

5.0 - CUMULATIVE IMPACTS ANALYSIS

Cumulative impacts result from the incremental impacts of an action when added to past, present, and reasonably foreseeable future actions, regardless of who takes the action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. This chapter discusses cumulative impacts as the incremental effect to specific resources or issues that would occur from Alternatives A, B, C in conjunction with other cumulative actions.

5.1 REASONABLY FORESEEABLE DEVELOPMENT

In support of the cumulative impact discussion, this chapter provides a discussion of past and present oil and gas activities in the Uinta Basin, both of which serve as introductions to the outlook for reasonably foreseeable development (RFD) in the Project Area and the greater Uinta Basin. The cumulative impact and RFD analysis is based upon the level of activities and actions identified in the VFO Mineral Potential Report (BLM 2002). Other cumulative activities would be livestock grazing and recreational projects. Spatial boundaries for cumulative impact assessments vary and are larger for resources that are mobile or migrate (i.e., air quality) compared to resources that are stationary. For the analysis purposed of this EA, the Cumulative Impact Analysis Area (CIAA) for most resources is VFO Planning Area, which encompasses approximately 5.5 million acres in Duchesne, Daggett, Uintah and Grand Counties.

5.1.1 OIL AND GAS

The Uinta Basin is a significant source of natural gas and oil, and it is currently one of the most active oil and gas producing areas in the onshore U.S. Oil and gas development is at an all-time high in the basin, with more rigs operating, and more applications for permit to drill (APDs) being processed than ever before. For example, over half of the total oil and gas wells drilled in Utah between 1911 and November of 2000 were drilled within the Uinta Basin. APDs and ROW applications processed by the BLM VFO have illustrated a significant upward trend, estimated to be approximately 15 percent annually. In support of the VFO Draft RMP, a mineral potential report was prepared (BLM 2002). In that report, it was estimated that a total of about 6,530 wells could be drilled in the Uinta Basin by various oil and gas operators over a 5-year period, of which about 67 percent would be new gas wells.

Exploratory drilling is currently proposed in the western and southwestern portions of the Uinta Basin, including BLM, Tribal, and National Forest lands. Production of exploratory wells typically lags discovery by many years. These exploratory wells are typically characterized by larger, deeper, more remote locations requiring greater per-well expenditures, potential delays in infrastructure access and, therefore, greater financial risk.

Future oil and gas development in the Uinta Basin will depend upon the feasibility of exploration, as determined by the underlying geology and further infill development projects within the Basin. Future development will be dependent upon the geologic feasibility of each prospect, the cost to develop the resources, and engineering technological advancements. Development of Tribal lands will continue and perhaps increase as exploratory wells are drilled in the Hill Creek Extension. Drilling in the Ashley National Forest will likely increase as a result of new leasing and management strategies. However, the level of development on Tribal and National Forest System lands is unknown.

The cumulative scenario for this EA is based on the number of existing wells in the VFO Planning Area, as well as the estimated total number of wells anticipated to be drilled over the coming 5 years in this same area. According to the UDOGM, as of August 2008, approximately 9,674 wells had been drilled in the VFO Planning Area. Of these wells, 78 percent (7,522 wells) are currently active (i.e., producing; shut-in; drilled commenced; drilling suspended), leaving 22 percent (2,152 wells) that have been plugged, abandoned, and reclaimed. Under the Mineral Potential Report, an estimated 6,530 oil and gas wells are anticipated in the VFO Planning Area (BLM 2002). The following surface disturbance assumptions have been applied regarding future construction associated with oil and gas development:

- Surface disturbance for a well pad: 2.4 acres;
- Surface disturbance for an access road, assuming 0.2 mile/well: .73 acre/well;
- Surface disturbance for pipelines and flowlines: 0.47 acre/well.

Based on these assumptions, the additional surface disturbance associated with past, present and reasonably foreseeable oil and gas development is estimated to be 50,587 acres, or approximately 0.9 percent of the 5.5 million acre VFO Planning Area. Details of the cumulative development scenario, excluding the Proposed Action and alternatives, are shown in **Table 5-1**.

Table 5-1. Cumulative Oil and Gas Development Surface Disturbance (Excluding Proposed Action and Alternatives) in the Vernal Field Office Planning Area

Planning Area	Existing Active Wells	RFD # Wells	Total # Wells	Well Pads (acres) ¹	Access Roads (acres)	Total Pipelines (acres)	Total Surface Disturbance (acres) in the CIAA
VFO	7,522	6,530	14,052	33,725	10,258	6,604	50,587

¹Well pad disturbance is overestimated, since it assumes one well per pad. In some cases, two or more wells may be drilled from a single well pad.

Table 5-2 shows the total disturbance of past, present, and reasonably foreseeable development (from **Table 5-1**) with the addition of surface disturbances associated with the Proposed Action and alternatives.

Table 5-2. Cumulative Oil and Gas Development Surface Disturbance in the VFO CIAA, Including the Proposed Action and Alternatives

Alternative	Existing Wells	RFD Wells	Alt Wells	Total # Wells	Well Pads (acres) ¹	Access Roads (acres)	Total Pipelines (acres)	Total Disturbance (acres)
A	7,522	6530	249	14,301	34,322	10,440	6,721	51,483
B	7,522	6530	36	14,088	33,811	10,284	6,621	50,716
C	7,522	6530	240	14,292	34,301	10,433	6,717	51,451

¹Well pad disturbance is overestimated, since it assumes one well per pad. In some cases, two or more wells may be drilled from a single well pad.

