

Table 4-19. Summary of Impacts to Special Status Fish and Wildlife Species ¹

Management Action	Alternative				
	I	II	III	IV	IV
Special Stipulations for ACECs	NA	Major (+)	Moderate to Major (+)	NA	NA
Protection of WSR-eligible Streams	NA	Moderate to Major (+)	Moderate to Major (+)	Moderate (+)	Moderate (+)
Watershed Management Areas	NA	Moderate to Major (+)	Major (+)	NA	NA
Special Management for Wilderness Values ²	NA	Moderate to Major (+)	Moderate (+)	NA	NA
Vegetation/Weed Management	Minor to Moderate (-)	Minor to Moderate (+)	Minor to Moderate (+)	Minor to Moderate (-)	Minor to Moderate (-)
Recreation/Travel Management	Moderate (-)	Moderate to Major (+)	Moderate to Major (+)	Moderate to Major (+)	Moderate (+)
Range Management	Moderate (-)	Moderate (+)	Moderate (+)	Moderate (+)	Minor (-)
Oil and Gas Development ^{3,4}	Negligible to Minor (-)	Minor to localized Moderate (-)	Negligible to localized Moderate to localized Major (-)	Moderate to localized Major (-)	Moderate to Major (-)

¹ For Federally listed, proposed, or candidate threatened or endangered species, USFWS would issue a Biological Opinion (BO) addressing potential effects and required conservation measures.

² Limited to roadlessness and naturalness under Alternative III.

³ Under Alternative I, oil and gas impacts for Alternative I almost entirely below cliffs due to no-lease of NOSR 1.

⁴ Under Alternative III, development above the rim deferred until 80% of anticipated total wells below the rim during the 20-year period of analysis have been drilled. "The "negligible to localized moderate" level reflects area above the rim during and after the deferral period, estimated at 16 years.

4.4 HUMAN ENVIRONMENT

4.4.1 Visual Resources

Introduction

As outlined in Section 3.4.1, VRM classes are assigned to the various parts of the landscape based on visual characteristics or to meet management objectives. These range from preserving a natural landscape and existing characteristics (Class I) to providing for management activities that allow major modification of the landscape (Class IV). While numerous management activities can impact visual values, the most significant impacts are large-scale or cumulative ground-disturbing activities that alter the existing form, line, color, and texture that characterize the existing landscape.

Impacts to visual resources are considered major if they substantially change or degrade the character of the landscape as seen from sensitive viewsheds or if the allowable modifications exceed VRM classifications. While topography can allow for some landscape modifications, many types of disturbance, such as roads and artificial structures, can dominate the landscape depending on their size, distance, topographic position, presence or absence of screening, and contrast with surrounding conditions. Viewsheds deemed to be of high value are those that have high scenic quality, such as East Fork Canyon, or high visual sensitivity due to the large amount of public interest and viewing.

A viewshed analysis was performed for each of five alternatives assessed by this RMPA/EIS. Although the alternatives include various resource management actions and land uses, increased levels of oil and gas development under each alternative would be the dominant

long-term landscape-altering activity. Visible changes associated with oil and gas exploration and production include not only physical structures, but also altered topography, exposed soils, and construction of roads (often with significant cut-and-fill) and pipelines. All of these activities require the removal of vegetation. While some temporary disturbances are reclaimed within 2 years, most pads and roads remain as long-term areas of physical and biological, and hence visual, modification.

Methods

The viewshed analysis was performed using ESRI ArcScene software and a USGS Digital Elevation Model (DEM). The DEM used for this project was based on USGS 7.5-minute topographic quadrangles with a cell size of 28.5 meters. The viewshed analysis process uses the DEM to identify all new pad locations that are visible from a given point or points. Roads were splined to reduce the number of vertices. Results of the viewshed analysis were combined with the analysis of potential oil and gas development under each alternative. The developable areas were assumed to have 40-acre surface spacing, consistent with the RFD (Appendix H). The GIS was then used to identify and enumerate potential well locations that would be visible within each viewshed for all five alternatives.

In adjusting from the potential maximum number of wells throughout the life of the leases to the number likely to be developed during the 20-year period of analysis of this RMPA/EIS, it was assumed that the reductions would be spread uniformly throughout the Planning Area. Thus, wells closer or farther from a viewpoint used in the viewshed analysis, and wells visible versus not visible from those locations, had equal probability of being drilled during the 20-year period. It was also assumed that wells would be drilled at 40-acre surface spacing, notwithstanding BLM's goal of encouraging clustered or collocated facilities. The impact of clustering or collocating has not been assessed due to uncertainties about whether, where, and to what degree it would be accomplished. While clustering or collocating would reduce the

number of distinct development areas, each area would be larger. Therefore, depending on numerous unknowns, it is possible that clustering or collocating could result in greater, not lesser, visual impacts.

Maps 28 through 30 show the viewsheds for I-70, SH 13, and Rim Road. The colored area depicts the portion of the landscape visible from the road.

To assist further in the assessment of impacts to visual resources, the GIS classified the potentially visible well locations by distance zone, as measured from the viewer, as follows:

- **Close Range** – Less than 0.25 mile
- **Near Foreground** – 0.25 to 1 mile
- **Foreground** – 1 to 3 miles
- **Midground** – 3 to 5 miles
- **Background** – More than 5 miles

Results of the analysis are presented in Table 4-20. The numbers shown for different viewsheds cannot be added to derive a total number of visible well locations within distance zones and among alternatives because of overlap in viewsheds (see Maps 28 through 30).

Note that for the Rim Road, numbers include wells visible below the rim in addition to those visible above the cliffs. However, not all of the wells shown in the viewshed below the rim would actually be visible from the road, although all would be visible by walking the short distance to the rim. This is an artifact of the 28.5-meter cells and the DEM contour interval used in the analysis, which creates discreet rather than continuous sight points. Table 4-20 shows the total number of well locations on top of the plateau that would be visible from the Rim Road (in parentheses behind the gross total). The wells above the rim are mostly within the close range (< 0.25 mile) and near foreground (0.25 to 1 mile) zones because of the topographic screening of the undulating terrain and the fact that the well locations are not greatly elevated above the road as in the I-70 and SH 13 viewsheds. The longer

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distance zones consist mostly or entirely of wells below the rim.

Additionally, the Rim Road analysis does not factor for vegetational screening, which could be significant for some locations, because clearing for a pad and access road would remove some or

all of the screening available at a given well. Furthermore, the numbers do not reflect the ability of BLM to require that proposed well locations be moved up to 200 meters under the standard lease terms or by more than 200 meters under SSR/CSU stipulations to mitigate visual impacts.

Table 4-20. Number of Well Pads Potentially Visible Based on Viewshed Analysis

Viewshed	Distance Zone	Alternative I	Alternative II	Alternative III	Alternative IV	Alternative V
I-70	< 0.25 mile	0	0	0	0	2
	0.25 – 1 mile	12	21	22	20	23
	1 – 3 miles	16	23	31	28	62
	3 – 5 miles	2	2	8	7	13
	> 5 miles	0	0	5	4	5
	Total	30	46	66	59	105
SH 13	< 0.25 mile	11	14	18	16	17
	0.25 – 1 mile	25	25	38	34	37
	1 – 3 miles	16	17	36	32	36
	3 – 5 miles	1	1	9	8	18
	> 5 miles	0	0	1	1	6
	Total	53	57	102	91	114
Rim Road ¹	< 0.25 mile	3	4	13	16	30
	0.25 – 1 mile	4	11	23	29	54
	1 – 3 miles	28	31	77	95	110
	3 – 5 miles	91	69	67	83	85
	> 5 miles	19	15	13	16	17
	Total	145 (7)	130 (25)	193 (31)	239 (99)	296 (138)

¹ For Rim Road viewshed, numbers of visible pads include some below the rim; total pads visible above the rim in parentheses.

Impacts to visual resources in the Planning Area under the five alternatives are described below. The viewshed analysis process did not include potential new roads or widened existing roads that would provide access to new oil and gas facilities. The access roads required to service oil and gas activities on BLM portions of the Planning Area range from an estimated 152 miles for Alternative I to 350 miles for Alternative V. These roads would represent additional impacts to visual resources, especially where they must cross a visible slope or require removal of trees.

Some of the impacts may represent an irreversible and irretrievable commitment of visual resources (see Section 4.6). Development on private lands within the Planning Area is discussed in the cumulative impact analysis portion of each alternative analysis. VRM classes under the five alternatives are shown on Maps 24 through 27; acres by VRM class are provided in Table 4-21.

Table 4-21. Acres of VRM Classes by Alternative

VRM Class	Alternative I	Alternative II	Alternative III	Alternative IV	Alternative V
Class I	0	37,240	925	925	0
Class II	24,039	13,428	48,752	48,752	0
Class III	37,115	14,607	15,563	15,563	63,022
Class IV	10,340	8,350	8,350	8,350	10,568
Class V	2,096	0	0	0	0
Urban	12	12	12	12	12

4.4.1.1 Alternative I

Under Alternative I, a total of 855 new wells on 254 new pads are anticipated in BLM portions of the Planning Area. The long-term surface disturbance associated with this level of development would be approximately 1,151 acres. The following viewshed analysis considers stipulations in place and shows the number of well pads that may be visible on public lands. The development assumptions (Section 2.4) yield approximately 845 wells below the rim and 10 above the rim on BLM lands.

I-70 Viewshed

Approximately 30 potential well pads may be visible on public lands along I-70. This number reflects the existing NSO and CSU stipulations to protect high sensitivity within the I-70 viewshed and Class II areas. The two closest zones (less than 1 mile) would include all but two of the well locations in the I-70 viewshed under this alternative.

The visual impact of gas development in the foreground (1 to 3 miles) would be greatest west of Rifle. More than half the BLM wells would be in this zone and relatively visible due to elevated topography and the potential for stark contrast of pads and roads to the existing pinyon/juniper in terms of color, line, and texture. A large percentage of the wells that could be developed on private lands in the Planning Area would also be in this portion of the I-70 viewshed. The rolling terrain within

this distance zone provides some opportunities for locating roads and pads to reduce visual impacts.

SH 13 Viewshed

Approximately 53 well pads may be visible on public lands from SH 13. The area nearest the highway is classified as VRM Class IV, which allows a high level of modification. This area includes the two closest distance zones. Nearly 68 percent of the well sites would be within the two closest distance zones (less than 1 mile). The cliff areas to the west are designated as Class III, which also allows for some development and provides some opportunities for screening due to the rolling hills. Visual impacts within the close range and near foreground zones would be moderate.

Rim Road Viewshed

Approximately 145 well pads may be visible on public lands from the Rim Road, with all but seven below the rim. The remaining wells, all located below the rim, would be less conspicuous than indicated by the horizontal distance class in which they occur due to the additional vertical separation. The combination of vertical and horizontal separation would decrease the sensitivity level of these wells due to decreasing visual size and loss of detail in color and texture.

4.4.1.2 Alternative II

Under Alternative II, a total of 310 new pads and 905 new wells are anticipated on BLM lands in the Planning Area. The new wells would include 818 below and 87 above the rim. Total long-term disturbance associated with the new development is estimated to be 1,348 acres. The following viewshed analysis considers stipulations that would apply to development on public lands.

I-70 Viewshed

Approximately 46 well pads may be visible on public lands from the I-70 viewshed. Many of these pads would be developed within VRM Class II and VRM Class IV areas. Class II areas would have an SSR/CSU stipulation to maintain existing landscape character. Mitigation may reduce numbers of visible wells within the Class II areas by relocating them. However, Class IV allows for a high level of disturbance, and management activities can dominate the landscape. All but two of the pads on BLM lands in this viewshed would be in the close range and foreground distances zones (<0.25 mile to 3 miles).

The cliffs and areas of high visual sensitivity within the I-70 corridor would be protected through an NGD/NSO stipulation. Lands within the areas having wilderness character, which would be managed to protect those values (Appendix D), would not be leased. These areas include most of the visual values represented by the cliffs, including Anvil Points. All visual values within the Anvil Points or Magpie Gulch ACECs that are within this viewshed would be protected by an NGD/NSO to meet VRM Class I objectives.

This area would also include a substantial portion of the wells likely to be developed on private lands in the Planning Area, many within 1 mile of I-70. Gas development in the foreground west of Rifle would change the character of the existing scenery so it appears more heavily industrialized.

SH 13 Viewshed

Approximately 57 well sites may be visible on public lands from SH 13 under Alternative II. More than 68 percent of these sites would be in the close range and foreground distance zones (<0.25 mile to 3 miles). This is within VRM Class IV, which allow for a high level of disturbance and for management activities to dominate the landscape.

The cliffs and most visually sensitive lands would be protected under management prescriptions for areas having wilderness character, including a no-lease limitation. Additionally, all visual resource values within the Magpie Gulch ACEC would be protected by an NGD/NSO to meet VRM Class I objectives.

Approximately 29 wells may be visible within 1 mile of the SH 13 viewshed on private lands. The visual character of the near foreground north of Rifle would change from rural agricultural to more heavily industrialized.

Rim Road Viewshed

Approximately 130 well sites may be visible on public lands from the Rim Road, including 25 pads on top of the plateau and 105 below the rim. The new pads above the rim would be in the two closest distance zones (<0.25 to 3 miles) on lands managed as Class III. The 88 percent of the pads in the three greatest distance zones (1 to >5 miles) would be below the rim but visible from the rim, with the associated reduction in visual size and loss of detail in color and texture. New pad locations below the rim are mostly on Class IV lands.

Under this alternative, most of the Rim Road skirts VRM Class I areas and is protected from development. Since a portion of the plateau is VRM Class III, development in that area would be located adjacent to or within sight of the Rim Road. The area between the Trapper Creek ACEC and the area of East Fork Parachute Creek having wilderness character could take on an appearance of development even though Class III restrictions would be applied.

4.4.1.3 Alternative III – Preferred Alternative

The viewshed analysis for this alternative estimates 402 new pad locations and 1,761 acres of long-term surface disturbance on BLM portions of the Planning Area. The 1,324 new wells on BLM lands under this alternative include 1,273 below and 51 above the rim. The following viewshed analysis considers stipulations that would be applied to development on public lands.

I-70 Viewshed

Approximately 66 well pads may be visible on BLM lands from I-70. The concentration of visual impacts (80 percent of the pads) would be in the near foreground and foreground zones (0.25 mile to 3 miles). Many of these pads would be developed within Class II and Class IV areas. Class II areas would have an SSR/CSU stipulation to maintain the existing landscape character, while Class IV areas would allow for a high level of disturbance and visual impacts from management activities.

The cliffs and areas determined to contain high visual sensitivity within this viewshed would be protected through an NGD/NSO stipulation.

SH 13 Viewshed

Approximately 102 well pads may be visible on BLM lands from SH 13. Most of the development (87 percent) would occur in the close range through foreground distance zones (< 0.25 mile to 3 miles). These are mostly within VRM Class IV areas, which allow for a high level of disturbance and allow management activities to dominate the landscape.

The cliffs and other areas of high visual sensitivity within this viewshed would not be protected by an NGD/NSO stipulation under this alternative. Mitigation for impact to high sensitivity lands would occur through the Class II SSR/CSU, which allows gives BLM authority to require relocation surface features by more than 200 meters to minimize visual impacts.

Rim Road Viewshed

Approximately 193 potential well pads may be visible on BLM lands from the rim road, including 31 above and 154 below the rim. Most of the new pads above the rim would be on lands managed as Class II, with the remaining on Class III. These new sites would occur in the close range to foreground distance zones (<0.25 mile to 3 miles), primarily less than 1 mile.

New pads below the rim would mostly occur on Class IV lands, which would allow for a high level of disturbance and for management activities to dominate the landscape. The total area of the viewshed from the Rim Road is vast due to its elevated position, resulting in the relatively large number of wells. However, these would be viewed from greater distances (often more than 3 miles and with considerable vertical separation, greatly reducing their visual impact.

4.4.1.4 Alternative IV

The viewshed analysis for this alternative estimates 449 new pad locations and 1,940 acres of long-term surface disturbance on BLM portions of the Planning Area. The 1,324 new wells on BLM lands under this alternative include 1,156 below and 168 above the rim. The following viewshed analysis considers stipulations that would be applied to development on public lands.

