**43,600**	**51,700**	**0**	**95,300**

Special status and other species

Sensitive cutthroat trout species occur within most RFOGDs under the Proposed Action Alternative. Bonneville cutthroat trout occur in all RFOGDs except Currant Creek and Vernon; Colorado cutthroat trout occur in Currant Creek and Strawberry. As under all alternatives, no direct impacts to sensitive (or other) fish species would occur due to SLT.

Under the Proposed Action Alternative, NSO stipulations would apply to all RHCA classes as well as riparian/wetland areas >40 acres. These stipulations would provide protection to fish and other riparian species such as Columbian spotted frog (occurring in the Deer Creek, Diamond Fork, and Upper Provo RFOGDs), migratory birds including bald eagle, and beaver (MIS).

Wintering bald eagle (occurring in all RFOGDs except Currant Creek and Upper Provo) would also be protected by the MBTA and the BGEPA. Surveys would be required for Forest sensitive species such as flammulated owl, goshawk, three-toed woodpecker, and sensitive plants Wasatch jamesia (occurring in American Fork, Deer Creek and Payson RFOGDs) and Garrett's bladderpod (occurring in American Fork, Deer Creek, Payson, Strawberry RFOGDs). No direct impacts are anticipated and indirect impacts would be negligible to minor, because of mitigation measures and other protections afforded to special status species.

Currant Creek Group

Under the Proposed Action Alternative, ninety nine percent (83,700 acres) of the Currant Creek RFOGD, including Currant Creek and West Fork Duchesne MAs, is administratively available for leasing. Two wells (10 acres of disturbance) are expected within this RFOGD.

About 50 percent (1,400 acres) of the 2,700 acres of available elk winter range and 50 percent (1,600 acres) of the available elk calving range (3,200 acres) within this RFOGD (all within the West Fork Duchesne MA) are covered by NSO. There is no deer winter range available for leasing in this RFOGD.

Thirty two percent (790 acres) of the critical sage grouse habitat is NSO. Surveys for boreal owl and great gray owl would be required (CSU for sensitive species) near Wolf Creek Summit. Within the West Fork Duchesne MA, there are approximately 41,670 acres of LAUs; all but 70 acres are available for leasing. Fifty eight percent (24,100 acres) of LAUs are covered by NSO; the remaining acres are CSU outside of the TL.

Deer Creek Group

Under the Proposed Action Alternative, 96 percent (167,400 acres) of the RFOGD, including Deer Creek Reservoir, Hobble Creek, and Lower Provo MAs, is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Ninety six percent (21,800 acres) of the available elk winter range, about 99 percent (11,100 acres) of the available deer winter range, 85 percent (95,900 acres) of the available deer fawning range, and 86 percent (1,180 acres) of the available elk year-long range within this RFOGD are covered by NSO. Surveys for peregrine falcon would be required (CSU stipulation) in suitable habitat (cliffs).

Diamond Fork Group

Under the Proposed Action Alternative, more than 99 percent (97,050 acres) of the Diamond Fork RFOGD is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Eighty four percent (7,200 acres) of the available elk winter range, more than three-quarters (78 percent; 6,600 acres) of the available deer winter range, and 65 percent (49,900 acres) of the available acres of deer fawning (summer) range within this RFOGD are covered by NSO. Disturbance in Ute ladies' tresses habitat would require a BA and compliance with the ESA (Lease Notice).

Payson Group

Under the Proposed Action Alternative, 77 percent (92,500 acres) of the Payson RFOGD, including Payson, Mona, Thistle, and Nephi MAs, is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Seventy-eight percent (19,400 acres) of available elk winter range and more than three quarters (82 percent; 2,300 acres) of the available deer winter range within this RFOGD are covered by NSO. There is no deer fawning range available for leasing in this RFOGD. Surveys for barneby woody aster would be required in suitable habitat (CSU stipulations).

Spanish Fork Canyon Group

Under the Proposed Action Alternative, all (44,300 acres) of the Spanish Fork Canyon RFOGD is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Over fifty percent (53 percent; 9,600 acres) of available elk winter range, 41 percent (2,800 acres) of the available deer winter range, over fifty percent (56 percent; 14,000 acres) of deer fawning range, and 10 out of 40 (25 percent) available acres of elk year-long range within this RFOGD are covered by NSO. Disturbance in clay phacelia habitat (Spanish Fork Canyon) would require a BA and compliance with the ESA (Lease Notice).

Strawberry Group

Under the Proposed Action Alternative, 65 percent (114,670 acres) of the Strawberry RFOGD, including Strawberry Reservoir, White River, and Willow Creek MAs, is administratively available for leasing. Three wells (15 acres of disturbance) are expected within this RFOGD.

About one third (38 percent; 500 acres within the White River MA) of available elk winter range, none of the 40 acres of deer winter range within the White River MA, one third (37 percent; 2,200 acres within the White River MA) of the elk year-long range, one third (37 percent; 40,000 acres) of the deer fawning range, and one quarter (24 percent; 1,600 acres within the Strawberry Reservoir MA) of the critical sage grouse habitat within this RFOGD are covered by NSO. All of the deer winter range in the White River MA is covered by CSU and TL stipulations.

American Fork Group

Under the Proposed Action Alternative, 57 percent (32,800 acres) of the American Fork RFOGD is administratively available for leasing. One well (5 acres of disturbance) is being analyzed within this RFOGD.

All of the 3,700 acres of available elk winter range and all of the 2,000 acres of available deer winter range within this RFOGD are covered by NSO. There is no deer fawning range available for leasing in this RFOGD.

Surveys for rockcress draba would be required (CSU stipulations) in suitable habitat. Disturbance in western yellow-billed cuckoo habitat (forested riparian - American Fork Canyon or Dry Canyon) would require a BA and compliance with the ESA. Cuckoo habitat would likely be protected by NSO for riparian.

Upper Provo Group

Under the Proposed Action Alternative, more than 99 percent (53,700 acres) of the Upper Provo RFOGD is administratively available for leasing. One well (5 acres of disturbance) is being analyzed within this RFOGD.

Seventy one percent (100 acres) of the available deer winter range within this RFOGD is covered by NSO. Only 22 percent (4,800 acres) of the available elk calving range and about one third (38 percent; 19,000 acres) of the available deer fawning range is NSO. There is no elk winter range available for leasing in this RFOGD. Surveys for dainty moonwort would be required (CSU stipulations) in suitable habitat (wet meadows on the Uinta Mountains), although these areas are likely to be NSO for riparian.

Vernon Group

Under the Proposed Action Alternative, all 91,000 acres of the Vernon RFOGD, including Vernon and West Sheeprock MAs, is administratively available for leasing. One well (5 acres of disturbance) is being analyzed within this RFOGD.

There is no elk winter range or deer winter range available for leasing in this RFOGD. Out of about 49,000 acres of critical sage grouse habitat within the Vernon RFOGD, 11 percent of the available acres (4,860 acres out of 43,600 available) are NSO. The majority (88 percent, 38,700 acres) of available acres are CSU outside of the TL.

4.9.6 Effects of the Modified Resource-based Alternative

Fewer acres are available for leasing under the Modified Resource-based Alternative, relative to the Proposed Action Alternative, because IRAs are unavailable for leasing (see Chapter 2). The amount of disturbance under the Modified Resource-based Alternative, however, would be identical to that under the Proposed Action Alternative. As a result, direct and indirect adverse impacts from oil and gas exploration to all wildlife and special status species under the Modified Resource-based Alternative would be similar to the Proposed Action Alternative: negligible to minor.

Leasing stipulations under the Modified Resource-based Alternative are the same as under the Proposed Action Alternative with two exceptions: in mule deer fawning habitat, a TL stipulation would apply from 15 May to 15 July; and in critical sage grouse habitat, the TL would be extended to include a 2-mile buffer around known breeding areas. These species would experience even fewer adverse impacts under this alternative than under the Proposed Action Alternative. The two-mile buffer around sage-grouse breeding habitat would reduce impacts to practically negligible.

All locations of big game ranges, critical sage grouse habitat, and LAUs are unchanged and are not discussed further. Leasing stipulations for special status species (and locations) would be the same as under the Proposed Action Alternative; thus, special status species are not discussed further. Effects under the Modified Resource-based Alternative are described with regard to resources and stipulations, below.

Winter Range

There are 18,580 acres of elk winter range available for leasing under the Modified Resource-based Alternative. Three quarters (72 percent; 13,220 acres) would be covered under an NSO

stipulation for other resources. For mule deer, there are 10,400 acres of winter range available for leasing under the Modified Resource-based Alternative. Sixty five percent (6,800 acres) would be covered by NSO.

Table 4.40. Acres of elk winter range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	2,000	400	0	2,400
	RFOGD Total	**2,000**	**400**	**0**	**2,400**
Deer Creek	Lower Provo	800	0	0	800
	Hobble Creek	200	20	0	320
	Deer Creek Reservoir	600	0	40	640
	RFOGD Total	**1,600**	**20**	**40**	**1,660**
Diamond Fork	Diamond Fork	1,900	300	20	2,220
	RFOGD Total	**1,900**	**300**	**20**	**2,220**
Payson	Mona	100	10	0	110
	Nephi	900	100	10	1,000
	Payson	1,200	20	0	1,220
	Thistle	50	0	0	50
	RFOGD Total	**2,250**	**130**	**10**	**2,390**
Spanish Fork	Spanish Fork	5,400	4,200	20	9,620
	RFOGD Total	**5,400**	**4,200**	**20**	**9,620**
Strawberry	White River	70	50	0	120
	RFOGD Total	**70**	**50**	**0**	**120**
Forest-wide Total		**13,220**	**5,100**	**90**	**18,410**

Table 4.41. Acres of deer winter range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Deer Creek	Lower Provo	400	0	0	400
	Hobble Creek	200	60	0	260
	RFOGD Total	**600**	**60**	**0**	**660**
Diamond Fork	Diamond Fork	2,300	500	200	3,000
	RFOGD Total	**2,300**	**500**	**200**	**3,000**
Payson	Mona	90	40	0	100
	Nephi	400	80	0	500
	Payson	400	0	0	400
	RFOGD Total	**890**	**120**	**0**	**1,010**
Spanish Fork	Spanish Fork	3,000	2,800	0	5,800
	RFOGD Total	**3,000**	**2,800**	**0**	**5,800**
Strawberry	White River	0	40	0	40
	RFOGD Total	**0**	**40**	**0**	**40**
American Fork	American Fork	60	0	0	60
	RFOGD Total	**60**	**0**	**0**	**60**
Forest-wide Total		**6,850**	**3,480**	**200**	**10,530**

Calving and Fawning

There are 19,500 acres of elk calving range available for leasing under the Modified Resource-based Alternative. One third (34 percent; 6,500 acres) of the available elk calving range would be NSO due to other resources. There are 140,800 acres of mule deer fawning habitat available for leasing under the Modified Resource-based Alternative. Unlike the Proposed Action Alternative, a TL stipulation would apply from 15 May–15 July. Half (70,900 acres) of the available mule deer fawning/summer range would be NSO due to other resources.

Table 4.42. Acres of elk calving range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	1,900	1,200	0	3,100
	RFOGD Total	**1,900**	**1,200**	**0**	**3,100**
Upper Provo	Upper Provo	4,600	11,700	0	16,300
	RFOGD Total	**4,600**	**11,700**	**0**	**16,300**
Forest-wide Total		**6,500**	**12,900**	**0**	**19,400**

Table 4.43. Acres of deer fawning range under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	8,300	5,400	0	13,700
	Currant Creek	15,100	1,900	3,400	20,400
	RFOGD Total	**23,400**	**7,300**	**3,400**	**34,100**
Deer Creek	Lower Provo	400	0	0	400
	Hobble Creek	2,400	500	400	3,300
	Deer Creek Reservoir	5,300	1,400	1,400	8,100
	RFOGD Total	**8,100**	**1,800**	**1,800**	**11,800**
Diamond Fork	Diamond Fork	6,400	1,000	2,100	9,500
	RFOGD Total	**6,400**	**1,000**	**2,100**	**9,500**
Spanish Fork	Spanish Fork	4,200	3,800	40	8,040
	RFOGD Total	**4,200**	**3,800**	**40**	**8,040**
Strawberry	White River	2,800	4,600	0	7,400
	Strawberry Reservoir	13,400	9,100	15,700	38,200
	Willow Creek	1,700	3,600	10	5,310
	RFOGD Total	**17,900**	**17,300**	**15,710**	**50,910**
Upper Provo	Upper Provo	10,900	15,400	0	26,300
	RFOGD Total	**10,900**	**15,400**	**0**	**26,300**
Forest-wide Total		**70,900**	**46,700**	**23,150**	**140,650**

Elk Yearlong Range

There are 2,360 acres of elk yearlong range available for leasing under the Modified Resource-based Alternative. Approximately 1,000 acres (45 percent) would be covered by NSO for other resources. The remainder would be covered under CSU or SLT outside of the TL.

Table 4.44. Acres of elk yearlong under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Deer Creek	Lower Provo	80	0	0	80
	Deer Creek Reservoir	200	0	0	200
	RFOGD Total	**280**	**0**	**0**	**280**
Spanish Fork	Spanish Fork	10	30	0	40
	RFOGD Total	**10**	**30**	**0**	**40**
Strawberry	White River	700	1,300	0	2,000
	RFOGD Total	**710**	**1,330**	**0**	**2,000**
Forest-wide Total		**990**	**1,330**	**0**	**2,320**

Sage Grouse

A 2-mile buffer restriction around sage grouse breeding areas in critical habitat would apply under the Modified Resource-based Alternative, in addition to the TL stipulation. There are 44,100 acres of critical sage grouse habitat available for lease under the Modified Resource-based Alternative; 6,100 acres (14 percent) would be NSO for other resources.

Table 4.45. Acres of sage grouse under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	200	300	0	500
	Currant Creek	700	600	0	1,300
	RFOGD Total	**900**	**900**	**0**	**1,800**
Strawberry	Strawberry Reservoir	2,300	3,800	40	6,140
	RFOGD Total	**2,300**	**3,800**	**40**	**6,140**
Vernon	Vernon	2,900	33,200	40	36,140
	RFOGD Total	**2,900**	**33,200**	**40**	**36,140**
Forest-wide Total		**6,100**	**37,900**	**80**	**44,080**

Lynx

There are 43,500 acres of LAUs available for leasing under the Modified Resource-based Alternative. Almost half (46 percent; 20,000 acres) are NSO for other resources.

Table 4.46. Acres of lynx habitat under each leasing stipulation by MA.

RFOGD	MA	Leasing Stipulation			Acres available for leasing
		NSO	CSU + TL	TL	
Currant Creek	West Fork Duchesne	8,400	5,800	0	14,200
	RFOGD Total	**8,400**	**5,800**	**0**	**14,200**
Upper Provo	Upper Provo	11,600	17,700	0	29,300
	RFOGD Total	**11,600**	**17,700**	**0**	**29,300**
Forest-wide Total		**20,000**	**23,500**	**0**	**43,500**

RFOGDs

Currant Creek Group

Under the Modified Resource-based Alternative, forty one percent (34,545 acres) of the Currant Creek RFOGD, including Currant Creek and West Fork Duchesne MAs, is administratively available for leasing. Two wells (10 acres of disturbance) are expected within this RFOGD.

Eighty four percent (1,951 acres) of available elk winter range and about two thirds (69 percent; 23,446 acres) of the available deer fawning range within this RFOGD are covered by NSO. There is no deer winter range available for leasing in this RFOGD. Within the West Fork Duchesne MA, 61 percent (1,929 acres) of the available elk calving range is NSO. Regarding sage grouse, 885 acres (52 percent) of the critical sage grouse habitat is NSO; the remainder within the Currant Creek RFOGD is CSU outside of the TL. Within the West Fork Duchesne MA, there are 41,674 acres of LAUs; all but 67 acres are available for leasing, as under the

Proposed Action Alternative. Under the Modified Resource-based Alternative, 8,390 of those acres (20 percent) are covered by NSO; the remaining acres are CSU outside of the TL.

Deer Creek Group

Under the Modified Resource-based Alternative, twelve percent (21,051 acres) of the Deer Creek RFOGD, including Deer Creek Reservoir, Hobble Creek, and Lower Provo MAs, is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Almost all (97 percent; 1,717 acres) of available elk winter range and 92 percent (606 acres) of the available deer winter range within this RFOGD are covered by NSO. Sixty nine percent (8,127 acres) of the available deer fawning range and all (287 acres) of the available elk year-long range would be NSO.

Diamond Fork Group

Under the Modified Resource-based Alternative, 13 percent (12,407 acres) of the Diamond Fork RFOGD is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Eighty four percent (1,921 acres) of available elk winter range and more than three quarters (78 percent; 2,265) of the available deer winter range within this RFOGD are covered by NSO. Two thirds (67 percent; 6,362 acres) of the available deer fawning range would be NSO.

Payson Group

Under the Modified Resource-based Alternative, seven percent (8,383 acres) of the Payson RFOGD, including Mona, Nephi, Payson, and Thistle MAs, is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Ninety three percent (2,258 acres) of available elk winter range and 88 percent (838 acres) of the available deer winter range within this RFOGD are covered by NSO. There is no deer fawning range available for leasing in this RFOGD.

Spanish Fork Canyon Group

Under the Modified Resource-based Alternative, one third (36 percent; 15,890 acres) of the Spanish Fork Canyon RFOGD is administratively available for leasing. One well (5 acres of disturbance) is expected within this RFOGD.

Over half (56 percent; 5,350 acres) of available elk winter range and over half (52 percent; 3,002) of the available deer winter range within this RFOGD are covered by NSO. Over half of the deer fawning range (52 percent; 4,228 acres) and ten (23 percent) of the 43 available acres of elk year-long range would be NSO.

Strawberry Group

Under the Modified Resource-based Alternative, one third (31 percent; 54,507 acres) of the Strawberry RFOGD, including Strawberry Reservoir, White River, and Willow Creek MAs, is administratively available for leasing. Three wells (15 acres of disturbance) are expected within this RFOGD.

Seventy four (61 percent) of the 121 acres of available elk winter range and none of the 41 available deer winter range (both within the White River MA) are covered by NSO. There are

50,898 acres of available deer fawning range in this RFOGD; 17,888 (35 percent) are covered by NSO. Of the 2,275 available acres of elk year-long range, all within the White River MA, one third (33 percent; 741 acres) are NSO. Regarding sage grouse, over one third (37 percent) of the 6,202 available acres of critical habitat are NSO. The remainder is CSU outside of the TL.

American Fork Group

Under the Modified Resource-based Alternative, 13 percent (7,793 acres) of the American Fork RFOGD is administratively available for leasing. One well (5 acres of disturbance) is being analyzed within this RFOGD.

None of the elk winter range in the American Fork RFOGD is available for leasing. A small fraction (63 acres) of deer winter range is available; all is NSO. There is no deer fawning range available for leasing in this RFOGD.

Upper Provo Group

Under the Modified Resource-based Alternative, about half (54 percent; 29,263 acres) of the Upper Provo RFOGD is administratively available for leasing. One well (5 acres of disturbance) is being analyzed within this RFOGD.

None of the elk winter range or deer winter range in the Upper Provo RFOGD is available for leasing. Forty one percent (10,857 acres) of the available deer fawning range in this RFOGD is NSO. More than one quarter (28 percent; 4,613 acres) of the available elk calving range is NSO. Within the Upper Provo MA, there are 56,575 acres of LAUs; all but 2,844 acres are available for leasing, as under the Proposed Action Alternative. Under the Modified Resource-based Alternative, 11,561 acres (22 percent) are covered by NSO; the remaining acres are CSU outside of the TL.

Vernon Group

Under the Modified Resource-based Alternative, sixty percent (54,349 acres) of the Vernon RFOGD, including Vernon and West Sheeprock MAs, is administratively available for leasing. One well (5 acres of disturbance) is being analyzed within this RFOGD.

There is no elk winter range or deer winter range available for leasing in this RFOGD. Out of about 49,000 acres of critical sage grouse habitat within the Vernon RFOGD, eight percent of the available acres (2,903 acres out of 36,090 available) are NSO. The majority (92 percent) of available acres are CSU outside of the TL.

4.9.7 Summary of Effects

Wildlife

Effects to wildlife would be the same under all alternatives because the amount of disturbance relative to the amount of available habitat on the UNF is less than one percent regardless of alternative. Impacts would be negligible to minor. Species that occur in riparian habitats may differ among alternatives; refer to Section 4.8, Vegetation.

Special Status Species

Effects to special status species would be the same under all alternatives because leasing stipulations are identical.