5.1.2 LIVESTOCK GRAZING

Livestock grazing is currently a permitted use of public lands within the VFO Planning Area. Although some minor changes may be expected over the next few years, it is reasonable to expect that livestock grazing would continue. Allocated AUMs would remain essentially unchanged; however, based on use trends over the past seven years, actual use may decline based on

individual grazing permittee’s operations and market conditions. The VFO currently administers grazing on 147 allotments. The 147 allotments within the VFO boundary designated for livestock grazing encompass approximately 2,268,120 acres (1,696,416 acres of BLM land; and 571,704 acres of private, State, and Tribal lands). Within the grazing allotments managed by the VFO, 153,370 AUMs are allocated for livestock.

5.1.3 RECREATION

Reasonable foreseeable recreation decisions potentially affecting cumulative impacts in the VFO RMP area could include designation of Areas of Critical Environmental Concerns (ACECs), Wild and Scenic Rivers (WSRs), and Special Recreation Management Areas (SRMAs), as well as trail, campground, and cabin development. These designations and developments would have beneficial impacts on recreation, but would also affect the management of other resources in the Cumulative Impact Analysis Area (CIAA).

5.2 CUMULATIVE IMPACTS

5.2.1 INTRODUCTION

This section discloses the impacts expected when the Proposed Action or alternatives are added to the past and reasonably foreseeable actions. **Table 5-3** presents a comparison of expected surface disturbance under each alternative. Although the CIAAs vary per resource, the table below describes surface disturbance within the Vernal Field Office Planning Area.

Table 5-3 Comparison of Surface Disturbances Associated with the Proposed Action (Alternative A) and Alternatives (B and C) to the CIAA

Alternative	Total Surface Disturbance Proposed in the SCPA by Alternative (acres)	Total Surface Disturbance in the CIAA (acres) ¹	Percentage of Surface Disturbance in the CIAA Caused by Alternatives in the SCPA
A	858	51,483	1.7
B	181	50,716	0.4
C	1,117	51,451	2.2

¹ Acreage determined using per well assumptions listed above in **Section 5.1.1**

5.2.2 GEOLOGY AND MINERALS

5.2.2.1 Geology and Minerals

Cumulative impacts to geologic and mineral resources in the CIAA (the VFO Planning Area) would primarily occur as a result of oil and gas development, which would deplete recoverable oil and gas from the formations underlying the CIAA and alter the local topography due to surface disturbance. Oil and gas development in the CIAA has been, and is expected to continue to be, extensive. Exploration for oil and gas reserves has diminished as infill projects are developed in known fields. Infill drilling continues to be proposed on decreased spacing, resulting in increasingly greater density of surface disturbance and installation of facilities in portions of the CIAA. Extraction of natural gas from geologic formations underlying the CIAA under the Proposed Action and alternatives would be irreversible, and would cumulatively add to depletions of oil and natural gas resources across the CIAA, especially from the Wasatch Formation and Mesaverde Group.

As of August 2008, there were 9,674 oil and gas wells in the VFO Planning Area, of which 7,522 wells are active. Under the Mineral Potential Report, an additional 6,530 oil and gas wells are anticipated in the VFO Planning Area during the next decade (BLM 2002). The Proposed Action and Alternative C would account for as many as 249 wells, or about 1.7 percent of the total reasonably foreseeable 14,052 wells (as of 2008). Under Alternative B (No Action), up to 36 wells would be drilled or about 0.4 percent of the total reasonably foreseeable wells. Development of other large oil and gas fields is currently proposed or is underway for other areas to the north, west, and northwest of the Project Area, including the Greater Deadman Bench Region, the Chapita Wells-Stagecoach Area, the North Chapita Area, the Little Canyon/Hill Creek Area, the Riverbend Area, the Rock House Area, the Antelope Creek and Brundage Canyon fields, and the Bonanza and West Bonanza areas.

In addition to oil and gas development, mining of oil shale could occur in some portions of the CIAA in the future. Oil Shale Exploration Company (OSEC) was granted a lease on 160 acres of land within the Project Area to evaluate oil shale extraction technologies. If the pilot project proves to be successful, OSEC may be granted an additional 4,960 acres of preferential lease rights within the Project Area for the development of a commercial-scale shale oil facility. The shale would be mined by underground room-and-pillar methods. Surface facilities would include fresh and spent shale stockpiles, roads, water management facilities, maintenance shops, and shale retorts. The Proposed Action and alternatives could conflict with future oil shale production in this area by occupying portions of the surface and from potential health and safety concerns associated with well casings that extend through the mining interval.

The Proposed Action and alternatives would have little cumulative impact on other mineral resources, including Gilsonite, tar sands, coal, dimension stone, and metallic minerals. There are a few Gilsonite veins in the Project Area but no current interest in mining them. Tar sands and coal deposits exist near the Project Area; however, better quality, more easily mined deposits exist in other areas of the CIAA, and these areas currently appear to be sufficient to satisfy future demand for these materials. The current demand for dimension stone is satisfied by the common collection areas that exist to the west of the Project Area. The Proposed Action and alternatives would have no cumulative impacts on metallic mineral production in the CIAA.