I-70 Viewshed

Approximately 59 well pads may be visible on public lands from I-70. The concentration of visual impacts (70 percent of the pads) would be in the near foreground and foreground zones (0.25 mile to 3 miles). Many of these pads would be developed within Class II and Class IV areas. Class II areas would have an SSR/CSU stipulation to maintain the existing landscape character, while Class IV areas allow for a high level of disturbance and visual impacts from management activities.

The cliffs and areas determined to contain high visual sensitivity within this viewshed would be protected through an NGD/NSO stipulation.

SH 13 Viewshed

Approximately 91 well pads may be visible on public lands from SH 13. Most of the development (90 percent) would occur in the close range through foreground distance zones (< 0.25 mile to 3 miles). These are mostly within VRM Class IV areas, which allow for a high level of disturbance and allow management activities to dominate the landscape.

The cliffs and other areas of high visual sensitivity within this viewshed would not be protected by an NGD/NSO stipulation under this alternative. Mitigation for impact to high sensitivity lands would occur through the Class II SSR/CSU, which gives BLM authority to require relocation of proposed surface features by more than 200 meters to minimize visual impacts.

Rim Road Viewshed

Approximately 239 potential well pads may be visible on public lands from the Rim Road, including 99 above and 140 below the rim. Most of the new pads above the rim would be on lands managed as Class II, with the remainder Class III. New sites would occur in the close range to foreground distance zones (<0.25 mile to 3 miles), primarily less than 1 mile.

New pads below the rim would mostly occur on Class IV lands, which would allow for a high level of disturbance and for management activities to dominate the landscape. The total area of the viewshed from the Rim Road is vast due to its elevated position, resulting in the relatively large number of wells. However, these would be viewed from greater distances (often more than 3 miles and with considerable vertical separation, greatly reducing their visual impact.

4.4.1.5 Alternative V

Alternative V is estimated to result in 584 new pads and 1,582 new wells on BLM portions of the Planning Area. The new wells would include 1,348 below and 234 above the rim. Total long-term disturbance from this new oil and gas development is estimated to be 2,495 acres. The following viewshed analysis considers stipulations that would be applied to development on public lands.

I-70 Viewshed

Approximately 105 well pads may be visible on public lands from I-70. Almost all of the development within this viewshed under Alternative II would be in Class III, with some development on the eastern edge of the viewshed occurring in Class IV. More than half (59 percent) of the well sites would be within the foreground zone (1 to 3 miles), with another 22 percent in the near foreground (0.25 mile to 1 mile).

Gas development in the foreground west of Rifle would change the character of the existing scenery, creating a more heavily industrialized appearance.

SH 13 Viewshed

Approximately 114 well pads may be visible on public lands from SH 13. Nearly 80 percent of the development would occur in the close range through foreground distance zones (<0.25 mile to 3 miles) in VRM Class III and IV areas. These allow for a high level of disturbance, and management activities are allowed to dominate the landscape.

Gas development at distances closer than 3 miles along SH 13 north of Rifle would change the character of the rural agricultural landscape, creating a more heavily industrialized appearance.

Rim Road Viewshed

Approximately 296 well pads may be visible on public lands from Rim Road, with 138 above

and 158 below the rim. All development above the rim would be in Class III, while development below the rim would be in both Class III and IV. Wells above the cliffs would mostly be viewed at distances of less than 1 mile. Wells in portions of the viewshed below the rim, while numerous, would mostly be viewed at distances of 3 miles or greater and with considerable vertical separation.

4.4.1.6 Effects Common to All Alternatives

While many management activities can affect visual values and alter the landscape, oil and gas development is the dominant ground-disturbing activity being analyzed. It represents an irretrievable commitment of resources that can create the most significant long-term impact to visual values. Therefore, while the impact analysis considers other land uses and management actions, oil and gas development is the focus of the analysis. Cumulative impact assumptions include development on private land in the Planning Area as well as development beyond the 20-year period of analysis on BLM lands. Current VRM classes (Alternative I) were assigned to reflect the inventory process for the 1988 GSRA RMP. VRM classes for the remaining alternatives were changed to reflect resource allocation objectives and are not based on a resource inventory process for determining visual values. Therefore, discussion of visual values reflects impacts to existing visual values and focuses on impacts to the existing landscape and VRM Class objectives, by alternative.

Disturbed VRM Class V areas would be eliminated and would be managed under the VRM Class area directly adjacent to the disturbance under all but Alternative I.

Short-term visual effects within the landscape during the construction period would be altered by the presence of construction vehicles, dust, equipment, lighting, personnel, and emerging new oil and gas facilities, roads, and pipelines. These impacts would be most visible to the adjacent communities of Parachute, Rifle, Battlement Mesa, Morrisania Mesa, and Holms

Mesa, and to travelers along the I-70 and SH 13 corridors.

After construction of oil and gas wells and associated facilities is completed, long-term visible impacts would be from access roads, pipelines, power lines, well pads, and other supporting infrastructure. These landscape alterations have the combined effect of changing overall landscape character to a more industrial appearance. While most development would occur at elevations higher than I-70 and SH 13, long-term cumulative impacts would occur in varying degrees by alternative.

4.4.1.7 Management, Cumulative Impacts, and Mitigation

Alternative I

Management — With no new leases or land-use activities on top of the plateau, impacts to visual values would be limited to small surface-disturbing projects mostly resulting from managing travel, recreation, and livestock. VRM Classes would be managed under existing VRM management objectives. The largest impacts to visual values are likely to occur below the rim from oil and gas activities, utility corridors, and ROW authorizations.

With the anticipated oil and gas development below the rim on lands available for lease, all viewsheds would be affected by surface disturbances; the highest concentration of wells and roads would occur in the near foreground and foreground distance zones. Development over the 20-year period of analysis is estimated at 2,328 new wells on 756 new pads, causing an estimated long-term disturbance of 3,319 acres. The current stipulations developed in the 1999 FSEIS would protect visual resources within the I-70 viewshed on lands available for lease and would not apply to the cliffs or any lands atop the plateau.

Lands designated as Class II that are not available for lease would be managed to maintain the existing character and would create minimal visual impacts due to steep terrain, which limits impacts from recreation, travel, or

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grazing management. Class II areas have high scenic quality and a high variety of landscape features. They are highly visible and highly sensitive to landscape modification. Class II areas that are available for lease would have a CSU stipulation to maintain the existing landscape character. However, Class II objectives may be exceeded where opportunities for mitigation are limited by valid existing rights on old leases, or because the landscape would not allow for mitigation under CSU.

Class III areas have moderate landscape variety and a few outstanding features. They may be moderately to highly visible, with moderate visual sensitivity. Lands managed as VRM Class III have no mitigation for visual values, and levels of change in the landscape may be moderate to evident. Long-term impacts in the overall landscape can be assumed to be negligible to minor above the rim due to no leasing. However, lands below the rim in Class III could experience a moderate level of change due to anticipated oil and gas activities, utility corridors, open travel designation, and grazing management. While the topography may screen many land uses, changes in the landscape can be expected.

Lands designated as Class IV would allow for moderate to major levels of modification in the existing landscape. The RMPA/EIS analysis projects the highest level of development within this area. These lands also have the highest level of visual exposure and sensitivity and are within the close range and foreground views of SH 13 and the town of Rifle.

Disturbed areas (Class V) would be managed toward reclamation and restoration so the area could at least meet a Class IV objective.

Cumulative Effects — Visual impacts would continue to become more noticeable as oil and gas pads, roads, recreation use, utility corridors, communication sites, and other management activities change the natural landscape. New impacts to visual values from future development on both private and public lands would be concentrated in the near foreground and foreground viewsheds of I-70 and SH 13

and would contribute the most to the change in overall landscape character.

Existing landscape modifications to date are characteristic of rural agricultural and ranching lands. Utility corridors, residential and commercial uses, and gas field development are becoming increasingly more noticeable from I-70 within the near foreground. VRM Class objectives are likely to be exceeded where opportunities for mitigation are limited by valid existing rights on old leases or because the landscape would not allow for mitigation under CSU stipulations.

The Roan Plateau serves as a scenic backdrop and is the major landscape feature to many communities. Public scoping has indicated that residents want this scenic viewshed protected, not only for their community aesthetics but also to maintain their real estate values. Both the real estate values of private property and the aesthetic values of public lands are likely to be increased or decreased depending on how well these scenic values are protected.

Economists recognize that tourism and recreation in Colorado is big business and is based on visitors that are attracted to opportunities for recreating and sightseeing in the Rocky Mountains (USFS 2002). Scenic landscapes help determine the success of recreation and tourism. I-70 serves as Colorado's main east-west transportation corridor, with more than 5.5 million vehicles traveling on it yearly (CDOT 2002). As the availability of natural landscapes and scenic open spaces decreases, the value of irreplaceable visual open spaces will increase.

Mitigation — In addition to stipulations in place, mitigation for ground-disturbing activities could include the application of COAs to all new ground-disturbing activities (including existing leases) to lessen visual impacts, including measures such as:

- avoiding ridgelines;
- using low-profile tanks;

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- locating new disturbances within existing disturbances;
- collocating new roads, pipelines, powerlines, and other facilities;
- reducing areas of cut-and-fill;
- painting with colors that blend with surroundings;
- avoiding straight lines in road construction; and
- using special design and reclamation for visual resources such as vegetation screening and berms.

The VRM contrast rating process should be used in accordance with BLM Manual H-8431-1 to analyze potential visual impacts from proposed projects and activities, with follow-up monitoring of reclamation and mitigation measures to provide opportunities to evaluate success and recommend changes if necessary.

Alternative II

Management — This alternative emphasizes protection of visual values and natural-appearing landscapes within special designation areas (WSRs, ACECs, areas having wilderness character) and areas of high visual sensitivity while allowing for some changes to the existing landscape character outside the special designation areas. The ACECs and areas having wilderness character would be designated VRM Class I, which allows for very limited landscape modifications (WO-IM-2000-096). Emphasis would be given to preserving and protecting areas with high scenic quality such as East Fork Canyon and the sensitive viewsheds of I-70 and SH 13.

Most impacts to visual values would be limited to lands below the rim and outside special designation areas within the near foreground and foreground distance zones. The majority would occur on private lands. Disturbance from the predicted level of development would occur in Class II, III, and IV areas.

Areas having wilderness character would not be available for lease, and NGD/NSO stipulations

would apply in VRM Class I areas and on lands proposed for ACEC designation. An SSR/CSU stipulation would apply to all VRM Class II lands above and below the rim. In addition, most Class II lands within the I-70 and SH 13 viewsheds would have an NGD/NSO stipulation on slopes over 30 percent and on areas of high visual sensitivity. However, Class II objectives may be exceeded from cumulative impacts and where opportunities for mitigation are limited by valid existing rights on old leases, or because the landscape would not allow for mitigation under SSR/CSU. Additional impacts on private lands would likely occur within close range and foreground viewsheds of I-70 and SH 13.

Lands managed as Class III would allow for evident changes within the landscape. Landscape modifications from oil and gas activities are likely to occur above the rim on Class III lands between the areas with special management designations.

Class IV lands would experience the highest level of gas development. Modifications within the landscape from oil and gas activities and utility corridors are likely to be moderate to major and will affect the overall landscape character. These lands have the highest level of visual exposure and are within the close range and foreground views. These are also the lands that receive the highest intensity of use.

Recreation and travel management activities would not impact visual values above or below the rim due to travel limitations on a system of designated routes. Recreation would be managed for dispersed recreational activities with no emphasis on project or site developments. Grazing is also not likely to affect visual resources adversely, because most of the allotments are within special designation areas with mitigation for new developments.

Disturbed areas (VRM Class V) would be managed under the VRM Class areas directly adjacent to the disturbance.

Cumulative Effects — Visual impacts to public lands would be reduced in the overall landscape with the preservation of high-quality scenic

areas and sensitive viewsheds. Adjacent communities, tourists, recreationists, and travelers along I-70 and SH 13 would experience long-term benefits, both onsite and offsite, from the preservation of sensitive viewsheds and retention of overall landscape character above the rim. With increased urbanization along the I-70 corridor and a decrease of natural landscapes within the viewshed, preservation of this irreplaceable resource would be significant. The protection of East Fork Parachute Creek Canyon would preserve an area of high scenic quality that is unique, irreplaceable, and vulnerable to adverse change.

The highest number of new well sites and likely visual impacts would occur on both private and public lands concentrated in the foreground and midground viewsheds of SH 13 where VRM Class IV objectives would allow for high levels of modification in the landscape.

Development within the I-70 corridor would be mitigated on public lands; however, development on private property is occurring and can be expected to increase within the close range and near foreground zones. While SSR/CSU stipulations mitigate most site-specific projects on public lands, VRM Class II objectives are likely to be exceeded due to cumulative disturbances or because the landscape would not allow for successful mitigation under an SSR/CSU.

The Planning Area would retain its overall landscape character with changes in the close range and near foreground zones to a more industrialized appearance. Long-term large-scale landscape modifications such as roads, utility corridors, and cumulative surface disturbances would contribute the most to the change in overall landscape outside of special designation areas below the rim.

Mitigation — In addition to stipulations in place, mitigation for ground-disturbing activities could include the measures listed for Alternative I, above.

Alternatives III and IV

These alternatives allow limited changes and retains visual values in areas with high sensitivity, high scenic quality, and where natural landscapes and associated values are important. A Class I designation would be maintained by an NGD/NSO stipulation with limited exceptions to protect the high scenic quality of East Fork Parachute Creek Canyon. An NGD/NSO stipulation would also be applied to the sensitive viewshed along I-70.

Most of the Planning Area would be designated Class II under these alternatives, providing for special mitigation measures to retain the existing landscape character. Most Class II lands within the I-70 viewshed with high sensitivity would have an NGD/NSO on slopes over 30 percent. However, lands with high sensitivity within the SH 13 viewshed would not have an NSO; oil and gas development could cause these areas to exceed VRM Class II objectives.

Lands managed as Class III would allow for evident changes within the landscape which would occur throughout the distance zones above the rim. Projected development in these areas is predominantly based on 20-acre surface spacing, which would allow the existing landscape character to undergo extensive changes.

Class IV lands would be managed the same as under Alternative II. Class IV lands would experience the highest level of oil and gas development under this alternative. This would create moderate to major modifications within the existing landscape and is likely to affect the overall landscape character. These lands have the highest level of visual exposure and are within the close range and foreground views. These are also the lands that receive the highest intensity of use.

Recreation and travel would have limited impacts to visual values above the rim through limiting travel to designated roads and trails. Recreation would be managed for dispersed recreational activities, with no emphasis on project or site development. Grazing

management is also unlikely to affect visual resources adversely because most of the allotments are within areas containing mitigation for all new surface developments.

Disturbed areas (VRM Class V) would be eliminated and managed under the VRM Class areas directly adjacent to the disturbance.

Cumulative Effects — Changes in the overall landscape would be limited in the short term, with most of the Planning Area managed as Class II. Protection through an NGD/NSO for East Fork Parachute Creek Canyon and high-sensitivity areas within the I-70 corridor would provide long-term protection for these important visual resources.

Special mitigation measures would be implemented within Class II areas to retain the existing landscape character while allowing for land uses. However, while Class II areas have an SSR/CSU stipulation to mitigate for site-specific locations, this does not account for cumulative disturbances resulting from increased development. In time, these areas would exceed Class II objectives.

Adjacent community residents, tourists, recreationists, and travelers along I-70 would experience short-term benefits both onsite and offsite from the retention of the viewshed and overall landscape character through NGD/NSO stipulations. However, without permanent protection or special designation, these stipulations are revocable through additional planning efforts.

The sensitive lands within the SH 13 viewshed are protected through an SSR/CSU stipulation. With increased urbanization along I-70 and SH 13 and decreased natural landscapes, visual open spaces would become a valued and irreplaceable resource. Mitigation on a site-by-site basis through SSR/CSU would not retain these sensitive landscapes into the future. Cumulative effects from irretrievable management commitments and landscape modifications would exceed VRM Class II objectives under this alternative within these sensitive viewsheds.

