

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

This chapter provides a description of the environmental consequences of implementing each of the five alternatives described in Chapter 2. The alternatives were designed to encompass the full range of leasing options and meet the requirements of 36 CFR 228.102. It should be reiterated that the decisions to be made from this document are (1) what NFS lands are available for oil and gas leasing and (2) whether to lease specific lands, and under what conditions. Although the issuance of a lease grants rights that could result in surface disturbing activities (unless 100% NSO lease), further project analysis would be required prior to approval of such activities per 36 CFR 228.107. In order to evaluate impacts, the Reasonably Foreseeable Development Scenario (RFDS) described in Section 2.2 and Appendix D is used. Any future oil and gas activities resulting in ground-disturbing activities will require further environmental review, in accordance with NEPA and other applicable regulations, prior to implementing the activities.

As described in Chapters 1 and 2, there are two levels of analysis required to make the necessary decisions on the availability of NFS lands for oil and gas leasing, and on the terms and conditions that could be attached to the leases. The first level of analysis considers the effects of the five lease options on the sensitive resource components identified in Chapter 3. The five lease options are No Lease (NL), No Surface Occupancy (NSO), Controlled Surface Use (CSU), Timing Limitations (TL), and Standard Lease Terms (SLT); these are described in Sections 1.5.2 and 2.1, and in Appendix A. The second level of analysis describes the effects of the alternative leasing programs, which consist of various combinations of lease options. These alternatives are described in Chapter 2.

In this chapter, resource specialists describe the potential impacts of each alternative on the sensitive resource components, using the information on the existing environment provided in Chapter 3, a description of the leasing options and alternatives, and the reasonably foreseeable oil and gas activity under each alternative. Impacts are defined as modifications to the existing environment that are brought about by an outside action. Impacts can be beneficial (positive) or adverse (negative), and result from the action directly or indirectly. Impacts can be permanent, long-lasting (long term), or temporary (short term). Impacts can vary in significance from no change, or only slightly discernible change, to a full modification or elimination of the existing

environmental condition. Emphasis was placed on stipulations that could be applied to areas sensitive to potential oil and gas activity to mitigate or eliminate impacts.

Two methods were used to quantify possible impacts under each of the alternatives. For the Uinta NF and the Ashley NF outside the Sowers Canyon area, the RFDS predicts the possibility of exploration wells in these areas. Since it is unknown where these wells would occur, it was assumed from the purpose of analysis, that any disturbance associated with the exploration wells would occur in the sensitive resource area being evaluated. In the Sowers Canyon area the RFDS predicts development of a field. Since the location of wells in this field would be governed by well spacing requirements (the RFDS predicts 320 to 640 acres spacing), it was unreasonable to assume that all disturbance might occur only within the bounds of a particular sensitive resource unit. Therefore, the percentage of the sensitive resource unit occurring in Sowers Canyon was calculated and that percentage was applied to the expected area of disturbance.

Impacts to a particular resource were analyzed based on stipulations given to that resource, as identified in Table 2-1. Stipulations, other than that identified for a particular resource, may occur in the same location based on other resource sensitivities.

The following sections present a description of the general effects of oil and gas activity to the resource components which may be expected without the application of stipulations; a lease option analysis for the identified resource components; and an analysis of the potential impacts of each alternative.

4.1 GEOLOGY/MINERALS

This section provides a description of potential impacts to geology/minerals that could result from the various leasing options and from the alternatives. The analysis is focused on the sensitive geologic resource component identified in Section 3.1, Mineral Resources. This includes oil and gas as well as other mineral resources.

General Effects

Exploration for or development of other locatable or salable minerals besides oil and gas, should any be identified, would not be impacted by implementation of any of the alternatives since the leases and stipulations are valid only for oil and gas; although, 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.

Effects of Lease Options

No Lease and No Surface Occupancy: NL and NSO 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. 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. This is unlikely however, due to the high costs and technical limitations associated with directional drilling. No limitations would be placed on access and development of other mineral resources, should any be identified.

Controlled Surface Use, Timing Limitations, and Standard Lease Terms: These leasing options might affect the location, design, and/or timing of oil and gas development and facilities installation. However the current oil and gas deposits would be administratively available for extraction. These lease options could have a minor effect on other mineral resources, should any be identified in the future, if access roads developed and maintained for oil and gas activities also provide access to areas of development for other minerals, which could facilitate their development.

Effects of Alternatives

Alternative 1

No new leases would be issued under this alternative; however, some extraction of oil and gas resources could occur on existing leases until these leases expire or production ceases. There are existing leases within the study area, primarily within Sowers Canyon. The leases within Sowers Canyon are capable of production and, as such, may not terminate or expire at the end of the primary lease term, rather they would be extended until production ceases. It is estimated that 12 of the 30 projected development wells would be drilled under this alternative. The remaining 18 wells would not be drilled due to unleased acreage. When the existing leases expire or production ceases, these lands would revert to NL.

Exploration for oil and gas resources outside the Sowers Canyon area would be limited. Only one of the five projected exploratory wells would be drilled on the Ashley NF outside of the Sowers Canyon area. This is due to limited acres currently under lease and the fact that no new leases would be issued under this alternative. It is not anticipated that this one exploratory well would result in a discovery; therefore, after the existing leases expire, NL would apply to these lands.

No exploratory drilling is projected on the Uinta NF since nearly all of the previous leases have expired or terminated and there is little industry in this area. No new leases would be issued.

This alternative would place the most severe limitations on the opportunity to explore for and develop oil and gas of any of the alternatives. Impacts to oil and gas reserves in the Western Uinta Basin would be minor, limited to the direct extraction by the estimated 12 wells in the Sowers Canyon area. Exploration wells would have no impact on oil and gas reserves unless exploration results in field development, which is not anticipated in the RFDS outside of the Sowers Canyon area.

Alternative 2

Under this alternative all federal oil and gas minerals within the study area would be administratively available for leasing and would be leased with the following stipulations: a NSO stipulation would be applied to 235,386 acres; a CSU stipulation would be applied to 230,816 acres; and a TL stipulation would be applied to 200,760 acres. This alternative is shown in Figure 2-2.

Under this alternative, approximately 35 percent of the Sowers Canyon area would be available for surface occupancy. Based on this and existing leases, it is anticipated that 20 of the 30 projected development well would be drilled.

Two of the five projected exploratory wells in the Ashley NF outside of the Sowers Canyon area would be anticipated due to the extensive areas of NSO under this alternative. Industry would likely be discouraged from drilling exploratory wells since the likelihood of being able to develop a field, should one be found, would be greatly reduced.

The one projected exploratory well on the Uinta NF would be foreseeable.

Because of the large areas of NSO under this alternative and the additional costs of directional drilling, impacts to the oil and gas reserves outside of the Sowers Canyon area would be minor or negligible. Within the Sowers Canyon area, oil and gas would largely be available for extraction within the confines of the leasing stipulations, i.e., approximately 65 percent of the area would be under a NSO stipulation, virtually the entire area would be under a TL stipulation, and approximately 30 percent would be under a CSU stipulation.

Alternative 3

Under this alternative all federal oil and gas minerals within the study area would be administratively available for leasing and would be leased with the following stipulations: a NSO stipulation would be applied to 169,374 acres; a CSU stipulation would be applied to 238,686 acres; and a TL stipulation would be applied to 203,302 acres. This alternative is shown in Figure 2-3.

Within the Sowers Canyon area, it is anticipated that 27 of the projected 30 development wells would be reasonably foreseeable. Three of the wells would be precluded due to the NSO stipulation and some of the other wells would need to be carefully located in order to space the well for effective recovery while still avoiding areas of NSO.

It is anticipated that three of the projected five exploratory wells in the Ashley NF outside of the Sowers Canyon area would be foreseeable, although, depending on the specific location, a well may need to be directionally drilled due to the blocks of NSO associated with this alternative. Since the technical aspects of directional drilling would be limited by the relatively shallow depth of primary targets, portions of the blocks of NSO areas would not be able to be explored.

The one exploratory well on the Uinta NF would be foreseeable under this alternative.

As with Alternative 2, the large areas of NSO under this alternative and the additional costs or technical restrictions of directional drilling would likely result in minor or no impacts to the oil and gas reserves outside of the Sowers Canyon area. However, within the Sowers Canyon area, oil and gas would largely be available for extraction within the confines of the leasing stipulations. Compared to Alternatives 1 and 2, fewer lands would have NSO and CSU stipulations within the Sowers Canyon area, but most of the Sowers Canyon area would have TL stipulations.

Alternative 4

Under Alternative 4 all federal oil and gas minerals within the study area would be administratively available for leasing and would be leased with the following stipulations: a NSO stipulation would be applied to 1,594 acres; a CSU stipulation would be applied to 213,970 acres; and a TL stipulation would be applied to 172,810 acres. This alternative is shown in Figure 2-4.

Under this alternative the full projected development scenario would be reasonably foreseeable and would consist of 30 development wells within the Sowers Canyon area, five exploratory wells on the Ashley NF outside the Sowers Canyon area, and one exploratory well on the Uinta NF. The exploration wells would have no impact on oil and gas reserves unless exploration results in field development, which is not anticipated in the RFDS outside of the Sowers Canyon area. Within the Sowers Canyon area full development of the oil and gas resources are anticipated.

Alternative 5

Under this alternative all federal oil and gas minerals within the study area would be administratively available for leasing and would be leased with standard lease terms (no special stipulations). Mitigation of impacts to other resources would be based on existing laws and their implementing regulations, such as the Endangered Species Act, the Archeological Resource Protection Act, the Clean Water Act, and the Clean Air Act. For resources which are not protected by law, mitigation would be based on the standard lease terms and 43 CFR 3101.1-2 which provides clarification of reasonable mitigation as used in Section 6 of the standard lease terms (delaying activities for up to 60 days, or moving a well location up to 200 meters).

Like Alternative 4, the full projected development scenario would be reasonably foreseeable and would consist of 30 development wells within the Sowers Canyon area, five exploratory wells on the Ashley NF outside the Sowers Canyon area, and one exploratory well on the Uinta NF. The exploration wells would have no impact on oil and gas reserves unless exploration results in field development, which is not anticipated in the RFDS outside of the Sowers Canyon area. Within the Sowers Canyon area full development of the oil and gas resources are anticipated.

Cumulative Impacts

There are currently 7,273 acres of existing leases in the Western Uinta Basin EIS study area. Approximately 2,073 acres of existing leases are expected to expire by the year 1997, and the other 5,200 acres are held by production and have therefore been extended. The area available for lease would remain the same under Alternative 1, and would be greatly expanded under the other alternatives. Under Alternatives 2, 3, 4 and 5, all federal oil and gas minerals within the study area would be administratively available for leasing.

Within Sowers Canyon area, oil and gas would largely be available for extraction within the confines of leasing stipulations under Alternatives 2 to 5. The new area available for lease and extraction combined with the existing leases in this area would cumulatively increase oil and gas extraction but would have no effects on other mineral resources. In the remainder of the study area, exploration wells will likely have no effect on oil and gas reserves unless exploration results in field development, which is not anticipated in the RFDS. Exploration wells would not result in any cumulative effects on other mineral resources.

4.2 WATERSHED RESOURCES

This section provides a description of potential impacts to watershed resources, which could result from implementation of the various leasing alternatives. The analysis focuses on the sensitive resource components identified in Section 3.2, which includes geologic hazards/unstable soils, steep slopes, accelerated stream and gully erosion, soil productivity, water quality, and wetlands/riparian.

4.2.1 Geologic Hazards/Unstable Soils

General Effects

Exploration or development activity for oil and gas production on existing or new leases would result in impacts to existing soil and geologic-substrate composition and stability, and the dynamic processes involved in the breakdown of rocks and the development of soils. Although direct site-specific impacts to areas of potential geologic hazard would result from the construction and operation of facilities, additional and potentially more significant impacts to resource and

resource-use conditions are likely to occur on adjacent, more extensive land areas and to other resources including:

- Vegetation - contributes to soil/geologic stability and wildlife habitat/livestock forage
- Water runoff and quality of particularly channelized flows or streams of the watershed
- Visual aesthetics

Mass wasting can include rock falls and talus or scree deposits; landslides and slumps; earth, mud, and debris flows; or soil creeps. Conventional construction activities on existing or potential areas of mass wasting 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 the 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 a new mass wasting feature or reactivation of an old feature could occur should applied design and construction techniques not avoid, or use methods to mitigate, the challenge presented by inherently 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 disturbing forces of natural accumulations of surficial water, snow, or talus; and man-made pressures including weight and vibrations from heavy construction and operational equipment, and
- 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 runoff 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 existing 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, access roads, and pipelines could be damaged or destroyed, which could release oil 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.

Effects of Lease Options

No Lease and No Surface Occupancy: 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 gullyng. NSO does not apply to roads and pipelines, but Forest Service standards and guidelines for construction should prevent most potential impacts.

Controlled Surface Use: Under this leasing option, the federal minerals on lands with geologic hazards 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 (Section 2.2.3 and 2.2.4) would require that surface disturbing activities be located and designed to minimize the effects on unstable soils (36 CFR 228.108). 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 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, gullyng, 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 standard lease terms option because of the increased ability to avoid unstable areas and to mitigate impacts.

Timing Limitations: TL would not specifically be applied for geologic hazards/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.

Standard Lease Terms: Application of SLT would result in the increased probability for slope failure and accelerated erosion on unstable slopes. 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.

Effects of Alternatives

Table 2-1 shows the stipulations that would be applied for geologic hazards/unstable soils under the five alternatives. Acreages of direct effects are summarized in the following table. Direct effects for Uinta NF and for Ashley NF outside the Sowers Canyon area are estimated based on the assumption that affected areas could be located entirely within sensitive areas. A proportional methodology is used for the Sowers Canyon area, since it is not reasonable to assume that all impacts will occur in sensitive areas because of well spacing requirements. The percent acreage affected in the Sowers Canyon area was estimated based by assuming that it would be the same as the percentage of sensitive area within Sowers Canyon area.

Acres of Affected Geologic Hazards/Unstable Soils

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres	0.0	6.9	6.9	6.9	6.9
Ashley NF, outside Sowers Canyon area	Acres	5.4	10.7	20.4	26.8	26.8
Sowers Canyon area	Acres	3.0	5.0	6.7	7.5	7.5

Alternative 1

Although no new leases would be granted under this alternative, implementation of Alternative 1 would result in potential short-term impacts from exploration activities and long-term impacts from field development authorized under existing leases. This alternative would include one exploratory well and related roads on the Ashley NF outside the Sowers Canyon area, and 12 development wells and related roads and pipelines in the Sowers Canyon area (Table 2-8).

Site-specific effects of displacements or soil loss cannot be determined until the APD stage of permitting approval. Potential impacts are the same as those described under above under general effects, and include accelerated erosion and mass wasting. Standard lease terms applicable to existing leases would provide some protection for geologic hazards/unstable soils, by allowing the USFS to request movement of facilities by up to 200 meters, and delay of activities by 2 months.

Alternative 2

An NSO stipulation would be applied to all 45,340 acres of geologic hazards/unstable soils under Alternative 2. Although the siting of well pads would be precluded under NSO, construction and operation of access roads and pipelines would be permitted. The areas of potential direct impacts are summarized above, and include approximately 7 acres of disturbance from exploration-related road construction on the Uinta NF, 10.7 acres on the Ashley NF outside of the Sowers Canyon area, and 5 acres within the Sowers Canyon field.

Again, site-specific effects of displacements or soil loss cannot be determined until the APD stage. Potential impacts from construction of roads and pipelines are the same as those described under above under General Effects, and include accelerated erosion, mass wasting, and debris flows. Standard lease terms applicable to existing leases are likely to minimize exposure of access roads and pipelines from potential damage from geologic hazards/unstable soils, by allowing the USFS to request movement of facilities by up to 200 meters, and delay of activities by 2 months.

Alternative 3

Under Alternative 3, CSU stipulations would be applied to areas of geologic hazards and unstable soils. Because of overlap with other resources, approximately 12,170 of the 45,340 acres of geologic hazards and unstable soils would also be NSO. The area of geologic hazards and unstable soils which may be affected are 6.9 acres on the Uinta NF, 20.4 acres on the Ashley NF, and 6.7 acres in the Sowers Canyon area.

Compliance with the CSU stipulation would require that proposed surface disturbing activities be located and designed to minimize effects on unstable soils or areas subject to mass movement (36 CFR 228.1080). This FS surface use requirement further mandates an operator to avoid operations in areas subject to mass soil movement unless an approved surface use plan of operations requires the operator to take measures to minimize clearing of land and minimize or prevent erosion and sediment production (36 CFR 228.1080). Preparation of a site-specific surface use plan which provides avoidance or appropriate mitigation measures to be implemented as integral parts of the oil and gas activities would minimize both short-term and long-term direct and indirect impacts.

Alternative 4

The CSU stipulation would also be applied in this alternative for all 45,340 acres of geologic hazard/unstable soils. The mitigated impacts under Alternative 4 would be similar to those described under Alternative 3, except that the area affected in the Sowers Canyon area would be slightly larger (7.5 acres) in this alternative. The application of CSU stipulations would reduce both short-term and long-term direct and indirect impacts to acceptable levels as described under Alternative 3.

Alternative 5

Under Alternative 5, SLT would apply to all areas of geologic hazard/unstable soils including steep slopes and valley bottoms. SLT would require only general mitigation and reasonable reclamation measures. Such measures would not require relocation of proposed operations by more than 200 meters; siting of operations off leasehold; or prohibition of new surface disturbing operations in excess of a 60-day period in any lease year (43 CFR 3101.1-2). As these requirements/stipulations would likely be less stringent than those specified under CSU stipulations, the potentials for direct

activation of mass wasting events and associated indirect effects on other resources, and damage or loss of facilities under construction or in operation would be greater than under CSU or NSO stipulations. This alternative is the least restrictive; and therefore, offers the greatest potential for adverse impacts. Acreages of disturbance are the same as those identified for Alternative 4, but the adverse effects may be greater.

4.2.2 Steep Slopes

General Effects

Construction and operation activities on steep slopes typically result in the removal of protective vegetative cover, excavation/disturbance of soil materials, distribution/exposure of soil materials on (often steeper) cut-and-fill slopes, compaction of soil materials, and capture of runoff 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, access roads, pipelines, and other facilities 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 runoff 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.

Effects of Lease Options

No Lease and No Surface Occupancy: Preclusion of oil and gas activities would prevent construction on steep slopes. NSO does not apply to roads and pipelines, but FS standards and guidelines for construction should prevent most potential impacts.

Controlled Surface Use: Under this leasing option, the federal minerals on lands with steep slopes 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 (Section 2.2.4) would require that activities be located and designed to ensure that the disturbed area can be reclaimed and slope stability maintained (36 CFR 228.108 (g)(3) and j)). However, it may not be possible in all cases to totally avoid steep slopes and unavoidable impacts could still occur from the construction associated with oil and gas activity on steep slopes. Potential impacts include slope failure and accelerated erosion and the associated surface disturbance. It is expected that impacts from surface disturbing activities would be less that would occur under the SLT option because of the increased ability to avoid steep slopes and to mitigate impacts.

Timing Limitations: TL stipulations would not specifically be applied for steep slopes. TL stipulations for various wildlife resources would limit oil and gas construction activities to certain periods of time during the year. Where these TL stipulations cover periods of high soil moisture, a condition under which slope failures are more likely to occur, they could help to reduce or avoid slope failure.

Standard Lease Terms: Application of SLT would result in the increased probability for slope failure/destabilization. An operator would be required to conduct operations using reasonable, prudent measures to avoid slope destabilization. In addition, an operator could be required to relocate proposed facilities by up to 200 meters, which may be effective at avoiding steep slopes. An operator can also be required to delay operation for up to 60 days, which could reduce impacts

by precluding construction during periods of high soil moisture. Reclamation/revegetation may be required as a Condition of Approval at the APD stage.

Effects of Alternatives

The acreage of steep slopes that would be affected under the various alternatives are summarized below. These acreages are based on two assumptions: (1) in Uinta NF and in Ashley NF outside of Sowers Canyon area, affected areas could be located entirely in sensitive areas, and (2) in the Sowers Canyon area, the acreage of affected sensitive areas would be proportional to their occurrence in the area.

