



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Rock Springs Field Office
280 Highway 191 North
Rock Springs, Wyoming 82901



ENVIRONMENTAL ASSESSMENT

RUBICON 3D SEISMIC SURVEY

SWEETWATER COUNTY, WYOMING

#WY-040-EA08-195

July 11, 2008

The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long-term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness, and natural, scenic, scientific, and cultural values.

Table of Contents

| | |
|--|-----------|
| 1.0 PURPOSE AND NEED | 1 |
| 1.1 NEED FOR PROPOSED ACTION..... | 1 |
| 1.2 CONFORMANCE WITH LAND USE PLANS..... | 2 |
| 1.3 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS | 2 |
| 1.4 SCOPING..... | 2 |
| 1.5 ISSUES | 3 |
| | |
| 2.0 PROPOSED ACTION AND ALTERNATIVES | 9 |
| 2.1 BACKGROUND ON SEISMIC EXPLORATION..... | 9 |
| 2.2 PROPOSED ACTION | 10 |
| 2.2.1 Management Objectives | 11 |
| 2.2.2 Project Operations | 13 |
| 2.2.3 Applicant-Committed Environmental Protection Measures | 22 |
| 2.3 NO ACTION ALTERNATIVE..... | 27 |
| | |
| 3.0 AFFECTED ENVIRONMENT | 29 |
| 3.1 INTRODUCTION..... | 29 |
| 3.2 CLIMATE AND AIR QUALITY | 29 |
| 3.2.1 Climate | 29 |
| 3.2.2 Air Quality..... | 29 |
| 3.3 GEOLOGY AND MINERAL RESOURCES..... | 33 |
| 3.3.1 Regional Geology..... | 33 |
| 3.3.2 Mineral Resources | 34 |
| 3.3.3 Geologic Hazards | 36 |
| 3.4 SOIL RESOURCES..... | 36 |
| 3.4.1 Erosion Potential | 36 |
| 3.5 WATER RESOURCES | 37 |
| 3.5.1 Surface Water | 37 |
| 3.5.2 Groundwater | 40 |
| 3.5.3. Floodplains | 43 |
| 3.6 VEGETATION..... | 43 |
| 3.6.1 Vegetation Communities | 43 |
| 3.7 WETLANDS AND RIPARIAN AREAS..... | 44 |
| 3.7.1 Wetlands..... | 44 |
| 3.7.2 Riparian Areas | 44 |
| 3.8 INVASIVE NONNATIVE PLANT SPECIES..... | 44 |
| 3.9 SPECIAL STATUS SPECIES | 45 |
| 3.9.1 Federally Listed Species..... | 47 |
| 3.9.2 BLM Sensitive Species..... | 48 |

| | |
|--|-----------|
| 3.10 WILDLIFE AND FISHERIES | 51 |
| 3.10.1 Big Game Species..... | 51 |
| 3.10.2 Upland Game Birds | 53 |
| 3.10.3 Migratory Birds | 53 |
| 3.10.4 Fisheries..... | 54 |
| 3.11 CULTURAL RESOURCES AND NATIVE AMERICAN RELIGIOUS CONCERNS | 55 |
| 3.11.1 Cultural Resources..... | 55 |
| 3.11.2 Native American Religious Concerns | 58 |
| 3.12 PALEONTOLOGY..... | 58 |
| 3.1 RECREATION..... | 58 |
| 3.13.1 Dispersed Recreation..... | 58 |
| 3.13.2 Hunting..... | 60 |
| 3.13.3 Off-Highway Vehicle (OHV) Management..... | 61 |
| 3.14 VISUAL RESOURCES | 62 |
| 3.15 SOCIOECONOMICS..... | 63 |
| 3.15.1 Local Economy and Employment | 63 |
| 3.15.2 Hunting and Recreation..... | 63 |
| 3.16 AREAS OF SPECIAL DESIGNATION | 64 |
| 3.16.1 Greater Red Creek Area of Critical Environmental Concern (ACEC) | 64 |
| 3.16.2 Sugarloaf Basin Management Area..... | 65 |
| 3.16.3 Wilderness Resource Management and Wilderness Study Areas | 66 |
| 3.17 ACCESS AND TRANSPORTATION..... | 67 |
| 3.18 RANGE RESOURCES | 67 |
| 3.18.1 Sugarloaf Allotment | 67 |
| 3.18.2 Spring Creek Allotment..... | 68 |
| 3.18.3 Red Creek Allotment..... | 69 |
| 3.19 FIRE MANAGEMENT | 69 |
| 3.19.1 Fire Regulatory and Management Direction | 69 |
| 3.19.2 Fire Environment..... | 70 |
| 3.20 WASTES, HAZARDOUS AND SOLID..... | 71 |
| 3.21 NOISE | 72 |
| 3.22 REALTY AND LAND USE | 74 |
| | |
| 4.0 ENVIRONMENTAL CONSEQUENCES..... | 75 |
| 4.1 INTRODUCTION..... | 75 |
| 4.2 AIR QUALITY AND CLIMATE | 76 |
| 4.2.1 Proposed Action | 76 |
| 4.2.2 No Action | 76 |
| 4.2.3 Additional Mitigation | 76 |
| 4.3 GEOLOGY AND MINERAL RESOURCES..... | 76 |
| 4.3.1 Proposed Action | 76 |
| 4.3.2 No Action Alternative | 77 |
| 4.3.3 Additional Mitigation..... | 77 |

| | |
|---|-----------|
| 4.4 SOILS | 78 |
| 4.4.1 Proposed Action | 78 |
| 4.4.2 No Action Alternative | 79 |
| 4.4.3 Additional Mitigation | 79 |
| 4.5 WATER RESOURCES | 79 |
| 4.5.1 Proposed Action | 79 |
| 4.5.2 No Action Alternative | 80 |
| 4.5.3 Additional Mitigation | 81 |
| 4.6 VEGETATION..... | 81 |
| 4.6.1 Proposed Action | 81 |
| 4.6.2 No Action Alternative | 82 |
| 4.6.3 Additional Mitigation | 82 |
| 4.7 WETLANDS AND RIPARIAN AREAS..... | 82 |
| 4.7.1 Proposed Action | 82 |
| 4.7.2 No Action Alternative | 82 |
| 4.7.3 Additional Mitigation | 83 |
| 4.8 INVASIVE NONNATIVE PLANT SPECIES..... | 83 |
| 4.8.1 Proposed Action | 83 |
| 4.8.2 No Action Alternative | 83 |
| 4.8.3 Additional Mitigation | 84 |
| 4.9 SPECIAL STATUS SPECIES | 84 |
| 4.9.1 Proposed Action | 84 |
| 4.9.2 No Action Alternative | 89 |
| 4.9.3 Additional Mitigation | 89 |
| 4.10 WILDLIFE AND FISHERIES | 89 |
| 4.10.1 Proposed Action | 89 |
| 4.10.2 No Action Alternative | 92 |
| 4.10.3 Additional Mitigation | 92 |
| 4.11 CULTURAL RESOURCES AND NATIVE AMERICAN RELIGIOUS CONCERNS | 93 |
| 4.11.1 Proposed Action | 93 |
| 4.11.2 No Action Alternative | 94 |
| 4.11.3 Additional Mitigation | 94 |
| 4.12 PALEONTOLOGY..... | 95 |
| 4.12.1 Proposed Action | 95 |
| 4.12.2 No Action Alternative | 95 |
| 4.12.3 Additional Mitigation | 95 |
| 4.13 RECREATION..... | 95 |
| 4.13.1 Proposed Action | 95 |
| 4.13.2 No Action Alternative | 97 |
| 4.13.3 Additional Mitigation | 97 |
| 4.14 VISUAL RESOURCES | 98 |
| 4.14.1 Proposed Action | 98 |
| 4.14.2 No Action Alternative | 98 |
| 4.14.3 Additional Mitigation | 98 |