The potential for increased landslides in the CIAA from oil and gas development is considered to be minor because the frequency of landslides in the Green River Formation, Uinta Formation, and Wasatch Formation, which cover much of the surface of the CIAA, is relatively low. Some slumping of material would likely occur in the cuts created for new access roads, pipelines, well pads, and other project facilities, especially on steep slopes. However, these mass movements would generally be minor in extent and most would not affect any existing structures.

Increased frequency of rock falls could occur as a result of blasting for well pad and access road construction. Areas in canyons with steep slopes where road construction occurs would have the greatest potential for increased rock fall activity. The potential impacts from rock falls include the disruption of traffic routes and destruction of cultural resources. In addition, rock falls that occur in steep canyons could cause safety concerns for workers and the general public.

Debris flows commonly occur in the CIAA. These flows originate in the upper reaches of side canyons and consist of flows of unconsolidated sand, gravel, and boulders that move down the drainage, sometimes cross existing roads.

5.2.2.2 Paleontology

For paleontological resources, the CIAA is the VFO Planning Area. Given the amount of anticipated development, oil and gas activities have the greatest potential to impact fossils in the Basin. Cumulative impacts to paleontological resources would primarily result from activities associated with surface and subsurface disturbance from oil and gas development projects, with additional impacts from recreational use/OHV travel, mining activities, other county and private road construction, and fire management. These activities could have short- and long-term cumulative effects on paleontological resources in the CIAA. Surface-disturbing activities could affect paleontological resources by damaging or destroying fossils. The Proposed Action would disturb an additional 858 acres in the CIAA. This would represent an increase of about 1.7 percent over the estimated total cumulative surface disturbance from past, present, and reasonably foreseeable oil and gas development in the CIAA of 50,587 acres. Alternative C would disturb about 1,117 acres (an increase of 2.2 percent) and the No Action Alternative would disturb about 181 acres (an increase of 0.4 percent). Adverse effects include physical damage to or destruction of fossils, as well as increased vandalism and theft that result from improved access to fossil localities. However, following the procedures for assessment and mitigation described in **Chapter 2** would reduce or remove the potential for most of these adverse impacts. Public education and, where necessary, law enforcement actions would also reduce unauthorized fossil collecting.

Surface-disturbing activities could also have a beneficial effect on paleontological resources by drawing the attention of a qualified paleontologist to areas that are not currently being researched, resulting in the collection of specimens and data that would not otherwise be recovered. Scientifically important fossils could be uncovered in this manner.

5.2.3 AIR QUALITY IMPACTS

Cumulative air quality impacts are defined as the combination of emissions resulting from the Proposed Action, existing nearby permitted sources, and Reasonably Foreseeable Development (RFD) within the region. Areas of concern include the Uinta Basin, the High Uinta Wilderness Area, as well as nearby mandatory federal PSD Class I areas such as Arches and Canyonlands National Parks and Flat Tops Wilderness. Potential Air Quality Related Value (AQRV) impacts to sensitive areas include regional impacts on visibility, total nitrogen and sulfur deposition, and Acid Neutralization Capacity (ANC).

It is anticipated that the pace and level of natural gas development within this region of the State will continue over the next few years. Air quality assessments presented in the technical support document (BLM 2005) for the Vernal Proposed RMP and Final EIS (BLM 2008d) have recently addressed the impacts to air quality in the Uinta Basin and surrounding areas of special concern, considering both existing permitted sources and an extended look at development over a fifteen year timeframe. The development alternatives were based on BLM's proposed plans for resource development, which included estimates for the number of wells drilled for oil and gas, compressor stations, and pipelines, along with other foreseeable development activities by non-BLM entities. In general, results from this analysis indicate that existing air quality in the region is good, and based on Reasonable Development Scenarios in conjunction with existing sources, is not of great concern.

In particular, cumulative well development activities in the Uinta Basin are not expected to affect attainment of NAAQS standards or regional PSD increments. Existing and RFD stationary sources including compressor engines and turbines, while of greater concern, are anticipated to be

adequately spaced to allow for favorable dispersion conditions. A cumulative effects analysis on visibility impairment within nearby Class I and selected Class II areas found that potential changes in visibility and acid deposition were within acceptable guidelines.

The Proposed Action would cumulatively contribute to disturbances occurring immediately adjacent to the Project Area and within the greater Uinta Basin. Several ongoing or recently proposed oil and gas exploration and development projects are underway or proposed within the Uinta Basin. On Tribal lands, these include the Brundage Canyon, Tabby Canyon, and Antelope Creek projects. On public, State, and private lands, these include the Castle Peak and Eight Mile Flat, Greater Deadman Bench, Chapita Wells-Stagecoach, North Chapita, Little Canyon, Sowers Canyon, Bonanza, Love Unit, and West Tavaputs projects.

In general, the increase in emissions associated with the Proposed Action will be localized, in some cases temporary (well development phase), and on a limited scale in comparison with regional emissions. Therefore, it is unlikely that the project would strongly impact the cumulative air quality of the region.