Acreage of Affected Steep Slopes

Area		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres	0.0	6.9	6.9	6.9	6.9
Ashley NF, outside Sowers Canyon area	Acres	5.4	10.7	20.4	26.8	26.8
Sowers Canyon area	Acres	14.8	24.7	33.4	37.1	37.1

Alternative 1

Although no new leases would be granted under this alternative, implementation of Alternative 1 would result in potential short-term impacts from exploration activities and long-term impacts from field development authorized under existing leases. A worst case of 5.4 acres of disturbance on steep slopes would result from exploration activities on the Ashley NF. Approximately 15 acres of disturbance on steep slopes would occur within the Sowers Canyon area. Although these estimates of disturbance acreages assume the absence of NSO stipulations, seven of the 13 existing leases on the Ashley NF and three of the six leases on the Uinta NF have NSO stipulations for steep slopes attached. Therefore, acreage estimates of impact are likely overestimated.

Site-specific effects cannot be determined until the APD stage of permitting approval. Potential impacts are the same as those described above under general effects, and include accelerated erosion, increased stream sedimentation, decreased water quality, gully development, and increased slope instability. SLT stipulations applicable to existing leases would provide some protection against construction on steep slopes, by allowing the USFS to request movement of facilities by up to 200 meters, and delay of activities by 2 months. In addition, activities must be consistent with

Forest Plan standards and guides, and site-specific mitigation measures (COA) may be attached at the APD stage, based on on-the-ground examination, and NEPA analysis.

Assuming the application of appropriate mitigative reclamation measures and adherence to the Forest Plans, the direct impacts of surface disturbances to occur on existing leases prior to their termination would be short term but mitigable for exploration activities and long term but also mitigable for field development. Indirect impacts of decreased vegetative productivity, increased stream sedimentation and gully development, decreased water quality, and increased slope instability would also be mitigated by application of best management practices as part of a comprehensive reclamation plan to reestablish approximate predisturbance conditions.

Alternatives 2 and 3

An NSO stipulation would be applied to all 154,090 acres of slopes >35% in the study area under these alternatives. Although the siting of well pads would be precluded under NSO, construction and operation of access roads and pipelines would be permitted. The areas of potential direct impacts are summarized above, and include approximately 6.9 acres of disturbance from exploration-related road construction on Uinta NF, and 10.7 acres on Ashley NF outside the Sowers Canyon area, under both Alternatives 2 and 3. Within the Sowers Canyon area, approximately 24.7 acres would be affected under Alternative 2, and 33.4 acres under Alternative 3.

Site-specific effects on steep slopes cannot be determined until the APD stage. Potential effects from construction of roads and pipelines are the same as those described above under General Effects, and include accelerated erosion and increased potential for mass wasting. Standard lease terms applicable to roads and pipelines may result in avoidance of areas of steep slopes, by allowing the USFS to request movement of facilities by up to 200 meters. However, alternative sites on slopes <35% may not be available within 200 meters. As described for Alternative 1, application of appropriate mitigation measures would result in mitigable short-term (exploration) and long-term (field development) direct and indirect impacts.

Alternative 4

A CSU stipulation would be applied to areas of slopes >35% under this alternative. Because of overlap with other resources, 1,160 acres of the 154,090 acres of steep slopes would also be NSO.

The areas of potential direct impact are summarized above, and include approximately 6.9 acres on the Uinta NF, 26.8 acres on the Ashley NF outside the Sowers Canyon area, and 37.1 acres in the Sowers Canyon area.

Compliance with the CSU stipulation for steep slopes would require that activities/facilities be located and designed to ensure that the disturbed area can be reclaimed and slope stability maintained (36 CFR 228.108(g)(3) and 0)), as part of an approved surface use plan of operations. Implementation of measures to ensure reclamation and maintain slope stability would minimize both short-term and long-term direct and indirect impacts.

Alternative 5

Acreages of disturbance on steep slopes would be the same as those described for exploration and field development activities under Alternative 4. Application of less restrictive SLT to oil and gas activities would likely result in a greater potential for adverse direct and indirect impacts. Under SLT, the FS may require relocation of proposed operations by up to 200 meters and delay of activities by up to 60 days. Since 200 meters would not be sufficient to avoid steep slopes in many areas, the potential for direct activation of mass wasting events and associated indirect affects on other resources, and damage or loss of facilities under construction or in operation would be greater than under CSU or NSO stipulations.

4.2.3 Stream Erosion

General Effects

As described above, construction and operation of well pads, access roads, and pipelines would likely result in increased runoff from uplands, particularly areas of steep slopes, and potential channelization of the runoff at higher positions in the landscape. 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. Releases of channelized flows from runoff and runoff diversion systems, such as ditches and culvert release points to areas below the oil and gas facility, could also initiate gully development and increased downgradient sedimentation. The previously described sources of ground disturbance have a high potential for increasing sediment delivery to stream channels.

Increased sediment loads could adversely impact the stability and hydrologic function of stream channels.

Effects of Lease Options

Stipulations have not been specifically identified for stream erosion; however, stipulations for other resources, particularly soil erosion, steep slopes and riparian, are applicable.

No Lease and No Surface Occupancy: NL or NSO would generally result in no additional stream bank erosion or gulying; however, activities on existing upstream leases of occupied lands could contribute to increased erosion downstream by increasing runoff. Effects could be positive if activities resulted in improved retention and more controlled release of runoff. NSO does not apply to roads and pipelines, but FS standards and guidelines for construction should prevent most potential impacts.

Controlled Surface Use: CSU measures (such as sediment/runoff control ponds below facilities, mulching and revegetation of disturbed surfaces immediately after construction, and engineered channeling of flows onto and away from facilities to reduce flow velocities and control discharge into streams) would contribute to reducing adverse gulling expansion or activation and stream bank erosion.

Timing Limitations: Avoiding soil disturbance during construction, particularly when the soils are wet, would reduce the potential for compaction and subsequent increased runoff from facilities. Increased runoff contributes to increased channelized erosion including gulying and stream bank erosion.

Standard Lease Terms: SLT would result in the greatest potential for adverse gulying and stream bank erosion. Runoff controls may be insufficient to prevent additional contributions to downstream channelized flows. An operator would be required to conduct operations using reasonable, prudent measures to protect watershed resources. In addition, an operator could be required to relocate proposed facilities up to 200 meters, which should reduce potential impacts.

Effects of Alternatives

Alternatives 1 to 5

Implementation of Alternatives 1, 2, 3, 4, or 5 would result in potential direct short-term (exploration) and long-term (field development) impacts on streambank and gully conditions in the Sowers Canyon area and remaining portions of the Ashley NF. Oil and gas activities would increase the potential for accelerated runoff and sediment contribution to streams. The addition of water volume and sediment would alter stream flow and channel characteristics which could exacerbate already vulnerable conditions of stream segments and adjoining terraces and valley sides; or initiate degradation of a drainage previously in good condition.

Site-specific effects cannot be determined until the APD stage of permitting approval. SLT stipulations applicable to existing leases would provide protection against construction in or along streams, by allowing the USFS to request movement of facilities by up to 200 meters, and delay of activities by 2 months. In addition, activities must be consistent with Forest Plan standards and guides, and site-specific mitigation measures (Conditions of Approval) may be attached at the APD stage, based on on-the-ground examination, and NEPA analysis. The application of appropriate mitigation measures to control runoff and soil erosion and adherence to the Forest Plans would minimize impacts to stream channel conditions, particularly the vulnerable segments, and potentially effect improvements in channel and gully conditions. With the stabilization of stream channel conditions, indirect impacts of effecting mass wasting by undercutting and destabilizing valley side slopes and gully development in tributary drainages would be minimized.

4.2.4 Soil Productivity

General Effects

Oil and gas exploration and development activities could occur within areas of limited reclamation potential for the restoration of soil/vegetative productivity. Principal sources of constraint would include:

- 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
- Disturbance in areas above timberline (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 (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.

Effects of Lease Options

Stipulations have not been applied specifically for areas of poor revegetation potential. However, stipulations developed for other resources will be applicable.

No Lease and No Surface Occupancy: Preclusion of oil and gas activities would prevent the removal of existing, protective vegetative cover; compaction, excavation, and/or mixing of soil horizons; and potential accelerated loss of soil growth media. Current soil productivity in terms of vegetative cover and production would not be affected. NSO does not apply to roads and pipelines, but FS standards and guidelines for construction should minimize potential impacts.

Controlled Surface Use: CSU measures for other resources would have little protective or mitigative value for areas of poor reclamation potential.

Timing Limitations: TL would preclude the removal of protective vegetation and the disturbance of soils during wet periods including spring snow melt and runoff and following summer storm precipitation events. The strength of soils and their ability to resist compaction and erosion are generally reduced when wet or saturated. Both compaction and soil loss by erosion reduce soil productivity.

Standard Lease Terms: SLT could result in soil compaction and/or soil loss to the extent that vegetative productivity is reduced in affected areas to unacceptable levels or that revegetation efforts are limited to unsuccessful. However, an operator would be required to conduct operations

using reasonable and prudent measures to protect the soil resource. In addition, an operator could be required to relocate proposed facilities by up to 200 meters, which may allow avoidance of areas of poor reclamation potential.

Effects of Alternatives

Alternative 1

As described in Section 4.1.2.1 for Alternative 1, approximately 5 acres of soil disturbance would occur in an area of limited reclamation/revegetation potential, assuming the worstcase siting for the construction of an exploration well pad and access road on Ashley NF lands (Tables 2-3 and 2-4). No activity on the Uinta NF is proposed; and areas of limited reclamation/revegetation potential are not present within the Sowers Canyon area.

Due to probable difficulties in completing successful revegetation of disturbed sites within this sensitive area, short-term impacts of exploration activities would likely result in long-term adverse direct and indirect impacts. Direct impacts would be the loss of vegetative cover and the exposure of soil materials to wind and water erosion and subsequent loss of soil material. Indirect impacts would include the loss of wildlife and sensitive species habitat, and deposition and/or sedimentation onto adjacent lands and down-gradient streams.

Standard lease terms applicable to existing leases are likely to reduce potential adverse effects from construction on soils with poor reclamation potential, by allowing the USFS to request movement of facilities by up to 200 meters, and delay of activities by 2 months. Application of standard reclamation measures consistent with the Forest Plan, should disturbance be required, could shorten the duration of adverse effects; however, special mitigation measures would likely be required to ensure successful revegetation/stabilization.

Alternative 2

Under this alternative, all areas of poor reclamation potential would be NSO, because of overlap with other resources. Although the siting of well pads would be precluded under NSO, construction and operation of access roads and pipelines would be permitted. The area of potential effects would be about 4.9 acres on the Uinta NF, and 6.7 acres on the Ashley NF, outside of the Sowers Canyon area. No areas of poor reclamation potential have been identified in the Sowers

Canyon area. The types of impacts resulting from disturbance of these sensitive areas would be similar to those described for Alternative 1. Mitigation requirements and their effectiveness would also be similar to those described in Alternative 1.

Alternatives 3 to 5

Under Alternatives 3, 4, and 5, most areas of poor reclamation would not be covered under stipulations for other resources that would provide greater protection than SLT. The area of potential effects would be 6.9 acres on the Uinta NF for all alternatives, 20.4 acres on Ashley NF for Alternative 3, and 26.8 acres on Ashley NF under Alternatives 4 and 5. Impacts and mitigation conditions would be similar to those described for Alternative 1.

4.2.5 Water Quality

General Effects

Impacts on water quality from oil and gas activities, in addition to increased sediment loading of perennial and intermittent streams, includes potential contamination of waters from releases of pollutants. Sources of pollutants are:

- 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
- Produced waste water which can be strongly saline and/or contain high concentrations of total dissolved solids

Introduction of sediment, fuels, lubricants, drilling fluids, or produced waste water to surface and/or groundwater would alter water quality and subsequently, and impact aquatic life and habitat in any affected perennial streams and other downstream surface water or down-hole groundwater uses.

Effects of Lease Options

Stipulations have not been specifically developed to protect water quality. However, SLT and special stipulations for other resources will provide varying levels of protection.

No Lease and No Surface Occupancy: NL or NSO would generally result in no degradation of water quality from oil and gas activities; however, water quality, particularly surface water quality, could be affected by activities on adjacent, upstream leased or surface occupied areas. Effects could be positive if activities resulted in the correction of previous erosion and sedimentation problems, or negative if activities create new erosion and sedimentation problems. NSO does not apply to roads or pipelines, but FS standards and guidelines for construction should prevent most potential impacts.

Controlled Surface Use: CSU stipulations for geologic hazards/unstable slopes, riparian/wetlands, and semi-primitive non-motorized would be beneficial to maintenance of water quality by prevention of erosion, avoidance of construction adjacent to streams, and reclamation.

Timing Limitations: TL stipulations for big game winter, summer and calving range would all reduce the potential for adverse effects. Avoiding soil disturbance during construction, particularly when soils are wet in the spring, winter (when soils are not frozen), and following summer storm events, would reduce the potential for erosion and subsequent sedimentation of streams.

Standard Lease Terms: SLT would result in the greatest potential for adverse impacts to water quality. Although a minimum distance of 200 feet is required between facilities and a stream course, distance alone may not be sufficient to prevent sedimentation. Erosion control and revegetation efforts may be insufficient to control erosion and increased sedimentation of the adjacent stream.

Effects of Alternatives

Alternatives 1, 2, 3, 4, and 5

Because all the alternatives involve the construction of both exploration and field development facilities including Alternative 1, impacts on both surface water and groundwater quality would be similar to that described above for General Effects. Differences among the alternatives would result from the increase in potential for adverse impacts as each successive alternative is less restrictive and/or proposes more oil and gas activity. NSO and CSU stipulations attached to watershed resources in Alternatives 2, 3, and 4 require significant controls over runoff, erosion, and sedimentation; each of which is a mechanism whereby spill/releases of contaminated waters and

soils and elevated levels of sediment can reach receiving streams. Of the three, Alternative 4 would likely have the greatest potential for stream pollution due to greatest level of oil and gas activity which increases the probability for a spill/release event to occur.

Alternative 5 would likely have the greatest potential for stream pollution to occur among all the alternatives as it proposes activity equal to Alternative 4 and stipulates fewer mitigative measures for minimizing potential impacts. SLT may be effective at limiting stream pollution, by allowing the FS to require relocation of facilities up to 200 meters away from a receiving stream, and by delaying construction activities up to 60 days (such as during a period of significant runoff).

4.2.6 Wetlands/Riparian

General Effects

Direct impacts to wetland/riparian areas from oil and gas exploration and development could include removal of vegetation and a change in hydrology resulting in conversion of wetlands to uplands, and/or loss or degradation of wetland functions. Indirect effects may occur from sedimentation, mass movement, alterations of surface and groundwater movement into or out of a wetland, gullyng and other earth movements, and may similarly result in conversion of wetlands or degradation of wetland quality.

Wetlands serve important and often unique functions in an ecosystem. For example, these areas provide wildlife and fisheries habitat, so the loss of vegetation could impact species dependent on the vegetation for food (such as the moose) or shade and cover (such as fish). Wetland/riparian areas also serve to purify water and trap sediment. Therefore, impacts to these areas could result in an increase in sediment in streams and a decrease in water quality, which could further impact fisheries habitat. Another function of wetland/riparian is flood abatement and control. These areas can reduce the impacts of flooding by reducing flow velocity and absorbing water. Loss of this function could result in increased stream erosion and sedimentation and activation or reactivation of gullyng. In addition, wetland/riparian serve as areas of groundwater recharge. Because wetlands/riparian make up such a small portion of the study area (approximately 2 percent), groundwater recharge would not be significantly affected, even if all wetland/riparian areas were lost.

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 and development. 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.

Effects of Lease Options

No Lease and No Surface Occupancy: NL or NSO would generally result in no direct adverse effects on wetland or riparian areas within the study area, for areas larger than 40 acres in size. Smaller areas would be avoided under SLT. As discussed above in Water Quality, adverse effects such as increased sedimentation and/or release of contaminants, could result from oil and gas activities on adjacent, upstream leased or surface occupied areas. Effects could be positive if adjacent, upstream activities resulted in the mitigation of degrading wetlands and riparian areas. NSO does not apply to roads and pipelines, but FS standards and guidelines for construction should minimize most potential impacts.

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 a change in hydrology. These impacts could further result in a loss of the functions of wetland and riparian areas which include wildlife habitat, water purification/sediment trapping, flood control, and groundwater recharge. Mitigation of these impacts could consist of reclamation/revegetation.

Timing Limitations: Timing limitations have not specifically been proposed for riparian/wetlands. However, timing limitations 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: SLT would result in the increased potential for impacts on wetlands and riparian areas. Under SLT, an operator can be required to relocate facilities up to 200 meters, which would protect wetlands from most direct and indirect impacts.

Effects of Alternatives

The amount of disturbance that could occur in wetland/riparian areas under each of the alternatives is shown below by area. For the Uinta NF and the Ashley NF outside the Sowers Canyon area, the acres of disturbance are based on the assumption that facilities would be located entirely in sensitive areas. For the Sowers Canyon area, acres of disturbance is based on a proportional methodology described at the beginning of Chapter 4.

Acres of Disturbance

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	0	6.9	6.9	6.9	6.9
Ashley NF, outside Sowers Canyon area	5.4	10.7	20.4	26.8	26.8
Sowers Canyon area	0.02	0.04	0.05	0.05	0.05

Alternative 1

Under Alternative 1, no new leases would be issued; however, oil and gas activity is anticipated on existing leases. The RFDS predicts one exploratory well on the Ashley NF outside the Sowers Canyon area and 12 development wells within Sowers Canyon. Impacts to wetland/riparian/ areas would not be significant in the Sowers Canyon area because such a small amount (0.02 acres) is expected to be impacted. Impacts could be significant on the Ashley NF outside the Sowers Canyon area if facilities were placed in or adjacent to a wetland, and would be as described above under General Effects. However, SLT on existing leases should provide adequate protection, by allowing the FS to require an operator to move proposed facilities by up to 200 meters. Direct and indirect effects would therefore be avoided or minimized by avoidance of activities in or near wetland/riparian areas. Should impacts occur (such as road crossings), they would be short-term, since the length of activity on exploratory wells is expected to be 80 days. Adherence to standards and guidelines in the Forest Plan should prevent adverse hydrologic changes from road or pipeline construction.

Alternative 2

Under Alternative 2, the RFDS predicts one exploratory well on the Uinta NF, two exploratory wells on the Ashley NF outside the Sowers Canyon area, and 20 development wells within Sowers Canyon. Under this alternative wetland/riparian areas greater than 40 acres would be protected by a NSO stipulation, which would apply to well pads but not to roads and pipelines. Wetland/riparian less than 40 acres in size would be protected from disturbance under SLT, which allows the FS to require operators to move proposed facilities up to 200 meters. Adherence to standards and guidelines in the Forest Plan should prevent adverse hydrologic changes from road or pipeline construction. Alternative 2 is therefore likely to have no or minimal adverse impacts on wetland/riparian resources.

Alternatives 3 and 4

Under Alternatives 3 and 4, a CSU stipulation would apply to wetland/riparian areas greater than 40 acres. As with the NSO stipulation under Alternative 2, areas less than 40 acres could be protected from disturbance under SLT. Adherence to standards and guidelines in the Forest Plan should prevent adverse hydrologic changes from road or pipeline construction. Alternatives 3 and 4 are therefore likely to have no or minimal adverse impacts on wetland/riparian resources.

Alternative 5

SLT and adherence to FS standards and guidelines should result in no or minimal impacts to wetlands/riparian areas.

Cumulative Impacts

Other proposed activities on the Uinta NF include the Diamond Fork System (an extensive water development project), wetland development, aquatic habitat improvement, vegetation management activities for wildlife habitat, watershed improvements, road stabilization and restoration, and possible land acquisition. Within Ashley NF, the only other major activity affecting watershed resources is vegetation management, including aspen and sagebrush treatments.

Adverse cumulative effects on watershed resources are unlikely. Many of the other proposed activities are designed to improve watershed conditions. Vegetation management, which involves

removal of existing vegetation, may result in short-term adverse impacts to watershed resources, but the activities are designed with adequate controls in order to have minimal adverse impacts during and following implementation.