| | |
|---|------------|
| 4.15 SOCIOECONOMICS | 99 |
| 4.15.1 Proposed Action | 99 |
| 4.15.2 No Action Alternative | 100 |
| 4.15.3 Additional Mitigation | 101 |
| 4.16 AREAS OF SPECIAL DESIGNATION | 101 |
| 4.16.1 Proposed Action | 101 |
| 4.16.1.3 Wilderness Resource Management and Wilderness Study Areas..... | 102 |
| 4.16.2 No Action Alternative | 102 |
| 4.16.3 Additional Mitigation | 102 |
| 4.17 TRANSPORTATION AND ACCESS | 102 |
| 4.17.1 Proposed Project..... | 102 |
| 4.17.2 No Action Alternative | 104 |
| 4.17.3 Additional Mitigation | 104 |
| 4.18 RANGE RESOURCES | 104 |
| 4.18.1 Proposed Action | 104 |
| 4.18.2 No Action Alternative | 104 |
| 4.18.3 Additional Mitigation | 104 |
| 4.19 FIRE AND FIRE MANAGEMENT | 105 |
| 4.19.1 Proposed Action | 105 |
| 4.19.2 No Action Alternative | 105 |
| 4.19.3 Additional Mitigation | 105 |
| 4.20 WASTES, HAZARDOUS AND SOLID | 105 |
| 4.20.1 Proposed Action | 105 |
| 4.20.2 No Action Alternative | 106 |
| 4.20.3 Additional Mitigation | 106 |
| 4.21 NOISE | 106 |
| 4.21.1 Proposed Action | 106 |
| 4.21.2 No Action Alternative | 108 |
| 4.21.3 Additional Mitigation | 108 |
| 4.22 REALTY AND LAND USE | 109 |
| 4.22.1 Proposed Action | 109 |
| 4.22.2 No Action Alternative | 109 |
| 4.22.3 Additional Mitigation | 109 |
| | |
| 5.0 CUMULATIVE EFFECTS | 111 |
| | |
| 6.0 CONSULTATION AND COMMUNICATION | 115 |
| 5.1 PUBLIC PARTICIPATION | 115 |
| 5.2 PREPARERS AND REVIEWERS OF THE EA | 115 |
| | |
| 7.0 REFERENCES | 117 |
| | |
| 8.0 ACRONYMS | 125 |

LIST OF TABLES

| | |
|--|-----|
| Table 2-1. Project Area Surface Ownership | 10 |
| Table 2-2. Land Use Buffers for the Sugarloaf Basin SMA (BLM 1997) | 12 |
| Table 2-3. Overview of the Rubicon 3D Seismic Survey Project Operations..... | 13 |
| Table 2-4. Layout Parameters and Estimated Potential Disturbance for the Rubicon 3D Seismic Survey Project..... | 15 |
| Table 2-5. Shot hole setback distances for sensitive resources. ¹ | 18 |
| Table 3-1. National and Wyoming Ambient Air Quality Standards | 31 |
| Table 3-2. Streams in the Proposed Rubicon Seismic Survey Project Area..... | 38 |
| Table 3-3. Groundwater Quality Summary | 41 |
| Table 3-4. Invasive Non-Native Plant Species Potentially Occurring in the Proposed Rubicon 3D Seismic Survey Project Area. | 45 |
| Table 3-5. Federally Listed and BLM Listed Sensitive Animal and Plant Species Potentially Occurring in the Proposed Rubicon 3D Seismic Survey Project Area. | 45 |
| Table 3-6. 2006 Harvest for Elk and Mule Deer in the Vicinity of the Proposed Seismic Exploration Area. | 60 |
| Table 3-7. 2008 Upland Game Bird Hunting Seasons by Species | 61 |
| Table 3-8. BLM Visual Resource Management (VRM Objectives) | 62 |
| Table 3-9. Typical Sound Levels of Common Noise Sources..... | 73 |
| Table 5-1. List of Preparers of this EA | 115 |
| Table 5-2. List of BLM Reviewers | 116 |

LIST OF FIGURES AND MAPS

| | |
|---|------------|
| Figure 2-3 Proposed Action | Map pocket |
| Figure 2-4. Typical helicopter portable drill rig | 17 |
| Figure 2-5. Typical shot hole cross-section. | 18 |

APPENDICES

APPENDIX A: ADDITIONAL FIGURES

Figure 2-1. General Vicinity Map

Figure 2-2. Surface Ownership and Transportation/Access Roads Map

Figure 3-1. Water Resources Map

Figure 3-2. Wyoming GAP Analysis Data Map

Figure 3-3. Pygmy Rabbit Suitable Habitat Map

Figure 3-4. Midget Faded Rattlesnake Suitable Habitat Map

Figure 3-5. South Rock Springs Pronghorn Herd Unit #142, Hunt Area, and Range Designation Map

Figure 3-6. South Rock Springs Elk Herd Unit #424, Hunt Areas, and Range Designation Map

Figure 3-7. South Rock Springs Mule Deer Herd: Unit #424, Hunt Area, and Range Designation Map

Figure 3-8. BLM Areas of Special Designations Map

Figure 3-9. Grazing Allotment Map

Figure 4-1. Cumulative Effects Analysis Area Map

APPENDIX B: SCOPING NOTICE

APPENDIX C: RMP MANAGEMENT OBJECTIVES

APPENDIX D: CONDITIONS OF APPROVAL

APPENDIX E: RESPONSE TO COMMENTS

1.0 PURPOSE AND NEED

This Environmental Assessment (EA) for the Rubicon 3D Seismic Survey (Rubicon) has been prepared in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. The EA complies with the Bureau of Land Management (BLM) Record of Decision and Green River Resource Management Plan (RMP) (BLM 1997), and the additional documents associated with the RMP. Prior to authorizing seismic operations on BLM-administered lands, the environmental and social effects of those actions must be evaluated on all federal and nonfederal lands within the potentially affected areas. The purpose of this EA is to disclose the direct, indirect, and cumulative effects of the Proposed Action and No Action Alternative. The findings in this EA would be used to determine whether the impacts from the Proposed Action are significant and whether an Environmental Impact Statement (EIS) would be required. If impacts are not significant, as defined in 40 Code of Federal Regulations (CFR) § 1508.27, a Decision Record (DR) and Finding of No Significant Impact (FONSI) would be prepared. The DR and FONSI along with the final EA are available to the public, and a Notice of Availability (NOA) is also published in the Rock Springs newspaper (Daily Rocket Miner) and Green River newspaper (Green River Star). For this EA, the responsible official is:

Lance Porter, Field Manager
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Rock Springs Field Office
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1.1 NEED FOR PROPOSED ACTION

Exploration and development of federal mineral resources by private entities is an integral part of the Federal Government's national energy policy through the *National Energy Policy Act of 2005*, which implements policy for "dependable, affordable, and environmentally sound production and distribution of energy." . BLM is authorized to lease the federal lands for oil and gas development under the authority of the *Mineral Leasing Act of 1920* (MLA), as amended; the *Mining and Minerals Policy Act of 1970* (MMPA); the *Federal Land Policy and Management Act of 1976* (FLPMA); the *National Materials and Minerals Policy, Research and Development Act of 1980* (NMMPRDA); and the *Federal Onshore Oil and Gas Leasing Reform Act of 1987* (FOOGLRA). The BLM is authorized to approve geophysical surveys on BLM-administered public lands pursuant to the MLA, as amended, and the Code of Federal Regulations 43 CFR Part 3150. Other relevant guidance includes the BLM Handbook H-3150 (Rel. 3-289 6/7/94).

The **purpose** of the Rubicon 3D Seismic EA (Proposed Project) is to authorize Devon Energy Production Company, L.P. (Devon) to conduct a 3D seismic survey in the proposed Project Area to determine the potential presence of oil and gas in the underlying stratigraphic and structurally

complex subsurface strata. Geophysical exploration utilizing 3D seismic techniques is capable of locating subsurface reservoirs which potentially contain hydrocarbons. The project **need** is because Devon has filed a *Notice of Intent (NOI) to Conduct Oil and Gas Geophysical Exploration Operations* on federal lands managed by the BLM. Through submission of the NOI, Devon requested authorization to conduct seismic exploration operations on federal lands.

1.2 CONFORMANCE WITH LAND USE PLANS

The Rock Springs Field Office (RSFO), as required by 43 CFR 1610.5, has determined that the Proposed Project conforms to the decisions, guidelines, and terms and conditions in the Record of Decision of the Green River Resource Management Plan (BLM 1997). In addition, the RSFO has determined that the geophysical oil and gas exploration under the Proposed Project meets the management conditions of the Sugarloaf Basin Special Management Area (SMA) given the required restrictions and stipulations in the RMP.