New impacts to visual values would occur throughout the Planning Area on both private and public lands. Most noticeable impacts would occur on lands managed as Class IV, in which disturbances can dominate the landscape. Most disturbances would be concentrated in the near close range through foreground distance zones near the town of Rifle.

In summary, long-term, large-scale, and cumulative landscape modifications would contribute the most to the change in overall landscape character. Mitigation and reclamation efforts for long-term disturbance totaling 3,923 acres would reduce impacts. However, cumulative impacts would likely exceed objectives for VRM Class II and III areas. The overall landscape character outside the I-70 sensitive viewshed and East Fork Canyon would change to a more industrialized appearance.

Mitigation — In addition to stipulations in place, mitigation for ground-disturbing activities could include the measures described under Alternative I, as well as the following additional measure:

- Consider ACEC designation for protection for the high sensitivity areas within the I-70 and SH 13 viewsheds and the area of high scenic quality within the East Fork Parachute Creek Canyon viewshed.

Alternative V

Management — Alternative V allows for long-term changes to existing landscape character and to visual values throughout the Planning Area. Oil and gas development under Alternative V would result in a major level of modification throughout the landscape. The management direction would allow for significant impacts to areas of high scenic quality and to sensitive viewsheds where modifications would dominate the landscape. No special management protection to preclude visual impacts would be utilized.

The top of the plateau, the cliffs, East Fork Parachute Creek Canyon, and sensitive viewsheds would be designated VRM Class III,

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which allows for management activities that may be moderate and evident within the landscape. The existing landscape character would be changed.

Remaining lands would be designated Class IV, which allows changes in the landscape to dominate the viewshed. The impacts would be the same as portions of Alternative I where the level of development is projected to be high. These lands also have a high level of visual exposure and sensitivity and are within the close range and foreground distance zones (<0.25 mile to 3 miles) as viewed from SH 13 and the town of Rifle.

Cumulative Effects — Long-term irretrievable impacts (based on the life of a lease) to visual values within the existing landscape would be significant for the entire Planning Area. Management direction under this alternative would allow for irreversible impacts to areas of high scenic quality, sensitive viewsheds, and the overall landscape character within and outside the Planning Area.

Impacts to public users, adjacent communities, and both onsite and offsite travelers could be far-reaching. Economic losses could occur from loss of recreation, hunting, and tourism opportunities (USFS 2002). Adjacent communities could experience reduced property values. The long-term impacts resulting from permanent loss of visual open spaces and natural landscapes are far-reaching and represent an irretrievable commitment of resources (CEQ Req. Sec.1502.16).

Mitigation — To reduce impacts to visual values, mitigation for ground-disturbing activities could include the measures described for Alternative I, above.

4.4.2 Cultural Resources

Introduction

Cultural resources, in the broadest terms, include the built environment, artifacts, and landscapes. Cultural resources are the products of man living on the earth and interacting with the earth to

produce the goods and services that sustain and improve life. Cultural resources can range from a prehistoric arrowhead to an historic building to a landscape held sacred by a group of people who live on and work the land.

Consideration of cultural resources by Federal agencies is mandated by a number of Federal statutes. The National Historic Preservation Act (NHPA) of 1966 as amended (16 USC 470a-x6), particularly Section 106 (16 USC 470f) and Section 110 (16 USC 470h-2(a)), requires Federal agencies to “take into account the effects of Federal actions on historic properties” and outlines Federal agency responsibilities for the management, protection, preservation, and use of historic properties. The principal Federal regulations that guide implementation of this statute are found at 36 CFR 800 (Protection of Historic Properties) and 36 CFR 60 (National Register of Historic Places). The National SHPO Programmatic Agreement/Colorado Protocol provides alternative procedures for implementing 36CFR800 between the BLM, Advisory Council for Historic Preservation, and the National Conference of State Historic Preservation Officers and BLM Manual 8100 details the alternative procedures implemented by BLM, supplemented by WO-IB-2002-101 (BLM 2002g). Other Federal statutes that may affect the management of historic properties include the Archaeological Resources Protection Act (ARPA) of 1979 (16 USC 470aa-mm), the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 USC 3001-3013), Executive Order 13007 Sacred Sites, and the American Indian Religious Freedom Act (AIRFA) of 1978 (42 USC 1996).

Not all sites are considered significant and qualified for protection under the NHPA. Significant sites are designated as “historic properties” and are defined in 36 CFR 800.16(l) as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register of Historic Places (NRHP).” Eligibility criteria for listing in the NRHP are presented in 36 CFR 60.4. Under 36 CFR 60.4, sites can be evaluated as:

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- eligible for nomination to the NRHP,
- not eligible to the NRHP, or
- potentially eligible to the NRHP.

Traditional cultural properties are eligible for nomination to the NRHP. Potentially eligible sites require additional study to make a definitive eligibility determination and are protected as significant resources until a determination can be made.

The following discussion evaluates the known sites in the Planning Area in terms of impacts. Sites are non-renewable resources that can be irretrievably lost if subject to certain actions. In general, any activity that destroys or irreversibly alters an historic property is an “adverse effect.” Adverse effects can be mitigated by a variety of methods. The type of site and proposed action affects the chosen method(s) and is determined by consultations between the Federal agency, SHPO, and the Advisory Council on Historic Preservation. Applicable Native American tribes and the public are included in these consultations as necessary. Native American consultation requirements are outline in BLM Manual 8160 and H-8160-1.

A number of assumptions were used to guide the analysis of alternatives. The first assumption is that additional mineral leasing will be the primary impact agent. Activities such as recreation, grazing, hunting, etc. will increase or decrease in relation to the amount of mineral leasing. Most new impacts will be from ground-disturbing activities associated with oil and gas exploration and development. The second assumption is that any new roads built in the Planning Area will increase the probability that cultural resources will be adversely affected, either directly and indirectly. The third assumption is that only lands with BLM surface estate and/or Federal mineral estate are subject to this analysis, except for the utility corridor, which contains some private lands. Finally, initial acreage disturbed (acres disturbed prior to revegetation) was used to calculate probable impacts to cultural resources.

The effects or potential effects of each alternative were determined by analyzing the number, type, significance, and density of cultural resources in each alternative. Since 58 percent of the Planning Area has been surveyed for cultural resources and 429 resources have been recorded, reasonable estimates of the impact of each alternative can be determined. The data used for the analysis were derived from the GIS database compiled for the *Roan Plateau Class I Cultural Resources Overview* (Hoefler et al. 2002). The data used to compile the overview were obtained from the files and GIS data of the Glenwood Springs Field Office of BLM, the Colorado Historical Society Office of Archaeology and Historic Preservation, and reports on archaeological investigations in the Planning Area.

The analysis began by subdividing each alternative into areas open to mineral leasing, areas closed to mineral leasing, and the utility corridor. The number and types of documented cultural resources in each of these areas was tabulated, along with the NRHP status of each resource. These numbers can be used to compare the numbers of known cultural resources in each alternative. The density of cultural resources in each alternative was calculated by dividing the number of acres inventoried for cultural resources by the number of known cultural resources. The density is expressed as one resource per number of acres (e.g., one site per 100 acres). The potential number of cultural resources that may be impacted in each alternative was estimated by dividing the potential number of acres disturbed in each alternative by the site density. The number of significant sites (historic properties) was estimated by multiplying the potential number of sites by 0.18. This number was derived from the Class I Overview (Hoefler et al. 2002) (Table 32), in which 18 percent of the documented cultural resources in the Planning Area were evaluated as eligible or potentially eligible to the NRHP.

The following analysis is concerned with three types of impacts. Direct and indirect impacts may cause adverse effects to individual cultural resources. Cumulative impacts result in

incremental loss of cultural resources in the Planning Area. These impacts are defined as:

- **Direct** – Direct impacts are caused by ground-disturbing activities that immediately alter cultural resources in a physical manner (e.g., construction of roads, wells, pipelines, and stockponds).
- **Indirect** – Indirect impacts result from activities that may cause degradation to cultural resources as an unintended consequence of the activity. Examples include livestock grazing, cross-country vehicular travel, construction that leads to erosion in areas outside the construction zone, recreation, and increased artifact collection and vandalism.
- **Cumulative** – Cumulative impacts represent the loss of cultural resources over the long term due to the incremental impact of past, present, and reasonably foreseeable future actions. Over time, certain types of cultural resources (e.g., prehistoric campsites or historic homesteads) may be lost if development is concentrated in areas containing these resources.

Impacts to cultural resources in the Planning Area under the five alternatives are described below. Some impacts may represent an irreversible and irretrievable commitment of cultural resources (see Section 4.6).

4.4.2.1 Alternative I

Alternative I would maintain the current management situation in the Planning Area. Under this alternative, most of the upland area above the rim is not open to oil and gas leasing. The area below the rim would be open to leasing with various stipulations. This development would directly affect an estimated 1,901 acres of land, including both long-term impacts (1,151 acres) and short-term impacts (750 acres). Other activities that may impact cultural resources include grazing, recreation (including hunting), cross-country travel, and the development of coal and oil shale resources. Grazing and range management would follow current management practices, cross-country motorized or

mechanized travel would be allowed throughout the Planning Area, and no coal or oil shale leasing would be allowed.

Direct Impacts

A cultural resources inventory has been conducted on 80.4 percent of the acreage closed to leasing (35,574 acres) and 45.6 percent (13,376 acres) of the current lease area. Within the no-lease area, 181 known cultural resources have been documented; 32 are eligible or potentially eligible for nomination to the NRHP. In the lease area, 135 known cultural resources have been documented; 19 are eligible or potentially eligible for nomination to the NRHP. Tables 4-22 and 4-23 list the types and NRHP eligibility classification for no-lease and leasable areas under this alternative.

The resource density (sites and isolated finds) in the lease area is one site per 99 acres. The calculated disturbance acreage for the lease area is 1,901 acres, including both long-term and short-term impacts. This indicates that 19 cultural resources may be affected under the current management scenario. If 18 percent of the sites in the Planning Area are eligible or potentially eligible for the NRHP (Hoefler et al. 2002), three to four eligible or potentially eligible sites may be affected in Alternative I.

Indirect Impacts

Under current management, the existing 259 miles of routes and trails would remain open to public or administrative access. Continued unfettered access to an area increases the probability that cultural resources will be looted and/or vandalized (Nickens et al. 1981). Erosion caused by oil and gas construction and maintenance, increased access and recreational traffic, and continued cross-country travel may increase the probability of damaging cultural resources outside the direct impact areas. Another indirect impact is the effect of development on private lands. Siting of roads and pipelines on Federal lands may influence the route these developments take across private lands. This may impact an unknown number of cultural resources on private lands.

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Table 4-22. Cultural Resources in the Alternative I No-Lease Area

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	56	56
	Lithic Scatter	3	6	25	34
	Open Camp	15	6	33	54
	Other Prehistoric	1	0	0	1
Historic	Isolated Find	0	0	1	1
	Habitation	0	1	10	11
	Aspen Art	0	0	21	21
	Ditch/Water Control	0	0	0	0
	Road	0	0	0	0
	Mine	0	0	0	0
	Artifact Scatter	0	0	1	1
	Other Historic	0	0	2	2
Total		19	13	149	181

Table 4-23. Cultural Resources in the Alternative I Lease Area

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	63	63
	Lithic Scatter	1	1	12	14
	Open Camp	4	5	19	28
	Other Prehistoric	0	1	4	5
Historic	Isolated Find	0	0	1	1
	Habitation	0	1	8	9
	Aspen Art	0	0	0	0
	Ditch/Water Control	2	0	2	4
	Road	1	1	0	2
	Mine	1	0	2	3
	Artifact Scatter	0	0	3	3
	Other Historic	0	1	2	3
Total		9	10	116	135

Cumulative Impacts

Cumulative impacts cannot be directly measured. Since they are non-renewable, damaged or destroyed cultural resources are an irretrievable resource loss. Cumulative impacts under Alternative I would primarily occur from

oil and gas development and cross-country travel. Over time, these activities will impact resources. If the impact is not mitigated, an irretrievable loss will occur.

4.4.2.2 Alternative II

Alternative II would allow oil and gas leasing in NOSR 1, but large areas would remain unavailable for leasing, primarily in the East Fork Parachute Creek drainage and in some areas along the cliffs. Most of the area below the rim and the Northwater and Trapper Creek drainages atop the plateau would be open to leasing with various stipulations. This alternative also includes a utility corridor along the eastern side of the Planning Area. The no-lease area covers 21,382 acres (29.1 percent) of BLM lands in the Planning Area, and the area open to leasing covers 51,220 acres (69.6 percent). The utility corridor covers 6,827 acres of Federal and private lands. An estimated 310 well pads would be developed during the 20-year period of analysis. These facilities would directly affect 2,262 acres of land, creating both long-term and short-term impacts.

Grazing, range management, and recreation (including hunting) could also impact cultural resources. Travel would be restricted to designated corridors throughout the Planning Area, with an SRMA for OHV recreation in the Hubbard Mesa area. A total of 216 miles of existing routes and trails would be open to public or administrative use. Range management would rely on administrative actions, although some on-the-ground activities would occur. No coal or oil shale leasing would be allowed.

Direct Impacts

A cultural resources inventory has been conducted on 59 percent of the no-lease area (13,204 acres), 69.8 percent (35,746 acres) of the proposed lease area, and 16.3 percent (1,116 acres) of the utility corridor. Within the proposed no-lease area are 59 known cultural resources; 12 are eligible or potentially eligible for nomination to the NRHP. The lease area contains 257 known cultural resource sites, of which 39 are eligible or potentially eligible for nomination to the NRHP. It is likely that the portion of the lease area on top of the plateau contains additional cultural resources. Heavy vegetation cover in this portion of the Planning Area is probably obscuring additional cultural resources (Hoefler et al. 2002). The utility corridor contains 43 known cultural resources, of which six sites are eligible or potentially eligible for nomination to the NRHP. Tables 4-24 and 4-25 list the types and NRHP eligibility classification for no-lease and leasable areas under Alternative II. Table 4-26 provides information for the utility corridor.

The resource density in the proposed lease area and utility corridor is one resource per 123 acres. Under the current management scenario, 18 resources may be affected within the combined 2,262 acres of long-term and short-term impacts. Assuming that 18 percent of the sites in the Planning Area are eligible or potentially eligible to the NRHP (Hoefler et al. 2002), approximately three eligible or potentially eligible sites could be impacted under Alternative II.

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Table 4-24. Cultural Resources in the Alternative II No-Lease Area

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	22	22
	Lithic Scatter	1	0	9	10
	Open Camp	7	3	6	16
	Other Prehistoric	1	0	0	1
Historic	Isolated Find	0	0	1	1
	Habitation	0	0	5	5
	Aspen Art	0	0	3	3
	Ditch/Water Control	0	0	0	0
	Road	0	0	0	0
	Mine	0	0	0	0
	Artifact Scatter	0	0	0	0
	Other Historic	0	0	1	1
Total		9	3	47	59

Table 4-25. Cultural Resources in the Alternative II Lease Area

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	97	97
	Lithic Scatter	3	7	28	38
	Open Camp	12	8	46	66
	Other Prehistoric	0	1	4	5
Historic	Isolated Find	0	0	1	1
	Habitation	0	2	13	15
	Aspen Art	0	0	18	18
	Ditch/Water Control	2	0	2	4
	Road	1	1	0	2
	Mine	1	0	2	3
	Artifact Scatter	0	0	4	4
	Other Historic	0	1	3	4
Total		19	20	218	257

Table 4-26. Cultural Resources in the Utility Corridor

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	21	21
	Lithic Scatter	0	0	3	3
	Open Camp	0	1	7	8
	Other Prehistoric	0	1	1	2
Historic	Isolated Find	0	0	1	1
	Habitation	0	0	3	3
	Aspen Art	0	0	0	0
	Ditch/Water Control	1	0	0	1
	Road	1	1	0	2
	Mine	0	0	0	0
	Artifact Scatter	0	0	1	1
	Other Historic	0	1	0	1
Total		2	4	37	43

Indirect Impacts

The 216 miles of open roads would represent a 16.6-percent decrease compared to Alternative I. Further, the closure of the entire area (including the Hubbard Mesa SRMA) to cross-country travel would decrease the probability that cultural resources will be looted and/or vandalized (Nickens et al. 1981). However, any public access into an area creates the potential for damage to cultural resources. Erosion caused by oil and gas construction and maintenance may increase the probability of damaging cultural resources outside the direct impact areas. Another indirect impact is development on private lands. Siting of roads and pipelines on Federal lands may influence the route these developments take across private lands. This may impact an unknown number of cultural resources on private lands.