5.2.4 CULTURAL RESOURCES

The CIAA for cultural resources is defined as the boundary of the SCPA. Impacts to the cultural resources in the CIAA would primarily result from activities associated with surface and subsurface disturbance. Surface disturbance from previous oil and gas activities in the CIAA have disturbed approximately 25 acres. While recreational use on the White River is moderate, use of the SCPA for recreation is relatively low. As such, surface disturbance from these activities in the SCPA is rare. Future impacts to the cultural resources in the CIAA would primarily result from surface disturbance associated with additional oil and gas development projects and increased visitation to the SCPA. Additional surface disturbance associated with oil and gas development in the CIAA would occur based upon the alternative selected (Alternative A = 858 acres; Alternative B = 181 acres; Alternative C = 1,117 acres) for this EA. Impacts may also result from specific cultural resource management decisions and from non-surface-disturbing activities that create atmospheric, visual, and/or auditory effects. These latter impacts would apply to sites or locations that together comprise the overall cultural experience for all visitors to the area. These types of impacts cumulatively affect not only the historic setting, feeling, and viewshed of cultural properties, but also their eligibility potential for nomination to the NRHP.

5.2.5 SOILS

The CIAA for soils is defined as the VFO Planning Area. Any surface-disturbing activity that removes native vegetation and topsoil can result in an increase in erosion rates and sediment yield. The Proposed Action would disturb an additional 858 acres of surface soils in the CIAA, an increase of 1.7 percent over the total RFD surface disturbance of 50,587 acres. An additional 181 acres would be disturbed under the No Action Alternative (an increase of 0.4 percent) and 1,117 acres would be disturbed under Alternative C (an increase of 2.2 percent). Additional BLM-authorized actions (other oil and gas developments, mining, livestock grazing, prescribed burns, and recreational activities), and the construction or improvement of county and private roads, that would result in increased erosion and sediment yield within the CIAA, are likely to occur. Of these potential surface-disturbing activities, existing and proposed roads are the features of highest concern. Unlike surface and buried pipelines, active roadways are not reclaimed, thus sediment yield from roads can continue at rates two to three times above background rates into the indefinite future. The Proposed Action would create an additional 36 miles of unpaved roadway in the CIAA. For comparison, the No Action Alternative would create

12 miles of roads and Alternative C would create 50 miles of roads. Using the assumptions provided in **Section 5.1.1**, the CIAA contains an estimated 1,504 miles of access roads for oil and gas facilities, with another 1,306 miles of access roads reasonably foreseeable. Therefore, the Proposed Action and alternatives would increase the total length of unpaved roads associated with oil and gas facilities in the CIAA by about 0.42 to 1.78 percent, depending on the alternative selected. Other unpaved roadways may also be constructed in the CIAA for mining and agricultural use.

Soil loss calculations reveal that under the Proposed Action an estimated 2,488 tons per year of additional erosion could be initially expected to occur. Using the average erosion rate for soils in the Uinta Basin of 1.45 tons/acre/year (BLM 1984), an estimated 7,975,000 tons of erosion occur each year in the 5.5 million acre CIAA. Therefore, the Proposed Action would initially increase gross erosion in the CIAA by about 0.032 percent. Under the No Action Alternative, 525 tons of additional erosion would occur (an increase of 0.0066 percent) and under Alternative C, 3,239 tons of additional erosion is expected (an increase of 0.041 percent). Reasonably foreseeable oil and gas development would add about 28,835 acres of disturbance to the CIAA, using the assumptions provided in **Section 5.1.1**. If it assumed that erosion rates would initially triple on these disturbed surfaces, construction of these projects would potentially increase erosion by about 83,622 tons per year, or an increase of about 1.05 percent over the current erosion rates. Additional increases in erosion rates could also be expected from expanded recreational use, mining activities, livestock grazing, prescribed burns, and construction or improvement of county and private roads.

Rangeland Health Standard 1 states that “upland soils should exhibit permeability and infiltration rates that sustain or improve site productivity, considering the soil type, climate, and landform”. The Proposed Action and alternatives would add to other actions that have a negative impact on the attainment of this standard, due to compaction and blending of soils in some locations. Compaction due to construction activities at the well pads and along access roads would result in a small increase in surface runoff from the area. This slightly increased runoff could in turn cause increased sheet, rill, and gully erosion.

The construction and operation of the wells would incrementally increase the chance that leaks or spills of petroleum products, saline water, hydrofracturing chemicals, fuels, and lubricants would occur within the CIAA. Spills of this nature could increase the loss of soil productivity within the area. Other activities, including recreational OHV use, livestock operations, and mining activities, also add to the cumulative risk of contamination of soils.

5.2.6 WATER RESOURCES

In the CIAA, defined as the VFO Planning Area for water resources, construction of oil and gas facilities has the greatest potential impact on erosion and sedimentation rates. In addition to oil and gas development, recreational activities (OHV use and the development of facilities including campgrounds), mining activities (Gilsonite, sand and gravel, and, potentially oil shale), county and private road construction, agricultural activities (livestock grazing), and prescribed burns also increase natural erosion rates and contribute sediment to the rivers in the CIAA.

The Proposed Action and alternatives would result in a slight increase in erosion rates and sediment yield. If reclamation and mitigation measures are not successful, additional sedimentation and turbidity of surface water, including that in the White River, could persist. The increased erosion, combined with increases associated with other oil and gas development,

recreational activities including OHV use, livestock grazing, and mining, could have cumulative negative impacts on aquatic habitat within affected drainages.