1.3 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS

The BLM, as mandated by NEPA and the Council for Environmental Quality (CEQ) regulations, analyzes actions involving federal lands to determine their impact on the human environment (40 CFR §§ 1500-1508). Prior to issuing a decision on the Proposed Action, the BLM must comply with NEPA, which requires federal agencies to use a systematic, interdisciplinary approach in planning and decision making. NEPA also directs that an environmental analysis of proposed federal actions must be completed to determine the potential effects of the federal action on the human environment. The analysis is to determine whether approval of the Proposed Action would cause “significant” impacts to the human environment.

Authority for conducting geophysical surveys on BLM-administered public lands is contained in the Mineral Leasing Act (MLA) of February 25, 1920, as amended, and the Code of Federal Regulations 43 CFR Part 3150. Other relevant guidance includes the BLM Handbook H-3150 (Rel. 3-289 6/7/94 BLM 2008).

The Proposed Project has been evaluated in accordance with requirements of *Onshore Oil and Gas Operations* (43 CFR Part 3160), *Onshore Oil and Gas Order Nos. 1 through 7* (43 CFR § 3164), NEPA and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR §§ 1500-1508), and the *BLM Handbook H-1790* (Rel. 1-1710 01/30/2008).

1.4 SCOPING

The RSFO published a notice of intent to prepare the Rubicon 3D seismic EA and a scoping notice (Appendix B), with a 30-day scoping period that began on May 12, 2008, and ended on June 10, 2008. The Notice of Intent (NOI) required by 43 CFR Subpart 3151 is the regulatory procedure that allows for geophysical surveys on federal lands.

There was a high level of interest in the Proposed Project. During the comment period a total of 18 letters were received, which included a total of 296 individual comments. The comments covered a wide range of issues and concerns. Many of the comments expressed concerns about potential impacts from the seismic operations to wildlife and recreation.

1.5 ISSUES

Public scoping is an important component of NEPA and is used to identify the key issues related to the Proposed Action. It also serves to establish the level and scope of the analysis to comply with NEPA and the Council of Environmental Quality (CEQ) regulations.

Representatives from State and Federal agencies and the public were encouraged to participate in the scoping process to help identify the analysis needed for the proposed Rubicon 3D Seismic Survey, alternatives to the Proposed Action, mitigation measures, conditions of approval, and any other suggestions to ensure the completeness of the analysis process.

Comments to the proposed Rubicon 3D seismic project were made by state and federal agencies, environmental organizations, and other interested parties. The commenters included the Rock Springs Grazing Association, Wyoming Office of State Lands and Investments, Natural Resource Conservation Service, Wyoming Game and Fish Department, Office of the Governor of the State of Wyoming, Oregon-California Trails Association, Trout Unlimited, Wyoming Wildlife Federation, U.S. Fish and Wildlife Service, Wyoming Department of Transportation, Wyoming Outdoor Council, and numerous private citizens concerned about impacts to hunting and other recreation activities. A summary of the comments and responses prepared by the BLM are provided in Appendix C. The key issues raised in the comments are provided below.

Issue 1 – Big Game Hunting and Fishing

Numerous concerns were raised by the public regarding the impacts from the proposed seismic survey to big game hunting. Impacts from helicopters were noted as of particular concern. Game hunting is a major recreational activity in this part of Wyoming for both residents and out-of-state visitors. Hunting in the Little Mountain area, one of Wyoming's premier hunting areas for elk and mule deer, is a once-in-a-lifetime event. The area is known to contain some of the finest trophy bull elk and buck deer in the State of Wyoming. Many responders felt that conducting seismic surveys during the hunting season would ruin the recreational opportunity that numerous individuals had paid thousands of dollars in order to participate in. In addition, the State would lose millions of dollars lost revenue. Several commenters suggested that the seismic operations be shut down before the beginning of the 2008 hunting season in September.

Fishing is another major recreational activity in the State of Wyoming. Concerns were raised that the ground disturbance from seismic operations would contribute to the degradation of the

\$10 million sport fishery in the Flaming Gorge Reservoir through increased sediment and phosphorus loading into the reservoir.

Issue 2 – Water Resources

The area of the proposed seismic project is an important aquifer recharge area, which plays a significant role in the unique trout fisheries and aquatic diversity that is found in the area. In addition, the area contains numerous springs and seeps, as well as ephemeral streams that feed into the nearby creeks that support an important fishery. Several commenters expressed concern that the proposed seismic operations would adversely affect the seeps and springs in the area, and reduce the water quality. Concern was also expressed that a 1,320-foot buffer around springs would not provide adequate protection to springs and seeps. Concerns were also expressed about the need to protect riparian areas and area streams.

Issue 3 – Wildlife and Special Status Species

Numerous concerns were raised about the wildlife species that inhabit the area of the proposed seismic operations. Many wildlife species breed in the area, use the area as crucial winter habitat, and forage in the area in the summer. Some of the wildlife issues raised are summarized below.

Species of Greatest Conservation Need

The area is suitable habitat for numerous wildlife species identified in Wyoming's Comprehensive Wildlife Conservation Strategy as species of greatest conservation need, as shown by more than \$2.1 million in contributions for ecosystem restoration projects in the Little Mountain area since 1990. The Colorado River cutthroat trout is one of the species that has been identified as a species of "greatest conservation need."

Midget Faded Rattlesnake

Suitable habitat of the midget faded rattlesnake, a BLM sensitive species, is present in the Project Area. Due to the reduction in population numbers of this species, it is being considered for listing as threatened under the Endangered Species Act. The midget faded rattlesnake occupies dens in rocky outcrops in the area. Several people expressed concern that the seismic operations could result in collapse of midget faded rattlesnake dens and result in a further reduction in population numbers.

Other Special Status Species

The pygmy rabbit and greater sage-grouse occur in this area. These species are also being considered for listing under the Endangered Species Act. Mitigation measures need to be implemented to protect these and other wildlife species.

The Ute ladies'-tresses, endangered Colorado River Fish, and the black footed ferret may be present in Sweetwater County and should be analyzed in the EA.

Big Game

Much of the Rubicon seismic survey area is in an important elk parturition area. This area is used by the elk to give birth and nurse the young. Disturbance to the area could potentially adversely affect the elk reproductive success. There is critical winter range for the mule deer and elk in the proposed Project Area. Commenters expressed concern that the critical winter ranges and other year round ranges would be negatively impacted by the seismic project. Commenters also expressed concern about the disturbance that helicopters and seismic shots will have on big game health.

Issue 4 – Little Mountain Area

The Little Mountain area is viewed by many commenters as a unique habitat. A portion of the Little Mountain area is located in the eastern part of seismic survey area. It is an area rich in terrestrial and aquatic species, which several commenters felt would be impacted by the proposed seismic survey. The Little Mountain area also serves as a rare depository for alpine ecosystems, which should not be disturbed. Little Mountain is the headwaters to numerous area streams, some containing Colorado Cutthroat Trout. The area is also the source of groundwater that feeds the springs and seeps that are used for livestock and wildlife. Since the Project Area is in a groundwater recharge area, there was a high level of concern that detonation of charges could fracture surface water and groundwater resources.

The Little Mountain area is also one of the most popular elk hunting areas in Wyoming for both resident and non-resident hunters.

Issue 5 – Location of Staging Areas

The location of some of the staging areas near drainages and springs was identified by commenters as a major issue, as they could lead to unacceptable impacts to nearby streams, seeps, springs and riparian areas. It was recommended that alternate staging areas be used that would not impact these important water resources and wildlife habitat.

Issue 6 – Conformance with the Green River RMP

Numerous commenters felt that the proposed Rubicon 3D seismic survey project was not in conformance with the management objectives in the BLM's Green River Resource Management Plan (BLM 1997). Specific examples of the belief that the project was not in accordance with the RMP are listed below.

- There is no indication from the scoping notice that appropriate mitigation for the Sugarloaf Special Management Area in conformance with the RMP will be implemented.

- The Sugarloaf Basin SMA is a rights-of-way avoidance area. Seismic activity within the Sugarloaf Basin SMA violates the RMP.
- The Current Creek Watershed should be closed to seismic activities to conform to the RMP.
- The BLM should honor the commitments it made in the Green River RMP.
- By allowing oil and gas development and seismic operations, the BLM is not in accordance with the commitments made in the RMP.
- The greater sage-grouse is a sensitive species imperiled across its range. By allowing the seismic survey to occur in its habitat, the BLM would fail to follow the management objectives in the RMP of maintaining and improving sage-grouse habitat.
- The BLM must comply with the decisions in the Green River RMP as it related to the Sugarloaf Special Management Area and Currant Creek ACEC.