Cumulative Impacts

Cumulative impacts cannot be directly measured. Since they are non-renewable, damaged or destroyed cultural resources are an irretrievable resource loss. Cumulative impacts under Alternative II would primarily occur from

oil and gas development, expansion of recreational opportunities below the rim, and the establishment of the Hubbard Mesa SRMA. If impacts are not mitigated, an irretrievable loss would occur.

4.4.2.3 Alternative III – Preferred Alternative

Under this alternative, all BLM surface lands and Federal mineral estate lands would be eligible for leasing, and a utility corridor would extend through the eastern side of the Planning Area. Development of the lease area atop the plateau would be deferred for a number of years until the area below the rim attains 80-percent development. The lease area covers 73,602 acres of BLM land, and the utility corridor covers 6,827 acres of Federal and private lands. An estimated 402 well pads would be developed, resulting in 2,948 acres of long-term and short-term disturbance. This total would include 241 miles of new or improved access roads

Grazing, range management, and recreation (including hunting) could also impact cultural resources. A total of 233 miles of existing

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routes would remain open for public or administrative use. However, cross-country motorized or mechanized travel would not be allowed, except for the Hubbard Mesa SRMA. Range management would use a combination of administrative and physical measures (e.g., additional stock watering ponds). Coal or oil shale development would be allowed under this alternative but are considered very unlikely to occur during the 20-year period of analysis.

Direct Impacts

A cultural resources inventory has been conducted on 66.5 percent of the lease acreage (48,950 acres) and on 16.3 percent (1,116 acres)

of the utility corridor. Within the proposed lease area are 316 known cultural resources, of which 51 are eligible or potentially eligible for nomination to the NRHP. It is likely that the portion of the lease area above the rim contains additional cultural resources. Heavy vegetation cover in this portion of the Planning Area is probably obscuring additional sites (Hoefler et al. 2002). In the utility corridor are 43 known cultural resources, of which six are eligible or potentially eligible for nomination to the NRHP. Table 4-27 lists the types and NRHP eligibility classification for the Alternative III (and) IV lease area. See Table 4-26 regarding sites in the utility corridor.

Table 4-27. Cultural Resources in the Alternative III and IV Lease Areas

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	117	117
	Lithic Scatter	4	7	37	48
	Open Camp	19	11	52	82
	Other Prehistoric	1	1	5	7
Historic	Isolated Find	0	0	2	2
	Habitation	0	2	18	20
	Aspen Art	0	0	21	21
	Ditch/Water Control	2	0	2	4
	Road	1	1	0	2
	Mine	1	0	2	3
	Artifact Scatter	0	0	4	4
	Other Historic	0	1	5	6
Total		28	23	265	316

4.4.2.4 Alternative IV

Under this alternative, all BLM surface lands and Federal mineral estate lands would be eligible for leasing — without the deferred leasing and development atop the plateau as described for Alternative III — and a utility corridor would extend through the eastern side of the Planning Area. The lease area covers 73,602 acres of BLM land, and the utility corridor covers 6,827 acres of Federal and

private lands. An estimated 449 well pads would be developed, resulting in 3,269 acres of long-term and short-term disturbance.

Grazing, range management, and recreation (including hunting) could also impact cultural resources. A total of 233 miles of existing routes and trails would remain open for public or administrative use, but cross-country motorized or mechanized travel would not be allowed, except within the Hubbard Mesa SRMA. Range management would use a combination of

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administrative and physical measures (e.g., additional stock watering ponds). Coal or oil shale development is considered very unlikely during the 20-year period of analysis.

Direct Impacts

A cultural resources inventory has been conducted on 66.5 percent of the lease acreage (48,950 acres) and on 16.3 percent (1,116 acres) of the utility corridor. Within the proposed lease area are 316 known cultural resources, of which 51 are eligible or potentially eligible for nomination to the NRHP. It is likely that the portion of the lease area above the rim contains additional cultural resources. Heavy vegetation cover in this portion of the Planning Area is probably obscuring additional cultural resources (Hoefler et al. 2002). In the utility corridor are 43 known cultural resources, of which six are eligible or potentially eligible for nomination to the NRHP. Table 4-27 lists the types and NRHP eligibility classification for the lease area under Alternative IV, which are the same as under Alternative III (the deferral of oil and gas leasing and drilling on top of the plateau does

not affect these numbers). See Table 4-26 for information regarding the utility corridor.

Resource density in the proposed lease area and utility corridor is one resource per 155 acres. Under current management, 21 resources could be affected within the estimated 3,269 acres of long-term and short-term impacts. If 18 percent of the sites in the Planning Area are eligible or potentially eligible to the NRHP (Hoefler et al. 2002), four eligible or potentially eligible sites may be impacted under Alternative IV.

Note that this impact level is identical to that for Alternative III, reflecting the fact that deferred leasing and development of oil and gas on top of the plateau would not affect potential impacts to cultural resources. Instead, the impact level is driven by acres of ground-disturbing activities, which this RMPA/EIS assumes would not differ between these two alternatives. If deferred leasing results in an increase or decrease in the number of pads or miles of new or widened access roads over the 20-year period of analysis, the potential for impacts to cultural sites would be affected proportionally.

Table 4-28. Cultural Resources in the Alternative IV Lease Area

Component Type	Resource Type	NRHP Eligibility			Total
		Eligible	Potentially Eligible	Not Eligible	
Prehistoric	Isolated Find	0	0	117	117
	Lithic Scatter	4	7	37	48
	Open Camp	19	11	52	82
	Other Prehistoric	1	1	5	7
Historic	Isolated Find	0	0	2	2
	Habitation	0	2	18	20
	Aspen Art	0	0	21	21
	Ditch/Water Control	2	0	2	4
	Road	1	1	0	2
	Mine	1	0	2	3
	Artifact Scatter	0	0	4	4
	Other Historic	0	1	5	6
Total		28	23	265	316

Indirect Impacts

Under Alternative IV, the 233 miles of roads to remain open for public use represents a 7.9-percent increase over Alternative II but a 10-percent decrease from Alternative I. Closure of the Planning Area to cross-country motorized or mechanized travel (including off-route travel by snowmobile) would decrease the probability that cultural resources will be looted and/or vandalized (Nickens et al. 1981). However, any public access into an area creates some opportunity for damage to cultural resources. Erosion caused by road and pipeline construction and cross-country travel in the Hubbard Mesa SRMA may increase the probability of damaging cultural resources outside direct impact areas. Another indirect impact is the effect of development on private lands. Siting of roads and pipelines on Federal lands could influence the route these developments take across private lands, adversely affecting an unknown number of cultural resources on private lands.

Cumulative Impacts

Cumulative impacts cannot be directly measured. Since they are non-renewable, damaged or destroyed cultural resources are an irretrievable resource loss. Cumulative impacts under Alternative IV would primarily occur from oil and gas development, limited development of recreational opportunities throughout the Planning Area, establishment of the Hubbard Mesa SRMA, and possibly coal and oil shale leasing activities. Over time, these activities will impact resources. Without mitigation, irretrievable loss will occur.

4.4.2.5 Alternative V

Under this alternative, all BLM lands would be eligible for leasing, again without deferred leasing atop the plateau, and resources would be

protected from mineral development by focused mitigation. This alternative also includes a utility corridor along the eastern side of the Planning Area. The lease area covers 73,602 acres of BLM land, and the utility corridor covers 6,827 acres of both Federal and private lands. An estimated 584 well pads would be developed during the 20-year period, resulting in 4,211 acres of long-term and short-term impacts.

Grazing, range management, and recreation (including hunting) could also impact cultural resources. A total of 259 miles of existing routes and trails would be open for public or administrative access, but the entire area would be closed to cross-country motorized or mechanized travel (except for off-route travel by snowmobile). Range management would include a combination of administrative and physical projects (e.g., additional stock ponds). Coal and oil shale leasing would be allowed but are very unlikely during the 20-year period.

Direct Impacts

A cultural resources inventory has been conducted on 66.5 percent of the lease acreage (48,950 acres) and on 16.3 percent (1,116 acres) of the utility corridor. Within the proposed lease area are 316 known cultural resources, with 51 eligible or potentially eligible for nomination to the NRHP. It is likely that the portion of the lease area on the plateau above the rim contains additional cultural resources. Heavy vegetation cover in this portion of the Planning Area is probably obscuring additional cultural resources (Hoefler et al. 2002). The utility corridor contains 43 known cultural resources, of which six are eligible or potentially eligible for nomination to the NRHP.

Table 4-29 lists the types and NRHP eligibility classification for the leasable area under Alternative V. See Table 4-26 for information regarding sites in the utility corridor.

Table 4-29. Cultural Resources in the Alternative V Lease Area

Resource Type	NRHP Eligibility			Total
	Eligible	Potentially Eligible	Not Eligible	
Isolated Find	0	0	117	117
Lithic Scatter	4	7	37	48
Open Camp	19	11	52	82
Other Prehistoric	1	1	5	7
Isolated Find	0	0	2	2
Habitation	0	2	18	20
Aspen Art	0	0	21	21
Ditch/Water Control	2	0	2	4
Road	1	1	0	2
Mine	1	0	2	3
Artifact Scatter	0	0	4	4
Other Historic	0	1	5	6
Total	28	23	265	316

Resource density in the proposed lease area and utility corridor is one resource per 155 acres. The potential disturbance acreage for the lease area is 4,211 acres, including both long-term and short-term impacts. Twenty-seven cultural resources could be impacted under this alternative. If 18 percent of the sites in the Planning Area are eligible or potentially eligible to the NRHP (Hoefler et al. 2002), approximately 5 eligible or potentially eligible sites could be impacted under Alternative V.

Indirect Impacts

Under Alternative V, 259 miles of existing routes and trails would remain open to public use — the same as in Alternative I but with no cross-country travel. The length of open roads and routes represents an increase of 19.9 percent over Alternative II and 11.1 percent over Alternative IV. Public access increases the probability that cultural resources will be looted and/or vandalized (Nickens et al. 1981), although the prohibition against cross-country travel reduces this risk. Erosion caused by oil and gas construction and maintenance, and increased recreational traffic, may increase the probability of damaging cultural resources

outside the direct impact areas. Another indirect impact is the effect of development on private lands. Siting of roads and pipelines on Federal lands may influence the route these developments take across private lands, affecting an unknown number of sites on private lands.

Cumulative Impacts

Cumulative impacts cannot be directly measured. Since they are non-renewable, damaged or destroyed cultural resources are an irretrievable resource loss. Cumulative impacts under Alternative V would primarily occur from oil and gas development, greater development of recreational opportunities throughout the Planning Area, and possibly coal and oil shale leasing activities. Over time, these activities would impact resources. If the impact is not mitigated, an irretrievable loss would occur.

4.4.2.6 Traditional Cultural Properties

Traditional cultural properties are sites, locations, areas, and landscapes that may be important to certain groups. No traditional cultural properties have been identified in the Planning Area.

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4.4.2.7 Comparison of Alternatives

Each alternative could impact cultural resources. The magnitude of potential impacts is directly related to the amount of oil and gas development activities and other ongoing resource uses. The potential for significant cultural properties to be directly impacted increases slightly from Alternative I through Alternative IV. The potential for impacts increases in Alternative V, under which 29 percent more cultural resources and 25 percent more significant cultural resources may be impacted than under Alternatives III and IV. The potential lease areas on top of the plateau for Alternatives II through V may contain additional cultural resources that are now obscured by vegetation cover. If this is the case, then the estimates of the potential number of directly impacted cultural resources in Alternatives II through V are too low. Alternatives I and V would have the most indirect impact. Tables 4-30 and 4-31 compare the number of cultural resources by

NRHP eligibility category and potential numbers of affected resources. In terms of cumulative impacts, Alternatives II through IV would have the least effect and Alternative V the most effect.

4.4.2.8 Mitigation Strategies

Impacts to significant cultural resources (historic properties) can be mitigated with a variety of strategies. To conform to the requirements of Section 106 of the NHPA, cultural resource inventory and evaluation projects are conducted prior to development activities. If significant cultural resources are encountered, it is BLM policy to avoid them whenever possible. If a resource cannot be avoided, BLM, SHPO, and the Advisory Council on Historic Preservation (ACHP) consult to determine the appropriate mitigation measures, according to the terms of the BLM National Programmatic Agreement (PA).

Table 4-30 Number of Known Cultural Resources and NRHP Eligibility by Alternative

Alternative and Area		NRHP Eligibility			Total Cultural Resources
		Eligible	Potentially Eligible	Not Eligible	
Alternative I	Lease Area	9	10	116	135
	No-Lease Area	19	13	149	181
Alternative II	Lease Area	19	20	218	257
	No-Lease Area	9	3	47	59
Alternatives III, IV, and V (All Leased)		28	23	265	316
Utility Corridor (Alternatives II – V)		2	4	37	43

Table 4-31 Number of Potentially Affected Cultural Resources by Alternative

Alternative	Area of Long-term and Short-term Surface Disturbance	Average Cultural Resource Density in Areas of Oil & Gas Leasing	Potential Number of Affected Cultural Resources	Potential Number of Affected Significant Cultural Resources
I	1,901 acres	1 per 99 acres	19	3.5
II	2,262 acres	1 per 123 acres	18	3.3
III	3,269 acres	1 per 155 acres	21	3.8
IV	3,269 acres	1 per 155 acres	21	3.8
V	4,211 acres	1 per 155 acres	27	4.9

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Native American groups, and the public are consulted as necessary.

To further integrate BLM cultural resource policy with the goals and policies of other resources, BLM issued an agency-wide Information Bulletin (IB), 2002-101, in May 2002. This IB has two goals. Goal 1 is to preserve and protect significant cultural resources and ensure they are available for appropriate uses by present and future generations. Goal 2 is to identify priority geographic areas based on probability of unrecorded significant resources.

Goal 1 is met by the inventory and evaluation of cultural resources and classification of resources into six use categories:

- scientific use
- conservation for future use
- traditional use
- public use
- experimental use
- discharged from management

Classified cultural resources in the first five categories are subject to management actions that preserve and protect the resource. Those that are discharged from management have all protective measures removed.

To meet Goal 2, sensitivity areas were developed for the Planning Area to inform future management decisions (Hoefler et al. 2002). High-sensitivity areas are those parts of the Planning Area where the density of cultural resources is one per 118 acres. Moderate-sensitivity areas have a density of one cultural resource per 234 acres, and low-sensitivity areas have a density of one cultural resource per 538 acres.

4.4.2.9 Management Actions

Management actions for each use allocation and sensitivity area are discussed below. Sensitivity area recommendations are summarized in Table 4-32, followed by recommendations for data collection, monitoring, geoarchaeological investigations, site evaluation policies, and impacts to private lands.

Table 4-32. Recommended Cultural Resource Management Actions

Sensitivity Zone	Recommended Action				
	Project Location	Areas Not Yet Inventoried	Areas Inventoried – No resources	Potentially Eligible Resources	Eligible Resources
High	Atop the Plateau	Conduct Class III inventory	Monitor	Avoid or test excavate	Avoid or implement data recovery plan
	Below the Rim	Conduct Class III inventory	Monitor	Avoid or test excavate	Avoid or implement data recovery plan
Moderate	Atop the Plateau	Conduct Class III inventory	Monitor	Avoid or test excavate	Avoid or implement data recovery plan
	Below the Rim	Conduct Class III inventory	No further work	Avoid or test excavate	Avoid or implement data recovery plan
Low	Atop the Plateau	Conduct Class I inventory	No further work	Avoid or test excavate	Avoid or implement data recovery plan
	Below the Rim	Conduct Class I inventory	No further work	Avoid or test excavate	Avoid or implement data recovery plan

Use Allocations

Scientific — Sites in this category need to be preserved and protected from all potentially damaging actions until the research potential is fulfilled. Once the research potential is fulfilled through excavations, surface collections, or any other appropriate method, further conservation is unnecessary.