4.3 AIR QUALITY

General Effects

Under all alternatives, impacts to air quality would primarily be increased dust levels, smoke from the burning of slash, and/or exhaust emissions from gasoline or diesel engines. Impacts would primarily result from construction of roads or well pads and emissions from vehicles and operation of drill site machinery. The amount of dust would depend on the soil type, moisture conditions, and the amount of traffic on dirt or gravel roads. Smoke, if any, is not anticipated to be significant since in many parts of the study area the amount of slash from construction would not be enough to warrant burning. Vehicle exhaust emission would primarily depend on the amount of traffic. If production would occur on existing leases, impacts would likely be longer-term and could also include impacts from flaring of natural gas. Impacts would generally be localized and would not be expected to exceed Class 11 standards which allow emissions from industrialization. In addition, any activity on existing leases must comply with the Clean Air Act.

Effects of lease Options

Stipulations other than standard lease terms have not been proposed for air quality; however, stipulations for other resources may provide additional protection.

No Lease and No Surface Occupancy: NL and NSO would not result in a change to air quality in the study area over existing baseline conditions unless directional drilling occurs from outside the study area, production is established in areas with existing leases (e.g., Sowers Canyon), or roads and/or pipelines are constructed through areas with NSO stipulations. Directional drilling could result in minor, temporary impacts to air quality such as increased dust, however directional drilling is considered unlikely due to technical and cost constraints. If natural gas is produced in areas with existing leases, impacts to air quality from flaring or other emission sources could occur. If roads or pipelines are constructed through NSO area, increased dust and vehicle emissions could result. None of the possible impacts are anticipated to exceed Class 11 standards. The study area is a Class II area which means emissions from industrialization is allowed.

Controlled Surface Use and Timing Limitations: 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. However, other CSU or TL stipulations could result in temporary 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 11 standards.

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 pads, and pipeline construction. Any impacts are not anticipated to exceed Class 11 standards.

Effects of Alternatives

Alternative 1

Under the No Action/No Lease alternative, none of the federal minerals would be administratively available for oil and gas leasing; therefore no impacts to air quality would occur other than impacts from activity on existing leases, as described above. The RFDS anticipates one exploratory well on the Ashley NF outside of the Sowers Canyon area and 12 development wells within the Sowers Canyon area. Based on this RFDS, any air quality impacts would primarily be localized in the Sowers Canyon area and would continue until the leases expire or production ceases.

Alternative 2

Under this alternative, all federal minerals within the study area would be administratively available for leasing; however, approximately half of the study area would have a NSO stipulation and additional areas would have CSU, TL or both stipulations applied. None of the stipulations specifically address air quality. The RFDS projects one exploratory well on the Uinta NF, two exploratory wells on the Ashley NF outside the Sowers Canyon area, and 20 development wells within the Sowers Canyon area. Given this, impacts would occur to air quality as described above under "General Effects". The impacts would be focused in the Sowers Canyon area. Impacts are not anticipated to exceed Class II standards and would likely be only slightly higher than impacts to air quality under Alternative 1.

Alternative 3

Impacts to air quality under this alternative are anticipated to be very similar to that described for Alternative 2. One more exploratory well on the Ashley NF outside the Sowers Canyon area and 7 more development wells within Sowers Canyon are anticipated under this alternative as compared to Alternative 2, so impacts would be slightly greater but generally similar in nature.

Alternative 4

Under this alternative, impacts to air quality would likely be greater than that described for Alternatives 2 and 3 since fewer lands would be subject to NSO or other stipulations and the full RFDS is foreseeable. Like Alternatives 2 and 3, impacts would primarily be concentrated in the Sowers Canyon area, but anticipated to be within Class 11 standards. The nature of impacts to air quality would be as described above under "General Effects". Because some lands would still be subject to stipulations (mostly a CSU stipulation), impacts are expected to be less than that under Alternative 5.

Alternative 5

Under Alternative 5, all federal minerals within the study area would be administratively available for oil and gas leasing and would be leased with no special stipulations. The full RFDS is foreseeable under this Alternative, but any activity would have to comply with the Clean Air Act. Impacts would be as described above under "General Effects". Additionally, it is anticipated that the full RFDS would not exceed Class 11 standards.

Cumulative Impacts

Other proposed activities on the Uinta NF include the Diamond Fork System (an extensive water development project), wetland development, aquatic habitat improvement, vegetation management activities for wildlife habitat, watershed improvements, road stabilization and restoration, and possible land acquisition. Within Ashley NF, the only other major activity affecting watershed resources is vegetation management, including aspen and sagebrush treatments.

While these activities mostly include vehicular emissions and generation of fugitive dust, adverse cumulative effects on air resources are highly unlikely due to the large size of the area and the comparatively small scale of the activities.

4.4 WILDLIFE AND FISHERIES

This section provides a description of potential impacts to wildlife and fisheries resulting from implementation of the various leasing options and alternatives. The sensitive wildlife and fisheries components identified in Chapter 3 for analysis include sage grouse habitat, big game winter range, big game summer range, elk calving/mule deer fawning areas, and raptor habitat.

4.4.1 Sage Grouse Habitat

General Effects

Leks are the traditional breeding/strutting grounds used by sage grouse generation after generation. A lek may be as large as 1 km long by 200 m wide (Welty 1975). Breeding at leks occurs during late April and May. Sage grouse hens typically construct their nests in the vicinity of the lek. Any oil and gas activity that results in complete elimination of a lek would result in significant effects to the sage grouse, even to the survival of the affected population. Alteration of sagebrush habitat in the vicinity of a lek may also cause population declines or abandonment of an area by breeding sage grouse (Ellis et al. 1989). While specific leks have not been mapped, 25,030 acres of critical sage grouse habitat occurs within the study area, about half within the Sowers Canyon area (12,890 acres), and about half on the Ashley NF outside Sowers Canyon (12,140 acres) (Figure 3-7). There is no critical sage grouse habitat on Uinta NF within the study area. Prior to ground-disturbing activities, sage grouse surveys should be conducted and leks should be identified and avoided. Ellis et al. (1989) recommend protection of all sagebrush within a 3-km radius of a lek; if this is not possible, male day-use areas should be identified and protected. Day use areas typically have the greatest sagebrush height and cover in the area surrounding the lek.

Effects of Lease Options

No Lease: NL would result in no effects to sage grouse leks. Leks and the surrounding critical sagebrush habitat would not be impacted by oil and gas activity.

No Surface Occupancy: A NSO stipulation would prevent well pads from being constructed in critical sage grouse habitat; however, NSO would not apply to access roads and pipeline/powerlines. Therefore, critical sage grouse habitat could be lost and associated impacts to sage grouse populations would result, such as population declines, displacement, and increased hunting pressure from increased access. The magnitude of impact would depend on the location of disturbance. Disturbance at lek sites or within 3 km of leks (as recommended by Ellis et al. 1989) would be more severe than in other sage grouse habitat. In addition, impacts may be somewhat mitigatable since proposals for roads and pipelines (including design and placement) would be governed by standards and guidelines in the Forest Plans. For example, the Ashley Forest Plan states "design and construct roads to avoid adversely affecting critical wildlife areas" (USFS 1986a, pg. IV-50). Given this, it is assumed that leks would be avoided by roads; however, it might not be possible to avoid a 3-km radius around leks. It is recommended that surveys be conducted prior to ground disturbing activities, and reasonable attempts are made to avoid leks and the 3 km radius around leks, where possible.

Controlled Surface Use: A CSU stipulation specifically for sage grouse is not proposed. CSU stipulations for other critical wildlife habitat would restrict the number of concurrent operations (wells being drilled) at any given time. Disturbance could take place in critical sage grouse habitat, including leks and the recommended 3 km buffer area around leks. As a result sage grouse could experience population declines, displacement to less favorable habitat, and increased hunting pressure from increased access. However, with a CSU stipulation the magnitude of such impacts could be lessened because of the restriction on human activity/disruption at any one time.

Timing Limitations: A TL stipulation would preclude activities during key periods of use by wildlife. A TL stipulation would reduce the impact of a disturbance in critical sage grouse habitat. For example, if a well pad, road, or pipeline were built at or near a lek but no activity occurred at these sites during breeding (late March and April) and nesting (May, June, July) seasons, the impacts would be greatly reduced. Breeding and nesting would likely still occur with little disruption due to the presence of oil and gas facilities as long as human activity at these sites were restricted during these critical times. Direct loss of habitat would not be reduced.

Standard Lease Terms: Under SLT, no special stipulations would be applied. SLT would not provide special consideration for the protection of sage grouse critical habitat. This could result in a direct loss of habitat from the construction of roads, well pads and pipelines, including loss of critical breeding (leks) and nesting grounds. As a result, sage grouse could experience population

declines and/or displacement, and possible increase in hunting pressure from increased access. However, such impacts may be somewhat mitigatable under SLT because an operator can be required to relocate proposed facilities up to 200 meters which would likely ensure protection of most leks (assuming lek locations have been identified), although breeding activity would likely be adversely affected by disturbance and nesting and feeding habitat would be reduced. In addition, operators may be required to delay operations for up to 60 days, which could reduce impacts to sage grouse during their critical breeding season.

Effects of Alternatives

Table 2-1 shows the stipulations that would be applied for sage grouse under the five alternatives. Direct and indirect impacts are summarized and discussed below. Direct impacts for the Uinta NF and for Ashley NF outside the Sowers Canyon area are estimated based on the assumption that affected areas could be located entirely within sensitive habitats. For the Sowers Canyon area, it is not reasonable to assume that all impacts will occur in sensitive habitat, because of well spacing requirements, and a proportional methodology is used - the percentage of the disturbance area in sensitive habitat is assumed to be the same as the percentage of that type of sensitive habitat in the Sowers Canyon area.

Direct Impacts on Sage Grouse Critical Habitat

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres	0	0	0	0	0
	% ¹	0	0	0	0	0
Ashley NF, outside Sowers Canyon area	Acres	5.4	6.7	20.4	26.8	26.8
	%	0.04	0.05	0.2	0.2	0.2
Sowers Canyon Area	Acres	16.3	16.8	36.7	40.7	40.7
	%	0.1	0.1	0.3	0.3	0.3

¹ % represents percent of habitat type disturbed. For example, for Ashley NF outside the Sowers Canyon area under Alternative 1, 5.4 acres could be disturbed. This represents .04% of the total Sage Grouse Habitat within Ashley NF outside Sowers Canyon area.

Alternative 1

Although Alternative 1 is the No Action/No Lease alternative, oil and gas activities could occur on existing leases until the leases expire or production ceases, at which time the lands under existing leases would revert to No Lease. Since the existing leases do not include any stipulations for protection of sage grouse or their habitat, impacts to sage grouse are possible under this alternative until the existing leases expire. Once existing leases expire or production ceases, sage grouse habitat could be restored.

Direct impacts from one exploratory well and related roads on the Ashley NF outside the Sowers Canyon area would be 5.4 acres, and direct impacts from 12 development wells and related facilities within Sowers Canyon on existing leases would be 16.3 acres (based on the Sowers Canyon area being 25.8% critical sage grouse habitat). These areas are each less than 0.1% of sage grouse critical habitat acreage in their portion of the study area. There is no critical sage grouse habitat on Uinta NF within the study area, and there would be no oil and gas activities on Uinta NF.

Although roads may be constructed through sage grouse habitat, the standard lease terms would provide adequate protection of lek sites, if they are known to be present based on clearance surveys or other field observations. These stipulations would not provide adequate protection if clearance surveys are not completed, and the USFS would require them prior to construction. The SLT terms allow the USFS to request movement of facilities by 200 m and delay of activities by 2 months. These terms would both protect leks from direct disturbance, and prevent indirect disturbance from construction near leks during the breeding season. Indirect impacts from use of the roads in subsequent years would also be minimal.

Alternative 2

An NSO stipulation would be applied to all 25,030 acres of sage grouse habitat under Alternative 2. Since NSO only applies to well pads, direct and indirect impacts could occur to sage grouse habitat from access roads and pipelines. The area of direct impacts would be 5.4 acres on the Ashley NF outside the Sowers Canyon area, and 16.8 acres within Sowers Canyon. These areas are about 0.05% and 0.1% of sage grouse critical habitat acreage in their portion of the study area. As with Alternative 1, the standard lease terms would provide adequate protection of lek sites, if they are

present. They would both protect leks from direct disturbance, and would prevent indirect disturbance from construction near leks during the breeding season.

Alternative 3

Under Alternative 3, a TL stipulation would be applied to sage grouse habitat. Because of overlap with steep slopes which is NSO under this alternative, 4,620 acres of sage grouse habitat would be NSO, and the remaining 21,410 acres would be TL. TL would greatly reduce disturbance effects on sage grouse during the critical breeding season, helping to maintain habitat effectiveness. Losses of habitat could potentially still occur from direct disturbance of leks during the remainder of the year, but the standard lease terms allow the USFS to request movement of facilities by 200 m should prevent direct disturbance of lek sites. The area of direct impacts would be 20.4 acres on the Ashley NF outside the Sowers Canyon area, and 36.7 acres within Sowers Canyon. These areas are about 0.2 and 0.3% of sage grouse critical habitat acreage in their portion of the study area. Direct impacts to this amount of nesting and feeding habitat, in the absence of direct or indirect effects on leks, will have only a minor effect on sage grouse populations. With the TL stipulation, it can be assumed that indirect effects would be minor.

Alternatives 4 and 5

No special stipulations would be attached to leases for sage grouse habitat under these two alternatives, and SLT would apply. SLT should provide protection of leks from direct disturbance (facilities can be moved up to 200 m), and should provide protection against some indirect effects (activities can be delayed for up to 2 months). CSU stipulations for steep slopes (about 20% of the sage grouse habitat) may reduce long-term habitat losses but would not reduce indirect disturbance-related effects. In addition, all 24,030 acres of critical sage grouse habitat are located within elk critical winter range, which under Alternative 4 would have a TL stipulation from November 15 to April 30, including the first half of the sage grouse breeding season.

The area of direct impacts are estimated to be 26.8 acres on the Ashley NF outside the Sowers Canyon area, and 40.7 acres within Sowers Canyon. These areas are about 0.2 and 0.3% of sage grouse critical habitat acreage in their portion of the study area. These direct losses of nesting and feeding areas would not have a significant effect on the sage grouse population.

4.4.2 Big Game Winter Range

General Effects

Elk, mule deer, and moose winter range are included in this analysis. Winter range is critical to big game populations because it typically provides thick cover for security, ample forage, and limited accessibility by humans during this vulnerable time of year. Elk and deer generally congregate in large herds at lower elevations during the winter, while moose commonly occur in small groups and browse on woody plants.

The major types of impacts from oil and gas exploration and development include direct loss of habitat, disturbance and indirect loss of habitat, and mortality.

Direct loss of habitat occurs from clearing of vegetation for well pads, roads and pipelines. These areas will not produce forage until they are revegetated. It is assumed that the carrying capacity of the overall winter range is reduced proportionally to the percentage of winter range affected.

The largest impact on wintering big game is disturbance by increased human activity and noise. Big game animals often move away from a disturbance to other habitat, or alter their activity patterns. This may result in underuse of habitat near the disturbance (loss of habitat effectiveness), and overuse of other areas. Wildlife may be forced into areas of lower habitat value. Individual animals may suffer physiological stress and high energy expenditure from repeated disturbance, which may lead to increased mortality or decreased reproduction the following spring. While these effects may occur at any time of year, their effect is particularly important during the winter when the animals are already under stress.

The extent of impact is difficult to predict because of site-specific variables such as visibility and hiding cover, the tolerance of the individual animals, the timing and type of disturbance, time of day and other factors. In general, the effects would be greatest closest to the disturbance, and would decrease with increasing distance. Effects would be greatest during the construction and drilling phase when the level of human activity is highest, and would decrease during operation.

Disturbance and displacement of deer and elk caused by road traffic, logging, and other facilities reported in the literature typically vary between 200 and 1000 m (Lyon et al. 1985; Ward 1976; Ward and Cupal 1979; Lyon and Ward 1982; Edge and Marcum 1985; and Rost and Bailey 1979).

Elk responses are more severe and pronounced than deer, and elk have much higher security requirements than deer. In Wyoming, elk moved 0.5 to 2.5 miles away from a well site, often placing visual and auditory barriers between the herd and the well site (Hayden-Wing Associates 1990). Elk displacement away from activities sometimes has been shown to be significant (Johnson and Lockman 1980) and at other times they appear to habituate to such activities (Knight 1980).

Much of the Ashley NF and Sowers Canyon area consists of fairly open vegetation, with numerous canyons up to a mile wide or more. Wells and roads in the middle of a canyon could reduce elk and deer use up to the canyon rim, but pinyon-juniper woodlands and side canyons may provide cover and reduce the area of displacement. For this study, the area of indirect impact was estimated based on displacement of elk by 0.5 mile, and mule deer by 0.25 mile. Use of habitat within this zone could be reduced by 10-70%. It was assumed that moose would not be adversely affected by disturbance outside of riparian habitat.

There will likely be mortality from vehicle collisions with big game. Because of their greater tolerance to human activities, collisions with mule deer are likely to increase more than collisions with elk.

Impacts to moose winter range are likely to be more significant than impacts to elk or mule deer winter range. First, there is less moose winter range in the study area than there is elk and mule deer winter range. Second, moose winter range is relatively specialized habitat (primarily wetland and riparian areas); therefore, the likelihood of displacement by oil and gas activity into marginal habitat during winter months is greater.

Effects of Lease Options

No Lease: NL on big game winter range would generally limit most negative effects from oil and gas exploration and development. However, there could be a loss of habitat effectiveness at the outer perimeter of the study area where big game winter range occurs if oil and gas activities were occurring on adjacent lands or on non-Federal mineral ownership. Development on adjacent lands could also displace animals from those areas and onto the protected winter ranges, possibly causing overuse and a decrease in carrying capacity.

No Surface Occupancy: NSO is not proposed specifically for big game winter range. NSO stipulations for other resources overlapping with big game winter range would prevent well pads from being constructed. NSO would not apply to access roads and pipeline/powerlines. Therefore, big game winter range could be impacted, resulting in direct loss of habitat, fragmentation of winter range, and loss of habitat effectiveness. Big game could be displaced from preferred, optimum or secure habitats to marginal habitats lacking the winter range habitat conditions that are necessary for survival. Increased access could also result in increased hunting pressure. However, impacts may be somewhat mitigatable since proposals for roads and pipelines (including design and placement) would be governed by standards and guidelines in the Forest Plans. For example, the Ashley Forest Plan states "design and construct roads to avoid adversely affecting critical wildlife areas" (USFS 1986a, pg. IV-50). This could offer some protection to big game winter range, but impacts may still occur.

Controlled Surface Use: A CSU stipulation would restrict the number of concurrent operations (wells being drilled) at any given time. Disturbance could take place in big game winter range with the associated impacts to big game, such as direct loss of habitat, fragmentation of winter range, loss of habitat effectiveness, displacement of big game to less favorable habitats, and increased hunting pressure. However, with a CSU stipulation, the magnitude of disturbance-related impacts would be lessened because of the restriction on human activity/disruption at any one time.

Timing Limitations: TL stipulations would preclude oil and gas activities in big game winter range during key winter periods from November 15 to April 30 (see Chapter 2). Although surface disturbance would still occur in big game winter range and direct habitat loss would occur, indirect impacts such as the reduced habitat effectiveness and displacement of big game would be greatly reduced since no human activity/disruptions would occur during critical winter months.

Standard Lease Terms: SLT would not provide special consideration for the protection of big game winter range. This could result in a direct loss and fragmentation of habitat from the construction of roads, well pads and pipelines; reduced habitat effectiveness from human activity/disruptions; possible displacement of big game from preferred, optimum or secure habitats to marginal habitats lacking the winter range habitat conditions that are necessary for survival; and possible increase in hunting pressure from increased access.

Effects of Alternatives

Table 2-1 shows the stipulations that would be applied for big game winter range under the five alternatives. Direct and indirect impacts are summarized and discussed below.