Issue 7 – Areas of Special Designation (ACECs, Special Management Areas)

The proposed seismic survey area is located within the Currant Creek portion of the Greater Red Creek ACEC and the Sugarloaf Basin Special Management Area. Several commenters stated that seismic surveys should not be allowed within the Currant Creek ACEC. The Sugarloaf Basin SMA is supposed to be managed to maintain and protect important wildlife habitat. If the seismic survey is allowed to proceed, the management objectives of the RMP will not be met.

Issue 8 – Noise from Helicopters, Shot-hole Drilling and Detonation of Charges

Noise from the helicopters, shot hole drilling and detonation of charges was identified as a major issue resulting in impacts to wildlife and recreational activities, especially hunting, which would occur while the proposed seismic operations were still underway.

Noise from helicopters will displace elk, mule deer, and pronghorn from the area and have a major impact on the hunting season. The hunters, which have only a 4% chance of securing a license to hunt in this area, will be outraged.

According to one commenter, the sound waves from detonation of charges have been shown to result in a decrease in catch rate of fish species. They could also result in interference with spawning behavior.

Issue 9 – Road Use

The scoping notice stated that the seismic survey would be confined to existing roads and two-track roads. However, concern was expressed that any vehicular traffic off roads would result in creation of an “established road,” which would be continued to be used and result in degradation of wildlife habitat. Any ruts that are caused by Devon’s use of the roads should be required to be

repaired by the company. Some commenters expressed concern that use of the area roads and two-tracks could lead to resource damage such as stream degradation at road crossings.

The Sugarloaf Basin SMA and Currant Creek ACEC are in rights-of-way avoidance areas. In addition, vehicle traffic should not be allowed on Currant Creek Ridge, the hydrographic divide between Marsh Creek and Currant Creek.

Issue 10 – Soil Erosion and Air Quality

Concern was expressed that the placement of shot holes could contribute to soil erosion impacts, including high sediment loads in area streams. Commenters also expressed concern that use of trucks, helicopters, and vegetation removal would increase erosion and result in increased dust into the air.

Issue 11 – Cumulative Impacts

Some commenters wanted to ensure that cumulative impacts would be discussed in the EA. The BLM must also consider the impacts of the nearby proposed Hiawatha field in the cumulative impacts analysis.

Issue 12 – Compliance with Environmental Statutes

Some commenters expressed concern that the proposed Rubicon 3D seismic survey project was not in compliance with Federal and State statutes and regulations and cited statutes and regulations that the BLM was required to follow. They include the following.

- The Federal Land Policy and Management Act (FLPMA) require the BLM to protect the natural environment and prevent “undue degradation of public lands.”
- The Mineral Leasing Act gives the BLM the authority to impose conditions to leases.
- Under NEPA, the primary purpose of an EA is to determine whether an EIS is required. Given that the Sugarloaf Basin SMA and Currant Creek ACEC overlap the Rubicon Project Area; there is an increased likelihood that significant impacts would result from the proposed action.
- In accordance with the CEQ regulations, a “reasonable range of alternatives” must be analyzed.
- The BLM must abide by the multiple use and sustained yield standard addressed in FLPMA.
- The BLM must comply with the Clean Water Act and Water Quality Issues.
- BLM must comply with laws protecting cultural and historic resources, including the National Historic Preservation Act, Archaeological Resources Protection Act and Native American Graves Protection and Repatriation Act.

- The BLM must comply with Executive Order 11990, minimizing destruction, loss of, or degradation of wetlands, and Executive Order 11998, which requires avoidance of impacts to floodplains.
- The BLM must comply with E.O. 13112, which requires control of invasive and noxious weeds.
- The BLM must consult with Native American Tribes as part of the Rubicon Environmental Review process.

Issue 13 - Full Field Development

A number of commenters brought up the potential for impacts if there is full field development in the area. There was concern that full field development may result in significant impacts to wildlife resources and be in conflict with existing land use plans. Many argued that a full EIS and comprehensive NEPA evaluation was needed at this time prior to any project implementation.

Issue 14 – Invasive Species

Some commenters expressed concern about the invasive weeds moving in as a result of the project. They ask that the BLM ensure compliance with established requirements and procedures to adhere to invasive species prevention and control. Notes that cheatgrass is well established throughout the proposed Project Area, and that it is detrimental to wildlife and other resources.

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and No Action Alternative that are analyzed as part of the Rubicon 3D Seismic EA.

2.1 BACKGROUND ON SEISMIC EXPLORATION

Seismic surveys are used to map the subsurface structure of rock formations. Seismic technology is used by geologists and geophysicists who interpret the data to map structural traps that could potentially contain hydrocarbons. Seismic exploration is the primary method of exploring for hydrocarbon deposits. Although the technology of exploration activities has improved substantially in the past 20 years, the basic principles for acquiring seismic data have remained the same (Wikipedia 2008).

The general principle of seismic surveys is to send sound energy waves into the Earth, where the different layers within the Earth's crust reflect back this energy. These reflected energy waves are recorded over a predetermined time period (called the record length) by using geophones. The reflected signals are transferred to a storage medium, which is usually magnetic tape. Once the data are recorded, they are processed using specialized software which will result in a series of seismic profiles. These profiles or data sets are then interpreted for possible hydrocarbon reserves (Wikipedia 2008).

The seismic crew consists of surveyors, layout and loading crew, shooters and recorders and the pick-up crew. The shot and receiver points on the source and receiver lines are initially determined using mobile GPS stations. A survey crew then stakes out the source and receiver lines and gives each receiver line and each receiver point a number. Once the shot and receiver points have been surveyed in and shot holes have been drilled to the appropriate depth, loaders put explosive charges into the shot holes on the source lines. The receiver stations are laid out with geophones along the receiver lines. When corresponding shot and receiver lines are ready, the shooters prepare a single shot hole for firing, while the recording shack or vehicle is hooked up to the geophone spread laid on the corresponding receiver line to record the data. Once a charge is ready to be shot, the recording shack initiates the shot hole firing sequence via a radio link and records the seismic data from the whole geophone spread onto magnetic medium. When the shot is completed, the shooters move to the next shot hole and the shoot / record sequence begins again. Seismic surveying requires deployment of the hundreds to thousands of geophones necessary to record the data. Most surveys today are conducted by laying out a two-dimensional array of geophones together with a two-dimensional pattern of source points. This allows the interpreter to create a three-dimensional image of the geological structure beneath the array (Wikipedia 2008).

2.2 PROPOSED ACTION

Devon Energy Production Company LP (Devon) notified the Bureau of Land Management (BLM) Rock Springs Field Office (RSFO) that it plans to conduct a 3D seismic survey in Township 13N, Range 106W; Township 12N Range 106W; Township 13N, Range 107W; and Township 14N, Range 106W; in Sweetwater County, Wyoming (Appendix A Figure 2-1). The boundary of the proposed survey area encompasses 41.82 square miles, of which 37.22 square miles is BLM-administered land (89 percent), 4.09 square miles is State land (9.8 percent), and 0.51 acres is private land (1.2 percent) (Table 2-1; Appendix A, Figure 2-2.). Permits needed to carry out seismic operations on state and private lands would be acquired before the proposed project begins. Total surface disturbance is approximately 147.3 acres (see Section 2.2.2 for project details and Table 2-4). The surface disturbance is temporary in nature, with majority of the disturbance limited to minor soil compaction and vegetation trampling.

Table 2-1. Project Area Surface Ownership

| Surface Ownership | Sq Miles | Acres | Percentage of Program |
|---------------------------|----------|-----------|-----------------------|
| Bureau of Land Management | 37.22 | 23,821.06 | 89.01% |
| Private | 0.51 | 323.69 | 1.21% |
| State | 4.09 | 2617.78 | 9.78% |
| Total | 41.82 | 26,762.53 | 100.00% |

In order to reduce potential environmental impacts, the seismic survey will be conducted using only heli-portable drilling and recording techniques. No vibroseis vehicles would be used (a vehicle mounted with a ground device which can be used to provide the seismic source). Light trucks would be used, where necessary, to transport personnel and equipment to various sites, but would only utilize access routes for which a cultural survey has been conducted (Kail, 2008) and which are approved by BLM (Appendix A, Figure 2-2). In addition, all terrain vehicles (ATVs), or other similar mechanized vehicles may transport personnel and equipment on the BLM-approved routes, which include existing two-track and improved roads. No mechanized vehicles would be operated during periods of saturated soil conditions, when surface ruts greater than 4 inches would occur. Field operations would be conducted from one of the proposed staging areas located in Township 13N, Range 106W, Section 20 (See Figure 2-3 in Figure pocket at the end of this EA). A back-up staging area has been designated in an existing gravel storage area, and is located in Township 13N, Range 105W, Section 31.