Conservation for Further Use — Sites in this category should be segregated from all other land or resources uses, including cultural resource uses, which would threaten the maintenance of their present condition or setting. Protective measures and designations should be developed and implemented for these sites.

Traditional — Cultural properties in this category are to be managed in ways that recognize the importance ascribed to them and seek to accommodate their continued traditional use. Consultation with tribes should be conducted to determine how traditional use allocations should be protected, managed, and used.

Public — Cultural properties assigned public uses should be managed in a way that makes them available for use by the public, but at the same time protects the historic value of the property. For each site in this category, permitted uses and limitations need to be determined. It is recommended that the public, especially historical societies and educational institutions, be consulted on possible uses and management of such properties.

Experimental — Should any sites be placed in this category in the future, the type(s) of experimentation allowed should be specified. It is further recommended that BLM develop a protocol to use for experimental sites including proposal review, monitoring implementation, and reporting requirements.

Discharged from Management — Properties discharged from management remain in the inventory, but are removed from further management consideration and do not constrain other land uses. No protective measures will be instituted for sites in this category. It is

recommended that BLM develop specific criteria to determine when and how sites should be placed in this category. At a minimum these criteria should consider the physical condition, information potential, and public use potential of the site.

High-Sensitivity Zones

Areas Not Inventoried — Class III inventories should be conducted in both the upland and lowland areas where no inventories have occurred. Limited auger or shovel testing should be conducted at all newly discovered sites. Testing should be of sufficient scope to describe subsurface deposits and make reasonable estimates on the probability of the presence of subsurface deposits.

Inventoried Areas, No Resources — In the upland high sensitivity areas, where no surface resources have been encountered, any ground-disturbing activity should be monitored. Such monitoring is needed because much of the surface is obscured by vegetation. In the lowlands, monitoring should occur in areas with potentially intact Holocene or late Pleistocene deposits. Should monitoring encounter any surface or subsurface materials, sufficient testing should be conducted to determine the vertical and horizontal extent of the deposit, evaluate site geomorphology and stratigraphy, salvage any identified manifestations, and determine NRHP eligibility.

Potentially Eligible Sites — Sites evaluated as needing additional data and located within areas of potential effect that cannot be avoided will require testing to refine NRHP eligibility further.

Eligible Sites — NRHP-eligible sites within the area of potential effect that cannot be avoided will require a data recovery plan to be formulated and implemented.

Ineligible Sites — In upland areas, these sites should be monitored during ground-disturbing activities and reevaluated if subsurface remains are found. Although these sites have been field evaluated as ineligible, the vegetation obscuring the ground surface brings into question

evaluations of these sites. Many site forms have poorly written evaluation statements and it is unclear whether or not the sites are significant. No further work is recommended for ineligible sites in lowland areas.

Moderate Sensitivity Zones

Areas Not Inventoried — Class III inventories should be conducted in upland areas and Class II inventories in the lowland areas. In the uplands section, auger or shovel testing should be conducted at all newly discovered sites. This testing should be of sufficient scope to describe the subsurface deposits and make reasonable estimates as to the probability of the presence of subsurface deposits. The location and amount of Class II inventory in the lowland areas should be determined on a case-by-case basis.

Inventoried Areas, No Resources — In upland moderate-sensitivity areas, where no surface resources have been encountered, any ground-disturbing activity should be monitored. Such monitoring is needed because much of the surface is obscured by vegetation. Should monitoring encounter any surface or subsurface materials, sufficient testing should be conducted to determine the vertical and horizontal extent of the deposit, evaluate site geomorphology and stratigraphy, salvage any identified manifestations, and determine NRHP eligibility. In the lowlands, monitoring should occur only in known areas of intact Holocene or late Pleistocene deposits with a good probability of containing intact cultural deposits.

Potentially Eligible Sites — Sites evaluated as needing additional data, located within areas of potential effect that cannot be avoided, will require testing to refine NRHP eligibility further.

Eligible Sites — NRHP-eligible sites within the area of potential effect that cannot be avoided will require formulation and implementation of a data recovery plan.

Ineligible Sites — Upland area sites should be monitored during ground-disturbing activities and re-evaluated if subsurface remains are found. Although these sites have been field

evaluated as ineligible, vegetation obscuring the ground surface brings into question evaluations of these sites. Many of site forms have poorly written evaluation statements and it is unclear whether or not the sites are significant. No further work is recommended for ineligible sites in lowland areas.

Low Sensitivity Zones

Areas Not Inventoried — Conduct a Class I inventory to determine if known sites are in the area of potential effect. Special attention should be focused on possible early oil shale extraction and processing sites in the Roan Cliffs area. If the Class I study identifies areas where sites may occur, these areas should be subject to inventory.

Inventoried Areas, No Resources — No further work is recommended.

Potentially Eligible Sites — Sites evaluated as needing additional data, located within areas of potential effect that cannot be avoided, will require testing to refine NRHP eligibility further.

Eligible Sites — NRHP-eligible sites within the area of potential effect that cannot be avoided will require formulation and implementation of a data recovery plan.

Ineligible Sites — No further work is recommended.

4.4.2.10 Policy Recommendations

Data Collection Policy

Temporal information is not currently being collected in the study area. Accurate temporal information is lacking for most prehistoric sites in the study area. Projectile point and ceramic chronologies have proven less than useful as an indicator of site age. To rectify this situation, different types of information need to be gathered. The best source of temporal information is material that can be dated by radiocarbon methods or ceramic sherds that can be dated by thermoluminescent methods. It is recommended that BLM encourage the collection and analysis of datable materials and

develop procedures for the controlled collection and analysis of such samples on all monitoring and testing projects. Any material that is collected for dating should, at a minimum, meet one of the following conditions: (1) the sample is in stratigraphic context, and/or (2) the sample is in good association with artifacts or features.

Monitoring Policy

The monitoring recommendation is presented to determine if cultural material is being obscured by vegetation in the highlands and to develop a better understanding of sediments correlated with cultural deposits. It is recommended that monitoring be conducted on all ground-disturbing activities in the areas outlined above until sufficient information is gathered to determine if (1) the vegetation is obscuring additional cultural remains in the uplands, and (2) certain sediments contain buried cultural components. The results of such monitoring should be reviewed annually to determine if this approach is reaching the stated objectives.

Geoarchaeological Policy

To ensure that the archaeologist conducting test excavations or monitoring activities is adequately informed, a geoarchaeological investigation of the study area is desirable (Waters 1992). A geoarchaeological investigation focusing on the formation of current and past landforms and sediments and the ages of sediments provides a context to evaluate subsurface cultural deposits discovered during testing or monitoring. A geoarchaeological evaluation can be done two ways. A geoarchaeological specialist can be required to be part of any investigation where ground disturbance is likely. Alternatively, a geoarchaeological overview of the study area would be initiated and the results made available to future archaeological investigations. It is recommended that BLM pursue funding for a geoarchaeological overview of the study area, or require a geoarchaeological specialist on all archaeological monitoring and testing/excavation projects. Such work is critical for proper NRHP evaluations to be conducted.

Site Evaluation Policy

It is recommended that a more rigorous methodology of NRHP site evaluations be required, particularly on sites that may contain historic archaeological remains or are representative of a single occupation. In formulating site recommendations, the research questions presented at the end of the Results Section should be used as a basis for the recommendations. Research questions presented in Reed and Metcalf (1999) can also be used if applicable to the study area, and research questions not identified in the Class I overview (Hoefler et al. 2002) can also be used if they identify an applicable research problem. Following a method such as that outlined below may remedy some of the evaluation bias problems discovered in the site analysis. First and foremost, it is recommended that the method presented in Little et al. (2000:29) be used as a model for evaluation methodology. The method includes the following steps:

1. Identify the data set(s) or categories of archaeological, historical, or ecological information available for the property.
2. Identify the historic context(s), i.e., the appropriate historical and archaeological framework in which to evaluate the property.
3. Identify the important research question(s) that the data sets can be expected to address.
4. Taking archaeological integrity into consideration, evaluate the data sets in terms of their potential and known ability to answer research questions.
5. Identify the important information that an archaeological study of the property has yielded or is likely to yield.

Recommendations for Inventory of Private Lands in the Planning Area

To develop information on portions of the study area not under Federal jurisdiction, archaeological investigations on private lands are encouraged. Section 112 of the NHPA encourages Federal agencies to work with

private landowners whose property contains historic resources. The types of sites on private lands and the information contained within them are needed to complete the picture of prehistoric and historic developments in the area. This may be a unique opportunity to develop a public-private partnership to explore the prehistory and history of the upper Grand Valley. It is recommended that BLM actively pursue partnerships with existing Federal, State, and non-profit programs to help inventory, evaluate, and protect cultural resources on private lands.

4.4.3 Socioeconomics

Introduction

A number of the management changes proposed by BLM have the potential to produce socioeconomic (sociological and economic) impacts. Proposed changes in the amount of Federal mineral estate available for oil and gas leasing could substantially increase the region's mineral fuel reserves and would extend the length of time that the region would continue to supply oil and gas. These changes would also increase Federal and local government revenues and local employment. Other management actions proposed under the various alternatives analyzed in this RMPA/EIS — e.g., to establish ACECs, close some of the roads in the Planning Area to public motorized or mechanized use, prohibit cross-country travel in all or parts of the Planning Area, and manage areas having wilderness character to maintain their wilderness values — could change the recreational experience in the area, which in turn could alter the pattern of local expenditures for recreation equipment and supplies.

The proposed management changes under the various alternatives would have the potential to alter the perceptions of area residents about their lifestyles and the quality of their lives. Table 4-33 summarizes the socioeconomic impacts under each alternative.

The impact assessment standards used in this analysis are described below. Because impact assessment is a professional judgment, often based on contradictory elements, the standards

should be viewed only as guidelines. Some proposals could have impacts that vary in degree depending on the scale of comparison. For example, changes in the grazing program could have a major impact on individual ranchers, a moderate impact on grazing in the region, and a negligible impact on the local economy. In general, adverse impacts are described in terms of the local economy or the local community of residents.

- **None** – The action is unlikely to result in any change in socioeconomic conditions.
- **Negligible** – The management proposal may bring about temporary, short-term, or marginal changes that are unlikely to be noticed by or of interest to the general public. If the impact indicator could be quantified, it would be less than 1 percent of the current or future condition.
- **Minor** – The management proposal may bring about permanent or temporary changes that would not substantially alter socioeconomic conditions but could be noticed by and be of interest to some of the general public. If the impact indicator could be quantified, it would be between 1 and 5 percent of the current or future level of that indicator.
- **Moderate** – The management proposal is likely to bring about permanent or long-term changes that alter socioeconomic conditions and would be noticed by and be of interest to the general public. If the impact indicator could be quantified, it would be between 5 and 15 percent of the current or future level of that indicator.
- **Major** – The management proposal is likely to bring about permanent or long-term changes that substantially alter socioeconomic conditions and would be noticed by and be of great interest to the general public. If the impact indicator could be quantified, it would be over fifteen percent of the current or future level of that indicator; e.g., a change in total employment of more than 15 percent on a long-term or permanent basis.

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Table 4-33. Socioeconomic Impacts of the Four RMP Alternatives, 20-year Period of Analysis

	Alternative I	Alternative II	Alternative III	Alternative IV	Alternative V
Wells Drilled per Year	43	45	66	66	79
Employment in 2025					
Oil and Gas Employment	151	160	234	234	280
Recreation Employment ¹	0	12	- 3	- 3	- 6
Indirect Employment	151	172	231	231	274
Total Employment	302	344	462	462	548
Percent Change	0.7%	0.7%	1.0%	1.0%	1.2%
Population in 2025					
Number of People	544	619	832	832	986
Percent Change	0.6%	0.7%	1.0%	1.0%	1.1%
Cumulative Gas Development					
Total Wells Drilled	855	906	1,324	1,324	1,582
Gas Production (BCF) in 20 Years	504	535	781	781	933
Households Heated in 20th Year	268,324	284,330	415,511	415,511	496,479
Cumulative Fiscal Impact					
Value of Gas Production (million \$)	1,512	1,605	2,343	2,343	2,799
Federal Royalty (million \$)	189	201	293	293	350
State Share of Royalty (million \$) ²	95	101	146	146	175
Property Tax Revenue (million \$) ³	69.5	73.7	107.7	107.7	128.6

¹ Assumes 5% and 10% decreases in recreation under Alternatives IV and V, respectively, due to oil and gas.

² Would be reduced by an estimated \$40 million due to provisions of the transfer act for NOSRs 1 and 3.

³ Assumes a mill levy of 50.

Note that the same terms are applied in a more relative sense to describe beneficial impacts.

Environmental justice review during an environmental analysis requires that each Federal agency identify any “disproportionately high and adverse human health or environment effects of its programs, policies, and activities on minority populations and low-income populations.” Under all of the alternatives analyzed in this RMPA/EIS, no minority or low-income populations would suffer a disproportionately severe effect. The only minority population of note is the Hispanic community, representing about 17 percent of the Garfield County population. The low-income population of Garfield County is dispersed,

although more people receiving assistance tend to be located in the vicinity of Rifle and Parachute. No evidence suggests that the Hispanic community or low-income population would be affected by BLM management decisions in the Planning Area to a greater or lesser degree than any other population segment.

Results of the interviews with community leaders, government representatives, and private citizens supported this conclusion. When these individuals were asked about the potential for disproportionately adverse impacts on any population, the Hispanic community was usually cited as the only identifiable minority population. Respondents generally indicated that this population would be affected by BLM

management decisions to the same degree and in the same manner as the majority population. The same opinions were expressed regarding the County's low-income population.

4.4.3.1 Alternative I

Alternative I would continue existing land uses and resource management. No oil and gas leasing would occur on the 44,267 acres of transferred lands that have not already been leased. Leasing and development would occur for the remaining 29,333 acres of Federal mineral estate in the Planning Area. BLM would continue to provide opportunities for motorized, mechanized, and non-motorized travel within the framework of existing management, including cross-country travel. No additional management designations would alter the conditions under which people recreate or pursue commercial opportunities on BLM lands in the Planning Area.

Impacts from Oil and Gas Development

Under this alternative, approximately 855 new wells would be drilled on public lands that are currently leased or available for lease, eventually recovering reserves estimated at 983 BCF of gas. During the 20-year life of the plan, about 504 BCF would be produced. By the 20th year of the plan, the production rate would supply the annual natural gas needs of nearly 270,000 households. At \$3.00/MCF, the value of gas produced would be \$1.5 billion, generating Federal mineral royalties of \$189 million.

Up to half the Federal royalties, or nearly \$95 million, could be disbursed to Colorado for allocation to various jurisdictions within the State, including local governments in Garfield County. However, the amount of Federal royalty monies that jurisdictions in Colorado could receive would be reduced by a provision of the transfer act. This act specifies that none of the Federal royalty monies generated by lease of lands in the former NOSRs (in this alternative, only the leases in NOSR 3) are to be disbursed to Colorado until the Federal government recoups DOE's cost for gas development in NOSR 3 and the cost to BLM of

environmental restoration in NOSRs 1 and 3. The recouped costs could amount to \$40 million or more. Oil and gas production in the Planning Area would increase Garfield County's assessed property valuation, yielding an estimated \$70 million in property tax revenue over the 20 year period of analysis. Availability of the Planning Area royalties to the Federal government would be a negligible impact. However, to Colorado and jurisdictions within Colorado, the disbursement of Federal royalties and generation of additional property tax revenues would constitute a moderate beneficial impact.

Job growth under this alternative would depend on the extent to which drilling in the Planning Area is in addition to ongoing activity instead of replacing drilling that would otherwise occur in areas outside the Planning Area. Assuming that all Planning Area oil and gas activity would be new drilling, the assumed average of 43 wells per year (Appendix H) could lead to direct employment of 151 workers in the oil and gas industry. This increased direct oil and gas employment would in turn cause a similar increase in jobs indirectly tied to this growth. Together, the new jobs would increase the population of the area by 544 people, including direct and indirect employees and family members. Most of the new jobs and the population increase would be located in Garfield County, but Mesa County and perhaps Rio Blanco County would also see some growth. Table 4-33 assumes that all new jobs and new residents would be located in Garfield County.