Direct Impacts on Elk Critical Winter Range

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres of Impact	0	6.9	6.9	6.9	6.9
	% of Habitat ¹	0	0.03	0.03	0.03	0.03
Ashley NF, outside Sowers Canyon area	Acres of Impact	5.4	10.7	20.4	26.8	26.8
	% of Habitat	0.01	0.01	0.02	0.03	0.03
Sowers Canyon area	Acres of Impact	61.7	102.8	138.9	154.3	154.3
	% of Habitat	0.1	0.2	0.3	0.3	0.3

Direct Impacts on Mule Deer Critical Winter Range

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres of Impact	0	6.9	6.9	6.9	6.9
	% of Habitat ¹	0	0.03	0.03	0.03	0.03
Ashley NF, outside Sowers Canyon area	Acres of Impact	5.4	10.7	20.4	26.8	26.8
	% of Habitat	0.05	0.1	0.2	0.3	0.3
Sowers Canyon area	Acres of Impact	3.7	6.2	8.4	9.3	9.3
	% of Habitat	0.1	0.2	0.3	0.3	0.3

¹ Percent of habitat available. For example, under Alternative 3, 6.9 acres of elk critical winter range in the Uinta NF could be directly impacted. This represents 0.03 percent of this habitat within the Uinta NF portion of the EIS study area.

Alternative 1

Under Alternative 1, none of the federal mineral areas would be administratively available for oil and gas leasing. This would provide protection of all big game winter range in the study area from new oil and gas leasing activity. However, existing leases may still be developed. Impacts would occur until existing leases expire or production ceases.

Direct impacts from one exploratory well and related roads on the Ashley NF outside the Sowers Canyon area would be 5.4 acres of mule deer and elk critical winter range. Direct impacts from 12 development wells and related facilities within Sowers Canyon on existing leases are estimated to be 61.7 acres for elk, and 3.7 acres for mule deer, based on the proportion of their habitat in this area (the Sowers Canyon area is 97.7% critical elk winter range, and 5.9% critical mule deer winter range). These areas of direct disturbance are 0.1% or less of elk and mule deer critical winter range in their portion of the study area. There would be no oil and gas activities on Uinta NF within the study area, and no effects on moose winter range.

Indirect effects could occur from human activity and noise during construction. Assuming that elk may be displaced by 0.5 mile and mule deer by 0.25 mile from roads and wells, the area of indirect impacts would be as follows:

Area of Indirect Impacts to Elk and Mule Deer (Alternative 1)

Area	ELK		MULE DEER	
	Acres	% of Habitat	Acres	% of Habitat
Ashley NF, outside Sowers Canyon area	1,019	0.6	510	5.1
Sowers Canyon area	8,945	18.6	268	9.2

This displacement would result in a significant loss in habitat effectiveness for elk and mule deer winter range in the Sowers Canyon area. It may result in lower winter survival and displacement to less favorable habitat. Impacts would probably be greatest during construction, and be much less during operation when human activity and noise would be reduced, and big game may have become more adapted to the disturbance.

Alternative 2

Under Alternative 2, a TL stipulation would be applied to all elk and mule deer critical winter range. Because of overlap with other resources covered by NSO stipulations, much of the elk and deer winter range would also be NSO. For elk, 139,140 acres would be NSO because of overlap with steep slopes, sage grouse habitat, RARE II area, RNAs, elk yearlong habitat, and geological hazards, and the remaining 35,830 acres of elk winter habitat would not be NSO. For mule deer, 14,710 acres of winter habitat would be in areas covered by NSO stipulations, and 7,370 acres would not be NSO. The NSO stipulations in mule deer winter range are due to overlap with steep slopes, RARE II areas, and visual resource retention areas. Moose winter range would be protected from direct impact by an NSO for riparian/wetlands.

Since NSO only applies to well pads, direct and indirect impacts could occur to big game winter range habitat from construction and use of access roads and pipelines. The TL stipulation would therefore provide greater protection against indirect impacts because it would restrict all construction activity from November 15 to April 30. The use of the TL stipulation would eliminate most or all indirect impacts from construction disturbance during the critical winter period. Some disturbance and avoidance of well sites (in the areas not covered by NSO) and roads may occur during operation but this is likely to be minor in the absence of human activity.

Direct losses of habitat would occur, and are summarized above. The proportion of habitat directly affected would be 0.2% or less in each area.

Alternative 3

Under Alternative 3, a TL stipulation would also be applied to all elk and mule deer critical winter range. Much of the elk and deer habitat would also be covered by an NSO stipulation due to overlap with other resources. For elk, 82,110 acres would be covered by NSO (overlap mostly with steep slopes, and some with RNAs), and 92,860 acres would not be NSO. Mule deer winter

range would include 11,020 acres covered by NSO (steep slopes and retention), and 11,060 acres of winter range would not be NSO. Moose winter range would be covered by a CSU stipulation for riparian/wetland, for areas greater than 40 acres. SLT terms allowing the FS to require movement of facilities up to 200 m or delay of activities up to two months would also protect moose habitat.

Impacts would be similar to Alternative 2, but the proportion of habitat directly affected would be slightly larger (up to 0.3% in the Sowers Canyon area).

Alternative 4

Under Alternative 4, a TL stipulation would be applied to elk winter range, and a CSU stipulation to mule deer winter range. About 1,600 acres of elk winter range is within an RNA and would be covered by an NSO stipulation. Nearly all of the mule deer winter range on Ashley NF (including Sowers Canyon area) is within elk winter range, and therefore would be covered by the TL stipulation for elk. Moose habitat would be covered by a CSU stipulation for riparian/wetland, and by SLT allowing movement of facilities.

The impacts would be similar to the previous two alternatives. In the area of mule deer critical winter range not covered by the elk TL stipulation, the CSU stipulation would restrict the number of concurrent operations. Since this is a very small area, it is doubtful if there would be more than one well or road even without the CSU stipulation.

Alternative 5

Under Alternative 5, the full RFDS is projected with no special stipulations. Unlike the other alternatives, Alternative 5 would allow construction of facilities during the November 15 to April 30 period critical winter period for wintering big game. SLT terms would allow delay of activities for up to two months and movement of facilities by up to 200 m, but these restrictions would not provide meaningful protection for elk and mule deer winter range. However, they may be effective for moose habitat, which occurs in linear and narrow riparian areas.

Elk and mule deer would be displaced from the vicinity of the oil and gas activities. Assuming that elk would be displaced up to 0.5 mile and mule deer up to 0.25 mile from roads and well sites, the area of indirect impacts would be as follows:

Area of Indirect Impacts on Elk and Mule Deer (Alternative 5)

	Elk Acres	% of habitat	Mule Deer Acres	% of Habitat
Uinta NF	1,339	5.3	670	7.3
Ashley NF, outside Sowers Canyon area	5,095	5.0	2,550	25.6
Sowers Canyon area	22,364	46.4	676	23.1

This displacement would result in a significant loss in habitat effectiveness for elk winter range, especially in the Sowers Canyon area, and may result in lower winter survival, displacement to less favorable habitat, and long-term reductions in populations. For mule deer, large proportions of winter habitat would also be affected. The long-term effects are likely to be less than for elk due to mule deer's greater ability to adjust. Direct losses of habitat for elk and mule deer would be similar to those for Alternative 4, and would be minor compared to indirect effects.

4.4.3 Big Game Summer Range

General Effects

Elk and mule deer summer range are included in this analysis. Impacts from oil and gas activity to big game summer range are generally not as severe as impacts to winter range or calving/fawning areas. Summer range habitat conditions appear to be adequate; however, impacts to the quality or quantity of summer range could result in reduction of big game populations. Summer range is important for high quality forage, security, and lack of disturbance. Summer range is also important for its buffering effects for calving/fawning areas.

Impacts from oil and gas activity would include direct loss of habitat and high quality forage from well pads, roads, and pipelines and direct loss of security from vehicles and other human activities. These conditions could cause displacement of big game to other summer range and a reduction in habitat effectiveness. Oil and gas activity would also result in fragmentation of summer range. These impacts would vary in magnitude depending on the level of oil and gas activity, and would be short-term in the case of exploratory wells that do not result in discovery and long-term in the case of development wells.

The amount of summer range impacted under each alternative is presented below.

Effects of Lease Options

No Lease: NL would result in no impacts to big game summer range. Even if oil and gas activity occurred on the perimeter of the study area, effects to summer range are unlikely since summer range habitat conditions appear adequate and summer range is less critical than winter range.

No Surface Occupancy: An NSO stipulation would not be applied specifically for elk or deer summer range. However, NSO stipulations for other resources would prevent well pads from being constructed on some areas of big game summer range. NSO would not apply to access roads and pipeline/powerlines. Therefore, big game summer range could be impacted, resulting in direct loss of summer range habitat, fragmentation of habitat, loss of habitat effectiveness, and displacement of big game to other summer range. However, impacts may be somewhat mitigatable since proposals for roads and pipelines (including design and placement) would be governed by standards and guidelines in the Forest Plans. For example, the Ashley Forest Plan states "design and construct roads to avoid adversely affecting critical wildlife areas" (USFS 1986a, pg. IV-50). This could offer some protection to big game summer range, but some impacts could still occur since summer range is generally less critical than winter range or calving/fawning areas.

Controlled Surface Use: A CSU stipulation would restrict the number of concurrent operations (wells being drilled) at any given time. Disturbance could still take place in big game summer range with the associated impacts to big game, such as direct loss of habitat, fragmentation of habitat, reduced habitat effectiveness, and possible displacement to other summer range. A CSU stipulation could reduce the magnitude of impact because of the restrictions on human activity/disruption occurring at one time.

Timing Limitations: A TL stipulation has not been proposed for elk summer range. For mule deer, the TL is primarily proposed to limit adverse effects on fawning. Therefore, impacts could occur to big game from oil and gas activities on summer range. Impact could include direct loss of habitat, fragmentation of habitat, reduced habitat effectiveness, and possible displacement to other summer range. Impacts to big game on summer range are likely to be less adverse than winter range, because of the adequate amounts of alternative summer range, and the absence of weather and food stress.

Standard Lease Terms: SLT would not provide special consideration for the protection of big game summer range. This could result in a direct loss and fragmentation of habitat from oil and gas facilities (including road and pipelines) constructed in summer range, reduced habitat effectiveness from human activity/disruptions, and possible displacement of big game to other summer range. Under SLT an operator can be required to relocate proposed facilities up to 200 meters or delay activity up to 60 days. These provisions may reduce construction impacts but would not likely reduce operational impacts to big game summer range.

Effects of Alternatives

Table 2-1 shows the stipulations that would be applied for big game summer range under the five alternatives. Direct and indirect impacts are summarized and discussed below.

Direct Impacts on Elk Critical Summer Range

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres of Impact	0	6.9	6.9	6.9	6.9
	% of Habitat ¹	0	0.1	0.1	0.1	0.1
Ashley NF, outside Sowers Canyon area	Acres of Impact	0	0	0	0	0
	% of Habitat	0	0	0	0	0
Sowers Canyon area	Acres of Impact	0	0	0	0	0
	% of Habitat	0	0	0	0	0

Direct Impacts on Mule Deer Critical Summer/Fawning Range

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres of Impact	0	0	0	0	0
	% of Habitat ¹	0	0	0	0	0
Ashley NF, outside Sowers Canyon area	Acres of Impact	5.4	10.7	20.4	26.8	26.8
	% of Habitat	0.02	0.04	0.07	0.09	0.09
Sowers Canyon area	Acres of Impact	9.2	15.4	20.7	23.1	23.1
	% of Habitat	0.1	0.2	0.3	0.3	0.3

¹ Percent of available habitat. For example, under Alternative 3, 6.9 acres of elk critical summer range in the Uinta NF could be directly impacted. This represents 0.1 percent of this habitat within the Uinta NF portion of the EIS study area.

Alternative 1

Under Alternative 1, none of the federal minerals areas would be administratively available for oil and gas leasing. This would provide protection of all big game summer range in the study area from new oil and gas leasing activity. However, existing leases may still be developed. There are no stipulations for protection of big game summer range under existing leases. Impacts would occur until existing leases expire or production ceases.

There would be no impact to elk summer range because there would be no wells on Uinta NF, and there is no elk summer range within the Ashley NF portion of the study area. Direct impacts to mule deer would include loss of 5.4 acres of critical summer range on the Ashley NF, and 9.2 acres in the Sowers Canyon area. These areas of direct disturbance are 0.1% or less of the available critical summer range. The Sowers Canyon area is about 14.4% critical mule deer summer range.

Indirect impacts could occur from human activity and noise during construction. Mule deer are likely to be displaced from near the facilities. Impacts would probably be greatest during construction, and be much less during operation when human activity and noise would be reduced, and mule deer would have become habituated to the new facilities and activities. Most impacts

would therefore probably be short term, and long-term effects on mule deer populations are unlikely.

Alternative 2

Under Alternative 2, a CSU stipulation would be applied to all elk and mule deer summer range. However, most of the elk and mule deer summer habitat would be within NSO areas because of other resources. For elk, 6,540 acres would be NSO because of overlap with RARE II areas, geological hazards, and steep slopes, and only 10 acres would not be NSO. Mule deer habitat would include 30,120 acres of NSO because of overlap with steep slopes, sage grouse habitat, and small areas of a few other resources, and 5,310 acres would not be NSO..

NSO stipulations only apply to well pads, and direct and indirect impacts to big game summer range could occur from construction of roads and pipelines. The CSU stipulation would limit the number of concurrent construction activities in big game summer range, which would limit indirect impacts but not change the direct effects. Direct losses of summer range are summarized above, and are 0.2% or less of the available habitat in these areas. Indirect effects are likely to be more significant than direct effects. Human activity and noise may displace elk and mule deer from the construction sites. The effects of disturbance to big game on summer range are likely to be less than similar disturbance on winter range because the animals are under less physiological stress. However, there is likely to be some reduction in habitat effectiveness. Impacts will be reduced following construction, but some loss of habitat effectiveness for elk will persist.

Alternative 3

Under Alternative 3, an SLT stipulation would be applied to all elk critical summer range, and a TL stipulation to mule deer critical summer range for the period May 15 to June 15. Much of the big game summer range would be covered by other stipulations under this alternative. 2,240 acres of elk summer range would be NSO, mostly because of overlap with steep slopes. The remaining 4,310 acres of elk summer range would be covered by controlled surface use stipulations for geological hazards, roadless areas, semiprimitive nonmotorized areas, and retention. These stipulations would require extensive reclamation. While short-term disturbance effects would still occur, long-term effects on habitat may be reduced.

About half of the mule deer summer range, 15,700 acres, would be included in NSO areas (mostly for steep slopes). The remaining 19,730 acres would be covered under TL and CSU stipulations. CSU stipulations for semi-primitive nonmotorized and partial retention areas would each apply to about 15% of the mule deer summer range. These stipulations would require extensive reclamation, which may reduce long-term habitat loss.

Direct impacts on habitat are summarized above, and would be up to 0.3% of critical summer habitat in the Sowers Canyon area. Indirect effects would also occur from disturbance and displacement, as described under

Alternative 2. Indirect impacts to mule deer are unlikely during the May 15 to June 15 period when activity would be restricted. This TL primarily protects deer fawning, which occurs on summer range.

Alternatives 4 and 5

Under Alternatives 4 and 5, the full RFDS is projected with no special stipulations for protection of big game summer range. Only SLT would be directly applicable. However, under Alternative 4, 4,230 acres of elk summer range would be included in CSU areas for geologic hazards and steep slopes, which may reduce long-term effects. Most of the mule deer summer range would be covered by an elk TL in Alternative 4, which would provide no additional protection, and some portions would be covered by a CSU for steep slopes, which would require extensive reclamation.

Direct impacts for mule deer range would be slightly larger than Alternative 3, and would be about 0.3% of available habitat in the Sowers Canyon area. Direct impacts for elk summer range would be the same as in Alternatives 2 and 3. Indirect impacts from noise and human activity may occur, and big game are likely to be displaced from the immediate vicinity of construction or other activities. Impacts would probably be greatest during construction, and would be reduced during operation.

4.4.4 Elk Calving/Mule Deer Fawning Areas

General Effects

Impacts from oil and gas activity to elk calving/mule deer fawning areas are likely to be significant, possibly resulting in reduced populations of these species. Impacts could include direct loss of

calving/fawning areas, possible loss of calves/fawns, and displacement during a critical phase of an animal's life cycle. If elk and deer are displaced to less favorable calving/fawning sites, they may also acquire an increased potential for mortality due to predation, accidents, and disease. These impacts could vary in magnitude depending on the level of oil and gas activity, and would be short-term in the case of exploratory wells and long-term in the case of development wells.

The amount of elk calving/mule deer fawning areas potentially impacted under each alternative is presented below by area. Elk calving areas are specific areas, as mapped on Figure 3-6. However, mule deer fawning areas are not specific sites but generally correspond to mule deer summer range and as such, mule deer summer range is used in the calculations below.

Effects of Lease Options

No Lease: NL would generally result in no impact to elk calving or mule deer fawning areas. Indirect impacts could occur if oil and gas activity occurs on lands adjacent to the study area resulting in displacement from other adjacent, unprotected areas and an increase in habitat use and animal stress in the study area.

No Surface Occupancy: A NSO stipulation would not be applied specifically for big game calving/fawning areas. However, NSO for other resources in calving/fawning habitat would prevent well pads from being constructed in elk calving/mule deer fawning areas. NSO would not apply to access roads and pipeline/powerlines, and these areas could be impacted, resulting in loss of calving/fawning areas, possible loss of calves/fawns, and displacement during a critical phase of an animal's life cycle. If elk and deer are displaced to less favorable calving/fawning sites, they also acquire an increased potential for mortality due to predation, accidents, and disease. However, these impacts may be somewhat mitigatable since proposals for roads and pipelines (including design and placement) would be governed by standards and guidelines in the Forest Plans. For example, the Ashley Forest Plan states "design and construct roads to avoid adversely affecting critical wildlife areas" (USFS 1986a, pg. IV-50). This could offer some protection to calving/fawning areas.

Controlled Surface Use: A CSU stipulation would restrict the number of concurrent operations (wells being drilled) at any given time. Disturbance could still take place in calving/fawning areas with the associated impacts, such as loss of calving/fawning areas, possible loss of calves/fawns, and displacement during a critical phase of an animal's life cycle. A CSU stipulation could reduce

the magnitude of impact because of the restrictions on human activity/disruption occurring at one time; however, if the disturbance is in the vicinity of calving/fawning areas impacts may still be significant.

Timing Limitations: TL stipulations would reduce impacts by restricting activities during the elk calving period of May 1 to June 30. The mule deer summer range TL would restrict activities from May 15 to June 15. Although surface disturbance could still occur in calving/fawning areas, the impacts to elk and mule deer would be reduced, particularly potential loss of calves/fawns and displacement to less favorable habitat. This stipulation would likely be more effective for mule deer fawning areas since mule deer do not have specific fawning areas which are used year after year. Elk calving areas are more specific and impacts to these areas, even if not during calving periods, may adversely impact elk.

Standard Lease Terms: SLT would not provide special consideration for the protection of elk calving/mule deer fawning areas. Oil and gas activities could occur in these areas resulting in direct loss of calving/fawning areas, possible loss of calves/fawns, and displacement during a critical phase of an animal's life cycle. However, under SLT an operator can be required to relocate proposed facilities up to 200 meters or delay activity up to 60 days. These provisions could reduce impacts to elk calving/mule deer fawning areas by avoiding them or restricting activity during critical periods.

Effects of Alternatives

Table 2-1 shows the stipulations that would be applied for big game birthing range under the five alternatives. Direct and indirect impacts are summarized and discussed below. Mule deer critical fawning range coincides with mule deer critical summer range, and direct losses of habitat would be the same as previously provided.

Direct Impacts on Elk Calving Range

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres of Impact	0	6.9	6.9	6.9	6.9
	% of Habitat ¹	0	0.1	0.1	0.1	0.1
Ashley NF, outside Sowers Canyon area	Acres of Impact	0	0	0	0	0
	% of Habitat	0	0	0	0	0
Sowers Canyon area	Acres of Impact	0	0	0	0	0
	% of Habitat	0	0	0	0	0

¹ Percent of available habitat. For example, under Alternative 3, 6.9 acres of elk calving range in the Uinta NF could be directly impacted. This represents 0.1 percent of this habitat within the Uinta NF portion of the EIS study area.