Activities at the staging area would include offloading or loading of equipment from tractor trailer units, transfer of equipment to and from light trucks and helicopter(s), temporary storage of equipment, battery charging from several light trailers, minor equipment repairs, and logistical

coordination. The staging area would also be used to store fuel, lubricants, explosives, and other necessary supplies (in BLM-approved storage facilities). In addition, the staging area can be used as a muster point, should it be necessary to implement the Devon Emergency Response Plan. The proposed and backup staging areas are identified on the map in a pocket at the end of this EA. Based on current planning, the seismic survey would begin in the southwest corner of the proposed Project Area and follow the seismic line running in a north-easterly direction. The survey would progress towards the east of the Project Area.

The Rubicon 3D seismic survey would begin sometime during mid-July 2008, following a Finding of No Significant Impact (FONSI) and Decision Record signed by the BLM Field Manager. The project would continue until August 31, 2008, the date that Devon has agreed to discontinue helicopter operations to prevent disturbance to large game species prior to the beginning of the bow hunting season. The portion of the seismic survey that has not been completed by August 31, 2008, could be reinitiated in Spring 2009. The BLM would consult with the Wyoming Game and Fish Department (WGFD) should Devon request an exemption to wildlife stipulations in effect until July 31, 2009.

Devon and its contractors would comply with all Federal, State, and local laws, and regulations. As required by the NEPA, Devon and the RSFO will agree upon Applicant-Committed Environmental Protection Measures and Conditions of Approval for the proposed project.

2.2.1 Management Objectives

Federal lands within the Project area are administered by the BLM under the Green River RMP. State of Wyoming and private lands are not managed under the RMP. However, analysis of the environmental impacts to these lands, are included in this EA. Regulations governing State and private lands are under the Wyoming Oil and Gas Conservation Commission (WOGCC) and other local, state, and federal regulations.

According to the RMP, the Project Area is open to consideration of geophysical activities, except where off-road vehicle use or explosive charges would cause unacceptable impacts. The objective for seismic surveys is to provide opportunity for collection of geophysical data, while protecting natural resource values. Geophysical activities are required to conform to the off highway vehicle (OHV) management prescriptions for the planning area.

2.2.1.1 Off Highway Vehicles

The Sugarloaf Basin SMA is a management area where travel is limited to designated roads and trails. Vehicles of any kind, including ATVs, will only be allowed on existing two-tracks and improved roads that have received cultural clearance and been pre-approved by the BLM. Devon and its contractors, under the direction of the BLM, established a transportation route for the seismic operations, using existing two-tracks and improved roads that have been culturally

cleared (Appendix A, Figure 2-2). These pre-approved access routes are the only areas that the seismic crew can utilize with motorized vehicles.

2.2.1.2 Sugarloaf Basin SMA

The management objectives for the Sugarloaf Basin SMA include: 1) improve watershed condition and enhance watershed values; 2) improve riparian areas to proper functioning condition; 3) provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives; and 4) maintain and protect important wildlife habitat (BLM 1997). In addition, this is a right-of-way avoidance area. The SMA is open to mineral leasing and related exploration and development activities with appropriate mitigation requirements applied to protect resource values. Management includes emphasis on maintaining or improving important wildlife habitat. Aquifer recharge zones in the area are managed to protect groundwater quality and aquifer recharge function. Restrictions from surface disturbing activities for protection of raptors, big game crucial winter range, and big game calving/fawning areas apply to the Sugarloaf Basin SMA (see Table 2-2).

Table 2-2. Land Use Buffers for the Sugarloaf Basin SMA (BLM 1997)

| Affected Areas/Resources | Restriction | Restricted Area |
|--------------------------------|--------------------------------|---|
| Big Game Crucial Winter Ranges | Nov. 15 - April 30 | Antelope, elk, moose, and mule deer crucial winter ranges |
| Parturition Areas | May 1 - June 30 | Designated parturition areas |
| Greater Sage Grouse Leks | Mar. 1 - May 15 | Within one-quarter mile radius of lek |
| Sage Grouse Nesting Areas | Mar. 15 - July 15 | Up to 2-mile radius of nesting area |
| Golden Eagle Nest | Feb. 1 - July 31 | Within one mile radius |
| Osprey Nest | Feb. 1 - July 31 | Within one-half mile radius |
| Swainson's Hawk Nest | Feb. 1 - July 31 | Within one-half mile radius |
| Ferruginous Hawk Nest | Feb. 1 - July 31 | Within one mile radius |
| Coopers Hawk Nest | Feb. 1 - July 31 | Within one-half mile radius |
| Burrowing Owl Nest | Feb. 1 - July 31 | Within one-half mile radius |
| Merlin Nest | Feb. 1 - July 31 | Within one-half mile radius |
| Other Raptors | Feb. 1 - July 31 | Within one-half mile radius |
| Game Fish Spawning Areas | Spring spawning, Fall spawning | Determined on case-by-case basis |

Source: Green River RMP (BLM 1997).

2.2.1.3 Currant Creek Portion of the Greater Red Creek ACEC

The Proposed Action described in the Public Scoping Notice included the Currant Creek portion of the Greater Red Creek ACEC. However, as a result of discussions among the State Office of

the BLM, Devon, Wyoming Game and Fish Department, and the Office of the Governor of the State of Wyoming, an agreement was reached that no shot holes would be placed within the designated Curren Creek ACEC. In addition, the use of receiver lines with geophones was approved by the state and federal agency representatives.

2.2.2 Project Operations

2.2.2.1 Overview

This project is divided into four activity segments as outlined below. Time lines are tentative at this time due to uncertainty of weather conditions. A detailed schedule will be provided as early as possible prior to any field activities. Table 2-3 provides an overview of operations, provided by Devon.

Table 2-3. Overview of the Rubicon 3D Seismic Survey Project Operations

| Activity | Scope | Critical Steps | People Involved |
|---|--|--|--|
| Archaeological / Wildlife Surveys / Permitting | <ul style="list-style-type: none"> - Survey proceeds under Casual Use definition with consultation from BLM - Survey source points (shot holes) with GPS. Walk only off road. - Mark points with 2-foot lathe or 2x2 hub, and flagging. - Access roads and staging areas require cultural Class III survey in undisturbed areas - Archaeological inspection, walk only off road. - Archaeological report to BLM - Surface and mineral permitting of non-Federal lands. - Midget Faded Rattlesnake habitat survey - Habitat survey for pygmy rabbit <ul style="list-style-type: none"> - Raptor survey - Survey for sensitive plant species | <ul style="list-style-type: none"> - Start survey work as soon snow cover melts, approximately 30 days to complete. - Archaeological survey start soon after geophysical location survey - Permitting ongoing, as required. - Biological and wildlife surveys begin prior to start of disturbance activities | <ul style="list-style-type: none"> - 10 survey crew members - 3 archaeological personnel - Approximately 15 qualified biologists for wildlife and plant surveys |
| Re-Survey / Shot Hole Drilling | <ul style="list-style-type: none"> - Re-survey of source points, as needed - Survey receiver locations. - Locate and monitor explosive magazine site. - Heli-portable drilling of all source | <ul style="list-style-type: none"> - Access road and post plot mapping ongoing. - Explosive magazine arrives on site - Heli-portable drills arrives, start as soon as practical | <ul style="list-style-type: none"> - 6 to 8-person survey crew using GPS. - Approx. 25 people working on drill crews |

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

| Activity | Scope | Critical Steps | People Involved |
|--------------------|--|---|--|
| | points using heli-portable recording procedures; | | |
| Recording | <ul style="list-style-type: none"> - Place geophones, cabling and ancillary equipment necessary to record seismic data. - Detonate pre-drilled shot holes using as many as 6 shooters. | <ul style="list-style-type: none"> - Start laying cable when drills are 80% complete, - Continue cable pick-up, lay out and detonation until project completed | <ul style="list-style-type: none"> - Approx. 45 people working on recording crew. |
| Reclamation | <ul style="list-style-type: none"> - Travel each source and receiver line in teams of two on foot - Pick up and dispose of all trash, survey flagging, wire and man-made debris. - Return staging areas and roads to same condition as found. | <ul style="list-style-type: none"> - As soon as reasonably practical, after recording operations have complete segments of the survey. - Continue through recording operation - Repairs to staging areas / roads, as needed - This activity can be conducted in a low impact manner with limited or no helicopter support | <ul style="list-style-type: none"> - Approximately 6 people assigned to reclamation / clean up. |

Source: Devon Plan of Action for Seismic Exploration, Rubicon 3D Seismic Survey, 2008.