Big Game, Sage Grouse, and Lynx

Effects to elk year-long range would be the same under all alternatives because leasing stipulations are identical. Other leasing stipulations for big game, sage grouse, and lynx (LAUs) vary among alternatives; effects to these resources are listed in table 4.47. All impacts would be short-term and site-specific.

Fishes

Direct impacts to aquatic ecosystems, fish habitat, and fish populations would not occur from well pad construction under any of the alternatives. Direct impacts to fish populations could occur from associated road construction and road crossings, but properly implemented BMPs would avoid impacts to water quality from road construction that may affect fish.

Indirect impacts to fish populations could occur through habitat degradation and the loss of ecosystem function as a result of the construction of well pads and access roads. Under all alternatives, indirect impacts from habitat degradation would be long-term and minor.

Table 4.47. Comparison summary of effects: big game, sage grouse, and lynx.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	NA	• big game wintering: negligible to minor	• big game wintering: negligible to minor
Currant Creek	• big game wintering: no impact • calving: no impact • fawning: negligible to minor • sage grouse habitat: no impact • LAUs: negligible to minor	• big game wintering: negligible to minor • calving: negligible to minor • fawning: minor • sage grouse habitat: negligible to minor • LAUs: negligible	• big game wintering: negligible to minor • calving: negligible to minor • fawning: negligible to minor • sage grouse habitat: negligible • LAUs: negligible
Deer Creek	NA	• big game wintering: negligible to minor • fawning: minor	• big game wintering: negligible to minor • fawning: negligible to minor
Diamond Fork	• big game wintering: negligible • fawning: negligible to minor	• big game wintering: negligible to minor • fawning: minor	• big game wintering: negligible to minor • fawning: negligible to minor
Payson	NA	• big game wintering: negligible to minor	• big game wintering: negligible to minor
Spanish Fork Canyon	• big game wintering: negligible • fawning: negligible to minor	• big game wintering: negligible to minor • fawning: minor	• big game wintering: negligible to minor • fawning: negligible to minor

Strawberry	• big game wintering: negligible • fawning: negligible to minor • sage grouse habitat: minor	• big game wintering: negligible to minor • fawning: minor • sage grouse habitat: negligible to minor	• big game wintering: negligible to minor • fawning: negligible to minor • sage grouse habitat: negligible
Upper Provo	NA	• big game wintering: negligible to minor • calving: negligible to minor • LAUs: negligible	• big game wintering: negligible to minor • calving: negligible to minor • LAUs: negligible
Vernon	NA	• sage grouse habitat: negligible to minor	• sage grouse habitat: negligible
Forest-wide	• big game wintering: no impact • calving: no impact • fawning: negligible to minor • sage grouse habitat: no impact • LAUs: negligible to minor	• big game wintering: negligible to minor • calving: negligible to minor • fawning: minor • sage grouse habitat: negligible to minor • LAUs: negligible	• big game wintering: negligible to minor • calving: negligible to minor • fawning: negligible to minor • sage grouse habitat: negligible • LAUs: negligible

4.9.8 Cumulative Effects

Past, Present, and Reasonably Foreseeable Actions

Currently the UNF is in “maintenance” mode and not planning any new construction of facilities or roads in the next 10 years. Activities possibly affecting wildlife that have been occurring and are ongoing throughout the UNF include oil and gas leasing, grazing, trail building and realignments, habitat treatments (including restoration), and the construction of communication facilities. These activities have had and will continue to have both detrimental and beneficial effects on wildlife. The main detrimental effects of these activities include habitat loss and fragmentation; the main beneficial effect is habitat gain (restoration).

Many wildlife species are affected by fragmentation. For large mammals such as lynx and wolverine, fragmentation may hinder metapopulation dynamics such as migration and dispersal. At a smaller scale, mammals such as rodents and other prey species for raptors, owls, and other predators are affected by single roads that may split a population in half and prevent migration in and out. Habitat fragmentation may not be as relevant on the UNF as on other forests, as the natural vegetation patterns on the UNF are heterogeneous and highly fragmented (USFS 2003b:273). These patterns are determined mainly by soil moisture and not by human disturbance. Within the three main vegetation types on the UNF (aspen, oak/maple, and sagebrush), some human-caused fragmentation has occurred in conifer habitats due to timber harvesting, but in general, management has resulted in relatively little fragmentation at the landscape scale (USFS 2003b: 285).

Oil and gas – past activities

In three of the past four years, 187,242 acres have been leased (89 leases total) on the UNF, including one lease in 2003 (910 acres), 66 leases in 2004 (139,590 acres), and 22 leases in 2005 (46,742 acres). These leases have occurred within the Diamond Fork, Spanish Fork, and Strawberry RFOGDs. These oil and gas leases have likely caused habitat losses and some short-term disturbance to wildlife.

Grazing – past activities

Past grazing allotments administered to UNF standards include 11 allotments totaling 128,900 acres in 2003, nine allotments totaling 91,000 acres in 2004, and five allotments totaling 87,300 acres in 2005. Grazing has occurred within all RFOGDs. Grazing has caused competition among big game for forage and possible changes to the structure of wildlife habitats.

Upcoming or imminent projects are discussed at the RFOGD level, below. The majority of present and foreseeable future actions would have beneficial effects on wildlife.

RFOGDs

Currant Creek Group

Present and foreseeable future actions within the Currant Creek RFOGD include construction of a fish barrier to prevent the spread of whirling disease (West Fork Duchesne MA), sagebrush treatments (70 acres; West Fork Duchesne MA), and fence building to protect a sensitive plant from ATVs (15 acres; Silver Meadow).

Deer Creek Group

Present and foreseeable future actions within the Deer Creek RFOGD include a boardwalk replacement (Cascade Springs), watershed restorations (13 miles of road, Dry Canyon; 25 miles of road, Northern Wasatch Front), and trail construction (1.6 miles; Bonneville Shoreline Trail from Lindon to Dry Canyon).

Diamond Fork Group

Present and foreseeable future actions within the Diamond Fork RFOGD include water pipeline modification (Diamond Fork River, part of CUP), construction of a fish barrier (Diamond Fork River), trail construction (¾ mile, Diamond Fork Youth Forest Discovery Trail; Monk's Hollow, for ATVs), and high-elevation water improvements for bighorn sheep and other wildlife (Cascade Mountain and Provo Peak).

Payson Group

Present and foreseeable future actions within the Payson RFOGD include bighorn sheep relocations in the Mount Nebo Wilderness (by helicopter).

Spanish Fork Group

Present and foreseeable future actions within the Spanish Fork RFOGD include habitat restoration by juniper thinning (1,000 acres, Tank Hollow; 1,000-1,500 acres elsewhere within big game winter/transitional range), and clay phacelia introductions (up to 13 one-acre sites).

Strawberry Group

Present and foreseeable future actions within the Strawberry RFOGD include a boreal toad habitat improvement project (<1 acre, west of Strawberry Reservoir), fence construction to

exclude livestock (Strawberry River), fish habitat restoration (Strawberry River, phases II and III), drilling of monitoring wells (9-15 wells), road realignment (Indian Springs Road, off Strawberry Ridge), pipeline construction to improve spawning habitat (Vern's springing Baldy Creek), other fish habitat restorations (Bjorkman Headcut Restoration, north of Daniel's Pass), sage grouse habitat improvements (264 acres, north of Strawberry Reservoir), and sage grouse reintroductions.

American Fork Group

Present and foreseeable future actions within the American Fork RFOGD include fiber optic cable installation in American Fork Canyon (< 5 acres; Hanging Rock to South Fork Guard Station), construction of a 138kV transmission line (0.5 miles; mouth of Grove Creek Canyon), bridge construction across American Fork Canyon, and trail realignment in the Mount Timpanogos Wilderness Area.

Upper Provo Group

There are no present and future actions within the Upper Provo RFOGD that may have significant cumulative impacts on wildlife.

Vernon Group

Present and foreseeable future actions within the Vernon RFOGD include sage grouse habitat improvements by pinyon/juniper thinning and sagebrush treatments (40 acres pinyon/juniper thinning; 300 acres sagebrush thinning; 600 acres juniper lopping/scattering), and mine closures (73 mines).

Cumulative Effects of the No Action Alternative

The cumulative effects of the No Action Alternative would be negligible in terms of habitat loss and fragmentation. The No Action Alternative would not add a significant amount of habitat loss to that already occurring in the past, present, and foreseeable future within the WUB Study Area.

Cumulative Effects of the Proposed Action Alternative

Cumulative effects of the Proposed Action Alternative would be negligible to minor in terms of habitat loss and fragmentation, because the amount of expected habitat loss under the Proposed Action Alternative is small and is not likely to add a significant amount to that already occurring on the UNF. Most past, present, and future activities on the UNF have been restorative in nature, such that the net effect of oil and gas leasing, in general, would be negligible considering all activities on the UNF. Within the American Fork RFOGD, fewer beneficial activities are projected so the cumulative effects have the potential to be minor. American Fork also contains a relatively large amount of forested riparian habitat, the most imperiled habitat on the UNF. Because no direct impacts to forested riparian habitat would occur due to protection of RHCAs under the Proposed Action Alternative, cumulative effects would last for the duration of exploration activities (short-term noise effects).

Cumulative Effects of the Modified Resource-based Alternative

Cumulative effects of the Modified Resource-based Alternative would be similar in context and intensity to the Proposed Action Alternative. However, cumulative effects under the Modified Resource-based Alternative are more likely to be negligible than under the Proposed Action Alternative because wildlife are likely to be more protected by more restrictive leasing

stipulations under the Modified Resource-based Alternative and fewer acres of area available for leasing.

Table 4.48. Cumulative effects under each Alternative.

RFODG	Past, Present, and Reasonably Foreseeable Future Activities	Cumulative Effects Under the No Action Alternative	Cumulative Effects Under the Proposed Action Alternative	Cumulative Effects Under the Modified Resource-based Alternative
American Fork	grazing, fiber optic cable installation, construction of a 138kV transmission line, bridge construction, and trail realignment	NA	minor short-term	negligible; minor short-term
Currant Creek	grazing, construction of a fish barrier, sagebrush treatments, and fence building	negligible	negligible	negligible
Deer Creek	grazing, boardwalk replacement, watershed restorations, and trail construction	NA	negligible	negligible
Diamond Fork	grazing, oil and gas leasing, water pipeline modification, construction of a fish barrier, trail construction, and water improvements	negligible	negligible	negligible
Payson	grazing, bighorn sheep relocations	NA	negligible	negligible
Spanish Fork Canyon	grazing, oil and gas leasing, juniper thinning, and clay phacelia introductions	negligible	negligible	negligible
Strawberry	grazing, oil and gas leasing, boreal toad habitat improvement, fence construction, fish habitat restoration, drilling of monitoring wells, road realignment, pipeline construction, other fish habitat restorations, and sage grouse habitat improvements and reintroductions	negligible	negligible	negligible
Upper Provo	grazing	NA	negligible	negligible
Vernon	grazing, pinyon/juniper thinning and sagebrush treatments, and mine closures	NA	negligible	negligible
Forest-wide	—	negligible	negligible	negligible

4.10 Air Resources

4.10.1 Introduction

This section provides a description of the potential impacts to air quality resources that could result from the various leasing options and the identified alternatives. This analysis evaluates the effects on air quality from activities associated with exploratory well drilling. Overall short- and long-term ambient air quality and potential emissions were used in relation to ambient air quality standards to analyze resulting impacts.

Methodology

Sources of existing information regarding the impacts of oil and gas exploration activities on air quality resources came from the UDEQ, the WRAP, Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b), and current ambient air quality conditions. Other sources are sited in the text.

Measurement Indicators

The following indicators were used to quantify and qualify the impacts that each alternative could have on air resources:

- Change in air quality above ambient conditions
- Emission levels in relation to ambient air quality standards

4.10.2 General Effects

Under all alternatives, impacts to air quality would be similar to those listed in the WUB FEIS and would primarily consist of increased dust levels and/or exhaust emissions from gasoline or diesel engines. The majority of impacts would result from construction of roads and well pads and emissions from vehicles and operation of drilling equipment. The amount of dust would depend on the soil type, moisture conditions, and the amount of traffic on dirt or gravel roads. Vehicle exhaust emissions would primarily depend on the amount of traffic.

The potential emissions resulting from exploratory drilling of oil and gas wells are nitrous oxide (NO_x) and sulfur dioxide (SO_2). These emissions have been estimated to emit an average of 13.5 TPY NO_x and 3.3 TPY of SO_2 (Environ 2005). Typical emissions estimates for VOCs, used by the Colorado Department of Public Health and Environment (CDPH&E) are 16.7 TPY for well completions. For this effects analysis, both active and passive disturbance particulate emissions were estimated using liberal (overestimate) factors from U.S. EPA's Emission Factors (AP-42). The impact assumes two months from start of road construction to the end of well completion (active disturbance) and the remaining part of the year, inactive. Nonetheless, accurate emissions for road construction and exploratory well development are dependent on various factors, which cannot be accurately estimated at this time without further details and site characteristics. Analysis at the site-specific level would occur when locations and operation plans are known. Because the exploratory drilling activity would be limited temporarily, the effects of each projected pad would be short-term, lasting only the duration of the activity itself.

The UNF is a Class II area which means emissions from industrialization is allowed.

Exploratory impacts would generally be localized and short-term and would not be expected to exceed Class II standards. In addition, any activity on oil and gas leases must comply with the Clean Air Act and the Utah Air Quality Regulations.

Effects of Lease Options

Stipulations other than SLT have not been proposed for air quality; however, stipulations for other resources may provide additional protection. These effects are similar to those in the Western Uinta Basin EIS.

No Surface Occupancy: NSO would result in minor adverse effects, or "no effect" to air quality in the study area over existing baseline conditions. The exceptions to no effect impacts include actions such as directional drilling from outside the study area, further development on existing leases, and construction of roads through areas with NSO stipulations. Directional drilling could result in minor, temporary impacts to air quality such as increased dust. If roads are constructed through NSO areas, increased dust and vehicle emissions could result. None of the possible minor adverse impacts are anticipated to exceed Class II standards because of insignificant disturbance and the absences of pollution-producing activities.

Controlled Surface Use and Timing Limitation: CSU stipulations would likely result in some reduction of air quality impacts. For example, a CSU could require the operator to control fugitive dust by applying dust abatement materials when conditions warrant their application or require green completions from drilling activities. However, other CSU or TL stipulations could result in temporary minor adverse impacts to air quality. For example, if the burning of slash generated from road, well pad, and other activities is required during certain times of the year and/or during certain atmospheric conditions, temporary impacts from the burning could result. Such impacts are not anticipated to exceed Class II standards because of the large particulates generated by fires and the limited amount of fuel that results from the slashing activities.

Standard Lease Terms: SLT would result in the greatest potential for air quality impacts. Impacts would result from the burning of slash, dust from road construction and traffic, well venting, drilling, completion activities, and pipeline construction. Impacts are not anticipated to exceed Class II standards. However, the possibility of requiring dispersion modeling or site monitoring is most likely under this stipulation to ensure Class II standards; thus, moderate adverse impacts are not anticipated.

4.10.3 Effects of the No Action Alternative

Under this alternative, 22 percent of the UNF would be administratively available for leasing. However, 45 percent of the available leasing area would have NSO stipulations and additional areas would have SLT, TL, and CSU stipulations applied. None of the stipulations specifically address air quality. One exploration well is predicted on the UNF under this alternative. As stated in the General Effects, emissions from drilling one well would be approximately 13.5 TPY of NOx, 3.3 TPY of SO2 (Environ 2005), 16.7 TPY of VOCs (CDPH&E). Particulate emissions would be approximately 4.8 TPY PM, 2.3 TPY PM10, and 0.3 TPY PM2.5 (not additive). This would result in air quality impacts to occur as described under General Effects above.

Currant Creek MA

The effects of one exploratory well being drilled in this area would have air quality impacts as described under the General Effects above. Since the overall air quality of the Currant Creek MA is considered excellent, the impacts from one exploratory well pad facility would have a minimal, short-term, minor adverse effect.

Diamond Fork MA

The effects of an exploratory well being drilled in this MA would be slightly greater than those of the Currant Creek MA. This is because the western portion of the Diamond Fork MA is in an area that is classified as non-attainment for PM10 emissions. Exploration activities located within this non-attainment area would likely need to report to regulatory authorities and implement procedures for best management practices to minimize emissions. Because of BMPs that would be required and the short-term nature of exploration activities, only minor adverse effects from exploration activities are likely to result.

Upper Spanish Fork MA

Exploration activities would have air quality impacts similar to those of the Diamond Fork MA as both areas have the same air quality issues and portions lie within non-attainment areas.

Strawberry Reservoir MA

Since the air quality of the Strawberry Reservoir MA is similar to that of the Currant Creek MA, the impacts of one exploratory well would also be similar: short-term, minor, and adverse.

Willow Creek MA

The impacts of one exploratory well facility in this area would be the same as in the Strawberry Reservoir MA.

White River MA

The impacts of one exploratory well facility would be the same as in the Strawberry Reservoir MA.

4.10.4 Effects of the Proposed Action Alternative

Under this alternative, approximately 87 percent of the UNF would be administratively available for leasing. However, 61 percent of the study area would have a NSO stipulations, 20 percent would have CSU stipulations, and additional areas would have SLT, TL and or both CSU and TL stipulations applied. None of the stipulations specifically address air quality.

This analysis projects two exploratory wells in the Current Creek Group; one exploratory well in the Deer Creek, Diamond Fork, Payson, and Spanish Fork Groups; and three exploratory wells in the Strawberry Group. This would result in air quality impacts to occur as described under General Effects above. Compared to the No Action Alternative, this alternative would emit approximately 12 times the pollution from direct exploratory well drilling. On average, impacts to these collective MA's airsheds are 121.9 TPY of NOx, 29.7 TPY of SO_2, and 150.3 TPY VOCs. Without specific locations of these exploratory wells, it is difficult to estimate short- and long-term impacts from construction activities in regard to road improvements or associated vehicular traffic. However, a generalized estimate of 12 times the particulate pollution from

indirect roads and associated vehicle traffic can be assumed. Particulate emissions per MA are documented below.

Currant Creek Group

The effects of two exploratory wells being drilled in this area would have the air quality impacts as described under the General Effects above. Since the overall air quality of the Currant Creek MA is considered excellent, the impacts from one exploratory well pad facility would have a minimal, short-term, minor adverse effect.

Deer Creek Group

The effects of one exploratory well being drilled in this area would have the quality impacts as described under the General Effects above. The impacts from one exploratory well pad facility would have a minimal, short-term, minor adverse effect. Nine major sources border the UNF along the western border of this group. If one exploration well was drilled in this area, impacts would be slightly greater then elsewhere in the group, but still minor.

Diamond Fork Group

The effects of an exploratory well being drilled in this group would be slightly greater than those of other groups because the western portion of the Diamond Fork MA is in an area that is classified as non-attainment for PM10 emissions. Exploration activities located within this non-attainment area would likely need to report to regulatory authorities and implement procedures for best management practices to minimize emissions. Because of mitigation measures or BMPs that would be required, short-term, minor adverse effects from exploration activities are likely to result.

Payson Group

The air quality of the Payson Group is similar to that of the Deer Creek Group with the same air quality issues. Therefore, impacts to air quality as a result of one exploratory well pad facility being developed would similar to those of the Deer Creek group.

Spanish Fork Canyon Group

The Spanish Fork Group has air quality issues similar to those of the Diamond Fork Group. Therefore, impacts to air quality as a result of one exploratory well pad facility being developed would similar to those of the Diamond Fork Group.

Strawberry Group

The air quality of the Strawberry Group as a whole is excellent, although the southern border of the area is impacted by Highway 6. Emission estimates for three wells in this group would be 40.5 TPY for NOx, 9.9 TPY for SO2, and 50.1 TPY for VOCs. Particulate emissions are estimated to be approximately 10.4 TPY PM, 5.02 TPY PM10, and 0.6 TPY PM2.5. Impacts to air quality resulting from three potential oil and gas wells in this area would be short-term, minor and adverse. Minor effects are projected because of the overall excellent air quality in this group, and emissions are unlikely to result in exceedance of air quality standards, see General Effects.

American Fork Group

For analysis purposes it is assumed that there could be one exploratory well in this group. Given the current condition of the air quality for this group, exploration activities would result in short-term, minor adverse impacts to air quality.

Upper Provo Group

For analysis purposes it is assumed that there could be one exploratory well in this group. Exploration activities would result in short-term, minor adverse impacts, as described for the Deer Creek Group.