Alternative 1

Under Alternative 1, none of the federal mineral areas would be administratively available for oil and gas leasing, which would provide protection of calving/fawning areas in the study area from new oil and gas leasing activity. However, existing leases could still be developed, and existing leases have no stipulations for protection of calving or fawning areas.

Direct effects on mule deer fawning range would be 5.4 acres on the Ashley NF outside of the Sowers Canyon area, and 9.2 acres in the Sowers Canyon area. These represent 0.1% or less of available habitat. There would be no oil and gas activities on Uinta NF within the study area. Indirect impacts could occur from human activity and noise during construction. Mule deer are likely to be displaced from near the facilities. Impacts would probably be greatest during construction, and be much less during operation when human activity and noise would be reduced, and mule deer would have become habituated to the new facilities and activities. Most impacts would therefore probably be short term, and long-term effects on mule deer populations are unlikely.

Alternative 2

Under Alternative 2, a TL stipulation would be applied to elk calving areas, and a CSU stipulation would be applied to mule deer fawning areas (summer range). Most of the elk calving areas (14,130 acres) would be protected by NSO stipulations applied for other resources, mainly roadless areas. The remaining 3,880 acres of elk calving habitat would have the TL stipulation applied. Mule deer habitat would include 30,120 acres of NSO because of overlap with steep slopes, sage grouse habitat, and small areas of a few other resources. The remaining 5,310 acres would be covered by the CSU stipulation for mule deer summer range.

NSO stipulations only apply to well pads, and direct and indirect impacts to big game calving/fawning range could occur from construction of wells and pipelines. The TL stipulation for elk calving range would restrict activity from May 1 to June 30, and would prevent disturbance-related impacts during the calving season. The CSU stipulation for mule deer fawning/summer range would limit the number of concurrent operations, and would minimize the impacts.

Direct losses of habitat are summarized above. Losses of big game birthing range would be 0.2% or less of available habitat. Indirect impacts to elk calving range would be prevented by the TL stipulation. Indirect impacts may occur to mule deer, including displacement of deer from their normal fawning range.

Alternative 3

Under Alternative 3, a TL stipulation would be applied to both elk calving and mule deer fawning range. About one-fourth of the elk calving area would also be protected by a NSO stipulation for steep slopes, and the remaining 13,740 acres would have only the TL applied. About half of the mule deer fawning areas/summer range, 15,700 acres, would be included in NSO areas (mostly because of steep slopes). The remaining 19,730 acres would be covered under the TL stipulation.

NSO stipulations only apply to well pads, and direct and indirect impacts to big game calving/fawning range could occur from construction of wells and pipelines. The TL stipulation for elk calving would restrict activity from May 1 to June 30, including road and pipeline construction, and would prevent disturbance-related impacts during the birthing season. The TL for mule deer summer range would extend from May 15 to June 15.

Direct losses of habitat would still occur from construction outside the restricted period. The direct losses of habitat are summarized above, and are about 0.1% of elk calving range on the Uinta NF, and up to 0.3% of mule deer fawning range on the Ashley NF and Sowers Canyon area.

Alternatives 4 and 5

Under Alternatives 4 and 5, the full RFDS is projected with no special stipulations for elk calving or mule deer fawning areas. Only SLT would be directly applicable. Under Alternative 4, about one-fourth of the elk calving area would be covered under CSU stipulations for steep slopes, which may help to reduce long-term habitat losses. Most of the mule deer fawning area/summer range would be covered by an elk winter range TL which would provide no additional protection, and some portions would be covered by a CSU for steep slopes, which would require extensive reclamation and may reduce long-term habitat losses.

SLT allows the FS to delay activities by up to two months. Since the birthing season for elk and mule deer is up to two months long,, SLT could be used to restrict activities during all or a portion of the critical season. This would limit or prevent disturbance related adverse effects.

Direct losses of habitat would still occur from construction, and would be about 0.1% of elk calving range on the Uinta NF, and up to 0.3% of mule deer fawning range on the Ashley NF and Sowers Canyon area.

4.4.5 Big Game Yearlong Habitat

General Effects

Elk yearlong range includes two main periods of sensitivity, winter and calving. Effects of disturbance would be the same on yearlong habitat as in critical winter and calving range, depending on the season of disturbance. Effects of habitat loss would also be the same.

Effects of Lease Options

The effects of the lease options on elk yearlong range would the same as previously discussed for elk critical winter range, and for elk calving range.

Effects of Alternatives

Table 2-1 shows the stipulations that would be applied for elk yearlong range under the five alternatives. Direct and indirect impacts are summarized and discussed below.

Direct Impacts on Elk Critical Yearlong Range

		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF	Acres of Impact	0	0	0	0	0
	% of Habitat ¹	0	0	0	0	0
Ashley NF, outside Sowers Canyon area	Acres of Impact	5.4	10.7	20.4	26.8	26.8
	% of Habitat	4.9	9.7	18.5	24.4	24.4
Sowers Canyon area	Acres of Impact	15.5	25.5	34.8	38.7	38.7
	% of Habitat	0.1	0.2	0.3	0.3	0.3

¹ Percent of available habitat. For example, under Alternative 3, 34.8 acres of elk critical yearlong range in the Sowers Canyon area could be directly impacted. This represents 0.03 percent of this habitat within the Sowers Canyon area portion of the EIS study area.

Alternative 1

Under Alternative 1, none of the federal mineral areas would be administratively available for oil and gas leasing. This would provide protection of elk critical yearlong habitat in the study area from new oil and gas leasing activity. However, existing leases could still be developed, and existing leases have no stipulations for protection of critical yearlong habitat.

Direct effects from one exploratory well and related roads on the Ashley NF outside the Sowers Canyon area would be 5.4 acres of elk yearlong range. Direct loss of habitat within Sowers Canyon would be 15.5 acres. Overall, only about 0.1% of the habitat would be directly affected. The proportional area affected on Ashley NF outside of the Sowers Canyon area (4.9%) is relatively high because most nearly all of the yearlong range is within the Sowers Canyon area.

Indirect effects from noise and construction are likely to be more important than direct habitat loss. Assuming that elk are displaced up to 0.5 mile from human activities, the total area of indirect habitat loss would be 2243 acres in the Sowers Canyon area (about 18.3% of this habitat), and 110 acres in Ashley NF (all of the critical yearlong habitat). This would represent a significant portion of the elk yearlong range. It may result in lower winter survival, lower reproductive success, and displacement to less favorable habitat. Impacts would probably be greater during construction.

Alternative 2

Under Alternative 2, a NSO stipulation would be applied to elk yearlong range. Most of the range (about 80%) would also be covered by a TL stipulation for elk and mule deer critical winter range. Since NSO only applies to well pads, direct and indirect impacts could occur to elk from access roads and pipelines. The winter range TL stipulation would prevent indirect impacts during the critical winter months, but not during the calving season. However, the SLT allow delay of activities for up to two months, which would provide adequate protection against disturbance-related impacts during the calving season. Disturbance-related impacts could affect elk during construction of roads and pipelines on the 20% of the yearlong range not overlapping winter range. The area of indirect effect would be about 450 acres, or about 3.7% of the yearlong range. Direct habitat losses would be about 0.2% of the overall amount of habitat available.

Alternative 3

Under Alternative 3, a TL stipulation would be applied, for November 15 to June 30. A portion of the area would be NSO, mainly for steep slopes. The TL stipulation would prevent indirect impacts during the two critical time periods of winter and calving. Direct losses of habitat would be about 0.3% of the total.

Alternative 4

Under Alternative 4, a CSU stipulation would be applied to elk critical yearlong range. The CSU would restrict the number of concurrent drilling activities, but would not prevent direct or indirect impacts. A TL stipulation would be applied to about 80% of the elk critical yearlong range, for elk critical winter range, which would prevent indirect disturbance during the winter. The SLT allow the FS to delay activities by up to two months, which would also protect the calving season. Disturbance-related impacts could affect elk during construction of roads and pipelines on the 20%

of the yearlong range not overlapping winter range. The area of indirect effect would be about 450 acres, or about 3.7% of the yearlong range. Direct habitat losses would be about 0.3% of the overall amount of habitat available.

Alternative 5

Under Alternative 5, only SLT would be applied. This alternative would allow construction during the sensitive winter months and calving season. SLT terms would allow delay of activities for up to two months and movement of facilities by up to 200 me, but these restrictions would provide limited protection against direct and indirect impacts.

Elk would be displaced from the vicinity of the oil and gas activities. Assuming that elk would be displaced up to a half mile from roads and well sites, the area of indirect impacts would be 5,608 acres in the Sowers Canyon area (about 61.2% of this habitat), and all of the elk yearlong habitat in Ashley NF outside of the Sowers Canyon area. This would represent a significant portion of the elk yearlong range. It may result in lower winter survival, lower reproductive success, displacement to less favorable habitat, and long-term population reductions.

4.4.6 Raptor Habitat

General Effects

Although destruction of active nests would be illegal under federal law, indirect effects could occur from oil and gas activities in the vicinity of active nests. This could result in nest abandonment or loss of young. Raptors such as eagles, hawks, falcons and owls are typically sensitive to human activity and disturbance, although sensitivity varies by species. For example, ferruginous hawk is considered to be highly sensitive, while red-tailed hawks are much less sensitive. Nesting birds will be more sensitive to disturbances in the line of sight from a nest (e.g., below a cliff nest), than to activities not in the line of sight. Raptors will habituate to human activities to varying degrees, and may even build nests in locations where there is frequent non-threatening human activity, such as along a road. Locations of nests have not been identified, and may change from year to year.

Construction in the inactive season could result in destruction of breeding sites or habitat. Direct losses of habitat and of the prey base will also occur from conversion of natural vegetation to well pads and roads.

Effects of Lease Options

No specific stipulations have been proposed for protection of raptor habitat. SLT allows the FS to request delays of activities by up to two months or movement of facilities by up to 200 m. This would provide partial protection. Some raptors may require a greater buffer zone to prevent nest abandonment, and most raptors have nesting periods (including courtship, incubation and fledging) of longer than two months. This stipulation would also only be effective (to the extent it is effective) if nest locations are identified ahead of oil and gas activities.

Stipulations developed for other resources would be more protective of raptor nests and habitat, to varying degrees. NL would protect raptors from effects associated with new leasing, but would allow oil and gas activities on existing leases until the leases expire or production ceases. For existing leases, effects would be the same as for SLT. NSO would protect raptor habitat from placement of well sites, but would not affect placement of roads or pipelines. Construction near active nests could result in nest abandonment. TL stipulations for big game winter range, elk calving, mule deer summer range, and sage grouse habitat would all overlap the raptor breeding period to varying degrees and would provide protection against disturbance during those periods. CSU stipulations would restrict the number of concurrent activities, which may reduce disturbance-related effects.

Effects of Alternatives

Alternative 1

Alternative 1 is NL for new oil and gas leasing, but existing leases may still be developed. There would be no impacts to raptors in NL areas, but adverse impacts could occur on existing leases, where SLT would be applied. As discussed above, this would provide partial protection for raptors, but would not provide protection during the full nesting period and may not provide an adequate buffer to prevent nest abandonment. The area of direct disturbance for this alternative would be 63 acres, which is a very minor portion (0.01%) of the overall area, and losses of feeding habitat and prey base will be negligible.

Alternative 2

Under this alternative, NSO stipulations would be applied for a number of resources, including steep slopes, critical sagegrouse habitat, and elk yearlong habitat. This would result in about 75% of the study area being NSO. There would be no adverse effects on raptor nesting in those areas from construction or operation of wells, but some impacts could occur from construction and use of roads and pipelines. A large portion of the Sowers Canyon area and Ashley NF would be covered by TL stipulations for critical big game winter range, which would protect the early part of the raptor breeding season. Portions of the Uinta NF outside of the NSO area would be covered by a TL stipulation for elk calving, which would protect a two month period within the raptor nesting season. The combination of TL and SLT could be used to prevent activities near raptor nests during most or all of the nesting season for individual nests, if their locations are known.

The area of direct disturbance under this alternative would be 105 acres, which is a very minor portion of the overall area. Losses of potential feeding habitat and prey base will be negligible.

Alternative 3

Under Alternative 3, NSO would be applied to about 40% of the study area, and effects in these areas would be the same as discussed for Alternative 2. Much of the remaining area would be covered by TL stipulations for wildlife, including 100% of the Sowers Canyon area, about 50% of the other portions of Ashley NF, and about 15% of Uinta NF. TL stipulations for other wildlife would overlap with various portions of the raptor nesting period. In combination with SLT, they may protect most of the nesting period for individual nests, if their locations are known. In other areas, only SLT would apply, and there is a greater potential for adverse effects.

Alternative 4

Alternative 4 would have only small areas of NSO. TL stipulations would only be applied for elk critical winter range, which would apply to all of the Sowers Canyon area, and about 50% of other portions of Ashley NF. The elk TL stipulation would protect the early portion of the nesting season, and in combination with SLT may protect most of the nesting period for individual nests, if their locations are known. In most of the study area, SLT allowing delays of activities by two months and movement of facilities by 200 m would provide partial protection. SLT would not provide effective mitigation for highly sensitive species.

Alternative 5

SLT would apply for all resources under this alternative. The effects would be the same as those discussed above for SLT.

Cumulative Impacts

Other proposed activities on the Uinta NF include the Diamond Fork System project (an extensive water development project), wetland development, aquatic habitat improvement, vegetation management activities for wildlife habitat, watershed improvements, road stabilization and restoration, and possible land acquisition. These activities will variously have positive, neutral, or negative effects on wildlife resources, depending on the location and type of activity. The Diamond Fork System will adversely affect hundreds of acres of mule deer winter and severe winter habitat, but most of the negative impacts will be mitigated. Vegetation/forage improvement, prescribed burns, and watershed improvement will each affect 1,500 to 4,000 acres, and should improve habitat quality for wildlife. Other activities are likely to have little or no effect on wildlife.

Under Alternatives 2, 3, 4, and 5, one exploratory well could be drilled on the Uinta NF, disturbing 6.9 acres. Depending on its location, this disturbance could affect elk critical winter range, calving range, or summer range; mule deer critical winter range, moose critical yearlong range, or raptor habitat. Because of its relatively small area compared to the amount of wildlife habitat available, and the protection provided by the various leasing stipulations, there are likely to be no cumulative effects from the RFDS and other activities.

Within Ashley NF, major activities affecting lands and habitats is vegetation management, including aspen treatment and sagebrush treatment. Previously treated areas include aspen, sagebrush, and chained pinyon-juniper. There are roughly 9,000 acres of potential sagebrush treatment areas and 2,100 acres of previously treated sagebrush on the portion of Ashley NF within the study area and outside of the Sowers Canyon area. Small portions of the potential sagebrush treatment areas (up to a few hundred acres) are in sage grouse critical habitat, mule deer critical winter range, and/or elk critical winter range. Additionally, about 200 acres of previously treated sagebrush areas are in elk critical winter range. Potential and past aspen treatment areas are not in critical wildlife habitat.

The effects of sagebrush treatment vary by species, and according to the individual site conditions and treatment size and design. Removal of sagebrush may have detrimental effects on sage grouse. Removal of sagebrush may also reduce winter forage and thermal cover for mule deer in critical wintering areas. For elk, increases in grass forage on treated areas are likely to be a positive impact.

The acres of direct disturbance associated with exploration wells and roads on Ashley NF outside of the Sowers Canyon area range from 5.4 acres for Alternative 1 to 26.8 acres for Alternative 5, and are relatively minor. Indirect impacts may affect larger areas of habitat, including hundreds of acres in Alternative 1 and thousands of acres in Alternative 2. There may be temporary cumulative impacts to elk and deer if vegetation management coincides with oil and gas development. Adverse effects may be offset in a longer time span by improved habitat quality.

In the Sowers Canyon area, about 3,600 acres of sagebrush have previously been treated, and about 160 acres have been identified as potential treatment areas. Much of the previously treated sagebrush is within areas mapped as critical sage grouse habitat, and the potential sagebrush treatment area is within sage grouse habitat. Clearing of sagebrush is likely to be detrimental to sage grouse, but the cumulative acreages are small compared to the available habitat.

Some of previously treated sagebrush in the Sowers Canyon area is in mule deer critical winter range, and much of it is in critical summer/fawning range. Sagebrush treatment may adversely affect winter forage supply and thermal cover for mule deer, but may have beneficial effects on summer range. Much of the previously treated area is also elk critical winter range, which may have had positive impacts on elk. There may be temporary cumulative impacts to elk and deer if vegetation management coincides with oil and gas development. Adverse effects may be offset in a longer time span by improved habitat quality. There are also about 240 acres of previously treated aspen and 1800 acres of previously chained pinyon-juniper habitat, which are not in critical big game or sage grouse habitat.

4.5 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

General Effects

Since listed threatened and endangered plant and animal species are protected from impact under the Endangered Species Act of 1973, as amended, impacts are unlikely under any of the

alternatives. Impacts are least likely under Alternative 1, No Action/No Lease, and Alternatives 2 and 3, because of the large areas with NSO stipulations under these alternatives.

Candidate and sensitive species are not afforded the same protection under the Endangered Species Act; however, the Forest Service requires a Biological Evaluation of potential effects to sensitive species listed by the Forest Service for every proposed project.

Effects of Lease Options

All oil and gas activities are subject to the provisions of the Endangered Species Act, regardless of lease stipulations. Oil and gas activities would be cleared for threatened, endangered, and sensitive species occurrence prior to ground disturbance at the operational stage on a case by case basis, rather than at the leasing stage. This would be done in consultation with the U.S. Fish and Wildlife Service. Section 3.5 describes the protected threatened, endangered, and sensitive species and their habitat known to occur or potentially occurring in the study area.

The NL and NSO leasing options are the most restrictive in terms of oil and gas activity, and therefore the most protective of threatened, endangered, and sensitive species. A TL leasing option could potentially be used, if for example, an imperiled species is migratory. A TL could be applied during that time of the year the imperiled species occupies the area, provided that no other impacts would occur to its habitat that could jeopardize the species once it leaves the area. CSU and SLT would not likely provide further protection beyond the provisions in the Endangered Species Act. Under SLT, operators may be required to move their facilities up to 200 meters which, in some cases such as protected plants, may be sufficient to avoid impact.

Effects of Alternatives

Alternative 1

Under Alternative 1, federal minerals lands would not be administratively available for oil and gas leasing, except those lands currently held by leases. For those lands with existing leases, threatened and endangered species would be protected under the ESA, but candidate and sensitive species would not be afforded this protection. However, potential effects to Forest Service sensitive species would be evaluated in a Biological Evaluation as required by the Forest Service. Given this, direct impacts to threatened, endangered, candidate, and sensitive species are unlikely

under Alternative 1. Loss of or disturbance to habitat of candidate or sensitive species could occur if such habitat occurs in the Sowers Canyon area where most of the existing leases occur. Once existing leases expire and/or production ceases, there would be no impacts to threatened, endangered, or sensitive species due to oil and gas activity.

Alternatives 2, 3, and 4

Under Alternatives 2, 3, and 4, a LN would be attached to the lease to inform the lessee of the presence of threatened or endangered species or their habitat within the lease boundary. Protection of the species and habitat would be ensured through the ESA.

A CSU stipulation would be applied to leases that contain sensitive species or their habitats. This stipulation would be applied since sensitive species are not protected under the ESA. The CSU stipulation would state that an on-the-ground survey be conducted when a drilling proposal is submitted and any proposed operations would have to be located in such a manner as to not jeopardize the viability of the species. Given this stipulation, impacts to candidate and sensitive species are not likely under Alternatives 2, 3, and 4.

Alternative 5

Like Alternatives 2, 3, and 4, a LN would be attached to the lease under Alternative 5 to inform the lessee of the presence of threatened or endangered species or their habitat within the lease boundary. Protection of the species and habitat would be ensured through the ESA.

No special stipulations would apply for the protection of candidate and sensitive species. However, potential impacts to Forest Service sensitive species would be evaluated in a Biological Evaluation as required by the Forest Service. Given this, and the standard mitigations under SLT, direct impacts to candidate and sensitive species are unlikely. However, some loss of or disturbance to habitat of candidate or sensitive species could potentially occur if such habitat is within the lease area. In the case of candidate and sensitive plants, standard mitigation under SLT (i.e. requiring facilities be moved up to 200 meters) would likely be sufficient to avoid impacts to plants.