Table 2-4 provides quantitative estimates of the seismic survey layout parameters and estimated potential disturbance for each parameter. Because this project would be conducted using only heli-portable procedures, potential surface disturbance for placement of source and receiver lines would be approximately 135.5 acres. The single staging area would require an additional 10.0 acres. Shot hole drilling and reclamation would disturb an approximately three-foot wide radius and drilling 2,752 shot holes would result in 1.8 acres total disturbance. Total surface disturbance would be approximately 147.3 acres. The surface disturbance would be temporary in nature, with majority of the disturbance limited to minor soil compaction and vegetation trampling.

Table 2-4. Layout Parameters and Estimated Potential Disturbance for the Rubicon 3D Seismic Survey Project

| Layout Parameters | Value | Estimated Potential Disturbance (acres) |
|--|-------------|---|
| Source Line Spacing | 1,980 feet | -- |
| Total Source Line Length | 114.6 miles | 41.7 |
| Total Number Source Lines | 20 | -- |
| Average Source Line width | 3 feet | -- |
| Receiver Line Spacing | 880 feet | -- |
| Total Receiver Line Length | 258 miles | 93.8 |
| Total Number Receiver Lines | 36 | -- |
| Average Receiver Line Width | 3 feet | -- |
| Shot Hole Depth | 50 feet | -- |
| Shot Hole Radius (Estimated) | 3 feet | -- |
| Source Point Interval | 220 feet | -- |
| Total Source Points | 2,752 | 1.8 |
| Density per Square Mile | 65.5 | -- |
| Receiver Point Interval | 220 feet | -- |
| Total Receiver Points | 6156 | -- |
| Density per Square Mile | 147.7 | -- |
| Explosives per hole | 10 pounds | -- |
| Staging Area | 10 acres | 10.0 |
| Total Potential Surface Disturbance | | 147.3 |

2.2.2.2 Source Point Survey

The ideal location of shot hole source points and geophone receiver points would be determined prior to the initiation of the seismic survey. An initial set of coordinates based on a seismic survey grid system and known restrictions (Pre-plot coordinates) were stored in GPS units. Using these GPS and the stored pre-plot source point coordinates; a survey team would walk to each source point (approximately 220 feet apart). When the location of the GPS data matches the pre-plot coordinates stored in the GPS unit, the source point is marked on the ground with a wooden hub and/or surveyor's flags. Adjustments to the source points can be made in the field and those points are then updated on the GPS unit (post-plot coordinates).

Truck or ATV traffic would not be allowed off existing two-tracks or improved roads. In very hilly or remote terrain personnel and equipment may be shuttled with the helicopter. All personnel would carry handheld radios and, if required, survival packs in remote areas.

The survey team would also set up temporary towers with radio transmitters at several locations throughout the Project Area (usually on hill tops). These sites are used to transmit GPS corrections necessary for real time, high accuracy positioning. It may be necessary to move the source point (e.g., terrain too steep to safely land the helicopter). In these cases, source points may be moved as much as 1,000 feet to a more suitable location.

During source point layout, GPS operators would make sketches of obstacles, hazards, and archaeological site and exclusion zones. This “hazard” map would contain the entire post-plot locations of the source and receiver points surveyed. This information would be used by the crew and forwarded to the BLM.

2.2.2.3 Resurvey

Using methods and procedures outlined above, a re-survey may be necessary to replace hubs and/or lathes and markers previously established for the archaeology survey that are destroyed by wind, wildlife, or livestock.

The survey crew would concentrate on the re-survey of source points to enable uninterrupted progress of seismic operations. When source points are complete, layout of geophone receiver points would begin. Source and receiver points would be marked with lathe, flagging, and a 1-foot diameter spray paint mark.

2.2.2.4 Shot Hole Drilling

Shot holes would be drilled using heli-portable drilling equipment (Figure 2-4). Shot holes would not be drilled in any established setback areas from critical resources (see Table 2-1 and 2-5). A ground-based drilling coordinator, operating on foot, would locate the surveyed shot hole location. The coordinator would then direct the helicopter via VHF radio communication to set the drill on the location. Up to 10 drills could be utilized concurrently using this program. The drill is operated by a driller and drill helper. Drilling activities would take place only during daylight hours. The seismic equipment consists of a drill unit and a compressor unit, each weighing approximately 1,600 pounds. All industry safety requirements would be followed. All drill rigs are audited prior to commencement of drilling, and a daily inspection of each unit is documented. Each unit is transported from one source point to the next one by a Bell 205 “Huey”, or equivalent helicopter. The drill and compressor units are connected using “quick connect” air and hydraulic fittings. Drill cuttings from the hole are brought to the surface using compressed air.

Upon completion of the approximate 50-foot deep shot hole, 10 pounds of explosives are loaded into the hole. Approximately forty feet of the shot hole is then back-filled with cuttings. A plastic hole plug is then installed and approximately 10 feet of bentonite clay is placed in the

hole. Another plastic hole plug is placed at the surface. Figure 2-5 shows the placement of the explosives, cuttings, and bentonite in the shot hole.

Access to shot holes in sensitive areas would be evaluated by the BLM before they are drilled. Explosive storage and staging areas would be located on private or state land. If no suitable sites are found on these lands, the BLM would be contacted for possible locations on federal lands.

Prior to deployment on the Project Area, equipment would be power-washed to prevent spread of noxious weeds.

Maps and GPS coordinates of sensitive resources would be provided to the field crews. All established avoidance areas and required setback requirements would be followed (See Table 2-5).



Figure 2-4. Typical helicopter portable drill rig (Devon 2008)

Table 2-5. Shot hole setback distances for sensitive resources.¹

| Sensitive Resource | Setback Distance |
|----------------------------------|-----------------------|
| Springs | 1,320 feet (1/4 mile) |
| Riparian Areas | 500 feet |
| Streams | 100 feet |
| Stock pipeline (<3" in diameter) | 250 feet |
| Pygmy Rabbit Habitat | 800 feet |
| Midget Faded Rattlesnake Dens | 800 feet |
| Archeological Sites | 100 feet |
| Slopes greater than 25% | Drilling not allowed |
| State and County Road ROW | 100 feet |

¹See Table 2-2 for buffers and timing restrictions.

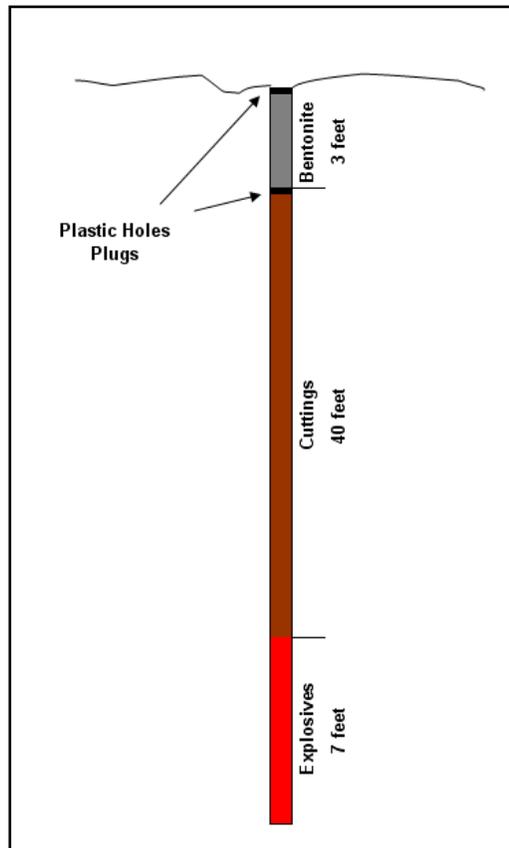


Figure 2-5. Typical shot hole cross-section (Devon 2008).