In some parts of western Colorado, a population increase of 544 people would be a major change. However, population growth in Garfield County has been substantial for a number of years and is expected to remain so into the future. Consequently, the additional population brought about by this alternative would be less than one percent of the projected 2025 Garfield County population. The same is true for County employment. Because the percentage change is so small, the impact would be negligible to minor.

Impacts from Other Proposed Management Actions

Hunting and other forms of dispersed recreation within the planning unit would continue to exert the same influence on local socioeconomic conditions as before, subject to changes in external factors such as CDOW hunting regulations, regional population growth, and changes in numbers of deer and elk. Grazing would continue in the Planning Area under the same management as at present and would generate the same impacts. No additional jobs, population levels, or public revenues would be generated.

Impacts on Quality of Life

The new wells drilled on Federal mineral estate would primarily be in the southern and eastern portions of the Planning Area. Drilling in the southern portion would intensify impacts that are already occurring. Drilling in the eastern portion would expand oil and gas development into areas west and north of Rifle that have seen little activity to date. The effect on quality of life would depend to some extent on the degree to which the oil and gas industry is perceived as being a “good neighbor.”

Beyond that, the introduction of industrial features in the landscape of the newly developed area would begin a transformation of the visual character that residents value so highly. This transformation could induce some residents to conclude that their quality of life is being adversely affected. The effect would be minor to moderate.

4.4.3.2 Alternative II

This alternative would focus public land management on the enhancement of visual resource values, natural processes, and the wilderness character of the area. In addition to managing over 21,000 acres to maintain wilderness values, four ACECs would be established, 43 miles of existing roads would be closed to motorized or mechanized travel, another 43 miles would be open only for administrative use, and cross-country travel

would be prohibited throughout the Planning Area, including over-snow travel by snowmobiles. More than 52,000 acres of Federal mineral estate would be available for oil and gas leasing.

Impacts from Oil and Gas Development

This alternative would result in an estimated 905 new wells on public lands that are currently leased or would be made available for lease, eventually recovering reserves estimated at 1,041 BCF of gas. By the 20th year of the plan, about 535 BCF would be produced, supplying the annual natural gas needs of approximately 285,000 households. At \$3.00/MCF, the value of the gas produced would be \$1.6 billion, generating Federal mineral royalties of \$201 million.

Up to half the Federal royalties, or about \$101 million, could be disbursed to Colorado for allocation to various jurisdictions within the State, including local governments in Garfield County. However, the amount of Federal royalty monies that jurisdictions in Colorado could receive would be reduced by a provision of the transfer act. It requires that none of the Federal royalty monies generated by lease of lands in the former NOSRs will be disbursed to Colorado until the Federal government recoups DOE’s cost for gas development in NOSR 3 and the cost to BLM for environmental restoration in NOSRs 1 and 3. The recouped costs could amount to \$40 million or more. Gas production in the Planning Area would increase Garfield County’s assessed property valuation, yielding an estimated \$74 million in property tax revenue over the 20-year plan. Availability of Planning Area royalties to the Federal government would be a negligible impact. To Colorado and jurisdictions within Colorado, the disbursement of Federal royalties and the generation of additional property tax revenues would constitute a moderate impact.

Drilling an average of 45 wells per year would require an increase in oil and gas industry employment of 160 workers. The increased oil and gas employment would in turn cause an increase of a comparable number of jobs

indirectly tied to the oil and gas growth. The new jobs, together with employment increases generated by changes in recreation management, would bring about a population increase of 619 people. Most of the new jobs and the population increase would be located in Garfield County, but Mesa County and, to a lesser extent, Rio Blanco County would see some change. For comparison purposes, Table 4-33 assumes that all new jobs and new residents would be located in Garfield County.

In some parts of western Colorado, a population increase of 619 would be a major change. However, population growth in Garfield County has been substantial for a number of years and is expected to remain so into the future. Consequently, the additional population brought about by this alternative would be less than one percent of the projected 2025 Garfield County population. The same is true for County employment. Because the percentage change is so small, the impact would be negligible to minor.

The development of oil and gas at the levels anticipated under Alternative II would run counter to those recommendations aimed at enhancing a backcountry recreation experience. This is especially true above the rim, where new access roads for gas drilling would not be in accord with efforts to maintain a backcountry setting. This effect would tend to reduce the socioeconomic benefits of attracting a more diverse group of recreationists.

The increased forage created by reclamation of oil and gas well pads could be seen as a short-term benefit by grazing permittees.

Impacts from Other Proposed Management Actions

The character of hunting and other forms of dispersed recreation within the Planning Area could change as restrictions on motorized use and a new emphasis on non-motorized recreation begins to attract a different group of recreationists. The number of hunters would probably stay about the same, depending more on CDOW regulations than BLM management.

However, over time, hunting success might improve, which could induce more hunters to try the area. The change in emphasis would have a negligible impact on the local economy, as spending patterns would simply shift to accommodate the equipment and supply needs of the new group of hunters.

The continued maintenance of wilderness values within the planning unit would tend to attract a new and different group of recreationists over time. In particular, recreational use outside the hunting season would be likely to grow. This new use has the potential to generate a minor impact as total sales of goods and services increase and as sales are spread over a longer season. Local employment could increase by as many as twelve jobs.

Grazing would continue in the Planning Area under much the same management as before, but fewer rangeland improvement projects could be constructed and maintenance of many existing projects would be complicated by the new limitations on motorized travel. The economic effect would be adverse but negligible.

Impacts on Quality of Life

The new wells drilled on Federal mineral estate would be in the southern and eastern portions of the Planning Area and, to a limited extent, on top of the plateau. Drilling in the southern portion would intensify impacts that are already occurring. Drilling in the rest of the Planning Area would expand the area of oil and gas development to areas west and north of Rifle and on top of the plateau that have seen little activity to date. The effect of this expansion on quality of life would depend to some extent on the degree to which the oil and gas industry is perceived as being a “good neighbor.”

Beyond that, the introduction of industrial features in the landscape of the newly developed areas would begin a transformation of the visual character that residents value so highly. This transformation could induce some residents to conclude that their quality of life is being adversely affected. Maintenance of wilderness values and the extensive use of NSO stipulations

under this alternative would help to ensure the visual quality of the Roan Plateau. This would be a welcome development to the many area residents who value highly the visual character of the Planning Area, and would reduce the negative visual impact of oil and gas development. The overall effect of this alternative on perceptions of quality of life would be moderate and negative.

4.4.3.3 Alternative III – Preferred Alternative

Under this alternative, public land management would aim for a balance between mineral resource development and non-renewable resources. A total of 26 miles of existing roads would be closed to motorized or mechanized travel, another 24 miles would be open only to administrative use, and cross-country travel would be prohibited through the Planning Area. The cross-country prohibition would not apply to off-route travel by snowmobile.

No special protection would be given to areas having wilderness character, but a total of 9,006 acres would be managed in ways that would protect roadlessness and naturalness (Map 36). Additionally, two ACECs would be designated, and WSR-eligible streams would be protected. The entire 73,602 acres of Federal mineral estate in the Planning Area would be made available for lease, but development above the rim would be deferred until 80 percent of anticipated wells below the rim have been completed.

Impacts from Oil and Gas Development

This alternative would result in an estimated 1,324 new wells on public lands that are currently leased or would be made available for lease, eventually recovering reserves estimated at 1,523 BCF of gas. By the 20th year of the plan, about 781 BCF of natural gas would be produced, supplying the annual needs of approximately 415,000 households. At \$3.00/MCF, the value of gas produced would be more than \$2.3 billion, generating Federal mineral royalties of \$293 million.

Up to half the Federal royalties, or about \$146 million, could be disbursed to Colorado for allocation to various jurisdictions within the State, including local governments in Garfield County. However, the amount of Federal royalty monies that jurisdictions in Colorado could receive would be reduced by a provision of the transfer act. It requires that none of the Federal royalty monies generated by lease of lands in the former NOSRs will be disbursed to Colorado until the Federal government recoups DOE's cost for gas development in NOSR 3 and the cost to BLM of environmental restoration in NOSRs 1 and 3. The recouped costs could amount to \$40 million or more. Gas production in the Planning Area would increase Garfield County's assessed property valuation, yielding an estimated \$108 million in property tax revenue over the 20-year period of analysis. Availability of the Planning Area royalties to the Federal government would be a negligible impact. To Colorado and jurisdictions within Colorado, the disbursement of Federal royalties and the generation of additional property tax revenues would constitute a moderate impact.

Drilling an average of 66 wells per year would require an increase in oil and gas industry employment of 234 workers. Increased oil and gas employment would in turn cause an increase of a similar number of jobs indirectly related to oil and gas growth. The new jobs, together with employment changes generated in the recreation sector, would bring about a population increase of 832 people. Most of the new jobs and the population increase would be located in Garfield County, but Mesa County and Rio Blanco County would see some change. For comparison purposes, Table 4-33 assumes that all new jobs and new residents would be located in Garfield County.

In some parts of western Colorado, a population increase of 832 would be a major change. However, population growth in Garfield County has been substantial for a number of years and is expected to remain so into the future. Consequently, the additional population brought about by this alternative would be only about 1 percent of the projected 2025 Garfield County population. The same is true for County

employment. Because the percentage change is so small, the impact would be minor.

Development of oil and gas at the levels anticipated would run counter to other program recommendations, especially above the rim, where new access roads for gas drilling would not be in accord with efforts to limit motorized activity. Hunting and other forms of dispersed recreation within the planning unit could eventually be affected by the substantial drilling activity atop the Roan Plateau. The number of new roads and the greatly increased traffic on those roads and roads leading into the area could diminish hunting success and reduce the attractiveness of the area to many recreationists. This could affect local employment slightly, costing an estimated three jobs. However, the overall economic impact would be negligible.

The increased forage created by reclamation of oil and gas well pads could be seen as a short-term benefit by grazing permittees.

Impacts from Proposed Management Actions

The character of hunting and other forms of dispersed recreation within the planning unit could change if limitations on motorized use and increased opportunities for non-motorized recreation begin to attract a different group of recreationists. The number of hunters would probably stay about the same, depending more on CDOW regulations than BLM management. If hunting success improves, it could induce more hunters to visit the area. The socioeconomic impact of any change is likely to be negligible as spending patterns would not increase or decrease but would simply shift to accommodate the varying equipment and supply needs of a different mix of recreationists. The overall socioeconomic impact of these changes would be negligible.

Grazing would continue in the Planning Area under much the same management as before but motorized access would be reduced. The economic effect would be negligible.

Impacts on Quality of Life

New wells would be drilled on Federal mineral estate throughout the Planning Area. Drilling in the southern portion would intensify impacts that are already occurring; drilling in the rest of the Planning Area would expand the area of oil and gas development to areas west and north of Rifle and on top of the plateau that have seen little activity to date. The effect of this expansion on quality of life would depend to some extent on the degree to which the oil and gas industry is perceived as being a “good neighbor.”

Beyond that, the introduction of industrial features in the landscape of the newly developed areas would be extensive and would bring about a transformation of the visual character that residents value so highly. This transformation could induce many residents to conclude that their quality of life is being adversely affected. The effect would be moderate to major.

Certainly the deferral of oil and gas development on top of the plateau until an estimated 16 years into the 20-year period would postpone the negative impacts in this part of the Planning Area, which is of special importance to much of the public. It is not known whether the intervening period would allow the development of more efficient, less impactful drilling and recovery techniques that would lead to less impact on quality of life than if drilling above the cliffs were to begin sooner.

4.4.3.4 Alternative IV

Under this alternative, public land management would aim for a balance between mineral resource development and non-renewable resources. A total of 26 miles of existing roads would be closed to motorized or mechanized travel, another 24 miles would be open only to administrative use, and cross-country travel would be prohibited, except within the Hubbard Mesa SRMA and over-snow travel by snowmobile. No special protection would be given to areas having wilderness character. However, two ACECs would be designated, and WSR-eligible streams would be protected. The

entire 73,602 acres of Federal mineral estate in the Planning Area would be made available for lease.

Impacts from Oil and Gas Development

This alternative would result in an estimated 1,324 new wells on public lands that are currently leased or would be made available for lease, eventually recovering reserves estimated at 1,523 BCF of gas. By the 20th year of the plan, about 781 BCF of natural gas would be produced, supplying the annual needs of approximately 415,000 households. At \$3.00/MCF, the value of the gas produced would be more than \$2.3 billion, generating Federal mineral royalties of \$293 million.

Up to half the Federal royalties, or about \$146 million, could be disbursed to Colorado for allocation to various jurisdictions within the State, including local governments in Garfield County. However, the amount of Federal royalty monies that jurisdictions in Colorado could receive would be reduced by a provision of the transfer act. It requires that none of the Federal royalty monies generated by lease of lands in the former NOSRs will be disbursed to Colorado until the Federal government recoups DOE's cost for gas development in NOSR 3 and the cost to BLM for environmental restoration in NOSRs 1 and 3. The recouped costs could amount to \$40 million or more. Gas production in the Planning Area would increase Garfield County's assessed property valuation, yielding an estimated \$108 million in property tax revenue over the 20-year period of analysis. Availability of Planning Area royalties to the Federal government would be a negligible impact. To Colorado and jurisdictions within Colorado, the disbursement of Federal royalties and the generation of additional property tax revenues would constitute a moderate impact.

Drilling an average of 66 wells per year would require an increase in oil and gas industry employment of 234 workers. Increased oil and gas employment would in turn cause an increase of a similar number of jobs indirectly related to oil and gas growth. The new jobs, together with employment changes generated in the recreation

sector, would bring about a population increase of 832 people. Most of the new jobs and the population increase would be located in Garfield County, but Mesa County and Rio Blanco County would see some change. For comparison purposes, Table 4-33 assumes that all new jobs and new residents would be located in Garfield County.

In some parts of western Colorado, a population increase of 832 would be a major change. However, population growth in Garfield County has been substantial for a number of years and is expected to remain so into the future. Consequently, the additional population brought about by this alternative would be only about 1 percent of the projected 2025 Garfield County population. The same is true for County employment. Because the percentage change is so small, the impact would be minor.

The development of oil and gas at the levels anticipated would run counter to other program recommendations, especially above the rim, where new access roads for gas drilling would not be in accord with efforts to limit motorized activity. Hunting and other forms of dispersed recreation within the planning unit could eventually be affected by the substantial drilling activity atop the Roan Plateau. The number of new roads and the greatly increased traffic on those roads and roads leading into the area could diminish hunting success and reduce the attractiveness of the area to many recreationists. This could affect local employment slightly, costing an estimated three jobs. However, the overall economic impact would be negligible.

The increased forage created by reclamation of oil and gas well pads could be seen as a short-term benefit by grazing permittees.

Impacts from Proposed Management Actions

The character of hunting and other forms of dispersed recreation within the planning unit could change if limitations on motorized use and increased opportunities for non-motorized recreation begin to attract a different group of recreationists. The number of hunters would probably stay about the same, depending more

on CDOW regulations than BLM management. If hunting success improves, it could induce more hunters to visit the area. The socioeconomic impact of any change is likely to be negligible as spending patterns would not increase or decrease but would simply shift to accommodate the varying equipment and supply needs of a different mix of recreationists. The overall socioeconomic impact of these changes would be negligible.

Grazing would continue in the Planning Area under much the same management as before but motorized access would be reduced. The economic effect would be negligible.

Impacts on Quality of Life

New wells would be drilled on Federal mineral estate throughout the Planning Area. Drilling in the southern portion would intensify impacts that are already occurring; drilling in the rest of the Planning Area would expand the area of oil and gas development to areas west and north of Rifle and on top of the plateau that have seen little activity to date. The effect of this expansion on quality of life would depend to some extent on the degree to which the oil and gas industry is perceived as being a “good neighbor.”

Beyond that, the introduction of industrial features in the landscape of the newly developed areas would be extensive and would bring about a transformation of the visual character that residents value so highly. This transformation could induce many residents to conclude that their quality of life is being adversely affected. The effect would be moderate to major.