Vernon Group

For analysis purposes it is assumed that there could be one exploratory well in this group. Exploration activities would result in short-term, minor adverse impacts, as described for the Deer Creek Group.

4.10.5 Effects of the Modified Resource-based Alternative

Under this alternative, 26 percent or approximately 224,500 acres of Federal minerals within the study area would be administratively available for leasing. However 46 percent of the study area would have a NSO stipulation and additional areas would have TL and combined TL and CSU stipulations applied. None of the stipulations specifically address air quality and with the information provided, determining vehicle miles traveled and the associated dust for indirect effects is not quantifiable at this juncture. This quantification would occur when locations and a plan of operations is known. The projected number of wells under this alternative is the same as for the Proposed Action Alternative. As such, impacts to air quality under the Modified Resource-based Alternative would be the same as described under the Proposed Action Alternative.

4.10.6 Summary of Effects

Table 4.49. Comparison summary of effects: air resources.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Currant Creek	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	Impacts would be similar to the No Action Alternative but the affected area would be larger due to increased number of wells and disturbed acres.	Impacts would be similar to the Proposed Action Alternative
Deer Creek	NA	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	
Diamond Fork	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	Impacts would be similar to the No Action Alternative.	

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Payson	NA	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	
Spanish Fork Canyon	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	
Strawberry	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	Impacts would be similar to the No Action Alternative but the affected area would be larger due to increased number of wells and disturbed acres.	
American Fork	NA	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	
Upper Provo	NA	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	
Vernon	NA	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	
Forest-wide	Minor and local adverse effects from fugitive dust, vehicle emissions, and drilling and completion emissions.	Impacts would be similar to the No Action Alternative but the impacts would be greater due to increased number of wells and disturbed acres.	

**NA= Not available for lease. These RFOGDs do not have land available for lease under the No Action Alternative.*

4.10.7 Cumulative Effects

Past, Present, and Reasonably Foreseeable Actions

Current and proposed activities on the UNF include wetland development, aquatic habitat improvement, road stabilization and restoration, timber thinning and sales, watershed improvement and management, vegetative management activities for wildlife habitat, and gravel processing and production. These activities include vehicular emissions and fugitive dust

generation. The Forest is currently in a maintenance management mode, which is expected to continue for the next 10 years.

Cumulative Effects of the No Action Alternative

The No Action alternative proposes one exploratory well within the UNF. The combined impact of one exploratory well in combination with the above listed activities is unlikely to result in adverse cumulative effects on air quality resources because of the large size of the area and the relatively small scale of activities. Should the exploratory well result in a producing well there would be short-term increase in VOC emissions from the producing well.

Cumulative Effects of the Proposed Action Alternative

With a greater number of predicted wells, the cumulative effects of this alternative would be greater than those listed for the No Action alternative, but would still be unlikely to result in adverse effects on air quality resources. The overall air quality of the air shed may have some short-term cumulative effects resulting from the combined emissions from all activities. Should exploration result in the development of an oil and gas filed, there would be short-term increases in VOC emissions.

Cumulative Effects of the Modified Resource-based Alternative

Cumulative effects would be as described for the Proposed Action.

4.11 Visual Resources

This section provides a description of the effects to visual resources that could result from oil and gas exploration activities.

4.11.1 Introduction

Scenery is an important natural resource of the UNF. The scenic resource varies by location and is largely influenced by existing natural features including vegetation, water, landforms, and geology. It is primarily through their visual sense that most visitors perceive the Forest and its interrelated components. Scenic forest settings contribute much to recreational experiences. Benefits derived from scenic settings include identity, self-image of communities and individuals, and enhanced quality of life. Sight-seeing, driving for pleasure, and outdoor photography are among the nation's leading recreational activities, and demand for them will continue (USFS 2003).

The primary issue associated with visual resources is the degree of visible change that may occur in characteristic landscapes, viewsheds, and areas with high scenic value. Oil and gas operations could adversely impact the landforms, colors, and textures in the environment, and thereby impact visual quality. Adopted Visual Quality Objectives (VQOs) were established through the Forest Plan, and consistency with these could be impacted.

Methodology

Sources of existing information on visual resources came from the UNF Land and Resource Management Plan (USFS 2003a), Western Uinta Basin Oil and Gas Leasing FEIS (USFS 1997b), Reasonably Foreseeable Development Scenario (RFDS 2006), and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development Gold Book (BLM/USFS 2006).

The UNF uses a process called the Visual Management System (VMS) as a tool for facilitating the attainment of aesthetic goals while balancing other equally important resource needs. VQOs are applied to different areas of the Forest. The term Visual Quality Objective refers to the degree of acceptable visual alteration of the landscape and is defined as a desired level of scenic excellence based on physical and sociological characteristics of an area. Typically, more restrictive VQOs are incorporated to protect the most highly visible and frequently seen areas that have the greatest amount of variety in vegetation and other naturally occurring features.

Potential impacts from oil and gas leasing activities relate to project visibility and the introduction of elements of different form, line, color, and texture into the landscape. The extent of noticeable change to the form, line, color, and texture of the landscape as a result of project exploration and construction can be measured in levels of visual contrast. The contrast levels (strong, moderate, and weak) that could result from the project components are defined as follows:

- Strong: strong contrast occurs where project activities would attract attention and dominate the landscape setting.

- Moderate: moderate contrast occurs where project activities are noticeable and start to dominate the setting.
- Weak: weak contrast occurs where project activities would be noticeable but would not attract attention, and would be subordinate to the setting.

Components of oil and gas exploration activities with the highest potential to adversely affect visual resources include the visual character of the well pad and road construction/reconstruction.

Measurement Indicators

The following indicators were used to quantify and qualify the impacts that each alternative could have on visual resources:

- Changes in visual quality from the construction of man made features in the viewshed
- Well pad size and density
- Acres of surface disturbance

4.11.2 General Effects

The degree to which oil and gas activities affect the visual resources of the UNF depends on the amount of visual contrast created by project facilities in relation to the existing landscape character. The amount of contrast created between project facilities and the surrounding landscape is defined by an analysis of how the proposed changes contrast with the basic visual elements of line, form, color, and texture.

Road construction and drilling activity would likely result in moderate to strong visual contrasts. Impacts would include strong color contrasts between the lighter colored soil of the road and other areas of disturbance, and the surrounding vegetation. Drilling rigs would introduce moderate to strong line and form contrasts. Noise and lighting associated with the drilling rig could also impact the aesthetics of surrounding areas within sight and sound of the activity. Noise impacts are more fully discussed in the Recreation Section 4.13 of this document. Exploration activities would be considered short-term impacts, which could be mitigated upon cessation of the exploration activities with the reclamation of disturbed areas.

Impacts to UNF VQOs

Lands within the UNF have been evaluated for their scenic quality, sensitivity, and distance from sensitive viewing locations, and classified into one of four VQO classes. Retention and Partial Retention are the two most sensitive VQO classes that could be impacted by oil and gas activity. Retention VQO is the most sensitive to changes in the landscape. Oil and gas activity within the foreground or middleground distance zones in Retention VQO areas, or the foreground distance zone in Partial Retention VQO area would most likely not meet objectives for managing scenic quality, although actual effects are dependent on factors such as siting facilities to take advantage of

Distance Zones

Immediate Foreground
0 to 300 feet

Foreground
0 to ½ mile

Middleground
½ to four miles

Background
4 to horizon

topographic and/or vegetative screening, and design of the facilities (e.g., painting structures to blend with the surrounding landscape).

Preservation VQO allows for ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited. Thus, oil and gas activity would not be allowed in areas with this VQO, and they would not be impacted.

Modification VQO covers areas that are of moderate scenic integrity and have experienced human alteration. Thus, oil and gas activity would be allowed in these areas. However, activities involving vegetative and landform alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that their visual characteristics are those of natural occurrences within the surrounding area or character type. Additional parts of these activities such as structures and roads must remain visually subordinate to the existing visual landscape.

An example of what a well pad and access road could look like after construction, along with the same site following reclamation, can be seen in figures 4.2 and 4.3.

Figure 4.2. Active well pad and access road.

BLM/USFS 2006.

Figure 4.3. Well pad and access road after reclamation.
BLM/USFS 2006.

4.11.3 Effects of Lease Options

Retention and Partial Retention VQO classes would be potentially affected by oil and gas leasing activity and would need additional mitigation measures along with to meet adopted VQO guidelines.

Not Available for Lease and No Surface Occupancy: NA would result in no direct effects to visual resources within the UNF. NSO would protect visual resources from disturbances caused from well pads or production facilities. Access roads not covered by NSO stipulations could cause impacts to visual resources, including line and color contrasts between the road and the surrounding natural landscape; these impacts would be short-term.

Controlled Surface Use: CSU would require that the VQOs for the affected area be met within one year of the commencement of activities. Operations would be located and designed to meet objectives through siting roads and well pads in areas that are screened with topography and/or with vegetative cover from primary viewing locations such as developed recreation areas, major trails, and roads. Where possible, well pad sites would be selected in areas with higher capabilities for visually absorbing the disturbance and on soils with good re-vegetation potential. Facilities would be designed to blend in as much as possible with the surrounding natural environment through the selection of facility color and minimization of ground disturbance.

Timing Limitation: TL could be imposed during the high-use summer period when there are more Forest visitors in the area who may be impacted by the increased industrial activity. However, primary factors involved in maintaining visual quality of the Forest landscape relate to the scale and amount of development, ground disturbance, and contrasts caused by vegetation removal and the presence of drill rigs and other structures. Limiting activity during certain periods would not change those factors.

Standard Lease Terms: Under SLT a major portion of the Retention VQO areas may not meet their adopted visual quality objectives. Partial Retention areas may be able to meet visual objectives in situations where the activity can be effectively screened from the majority of viewers. In locations where this is not possible, Partial Retention objectives would generally not be met. SLT does, however, provide for "reasonable" measures to minimize impacts. This can include siting and design considerations, which may reduce visual impacts.

4.11.4 Effects of the No Action Alternative

Under the No Action Alternative, Retention (R) and Partial Retention (PR) have a NSO and CSU stipulation, respectively. Visual impacts include strong line, color, and form contrasts associated with access roads and well pads. One well pad is predicted to be constructed; along with associated infrastructure such as access roads, the ground disturbance is estimated to be 6.9 acres. All disturbance would be short-term and related to exploration activity, and would be mitigated with successful reclamation.

Table 4.50 describes the VQO acreages forest-wide and which stipulations apply to those acreages under this alternative.

Table 4.50. VQO acreages of the No Action Alternative: Forest-wide.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	1,447	1,713	0	161	77	27,604	3,398	2
Partial Retention	53,565	62,704	248	842	1,426	18,314	118,785	59
Modification	35,064	40,759	0	359	2,682	5,180	78,864	39
Total	90,076	105,176	248	1,362	4,185	51,098	*201,047	100

** Actual acreage is 197,000. GIS rounding creates a small acreage discrepancy.*

Forest-wide

Since Partial Retention VQO applies to a majority of the leasable acres within the leasing area of this Alternative (59 percent), and Retention VQO applies to an additional two percent, there is a good chance that oil and gas exploration activity may affect high quality scenic resources.

Modification VQO applies to 39 percent of the leasable acres within the Forest. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Tables 4.51 through 4.57 describe the VQO acreages in each MA and which stipulations apply to those acreages under this alternative.

Currant Creek MA

Since Modification VQO applies to the largest portion of leasable acres within this MA (97 percent), it is not likely that oil and gas exploration activity would affect high quality scenic resources. However, Partial Retention applies to three percent of the leasable acres. Oil and gas exploration activity within the Partial Retention areas would likely have a minor, short-term impact on high quality scenic resources. This impact would be the result of well pad and access road construction.

Table 4.51. VQO acreages of the No Action Alternative: Currant Creek MA.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	0	0	0	0	0	0	0	0
Partial Retention	10	35	0	0	0	111	45	3
Modification	871	88	0	0	379	402	1,338	97
Total	881	123	0	0	379	513	1,383	100

Diamond Fork MA

Since Partial Retention VQO applies to a majority of the leasable acres within this MA (73 percent), there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 26 percent of the leasable acres within this MA. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.52. VQO acreages of the No Action Alternative: Diamond Fork MA.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	367	487	0	76	0	588	930	1
Partial Retention	29,866	18,972	0	71	92	2,532	49,001	73
Modification	11,472	6,076	0	0	12	205	17,560	26
Total	41,705	25,535	0	147	104	3,325	67,491	100

Strawberry Reservoir MA

The leasable acres within this MA are almost evenly split between Partial Retention VQO and Modification VQO, with only two percent covered by Retention VQO. Oil and gas exploration activity within the Partial Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.53. VQO acreages of the No Action Alternative: Strawberry Reservoir MA.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	161	665	0	0	15	26,314	841	2
Partial Retention	4,302	16,397	248	30	618	13,667	21,595	48
Modification	3,030	17,711	0	103	1,928	205	22,772	50
Total	7,493	34,773	248	133	2,561	40,187	45,208	100

Upper Spanish Fork Canyon MA

The leasable acres within this MA are almost evenly split between Partial Retention VQO and Modification VQO, with only four percent covered by Retention VQO. Oil and gas exploration activity within the Partial Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.54. VQO acreages of the No Action Alternative: Upper Spanish Fork Canyon MA.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	918	562	0	85	57	702	1,622	4
Partial Retention	8,024	8,953	0	433	73	799	17,483	44
Modification	11,003	9,442	0	62	276	2,925	20,783	52
Total	19,945	18,957	0	580	406	4,425	39,888	100

White River MA

The leasable acres within this MA are almost evenly split between Partial Retention VQO and Modification VQO. Oil and gas exploration activity within the Partial Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.55. VQO acreages of the No Action Alternative: White River MA.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	0	0	0	0	0	0	0	0
Partial Retention	6,476	5,524	0	123	74	1,205	12,197	53
Modification	6,829	3,910	0	176	0	1,443	10,915	47
Total	13,305	9,434	0	299	74	2,648	23,112	100

Willow Creek MA

Since Partial Retention VQO applies to a majority of the leasable acres within this MA (77 percent), there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 23 percent of the leasable acres within this MA. Any oil and gas exploration activity within Modification areas is not likely to affect visual resources, because this VQO is less sensitive to alteration, and other human alterations are present.

Table 4.56. VQO acreages of the No Action Alternative: Willow Creek MA.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	0	0	0	0	0	0	0	0
Partial Retention	4,887	12,822	0	185	569	1	18,463	77
Modification	1,859	3,532	0	18	86	0	5,495	23
Total	6,746	16,354	0	203	655	1	23,958	100

4.11.5 Effects of the Proposed Action Alternative

The Proposed Action is expected to have short-term, minor adverse effects on visual resources. These effects would result from road and well pad construction as described in the General Effects section above. It is assumed that well pad and access road construction would result in approximately five acres of ground disturbance per well pad site. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Table 4.57 describes the VQO acreages forest-wide and which stipulations apply to those acreages under this alternative.

Table 4.57. VQO acreages of the Proposed Action Alternative: Forest-wide.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	58,943	0	0
Retention	84,786	5,930	9,130	0	0	28,634	99,846	13
Partial Retention	250,539	90,821	57,376	0	0	14,769	398,736	51
Modification	141,236	55,931	46,362	2,536	31,801	1,772	277,866	36
No VQO	837	0	0	0	0	0	837	0
Total	477,398	152,682	112,868	2,536	31,801	104,118	777,285	100

Forest-wide

Since Partial Retention VQO applies to the largest portion of leasable acres within the Forest under this alternative (51 percent), and Retention VQO applies to an additional 13 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources.

Modification VQO applies to 36 percent of the leasable acres within the Forest. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Currant Creek Group

There is potential for seismic surveys in this group and a projection for two possible wells (see RFDS). Possible locations of the wells are unknown. The effects that these wells would have on scenic resources are described in the General Effects section. Well pad construction would result

in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (52 percent), and Retention VQO covers an additional seven percent, there is a good chance that oil and gas exploration activity would have a short-term, minor adverse impact on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 41 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.58 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.58. VQO acreages of the Proposed Action Alternative: Currant Creek group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	290	0	0	0	0	268	290	0.3
Retention	3,095	591	1,792	0	0	0	5,478	7
Partial Retention	27,891	6,945	8,526	0	0	111	43,362	52
Modification	21,710	243	8,136	7	4,459	405	34,555	41
No VQO	290	0	0	0	0	0	290	0.3
Total	52,276	7,779	18,454	7	4,459	784	83,975	100

Deer Creek Group

There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Specific scenic resources within this group that might be affected include the Provo Canyon Scenic Byway, the upper North Fork Provo River, the lower North Fork Provo River, and Little Provo Deer Creek. If a well pad is constructed within viewing distance of the Byway, the scenic quality of the Byway may be adversely affected. The upper North Fork Provo River, lower Fork Provo River, and Little Provo Deer Creek are all eligible for Wild and Scenic River classification. Well pad construction near these waterways may adversely affect this eligibility.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be completely reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (57 percent), and Retention VQO covers an additional 25 percent, there is a good chance that oil and gas exploration activity would have a short-term, minor adverse impact on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 18 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.59 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.59. VQO acreages of the Proposed Action Alternative: Deer Creek group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	6,111	0	0
Retention	39,709	927	1,131	0	0	0	41,767	25
Partial Retention	80,425	14,506	686	0	0	0	95,617	57
Modification	26,832	1,157	110	0	1,920	0	30,019	18
Total	146,966	16,590	1,927	0	1,920	6,111	167,403	100

Diamond Fork Group

There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. A specific scenic resource within this group that might be affected is Fifth Water Creek, which is eligible for Wild and Scenic River classification. Well pad construction near this creek may adversely affect its eligibility. It is currently classified as scenic.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (67 percent), and Retention VQO covers an additional four percent, there is a good chance that oil and gas exploration activity would have a short-term, minor adverse impact on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 29 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.60 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.60. VQO acreages of the Proposed Action Alternative: Diamond Fork group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	3,306	21	650	0	0	0	3,977	4
Partial Retention	40,677	20,667	4,002	0	0	0	65,346	67
Modification	17,896	6,335	752	0	2,744	0	27,727	29
Total	61,879	27,023	5,404	0	2,744	0	97,050	100

Payson Group

There is ongoing seismic survey work in this group and a projection for one possible well (see RFDS). Possible locations of the well are unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. A specific scenic resource within this group that might be affected is the Nebo Loop Scenic Byway. The Byway's scenic qualities may be adversely affected if a well pad is located in the immediate foreground or other viewing distance of the road.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (48 percent), and Retention VQO covers an additional 27 percent, there is a good chance that oil and gas exploration activity would have a short-term, minor adverse impact on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 11 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.61 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.61. VQO acreages of the Proposed Action Alternative: Payson group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	27,317	0	0
Retention	20,946	3,307	923	0	0	0	25,176	27
Partial Retention	42,913	10,324	3,457	0	0	0	56,694	48
Modification	7,792	2,134	661	0	0	0	10,587	11
No VQO	36	0	0	0	50	0	86	0
Total	71,687	15,765	5,041	0	50	27,317	92,543	100

Spanish Fork Canyon Group

There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

The leasable acres within this group are almost evenly split between Partial Retention VQO and Modification VQO (47 and 53 percent, respectively), with only five percent covered by Retention VQO. Oil and gas exploration activity within the Partial Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.62 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.62. VQO acreages of the Proposed Action Alternative: Spanish Fork Canyon group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	1,313	0	1,015	0	0	0	2,328	5
Partial Retention	8,734	1,854	7,695	0	0	0	18,283	47
Modification	13,500	2,155	7,616	0	437	0	23,708	53
Total	23,547	4,009	16,326	0	437	0	44,319	100

Strawberry Group

There is potential for seismic surveys in this group and a projection for three possible wells (see RFDS). Possible locations of the wells are unknown. The effects that these wells would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

The leasable acres within this group are almost evenly split between Partial Retention VQO and Modification VQO (53 and 46 percent, respectively), with less than one percent covered by Retention VQO. Oil and gas exploration activity within the Partial Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.63 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.63. VQO acreages of the Proposed Action Alternative: Strawberry group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	241	701	19	0	0	28,634	961	0.8
Partial Retention	21,618	26,689	12,778	0	0	14,658	61,085	53
Modification	21,249	11,679	1,473	2,529	15,255	1,367	52,185	46
Np VQO	448	0	0	0	0	16,015	448	0.4
Total	43,556	39,069	14,270	2,529	15,255	60,674	114,679	100

American Fork Group

For analysis purposes it is assumed that there will be one exploratory well in the group. Possible location of this well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Specific scenic resources within this group that might be affected include the Alpine Loop Scenic Byway and the South Fork American Fork

River. If a well pad is constructed within viewing distance of the Byway, it may adversely affect the scenic qualities of the Byway. South Fork American Fork River is eligible for Wild and Scenic Rivers classification. Well pad construction near the river may adversely affect its eligibility.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (49 percent), and Retention VQO covers an additional 43 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to seven percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.64 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.64. VQO acreages of the Proposed Action Alternative: American Fork group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	25,246	0	0
Retention	12,851	382	1,028	0	0	0	14,261	43
Partial Retention	14,801	1,273	107	0	0	0	16,181	49
Modification	2,079	212	59	0	0	0	2,350	7
No VQO	45	0	0	0	0	0	45	0
Total	29,776	1,867	1,194	0	0	25,246	32,837	100

Upper Provo Group

It is assumed that there will be one exploratory well in the group. Possible location of this well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (57 percent), and Retention VQO covers an additional 11 percent, there is a good chance that oil and gas exploration activity may affect high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 32 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.65 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.65. VQO acreages of the Proposed Action Alternative: Upper Provo group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	3,324	0	2,571	0	0	0	5,895	11
Partial Retention	12,139	0	18,759	0	0	0	30,898	57
Modification	4,268	0	12,671	0	0	0	16,939	32
No VQO	19	0	0	0	0	0	19	0
Total	19,750	0	34,001	0	0	0	53,751	100

Vernon Group

For analysis purposes it is assumed that there will be one exploratory well in the group. Possible location of this well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Modification VQO applies to the largest portion of leasable acres within this group (88 percent), any oil and gas exploration activity is not likely to affect high quality scenic resources.