The increased sediment loading to the White River from the Proposed Action would be about 746 tons per year, or about 0.3 percent of the current sediment loading in the river of about 242,360 tons per year at Asphalt Wash. Under Alternative C, the increased annual sediment loading to the White River would be about 972 tons (an increase of 0.4 percent). For the No Action Alternative, the increased annual sediment loading to the White River would be about 158 tons (an increase of 0.06 percent). Additional increases in sediment delivery could also be expected from expanded recreational use, mining activities, livestock grazing, prescribed burns, and construction or improvement of county and private roads.

Soils compacted on existing roads, new access roads, and well pads contribute slightly greater runoff than undisturbed sites. The Proposed Action and alternatives, when combined with other past, present, and reasonably foreseeable oil and gas projects and other surface-disturbing activities in the CIAA, would slightly increase runoff rates and could lead to slightly higher peak flows in the White River, potentially increasing erosion of the channel banks. The increased erosion would increase turbidity in the river during storm events.

Water for the project would be obtained from the White River (Water Right #49-2279) and would be considered a diversion of the White River

The Proposed Action or alternatives, combined with other oil and gas development and increased recreational activities, would slightly increase the chance that accidental spills of fuels, lubricants, and other petroleum products would occur and contaminate surface water within the CIAA. Spills of fuels or produced fluids from well pads, pipelines, and compressor stations also have the potential to contaminate the shallow alluvial groundwater along Project Area drainages and the White River.

Rapid and successful reclamation/re-vegetation of temporarily disturbed areas and installation of sediment control devices are particularly important in minimizing water quality impacts and to assure maintenance of long-term stream health. Mitigation measures included in the Proposed Action and alternatives, including berms, sediment control structures, and proper grading of well pads and access roads, would minimize the erosion of sediment from the proposed project facilities. In addition, mitigation measures applied to the project would minimize the additional sedimentation and the chance for contamination of surface water and groundwater.

The Proposed Action and alternatives could result in a slight increase in sediment yield to floodplains in the CIAA. Under the Proposed Action and alternatives, no well pads would be developed on floodplains. However, the Proposed Action and Alternative C would add 11.7 acres and 15.3 acres of surface disturbance to floodplains in the CIAA, respectively. The potential increased erosion and removal of vegetation in these areas, combined with increases associated with other oil and gas development, recreational activities including OHV use, and livestock grazing, could have cumulative negative impacts on floodplain ecological functioning within the CIAA.

5.2.7 VEGETATION

5.2.7.1 General Vegetation

The CIAA for general vegetation is the VFO Planning Area. Past, present, and reasonably foreseeable oil and gas projects in the CIAA would potentially disturb 50,587 acres of vegetation. In addition to vegetation lost from oil and gas developments, past, present, and reasonably foreseeable forage use by livestock grazing, wild horses, and wildlife, and additional recreational use of habitats, would also affect the productivity, composition, and community structure of vegetation throughout the CIAA. The most common vegetation types to be disturbed would primarily include pinyon-juniper, sagebrush, and mountain shrub. Impacts within the CIAA may include fragmentation of plant communities, competition with noxious weeds, soil compaction, accidental spills of fuels and lubricants, and fugitive dust.

The greatest disturbance to vegetation associated with Alternative A would be 858 acres or 1.7 percent of the cumulative reasonably foreseeable total. There would be 181 acres, or 0.4 percent of the cumulative reasonably foreseeable total, of disturbance to vegetation under Alternative B. Under Alternative C there would be 1,117 acres of disturbance, or 2.2 percent of the cumulative reasonably foreseeable total.

5.2.7.2 Invasive, Non-Native Species

The CIAA for invasive and non-native species is the VFO Planning Area. Past, present, and reasonably foreseeable oil and gas projects in the CIAA would potentially include the construction or upgrade of approximately 10,258 miles of road, and disturbance of approximately 50,587 acres of existing vegetation. As stated in **Section 3.7.1**, roads provide a major conduit for the spread of noxious and invasive weeds into natural areas, especially in areas where soil disturbance occurs. In addition to vegetation lost from oil and gas developments, past, present, and reasonably foreseeable forage use by livestock grazing, wild horses, and wildlife, and additional recreational use of habitats would also potentially increase noxious and invasive weeds throughout the CIAA. Specific negative effects of invasive plants and noxious weeds associated with the proposed development in the CIAA could include 1) reduction in the overall visual character of an area; 2) competition with, or elimination of, native plants; 3) reduction or fragmentation of wildlife habitats; and 4) increased soil erosion.

Under Alternative A, a maximum of 858 acres of surface disturbance would be added to the cumulative total of reasonably foreseeable disturbance in the CIAA. Under Alternative B, a maximum of 181 acres of surface disturbance would be added to the cumulative total of reasonably foreseeable disturbance in the CIAA. Under Alternative C, a maximum of 1,117 acres of surface disturbance would be added to the cumulative total of reasonably foreseeable disturbance in the CIAA.

With the implementation of the ACEPMs and additional protection measures implemented under these alternatives, it is expected that noxious weeds in the Project Area would be controlled, and the spread of noxious weeds would be minimized. Under the No Action Alternative, site-specific mitigation measures for noxious weeds management would be implemented on a well-by-well basis as part of the APD approval process. However, any increase in weeds from the alternatives would incrementally add to past, present, and reasonably foreseeable weed infestations with the CIAA.