4.4.3.5 Alternative V

Under this alternative, public land management would focus on maximizing mineral resource development while maintaining some essential protections for non-renewable resources. No ACECs or WSRs would be established, areas having wilderness character would not be given special protection, and the existing 259 miles of roads and routes would remain open. However, cross-country travel would be prohibited, except

for over-snow travel by snowmobile. The entire 73,602 acres of the Federal mineral estate in the Planning Area would be made available for lease. A substantial difference between this alternative and others is the removal of NSO stipulations to protect viewsheds and the CSU stipulation to protect VRM Class II areas. These changes were presumably made to increase the potential for extraction of oil and gas.

Impacts from Oil and Gas Development

Under this alternative, an estimated 1,582 new wells would be drilled on public lands that are currently leased or would be made available for lease, eventually recovering reserves estimated at 1,819 BCF of natural gas. By the end of the 20-year life of the plan, about 933 BCF would be produced, supplying the annual needs of an average of approximately 496,000 households. At \$3.00/MCF, the value of gas produced would be \$2.8 billion, generating Federal mineral royalties of \$350 million.

Up to half the Federal royalties, or about \$175 million, could be disbursed to Colorado for allocation to various jurisdictions within the State, including local governments in Garfield County. However, the amount of Federal royalty monies that jurisdictions in Colorado could receive would be reduced by a provision of the transfer act. It requires that none of the Federal royalty monies generated by lease of lands in the former NOSRs will be disbursed to Colorado until the Federal government recoups DOE’s cost for gas development in NOSR 3 and the cost to BLM of environmental restoration in NOSRs 1 and 3. The recouped costs could amount to \$40 million or more. Gas production in the Planning Area would increase Garfield County’s assessed property valuation, yielding an estimated \$129 million in property tax revenue over the 20-year period of analysis. Availability of the Planning Area royalties to the Federal government would be a negligible impact. To Colorado and jurisdictions within Colorado, the disbursement of Federal royalties and the generation of additional property tax revenues would constitute a moderate impact.

Drilling an average of 79 wells per year would require an increase in oil and gas industry employment of 280 workers. The increased oil and gas employment would in turn cause a comparable increase in jobs indirectly tied to the oil and gas growth. The new jobs, together with employment changes generated in the recreation sector, would bring about a population increase of 986 people. Most of the new jobs and the population increase would be located in Garfield County but Mesa County and Rio Blanco County would see some change. For comparison purposes, Table 4-33 assumes that all new jobs and new residents would be located in Garfield County.

In some parts of western Colorado, a population increase of 986 would be a major change. However, population growth in Garfield County has been substantial for a number of years and is expected to remain so into the future. Consequently, the additional population brought about by this alternative would be only about one percent of the projected 2025 Garfield County population. The same is true for County employment. Because the percentage change is so small, the impact would be minor.

The development of oil and gas at the levels anticipated for Alternative V would have a detrimental effect on some current recreation activities in the Planning Area, particularly hunting. The number of new roads created by gas drilling activities and the greatly increased traffic on those roads could diminish hunting success and reduce the attractiveness of the area to many recreationists. This could affect local employment slightly, costing an estimated six jobs. However, the overall impact would be negligible.

The increased forage created by reclamation of oil and gas well pads could be seen as a short-term benefit by grazing permittees.

Impacts from Other Proposed Management Actions

The character of hunting and other forms of dispersed recreation within the planning unit would not change much because of the

limitation on travel to designated roads and trails. Absent any changes caused by oil and gas drilling, the number of hunters would probably stay about the same depending more on CDOW regulations than BLM management. The socioeconomic impact would be negligible.

Grazing would continue in the Planning Area under much the same management as before but motorized access would be reduced. The economic effect would be negligible.

Impacts on Quality of Life

The new wells drilled on Federal mineral estate would be sited throughout the Planning Area. Drilling in the southern portion would intensify impacts that are already occurring. Drilling in the rest of the Planning Area would expand the area of oil and gas development to areas west and north of Rifle and on top of the plateau that have seen little activity to date. The introduction of industrial features in the landscape of the newly developed areas would be extensive and would bring about a transformation of visual character. The removal of NSOs to protect viewsheds and the CSU to protect VRM Class II areas would increase the rate at which the area's visual character is altered as cuts into the slopes of the Roan Cliffs for access roads and drill pads become visible at a distance. Area residents would see the transformation of the visual character of the Planning Area as a regional, rather than a local, impact. Many residents would conclude that their quality of life is substantially diminished, representing a major impact.

4.4.3.6 Indirect, Offsite, and Cumulative Impacts

The socioeconomic changes underway in Garfield County and the Roan Plateau impact area are expected to continue. The Colorado State Demography Section projects that the year 2025 population of Garfield County will be nearly double the 2000 population level, growing from 44,267 to almost 87,000 (CoLA 2003b). The 2.8 percent average rate of annual population growth during this period would be well ahead of the growth rate for the entire State

of Colorado, 1.7 percent. The number of jobs is also projected to grow at a rapid pace, increasing from 28,501 in the year 2000 to about 46,000 in 2025.

Figures 4-1 and 4-2 display the projected changes in baseline employment and population, as well as the population and employment impacts of Alternative V. Only the impacts of Alternative V are displayed because they represent the greatest impacts that might result from oil and gas development of BLM lands in the Planning Area.

The kind of continued growth projected for the County is high by historical standards and will challenge local governments and service providers to meet the additional infrastructure requirements of area residents. The area's housing stock, water treatment capacity and sewage treatment capacity all must expand in concert with population growth. So too must the law enforcement, fire protection, and social service sectors of local governments. The transportation system within the County will need continuous expansion and improvement. New schools and more teachers will be needed.

The increase in demand for developed and dispersed recreation opportunities could even exceed the rate of population growth.

This substantial socioeconomic change will continue to occur regardless of BLM management decisions for the Planning Area. However, rather than diminishing the significance of the impacts of BLM management, the growth casts a different light on those impacts. The employment and resultant population growth that could be produced by oil and gas development in the Planning Area is described in Table 4-33 as generally less than 1 percent of the employment and population projected for 2025. Although a seemingly insignificant share of the total, the impact should still be recognized as yet another addition to an already rapidly growing population base with its own additional demands for government and social services. On the other hand, while

Table 4-33 describes substantial additions to local property tax revenues, the significance of that additional revenue is heightened when considered in light of all the government service needs for the next 25 years.

The role that public lands play in defining quality of life for area residents may especially be affected by demographic changes in the future. As private property becomes more fully developed, public lands will become increasingly important as remaining reservoirs of open space and as providers of increasingly highly valued visual quality. To the extent that perceptions of quality of life are tied to visual quality and the maintenance of open space, BLM decisions that affect those elements become more important.

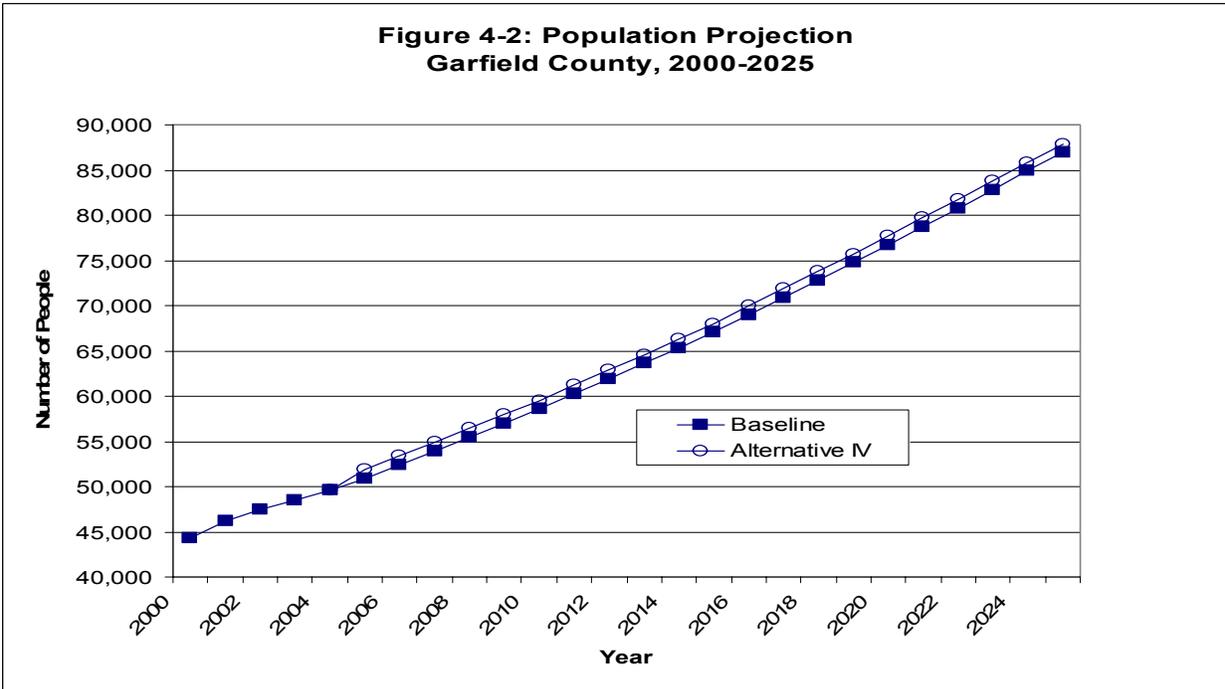
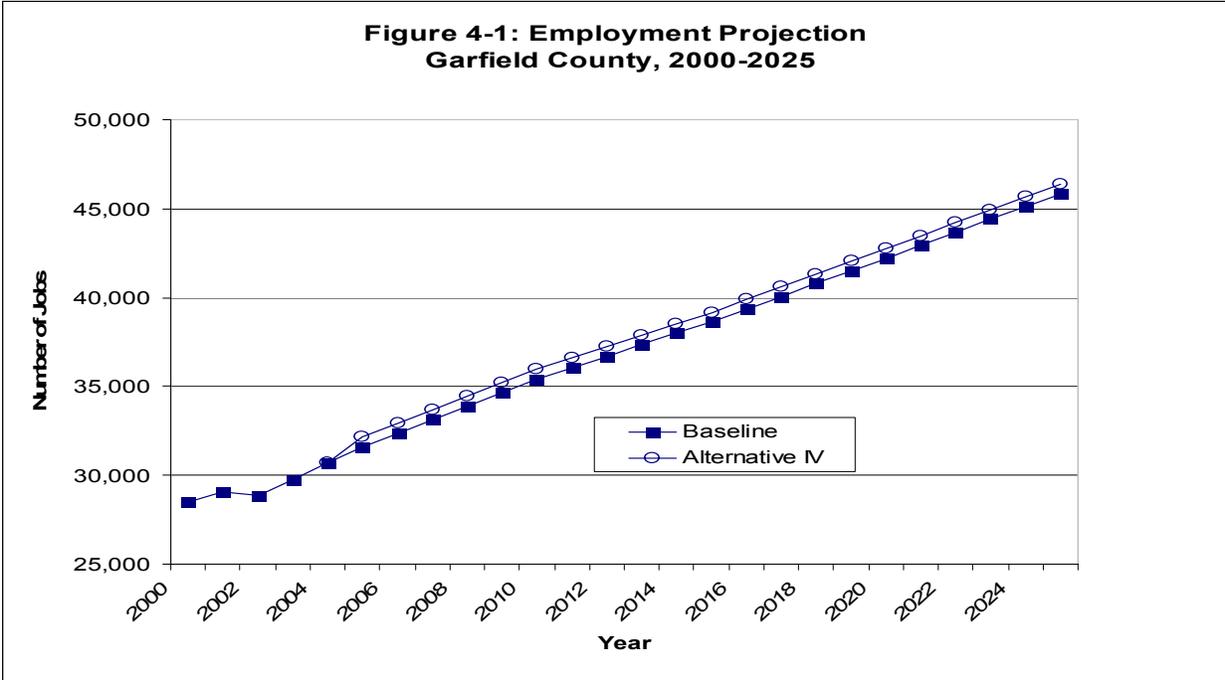
4.4.4 Transportation and Access

Introduction

Potential impacts on the Planning Area transportation system include changes in the amount and type of traffic and the construction of new roads or abandonment of existing roads. Changes in the level of traffic and the type of traffic inevitably have secondary impacts on the governmental entities that manage the road system and may have to deal with increased maintenance and other traffic management issues, like safety. Road construction and abandonment also have secondary effects, either increasing or decreasing the need for maintenance and system management.

Whatever impacts are brought about by changes in BLM management in the Planning Area, traffic levels near and into the Planning Area are expected to increase. Table 3-25 in Section 3.4.4 describes traffic levels that might occur in the year 2023. The relatively low levels of traffic occurring currently at critical Planning Area access points suggest the potential for changes in public land uses to have a major effect at those points. CR 242, the JQS Road, shows 84 average daily trips currently and a projected 113 in 2023. CR 244, at Fravert Reservoir shows 317 and 428 trips respectively.

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The change in BLM management with the greatest potential to affect traffic levels would be offering for lease the oil and gas mineral estate in the former NOSRs. As many as 234 new wells could be drilled above the rim and 1,348 below the rim under Alternative V.

The RFD (Appendix H) describes the assumed number of wells per year that are likely to be drilled in areas below the rim, based on recent historical drilling rates in the Planning Area and vicinity by Williams Production and Encana, the two major lessees. This estimate ranges from about 43 wells per year under Alternative I to 79 wells per year under Alternative V. On average, about 10 to 15 percent of the new wells in any given year would be atop the plateau (except for Alternative III, which defers drilling there). The

lower drilling rate atop the plateau reflects a combination of a smaller area of available land, more difficult access, a thicker geologic section to penetrate, more stringent environmental constraints, and a reduced drilling season due to snow accumulation (an assumed 5-month season) (Appendix H).

The traffic generated by the assumed drilling of 80 wells per year is described in Table 4-34. The table includes the number of vehicle trips required to develop a single well, the number required for an assumed maximum of 80 wells per year, and the average daily traffic generated by 80 wells. These numbers are derived from data used previously by Notar (1998) in modeling air quality impacts from oil shale development on the NOSRs.

Table 4-34. Typical Vehicular Traffic Required To Drill Gas Wells

Vehicle Class	Total Number of Trips for One Well	Number of Trips for 80 Wells	Average Daily Trips for 80 Wells ¹
16-wheel Tractor-Trailers	88	7,040	235
10-wheel Trucks	216	17,280	576
6-wheel Trucks	452	36,160	1,205
Pickups	404	32,320	1,077
Total	1,160	92,800	3,093

¹ Assumes an average 30 days to complete one well (see RFD, Appendix H).

In addition to increases in traffic volume, oil and gas development has a substantial impact from the construction of new roads or widening of existing roads to access well pads. These newly constructed or improved roads are the source of much of the environmental impact of gas drilling as vegetation is removed and the risk of soil erosion increases, especially over the long term. Construction or widening of access roads can also affect visual quality, impact surface water and aquatic habitat at stream crossings, and increase emission of fugitive dust. Potentially, new or widened roads can also affect wildlife through increased disturbance (louder noise and larger size) and habitat fragmentation and can impact paleontological and cultural resources.

The most important impact on transportation is the addition to the existing network of roads in an area. When new oil and gas development

roads are abandoned, BLM may elect to retain some of these roads and open them to public use. Some of the new access roads are likely to provide opportunities for recreational travel into otherwise remote, undisturbed locations. Whether this is viewed as a negative or beneficial impact depends on the perspective of the potential user. Any oil and gas roads that BLM deems inappropriate for retention following abandonment will be reclaimed.

BLM road construction standards are applied in the design of access roads for oil and gas development or other uses. These standards have proven effective in mitigating soil erosion problems related to disturbance from construction operations. Actions such as limiting road grades, providing proper water drainage including ditches and culverts, applying surface materials such as gravel,

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avoiding excessive earthwork and sidecast of materials, and implementing dust abatement techniques can effectively mitigate adverse impacts. BLM requires that the operator obtain all necessary local permits, including the hauling permits required by Garfield County.

Roads to producing wells are generally maintained periodically by the operator to provide year-round access. Maintenance activities such as surface blading, culvert and ditch cleaning, spot surfacing, and weed control are required to meet road standards and minimize resource impacts. When a well is plugged and abandoned, BLM usually requires the rehabilitation and closure of roads related to the site, unless overriding benefits to the public dictate that a road remain open for travel.