Partial Retention VQO applies to 12 percent of the leasable acres within this group. Any oil and gas exploration activity within Partial Retention areas is likely to have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Table 4.66 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.66. VQO acreages of the Proposed Action Alternative: Vernon group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	0	0	0	0	0	0	0	0
Partial Retention	1,343	8,565	1,365	0	0	0	11,273	12
Modification	25,912	32,014	14,885	0	6,936	0	79,747	88
Total	27,255	40,579	16,250	0	6,936	0	91,020	100

4.11.6 Effects of the Modified Resource-based Alternative

The Modified Resource-based Alternative is expected to have effects similar to the temporary, short-term, adverse effects on visual resources that the Proposed Action would have. These

effects would result from road and well pad construction as described in the General Effects section above.

Table 4.67 describes the VQO acreages forest-wide and which stipulations apply to those acreages under this alternative.

Table 4.67. VQO acreages of the Modified Resource-based Alternative: Forest-wide.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	300	0	0	0	0	58,409	300	0
Retention	27,077	0	0	0	0	28,894	27,077	11
Partial Retention	45,896	1,400	47,404	0	0	15,073	94,700	40
Modification	37,739	3,003	46,958	24,092	3,201	1,867	114,993	49
Total	111,012	4,403	94,362	24,092	3,201	104,243	237,070	100

Forest-wide

The leasable acres within the Forest are almost evenly split between Retention and Partial Retention VQO (51 percent combined) and Modification VQO (49 percent) under this alternative. Oil and gas exploration activity within the Partial Retention and Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Currant Creek Group

There is potential for seismic surveys in this group and a projection for two possible wells (see RFDS). Possible locations of the wells are unknown. The effects that these wells would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Modification VQO applies to the largest portion of leasable acres within this group (50 percent), any oil and gas exploration activity is not likely to affect high quality scenic resources.

Retention VQO applies to 14 percent of the leasable acres within this group and Partial Retention VQO applies to 35 percent. Any oil and gas exploration activity within Retention and Partial Retention areas is likely to have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Table 4.68 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.68. VQO acreages of the Modified Resource-based Alternative: Currant Creek group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	268	0	0
Retention	4,794	0	0	0	0	0	4,794	14
Partial Retention	7,371	0	4,593	0	0	111	11,964	35
Modification	10,592	0	2,836	3,447	0	405	16,875	50
NA	290	0	0	0	0	0	290	1
Total	23,048	0	7,428	3,447	0	784	33,923	100

Deer Creek Group

There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Specific scenic resources within this group that might be affected include the Provo Canyon Scenic Byway, the upper North Fork Provo River, the lower North Fork Provo River, and Little Provo Deer Creek. If a well pad is constructed within viewing distance of the Byway, the scenic quality of the Byway may be adversely affected. The upper North Fork Provo River, lower Fork Provo River, and Little Provo Deer Creek are all eligible for Wild and Scenic River classification. Well pad construction near these waterways may adversely affect this eligibility.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be completely reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (59 percent), and Retention VQO covers an additional 28 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 29 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.69 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.69. VQO acreages of the Modified Resource-based Alternative: Deer Creek group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	6,111	0	0
Retention	5,625	0	2	0	0	0	5,627	28
Partial Retention	7,044	0	1,855	0	0	0	8,899	44
Modification	3,905	0	0	1,889	0	0	5,794	29
Total	16,574	0	1,857	1,889	0	6,111	20,320	100

Diamond Fork Group

There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. A specific scenic resource within this group that might be affected is Fifth Water Creek, which is eligible for Wild and Scenic River classification. Well pad construction near this Creek may adversely affect its eligibility. It is currently classified as scenic.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

The leasable acres within this group are almost evenly split between Retention and Partial Retention VQO (47 percent combined) and Modification VQO (53 percent). Oil and gas exploration activity within the Partial Retention and Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.70 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.70. VQO acreages of the Modified Resource-based Alternative: Diamond Fork group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	2,051	0	0	0	0	0	2,051	18
Partial Retention	2,371	0	1,057	0	0	0	3,428	29
Modification	3,723	0	241	2,270	0	0	6,234	53
Total	8,145	0	1,298	2,270	0	0	11,713	100

Payson Group

There is ongoing seismic survey work in this group and a projection for one possible well (see RFDS). Possible locations of the well are unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. A specific scenic resource within this group that might be affected is the Nebo Loop Scenic Byway. The Byway's scenic qualities may be adversely affected if a well pad is located in the immediate foreground or other viewing distance of the road.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Retention VQO applies to the largest portion of leasable acres within this group (49 percent), and Partial Retention VQO covers an additional 41 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to nine percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.71 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.71. VQO acreages of the Modified Resource-based Alternative: Payson group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	27,080	0	0
Retention	3,893	0	9	0	0	0	3,902	49
Partial Retention	2,873	0	406	0	0	0	3,279	41
Modification	614	0	40	31	0	0	685	9
NA	36	0	0	0	0	0	36	0
Total	7,416	0	455	31	0	27,080	7,902	100

Spanish Fork Canyon Group

There is potential for seismic surveys in this group and a projection for one possible well (see RFDS). Possible location of the well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (58 percent), and Retention VQO covers an additional 13 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 28 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.72 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.72. VQO acreages of the Modified Resource-based Alternative: Spanish Fork Canyon group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	2,120	0	0	0	0	0	2,120	13
Partial Retention	3,711	0	5,479	0	0	0	9,190	58
Modification	1,974	0	2,322	134	0	0	4,430	28
Total	7,805	0	7,801	134	0	0	15,740	100

Strawberry Group

There is potential for seismic surveys in this group and a projection for three possible wells (see RFDS). Possible locations of the wells are unknown. The effects that these wells would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

The leasable acres within this group are almost evenly split between Retention and Partial Retention VQO (48 percent combined) and Modification VQO (51 percent). Oil and gas exploration activity within the Partial Retention and Retention areas would likely have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction. However, oil and gas activity within the Modification areas is not likely to affect high quality scenic resources.

Table 4.73 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.73. VQO acreages of the Modified Resource-based Alternative: Strawberry group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	949	0	0	0	0	22,039	949	2
Partial Retention	8,393	0	16,739	0	0	6,991	25,132	47
Modification	8,817	0	2,860	15,698	0	144	27,375	51
NA	448	0	0	0	0	16,015	448	1
Total	18,607	0	19,599	15,698	0	45,189	53,904	100

American Fork Group

For analysis purposes it is assumed that there will be one exploratory well in the group. Possible location of this well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Specific scenic resources within this group that might be affected include the Alpine Loop Scenic Byway and the South Fork American Fork River. If a well pad is constructed within viewing distance of the Byway, it may adversely affect the scenic qualities of the Byway. South Fork American Fork River is eligible for Wild and Scenic Rivers classification. Well pad construction near the river may adversely affect its eligibility.

Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Retention VQO applies to the largest portion of leasable acres within this group (51 percent), and Partial Retention VQO covers an additional 46 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to three percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.74 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.74. VQO acreages of the Modified Resource-based Alternative: American Fork group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	25,246	0	0
Retention	3,873	0	1	0	0	0	3,874	51
Partial Retention	2,855	0	599	0	0	0	3,454	46
Modification	198	0	11	28	0	0	237	3
NA	45	0	0	0	0	0	45	0
Total	6,971	0	611	28	0	25,246	7,610	100

Upper Provo Group

For analysis purposes it is assumed that there will be one exploratory well in the group. Possible location of this well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Partial Retention VQO applies to the largest portion of leasable acres within this group (58 percent), and Retention VQO covers an additional 11 percent, there is a good chance that oil and gas exploration activity may have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Modification VQO applies to 31 percent of the leasable acres within this group. Any oil and gas exploration activity within Modification areas is not likely to affect high quality scenic resources.

Table 4.75 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.75. VQO acreages of the Modified Resource-based Alternative: Upper Provo group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	3,052	0	0	0	0	0	3,052	11
Partial Retention	6,341	0	9,130	0	0	0	15,471	58
Modification	2,327	0	5,899	0	0	0	8,226	31
NA	19	0	0	0	0	0	19	0
Total	11,739	0	15,029	0	0	0	26,768	100

Vernon Group

Currently, there is potential for seismic surveys within this group, and for analysis purposes it is assumed that there will be one exploratory well in the group. Possible location of this well is unknown. The effects that this well would have on scenic resources are as described in the General Effects section above. Well pad construction would result in strong visual contrast that would attract attention and dominate the landscape setting. The contrast would be short-term, however, as the well pad site and access roads would be reclaimed following exploration activities.

Since Modification VQO applies to the largest portion of leasable acres within this group (79 percent), any oil and gas exploration activity is not likely to affect high quality scenic resources.

Partial Retention VQO applies to 21 percent of the leasable acres within this group. Any oil and gas exploration activity within Partial Retention areas is likely to have a short-term, minor adverse effect on high quality scenic resources. This impact would be the result of well pad and access road construction.

Table 4.76 describes the VQO acreages within this group and which stipulations apply to those acreages under this alternative.

Table 4.76. VQO acreages of the Modified Resource-based Alternative: Vernon group.

VQO	NSO	CSU	CSU & TL	TL	SLT	NA	Total VQO Acres Available for Leasing	% of Total Acres Available for Leasing
Preservation	0	0	0	0	0	0	0	0
Retention	0	0	0	0	0	0	0	0
Partial Retention	1,602	0	9,658	0	0	0	11,260	21
Modification	5,694	0	23,145	13,951	0	0	42,790	79
Total	7,296	0	32,803	13,951	0	0	54,051	100

4.11.7 Summary of Effects

Table 4.77 is a summary of impacts to visual resources by RFOGD.

Table 4.77. Comparison summary of effects: visual resources.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	NA	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Currant Creek	Impacts to visual resources due to well pad and road construction are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of two well pads and accompanying access roads are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of two well pads and accompanying access roads are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Deer Creek	NA	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Diamond Fork	Impacts to visual resources due to well pad and road construction are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Payson	NA	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Spanish Fork Canyon	Impacts to visual resources due to well pad and road construction are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Strawberry	Impacts to visual resources due to well pad and road construction are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of three well pads and accompanying access roads are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of three well pads and accompanying access roads are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Upper Provo	NA	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Vernon	NA	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of one well pad and accompanying access road are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.
Forest-wide	Impacts to visual resources due to well pad and road construction are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of 12 well pads and accompanying access roads are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.	Impacts to visual resources due to the projected construction of 12 well pads and accompanying access roads are expected to create strong visual contrasts, but impacts would be short-term due to reclamation following exploration activities.

4.11.8 Cumulative Effects

There are no major foreseeable activities on the UNF that would cause cumulative effects.

4.12 Cultural Resources

4.12.1 Introduction

The data described and utilized here comes from a Class I data review conducted at the UNF Supervisor's Office in Provo, Utah. Tables, including information regarding previously conducted cultural resource investigations and documented archaeological sites were generated from GIS coverages and the Heritage Resources Database. In order to determine site type and distribution across the Forest, site tables were generated for each of the RFOGDs. Site tables include, when available, state number, Forest number, site type, cultural affiliation, and National Register eligibility status. Condensed site tables are also provided below in the site type and distribution per RFOGD.

4.12.2 General Effects

Cultural resources are sensitive and nonrenewable resources that can be irreversibly damaged or destroyed by ground-disturbing activities, such as site and road construction, and secondary surface activities, such as vehicular and pedestrian traffic. Many of the known archaeological sites—both prehistoric and historic—on the UNF are shallow and therefore vulnerable to the direct impacts of oil and gas development including: vegetation clearing, right-of-way blading, wellpad and access road construction, and excavation of soils including pipeline trenching. Standing historic structures are more visible and more easily avoided by ground-disturbing activities, but these are not the predominant site type on the UNF.

Cultural resources are also subject to indirect impacts that frequently result from increased vehicular and pedestrian traffic associated with oil and gas development. Many of the 522 archaeological sites (173 recommended eligible) documented on UNF system lands lay within reasonable driving or walking distance of an existing road. Indirect impacts resulting from vandalism, surface artifact collection, excavation, and off-road travel can include inadvertent damage, destruction, or removal of significant scientific information, the loss of research potential, the loss of interpretation potential, and the destruction of the character or setting of a site.

4.12.3 Effects of Lease Options

All lease options would include the avoidance of significant prehistoric and historic archaeological resources under the National Historic Preservation Act of 1966 as amended, 36 CFR 800, and EO 11593. Under all lease options, at the APD stage, a cultural survey is required to be performed on all areas proposed for ground-disturbing activities before such activities commence. If a cultural resource is identified, it would be protected by avoidance or excavation and recordation. Standard stipulations require the lessee to report and protect all cultural resources found during construction.

4.12.4 Effects of the No Action Alternative

The No Action Alternative includes, under a variety of leasing stipulations, approximately 197,000 acres of lands available for leasing. Without exception, all the acreage is located within the Diamond Fork, Spanish Fork Canyon, and Strawberry RFOGDs. Therefore, cultural resources within the American Fork, Currant Creek, Deer Creek, Payson, Upper Provo, and Vernon RFOGDs would not be impacted by oil and gas exploration under this alternative.

However, under this alternative, direct and indirect impacts to cultural resources would likely occur in the Diamond Fork, Spanish Fork Canyon, and Strawberry RFOGDs. Specifically, site clusters in the southeast corner of the Strawberry Group, near the east central portion of the Diamond Fork Group, and along U.S. Highway 6 (Spanish Fork Canyon group).

Tables 4.78 and 4.79 detail the known conflicts between leasable lands and cultural resources. These conflicts do not necessarily indicate that an adverse impact will occur, only that the cultural resources have the potential to be impacted by potential future exploration. In all, there are 73 cultural properties that occur on the leasable lands under the No Action Alternative. Of these 73 properties, 23 are eligible to the NRHP, 47 are listed as not eligible, and three are unevaluated. In addition, the only documented Traditional Cultural Property on the UNF is located along U.S. Highway 6 in Spanish Fork Canyon. Avoidance of documented National Register eligible sites in these areas is recommended.

Additionally, areas identified as having a high probability of significant subsurface materials would be avoided, if possible, or monitored by a qualified archaeologist during surface disturbance. If avoidance is not possible, mitigation under an approved plan is required.

In addition, all workers would be informed of Federal and State laws and regulations intended to protect cultural resources, and of requirements for notification of authorized personnel in the event of discovery of cultural materials during construction. Efforts to minimize indirect impacts to known archaeological sites can be made through informing workers of Federal and State laws and regulations intended to protect cultural resources. However, indirect impacts to archaeological sites resulting from increased public access and use are considered probable and unavoidable.

Table 4.78. Known correlates between leasable land and cultural resources: No Action Alternative.

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
Diamond Fork Group	42Ut0368	European/American	Feature Other than Listed	Eligible
	42Ut0442	European/American	Historic Trash/dump	Not Eligible
	42Ut0445	European/American	Corral	Not Eligible
	42Ut0447	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0448	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0449	European/American	Corral	Not Eligible
	42Ut0450	European/American	Feature Other than Listed	Not Eligible
	42Ut0451	European/American	Historic Trash/dump	Not Eligible
	42Ut0455	European/American	Camp Site	Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Ut0460	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0461	European/American	Feature Other than Listed	Not Eligible
	42Ut0648	Late Prehistoric	Lithic Scatter/concentration	Not Eligible
	42Ut0649	European/American	Camp Site	Unevaluated
	42Ut0745	European/American	Homestead/ranching	Not Eligible
	42Ut0746	European/American	Feature Other than Listed	Not Eligible
	42Ut1074	European/American	Feature Other than Listed	Not Eligible
	42Ut1078	European/American	Feature Other than Listed	Eligible
	42Ut1079	European/American	Camp Site	Not Eligible
	42Ut1080	European/American	Camp Site	Not Eligible
	42Ut1081	European/American	Camp Site	Eligible
	42Ua019	European/American	Feature Other than Listed	Not Eligible
	FS 373	European/American	Feature Other than Listed	Eligible
Spanish Fork Canyon Group	42Ut0386	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42Ut0395	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut0424	European/American	Camp Site	Not Eligible
	42Ut0650	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0715	European/American	Historic Trash/dump	Not Eligible
	42Ut0727	European/American	Feature Other than Listed	Eligible
	42Ut0728	European/American	Feature Other than Listed	Eligible
	42Ut0736	European/American	Historic Trash/dump	Not Eligible
	42Ut0737	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut0738	European/American	Mine Pit (Prospect)	Not Eligible
	42Ut0739	European/American	Camp Site	Not Eligible
	42Ut0740	European/American	Feature Other than Listed	Eligible
	42Ut0741	European/American	Feature Other than Listed	Eligible
	42Ut0742	European/American	Feature Other than Listed	Eligible
	42Ut0743	European/American	Feature Other than Listed	Eligible
	42Ut0744	European/American	Corral	Not Eligible
	42Ut0844	European/American	Homestead/ranching	Eligible
	42Ut0845	European/American	Historic Trash/dump	Not Eligible
	42Ut0846	European/American	Feature Other than Listed	Not Eligible
	42Ut0847	European/American	Camp Site	Eligible
	42Ut0848	European/American	Camp Site	Not Eligible
	42Ut0864	European/American	Camp Site	Not Eligible
	42Ut0865	European/American	Corral	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Ut0866	European/American	Historic Trash/dump	Not Eligible
	42Ut0867	European/American	Historic Trash/dump	Not Eligible
	42Ut0868	European/American	Historic Trash/dump	Not Eligible
	42Ut0869	European/American	Historic Trash/dump	Not Eligible
	42Ut0870	European/American	Historic Trash/dump	Not Eligible
	42Ut0871	European/American	Corral	Not Eligible
	42Ut0872	European/American	Camp Site	Not Eligible
	42Ut0874	European/American	Historic Trash/dump	Not Eligible
	42Ut0875	European/American	Camp Site	Not Eligible
	42Ut0876	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
Strawberry Group	2Wa0014	Archaic (General)	Lithic Scatter/concentration	Eligible
	2Wa0021	European/American	Feature Other than Listed	Unevaluated
	2Wa0027	European/American	Corral	Not Eligible
	42Wa0028	Late Archaic	Lithic Scatter/concentration	Eligible
	2Wa0141	European/American	Buildings Other than Log	Not Eligible
	2Wa0149	European/American	Feature Other than Listed	Eligible
	2Wa0150	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	2Wa0151	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	2Wa0152	European/American	Corral	Not Eligible
	2Wa0159	European/American	Historic Trash/dump	Not Eligible
	2Wa0195	European/American	Corral	Not Eligible
	2Wa0196	European/American	Historic Trash/dump	Not Eligible
	2Wa0255	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	2Wa0257	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	2Wa0300	European/American	Log Building(s)	Not Eligible
	2Wa0301	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	2Wa0377	European/American	Camp Site	Not Eligible
	FS 374	European/American	Feature Other than Listed	Not Eligible

Table 4.79. Summary of cultural resources for the No Action Alternative by RFOGD.