5.2.7.3 Wetlands/Riparian Zones

The CIAA for wetlands/riparian zones is the VFO Planning Area; however, riparian/wetland maps in the CIAA have not been finalized by the BLM to the point where acreage calculations of existing wetlands/riparian zones and impacts to those areas can be quantified. As such, cumulative impacts to this resource will not be analyzed quantitatively. In the CIAA, wetlands/riparian zones would most likely be impacted by oil and gas development, recreational activities (OHV use and the development of facilities including campgrounds), county and private road construction, and agricultural activities (livestock grazing).

Wetlands/riparian zones in the Project Area occur along the White River and Evacuation Creek. Under the Proposed Action, the conceptual placement of a well pad does show some disturbance (approximately 1,001 feet) in the wetland/riparian zones in the Project Area. The conceptual placement of well pads, roads, and pipelines under Alternatives B and C also shows some disturbance (approximately 51 feet and 769 feet, respectively) in the wetlands/riparian zones in the Project Area. However, as feasible, surface-disturbing activities would be re-routed away from wetlands/riparian zone during the on-site process. In addition, mitigation measures included in the Proposed Action and alternatives, including sediment control structures and proper grading of well pads and access roads, would minimize impacts to wetlands and riparian zones.

5.2.8 LIVESTOCK GRAZING

The CIAA for livestock grazing is the combined area of all six grazing allotments, which fall within the Project Area. Cumulative impacts from oil and gas development to livestock grazing would include the loss of AUMs during the life of the disturbance. Recreation activities, mining activities, and prescribed burns also contribute to cumulative impacts, but the incremental contribution is not possible to quantify. **Table 5-4** below, displays how the Proposed Action and alternatives would contribute to the past, present, and reasonably foreseeable oil and gas development in the CIAA.

Table 5-4. AUMs Lost in the Livestock Grazing CIAA

Alternative	Allotment Name	Total AUMs in CIAA	AUMs lost from Project Alternative	Past and Present AUMs Lost	Future AUMs Lost	Total Reasonably Foreseeable AUMs Lost in CIAA ¹	Percent of Total AUMs in CIAA
A	Hells Hole	3,999	77	8	6	90	2.3
	Little Emma	3,624	0	99	51	150	4.1
	Southam Canyon	1,315	7	7	10	24	1.8
	Watson	1,258	3	2	3	8	0.6
	White River Bottoms	480	0	0	0	0	0.0
	TOTAL for CIAA	10,676	87	115	69	271	2.5
B	Hells Hole	3,999	6	8	6	19	0.5
	Little Emma	3,624	0	99	51	150	4.1
	Southam Canyon	1,315	<1	7	10	16	1.2
	Watson	1,258	<1	2	3	6	0.4
	White River Bottoms	480	0	0	0	0	0.0
	TOTAL for CIAA	10,676	6	115	69	190	1.8

Alternative	Allotment Name	Total AUMs in CIAA	AUMs lost from Project Alternative	Past and Present AUMs Lost	Future AUMs Lost	Total Reasonably Foreseeable AUMs Lost in CIAA ¹	Percent of Total AUMs in CIAA
C	Hells Hole	3,999	108	8	6	121	3.0
	Little Emma	3,624	0	99	51	150	4.1
	Southam Canyon	1,315	8	7	10	24	1.8
	Watson	1,258	2	2	3	8	0.6
	White River Bottoms	480	0	0	0	0	0.0
	TOTAL for CIAA	10,676	118	115	69	302	2.8

Source for Past, Present and Future well data is UDOGM data. Well status categories are as follows: Past and Present (plugged and abandoned, shut-in, producing, drilling operations suspended, and drilling commenced), and Future (new permit, approved permit). The assumptions discussed in **Section 5.1.1** were applied to number of wells in each category to calculate acreage disturbed (and eventually AUMs lost).

¹ The Reasonably Foreseeable AUMs were calculated by adding the following columns: AUMs lost from Project Alternative, Past and Present AUMs Lost, and Future AUMs lost.

In addition to loss of AUMs, increased roads within the CIAA would cumulatively contribute to difficulties in controlling livestock as more natural barriers to livestock movement are removed, and as more livestock use roads as travel routes. In addition, loss of vegetation and increased traffic and human activity in the CIAA could cumulatively add to livestock displacement in the CIAA. These past, present, and future construction activities, and other visual and noise impacts in the CIAA, could cause livestock to move to adjacent undisturbed areas thereby leading to additional livestock impacts on vegetation in those locations.

5.2.9 WILDLIFE AND FISH SPECIES

For the purposes of this EA, cumulative impact analyses for general wildlife, big game, migratory birds, raptors, upland game birds, and fisheries were analyzed using the CEQ definition of cumulative impacts, so as to meet the intent of NEPA. Refer to **Section 5.2.11** for a discussion of the CEQ definition for cumulative impacts.