Cumulative Impacts

Under Alternatives 1 to 4, no impacts are anticipated for threatened, endangered, and sensitive species. Under Alternative 5, some loss or disturbance of habitat of sensitive or candidate species could occur if such habitat is present within the lease area. Given the small area potentially affected by oil and gas exploration and production, measurable cumulative effects are very unlikely. Unique habitats and sensitive time periods for sensitive species are likely to be adequately protected by SLT, allowing movement of facilities by up to 200 m. and delays of activities by 2 months.

4.6 RESEARCH NATURAL AREAS

As described in Chapter 3 (Section 3.6), there are two candidate RNAs on the Ashley NF. According to FSM 4063.49, R2 Supplement #1, RNAs are to be withdrawn from mineral entry and leasing at the time of establishment. Following are descriptions of potential impacts to the candidate RNAs from the different leasing options.

Effects of Lease Options

No Lease and No Surface Occupancy: NL would protect the intended use of the RNAs, and NSO would prevent wells from being drilled at the candidate RNA sites. Although, roads and pipelines could potentially go through these areas under either NL or NSO; this would be prevented by FS administration policies. While NL would protect the candidate RNAs from site deterioration, as prescribed in the Ashley Forest Plan, until (or if) they are formally designated as RNAs and thus withdrawn from mineral entry and leasing, NSO could allow for some deterioration of these sites prior to a formal designation.

Controlled Surface Use, and Timing Limitations: These stipulations are not proposed for RNAs.

Standard Lease Terms: Any ground disturbing activities related to oil and gas would affect the intended use of the RNAs and could impact several of the physical and biological resources contained within the areas. These candidate sites could lose their potential for RNA designation.

Effects of Alternatives

Alternative 1

Alternative 1 would not likely have any impact on the candidate RNAs in the study area. Under this alternative, oil and gas activity could occur on existing leases; however, most existing leases are within the Sowers Canyon area and the candidate RNAs are outside this area. The RFDS for this alternative projects one exploration well (5.36 acres of disturbance) on the Ashley NF outside the Sowers Canyon area, which if located in a candidate RNA would likely cause the candidate RNA to lose its designation for a RNA.

Alternatives 2, 3, and 4

Under these alternatives, a NSO stipulation would be applied to the proposed RNAs which would prevent well pads from locating in RNAs. Although the NSO stipulation does not apply to roads and pipelines, Forest Plan standards would preclude the placement of those facilities within an RNA.

Alternative 5

Under this alternative, impacts to the candidate RNAs could potentially occur from oil and gas activity including well pads, roads, and pipelines. No existing laws protect candidate RNAs, and the standard stipulations, which include delaying activities for up to 60 days or moving a well location up to 200 meters, may not necessarily protect these areas. Under the RFDS for this alternative, 5 exploratory wells are projected for the Ashley NF outside the Sowers Canyon area for a total of 26.8 acres of disturbance including well pads and roads. By taking a "worst-case" scenario approach, this amount of acreage (26.8 acres) of potential RNA could be lost directly if the exploratory wells and associated disturbance (roads) occur in the candidate RNAs. In addition, the indirect impact of loss of naturalness for the remainder of the RNA not directly impacted would likely preclude any part of the proposed RNAs from being formally designated as such.

Cumulative Effects

There are no RNAs on Uinta NF or in the Sowers Canyon area, and therefore there will be no cumulative effects from this project and projects. There are two candidate RNAs on Ashley NF

outside of the Sowers Canyon area. The only activities planned for Ashley NF which may affect lands and habitat are various vegetation management activities. No vegetation management activities have previously occurred in the RNAs, and no potential vegetation treatment areas are within these areas. Therefore, any adverse affects will be project specific, and not cumulative.

4.7 ROADLESS AREAS

This section analyzes the potential impacts to roadless resources that could result from oil and gas leasing, exploration, and development within the study area.

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 and development activities, including access roads, well pads and operational activities would increase vehicular traffic and human activities, resulting in a 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 and development could bring these types of effects into roadless areas and cause a loss in the opportunity for solitude provided by roadless areas.

Although no primitive areas exist, semi-primitive recreational environments are available within the study area. An increase in roads, wells, and other ground disturbing activities, as well as in increase in the presence of humans decreases the opportunity for experiencing a semi-primitive recreational environment.

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 and development 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.

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. Roadless areas 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, and protect the various environments (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 roadless areas. The NSO stipulation does not apply to access roads which may be needed for access to well drilling and development 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, which is unlikely within roadless areas.

Controlled Surface Use: Activities associated with oil and gas exploration and development 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 can 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. Roadless access and oil and gas activities would adversely affect all or some of the values and uses of the roadless areas both for the short-term and long-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 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 are no laws or regulations that require the protection of roadless areas; consequently 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 standard lease terms 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.

Effects of Alternatives

Table 2-1 in Chapter 2 defined the lease options that would be applied for roadless areas under the five alternatives. The table below summarizes the direct impacts to roadless areas by alternative.

Direct Impacts to Roadless Areas

Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF					
- Acres	0	4.9	6.9	6.9	6.9
- Percent ¹	0	.003	.005	.005	.005
Ashley NF, outside Sowers Canyon area					
- Acres	5.4	6.7	20.4	26.8	26.8
- Percent	0.3	.03	.1	.1	.1
Ashley NF, Sowers Canyon area					
- Acres	0	0	0	0	0
- Percent	0	0	0	0	0

¹ Percent value is the percent of the roadless resource affected. For example, under Alternative 3, 6.9 acres of roadless areas in the Uinta NF could be directly impacted. This represents .005 percent of the roadless areas within the Uinta NF portion of the EIS study area.

Alternative 1

Under Alternative 1 (No Action/No Lease) none of the federal mineral areas would be administratively available for oil and gas leasing. This alternative would provide protection for all roadless areas in the study area from new oil and gas leasing activities. However, existing leases, which are not subject to the analyses provided in this document, may still be developed. Due to current leases, the RFDS predicts that one exploratory well could be drilled on the Ashley NF, outside of the Sowers Canyon area. This could possibly disturb 5.4 acres, which represents .03% of the roadless resource in this Area. Road construction, exploratory well pad development, and increased human activity would also cause indirect impacts to the roadless character in areas within sight and sound of the activity. Impacts include adverse effects on the user's sense of solitude, remoteness, and naturalness. No roadless areas exist within the Sowers Canyon area. No oil and gas exploration or development activities are predicted to occur within the Uinta NF under the RFDS for this alternative.

Alternative 2

Under Alternative 2, all of the roadless areas within the study area would be available for leasing with a NSO stipulation. This would protect the roadless resource from ground disturbing activities which may result from well sites and production facilities.

Access roads are not subject to NSO stipulations, and road building activities could possibly occur within roadless areas. Forest Plan standards and guidelines will govern the design, placement and decisions related to proposed roads and other linear facilities. The RFDS for Alternative 2 predicts 4.9 acres of direct disturbances associated with road construction in the Uinta NF and 6.7 acres of direct disturbance associated with road construction in the Ashley NF, outside the Sowers Canyon area. This disturbance could occur within roadless areas. The Sowers Canyon area contains no roadless areas. Impacts to the roadless resource associated with road construction would be as discussed under General Effects, and include effects to the remoteness, solitude and natural character of the roadless areas, and impacts to scenic resources. These effects would extend beyond the area of direct disturbance to those areas within sight and sound of the activity.

Alternative 3

Alternative 3 would make roadless areas within the study area administratively available for leasing with a CSU stipulation. Because of stipulations applied to other resources that occur within roadless areas (mostly steep slopes and retention VQO), 62,800 acres of roadless areas have a NSO stipulation. The remaining 102,630 acres would have the CSU stipulation applied. The RFDS for Alternative 3 predicts 6.9 acres of disturbance in the Uinta NF and 20.4 acres of disturbance in the Ashley NF, outside the Sowers Canyon area. This disturbance could occur within roadless areas. No roadless areas exist within the Sowers Canyon area. Impacts to roadless areas related to exploration activities under a CSU stipulation are discussed in the Effects of Lease Options and in the General Effects discussion at the beginning of this section. Impacts could be reduced with this stipulation by siting the activity in an area with minimum exposure to the majority of users in the area. However, impacts would persist to some extent until final reclamation.

Alternative 4 and 5

Alternatives 4 and 5 would make all of the roadless areas within the study area administratively available for leasing under SLT. The RFDS for both of these alternatives predicts 6.9 acres of

disturbance in the Uinta NF and 26.8 acres of disturbance in the Ashley NF, outside the Sowers Canyon area. All of this oil and gas activity could possibly occur within roadless areas on lands with no stipulations other than SLT. Impacts to roadless resources related to oil and gas development under STLs are described in the Effects of Lease Options and the General Effects sections found at the beginning of this section.

In Alternative 4, 1,280 acres of roadless areas within the Ashley NF would have a NSO stipulation because of a Research Natural Area that occurs partially within the Slab Canyon Roadless Area, and which has a NSO stipulation. An additional 150,950 acres of roadless areas have some type of special stipulation applied due to the presence of other resources. Most of these special stipulations are CSU stipulations applied to watershed resources (geological hazards, steep slopes, riparian areas), various wildlife habitats, and retention and partial retention VQO areas. These stipulations would help protect some of the ecological, geological and scenic special features found within the roadless areas. Alternative 5 provides no lease options other than SLT.

Cumulative Impacts

Other proposed activities on the Uinta NF include the Diamond Fork System (DFS) project, wetland development, vegetation management activities, watershed improvements, road stabilization and restoration, and possible land acquisition. The DFS is a component of the Central Utah Project, which is a major water development project. Facilities associated with the DFS include tunnels, aqueducts, powerplants, pipelines, switchyards, a dam and reservoir in Monks Hollow, and a 138 kV transmission line from the Diamond Fork drainage south to Spanish Fork Canyon. Associated with the project are proposed recreation developments, and wildlife and mitigation measures. Many of these facilities are located in roadless areas, and will impact many of the roadless attributes found within those areas.

Alternatives 1, 2, 3, 4, and 5 would cause direct impacts on 0, 4.9, 6.9, 6.9, and 6.9 acres, respectively. There are approximately 144,150 acres of inventoried roadless areas within the Uinta NF portion of the study area. Taking into account, the potential indirect impacts to the roadless environment caused by this level of activity, the area affected by the foreseeable level of development is not a significant contribution to any cumulative impacts that may be occurring to roadless areas.

Vegetation management is the primary land management activity anticipated to occur within the Ashley NF portion of the study area. Some of this activity includes potential sagebrush treatment sites located in Timber Canyon, within the Slab Canyon Roadless Area. This activity would cause short-term impacts to the apparent naturalness of the area. Alternatives 1, 2, 3, 4, and 5 would directly disturb 5.4, 6.7, 20.4, 26.8, and 26.8 acres, respectively within the Ashley NF, outside of the Sowers Canyon area. This represents a small percentage of the 21,280 acres of roadless areas, and would not cause significant cumulative impacts to the roadless resource.

4.8 RECREATION

This section provides a description of potential impacts to recreation resources that could result from oil and gas leasing, exploration and development within the study area.

General Effects to all Recreation Resources

As discussed in the affected environment for recreation (Section 3.8), lands within the study area provide both 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 term or long term. Exploration activities are considered short-term impacts, estimated to last not more than 80 days. Development activities can last for the productive life of the well, projected to be from 10 to 15 years. The RFDS predicts development activity only in the Sowers Canyon area in the Ashley NF.

Road building, well pad development and drilling are activities that are likely to have the most substantial effects to the recreation resource. These activities are typically short term (usually not lasting more than 80 days) but are when impacts such as new visible ground disturbance, increased traffic and increased noise are most noticeable. The operation and maintenance stage is typically less intrusive, but lasts longer.

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.

4.8.1 Developed Recreation

General Effects

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. It is unlikely that oil and gas activities would 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.

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.

No Surface Occupancy: NSO would protect developed recreation sites from direct impacts from well pad or production facilities. Buffer zones around developed sites are not specified or included in this stipulation since stipulations applied for the protection of visual resources would typically protect areas surrounding developed recreation sites. 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.

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.

Timing Limitations: 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.

Standard Lease Terms: SLT allows 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 peoples enjoyment of the area.

Effects of Alternatives

Alternative 1

Alternative 1 (No Action/No Lease) would not allow oil and gas leases on federal mineral acres within the study area. This would protect developed recreation sites from direct or indirect impacts from new well exploration and development. The RFDS for this alternative predicts one exploratory well in the Ashley NF, outside the Sowers Canyon area due to existing leases. There is one campground in this area that could be impacted by exploration activity; impacts would be as described in the General Effects section, and include indirect impacts to the aesthetic quality of the site caused by the presence of the industrial activity. No activity is predicted to occur within the Uinta NF section of the study area under this alternative. There are no developed recreation sites in the Sowers Canyon area.

Alternatives 2, 3 and 4

Alternatives 2, 3 and 4 would apply a NSO stipulation to developed recreation sites, which would protect these sites from direct impacts from oil and gas exploration and development.

The RFDS for Alternatives 2 and 3 predict 6.9 acres of disturbance in the Uinta NF and 10.7 and 20.4, respectively on the Ashley NF, outside the Sowers Canyon area. This could result in short-term, indirect impacts to developed recreation sites as described in the General Effects and in the Effects of Lease Options section. Developed recreation sites on both the Ashley and Uinta NFs are surrounded by lands rated as Retention VQO. Under both Alternatives 2 and 3, Retention VQO areas have a NSO stipulation applied, which would further protect the recreation sites from indirect impacts to the aesthetic values of the recreation site.

The RFDS for Alternative 4 predicts 6.9 acres of disturbance in the Uinta NF and 26.8 acres of disturbance in the Ashley NF, outside Sowers Canyon area from exploration activity. This could result in short-term, indirect impacts to developed recreation sites.

Alternative 5

Under this alternative all federal minerals within the study area would be administratively available for leasing with SLT. SLTs allow for the moving of ground disturbing activities 200 meters in order to protect sensitive resources, which would make the possibility of any direct impacts to developed recreation sites very unlikely.

The RFDS for Alternative 5 predicts 6.9 acres of disturbance from exploratory activity in the Uinta NF and 26.8 acres of disturbance in the Ashley NF, outside Sowers Canyon area from exploration activity. This could result in short-term, indirect impacts to the recreation site by impacts to the natural appearance of the landscape surrounding the site. Under Alternative 5, all resources receive a SLT stipulation, which increases the opportunity for oil and gas activity to occur in the vicinity of recreation sites.

4.8.2 Recreation Opportunity Spectrum

General Effects

Semi-Primitive Non-Motorized (SPNM) areas provide the most primitive type of recreational environment found within the study area, and are the most sensitive to changes in the landscape. Users of SPNM areas expect to find these types of lands to be remote, natural appearing backcountry areas with little evidence of the presence of humans and especially evidence of industrial activity. Building roads, or other well exploration or development activities in SPNM areas could potentially change the classification in the area of disturbance, and in a .5 mile buffer around the disturbance to Semi-Primitive Motorized or Roaded Natural depending on topography, vegetative cover, or density of road development. This would cause a decrease in the amount of SPNM opportunities for recreational users in the study area. There are 98,190 acres of SPNM in the Uinta NF portion of the study area, 20,760 acres of SPNM in the Ashley NF, outside the Sowers Canyon area, and 4,080 acres of SPNM in the Sowers Canyon area. With extensive reclamation of roads and other ground disturbance, it would be possible for lands to return to a

more primitive ROS classification. This is especially true for those areas which receive short-term impacts from exploration activities.

Effects of Lease Options

No Lease and No Surface Occupancy: NL and NSO would result in little to no effects to semi-primitive ROS environments. Activity adjacent to the boundary of SPNM could cause a small net reduction in the lands mapped as these categories because of buffers placed around roads when preparing ROS maps. More developed ROS classes of Roded Natural and Rural would experience no net change with the NL or NSO stipulations. Access roads are not included in the NSO stipulation. Road construction in SPNM areas would change the physical setting of the SPNM environment, possibly causing a loss in the amount of land classified as SPNM.

Controlled Surface Use: CSU would require operations to be located and designed to reduce impacts. This could include such things as gating access roads to limit traffic to operators; limiting activity to existing roads, and design facilities to reduce contrasts with the surrounding landscape. Reduction in the quality of the SPNM environment would still occur to some extent. Exploration and development activity would result in a shift from the more primitive environment to a more developed ROS class. Road construction and/or well drilling or development could cause the loss of SPNM classification to some areas.

Timing Limitations: TLs would limit activity to low-use recreation periods in the forests. This would not significantly mitigate the effects from oil and gas leasing in semi-primitive areas, since the presence of a road in a previously unroded area would be the major effect on ROS classes, and this impact would not be mitigated by timing restrictions.

Standard Lease Terms: SLT would result in net changes to the inventoried ROS environments. SLT would allow the construction of roads, wells and pipelines in all of the ROS environments, which would alter the ROS classes in the study area from the primitive end of the spectrum to the more developed ROS classes.

Effects of Alternatives

Table 2-1 in Chapter 2 defined the lease options that would be applied to SPNM areas under the five alternatives. The table below summarizes the direct and indirect impacts to SPNM in each

alternative. As was mentioned in the beginning of Chapter 4, two methods were used to quantify impacts, depending on the location and type of activity taking place. On the Uinta NF and the Ashley NF outside of the Sowers Canyon area, it is assumed for the purpose of analysis, that all of the disturbance associated with the exploration activity could occur entirely within the resource being evaluated. In the Sowers Canyon area, because of well spacing requirements, a proportional methodology was used to quantify acres of disturbance - the percentage of the total disturbance occurring in the Sowers Canyon area that could be impacting a certain resource was based on the percentage of that resource in the Sowers Canyon area. For example, there are 4,080 acres of SPNM within the Sowers Canyon area - that equals 8.2% of the total acres of the Sowers Canyon area. Therefore, 8.2% of the total disturbance occurring in the area is assumed to be occurring in SPNM lands.

Direct and Indirect Impacts to SPNM (acres)

Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Uinta NF					
- Direct Impacts/%	0/0	6.9/.007	6.9/.007	6.9/.007	6.9/.007
- Indirect Impacts/%	0/0	1,339/1.4	1,339/1.4	1,339/1.4	1,339/1.4
Ashley NF, outside Sowers Canyon area					
- Direct Impacts/%	5.4/0.3 1,019/4.9	10.7/.05 2,038/9.8	20.4/1 3,057/14.	26.8/.13 5,095/24.	26.8/.13 5,095/24.
- Indirect Impacts/%			7	5	5
Ashley NF, Sowers Canyon area					
- Direct Impacts/%	5.2/.13 750.8/18.	8.6/.21 1,251.3/30.	11.6/.28 1,689/41.	12.9/.32 1,877/46	12.9/.32 1,877/46
- Indirect Impacts/%	4	7	4		

Alternative 1

Under Alternative 1 (No Action/No Lease), federal minerals would not be available for oil and gas leasing. This would protect SPNM lands from new oil and gas lease activities. The RFDS for this alternative predicts one exploration well from existing leases in the Ashley NF outside the Sowers Canyon area. This could directly impact 5.4 acres of SPNM lands, which includes 1.2 miles of road reconstruction/construction. SPNM lands within .5 miles of new or improved roads could be reclassified into a more developed ROS category, such as SPM or RN. This could cause indirect

impacts to 1,019 acres of SPNM lands, or 4.9% of the total SPNM land in this area. 63.2 acres of land, which includes 9.6 miles of roads, could be disturbed in the Sowers Canyon area under the RFDS for Alternative 1. SPNM comprises approximately 8.2 percent of the Sowers Canyon area, which could result in 8.2 percent (5.2 acres) of the proposed disturbance occurring in SPNM land. An additional 751 acres of SPNM could be affected by the .5 mile buffer that is generally put around roads when mapping SPNM.

Alternatives 2 and 3

Under Alternative 2 and Alternative 3, SPNM lands would be available for leasing with CSU stipulations. CSU would require that operations be located and conducted so as to minimize the effects on SPNM areas and would require extensive reclamation. Impacts would be as described under the General Effects and the Effects of Lease Options sections discussed above, and include impacts to the user's sense of solitude and remoteness.