RFOGD	# of Sites	# of Eligible Sites	# of Non-eligible Sites	# of Unevaluated Sites
Diamond Fork	33	5	16	1
Spanish Fork Canyon	22	10	22	1
Strawberry Group	18	8	9	1
Total	73	23	47	3

4.12.5 Effects of Proposed Action

The Proposed Action Alternative includes, under a variety of leasing stipulations, approximately 777,300 acres of lands available for leasing Forest-wide. Tables 4.80 and 4.81 detail the known conflicts between leasable lands and cultural resources. These conflicts do not necessarily indicate that an adverse impact will occur, only that the cultural resources have the potential to be impacted by potential future exploration. In all, there are 245 cultural properties that occur on the leasable lands under the Proposed Action Alternative. Of these 245 properties, 79 are eligible to the NRHP, 132 are listed as not eligible, and 34 are unevaluated. The same avoidance and mitigation recommendations described under the No Action Alternative, apply under this alternative.

Impacts could potentially occur to the American Fork Mining district. Any exploration in the area would likely impact historic sites associated with this district. Few sites have been recorded within the acreage deemed leasable in the Currant Creek, Deer Creek, and Payson Groups. Class III surveys would be conducted in advance of any ground disturbing activities in these areas and avoidance or mitigation would be required if National Register eligible sites are documented. All other RFOGDs have a greater number of sites recorded see table 4.80.

Table 4.80. Known correlates between leasable land and cultural resources: Proposed Action Alternative.

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
American Fork Group	42Ut0398	Archaic (General)	Rock Art	Eligible
	42Ut0420	Archaic (General)	Lithic Scatter/concentration	Unevaluated
	42Ut0891	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0891	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0897	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0898	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0901	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0903	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0907	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0909	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0910	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0933	European/American	Mining Camp	Eligible
	42Ut0939	European/American	Mining Camp	Eligible
	42Ut0940	European/American	Mine Adit or Shaft	Eligible
	42Ut0952	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0979	European/American	Mining Camp	Not Eligible
	42Ut0985	European/American	Historic Trash/dump	Not Eligible
	42Ut1002	Fremont	Rock Art	Eligible
	42Ut1035	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut1142	European/American	Mining Camp	Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Ut1435	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut1438	European/American	Lithic Scatter/concentration	Not Eligible
	42Ut1450	European/American	Feature Other than Listed	Eligible
	FS 152	European/American	Recreation (Other)	Eligible
	FS281	European/American	Forest Service	Eligible
	FS288	European/American	Recreation (Other)	Eligible
	FS 551	European/American	Feature Other than Listed	Not Eligible
	FS 552	European/American	Feature Other than Listed	Eligible
Currant Creek Group	42Wa0024	European/American	Corral	Unevaluated
	42Wa0025	European/American	Log Building(s)	Eligible
	42Wa0026	European/American	Log Building(s)	Unevaluated
	42Wa0121	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0122	European/American	Feature Other than Listed	Not Eligible
	42Wa0124	European/American	Lithic Scatter/concentration	Not Eligible
	42Wa0161	European/American	Corral	Not Eligible
	42Wa0204	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0273	European/American	Historic Trash/dump	Not Eligible
	42Wa0370	European/American	Log Building(s)	Eligible
	42Wa0381	European/American	Feature Other than Listed	Not Eligible
	FS 369	European/American	Camp Site	Not Eligible
Deer Creek Group	42Ut0143	Fremont	Rock Art	Unevaluated
	42Ut0379	Fremont	Rock Art	Unevaluated
	42Ut0422	Fremont	Rock Art	Eligible
	42Ut0655	European/American	Historic Trash/dump	Not Eligible
	42Ut0656	European/American	Historic Trash/dump	Not Eligible
	42Ut0943	European/American	Mining Camp	Eligible
	42Ut1112	European/American	Historic Trash/dump	Not Eligible
	42Wa0129	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0130	European/American	Historic Trash/dump	Unevaluated
	42Wa0131	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0176	European/American	Irrigation Ditch	Not Eligible
	42Wa0233	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0234	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0269	European/American	Historic Trash/dump	Not Eligible
	42Wa0283	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0381	European/American	Feature Other than Listed	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	FS 280	European/American	Feature Other than Listed	Not Eligible
Diamond Fork Group	42Ut0368	European/American	Feature Other than Listed	Eligible
	42Ut0442	European/American	Historic Trash/dump	Not Eligible
	42Ut0445	European/American	Corral	Not Eligible
	42Ut0446	European/American	Homestead/ranching	Eligible
	42Ut0447	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0448	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0449	European/American	Corral	Not Eligible
	42Ut0450	European/American	Feature Other than Listed	Not Eligible
	42Ut0451	European/American	Historic Trash/dump	Not Eligible
	42Ut0453	European/American	Homestead/ranching	Not Eligible
	42Ut0454	European/American	Historic Trash/dump	Not Eligible
	42Ut0455	European/American	Camp Site	Eligible
	42Ut0456	European/American	Camp Site	Eligible
	42Ut0456	European/American	Camp Site	Eligible
	42Ut0460	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0461	European/American	Feature Other than Listed	Not Eligible
	42Ut0462	European/American	Feature Other than Listed	Eligible
	42Ut0464	European/American	Feature Other than Listed	Eligible
	42Ut0648	Late Prehistoric	Lithic Scatter/concentration	Not Eligible
	42Ut0649	European/American	Camp Site	Unevaluated
	42Ut0745	European/American	Homestead/ranching	Not Eligible
	42Ut0746	European/American	Feature Other than Listed	Not Eligible
	42Ut0843	European/American	Homestead/ranching	Unevaluated
	42Ut1074	European/American	Feature Other than Listed	Not Eligible
	42Ut1078	European/American	Feature Other than Listed	Eligible
	42Ut1079	European/American	Camp Site	Not Eligible
	42Ut1080	European/American	Camp Site	Not Eligible
	42Ut1081	European/American	Camp Site	Eligible
	42Ut1499	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42Wa0019	European/American	Feature Other than Listed	Not Eligible
	FS 373	European/American	Feature Other than Listed	Eligible
Payson Group	42Jb0493	European/American	Mining Camp	Eligible
	42Jb0495	European/American	Feature Other than Listed	Eligible
	42Jb0515	European/American	Mining Camp	Unevaluated
	42Jb0749	European/American	Forest Service	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Ut0322	European/American	Historic Trash/dump	Not Eligible
	42Ut0955	Ute/Paiute	Feature Other than Listed	Not Eligible
	42Ut0987	European/American	Mine Adit or Shaft	Not Eligible
	42Ut1319	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42Ut1323	European/American	Historic Trash/dump	Not Eligible
	42Ut1324	European/American	Historic Trash/dump	Not Eligible
	42Ut1325	European/American	Historic Trash/dump	Not Eligible
	42Ut1391	European/American	Mine Adit or Shaft	Not Eligible
	FS 139	Unknown Aboriginal	Lithic Quarry	Not Eligible
	FS436	European/American	Feature Other than Listed	Unevaluated
	FS 145	European/American	Historic Trash/dump	Not Eligible
Spanish Fork Canyon Group	42Ut0385	European/American	Homestead/ranching	Unevaluated
	42Ut0386	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42Ut0395	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut0424	European/American	Camp Site	Not Eligible
	42Ut0650	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0715	European/American	Historic Trash/dump	Not Eligible
	42Ut0727	European/American	Feature Other than Listed	Eligible
	42Ut0728	European/American	Feature Other than Listed	Eligible
	42Ut0736	European/American	Historic Trash/dump	Not Eligible
	42Ut0737	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut0738	European/American	Mine Pit (Prospect)	Not Eligible
	42Ut0739	European/American	Camp Site	Not Eligible
	42Ut0740	European/American	Feature Other than Listed	Eligible
	42Ut0741	European/American	Feature Other than Listed	Eligible
	42Ut0742	European/American	Feature Other than Listed	Eligible
	42Ut0743	European/American	Feature Other than Listed	Eligible
	42Ut0744	European/American	Corral	Not Eligible
	42Ut0844	European/American	Homestead/ranching	Eligible
	42Ut0845	European/American	Historic Trash/dump	Not Eligible
	42Ut0846	European/American	Feature Other than Listed	Not Eligible
	42Ut0847	European/American	Camp Site	Eligible
	42Ut0848	European/American	Camp Site	Not Eligible
	42Ut0849	European/American	Historic Trash/dump	Not Eligible
	42Ut0864	European/American	Camp Site	Not Eligible
	42Ut0865	European/American	Corral	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Ut0866	European/American	Historic Trash/dump	Not Eligible
	42Ut0867	European/American	Historic Trash/dump	Not Eligible
	42Ut0868	European/American	Historic Trash/dump	Not Eligible
	42Ut0869	European/American	Historic Trash/dump	Not Eligible
	42Ut0870	European/American	Historic Trash/dump	Not Eligible
	42Ut0871	European/American	Corral	Not Eligible
	42Ut0872	European/American	Camp Site	Not Eligible
	42Ut0874	European/American	Historic Trash/dump	Not Eligible
	42Ut0875	European/American	Camp Site	Not Eligible
	42Ut0876	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
Strawberry Group	42Wa0014	Archaic (General)	Lithic Scatter/concentration	Eligible
	42Wa0021	European/American	Feature Other than Listed	Unevaluated
	42Wa0027	European/American	Corral	Not Eligible
	42Wa0028	Late Archaic	Lithic Scatter/concentration	Eligible
	42Wa0127	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0141	European/American	Buildings Other than Log	Not Eligible
	42Wa0149	European/American	Feature Other than Listed	Eligible
	42Wa0150	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0151	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0152	European/American	Corral	Not Eligible
	42Wa0159	European/American	Historic Trash/dump	Not Eligible
	42Wa0176	European/American	Irrigation Ditch	Not Eligible
	42Wa0176	European/American	Irrigation Ditch	Not Eligible
	42Wa0195	European/American	Corral	Not Eligible
	42Wa0196	European/American	Historic Trash/dump	Not Eligible
	42Wa0255	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0257	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0300	European/American	Log Building(s)	Not Eligible
	42Wa0301	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0377	European/American	Camp Site	Not Eligible
	FS 374	European/American	Feature Other than Listed	Not Eligible
Upper Provo Group	42Wa0116	Archaic (General)	Lithic Scatter/concentration	Not Eligible
	42Wa0117	European/American	Forest Service	Eligible
	42Wa0118	Chinese-oriental	Feature Other than Listed	Not Eligible
	42Wa0119	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0120	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Wa0162	Archaic (General)	Lithic Scatter/concentration	Not Eligible
	42Wa0181	European/American	Portable Saw Mill Site	Eligible
	42Wa0202	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0203	European/American	Portable Saw Mill Site	Eligible
	42Wa0205	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0206	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0207	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0208	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0209	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0210	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0211	European/American	Historic Trash/dump	Not Eligible
	42Wa0212	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0213	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0214	European/American	Portable Saw Mill Site	Eligible
	42Wa0230	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0232	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0358	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0369	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0371	European/American	Feature Other than Listed	Not Eligible
Vernon Group	42To0147	Paleo-Indian	Lithic Scatter/concentration	Eligible
	42To0148	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0149	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0597	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0600	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0603	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0604	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0605	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0608	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0609	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0610	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0616	European/American	Feature Other than Listed	Not Eligible
	42To0728	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To0807	Fremont	Ceramic Scatter	Eligible
	42To0833	European/American	Mine Adit or Shaft	Not Eligible
	42To0838	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0839	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42To0896	European/American	Earthen Feature (Dam, berm, etc.)	Not Eligible
	42To0946	European/American	Earthen Feature (Dam, berm, etc.)	Not Eligible
	42To0947	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To1498	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To1503	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To1504	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To1506	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To1507	Fremont	Lithic Scatter/concentration	Eligible
	42To1508	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To1509	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To1882	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To2116	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2116	Unknown Aboriginal	Lithic Quarry	Eligible
	42To2119	Fremont	Lithic Scatter/concentration	Eligible
	42To2125	European/American	Historic Trash/dump	Not Eligible
	42To2126	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2129	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2130	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2131	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To2132	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2134	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2136	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2137	Fremont	Lithic Scatter/concentration	Eligible
	42To2138	Paleo-Indian	Lithic Scatter/concentration	Eligible
	42To2139	Early Archaic	Lithic Scatter/concentration	Eligible
	42To2140	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2199	European/American	Mine Adit or Shaft	Not Eligible
	42To2209	European/American	Mine Adit or Shaft	Not Eligible
	42To2216	European/American	Mine Adit or Shaft	Not Eligible
	42To2221	European/American	Mine Adit or Shaft	Not Eligible
	42To2223	European/American	Mine Adit or Shaft	Not Eligible
	42To2224	European/American	Mining Camp	Eligible
	42To2226	European/American	Mining Camp	Eligible
	42To2228	European/American	Mine Adit or Shaft	Not Eligible
	42To2234	European/American	Mine Adit or Shaft	Not Eligible
	42To2236	European/American	Mine Adit or Shaft	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42To2239	European/American	Mine Adit or Shaft	Not Eligible
	42To2243	European/American	Mine Adit or Shaft	Not Eligible
	42To2247	European/American	Mine Adit or Shaft	Not Eligible
	42To2248	European/American	Mine Adit or Shaft	Not Eligible
	42To2270	European/American	Homestead/ranching	Eligible
	42To2274	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2275	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2277	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2892	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	FS 150	European/American	Homestead/ranching	Unevaluated

Table 4.81. Summary of cultural resources for Proposed Action by RFOGD.

RFOGD	# of Sites	# of Eligible Sites	# of Non-eligible Sites	# of Unevaluated Sites
American Fork	28	12	15	1
Currant Creek	12	2	8	2
Deer Creek	17	5	9	3
Diamond Fork	31	10	18	3
Payson	15	2	10	3
Spanish Fork	35	10	23	2
Strawberry	20	8	11	1
Upper Provo	24	6	18	0
Vernon	63	24	20	19
Total	245	79	132	34

4.12.6 Effects of the Modified Resource-based Alternative

The Modified Resource-based Alternative includes, under a variety of leasing stipulations, approximately 224,500 acres of lands available for leasing. Under this alternative, IRAs have been excluded from oil and gas leasing. Tables 4.82 and 4.83 detail the known conflicts between leasable lands and cultural resources. These conflicts do not necessarily indicate that an adverse impact will occur, only that the cultural resources have the potential to be impacted by future exploration. In all, there are 165 cultural properties that occur in the leasable lands under this alternative. Of these 165 properties, 60 are eligible to the NRHP and 85 are listed as not eligible, and 17 are not evaluated.

Impacts could potentially occur to the American Fork Mining district. Any exploration in the area would likely impact historic sites associated with this district. Few sites have been recorded within the acreage deemed leasable in the Currant Creek, Deer Creek, and Payson Groups. Class III surveys would be conducted in advance of any ground disturbing activities in these areas and

avoidance or mitigation would be required if National Register eligible sites are documented. All other RFOGDs have a greater number of sites recorded see table 4.82.

Table 4.82. Known correlates between leasable land and cultural resources: Modified Resource-based Alternative.

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
American Fork Group	42Ut0891	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0898	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0903	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0907	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0933	European/American	Mining Camp	Eligible
	42Ut0939	European/American	Mining Camp	Eligible
	42Ut0940	European/American	Mine Adit or Shaft	Eligible
	42Ut0952	European/American	Mine Adit or Shaft	Not Eligible
	42Ut0979	European/American	Mining Camp	Not Eligible
	42Ut1142	European/American	Mining Camp	Eligible
	42Ut1435	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	FS 152	European/American	Recreation (Other)	Eligible
	FS 281	European/American	Forest Service	Eligible
	FS 288	European/American	Recreation (Other)	Eligible
	FS 551	European/American	Feature Other than Listed	Not Eligible
	FS 552	European/American	Feature Other than Listed	Eligible
Currant Creek Group	42Wa0121	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0122	European/American	Feature Other than Listed	Not Eligible
	42Wa0124	European/American	Lithic Scatter/concentration	Not Eligible
	42Wa0204	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0273	European/American	Historic Trash/dump	Not Eligible
	FS 369	European/American	Camp Site	Not Eligible
Deer Creek Group	42Ut0379	Fremont	Rock Art	Unevaluated
	42Ut0656	European/American	Historic Trash/dump	Not Eligible
	42Wa0129	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0130	European/American	Historic Trash/dump	Unevaluated
	42Wa0131	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0233	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0381	European/American	Feature Other than Listed	Not Eligible
	FS 280	European/American	Feature Other than Listed	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
Diamond Fork Group	42Ut0446	European/American	Homestead/ranching	Eligible
	42Ut0449	European/American	Corral	Not Eligible
	42Ut0453	European/American	Homestead/ranching	Not Eligible
	42Ut0454	European/American	Historic Trash/dump	Not Eligible
	42Ut0455	European/American	Camp Site	Eligible
	42Ut0456	European/American	Camp Site	Eligible
	42Ut0456	European/American	Camp Site	Eligible
	42Ut0462	European/American	Feature Other than Listed	Eligible
	42Ut0464	European/American	Feature Other than Listed	Eligible
	42Ut1074	European/American	Feature Other than Listed	Not Eligible
	42Ut1081	European/American	Camp Site	Eligible
	FS 373	European/American	Feature Other than Listed	Eligible
Payson Group	42Jb0493	European/American	Mining Camp	Eligible
	42Jb0495	European/American	Feature Other than Listed	Eligible
	42Ut0322	European/American	Historic Trash/dump	Not Eligible
	42Ut1323	European/American	Historic Trash/dump	Not Eligible
	42Ut1324	European/American	Historic Trash/dump	Not Eligible
	42Ut1325	European/American	Historic Trash/dump	Not Eligible
	FS 145	European/American	Historic Trash/dump	Not Eligible
	FS436	European/American	Feature Other than Listed	Unevaluated
Spanish Fork Canyon Group	42Ut0385	European/American	Homestead/ranching	Unevaluated
	42Ut0386	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42Ut0395	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut0424	European/American	Camp Site	Not Eligible
	42Ut0650	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Ut0727	European/American	Feature Other than Listed	Eligible
	42Ut0728	European/American	Feature Other than Listed	Eligible
	42Ut0736	European/American	Historic Trash/dump	Not Eligible
	42Ut0737	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Ut0738	European/American	Mine Pit (Prospect)	Not Eligible
	42Ut0739	European/American	Camp Site	Not Eligible
	42Ut0740	European/American	Feature Other than Listed	Eligible
	42Ut0741	European/American	Feature Other than Listed	Eligible
	42Ut0742	European/American	Feature Other than Listed	Eligible
	42Ut0743	European/American	Feature Other than Listed	Eligible
	42Ut0744	European/American	Corral	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Ut0845	European/American	Historic Trash/dump	Not Eligible
	42Ut0846	European/American	Feature Other than Listed	Not Eligible
	42Ut0847	European/American	Camp Site	Eligible
	42Ut0848	European/American	Camp Site	Not Eligible
	42Ut0864	European/American	Camp Site	Not Eligible
	42Ut0865	European/American	Corral	Not Eligible
	42Ut0867	European/American	Historic Trash/dump	Not Eligible
	42Ut0868	European/American	Historic Trash/dump	Not Eligible
	42Ut0869	European/American	Historic Trash/dump	Not Eligible
	42Ut0870	European/American	Historic Trash/dump	Not Eligible
	42Ut0871	European/American	Corral	Not Eligible
	42Ut0874	European/American	Historic Trash/dump	Not Eligible
	42Ut0875	European/American	Camp Site	Not Eligible
	42Ut0876	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
Straw-berry Group	42Wa0021	European/American	Feature Other than Listed	Unevaluated
	42Wa0027	European/American	Corral	Not Eligible
	42Wa0028	Late Archaic	Lithic Scatter/concentration	Eligible
	42Wa0141	European/American	Buildings Other than Log	Not Eligible
	42Wa0149	European/American	Feature Other than Listed	Eligible
	42Wa0150	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0151	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0152	European/American	Corral	Not Eligible
	42Wa0159	European/American	Historic Trash/dump	Not Eligible
	42Wa0176	European/American	Irrigation Ditch	Not Eligible
	42Wa0255	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0300	European/American	Log Building(s)	Not Eligible
	42Wa0301	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42Wa0377	European/American	Camp Site	Not Eligible
	FS 374	European/American	Feature Other than Listed	Not Eligible
Upper Provo Group	42Wa0117	European/American	Forest Service	Eligible
	42Wa0118	Asian/American	Feature Other than Listed	Not Eligible
	42Wa0119	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0120	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42Wa0162	Archaic (General)	Lithic Scatter/concentration	Not Eligible
	42Wa0181	European/American	Portable Saw Mill Site	Eligible
	42Wa0202	European/American	Portable Saw Mill Site	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42Wa0203	European/American	Portable Saw Mill Site	Eligible
	42Wa0205	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0206	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0207	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0208	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0209	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0210	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0211	European/American	Historic Trash/dump	Not Eligible
	42Wa0212	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0213	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0214	European/American	Portable Saw Mill Site	Eligible
	42Wa0230	European/American	Portable Saw Mill Site	Not Eligible
	42Wa0371	European/American	Feature Other than Listed	Not Eligible
Vernon Group	42To0147	Paleo-Indian	Lithic Scatter/concentration	Eligible
	42To0148	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0149	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0608	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0610	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0616	European/American	Feature Other than Listed	Not Eligible
	42To0728	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To0807	Fremont	Ceramic Scatter	Eligible
	42To0833	European/American	Mine Adit or Shaft	Not Eligible
	42To0838	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0839	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To0896	European/American	Earthen Feature (Dam, berm, etc.)	Not Eligible
	42To0946	European/American	Earthen Feature (Dam, berm, etc.)	Not Eligible
	42To0947	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To0981	Fremont	Lithic Scatter/concentration	Eligible
	42To1503	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To1504	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To1506	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To1507	Fremont	Lithic Scatter/concentration	Eligible
	42To1508	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To1509	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	42To2119	Fremont	Lithic Scatter/concentration	Eligible
	42To2125	European/American	Historic Trash/dump	Not Eligible

RFOGD	Site No.	Cultural Affiliation	Site Type	National Register Status
	42To2126	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2134	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2136	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2137	Fremont	Lithic Scatter/concentration	Eligible
	42To2138	Paleo-Indian	Lithic Scatter/concentration	Eligible
	42To2139	Early Archaic	Lithic Scatter/concentration	Eligible
	42To2140	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2216	European/American	Mine Adit or Shaft	Not Eligible
	42To2221	European/American	Mine Adit or Shaft	Not Eligible
	42To2236	European/American	Mine Adit or Shaft	Not Eligible
	42To2243	European/American	Mine Adit or Shaft	Not Eligible
	42To2247	European/American	Mine Adit or Shaft	Not Eligible
	42To2248	European/American	Mine Adit or Shaft	Not Eligible
	42To2270	European/American	Homestead/ranching	Eligible
	42To2274	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2275	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2277	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2757	Early Archaic	Lithic Scatter/concentration	Eligible
	42To2757	Early Archaic	Lithic Scatter/concentration	Eligible
	42To2758	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2759	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2760	Fremont	Ceramic Scatter	Eligible
	42To2763	Fremont	Lithic Scatter/concentration	Not Eligible
	42To2764	Unknown Aboriginal	Lithic Scatter/concentration	Eligible
	42To2765	Unknown Aboriginal	Lithic Scatter/concentration	Not Eligible
	42To2892	Unknown Aboriginal	Lithic Scatter/concentration	Unevaluated
	FS 150	European/American	Homestead/ranching	Unevaluated

Table 4.83. Summary of cultural resources for the Modified Resource-based Alternative by RFOGD.