The CIAA for general wildlife, big game (mule deer, elk, Rocky Mountain bighorn sheep, and bison), migratory birds, raptors, upland game birds, and fisheries is the VFO Planning Area. This cumulative impact analysis assumes that future surface disturbances in the CIAA would primarily result from oil and gas development. Past and RFD actions in the CIAA from oil and gas development have reduced habitat, contributed to habitat fragmentation, displaced individual wildlife species, resulted in collisions between wildlife and vehicles, and potentially contributed to the poaching of animals. Past and reasonably foreseeable surface disturbance, and thus wildlife habitat loss, from past and future oil and gas activity in the CIAA would be approximately 50,587 acres (refer to **Table 5-2**). Recreational activities, livestock grazing, prescribed burns, and other mining activities (e.g., oil shale development, Gilsonite, and sand and gravel) would also contribute to cumulative impacts, but their incremental contributions are not quantifiable, and therefore are not quantitatively estimated within the scope of this EA.

Surface disturbance calculations are considered a useful indicator of habitat loss because as habitats are removed to support oil and gas development, mining, and other development activities, wildlife carrying capacities of an area would be reduced. While surface disturbance does somewhat correspond to associated wildlife impacts, accurate calculations of cumulative wildlife habitat loss are not determinable because the direct impacts are species-specific and

dependent upon the following: status and condition of the population(s) or individual animals being affected; seasonal timing of the disturbances; value or quality of the project area as well as adjacent habitats; physical parameters of the affected and nearby habitats (e.g., extent of topographical relief and vegetative cover); and type of surface disturbance.

As shown in **Table 5-5** below, road development and surface disturbance associated with the Proposed Action or alternatives, when added to past, present, and other reasonably foreseeable actions, would have minimal impacts on wildlife habitats across the CIAA. In the context of cumulative impact analyses, each acre of vegetation disturbance adds to a cumulative impact by increasing erosion, incrementally adding to overall native vegetation loss, and potentially increasing invasion of invasive and noxious weeds. Ongoing and planned oil and gas activities, and other land uses within the CIAA, would further reduce the amount of available cover, foraging opportunities, and breeding areas for a wide variety of wildlife at various trophic levels. Additional development could displace wildlife or preclude wildlife from using areas of more intensive human activity. Although implementation of the Proposed Action or alternatives, and the resulting long-term disturbance, in combination with other activities in the CIAA may affect individual fish and wildlife species, including big game, migratory birds, raptors, and upland game species, the Proposed Action or alternatives would not likely result in a loss of viability, nor cause a trend to Federal listing of these species.

Table 5-5. Cumulative Impacts of Road Development and Surface Disturbance Associated with the Proposed Action and Alternatives

Alternative	Road Development by Alternative (acres)	Total Road Development of Alternative Added to Past, Present, and Other RFD Activities in the CIAA (acres)	% of Road Development for Past, Present, RFD, and Alternative in the CIAA	Surface Disturbance by Alternative (acres)	Total Surface Disturbance of Alternative Added to Past, Present, and Other RFD Activities in the CIAA (acres)	Percent of Surface Disturbance for Past, Present, RFD, and Alternative in the CIAA
Alternative A (Proposed Action)	218 (36 miles)	10,476	2.1	858	51,445	1.7
Alternative B (No Action)	73 (12 miles)	10,331	0.7	181	50,768	0.4
Alternative C (Vertical Drilling in the Potential Oil Shale Development Area)	305 (50 miles)	10,563	2.9	1,117	51,704	2.2

5.2.10 SPECIAL STATUS FISH AND WILDLIFE SPECIES

The CEQ regulations for implementing NEPA and the ESA define cumulative impacts differently. Specifically, according to Section 1508.7 of CEQ regulations, a cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. This differs from the ESA definition of cumulative impacts whereby cumulative impacts include

the effects of future State, Tribal, local, or private actions (i.e., non-Federal actions) that are reasonably certain to occur in an action area. Under the ESA definition of cumulative impacts, future Federal actions that are unrelated to a Proposed Action or alternative are not considered in a cumulative impact analysis because they require separate consultation pursuant to Section 7 of the Act. For the purposes of this EA, cumulative impact analyses for special status fish and wildlife species were analyzed using the CEQ definition of cumulative impacts, so as to meet the intent of NEPA.

The CIAA for special status species is the VFO Planning Area. This cumulative impact analysis assumes that cumulative impacts to special status species would be similar in nature to those discussed above for wildlife and fisheries. However, given their ongoing habitat losses, sensitivity to disturbances, and declining population numbers, special status species would be expected to be more sensitive to impacts related to development within the CIAA than other, more common wildlife species. Based on these sensitivities, existing and RFD land uses have reduced, and would likely continue to reduce, the quality and quantity of habitats in the CIAA for special status species.

Declines in the abundance or range of many special status species have been attributed to various human activities on Federal, State, and private lands, such as human population expansion and associated infrastructure development; construction and operation of dams along major waterways; water retention, diversion, or dewatering of springs, wetlands, or streams; recreation, including off-road vehicle activity; expansion of agricultural or grazing activities, including alteration or clearing of native habitats for domestic animals or crops; and introductions of non-native plant, wildlife, or fish or other aquatic species, which can alter native habitats or out-compete or prey upon native species. Many of these activities are expected to continue on State and private lands within the range of the various Federally-protected wildlife and fish species, and could contribute to cumulative effects to the species within the CIAA. Species with small population sizes, endemic locations, or slow reproductive rates, or species that primarily occur on non-Federal lands where landholders may not participate in recovery efforts, would be generally be highly susceptible to cumulative effects. On Federal lands, surveys are required in potential or known habitats of threatened, endangered, or otherwise special status species prior to project implementation. These surveys help determine the presence of any special status wildlife species or extent of habitat, and protective measures would generally be taken to avoid or minimize direct disturbance in these critical areas. Therefore, although implementation of the Proposed Action or alternatives, in combination with other activities in the CIAA may affect individual wildlife species, it is not likely to result in a loss of viability, nor cause a trend to Federal listing of these species (i.e., greater sage-grouse, yellow-billed cuckoo, bald eagle, and golden eagle). Similarly, implementation of the Proposed Action or alternatives, in combination with other activities in the CIAA *“may affect, is not likely to adversely affect”* the MSO.