2.2.2.5 Detonation and Recording

The seismic survey would utilize helicopter and ATV support for moving recording equipment. Helicopters would utilize navigational devices, which allow for accurate deployment of recording equipment regardless of ground cover. Post-plot coordinates generated by the survey crew are uploaded into the navigation device. The accuracies are within a few square feet. The crew may utilize ATVs on pre-approved access routes to assist in troubleshooting recording equipment and move personnel. The crew would be provided with updated hazard maps showing approved drive routes and areas of avoidance. They would also receive this information at the initial meeting prior to entry into the field.

During the recording phase, a minimum of 26 lines of recording equipment would be active at any given time. The “spread” (area occupied by live recording equipment), would encompass approximately 24 square miles. The parallel receiver lines are 880 feet apart with 220-foot intervals between receiver points. The parallel source lines are 1,980 feet apart with 220-foot intervals between source points. Source lines run north-south while receiver lines run east-west (see Figure 2-3 in map pocket at back of EA). The seismic survey data would be recorded in a sequential manner. The design of this 3D grid has the survey starting in the southwest corner and heading east.

Two-man teams of “shooters” would move down the source lines detonating the charges. There may be as many as five of these teams spread out on the active spread. Actual detonation of the charges is controlled by the observer in the recording shack or vehicle. This procedure is completed prior to any detonation to ensure worker safety. Depending upon site-specific conditions, this process can take up to ten minutes between detonations or occur as frequently as every 2-3 minutes. Conditions which may prevent the recording crew from recording the data are lightning; strong winds; animals chewing on the recording equipment; cattle, horses, or human vandalism disrupting the geophones; or surface noise created by vehicles or other industrial equipment.

2.2.2.6 Staging Area

A single 10-acre staging area in T13N, R106W, Section 20 has been designated for the seismic survey. A back-up staging area, in an existing BLM gravel storage area, would only be utilized, if necessary. The staging area, including a helicopter landing area, would be utilized to bag and prepare equipment to be transported by helicopter. Crew vehicles may be parked at the staging area as well as several 45-foot trailers. Mini helicopter landing zones may be utilized in some remote areas to reduce helicopter flight time and speed up the progress of the seismic program. An equipment truck may transport bagged equipment to a specific area utilizing existing two-tracks or improved roads, where the helicopter utilizing a long-line would pick up equipment and

fly it to nearby receiver lines. The staging area has been approved by the BLM Authorized Officer and has been surveyed for archaeological resources.

A crew of approximately 45 people would perform operations, 7 days a week for approximately 45 days during the recording phase until August 31, 2008, at which time helicopter flights would be discontinued, in accordance with an agreement with the BLM and State agencies. The total field portion of the proposed project is expected to take a minimum of 70 days. Since helicopter operations would be discontinued on August 31, 2008, the seismic survey would not be completed. The remainder of the survey would be completed in 2009 at a time approved by the BLM. The replacement of defective equipment would be completed by the crew on foot. The majority of crew would stay in motels in Rock Springs and would be transported by bus to the staging area in the morning following a safety and briefing meeting.

2.2.2.7 Safety

All contractors must adhere to Devon's comprehensive Geophysical Safety Guidelines policy. The contractor's corporate safety manual also addresses potential safety issues. Devon has a dedicated Geophysical Safety Coordinator who works closely with contractors to ensure compliance with all safety rules and regulations. Daily safety meetings are held with all contractors and documented. Devon and its contractors would have firefighting equipment on hand at various locations throughout the Project Area. Helicopter "Bambi Buckets," used to help control accidental fires, would be placed in the staging area to allow for rapid deployment. Water source areas would be identified prior to start-up of recording or drilling operations. Fire drills would be conducted on a regular basis.

Safe handling, transportation, and storage of explosives are of primary importance. These activities are strictly regulated by policies and procedures of several federal agencies. Explosives would be transported in industry-standard portable magazines. Explosives would be hand held under the care and control of personnel possessing a federally-approved explosives handling license. Storage of explosives would be in an approved magazine, temporarily established near or within the Project Area. The magazine would be accessible by truck and under the care and control of licensed personnel. Explosives not loaded into a shot hole must be returned to the central magazine each night and logged. A strict inventory is maintained.

An Emergency Response Plan (ERP) would be created prior to the initiation of the seismic survey. In the unlikely event of a medical evacuation, the ERP would be implemented. The ERP would be provided to BLM prior to approval of the Finding of No Significant Impact and Decision Record.

If additional security is warranted, Devon would provide the necessary personnel to secure the Project Area.

2.2.2.8 Reclamation

Project reclamation would proceed concurrently with seismic survey operations. All pin flags, flagging, stakes, and any other material associated with the project left on the surface would be collected as the seismic operations progress. Reclamation measures would be undertaken as soon as possible to restore areas as close to their original condition as possible. At the completion of the seismic survey, a final inspection would be conducted by the BLM Authorized Officer (AO). Additional reclamation would be carried out, if required by the BLM AO.

Drill cuttings would be spread over a radius of approximately 3 feet around the shot hole. The shot hole would not exceed a diameter of two inches and would be backfilled with soil and cuttings, and contoured to the approximate topography of the area. The shot holes are expected to recover without additional reclamation, with the goal of returning to pre-disturbance conditions within one or two growing seasons. Compacted native vegetation is expected to recover within one growing season, and would not likely require any additional reclamation.

Reclamation planned for the staging area, if necessary, would include planting certified and BLM-approved weed-free native seed. In the event that rutting of roads or two-tracks occurs, the ruts would be repaired by the crew. Damage to roads and two-tracks would be documented and reported to the BLM AO. Reclamation would, to the extent possible, restore the area to as close to its original condition as possible.

2.2.2.9 Solid Waste Management and Sanitation

Self-contained, chemical portable toilets would be provided at the staging areas for human waste disposal. The toilet holding tanks would be pumped out, as needed, and the contents disposed of in the nearest BLM-approved sewage disposal facility.

Garbage, trash, and other non-flammable waste materials would be collected and disposed of at an approved sanitary landfill. Trash would not be burned or buried on location.

2.2.2.10 Spill Response

If spills of diesel fuel or other hazardous fluids occur during the seismic operations, Devon or their contractors would immediately begin cleanup operations and contact the BLM and other regulatory agencies (e.g., EPA National Response Center, State of Wyoming), as required. Devon would maintain on site Material Safety Data Sheets (MSDS) for all chemicals used during seismic operations, in accordance with 29 CFR 1910.1200(g).

2.2.3 Applicant-Committed Environmental Protection Measures

Applicant-Committed Environmental Protection Measures are mitigation measures that Devon has voluntarily agreed to avoid or minimize environmental impacts. These mitigation measures are provided below.

2.2.3.1 General Operations

- Devon has agreed to conduct the entire seismic survey using a helicopter instead of vibroseis trucks.
- Devon has agreed that vehicular traffic will only be allowed on existing two-track or improved roads and that a Transportation Plan will be developed. Class III cultural surveys will be conducted on the two-track and roads identified through the Transportation Plan (Appendix A, Figure 2-2,).
- Devon has agreed to forgo data acquisition in the Currant Creek Watershed, except for walking receiver lines into the area. No source lines are proposed in the Currant Creek ACEC.
- Use of helicopters for seismic operations will cease on August 31, 2008, prior to the beginning of archery hunting season, to prevent helicopter noise from disturbing large game species (i.e., elk, mule deer, and pronghorn antelope).
- Devon will collaborate with the BLM and Wyoming Game and Fish Department to notify the public of the seismic activity while the project is being conducted.

2.2.3.2 Air Quality

- Members of the seismic and heli-portable drilling crews would be encouraged to carpool to and from surrounding towns to minimize vehicle-related emissions. Devon plans to have 30-person buses with professional drivers to transport crew to and from the field.

2.2.3.3 Cultural/Paleontological Resources

- Devon has agreed to conduct a Class III archaeological clearance for a 50-foot corridor from the centerline of the source point location on each side for the length of the source lines.
- Based on the results of field surveys, all cultural and/ or paleontological sites will be avoided. The survey crew will move any source points associated with identified cultural or paleontological sites to avoid these resources.
- If cultural or paleontological resources are discovered during seismic activities, all activity along the seismic line would cease, and Devon would immediately notify the

BLM. The BLM and Wyoming State Historic Preservation Office representatives would then determine how to avoid impacting the site or artifact.