RFOGD	# of Sites	# of Eligible Sites	# of Non-eligible Sites	# of Unevaluated Sites
American Fork	28	12	15	1
Currant Creek	12	2	8	2
Deer Creek	17	5	9	3
Diamond Fork	31	10	18	3
Payson	15	2	10	3
Spanish Fork	35	10	23	2
Strawberry	20	8	11	1
Upper Provo	24	6	18	0
Vernon	63	24	20	19
Total	245	79	132	34

4.12.7 Cumulative Effects

Evidence of human occupation on the UNF spans at least 10,000 years, from Paleo-Indian use through the present. While the existing UNF Heritage Resource Database provides a framework of human use of the Forest, there is potential for establishing the nature and extent of prehistoric and historic exploitation of the area through additional survey, site documentation, and, where appropriate, mitigation. Under all three proposed alternatives, a Class III inventory will be conducted in advance of all ground disturbing activities associated with oil and gas development on the UNF. Sensitive archaeological sites will be avoided or, if avoidance does not provide the required protection, adverse effects will be mitigated. Mitigation would be appropriate to the nature of the resource at risk and would adhere to the provisions of 36 CFR 800 and other regulations. Interested parties—the UNF Supervisor's Office, the Utah State Historic Preservation Office, the Advisory Council on Historic Preservation, Native American governments, traditional leaders, and others—would be consulted as part of the mitigation process.

Professional investigation in advance of ground disturbing activities, the subsequent documentation of identified archaeological sites, and the mitigation of effects to sensitive sites would, in the short- and long-term, result in the preservation of some archaeological information that might otherwise be lost through natural deterioration, erosion, or unauthorized collection/excavation. Such investigation would also result in the enhancement of the UNF Heritage Resource database.

Impacts that cannot be addressed through Class III survey or mitigation measures would result in an irretrievable loss of part of the archaeological record. Non-recognition of significant resources, a lack of information and documentation, erosion, unauthorized collection/excavation, and inadvertent destruction also would cause loss of research potential, opportunities for interpretation, government management options, and the sense of place, setting, and feeling.

If appropriate avoidance or mitigation measures cannot be applied to cultural resources during construction, then the disturbance of sites, areas, and resources that may be important to Native

American groups would have an adverse effect on traditional cultural values and those who practice them. The adverse impact would arise from the destruction of these sites, areas, and resources, the loss of religious values, and the loss of areas where traditional members may practice those beliefs central to their well being. A concomitant loss of ethnic identity and history could alienate the people from their past and affect their ties to the land.

4.13 Developed and Dispersed Recreation

4.13.1 Introduction

This section discusses the potential impacts that implementing the three alternatives may have on developed and dispersed recreation. In general, impacts to these resources within the UNF would be related to construction of temporary well pads and associated roads. Impacts would be minor and short-term.

Methodology

The following reports and documents were referenced and used to help inform the determination of the effects of implementing the three different alternatives:

- Western Uinta Basin Oil and Gas Leasing DEIS (USFS 1996b)
- BLM Gold Book (BLM/USFS 2006)
- Uinta National Forest 2003 LRMP (USFS 2003a)

Measurement Indicators

Based upon information contained within the above reports and documents, measurement indicators were developed to help qualify and quantify impacts that oil and gas leasing and connected actions may have on opportunities for recreation and on the enjoyment of recreational activities. These measurement indicators are as follows:

- Changes in noise levels
- Miles of new road constructed or maintained
- Changes in visual quality from road construction and maintenance and well pad construction

4.13.2 General Effects

Lands within the UNF provide valuable dispersed and developed recreational opportunities. Impacts from oil and gas exploration and development could be both direct (for instance, directly disturbing a campground or hiking trail with a road, well pad, or production facility) or indirect (for instance, physical developments or activities in close proximity to recreation resources which could affect the recreational environment or experience). Impacts may also be short- or long-term. Road building and well pad development can result in visible ground disturbance, increased traffic, and increased noise. Noise and visual impacts to recreation are discussed in more detail below. Exploration activities are considered short-term impacts, estimated to last not more than 80 days.

The primary issue with recreation is the potential for altering existing recreational opportunities. Impacts include displacement or exclusion of recreational area and use due to conflicts with other activities, and changes to visual quality, noise, cultural resources, vegetative communities, and wildlife.

Other impacts include direct and indirect impacts to recreation infrastructure, summer and winter recreational opportunities and users, campground water sources, and access roads and trails. ROS allocations and standards for recreation MPs (4.4, 4.5, and 8.4) for recreation were established in the 2003 Forest Plan, and consistency with these could be impacted.

During periods of active operations, increased noise and dust levels, temporary access closures, and increased vehicle use of back roads and highways may impact recreation uses. Displacement of users into other areas during periods of active operation could occur, but would likely be small in scale, localized, and temporary in duration. Effects on recreation management are expected to be localized and minimal, although some users may be displaced.

Noise Impacts

In Chapter 3 of this EIS, it was identified that many users come to the UNF to avoid noise, heat, or other aspects of urban life. Noise associated with oil and gas exploration activities could displace recreational users or decrease their enjoyment of the UNF.

Noise generated by oil and gas exploration activities could result in short-term, minor to moderate adverse effects on both developed and dispersed recreation. Noise would be generated throughout exploration activities. Construction of temporary roads, increased traffic volumes, daily operations, and reclamation activities all have the potential to increase noise levels in the surrounding area.

The BLM determined noise levels for a fluid minerals leasing EIS in New Mexico (BLM 2000). That study reported that at 50 feet, typical measured noise levels from well drilling measured 83 decibels (dBA). In contrast, the State of Utah noise abatement criteria for noise levels are 55 dBA for lands where serenity and quiet have significant value, and 65 dBA for picnic areas and recreation areas. Since an increase of 10dBA is generally perceived as twice as loud, oil and gas well drilling at 50 feet would sound approximately 2-3 times louder to the recreational user than noise at a developed campground or in areas that recreationists seek out for a sense of solitude.

Noise generally decreases by about 6 dBA for each doubling of distance, and at about 400 feet noise from oil and gas drilling would be approximately 65dBA, and at about 1,600 feet (over ¼ mile) would be approximately 53 dBA. Noise from oil and gas drilling would not likely be perceptible at ¼ mile, and at 400 feet noise from oil and gas drilling would sound similar to developed recreation sites.

Comparatively, ATV use can result in much higher noise levels than oil and gas exploration drilling. After market mufflers tend to have noise levels ranging from 91 to 100 decibels (Off-Road.com 2007). Noise standards for ATVs or OHVs are not in place in the State of Utah. However, California and Oregon have set noise emission standards for ATVs and OHVs. California standards range from 96 to 101 dBA and Oregon standards range from 93 to 97 dBA; standards are dependant on age of vehicle (California) or location (Oregon). As stated above, at 50 feet oil and gas drilling typically measures around 83 decibels, which would be perceived as half as loud as ATVs.

The Gold Book requires noise abatement measures to control sound levels that could result in disturbance of surface uses. Noise reduction techniques include siting roads and wells to take advantage of topography and distance, and construction engineered sound barriers (BLM/USFS 2006). These measures would reduce noise impacts to minor.

Overall, noise impacts from oil and gas exploration drilling would have minor indirect effects to developed and dispersed recreation. These impacts would be less than existing impacts from ATV or other motorized recreational use in the UNF.

Visual Quality Impacts

Visual impacts of ground disturbance and physical developments have the potential to be the most common effect of oil and gas activities on recreation, resulting in a change in the physical setting of the area and possibly degrading the recreational experience.

Impacts to Developed Recreation Sites

Impacts to developed recreation areas associated with oil and gas development would most likely be indirect effects, as even SLT, which is the least restrictive of the leasing options, allows for moving oil and gas exploration or development activities 200 meters in order to reduce impacts to resources. Oil and gas activities would not be allowed in campgrounds themselves, although activities could possibly affect access roads to campgrounds and/or be occurring in areas where the sights and sounds of the oil and gas activity would be noticeable from campgrounds. Indirect impacts could include a lowering of the quality of the surrounding natural environment which may ultimately result in the reduced enjoyment and use of the recreational facility.

Impacts to ROS Classification

Primitive (ROS P): Lands with this ROS classification provide very high probability of solitude, closeness to nature, and essentially an unmodified natural environment. This ROS classification is highly sensitive to changes in the environment. Building roads or other well exploration activities could potentially change the classification of the area of to a more developed ROS. Under the 2003 LRMP, road construction and reconstruction are not allowed on lands with this ROS class. Except for a research natural area in the Currant Creek MA (which has a NSO stipulation), Primitive ROS classes are not available for lease under any of the alternatives. The connected actions of oil and gas leasing would not occur in this ROS and impacts would not occur.

Semi-Primitive Non-Motorized (ROS SPNM): Similar to Primitive, this ROS offers high probability of solitude and closeness to nature. However unlike Primitive there is some evidence of others. All access is non-motorized. This ROS classification is sensitive to changes in the landscape. Connected actions of oil and gas activities would have an adverse impact on this ROS, and would greatly reduce user enjoyment of these areas. An increase in roads, wells, and other ground disturbing activities, as well as an increase in the presence of humans, decreases the opportunity for experiencing a semi-primitive recreational environment, and would adversely affect the recreational experience in this ROS.

Extensive reclamation of roads and other ground disturbance that is required in this ROS would reduce the impacts to short-term. Once reclamation has been completed, these areas would retain their ROS class.

Semi-Primitive Motorized (ROS SPM): Within this ROS there is moderate probability of solitude, few users, and evidence of human activities. This ROS is moderately sensitive to changes in the landscape and oil and gas exploration activities could result in a shift to a more developed ROS. A shift to more developed area would decrease recreational opportunities for

those users seeking a more primitive setting. Road and well pad construction related to oil and gas activities would result in adverse short-term impacts to this ROS.

Roaded Natural (ROS RN): This ROS has moderate evidence of human sights and sounds and has a moderate concentration of users. This ROS has moderate to low sensitivity to changes in the landscape. Construction and reconstruction of roads are allowed in this ROS and road and well pad construction related to oil and gas activities may have minor adverse effects on the natural setting of this ROS. Once reclamation has occurred these impacts would be negligible.

Roaded Modified (ROS M): Very similar to Roaded Natural, this ROS has moderate evidence of human sights and sounds and has a moderate concentration of users. This ROS has low sensitivity to changes in the landscape. Construction and reconstruction of roads are allowed in this ROS and road and well pad construction related to oil and gas activities would have minor adverse effects on this ROS. Once reclamation has occurred these impacts would be negligible.

Rural (ROS R): Natural environment is culturally modified and this ROS has low to no sensitivity to changes in the landscape. Connected actions of oil and gas leasing would have minor adverse to no impacts on this ROS.

4.13.3 Effects of Lease Options

No Lease: NL would result in no direct effects to developed recreation resources. However, oil and gas activity outside of the developed area could be located close enough to degrade the recreational environment and experience of users within the developed area.

NL would result in little to no effects on ROS classification. Indirect impacts may occur from adjacent activities but these would be minor and most related to a slight reduction in quality of the area related to potential indirect visual and/or noise impacts. These impacts would be short-term and would only last through reclamation of any disturbed sites.

No Surface Occupancy: NSO would protect developed recreation sites (including campgrounds, trailheads, summer recreation homes, and other developed recreation facilities) from direct impacts from well pad or production facilities. Road construction, drilling or well development activities in close proximity to developed sites could degrade the recreational environment and lessen recreationists' enjoyment of their activities.

Primitive and Semi-Primitive Non-Motorized ROS Classes could be impacted by a NSO stipulation. Access road construction could degrade the environmental setting and result in a more developed setting. These impacts would be short-term and would be negligible after reclamation has occurred. Because ROS Standard 6 in the 2003 LRMP prohibits construction or reconstruction of roads in these ROS classes, it is unlikely that road construction and its associated impacts would be allowed. Oil and gas exploration activities that could occur under a NSO stipulation would be directional drilling. Directional drilling would not have surface impacts and would not directly or indirectly impact recreation in primitive or semi-primitive non-motorized areas.

The more developed and roaded classifications would be minimally impacted by NSO stipulations. Under the 2003 LRMP roads can be constructed and reconstructed in Semi-Primitive Motorized, Roaded Natural, Roaded Modified and Rural ROS classes.

Controlled Surface Use: CSU would require operations within developed recreation areas to be screened for mitigation of visual and noise impacts. CSU would result in marginal improvement of adverse effects associated with industrial development within areas that receive high intensity recreation use.

This stipulation would also require in Semi-Primitive Non-Motorized Areas extensive reclamation to return the area to near natural conditions in a reasonably short amount of time. It may also require gating access roads to limit traffic to operators; limiting activity to existing roads; and design of facilities to reduce contrasts. While a CSU provides some mitigation, reduction in the quality of environment could occur and may result in a shift from a more primitive environment to a more developed ROS class.

Timing Limitation: TLs would limit oil and gas activity to the recreation off-season, when recreation sites such as campgrounds are closed. This would help to lessen the impacts to recreational users at those sites; however, the presence of industrial facilities would lower the quality of the area and operational and maintenance activity would still be allowed.

Although a TL would limit activity to low-use recreation periods, roads would still be present and impacts to ROS classification would not be mitigated. The presence of roads in previously unroaded areas would have adverse effects on ROS and would result in a less primitive environmental setting. In most cases, since oil and gas activities are projected to be only exploration, these impacts would be short-term and only last until reclamation was successful.

Standard Lease Terms: SLTs allow for "reasonable mitigation" - it would not be reasonable to place well pads within developed recreation areas. However, SLT could potentially allow oil and gas exploration and development activity to be located in very close proximity to developed recreation sites, causing substantial impacts to the quality of the recreational environment and enjoyment of the area.

Under SLT, roads, well pads, and other construction related to oil and gas exploration activity would occur in all of the ROS classes. These activities would alter the ROS classes from a more primitive environment to a more developed ROS class.

4.13.4 Effects of the No Action Alternative

Under the No Action Alternative, developed recreation sites (including campgrounds and recreation residences) and trailheads would have a NSO stipulation applied. Additional stipulations specific to recreation included a CSU stipulation for Semi-Primitive Non-Motorized Areas have. The CSU requires rapid reclamation of the site (see section 4.13.3). There would be no other stipulations specific to recreation applied under this alternative.

Forest-wide Impacts

Overall, direct and indirect impacts to both developed and dispersed recreation would be minor, adverse, and short-term.

One well is projected resulting in approximately 6.9 acres of disturbance (see Alternative 3 in the WUB FEIS). The exact location of this well is unknown. The small disturbance of land (less than a hundredth of a percent of UNF) would not significantly impact recreation users and though localized displacement may occur, recreation resources throughout the UNF would remain

unaffected and provide ample recreational opportunities. Furthermore impacts would be temporary, further reducing impacts to minor. Impacts of CSU and NSO stipulations would be as described under Section 4.13.3, and are summarized below.

No direct impacts to developed recreation sites would occur under this alternative. A NSO for developed recreation sites, which includes trailheads, campgrounds, and recreation residences, would not allow a drill pad and its associated infrastructure to be built within areas designated as developed recreation sites. A NSO still allows for access roads to be built. However, under SLT, the UNF could require the lessee to relocate roads up to 200 meters (656 feet) to avoid disturbance in developed recreation sites.

Adverse indirect visual or noise impacts to developed recreation could occur under this alternative, if the access road and/or well pad were built within view or hearing (generally within a ¼ mile) of developed recreation sites. These impacts would be mitigated through siting the road to screen it from developed recreation areas. Additionally stipulations applied for the protection of visual resources would also help decrease the impacts of road construction and use on recreation. Protection of visual resources may include painting of facilities to help them blend into the background and/or locating roads and well pads in areas that would screen them from view (see Section 4.11). Noise impacts would be minimized through the use of noise abatement controls as listed under section 4.13.2 General Effects.

Beneficial impacts to motorized recreation are expected to be negligible; temporary access roads built for oil and gas exploration would have restricted access and would be temporary. Under this alternative only 1.7 miles of temporary road may be affected by construction. Because of the limited miles of road constructed, restricted access, and short-term nature, the access road would not significantly enhance motorized access for recreation. In some cases increased traffic on existing roads from oil and gas activities may reduce enjoyment of the recreational experience for some motorized recreationists. As discussed in section 4.4: Transportation, local Forest Service roads would, in general, see a dramatic increase in traffic during active operations. This dramatic increase in traffic could either displace some motorized recreationists from the area or reduce their enjoyment of the sport.

Indirect adverse minor effects as described under section 4.13.2 may occur to dispersed recreation. These impacts include noise disturbances and disruption of visual quality from the construction of the well pad and access road. Noise impacts would be minimized through mitigation measures or BMPs that would be required for noise abatement (BLM/USFS 2006). Impacts to visual resources are as described in Section 4.11. These impacts would lessen recreational users' enjoyment of the area.

Additionally, direct impacts to dispersed recreation users may result. Direct impacts include the displacement of recreation activities to other areas, increasing use in those areas. Impacts from displaced use are as described under section 4.13.2 General Effects. However, because of the small number of acres disturbed and the short-term nature of disturbance, impacts from displacement would be minor and would only last until reclamation had occurred.

Impacts by RFOGD

Impacts as they are described under Forest-wide impacts would, in general, apply to all MAs that would have lands available for lease under the No Action Alternative. Since the location of the well pad or access road is unknown, it is assumed that any of the MAs could potentially be

impacted by well pad and access road construction. Factors that would affect variances in impacts by MA include the following:

- Amount of non-motorized recreational opportunities, expressed by number of leasable acres in ROS classes: Primitive and Semi-Primitive Non-Motorized. Users of these areas are generally seeking solitude and are sensitive to evidence of human activities.
- Number of leasable acres that allow motorized recreation. These areas are less likely to be impacted by noise. Noise impacts from ATVs are existing and users of these areas generally do not have the same expectation of quiet or solitude. An access road or well pad constructed in these areas are expected to have negligible impacts on recreation users.
- Amount of developed recreation (MPs 4.5 and 8.4), including campgrounds, recreation residences and trailheads. Developed recreation sites result in increased localized use and well pad or road constructed in the vicinity of recreation sites could potentially affect a higher number of recreational users than if they were constructed in more remote areas.