4.4.4.1 Alternative I

Impacts from Proposed Management Actions

This alternative would maintain existing management, and no new BLM roads or road abandonments are planned. The BLM road network would remain at 259 miles, with about 162 miles above the rim and about 97 miles below the rim (Table 4-35). Potential additions to this system would occur as new or access roads become necessary for oil and gas development. Traffic on existing roads and trails would increase incrementally over time, possibly requiring more maintenance on some roads. The impact would be negligible.

Table 4-35. Roan Plateau Travel Management Designations by Alternative

		<u>Alternative</u>				
		I	II	III	IV	IV
Travel Designation		Acres				
Open		66,934	0	2,460	2,460	0
Limited		0	45,552	64,474	64,474	66,934
Closed		0	21,382	0	0	0
Route Management		Miles				
Open to Motorized or Mechanized Use	Atop the Plateau	162	75	113	113	162
	Below the Rim	97	98	96	96	97
Administrative Access Only	Atop the Plateau	0	43	24	24	0
	Below the Rim	0	0	0	0	0
Closed to Motorized or Mechanized Use	Atop the Plateau	0	34	17	17	0
	Below the Rim	0	9	0	0	0

Impacts from Oil and Gas Development

Development of the Federal oil and gas mineral estate under this alternative would occur solely on the 29,331 acres of BLM mineral estate not within NOSR 1 and the unleased portion of NOSR 3. Eventually, the road network could include as much as 152 miles of new or widened access roads based on the RFD assumption of 0.6 mile of access road per pad (Appendix H). This per-well assumption is probably conservative because of the current road network within the Planning Area and the goal of BLM to encourage clustering or collocation of facilities. The estimated 4 miles of new roads above the rim would be a negligible impact, but the 148 miles below the rim would approximately double the current amount. This would require substantial management by BLM to oversee maintenance, maintain closures, and monitor use.

The amount of traffic due to oil and gas development would depend on the rate of development, but any period of intense development would impact the major points of access into the Planning Area. For example, the assumed annual average of 43 wells drilled per year would result in approximately 1,624 additional vehicle trips per day, most by large (larger than pickup-size) vehicles. If half of this traffic were to go through the intersection of SH 13 and US 6 at Rifle, the result would be a 38-percent increase over current levels and a 28-percent increase over the projected baseline in 2003 (Table 3-25). The actual distribution of traffic cannot be predicted because the exact rate of drilling and distribution within the Planning Area is both unknown and likely to vary from year to year.

Indirect, Offsite, and Cumulative Impacts

It is unlikely that the County road system within the Planning Area would grow because dispersed private lands within the Planning Area are already served by County roads. The road network on private lands created to serve oil and gas development would continue to grow, adding as much as 884 miles of roads, assuming

that the per-well average of 0.6 mile used in the RFD for BLM lands also applies to private lands and unless clustering, collocation, and consolidation of facilities reduces this average. Any increase in roads on private lands would be in addition to the estimated 152 miles on BLM lands.

County road maintenance costs would reflect the increased level of activity on County roads.

4.4.4.2 Alternative II

Impacts from Proposed Management Actions

This alternative would emphasize landscape management, natural values and wilderness character, featuring the area's ecological richness and unique ecosystem values. BLM recommendations to enhance and protect those values would include management of three areas having wilderness character to protect those values, as well as protective management of four ACECs and the WSR-eligible streams. In support of those and other program recommendations, BLM would close and rehabilitate 43 miles of roads and routes and limit another 43 miles to administrative use. The 43 miles to be closed to motorized or mechanized use would include 34 above and 9 below the rim.

The impact on the transportation system above the rim would be moderate in terms of closures. In the short term, BLM would have to pay for rehabilitation of the roads closed above the rim, but maintenance costs would be reduced sharply in the long term.

Traffic on the roads and trails remaining open would increase incrementally over time and might also show increases due to displaced use from closed roads. However, the change in the character of the landscape above the rim, from heavily motorized to an emphasis on non-motorized recreation, might in fact reduce overall use of roads above the rim.

Impacts from Oil and Gas Development

Development of Federal oil and gas mineral estate under this alternative would occur throughout the Planning Area, except on 21,382 acres managed to protect wilderness characteristics. Eventually, the road network above the rim might grow by as much as 40 miles due to gas drilling, versus 87 miles of existing roads to be closed to motorized or mechanized use. Below the rim, up to 146 miles of roads might be added to the existing 98 miles of open roads, a major change in the BLM road network in this area. These changes would require substantial management on BLM's part to oversee maintenance, maintain closures, and monitor use.

The amount of traffic due to oil and gas development would depend on the rate and distribution of development in any one year. However, the estimated 45 wells drilled per year under this alternative would result in 1,740 additional trips per day, mostly by vehicles larger than pickups. If the number of wells drilled annually in areas above and below the rim were in the same proportion as assumed in the RFD (Appendix H), about four wells would be drilled annually at the higher elevations. If all this traffic were to travel via Cow Creek Road via SH 13 to CR 5 in Rio Blanco County, the impact in 2023 of the additional 155 vehicle trips per day would represent a 4-percent increase on SH 13 north of Rifle and a 38-percent increase on CR 5. If all of the pickup truck traffic were to travel via the JQS Road, the impact on that road would be 54 trips per day, a 48-percent increase in 2023. BLM currently intends to preclude use of JQS Road for oil and gas activities that involve heavy or oversize vehicles, and the County may elect to establish other use restrictions on oil and gas travel using pickup trucks or other smaller vehicles. The latter restrictions, if established, could be based on safety concerns and interference with other uses (e.g., recreational travel).

Indirect, Offsite, and Cumulative Impacts

It is unlikely that the County road system within the Planning Area would grow because the

dispersed private lands within the Planning Area are already served by County roads. The road network on private lands created to serve oil and gas development would continue to grow, adding as much as 884 miles of new access roads to the area in addition to 186 miles on lands. This assumes that the per-well average of 0.6 mile used in the RFD for BLM lands also applies to private lands.

County road maintenance costs would reflect the increased level of activity on County roads.

4.4.4.3 Alternative III – Preferred Alternative

Impacts from Proposed Management Actions

This alternative would emphasize a variety of multiple resources, specifically allowing for oil and gas development where feasible. BLM program recommendations would include the WSR-eligible streams and two of the four ACECs proposed for Alternative II, but not the areas having wilderness character. BLM would close and rehabilitate 26 miles of existing roads, including 17 miles above and 9 miles below the rim. A total of 113 miles of road above the rim would remain open to motorized or mechanized travel, and an additional 24 miles would be limited to administrative use. Below the rim, 96 miles of roads would remain open to motorized or mechanized use.

In the short term, BLM would have to pay for rehabilitation of the roads closed above the rim, but maintenance costs would be reduced in the long term.

Traffic on the remaining open roads and trails would increase incrementally over time and might also show increases due to displaced use from closed roads. However, the change in the character of the landscape above the rim, from heavily motorized to a greater emphasis on non-motorized recreation, might in fact reduce overall use of roads above the rim.

Impacts from Oil and Gas Development

Development of Federal oil and gas mineral estate under this alternative would occur throughout the Planning Area. Eventually, the road network above the rim might change by the addition of 23 miles of roads due to oil and gas development. This would add substantially to the 113 miles to remain open to public motorized or mechanized use and 24 miles to remain open only to administrative use above the rim. Below the rim, up to 194 miles of roads might be added to the 96 miles to remain open to motorized or mechanized use. These additions would require substantial management by BLM to oversee maintenance, maintain closures, and monitor use.

The amount of traffic due to oil and gas development would depend on the rate and distribution of development in any one year. However, the estimated 66 wells drilled per year under this alternative would result in 2,552 additional trips per day, mostly by vehicles larger than pickups. Based on the number of wells drilled annually in areas above and below the rim assumed in the RFD (Appendix H), about seventeen wells would be drilled annually at the higher elevations following the estimated 16-year deferral period. If all of this traffic were to travel via Cow Creek Road via SH 13 to CR 5 in Rio Blanco County, the impact in 2023 of an additional 624 vehicle trips per day would represent a 16-percent increase on SH 13 north of Rifle and a 154-percent increase on CR 5. If all of the pickup truck traffic were to travel via the JQS Road, the impact on that road would be 218 trips per day, a 194-percent increase in 2023. BLM currently intends to preclude use of JQS Road for oil and gas activities involving heavy or oversize vehicles, and the County may elect to establish other restrictions pertaining to oil and gas travel in pickup trucks or other smaller vehicles. The latter restrictions could be based on safety concerns and interference with other uses such as recreational travel.

Indirect, Offsite, and Cumulative Impacts

It is unlikely that the County road system within the Planning Area would grow because the

dispersed private lands within the Planning Area are already served by County roads. The road network on private lands created to serve oil and gas development would continue to grow, adding as much as 1,200 miles of new or widened access roads to the area. This assumes that the per-well estimate of 0.6 mile used in the RFD for BLM lands also applies to private lands. Any increase in roads on private lands would be in addition to the estimated 241 miles of new or widened access oil and gas roads on BLM lands under this alternative.

County road maintenance costs would reflect the level of increased activity on County roads.

4.4.4.4 Alternative IV

Impacts from Proposed Management Actions

This alternative would emphasize a variety of multiple resources, specifically allowing for oil and gas development where feasible. BLM program recommendations would include WSR-eligible streams and two of the four ACECs proposed for Alternative II, but not the areas having wilderness character. BLM would close and rehabilitate 26 miles of existing roads, including 17 miles above and 9 miles below the rim. A total of 113 miles of road above the rim would remain open to motorized or mechanized travel, and an additional 24 miles would be limited to administrative use. Below the rim, 96 miles of roads would remain open to motorized or mechanized use. Cross-country travel would be allowed within the Hubbard Mesa SRMA.

In the short term, BLM would have to pay for rehabilitation of the roads closed above the rim, but maintenance costs would be reduced in the long term.

Traffic on the remaining open roads and trails would increase incrementally over time and might also show increases due to displaced use from closed roads. However, the change in the character of the landscape above the rim, from heavily motorized to a greater emphasis on non-motorized recreation, might in fact reduce overall use of roads above the rim.

Impacts from Oil and Gas Development

Development of the Federal oil and gas mineral estate under this alternative would occur throughout the Planning Area. Eventually, the road network above the rim might change by the addition of 76 miles of new or widened/improved roads due to oil and gas development. This would add substantially to the 113 miles to remain open to public motorized or mechanized use and 24 miles to remain open only to administrative use above the rim. Below the rim, up to 194 miles of new or widened/improved road might be added to the 96 miles to remain open to motorized or mechanized use. These additions would require substantial management by BLM to oversee maintenance, maintain closures, and monitor use.

The amount of traffic due to oil and gas development would depend on the rate and distribution of development in any one year. However, the estimated 66 wells drilled per year under this alternative would result in 2,552 additional trips per day, mostly by vehicles larger than pickups. If the number of wells drilled annually in areas above and below the rim were in the same proportion as assumed in the RFD (Appendix H), about 8 wells would be drilled annually at the higher elevations. If all of this traffic were to travel via Cow Creek Road via SH 13 to CR 5 in Rio Blanco County, the impact in 2023 of an additional 309 vehicle trips per day would represent an 8-percent increase on SH 13 north of Rifle and a 76-percent increase on CR 5. If all of the pickup truck traffic were to travel via the JQS Road, the impact on that road would be 108 trips per day, a 96-percent increase in 2023. BLM currently intends to preclude use of JQS Road for oil and gas activities involving heavy or oversize vehicles, and the County may elect to establish other restrictions pertaining to oil and gas travel in pickup trucks or other smaller vehicles. The latter restrictions could be based on safety concerns and interference with other uses such as recreational travel.

Indirect, Offsite, and Cumulative Impacts

It is unlikely that the County road system within the Planning Area would grow because the dispersed private lands within the Planning Area are already served by County roads. The road network on private lands created to serve oil and gas development would continue to grow, adding as much as 844 miles of roads to the area. This assumes that the per-well estimate of 0.6 mile used in the RFD for BLM lands also applies to private lands. Any increase in roads on private lands would be in addition to the estimated 270 miles of new or widened access roads on BLM lands under this alternative.

County road maintenance costs would reflect the level of increased activity on County roads.

4.4.4.5 Alternative V

Impacts from Proposed Management Actions

This alternative would emphasize energy development and other non-renewable resources. Few recommendations would be made to enhance or protect renewable resources or ecosystem values. The BLM road network of 259 miles, about 162 miles above the rim and 97 below the rim, would remain open. Potential additions to this system would occur as new roads become necessary for oil and gas development. Traffic on existing roads and trails would increase incrementally over time, possibly requiring more maintenance on some roads. The impact would be negligible.

Impacts from Oil and Gas Development

Development of the Federal oil and gas mineral estate under this alternative would occur throughout the Planning Area. Eventually, the road network above the rim might grow by as much as 105 miles of new or widened/improved roads due to oil and gas development. This would cause a substantial increase in the road system. Below the rim, as much as 245 miles of new roads might be added to the existing 97 miles. Although all new oil and gas roads would be open only to administrative use, the increase in the road network would require substantial

management by BLM to oversee maintenance, maintain closures, and monitor use.

The amount of traffic due to oil and gas development would depend on the rate and distribution of development in any one year. However, the estimated 79 wells drilled per year under this alternative would result in approximately 3,093 vehicle trips per day as shown for 80 wells in Table 4-34. Most of this traffic would be vehicles larger than pickups. If the number of wells drilled annually in areas above and below the rim were in the same proportion as assumed in the RFD (Appendix H), about 12 wells would be drilled at the higher elevations. If all of this traffic were to travel via Cow Creek Road via SH 13 to CR 5 in Rio Blanco County, the impact in 2023 of an additional 464 vehicle trips per day would represent an 11-percent increase on SH 13 north of Rifle and a 145-percent increase on CR 5. If all of the pickup truck traffic were to travel via the JQS Road, the impact on that road would be 162 trips per day, a 143-percent increase in 2023. BLM currently intends to preclude use of JQS Road for any oil and gas activities involving heavy or oversize vehicles, and the County may elect to establish restrictions for oil and gas travel involving pickup trucks or other smaller vehicles. The latter restrictions would be based on safety concerns and interference with other uses (e.g., recreational travel).

Indirect, Offsite, and Cumulative Impacts

It is unlikely that the County road system within the Planning Area would grow because the dispersed private lands within the Planning Area are already served by County roads. The road network on private lands created to serve oil and gas development would continue to grow, adding as much as 884 miles of new roads to the area, assuming that the per-well average of 0.6 mile of access road per pad used in the RFD for BLM lands would also apply to private lands. The 350 miles of new or widened access roads on BLM lands would be in addition to this total.

County road maintenance costs would reflect the level of increased activity on County roads.

4.5 MANAGEMENT ENVIRONMENT

4.5.1 Lands and Realty

4.5.1.1 Alternative I

This alternative calls for the continuation of existing management. The principal element of this alternative for the lands and realty program is continued maintenance of the two withdrawals used to establish NOSRs 1 and 3 in 1916 and 1924, respectively. Continuation of the withdrawals means that the 54,485 acres of the former NOSRs would not be available for actions that could result in the land going to patent — i.e., being transferred to a private entity under the Mining Law of 1872 or being included in a land exchange between BLM and another public or private entity.

BLM would be able to authorize land uses that do not call for patenting public land, such as rights-of-way, on the former NOSRs. Those lands and the remaining 12,452 acres of public land in the Planning Area would be available for location of utilities, roads, and communication and other facilities (such as wind power generation facilities) and would be dealt with on a case-by-case basis. No utility corridor for electric transmission lines and pipelines would be designated along SH 13.

All lands listed as Category I (Disposal) in the 1988 revised GSRA RMP would remain as such, and all lands except the former NOSRs would remain as Category II (Exchange). The former NOSRs would remain as Category III (Retention) lands. A 40-acre parcel adjacent to the Rifle Sportsmen's Club would not be designated as potentially suitable for R&PP lease and patent.

All direct impacts upon the lands and realty program would be administrative in nature; there would be no direct environmental impacts. Other programs and resources would be affected by failure to revoke the NOSR withdrawals, by the maintenance of current land tenure categories, by failure to clarify the availability of