The RFDS for Alternative 2 predicts 6.9 acres of direct disturbance in the Uinta NF, which includes 1.7 miles of road reconstruction/construction. Indirect impacts from road construction could impact 1,339 acres, or 1.4 percent of the total amount of SPNM land in the Uinta NF portion of the study area. Because of the overlap of other resources occurring within SPNM that have a NSO stipulation in Alternative 2, 87,280 acres of SPNM land have a NSO stipulation and would not be available for exploratory well activity. The remaining 10,910 acres of SPNM would be available under the CSU stipulation. The small amount of land impacted would not cause substantial effects to SPNM lands in the Uinta NF. Approximately 10.7 acres of direct disturbance could occur in the Ashley NF, outside the Sowers Canyon area, which includes 2.4 miles of road reconstruction/construction. Indirect impacts from the .5 mile buffer on roads could affect 2,038 acres, or 9.8 percent of the total SPNM land in this area. 17,710 acres of SPNM land in this portion of the study area have a NSO stipulation due to the presence of other resources with a NSO stipulation, mostly steep slopes and roadless areas. In the Sowers Canyon area, 8.6 acres could be directly impacted; 1,251 acres, or 30.7 percent of SPNM land, could be indirectly impacted by road construction. Overlap with other resources causes 4,010 acres of SPNM land to actually have a NSO stipulation, leaving only 60 acres available with a CSU stipulation.

Acres of direct and indirect impacts to SPNM lands under Alternative 3 are shown in the above table. 49,280 acres of SPNM land actually have a NSO stipulation under this alternative due to the presence of other resource stipulations, mostly steep slopes and retention VQO.

Alternatives 4 and 5

Under Alternatives 4 and 5, SPNM lands would be available for leasing with SLT. Mitigation of impacts would be based on existing laws and other reasonable mitigation practices such as delaying activities for up to 60 days or moving a well location up to 200 meters. For those areas of SPNM that may be affected by oil and gas activities, impacts would be as described under the General Effects and Effects of Lease Options sections discussed above. These impacts include a loss of the semi-primitive attributes of naturalness and solitude and an environment mostly free from human caused landscape modifications.

Acres of direct and indirect impacts associated with Alternatives 4 and 5 are tabulated above. In Alternative 4, 83,090 acres of SPNM land have some type of special stipulation applied due to the overlap with other resource stipulations, mostly CSU for steep slopes, critical elk and deer winter range, and retention and partial retention VQO. These stipulations would have minor effects to the SPNM resource. In Alternative 5, all SPNM land would have a SLT stipulation.

Cumulative Impacts

Proposed activities on the Uinta NF include the Diamond Fork System project, wetland development, vegetation management activities, watershed improvements, road stabilization and restoration, and possible land acquisition. The DFS is a component of the Central Utah Project, a major water development project. Associated with the project are proposed recreation developments in the Monks Hollow area (located in the Diamond Fork drainage), which will potentially increase developed recreation opportunities on the Uinta NF. Some of the proposed DFS project components will have a negative effect on SPNM resources through disturbance (transmission line and other facilities) that would be located on SPNM lands. Alternatives 1, 2, 3, 4, and 5 could cause 0, 6.9, 6.9, 6.9, and 6.9 acres of direct disturbance, and 0, 1,339, 1,339, 1,339, and 1,339 acres of indirect impacts, respectively. There would be little to no cumulative impacts to developed recreation sites. A maximum of 1.4 percent of SPNM land may be indirectly impacted by exploratory well activity. This would not be a significant contribution to cumulative impacts that may be occurring to SPNM lands in the Uinta NF.

Vegetation management is the primary land management activity anticipated to occur on the Ashley NF. This type of landscape modification could have short-term effects on the SPNM

environment, primarily by impacting the apparent naturalness of the area. Alternatives 1, 2, 3, 4, and 5 could cause 5.4, 10.7, 20.4, 26.8, and 26.8 acres of direct disturbance, and 1,019, 2,038, 3,057, 5,095, and 5,095 acres of indirect impacts, respectively, to lands in the Ashley NF, outside the Sowers Canyon area. This level of activity, particularly Alternatives 2, 3, 4, and 5 could cause substantial cumulative impacts to the SPNM environment. This activity is exploration well development, which is a short-term activity. Proper reclamation, including the reclamation of access roads, could return impacted lands to a semi-primitive condition.

Alternatives 1, 2, 3, 4, and 5 could cause 5.2, 8.6, 11.6, 12.9, and 12.9 acres of direct disturbance, and 750, 1,251, 1,689, 1,877, and 1,877 acres of indirect impacts, respectively, to SPNM lands within the Sowers Canyon area. Direct impacts would not be significant. Indirect effects could impact 18.4 percent of available SPNM lands in Alternative 1 up to 46 percent in Alternative 5. These impacts would be from development activity, considered to be long term. This could have a substantial effect on SPNM land in the Sowers Canyon area.

4.9 VISUAL RESOURCES

This section provides a description of the effects to visual resources that could result from oil and gas leasing, exploration and development.

General Effects

The degree to which oil and gas activities affect the visual resources of the study area 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 high 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. Exploration activity would be considered short-term impacts which could be mitigated upon cessation of the exploration activities, with the reclamation of disturbed areas.

Well development activity would introduce less intrusive changes to the landscape, but would require permanent facilities, including roads and equipment at the well pad. Equipment at a developed well could include a pumping unit, which is generally 12 to 14 feet high. For naturally flowing wells, a unit described as a "Christmas tree" would be installed to regulate the flow of oil and gas to the surface, replacing the pumping unit. Christmas tree units are typically four to eight feet high and are less visually intrusive than a pumping unit. Other permanent facilities at a developed well site could include separator tanks, storage tanks, tool shed, generator and pipe racks. Viewed within the foreground viewing distance (0-.25 miles), these facilities would create strong line and form contrasts with the surrounding natural scenery, and could dominate the view. Painting the facilities to blend in with natural colors found in the landscape would help to reduce color contrasts.

As discussed in the Affected Environment (Section 3.9), lands within the study area 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 areas 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 topographic and/or vegetative screening, and design of the facilities (e.g., painting structures to blend with the surrounding landscape).

Effects of Lease Options

Retention and Partial Retention VQO classes would be potentially affected by oil and gas leasing activity and would be the only VQOs needing additional mitigation measures (in addition to SLT) to meet adopted VQO guidelines.

No Lease and No Surface Occupancy: NL would result in no direct effects to visual resources within the study area. 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.

Controlled Surface Use: CSU would require that the VQOs for the affected area be met within one year of the commencement of activities. Operations should 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 should be selected in areas with higher capabilities for visually absorbing the disturbance and on soils with good revegetation potential. Facilities should 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 Limitations: 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, the 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.

Effects of Alternatives

Table 2-1 in Chapter 2 displays the various stipulations that would be applied to Retention and Partial Retention VQO areas under the five alternatives. Alternative 1 is a No Lease alternative. For Retention VQO areas, Alternatives 2 and 3 would apply a NSO stipulation, Alternative 4 a CSU stipulation, and Alternative 5 a SLT stipulation. For Partial Retention VQO areas, Alternatives 2, 3 and 4 would apply a CSU stipulation, and Alternative 5 a SLT stipulation. The table below quantifies the acres of direct disturbance possible to either Retention (R) and Partial Retention (PR) VQO areas, based on the Reasonably Foreseeable Development Scenario of the different alternatives. The Sowers Canyon area, where development activity is anticipated to occur, has no Retention or Partial Retention VQOs.

Direct Impacts to Retention and Partial Retention VQO

Area	<u>Alt. 1</u> R/PR	<u>Alt. 2</u> R/PR	<u>Alt. 3</u> R/PR	<u>Alt. 4</u> R/PR	<u>Alt. 5</u> R/PR
Uinta NF	0/0	4.9/6.9	4.9/6.9	6.9/6.9	6.9/6.9
Ashley NF, outside Sowers Canyon area	5.4/5.4	6.7/10.7	6.7/20.4	26.8/26.8	26.8/26.8
Sowers Canyon area	0/0	0/0	0/0	0/0	0/0

Alternative 1

Under Alternative 1, 5.4 acres of both Retention and Partial Retention could be impacted in the Ashley NF, outside of the Sowers Canyon area. Impacts would include strong line and color contrast caused by the construction of access roads, and strong form contrasts caused by the equipment and structures at the well site. Disturbance is associated with exploration activity, which is a short-term disturbance. With proper reclamation, impacted areas could meet their adopted VQOs.

Alternatives 2 and 3

Under Alternatives 2 and 3, Retention (R) and Partial Retention (PR) have a NSO and CSU stipulation, respectively. In Alternative 2, 102,600 acres of PR land have a NSO stipulation, due to the overlap of other resources with NSO stipulations. In Alternative 3, 46,110 acres of PR are protected with NSO. Acres of disturbance potentially occurring to Retention and Partial Retention lands are shown in the above table. Visual impacts include strong line, color and form contrasts associated with roads and well pads. All disturbance would be short-term exploration activity, and could be mitigated with successful reclamation.

Alternative 4

Under Alternative 4, both R and PR have CSU stipulations. 6.9 acres of both R and PR could be impacted in the Uinta NF, and 26.8 acres of R and PR lands could be impacted on the Ashley NF,

outside of the Sowers Canyon area. Short-term impacts include line, color and form contrasts caused by road construction and well pad equipment. Reclamation measures could return impacted lands to near their original condition.

Alternative 5

Under Alternative 5, both R and PR lands would be leased with a SLT stipulation. Acres affected are shown in the above table. SLT would not be completely effective in controlling when and where ground disturbance could occur, and strong visual contrasts, noticeable from high use areas, may occur. Impacts would be short-term, and reclamation should return the land to a condition compatible with the VQO rating.

Cumulative Impacts

Major foreseeable activities on the Uinta NF include the Diamond Fork System project, wetland development, vegetation management activity, watershed improvements, road stabilization, and possible land acquisition. The DFS is a major water development project, and will include the construction of the Monks Hollow Dam and Reservoir, powerplants, transmission lines, and other facilities. These facilities will change the existing scenery in several locations on the Uinta NF. The reservoir will add a large water feature to the landscape, generally considered to be a positive element. Other facilities, such as the powerplants and the 138 kV transmission line, will cause negative impacts to the existing scenery. Other planned activities are mostly vegetation management activities that would generally comply with the VQOs in the area they would take place.

The RFDS for oil and gas activity predicts 0, 4.9, 4.9, 6.9, and 6.9 acres of direct disturbance in Retention VQO areas in Alternatives 1, 2, 3, 4, and 5, respectively. A maximum of 6.9 acres of Partial Retention would be impacted under Alternatives 2, 3, 4, and 5. This small level of disturbance would not have a significant effect on Retention or Partial Retention lands within the Uinta NF.

On the Ashley NF, vegetation management is the primary land management activity anticipated to occur in the near future. This type of activity is short-term in nature and would likely meet the VQOs for the areas affected. The RFDS predicts 5.4, 6.7, 6.7, 26.8, and 26.8 acres of direct disturbance in Retention VQO lands on the Ashley NF, outside of the Sowers Canyon area, in

Alternatives 1, 2, 3, 4, and 5, respectively. Approximately 5.4, 10.7, 20.4, 26.8, and 26.8 acres of Partial Retention VQO lands could be disturbed in Alternatives 1, 2, 3, 4, and 5, respectively. This level of disturbance would not be a significant contribution to the overall low level of cumulative impacts occurring to the visual quality of forest lands.

4.10 CULTURAL RESOURCES

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.

Effects of Alternatives

This section provides a description of potential impacts to cultural resources in the study area that could result from implementation of the various leasing alternatives. Impacts would be similar under all alternatives since most of the significant cultural resources can be protected effectively through application of Section 106 of the National Historic Preservation Act (NHPA). This includes Forest Service consultation with the Utah State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Advisory Council). However, impacts would vary in magnitude between the alternatives. Impacts are least likely to occur under Alternative 1, where only cultural resources in areas under existing leases could potentially be impacted. Impacts under Alternatives 2 and 3 are less likely to occur than under Alternatives 4 and 5 due to the high amount of lands with a NSO stipulation under Alternatives 2 and 3. When specific areas of disturbance are known, a site-specific survey would be conducted to identify cultural resources that could be impacted and their significance determined. The Forest Service would comply with Section 106 and implementing regulations at 36 CFR 800 prior to land-disturbing activities.

Only a small part of the study area has been surveyed for cultural resources and for the most part, the significance (i.e., eligibility for the National Register of Historic Places) of identified cultural

resources has not been evaluated. Some would likely be considered eligible for inclusion in the National Register of Historic Places, others however probably would not. In situations where significant resources might be affected by oil and gas activity, mitigation measures could likely be employed to avoid or mitigate impacts to the site prior to disturbance. Even under Standard Lease Terms, an operator may be required to move facilities up to 200 meters which would likely allow avoidance of sites such as lithic scatters, burials, peeled trees, and rock art, in most cases. In other cases, such as the dams, diversions, ditches, and Indian trails, it may be more difficult to avoid impacts. Where significant sites cannot be avoided, impacts can often be mitigated through data recovery studies. This is usually done by partially excavating the site, using methodologies defined in a research design reviewed and approved by the Forest Service, SHPO, and Advisory Council. While information is retrieved from the site, the impacts to the site are irreversible.

Certain sites are considered significant for reasons other than their scientific value. Sites associated with significant events or persons or which embody distinctive characteristics may require different mitigation measures. Oil and gas activity may result in degradation of these resources or of the sensory environment (e.g., audio and visual) associated with these resources, or create conflicts with recreation and traditional users of these resources and areas. Often Memoranda of Agreement prepared according to 36 CFR 800, stipulating other types of mitigation measures must be developed and signed before a disturbance can proceed. Indirect or secondary impacts must also be considered at these sites.

Other impacts to cultural resources could include illegal collection, vandalism, or reduced use of traditional cultural properties by American Indians resulting from increased public access. Increased access, however, can increase recreational or educational value of certain cultural resource sites.

All lease options would include avoidance of significant prehistoric and historic archaeological resources. Any proposed alternative would have minor, if any, cumulative affects on the regional cultural resource base.

Cumulative Impacts

All lease options would include avoidance of significant prehistoric and historic archaeological resources. Any proposed alternative would have minor, if any, cumulative effects on the regional cultural resource base.

4.11 TRANSPORTATION

This section provides a description of potential impacts to the transportation system in the study area that could result from implementation of the various leasing alternatives. The analysis is focused on the sensitive resource components identified in Section 3.11, which include major highways and county and forest roads.

4.11.1 Major Highways

General Effects

Since most oil and gas activity is projected to occur under any of the alternatives in the Sowers Canyon area, the major highways that would likely be affected include U.S. Highway 40 and U.S. Highway 191. Impacts would include increased traffic levels, increased levels of dust and noise, and accelerated deterioration of road surfaces, bridges, and culverts.

Effects of Lease Options

No Lease and No Surface Occupancy: NL and NSO would result in no additional effects to roads or expansion of the existing transportation system from oil and gas leasing beyond that due to existing leases.

Controlled Surface Use, Timing Limitations and Standard Lease Terms: Under all options the lessee must at a minimum follow standards and guidelines as expressed in the standard lease form (Form 3100-11 [Appendix A]; 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; and close all newly constructed roads to public motorized use (with exceptions). Under a TL stipulation, roads may also be temporarily closed 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.

Effects of Alternatives

Alternative 1

While Alternative 1 is the No Lease alternative, oil and gas activity could occur for some period of time on existing leases. When existing leases expire or production ceases, those lands would revert to No Lease. Under Alternative 1, one exploration well is anticipated for the Ashley NF outside the Sowers Canyon area on existing leases. The increase in traffic or potential degradation on affected highways due to one exploration well would not be significant. Within the Sowers Canyon area, up to 12 new development wells could occur (in addition to 5 existing shut-in wells) on existing leases which would result in increased traffic on the major highways and other impacts mentioned above. However, overall impacts would be expected to be relatively low, and cause little disruption to the traveling public as a whole. Once existing leases expire or production ceases, no impact to affected highways would occur.

Alternatives 2, 3, 4, and 5

The nature of impacts to major highways under Alternatives 2, 3, 4, and 5 would be as described above in General Effects and Effects of Lease Options, but the magnitude of impact would be slightly greater for each successive alternative. Each successive alternative is less restrictive and has more projected oil and gas activity, hence more traffic, than the previous one. TL stipulations during winter months for Alternatives 2, 3, and 4 may reduce traffic and the associated risk of accidents during that part of the year. Other stipulations are not likely to impact traffic on major highways.

4.11.2 County and Forest Roads

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 road 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 access needs). Adverse impacts would be related to additional or

unnecessary surface disturbance, high traffic volumes, and increased access to previously undisturbed areas.

Alternative 1

Although Alternative 1 is the No Lease Alternative, oil and gas activity could occur on existing leases, primarily in the Sowers Canyon area. The RFDS predicted 12 development wells in Sowers Canyon on existing leases and 1 exploratory well on the Ashley NF outside the Sowers Canyon area. New road construction/reconstruction would be limited to providing access to areas with existing leases.

The RFDS assumes that, for the Ashley NF outside the Sowers Canyon area, access to exploratory wells would require 0.8 miles of light road reconstruction and 0.4 miles of heavy reconstruction or new construction. Additionally, each mile of light road reconstruction would have a net disturbance of 2.4 acres per mile after cut-and-fill slope reclamation and each mile of heavy road reconstruction (or new construction) would have a net disturbance of 3.6 acres per miles after cut-and-fill slope reclamation. Therefore, for the one exploratory well projected for the Ashley NF outside the Sowers Canyon area on existing leases, the projected disturbance for roads would be 3.4 acres. The calculation is as follows:

$$\begin{aligned} &1 \text{ exp well (Unit C)} \times 0.8 \text{ miles light road/well} \times 2.4 \text{ acres/mile} = 1.92 \text{ acres} \\ &1 \text{ exp well (Unit C)} \times 0.4 \text{ miles heavy road/well} \times 3.6 \text{ acres/mile} = 1.44 \text{ acres} \\ &\text{Total acreage of surface disturbance } (1.92 + 1.44) = 3.36 \text{ acres (rounded to 3.4)} \end{aligned}$$

For the 12 projected development wells in Sowers Canyon, the RFDS assumes 0.4 miles of light reconstruction of roads per well and 0.4 miles of heavy reconstruction or new construction per well. Surface disturbance for each type of reconstruction (or construction) would be the same as described above. Therefore the projected area of disturbance for the twelve development well in the Sowers Canyon area is 28.8 acres for roads. The calculation is shown below:

$$\begin{aligned} &12 \text{ dvlp wells} \times 0.4 \text{ miles light road/well} \times 2.4 \text{ acres/mile} = 11.52 \text{ acres} \\ &12 \text{ dvlp wells} \times 0.4 \text{ miles heavy road/well} \times 3.6 \text{ acres/miles} = 17.28 \text{ acres} \\ &\text{Total acreage of surface disturbance } (11.52 + 17.28) = 28.8 \text{ acres} \end{aligned}$$

Under Alternative 1, the impacts to county and forest roads would be as described above under General Effects, however, the impacts would occur only until existing leases expire or production ceases, at which time some of the roads may be reclaimed or closed, while other might remain open to serve other forest users. This would be determined at the APD or SUPO stage.

Alternative 2

Under Alternative 2, impacts would be as described above under General Effects and Effects of Lease Options. A total area of 59.6 acres is expected to be disturbed for road reconstruction/construction. This calculation is based on the RFDS presented in Appendix D and is shown below. Under this alternative, over half of the study area (235,000 acres) has NSO stipulation, but this would apply only to well pads and not roads. TL stipulations would limit road use in elk winter range and calving areas and deer winter range. Maintenance of roads would be required where there is long-term use.