Under this alternative there are no P-ROS class acres available for lease. All non-motorized recreation acres for lease are SPNM-ROS. The only MA which has leasable acres of non-motorized recreation is Diamond Fork. Developed recreation sites only occur in the Diamond Fork and Strawberry Reservoir MAs, all acres are designated as NSO. Diamond Fork and Strawberry Reservoir MAs are the most popular MAs and if the well pad and access road were to be placed in either of these MAs there would be more impacts to recreation than if oil and gas exploration activities were to occur in the remaining MAs. Impacts to dispersed recreation would be negligible for Currant Creek, Upper Spanish Fork, and White River MAs, since all leasable acres are located within motorized ROS classes, as noted above noise and visual impacts already exist in these ROS classes. A summary of the factors that affect developed and dispersed recreation can be found in table 4.84.

Table 4.84. Summary of leasable recreation resources by MA for the No Action Alternative.

MA	Non-motorized leasable acres / % NSO	Motorized leasable acres / %NSO	Developed Recreation Leasable acres
Currant Creek	0	1,383 / 64	0
Diamond Fork	2,136 / 53	65,660 / 63	17
Strawberry	0	45,654 / 17	171
Upper Spanish Fork	0	39,889 / 50	0
White River	0	23,959 / 28	0
Willow Creek	0	23,111 / 58	0
Total	2,136	175,697	188

GIS rounding creates a small acreage discrepancy.

4.13.5 Effects of the Proposed Action Alternative

Under the Proposed Action Alternative, leasing stipulations were assigned according to ROS classification and for other recreation resources. Table 4.85 summarizes the stipulations that

would apply under the Proposed Action Alternative to the different ROS Classes and recreation resources.

Table 4.85. Recreation leasing stipulations under the Proposed Action Alternative.

ROS Class/Recreation Resources	Leasing Stipulations
P	NL, NSO
SPNM	NSO, CSU
SPM, RN, RM, and R	NSO, CSU, TL, SLT
MP 4.4 Dispersed Recreation	NSO for SPNM; TL and CSU for SPM, RN, RM, and R
MP 4.5 Developed Recreation	NSO
MP 8.4 Recreation Residences	CSU
Developed Campgrounds	NSO

Forest-wide Impacts

General effects of applying different lease stipulations to ROS classes are as described above under section 4.13.3: Effects of Lease Options. Direct and indirect impacts to recreation resources are as described in section 4.13.2: General Effects. Overall, direct and indirect impacts to recreation resources would be minor, adverse, and short-term. Reasoning for and a summary of impacts can be found below.

Forest-wide, 12 exploration wells are projected in RFOGDs with oil and gas potential. For analysis purposes, impacts of wells in RFOGDs without projected oil and gas potential are described. Total acres of disturbance associated with projected wells is 60 acres, with the additional wells added for analysis purposes, the 60 acres total disturbance is analyzed. Sixty acres of disturbance is equal to 0.0068 percent of all NFS lands within the UNF boundaries. Location of well pads and access roads are unknown. Because they are unknown, impacts are discussed in general terms. A site-specific analysis would occur once well locations are proposed and would tier off this analysis.

ROS Classes

Impacts to ROS Classes as described under section 4.13.3: Effects of Lease Options would be temporary impacts. Once reclamation was completed for the disturbance associated with exploration activities, all ROS classes would retain their original classification. Additionally the small amount of disturbance that is projected would result in only a small percentage each classification of ROS being impacted. For the P-ROS class, the only land available for lease is in Currant Creek and is associated with a Research Natural Area (RNA). A NSO stipulation would be allowed, however no road construction would be allowed in the RNA in accordance with the 2003 LRMP (see standard MP2.4-4). Directional drilling would be the only oil and gas activity allowed and no surface impacts would occur to the RNA.

Developed Recreation

In general, because of the NSO that would apply, no direct impacts would occur to developed recreation sites (MP 4.5). Adverse indirect impacts include increased noise levels from road construction and exploration activities; visual impacts from dust associated with construction and disruption of natural views from constructed roads and well pads (for more impact to Visual Resources see section 4.11). Noise impacts would be the greatest in areas of non-motorized

recreation where users have an expectation for solitude and quiet. In areas of motorized recreation, noise levels would generally have less impact because of existing impacts from ATV or other motorized recreational use. Additionally, noise impacts of oil and gas activities would be greatly reduced through noise abatement techniques as described in section 4.13.2: General Effects.

A CSU applied to recreation residences could result in minor adverse short-term impacts. Impacts would be minor because of special siting, noise abatement, and visual mitigation measures that would be implemented for any oil and gas exploration activities that would occur within the vicinity of recreation residences. All impacts would be short-term and would be negligible after successful reclamation. Unlike other recreational users in the UNF, recreation residences are permanent structures and displacement into other areas could not occur. Owners of recreation residences may avoid use of their facilities if noise and dust from road construction and use becomes a significant annoyance. However, as noted above, special controls would be implemented that would require that roads and well pads be sited to reduce visual and noise impacts. Siting would take advantage of natural vegetation screens and topography. Additional protection to visual resources would be afforded through stipulations and other mitigation measures (see section 4.11). Noise abatement controls would also be required (see section 4.13.2 General Effects) to reduce annoyance to neighbors. Controls required by the CSU stipulation, protections afforded to visual resources, and noise abatement techniques would result in a reduction of adverse impacts to recreation residences to minor. The temporary nature of oil and gas exploration activities would result in short-term impacts. No long-term impacts are anticipated from oil and gas exploration activities.

Dispersed Recreation

Beneficial impacts to motorized recreation are expected to be negligible; temporary access roads built for oil and gas exploration would have restricted access and would be temporary. Under this alternative only 12 miles of temporary road would potentially be constructed. Because of the limited miles of road constructed, restricted access, and short-term nature of the activity, the access road would not significantly enhance motorized recreation. In some cases increased traffic on existing roads from oil and gas activities may reduce enjoyment of the recreational experience for some motorized recreationists. As discussed in section 4.4: Transportation, local Forest Service roads would, in general, see a dramatic increase in traffic during active operations. This dramatic increase in traffic could either displace some motorized recreationists from the area or reduce their enjoyment of the sport. These impacts would be temporary and not expected to last longer than three months. However, the TL stipulation applied to dispersed recreation would limit activities to the recreation off-season, further reducing impacts from increased traffic.

Direct impacts to dispersed recreation would include the displacement of users into other areas. These impacts are described under Section 4.13.2: General Effects. However, due to the small amount of disturbance (0.0068 percent of Forest-wide acres) and the short-term nature of disturbance, direct impacts are expected to be minor. Indirect adverse impacts to dispersed recreation would include noise and dust from road traffic, noise of drilling operations and visual impacts. As described above for developed recreation, mitigation measures for noise abatement and the protection of visual resources would reduce these impacts to minor. Additionally, the application of a TL on dispersed recreation would limit activities to the recreation off-season, further reducing impacts to dispersed recreation. Impacts would be short-term because of the temporary nature of oil and gas exploration activities.

Impacts by RFOGD

Impacts as described Forest-wide would, in general, be applicable to the RFOGDs. Since the locations of the well pads or access roads are unknown, it is assumed that any of the RFOGDs could potentially be impacted by well pad and access road construction. Factors that would affect variances in impacts by RFOGD include the following:

- Amount of non-motorized recreational opportunities, expressed by number of leasable acres in ROS classes: Primitive and Semi-Primitive Non-Motorized. Users of these areas are generally seeking solitude and are sensitive to evidence of human activities.
- Number of leasable acres that allow motorized recreation. These areas are less likely to be impacted by noise. Noise impacts from ATVs are existing and users of these areas generally do not have the expectation of quiet or solitude. An access road or well pad constructed in these areas are expected to have negligible impacts on recreation users.
- Amount of developed recreation (MPs 4.5 and 8.4), including campgrounds, recreation residences and trailheads. Developed recreation sites result in increased localized use and well pad or road constructed in the vicinity of recreation sites could potentially affect a higher number of recreational users than if they were constructed in more remote areas.
- Number of wells projected and known oil and gas potential

These factors are summarized by RFOGD below.

Currant Creek

This Group has oil and gas potential and it is likely that oil and gas exploration activities could occur. A total of two exploration wells are projected for this group, resulting in approximately ten acres of disturbance. Impacts from ten acres of disturbance would be minor, would result in less than a hundredth of a percent of the total acres (84,480 acres) of this RFOGD.

No recreation residences are located in this RFOGD. There are no non-motorized ROS class available for lease, other than the RNA discussed above. Roads would not be allowed in the RNA and no impacts to recreation would occur from leasing this area. A summary of recreation resources available for lease in the Currant Creek Group is found in table 4.86.

Table 4.86. Summary of recreation resources available for lease by MA: Currant Creek group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Currant Creek	West Fork Duchesne	0	41,607 / 58	0	0
	Currant Creek	0	42,077 / 69	133	0
	RFOGD Total	**0**	**83,684 / 63**	**133**	**0**

Deer Creek

This RFOGD has oil and gas potential and one exploration well is projected, resulting in five acres of disturbance. The impacts of five acres of disturbance would be minor, impacting a small fraction of one percent of lands designated specifically for recreation.

All non-motorized acres would be covered by NSO stipulation because of other resources, further reducing impacts to dispersed recreation. Camping, hiking and fishing are popular activities in this RFOGD, and impacts to fish habitat, big game habitat (see Section 4.9), and scenic values may impact enjoyment of such activity. However since impacts to fish and wildlife habitat would be minor, impacts to these activities would be minor. Additionally, the majority of motorized acres would also be covered by an NSO (77 percent); further reducing impacts to dispersed recreation. Developed recreation is located in this RFOGD and impacts described under Forest-wide impacts could affect this resource. All adverse impacts to developed and dispersed recreation would be minor and short-term. A summary of recreation resources available for lease in the Deer Creek Group is found in table 4.87.

Table 4.87. Summary of recreation resources available for lease by MA: Deer Creek group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Deer Creek	Lower Provo	35,283	22,085 / 93	124	0
	Hobble Creek	42,252	28,936 / 81	28	0
	Deer Creek Res.	2,420	36,426 / 63	38	0
	RFOGD Total	**79,955**	**87,447 / 77**	**190**	**0**

Diamond Fork

This RFOGD has oil and gas potential and one exploration well is projected, resulting in five acres of disturbance. The impacts of five acres of disturbance would be minor, impacting a small fraction of one percent of lands designated specifically for recreation.

All non-motorized acres would be covered by NSO stipulation because of other resources, further reducing impacts to dispersed recreation. Fishing is a popular activity in this RFOGD, and impacts to fish habitat (see Section 4.9) may impact enjoyment of that activity. However since impacts to fish habitat would be minor, impacts to fishing activities would be minor. Additionally, the majority of motorized acres would also be covered by an NSO (61 percent); further reducing impacts to dispersed recreation. Developed recreation is located in this RFOGD and impacts described under Forest-wide impacts could affect this resource. All adverse impacts to developed and dispersed recreation would be minor and short-term. A summary of recreation resources available for lease in the Diamond Fork Group is found in table 4.88.

Table 4.88. Summary of recreation resources available for lease by MA: Diamond Fork group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Diamond Fork	Diamond Fork	7,904	89,145 / 61	66	0
	RFOGD Total	**7,904**	**89,145 / 61**	**66**	**0**

Payson

This RFOGD has oil and gas potential and one exploration well is projected, resulting in five acres of disturbance.

All non-motorized acres would be covered by NSO stipulation because of other resources, further reducing impacts to dispersed recreation. Hunting is a popular activity in this RFOGD, and impacts to big game habitat (see Section 4.9) may impact enjoyment of that activity. However since impacts to big game habitat would be minor, impacts to hunting activities would be minor. Additionally, the majority of motorized acres would also be covered by an NSO (72 percent); further reducing impacts to dispersed recreation. Developed recreation is located in this RFOGD and impacts described under Forest-wide impacts could affect this resource. Recreation residences located in this RFOGD, are all covered by NSO stipulation because of overlapping resources. This affords additional protections to residences further reducing impacts from the noise and visual impacts of a well pad. All adverse impacts to developed and dispersed recreation would be minor and short-term. A summary of recreation resources available for lease in the Payson Group is found in table 4.89.

Table 4.89. Summary of recreation resources available for lease by MA: Payson Group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Payson	Mona	0	980 / 90	0	0
	Nephi	6,568	18,613 / 64	62	2
	Payson	7,464	22,246 / 85	306	34
	Thistle	3,967	32,706 / 68	241	0
	RFOGD Total	**17,999**	**74,545 / 72**	**610**	**36**

Spanish Fork Group

This RFOGD has oil and gas potential and one exploration well is projected, resulting in five acres of disturbance.

In the Spanish Fork Group, there are no non-motorized acres available for leasing. Additionally no developed recreation sites exist within this Group. Motorized and dispersed recreation such as hunting is the primary recreational use and there would be minimal impacts to recreation from oil and gas exploration activities. There is only one well projected in this Group, and it is not expected that five acres of disturbance would result in significant impacts to motorized recreation of this MA. A summary of recreation resources available for lease in the Spanish Fork Group is found in table 4.90.

Table 4.90. Summary of recreation resources available for lease by MA: Spanish Fork group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Spanish Fork	Spanish Fork	0	44,318 / 53	0	0
	RFOGD Total	**0**	**44,318 / 53**	**0**	**0**

Strawberry Group

The Strawberry group has greater oil and gas potential and the highest number of wells predicted (3), than any other RFOGD. Within this RFOGD there is higher probability of recreational users

being displaced by oil and gas activities. However, the small number of acres of disturbance (15) and the short-term nature of exploration activities would result in minor, short-term impacts.

The primary recreation use of this Group is related to Strawberry Reservoir. Strawberry Reservoir is popular for both dispersed (fishing) and developed recreation. Additionally, recreation residences within this MA could be impacted by oil and gas exploration activities, impacts are described under Forest-wide impacts. Dispersed and developed recreation would experience more impacts in Strawberry Reservoir than in the other MAs in this group. White River and Willow Creek MAs primary recreational use is dispersed recreation (hunting, fishing, and ATV use). Since impacts to big game habitat and to fish habitat would be minor (see Section 4.9), recreation activities in White River and Willow Creek MAs would remain largely unaffected, increased traffic from oil and gas activities may result in minor adverse impacts to motorized recreation, such as ATV use. Table 4.91 provides a summary of recreation resources available for lease in the Strawberry Group.

Table 4.91. Summary of recreation resources available for lease by MA: Strawberry group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation /%NSO
Strawberry	White River	0	25,759 / 41	0	0
	Strawberry Reservoir	0	64,959 / 36	169	88 / 17
	Willow Creek	0	23,959 / 40	0	0
	RFOGD Total	**0**	**114,677 / 38**	**169**	**88 / 17**

American Fork

This RFOGD does not have known oil and gas potential, but one exploration well will be analyzed, resulting in five acres of disturbance. These five acres of disturbance are less likely to occur because of the lack of known oil and gas potential.

This group experiences a high amount of recreational use including hiking, camping, scenic driving, and fishing. Users' tolerance to noise and visual impacts of well pad and access roads would be expected to be low. Any oil and gas activities located in this RFOGD would like result in more impacts to recreation than other groups, with the possible exception of Strawberry Group. All non-motorized acres would be covered by NSO stipulation because of other resources, further reducing impacts to dispersed recreation. The majority (73 percent) of recreation residences located in this RFOGD, are covered by NSO stipulation because of overlapping resources. This affords additional protections to residences, further reducing impacts from the noise and visual impacts of a well pad. Additionally, all developed recreation would also be covered by NSO (all but five acres are available for lease). Impacts to recreation resources would be as described under Forest-wide impacts. All adverse impacts to developed and dispersed recreation would be minor and short-term.

A summary of recreation resources available for lease in the American Fork Group is found in table 4.92.

Table 4.92. Summary of recreation resources available for lease by MA: American Fork group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres / % NSO	Developed Recreation leasable acres	Residence Recreation /%NSO
American Fork	American Fork	16,570	16,269 / 81	225	85 / 73
	RFOGD Total	**16,570**	**16,269 / 81**	**225**	**85 / 73**

Vernon

This RFOGD does not have known oil and gas potential, but one exploration well will be analyzed, resulting in five acres of disturbance. These five acres of disturbance are less likely to occur because of the lack of known oil and gas potential.

In the Vernon Group, there are no non-motorized acres available for leasing. Motorized and dispersed recreation such as hunting is the primary recreational use and there would be minimal impacts to recreation from oil and gas exploration activities. There is only one well analyzed in this Group, and it is not expected that five acres of disturbance would result in significant impacts to motorized recreation of this MA. Developed recreation is located in this RFOGD and impacts described under Forest-wide impacts could affect this resource. However all recreation residences are covered by NSO stipulation, further reducing impacts. All adverse impacts to developed and dispersed recreation would be minor and short-term. A summary of recreation resources available for lease in the Vernon Group is found in table 4.93.

Table 4.93. Summary of recreation resources available for lease by MA: Vernon group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Vernon	Vernon	0	65,564 / 24	53	0
	West Sheeprock	0	25,456 / 45	0	0
	RFOGD Total	**0**	**91,020 / 30**	**53**	**0**

Upper Provo

This RFOGD does not have known oil and gas potential, but one exploration well will be analyzed, resulting in five acres of disturbance. These five acres of disturbance are less likely to occur because of the lack of known oil and gas potential.

In the Upper Provo Group, there are no non-motorized acres available for leasing. Motorized and dispersed recreation such as hunting and fishing is the primary recreational use, and there would be minimal impacts to recreation from oil and gas exploration activities. There is only one well analyzed in this Group, and it is not expected that five acres of disturbance would result in significant impacts to motorized recreation. Developed recreation is located in this RFOGD and impacts described under Forest-wide impacts could affect this resource. However all recreation residences are covered by NSO stipulation further reducing impacts. All adverse impacts to developed and dispersed recreation would be minor and short-term. A summary of recreation resources available for lease in the Upper Provo Group is found in table 4.94.

Table 4.94. Summary of recreation resources available for lease by MA: Upper Provo group.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO	Developed Recreation leasable acres	Residence Recreation
Upper Provo	Upper Provo	0	53,752 / 37	71	0
	RFOGD Total	**0**	**53,752 / 37**	**71**	**0**

4.13.6 Effects of the Modified Resource-based Alternative

Similar to the Proposed Action Alternative, under the Modified Resource-based Alternative, leasing stipulations were assigned according to ROS classification and for other recreation resources. Table 4.95 summarizes which stipulations would apply to the different ROS Classes and recreation resources.

Table 4.95. Recreation leasing stipulations under the Modified Resource-based Alternative.

ROS Class/Recreation Resources	Leasing Stipulations
P	NL, NSO
SPNM	NSO, CSU
SPM, RN, RM, and R	NSO, CSU, TL, SLT
MP 4.4 Dispersed Recreation	NSO for SPNM; TL and CSU for SPM, RN, RM, and R
MP 4.5 Developed Recreation	NSO and ¼ mile NSO buffer
MP 8.4 Recreation Residences	NSO
Developed Campgrounds	NSO

Forest-wide Impacts

Developed Recreation

Under this alternative, no direct impacts would occur to developed recreation sites and recreation residences. Indirect impacts that would occur include impacts from visual and noise disturbances. However, with the application of a ¼ mile buffer around developed recreation sites, indirect impacts to developed recreation sites as described under the Proposed Action Alternative would be reduced to almost negligible. Application of NSO stipulation to recreation residences would also reduce the direct and indirect adverse impacts of oil and gas exploration activities on this resource. Under this alternative, IRAs are not available for lease. Developed recreation sites are unaffected by the reduced number of acres available for lease. Number of acres of developed recreation that are available for lease as reported under the Proposed Action would apply to the Modified Resource-based Alternative.

Dispersed Recreation

Under this alternative, IRAs are not available for lease. This greatly reduces the amount of dispersed recreation acres available for leasing. In general, users seek out recreation in IRAs for a sense of solitude and for their natural beauty (see Section 3.5 for a description of roadless area characteristics). Having more acres in these areas unavailable for leasing greatly reduces impacts to dispersed recreational users who come to the UNF seeking solitude and quiet and decreases the potential for displacement of these users.