Reasonably foreseeable future activities that may affect affected river-related resources in the CIAA include oil and gas exploration and development, irrigation, urban development, recreational activities, and activities associated with the Upper Colorado River Endangered Fish Recovery Program. Implementation of all or any of these projects has affected and would continue to affect the environment including but not limited to water quality, water rights, socioeconomic, and wildlife resources.

Cumulative effects to these species would include the following types of impacts:

- Changes in land use patterns that would further fragment, modify, or destroy potential spawning sites or designated critical habitat;

- Shoreline recreational activities and encroachment of human development that would remove upland or riparian/wetland vegetation and potentially degrade water quality; and
- Competition with, and predation by, exotic fish species introduced by anglers or other sources.

Water depletions associated with the Proposed Action or alternatives, in combination with depletions from other activities in the CIAA, would reduce the ability of the Upper Colorado River Basin to create and maintain the physical habitat (areas inhabited or potentially habitable to special status fish for use of spawning, development of fish larvae, feeding, or serving as corridors between these areas) and the biological environment for the endangered Colorado River fish. Additionally, implementation of the Proposed Action or alternatives, in combination with other activities in the CIAA, could also degrade USFWS-designated critical habitat for the endangered Colorado River fish by increasing erosion and sediment yield into the White River. However, these impacts would be minimized by implementation of appropriate erosion control measures in and near floodplains. Based on the cumulative impacts listed above, the Proposed Action or alternatives “*may affect, are likely to adversely affect*” the endangered Colorado River fish and their USFWS-designated critical habitat, and would likely have similar detrimental effects on the physical and biological environment for the bluehead sucker, flannelmouth sucker, and roundtail chub.

5.2.11 RECREATION

The CIAA for recreation is the SCPA. The Project Area includes approximately 25 acres of existing surface disturbance from oil and gas activities as well as numerous existing roads. Disturbances from oil and gas development, road development, and livestock activities have reduced the value of the Project Area for recreationists seeking pristine landscapes, but have also increased access to the area. Recreation activities on public lands in the winter months generally include hunting of mule deer and elk. Throughout the remainder of the year, recreational use can best be classified as dispersed and is generally quite low. The impacts from the Proposed Action and alternatives would incrementally and cumulatively add to the impacts to recreational activities in the Project Area.

5.2.12 VISUAL RESOURCES

The CIAA for visual resources is the VFO Planning Area. Past, present and reasonably foreseeable future actions, including mineral extraction activities (i.e., mining and oil and gas exploration and development), OHV use, trail and road development vegetation manipulation, and fire management could impact the quality of the visual landscape. Oil and gas activities are the predominant source of modification to the landscape. Impacts would result from clearing practices that remove vegetation, grading practices which result in the creation of cut and fill slopes, and the placement of permanent and temporary surface facilities (e.g., pipelines, well facilities, and compressor stations) that add an industrial component to the landscape. Implementation of any alternatives would contribute to these cumulative impacts. Impacts would be greatest in areas where the current landscape is natural with little evidence of human activity and in areas used for non-motorized recreational activity. However, all disturbances within VRM II and IV areas would be in conformance with management objectives.

All development proposed within the VFO Planning Area, which includes areas surrounding the White River, must conform to established VRM class objectives through design, camouflage, and/or topographic screening if the leases were issued subsequent to the VFO Approved RMP.

Conformance with VRM objectives would prevent oil and gas facilities from dominating the visual landscape in sensitive VRM Class designations.

5.2.13 LAND USE AUTHORIZATIONS

Implementation of the Proposed Action or Alternative C in combination with other past, present, and reasonably foreseeable oil and gas exploration and development activities could lead to the displacement of other land uses. In particular, wells could be developed within the ROW for the White River Dam. If construction of the dam were to occur, these well pads and associated roads and pipelines would be located in an area that could potentially inundated. However, as previously discussed in **Section 3.15.1**, although the State of Utah has never relinquished the ROW for this water facility, neither the State Of Utah’s Water Plan (Utah Division of Water Resources 2001) or the Uintah Basin’s Water Plan (Utah Division of Water Resources 1999) give any indication that the White River Dam will be constructed in the reasonably foreseeable future.

As discussed in **Section 3.15**, the Project Area includes both an oil shale RD&D area as well as a preferential lease area. The BLM is currently in the process of evaluating the impacts of additional tar sands and oil shale development within a Programmatic EIS. Should more public lands become available for oil shale development, multiple mineral management conflicts such as those disclosed within **Section 4.2** and **4.6** of this document could occur throughout large portions of the VFO Planning Area.

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