1 exp well (Unit A or B) x 1 mile light road/well x 2.4 acres/mile = 2.4 acres
1 exp well (Unit A or B) x 0.7 miles heavy road/well x 3.6 acres/mile = 2.5 acres
2 exp wells (Unit C) x 0.8 miles light road/well x 2.4 acres/mile = 3.8 acres
2 exp wells (Unit C) x 0.4 miles heavy road/well x 3.6 acres/mile = 2.9 acres
20 dvlp wells x 0.4 miles light road/well x 2.4 acres/mile = 19.2 acres
20 dvlp wells x 0.4 miles heavy road/well x 3.6 acres/miles = 28.8 acres
Total acreage of surface disturbance = 59.6 acres

Alternative 3

Under Alternative 3, impacts to county and forest roads would be as described under General Effects and a total of 79.8 acres would be disturbed for road reconstruction/construction. This figure is based on the RFDS presented in Appendix D and the calculation is presented below. Like Alternative 2, road use would be restricted by TL stipulations on critical habitat areas. Maintenance of roads would be required where there is long-term use.

1 exp well (Unit A or B) x 1 mile light road/well x 2.4 acres/mile = 2.4 acres
1 exp well (Unit A or B) x 0.7 miles heavy road/well x 3.6 acres/mile = 2.5 acres
3 exp wells (Unit C) x 0.8 miles light road/well x 2.4 acres/mile = 5.8 acres
3 exp wells (Unit C) x 0.4 miles heavy road/well x 3.6 acres/mile = 4.3 acres

27 dvlp wells x 0.4 miles light road/well x 2.4 acres/mile = 25.9 acres
27 dvlp wells x 0.4 miles heavy road/well x 3.6 acres/miles = 38.9 acres
Total acreage of surface disturbance = 79.8 acres

Alternative 4

Under Alternative 4, the full RFDS (described in Appendix D) is projected and a total of 93.7 acres is expected to be disturbed for road reconstruction/construction, the calculation is presented below. Otherwise, impacts would be as described above under General Effects. Again, use of roads would be restricted by TL stipulations in elk winter range. Maintenance of roads would be required where there is long-term use.

1 exp well (Unit A or B) x 1 mile light road/well x 2.4 acres/mile = 2.4 acres
1 exp well (Unit A or B) x 0.7 miles heavy road/well x 3.6 acres/mile = 2.5 acres
5 exp wells (Unit C) x 0.8 miles light road/well x 2.4 acres/mile = 9.6 acres
5 exp wells (Unit C) x 0.4 miles heavy road/well x 3.6 acres/mile = 7.2 acres
30 dvlp wells x 0.4 miles light road/well x 2.4 acres/mile = 28.8 acres
30 dvlp wells x 0.4 miles heavy road/well x 3.6 acres/miles = 43.2 acres
Total acreage of surface disturbance = 93.7 acres

Alternative 5

Like Alternative 4, the full RFDS is projected under this alternative, therefore, the same amount of acreage (93.7 acres) would be disturbed for road reconstruction/construction. The calculation is shown above under Alternative 4. Otherwise impacts would be the same as described above under Impacts Common to all Alternatives. There would be no restrictions on road use due to TL stipulations.

Cumulative Impacts

The minimal amount of road construction needed for exploration activity on the Uinta NF (0 miles in Alternative 1; 1.7 miles in Alternatives 2, 3, 4 and 5) would not be a significant contribution to the cumulative effect occurring to the transportation system in that portion of the EIS study area. On the Ashley NF, few land management activities other than oil and gas exploration and development are anticipated to involve a significant level of road construction. 1.2, 2.4, 3.6, 6, and

6 miles of road construction would be needed for exploration activity in the Ashley NF, outside Sowers Canyon area in Alternatives 1, 2, 3, 4 and 5, respectively. This is a short-term activity; after reclamation there would not be cumulative effects to roads. In the Sowers Canyon area, 9.6, 16, 21.6, and 24 miles of road construction would be needed for well development in Alternatives 1, 2, 3, 4 and 5, respectively. These roads would exist for at least the life of the development activity - projected to last 20 years or more. This projected level of road construction would likely be the largest contributor to road densities in this portion of the Ashley NF.

4.12 SOCIOECONOMICS

This section provides a description of potential impacts to the socioeconomic conditions described in Chapter 3 (Section 3.12) that could result from implementation of the various leasing alternatives. The analysis is focused on the sensitive resource components identified in Section 3.12, which include population, employment and income, housing, local government facilities, services, and fiscal conditions, and social setting.

Effects of Lease Options

This leasing option analysis is given to respond to the effects that lease options have on the economic costs to the oil and gas industry. Other socioeconomic effects are discussed in the alternative analysis, Section 4.2.1.2.

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 lease expires.

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.

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.

Timing Limitations: 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.

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.

4.12.1 Population

None of the alternatives are expected to result in significant, long-term changes in the population of the affected area, primarily Duchesne and Uintah Counties and the communities of Duchesne, Roosevelt, and Vernal. However, short-term fluctuations in population could occur. A minor population increase could occur under the full RFDS (Alternatives 4 and 5). Significant, long-term changes in population are not expected because of the existing level of oil and gas activity in the general area (e.g., the nearby Altamont-Bluebells and the Brundage Canyon fields). Employees are likely to be existing residents already in the oil and gas industry, and other support and supply centers likely already exist. The full RFDS, which consists of one exploratory well on the Uinta NF, five exploratory wells on the Ashley NF outside of the Sowers Canyon area, and 30 development wells within the Sowers Canyon area (in addition to the five shut-in wells already present) over a 15-year period, could result in the need for additional oil and gas workers, but population effects over the two-county study area would be expected to be minor, probably within or slightly above the predicted growth for Duchesne and Uintah Counties (17,000 and 32,600 persons by the year 2020, respectively from current levels of 12,900 and 23,700, respectively).

4.12.2 Employment and Income

General Effects

As with population, none of the alternatives are expected to result in significant, long-term impacts to the current employment and income situation in the affected area, particularly under Alternatives 1, 2, and 3. The full RFDS is anticipated under Alternatives 4 and 5, which could result in the need for additional oil and gas workers and supply and support personnel. However, it is anticipated that most of these workers, supply and support personnel, and families are existing residents in the study area. Employment needs and crew utilization would obviously depend on the number of drilling operations, number of production wells, and the distribution of drilling activity at one time.

The opening of the Sowers Canyon field (and possibly other fields, if found and developed in the study area) to oil and gas production could result in an increase in, or maintenance of, personal income for oil and gas and related workers. The hourly wage for oil and gas workers may range from \$27.82 up to \$38.49, resulting in higher than average personal income for these workers relative to other occupations in the area.

Income benefits are calculated based on the following assumptions developed in the recent EIS for oil and gas leasing on the North Slope of the Uinta Mountains (USFS 1993), with slight revisions to account for differences between these study areas (i.e., well depth in the North Slope EIS was estimated to be 17,000 feet and the RFDS for the Western Uinta Basin estimates well depth at 2,000 to 5,500 feet; therefore period for spudding was reduced from 250 days to 80 days).

1. The typical well spudding (i.e., drilling) period would require a period of 80 days per well.
2. Each rig would require 15 rig hands working 40 hours per week at a rate of \$38.49 per hour over the 80 day period.
3. Each rig would require an additional 12 support individuals working at a rate of \$27.82 per hour over the 80 day period.

The economic benefits in terms of direct employment income to the study area from drilling operations are estimated by alternative below.

Alternative 1

Under Alternative 1, one exploratory well would be spudded on existing leases on the Ashley NF outside the Sowers Canyon area, and 12 new development wells would be spudded in Sowers Canyon. Development of Sowers Canyon with the 12 development wells (plus the current existing

five shut-in wells) would occur over the 15-year projection period. The labor costs per well for spudding as estimated using the above assumptions total about \$583,000 per well (15 workers x \$38.49/hr x 8 hr/day x 80 days = \$369,504; 12 workers x \$27.82/hr x 8 hr/day x 80 days = \$213.657; \$369,504 + \$213.657 = approximately \$583,000). Under Alternative 1 the total outlay for wages would be approximately \$7.6 million (\$583,000 x 13 wells).

Alternative 2

Under Alternative 2, the RFDS anticipates three exploratory wells (one spudded on the Uinta NF and two on the Ashley NF) and 20 development wells spudded in Sowers Canyon (in addition to five shut-in wells) over the projected 15-year period. The exploratory wells are not expected to result in a discovery. The total outlay for wages under this scenario would be about \$13.4 million (\$583,000 x 23 wells).

Alternative 3

The RFDS for Alternative 3 predicts one exploratory well on the Uinta NF, 3 exploratory wells on the Ashley NF outside the Sowers Canyon area, and 27 development wells (in addition to five existing shut-in wells) within the Sowers Canyon area over the projected 15-year period. The exploratory wells are not expected to result in a discovery. The total outlay for wages under this scenario would be about \$18.1 million (\$583,000 x 31 wells).

Alternatives 4 and 5

Under Alternatives 4 and 5, the full RFDS is projected. The full RFDS consists of 1 exploratory well spudded on the Uinta NF, five exploratory wells spudded on the Ashley NF outside the Sowers Canyon area, and 30 development wells spudded within Sowers Canyon (in addition to the five existing shut-in wells). The exploratory wells on the Uinta and Ashley NFs are not expected to result in a discovery. The total outlay for wages under this alternative would be about \$21 million (\$583,000 x 36 wells).

4.12.3 Housing

Since population is not anticipated to change significantly under any of the alternatives, the housing situation in Duchesne and Uintah counties likewise would not be expected to change

significantly. The current housing situation could likely accommodate most new workers. With the addition or continuation of work brought about by oil and gas development in the Western Uinta Basin, particularly under Alternatives 4 and 5, some existing residents may chose to upgrade their housing situation (e.g., from a rental unit to an owner-occupied unit, or from an existing owner-occupied unit to a larger one). These conditions could result in a minor increase in local construction.

4.12.4 Local Government Facilities, Services, and Fiscal Conditions

Demand for schools, water, sewage systems, law enforcement, emergency facilities, and recreation would not likely increase or change significantly under any alternative, in line with the anticipated population impacts.

Both Duchesne and Uintah Counties levy property taxes on oil and gas activity on the value of real property pertinent to such operations (e.g., drilling rigs). The value is assessed by the state, but the counties collect the tax. Because this is a value-based tax, additional income to the counties resulting from implementation of the different alternatives is difficult to estimate, but it can be assumed that the affected counties would likely receive some additional revenue under any of the alternatives, with greater revenue under Alternatives 4 and 5 (the full RFDS) compared to Alternatives 1, 2, and 3.

Duchesne County, location of the expected development, would also receive additional revenue indirectly from royalties and state taxes under any of the alternatives. Recall that the State of Utah receives a royalty payment of 50 percent of 12.5 percent of the gross income of gas and oil production on leased federal lands. For acquired lands associated with National Forest, only 25 percent of the bonuses, rentals, and royalties are returned to the state or county from which the revenue was collected (see Table in Section 3.12.4.4). The State of Utah also has a severance tax on the gross value of oil and gas production less exemptions; such tax was 4 percent in Utah prior to January 1, 1992, when a graduated rate scale was initiated. A conservation tax is furthered levied on proceeds from sales. Affected counties receive some of these monies back in the form of grants and loans through the state Community Impact Board. The Community Impact Board is mandated to return a portion of impacts funds to affected counties (based on the dollar amount of oil and gas production in that county). The Community Impact Board began the grant program in 1979. For the 13-year period from 1979 to 1992 the average percent return to counties in the form of grants was 45.5 percent, and in the form of loans, 43.9 percent. This return rate, however, is

highly variable by county. Over the same 13-year period Uintah County received 7.9 percent return in grants and 17.2 percent in loans, while Duchesne County received 97.8 percent return in grants and 62.7 percent return in loans. Currently, several counties are working to equalize the amount of return among the counties.

Using the overall average return percentages (45.5 percent for grants and 43.9 percent for loans), the amount of revenue to Duchesne County for initial oil and gas production under the full RFDS can be estimated. In

Appendix D, the initial daily production potential of development wells in Sowers Canyon is predicted to range from 0 to 54 barrels of oil and 0 to 3,000 mcf of gas under the full RFDS. In the years 1991 through 2000, oil prices are projected to range between \$18.00 and \$26.00 per barrel, and natural gas prices are projected to reach the \$3.00 per mcf level in the year 2000 (Kaldenbach 1991a). Assuming the maximum initial daily projections for oil and gas (54 barrels and 3,000 mcf, respectively) and the highest projected oil and gas prices presented above (\$26.00 per barrel and \$3.00 per mcf, respectively), a rough estimate of return to Duchesne County can be made. Duchesne County therefore could optimistically expect a return of \$1,727,844 in grants and \$1,667,084 in loans. The calculations are shown below.

$$\begin{aligned} &54 \text{ barrels of oil/day} \times \$26.00/\text{barrel} \times 365 \text{ days/year} = \$512,460/\text{year for oil} \\ &3,000 \text{ mcf of gas/day} \times \$3.00/\text{mcf} \times 365 \text{ days/year} = \$3,285,000/\text{year for gas} \\ &\$512,460/\text{year for oil} + \$3,285,000/\text{year for gas} = \$3,797,460/\text{year} \\ &\$3,797,460/\text{year} \times 45.5 \text{ percent} = \$1,727,844 \text{ in grants} \\ &\$3,797,460/\text{year} \times 43.9 \text{ percent} = \$1,667,084 \text{ in loans} \end{aligned}$$

Because of the uncertainties built into these calculations, actual revenue could vary greatly. Funds returned to the counties vary, and the actual rates may be very different from that shown above. The estimated amount of oil and gas and the projected prices for these commodities could also vary greatly. In addition, these calculations are based on the full RFDS (Alternatives 4 and 5). Therefore, these figures would likely be much less for Alternatives 1, 2, and 3, since varying degrees of the RFDS are projected for these alternatives.

Although it is difficult to predict actual fiscal benefit to the affected counties, both Uintah and (to a greater degree) Duchesne County are likely to receive additional revenue under any of the alternatives. Since the Uinta NF portion of the study area is located in Wasatch County, this

county could also benefit financially if the exploratory wells result in a discovery. This benefit, however, is not anticipated under the RFDS.

4.12.5 Social Setting

As described above, significant, long-term changes in population are not anticipated as a result of projected oil and gas activity. Factors that affect lifestyles, attitudes, beliefs, values, social organization, and settlement patterns would therefore not likely change from the existing situation.

The counties and communities in the study area have prior experience with oil and gas activity. Possible impacts to the social groups described in Chapter 3 (Section 3.12.4) are discussed below, however.

Native Americans

Potential impacts to Native Americans from oil and gas leasing in the Western Uinta Basin could include revenue from oil and gas if production were to occur on Indian parcels included in the Western Uinta Basin study area (i.e., on the Uinta NF). Based on the RFDS, however, production in these areas is not anticipated. For those Native Americans interested in maintenance of their traditional hunting and gathering lifestyle and spiritual use of traditional cultural properties, such persons may be negatively impacted if oil and gas exploration or development interferes with these activities. These impacts could occur under any of the alternatives, since all alternatives include some level of oil and gas activity due to existing leases. Localized impacts therefore may affect Native Americans' traditional land uses.

Younger Newcomers

This group may be negatively impacted since they are most interested in those activities which limit resource use and they may prefer less commodity development if their livelihood is not affected. These impacts could occur under any of the alternatives, since all alternatives include some level of oil and gas activity due to existing leases.

Ranchers/Farmers

This group would generally not be impacted, either positively or negatively, by oil and gas activity, although negative impact could occur if oil and gas production (under any of the alternatives)

interferes with their ability to produce crops or livestock from present or planned leasing activities on federal lands.

Business People

In general, business people would benefit from any level of oil and gas activity, as it would bring some level of additional money into the local economy. Some businesses, however, could benefit more than others, or some could actually be negatively impacted depending on the business. For example, a business person selling tools and equipment for oil and gas operations would experience beneficial impacts, while a business person selling recreation equipment may be negatively impacted if the recreation opportunities in the study area are diminished.

Oil and Gas Workers/Miners

This group would generally benefit from oil and gas activity, particularly under Alternative 5 (Standard Lease Terms). The No Lease alternative (Alternative 1) and the restrictions placed on oil and gas activity under Alternatives 2 - 4 could limit future opportunities for this group in the Western Uinta Basin.

Government Workers/Educators

This group is unlikely to be impacted substantially by oil and gas activity. However, this group generally favors maximum protection to the natural setting in the Forests.

Retirees

This group may be negatively impacted by oil and gas activity under any of the alternatives, because these persons have often purchased property in the area for a certain lifestyle, and disruption of this lifestyle by oil and gas exploration and development would be viewed negatively.

Regional Population

Two regional populations are discussed in Chapter 3: the Uinta Basin in general and the Salt Lake City region. The Uinta Basin region would likely consider oil and gas activity in the Western Uinta Basin in a positive light, as a source of new opportunities and economic growth. The Salt Lake

City regional view of oil and gas activity in the Western Uinta Basin would probably be mixed: negative for those people who use the National Forests for recreation, and positive for those who supply goods and services indirectly to such industries in less populated areas.

National

Many national groups interested in resource values of the National Forests, other than oil and gas, may view oil and gas activity under any of the alternatives in a negative light. However, to the nation as a whole, oil and gas development would help reduce dependence on foreign countries for these energy resources and contribute to the national treasury and economic growth in the form of rentals and royalties and an adequate fuel supply.

4.12.6 Cumulative Impacts

Few cumulative impacts are associated in the area for socioeconomics. Other vegetation treatment activities would likely have little effect on employment and income.

4.13 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 or the life of the producing field. Alternatives 4 and 5 would likely result in full field development for the Sowers Canyon area, and thus can be considered an irretrievable commitment of resources. Alternatives 2 and 3 would make the Sowers Canyon area oil and gas reserves mostly available for extraction; and Alternative 1 would allow considerable extraction in the Sowers Canyon area. Once the oil and gas has been extracted, it is not replaceable. Potential oil and gas reserves outside of the Sowers Canyon area are not expected to be irretrievably committed, 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 best management practices. 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 watershed protection and rehabilitation.

The minor and localized increases in fugitive dust and vehicle exhaust that would occur under all five alternatives would not be an irreversible or irretrievable commitment of air quality resources.

There will be an irretrievable loss of big game habitat during the drilling and production, that will last until the facilities are closed and the disturbed areas are reclaimed. The commitment is for the life of production, which averages about 20 years. The loss of big game habitat is not an irreversible commitment past the life of the field. If roads are kept open after the life of the project, the irreversible and irretrievable affects 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 Alternatives 1-4. Under Alternative 5, minor commitment (loss) of sensitive species or their habitats may occur; this may be irretrievable for the life of the project, but not irreversible.

There would be an irreversible loss of roadless resources due to exploration activities on both the Uinta NF and the Ashley NF, outside Sowers Canyon area. The potential acres disturbed by alternative is shown in Section 4.7. 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.

Semi-Primitive Non-Motorized (SPNM) areas have the potential to be impacted in all three areas (Uinta NF, Ashley NF, outside Sowers Canyon, and the Sowers Canyon area). The amount of potential direct and indirect impacts are shown in Section 4.8.2. 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. In the Sowers Canyon area, the irreversible loss would be long term, due to the nature of development activity which can last 20 years or more. 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 (Alternative 5). This loss in visual quality would last until the activity ceased and the area is 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.

4.14 UNAVOIDABLE ADVERSE EFFECTS

Minor effects on watershed 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 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, roads and pipelines. These losses of habitat typically represent up to 0.3% 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 the roadless resource 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. Alternatives 4 and 5 have 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. The CSU stipulation that would be applied under alternatives 2 and 3 would reduce impacts; however, the increased human presence would cause unavoidable effects to the semi-primitive character of the area.

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 on the Uinta NF and the Ashley NF, outside the Sowers Canyon area. 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 the well site. This exploration activity would be a short term impact; there would be no long term unavoidable impacts.

No unavoidable adverse effects would occur to transportation, cultural, or socioeconomic resources.

4.15 RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

Short-term activities, including building of roads, pipelines, 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. The potential for long-term adverse effects is greatest under Alternative 5.

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 pipeline ROWs are restored, and 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. These effects are most likely under Alternative 5, and to a lesser extent under Alternative 1.

Some long-term loss or disturbance of habitat of candidate and sensitive species may occur under Alternative 5, from short-term activities.

Short-term activities could cause long-term impacts to RNAs of oil and gas development occurs and severely modifies the character of these areas. This may occur under Alternative 5, but the other 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 the transportation, cultural or socioeconomic resources.