All other impacts on recreation as described under the Proposed Action would apply to the Modified Resource-based Alternative. Adverse impacts to developed and dispersed recreation would be minor and short-term.

Impacts by RFOGD

Impacts to recreation under this Alternative would not differ significantly from that described under the Proposed Action Alternative. Oil and gas potential and the number of wells analyzed for each group is unchanged. Since the locations of well pads and access roads are unknown, indirect and direct impacts to recreation in each RFOGD would be as described in the Proposed Action Alternative. As noted above under Forest-wide Impacts, areas designated as dispersed recreation have fewer acres available for lease. Under this alternative, there are no P-ROS areas available for lease. Because of overlapping resources, all SPNM-ROS areas have a NSO lease stipulation applied, further reducing impact to semi-primitive areas. Additionally, only a small number of SPNM-ROS areas are available for lease, ranging 42 acres in the American Fork Group to 3,425 in the Deer Creek Group and only totaling 4,120 acres Forest-wide. Motorized acres available for lease are also greatly reduced from the Proposed Action Alternative, and only 235,340 acres are available for lease. A summary of dispersed recreation resources available for lease for each RFOGD is found in table 4.96.

Table 4.96. Summary of recreation resources available for lease by MA for each RFOGD.

RFOGD	MA	Non-motorized leasable acres	Motorized leasable acres/ % NSO
Currant Creek	West Fork Duchesne	0	13,90 / 607
	Currant Creek	0	20,016 / 72
	RFOGD Total	**0**	**33,923 / 68**
Deer Creek	Lower Provo	3,403	5,664 / 97
	Hobble Creek	22	3,026 / 71
	Deer Creek Reservoir	0	8,207 / 67
	RFOGD Total	**3,425**	**16,897 / 78**
Diamond Fork	Diamond Fork	609	11,104 / 68
	RFOGD Total	**609**	**11,104 / 68**
Payson	Mona	0	332 / 72
	Nephi	46	1,010 / 82
	Payson	0	5,902 / 97
	Thistle	0	574 / 97
	RFOGD Total	**46**	**7,818 / 93**
Spanish Fork	Spanish Fork	0	15,741 / 50
	RFOGD Total	**0**	**15,741 / 50**
Strawberry	White River	0	7,024 / 40
	Strawberry Reservoir	0	41,452 / 34
	Willow Creek	0	5,427 / 33
	RFOGD Total	**0**	**53,902 / 35**
American Fork	American Fork	42	7,567 / 92
	RFOGD Total	**42**	**7,567 / 92**
Vernon	Vernon	0	48,104 / 17
	West Sheeprock	0	5,947 / 12
	RFOGD Total	**0**	**61,619 / 12**
Upper Provo	Upper Provo	0	26,769 / 44
	RFOGD Total	**0**	**26,769 / 44**
Forest-wide Total		**4,121**	**235,340 / 44**

GIS rounding creates a small acreage discrepancy.

4.13.7 Summary of Effects

Table 4.97 provides a comparative summary of the impacts of each alternative by RFOGD.

Table 4.97. Comparison summary of effects: developed and dispersed recreation.

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
American Fork	Not applicable, no acres available for lease. No impacts.	The five acres of disturbance analyzed is less likely to occur because of the lack of known oil and gas potential. This RFOGD experiences a high amount of recreational use, and impacts from noise and traffic, as well as visual impacts would be less tolerated. Overall, short-term minor adverse impacts could occur.	Fewer acres of recreation available for leasing and additional stipulations applied to developed recreation would result in fewer impacts to recreation than the Proposed Action Alternative. All other impacts would be same as the Proposed Action Alternative.
Currant Creek	Short-term minor adverse impacts. Total projected disturbance is less than a hundredth of one percent of recreational acreage available.	Ten acres of disturbance projected from two wells and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	
Deer Creek	Not applicable, no acres available for lease. No impacts.	Five acres of disturbance projected from two wells and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	
Diamond Fork	Short-term minor adverse impacts. Total projected disturbance is less than a hundredth of one percent of recreational acreage available.	Five acres of disturbance projected from one well and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts. Impacts may be greater because of the popularity of sport fishing along Diamond Fork.	
Payson	Not applicable, no acres available for lease. No impacts.	Five acres of disturbance projected from one well and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	

RFOGD	Effects of the No Action Alternative	Effects of the Proposed Action Alternative	Effects of the Modified Resource-based Alternative
Spanish Fork Canyon	Short-term minor adverse impacts. Total projected disturbance is less than a hundredth of one percent of recreational acreage available.	Five acres of disturbance projected from one well and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	
Strawberry	Short-term minor adverse impacts. Total projected disturbance is less than a hundredth of one percent of recreational acreage available.	Fifteen acres of disturbance projected from three wells and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts. Greater impacts could occur because of the popularity of recreation.	
Upper Provo	Not applicable, no acres available for lease. No impacts.	Five acres of disturbance analyzed from one wells and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	
Vernon	Not applicable, no acres available for lease. No impacts.	Five acres of disturbance analyzed one well and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	
Forest-wide	Short-term minor adverse impacts. Total projected disturbance is less than a hundredth of one percent of recreational acreage available.	60 acres of disturbance projected from nine wells and access roads. Small amount of disturbance and short-term nature of exploration activities results in minor, adverse effects. Effects would be minimized through mitigation measures and BMPs implemented to reduce noise and visual impacts.	

4.13.8 Cumulative Effects

Past, Present, and Reasonably Foreseeable Actions

Past recreational activities include the development and construction of existing recreational sites such as campgrounds, hiking trails, fishing access points, and ATV and snowmobile trails. Existing activities include the continued use of developed recreation sites and continued dispersed recreation such as primitive camping, fishing, hiking, cross-country skiing, etc. Other activities on the UNF include vegetation management and Central Utah Project activities. The UNF is currently in maintenance mode and no new classified roads or recreational facilities are anticipated to be built in the next 10-15 years.

The UNF will most likely remain a popular recreation destination, and as population grows on the Wasatch Front, recreational use would increase. During the next 10-15 years, growth is expected in all areas of recreation use. As a result, there will likely be an increase in conflicts between users and user groups as the demand for recreation resources grows and begins to reach the limits of what the UNF can provide. There will be an increased need for some users to develop a higher degree of tolerance for other users and their activities.

Cumulative Effects of the No Action Alternative

Cumulative impacts under this Alternative would include the possible displacement of recreation use during active operations of exploratory drilling, increasing recreational pressures in other areas of the UNF. The majority of cumulative effects would occur to dispersed recreation since developed recreation sites have a NSO stipulation and it is not anticipated that developed recreation sites would have significant impacts. Since noise and visual impacts are only expected to encompass a ¼ mile radius around the well pad and access road, approximately 700 acres recreation would be displaced for a period of 1–3 months. Since this is only a fraction of Forest-wide acres no significant cumulative effects are anticipated under this alternative.

Cumulative Effects of the Proposed Action Alternative

Cumulative impacts under this Alternative would include the possible displacement of recreation use during active operations of exploratory drilling, increasing recreational pressures in other areas of the UNF. The majority of cumulative effects would occur to dispersed recreation, since developed recreation sites have a NSO stipulation and it is not anticipated that developed recreation sites would have significant impacts. Since noise and visual impacts are only expected to encompass a ¼ mile radius around each well pad and access road, approximately 9,600 acres of recreation (see below) would be displaced Forest-wide. This displacement would be temporary, lasting 1–3 months during exploration activities. Since this is only a fraction (1 percent) of the UNF, no significant cumulative effects are anticipated under this alternative.

Displacement acres were calculated assuming a ¼ mile buffer around one mile of temporary road, one mile of widened road, and two acres of well pad. These acres are broken down as follows:

- 1 mile road widening = 320 acres of displacement
- 1 mile new road = 320 acres of displacement
- total road = 640 acres of displacement
- 1 well pad = 160 acres of displacement

- Total displacement per well pad = 800 acres
- Total displacement Forest-wide = 800 acres x 12 wells or 9,600 acres.

Cumulative Effects of the Modified Resource-based Alternative

Cumulative effects described under the Proposed Action Alternative would apply.

4.14 Other Mineral Resource Extraction Activities

This resource has been analyzed under Section 4.3: Soils and Geologic Hazards.

4.15 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources refers to the loss of production or use of a resource due to a land use decision, that once executed, cannot be changed. An irretrievable commitment of resources refers to losses of production or use of renewable resources.

Issuance of a lease would be an irreversible decision for the life of the lease. If a discovery is made and once the oil and gas has been extracted, it is not replaceable. Potential oil and gas reserves are not expected to be irretrievably committed under all alternatives, because the exploratory wells are not anticipated to result in full-field development.

Potential adverse effects on watershed resources include accelerated erosion and mass-wasting, increased stream sedimentation, decreased water quality, gully development, increased slope stability, altered stream flows and channel degradation, long-term loss of vegetation productivity, and loss of wetland/riparian resources. Potential adverse impacts can be greatly reduced by appropriate site-specific mitigation and avoidance at the APD stage, including adherence to Forest Plan standards and guidelines, and use of BMPs. Effects on watershed resources are irretrievable (loss of production during the period of impact), and may be irreversible (not-restorable) depending on the amount and success of reclamation.

The minor and localized increases in fugitive dust and vehicle exhaust that would occur under all three alternatives would not be an irreversible or irretrievable commitment of air quality resources.

There will be an irretrievable loss of big game habitat during drilling, that will last until the facilities are closed and the disturbed areas are reclaimed. The commitment is for the duration of active exploratory drilling operations, which typically averages about one year. The loss of big game habitat is not an irreversible commitment past active exploratory drilling operations. If roads are kept open after the life of the project, the irreversible and irretrievable effects will continue for a longer period of time.

There will be no irreversible or irretrievable commitment of endangered or threatened species or their habitat. There will also be no irreversible or irretrievable commitment of sensitive species or their habitat under all the alternatives.

There would be an irreversible loss of roadless resources due to exploration activities under the Proposed Action Alternative. The potential acres disturbed by each alternative are shown in Section 4.5. Exploration activity typically lasts about 80 days. The roadless character could eventually return to disturbed lands with successful reclamation, including closure and reclamation of all access roads.

Primitive and Semi-primitive Non Motorized areas have the potential to be impacted. The amount of potential direct and indirect impacts is shown in Section 4.5.9. There would be an irreversible loss of the SPNM resource which would last until the oil and gas activity ceased and the disturbed areas successfully reclaimed. There would be no irreversible or irretrievable loss of developed recreation sites.

Retention and Partial Retention VQO lands would experience an irreversible loss in visual quality wherever oil and gas activity occurred with an SLT stipulation. This loss in visual quality would last until the activity ceased and the area was reclaimed. With successful reclamation there would be no irretrievable loss of visual quality.

No irreversible or irretrievable impacts to cultural resources are expected due to established laws and regulations which will avoid impacts to significant prehistoric and historic cultural resources.

Oil and gas leasing activity would cause an irreversible impact to the transportation resource for the life of the activity. Impacts from increased traffic, road surface deterioration, and increases in dust and noise would cease once the activity was completed.

4.16 Unavoidable Adverse Effects

Minor effects on watershed, water, and soil resources, including increased erosion, are probably unavoidable under all alternatives. However, significant adverse impacts can be avoided by use of appropriate site-specific mitigations and avoidance of critical areas. Prevention of unavoidable adverse effects for watershed, water, and soil resources will result both from stipulations evaluated in this EIS, and from Conditions of Approval attached at the APD stage.

Minor losses of critical big game and sage grouse habitat would occur under all alternatives, from construction of well sites and roads. These losses of habitat would represent approximately 0.0068 percent of available habitat. Some disturbance-related indirect effects may be unavoidable, but substantial losses of habitat effectiveness can be prevented by appropriate mitigations.

There are no unavoidable adverse effects to mineral resources, threatened, endangered and sensitive species, or Research Natural Areas.

Unavoidable impacts would occur to IRAs whenever oil and gas activity takes place within roadless areas. These impacts would include effects to the roadless characteristics of natural appearance and opportunity for solitude. The Proposed Action Alternative has the potential to disturb the most roadless area, and would allow oil and gas activity under an SLT stipulation, which may not provide the necessary control to limit or reduce potential impacts.

Unavoidable impacts to Semi-primitive Non Motorized areas would occur wherever oil and gas activity takes place within SPNM lands. Leasing stipulations that would apply under all alternatives would reduce impacts; however, the increased human presence would cause unavoidable effects to the semi-primitive character of these areas.

The presence of industrial activity, including the construction of new access roads and the actual well drilling equipment and ancillary facilities/structures would cause unavoidable impacts to the scenic quality of Retention and Partial Retention VQO lands. Unavoidable impacts would include form, line, and color contrasts created by the new roads and drilling equipment. These impacts can be greatly reduced by careful siting of well site. This exploration activity would be a short-term impact; there would be no long-term unavoidable impacts.

Impacts to archaeological sites resulting from increased public access and use are considered possible and unavoidable.

No unavoidable adverse effects would occur to transportation or socioeconomic resources.

4.17 Relationship Between Short-Term Use and Long-Term Productivity

Short-term activities, including building of roads and well pads, may result in long-term loss of watershed resources, such as soil erosion, gully formation, stream sedimentation, and other effects. Adverse effects on soil and watershed resources would reduce productivity of other resources, including vegetation and wildlife. Most adverse affects can be prevented by adequate site-specific mitigation and avoidance of sensitive areas. The stipulations included in this EIS would provide varying levels of protection, but additional and more site-specific mitigation would be required at the APD stage.

In general, direct losses of wildlife habitat would occur until wells are abandoned or closed, and the sites reclaimed. Similarly, direct losses of wildlife habitat will occur until roads are closed. Short-term activities could affect long-term productivity if there are substantial indirect effects on big game, such that there are major changes in habitat use, or if sage grouse leks are destroyed or made unsuitable.

Short-term activities could cause long-term impacts to RNAs if oil and gas development occurs and severely modifies the character of these areas. RNAs are not located in the No Action Alternative acreages and the action alternatives have stipulations preventing such degradation.

Short-term use of both the roadless and semi-primitive non motorized (SPNM) environment for oil and gas activities could affect the long-term productivity of these resources if access roads built for oil and gas leasing activities remained after the activity had ceased. Closure and reclamation of both the well site and roads built to serve these sites would prevent long-term effects to the roadless and SPNM resource.

With successful reclamation there would not be long-term impacts to the scenic quality of lands used for oil and gas exploration activities. Required mitigations, and existing laws and regulations that would be applied to oil and gas leasing activity, would prevent long-term effects to transportation, cultural, or socioeconomic resources.

4.18 Cumulative Effects: Potential Commercial Discovery

While this EIS is concerned with the potential future offering of leases on the UNF for the purpose of exploration for oil and gas, a potential outcome from such leasing decisions is that a commercial discovery might occur. There is no way to determine at this time the likelihood of such an event, but it is implied as a possibility by the leasing action itself since the purpose of exploration drilling is to make an oil and/or gas discovery, and ultimately to prove such a discovery is economically viable. Exploration drilling that results in a discovery being made on a lease would lead to an extended period of testing and analysis to determine the magnitude of the discovery and its economic potential. Such testing would be a natural follow-on to the normal activities associated with leasing and exploring for oil and gas. However, a determination by the lessee that the discovery is economic would lead to a different course of potential future actions on the UNF.

Initially, the well would be suspended and infrastructure, such as the road access and pad associated with the discovery may be left in place for an indefinite period of time until a determination is made by the lessee to move forward with commercial development. That determination may involve additional exploration drilling occurring on adjacent leases to determine the extent of the oil/gas discovery and initial estimation of probable commercial reserves. The number of additional wells drilled would be determined by the complexity of the geologic structure and the testing results from the discovery well.

Once the lessee makes the determination that the discovery is economically viable then additional NEPA analysis must take place. An EIS would be required to assess whether or not to proceed with the commercialization of the oil/gas discovery, based on the development plans and studies submitted by the lessee. The commercial development, if it occurs, would follow the decision process and alternative selected in the development EIS. If it were a gas discovery then the most likely future development scenario would involve construction of a gas pipeline system to the nearest existing gas transmission pipeline in the region. If it were an oil discovery the most likely development scenario would be expected to be similar to that taking place on the Ashley National Forest. Oil would be accumulated in storage tanks on site and then periodically trucked to refinery locations along the Wasatch Front. The number of oil tanker truck trips would be determined by the magnitude of the discovery, number of wells proposed, and quality of oil produced. Such details would all be contained within the NEPA documents required for the commercial development of the discovery. Additionally, impacts to resources from commercial development would be analyzed as a part of the commercial development EIS.

A total of 30 wells have been drilled on the Forest or within its boundaries in the past; all having been plugged and abandoned. Nothing in the available geologic information for the UNF suggests that oil fields or reservoirs similar to highly productive fields found in central Utah or Southwestern Wyoming/Utah are present beneath the UNF. However, future development cannot be ruled out. In the eastern part of the UNF, where Tertiary and Cretaceous rocks occur on the surface as they do in the Southwestern Wyoming/Utah fields, recent work by the Utah Geological Survey has postulated a trend or fairway in the Navajo/Nuggett and/or Twin Creeks Formations in the subsurface east of the Charleston-Nebo thrust system in Utah and Wasatch Counties (National Energy Technology Laboratory 2006 and Chidsey and Sprinkel 2005 in

RFDS). This trend is highly speculative and is not supported by any drill hole stratigraphic or lithologic data, but instead appears to be aligned with the surface trace of major thrust faults that have been mapped in the region (see RFDS).

There is much uncertainty regarding future oil and gas development on the UNF. Nearly all of the UNF has been assumed to be prospective for oil and gas exploration. Potential for additional seismic surveys exists for the Currant Creek, Deer Creek, Diamond Fork, Payson, and Strawberry Groups. Interest in Overthrust Belt-related oil and gas exploration activities in the eastern Great Basin in Utah and Nevada may lead to seismic activity in the Vernon Group. The probability of exploration drilling is considered low during the 10- to 15-year period on this group due to the lack of known oil or gas reservoirs in the eastern Great Basin of Utah. No seismic surveys or exploration drilling are predicted in the American Fork and Upper Provo Groups in the RFDS. It is assumed that speculative drilling may occur.

If commercial quantities of natural gas were to be found on the UNF, a gathering system and pipeline link to the nearest regional gas transmission line with available capacity would need to be installed. It is assumed that even if a natural gas discovery is made, commercial production would require multiple producing wells prior to pipeline construction, which may not occur during the 10-15 year period for which this evaluation is to apply (see RFDS).

If a commercial oil discovery was made, production could begin soon after completion and well testing. This would require installation of such facilities as product tanks, produced water tanks, separators, and flare pits, if required. Site restoration would also begin by drying the reserve pit, disposing of any contaminated soils in the pit, backfilling the pit, replacing salvaged topsoil, and revegetating the pit site. Product would be stored in on-site tanks and oil would be hauled by truck to a refinery. This would require widening access roads to 30 feet, excluding cut and fill, at each discovery location. The two miles of access road estimated for the well would be widened by an additional 10 feet, resulting in an additional disturbance of 1.2 acres of road disturbance. This additional disturbance might be offset to some degree by reclamation of reserve pits and other parts of the well pad.

In addition to crude oil, produced water would also be trucked from the producing well site and transported to a commercial-produced water management facility. Crude oil and produced water truck traffic could result in multiple trips per day, round the clock, or as few as several trips per week, depending on well production rates. Well pads, facilities, and some roads would be reclaimed upon the end of well production (RFDS).

Although the exploratory wells are not expected to result in a discovery, if a discovery were to occur, then additional beneficial economic impacts would likely occur. Based on an analysis conducted by the Utah Energy Office on the economic impacts of oil and gas development in the Uinta Basin just to the east of the UNF, each production well would likely create approximately 14.8 additional jobs and $359,300 in additional personal income, as well as $580,000 in recovery and production value (UEO 2004).

If oil and gas production were to occur, disturbance associated with production wells, including roads, would become more permanent and could result in more long-term impacts. This is particularly true if there are impacts to hydrology, such as stream erosion, that can be difficult to restore.

Additional long-term impacts could occur to wildlife habitat, as well. In general, direct losses of wildlife habitat would occur until wells are abandoned or closed, and the sites reclaimed. Similarly, direct losses of wildlife habitat would occur until pipeline ROWs are restored and until roads are closed. If roads are kept open after the life of the project, the adverse effects will continue for a longer period of time.

Should the exploratory well result in a producing well there would be short-term increase in VOC emissions from the producing well.