2.2.3.4 Hazardous and Solid Waste/Trash Disposal

- Fuel and lubricants would be temporarily stored in transportable containment-trailers at staging areas, with secondary containment, to minimize potential for accidental releases/spills.
- All spills or leaks of diesel fuel, hydraulic fluid, lubricating oil, and coolant, including contaminated soil material, would be excavated and placed in an appropriate container and transported to an approved disposal site. All incidents would be reported to the appropriate regulatory agency, allowing the agency representative to monitor the reclamation of the site.
- All solid waste or trash would be transported for disposal to an approved solid waste disposal facility.
- Portable human waste receptacles will be placed in staging areas and maintained, as necessary, for the duration of the seismic program. Human waste receptacles can also be placed along access routes and established two-track roads, as needed.
- An Emergency Response Plan (ERP) will be located in each vehicle used for seismic operations to ensure rapid response to leaks and spills.

2.2.3.5 Erosion and Sedimentation Control

- No cross-country travel would be allowed and all vehicles would be restricted to designated roads and two-tracks.
- Employees and contractors would be instructed to travel at appropriate speeds to limit disturbance to soils and vegetation, and to minimize the potential for vehicle-wildlife and vehicle-vehicle collisions.
- At the end of the project, all equipment, supplies, and trash would be removed
- Any staging areas, where vegetation may have been disturbed, would be re-contoured and reseeded, if necessary. If requested by the BLM, a representative of the agency can be flown over “cleared” lines to verify that these areas are free of trash and that no areas are disturbed from Devon’s operations.
- Ephemeral low water stream crossings would be avoided when the streams are flowing.

2.2.3.6 Vegetation Resources

- To reduce the introduction/ spread of noxious and invasive weed species from vehicles and equipment to the well sites, employees and contractors would not be allowed to drive off-road.
- A noxious weed control management program will be implemented to prevent or control the spread of noxious weeds at the proposal site. All vehicles that enter the proposed Project Area will be washed prior to the beginning of the survey.
- All applicable equipment, including on-road and off-road equipment, would be cleaned to remove weed seed and soil (which may contain weed seeds), prior to commencing operations on public lands within the Project Area.
- Weed infestations resulting from the seismic operations would be treated, as necessary, by an herbicide approved by the BLM AO to prevent additional weed spread.

2.2.3.7 Wildlife Protection

- Devon has agreed to alter the helicopter flight plan, as necessary, to minimize impacts to big game species.
- Devon would comply with all BLM restrictions for the protection of wildlife.
- To reduce the potential for wildlife-vehicle collisions, Devon would require their employees and contractors to always drive at safe speeds.
- No dogs / pets will be allowed in the proposed Project Area.
- No firearms will be allowed in the proposed Project Area. This is a CGG Veritas Company policy.

2.2.3.8 Public/Crew Safety

- Devon would take all necessary precautions for the protection and safety of the public for the duration of the seismic program. At road intersections, if approved by Devon, maps of the Project will be available for public viewing.
- To further facilitate coordination with local emergency services, Devon would provide mapped locations of the proposed seismic exploration areas and times to the respective emergency services, personnel, as applicable, in advance of any exploration activities. In addition, Devon would have cell phones, satellite phones or radios onsite, as appropriate, to provide immediate communication to emergency services.
- Emergency Response Plans (ERP) will be drafted and available at all staging areas, in all contractor and sub-contractor vehicles, as well in crew offices in Rocks Springs, BLM

Rock Springs Office, and other applicable agency offices as necessary. The ERP will be updated and distributed regularly to reflect any changes. ERP Plans are a required document with CGG Veritas.

- Vehicle traffic would be limited to existing roads and two-tracks. Vehicles would travel at speeds within set speed limits of main access roads and at slower speeds appropriate for conditions on more remote roads and two-tracks.
- At a minimum, all crew members would comply with the Occupational Safety and Health Administration (OSHA) rules and regulations.

Signs warning the public of seismic survey activity would be located at the closest road/trail intersections on either side of the next day's planned drilling.

2.2.3.9 Existing Facilities/Right of Way Protection

- Devon will be responsible for road repair and/or improvements as needed on the existing BLM access roads per BLM road standards if the damages are a result of the seismic operation.
- Devon will provide maintenance services for county roads used in the project, as requested by the Sweetwater County. Services could include returning the road to original or better condition, placing erosion control features at key points along the road in order to prevent sediment movement into nearby streams associated with this project, and providing dust control, if needed, during the project. All services provided by Devon will be coordinated with and approved by Sweetwater County with a permit. Road maintenance services will be coordinated with Sweetwater County.
- A representative from the County Road Department is invited to attend the crew start-up meeting.
- Safe operating distances (based on accepted industry standards) will be maintained between shot holes and existing facilities including oil and gas wells, roads, pipelines, and electrical utility lines.
- Any facilities impacted by the proposed seismic survey would be repaired or replaced as soon as practical before the end of the project.

2.2.3.10 Fire Protection

- Vehicles with catalytic converters will be restricted to approved roads and two-tracks. Parking or idling will not be permitted in portions of roads or two-tracks with tall vegetation.

- All brush build-up around mufflers, radiators, heater-treaters, and other engine parts will be avoided; periodic checks will be conducted to prevent this build-up.
- All personnel will be advised that smoking is only allowed in crew vehicles. All other areas are designated as non smoking areas.
- All personnel will be advised that campfires or uncontained fires of any kind are prohibited except in an extreme emergency situation as defined in contractor safety manuals. The Emergency Response Plan (ERP) includes a fire communications protocol for contacting fire-fighting personnel. Fire boxes will be used, if required.
- Prior to start-up Devon will engage local fire prevention agencies and discuss protocols for emergency fire fighting.
- Personnel will be trained in fire fighting techniques, as needed.
- Firefighting equipment will be kept on site at all times containers painted red with “Fire Equipment” printed on the container in a highly visible manner. These containers will have the contents displayed on the exterior of the box.
- The fire containers will be constructed in such a manner that they can be simply rigged up and transported via helicopter in an expeditious manner.
- An aerial water deployment tool such as a “Bambi Bucket” will be available in a conspicuous location for rapid deployment.
- The location of emergency water supplies for fighting fires will be identified on maps. Helicopter pilots will document the locations of emergency water supplies and evaluate flight times to these water sources.
- One fire fighting tool for every person on site will be contained in the boxes.
- Fire fighting drills will be conducted at regular intervals.
- All vehicles will be equipped with fire extinguishers, shovels, and first aid kits.
- All-terrain vehicles (ATVs) will be equipped with spark arresters, fire extinguisher, and a fire fighting tool.
- Portable generators used in the Project Area will be required to have spark arresters.

2.2.3.11 Noise

- Use of helicopters will cease after August 31, 2008, to avoid displacing large game species prior to the beginning of the fall hunting season.
- The helicopter would follow flight paths chosen to be efficient, while following activity-specific aviation operational safety standards for flight altitudes. Recreationists, wildlife,

wild horses, and livestock will be avoided to the extent practical. The post plot helicopter routes will be provided to the BLM, if requested.

2.3 NO ACTION ALTERNATIVE

In accordance with the NEPA and the CEQ regulations, a No Action Alternative is required. The No Action Alternative would be the denial by the BLM of Devon's proposal to conduct the Rubicon 3D seismic survey. It serves as a benchmark, enabling decision-makers to compare the magnitude of environmental effects resulting from the Proposed Action with a No Action Alternative. Under the No Action Alternative, there would be no new impacts to vegetation, wildlife, special status plant and animal species, soil, cultural resources, paleontological resources, recreation, surface water and groundwater, range resources, and other resources. In addition, there would be no net economic benefits or new employment opportunities for the local communities.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

Chapter 3 provides a description of the existing human and natural environment resources that could be affected by the Proposed Action and No Action Alternative in the analysis area. The analysis area is defined for each resource and is based on the nature of the resource. For some resources, the analysis area is the proposed Project Area, and for other resources the analysis area encompasses a larger area. For example, a larger area is analyzed for wildlife species, which are mobile, versus plant species, which are stationary. The existing baseline conditions in the analysis area are a result of past and present activities in the area. Aspects of the baseline condition that affect a specific resource are presented in the discussion for that resource.

3.2 CLIMATE AND AIR QUALITY

3.2.1 Climate

The climate in the proposed Project Area (south of Rock Springs, Wyoming) is semiarid and continental, with short, dry summers and long, cold winters. July and August are the hottest months of the year while December and January are the coldest. According to the Western Regional Climate Center (WRCC, 1971-2000), Rock Springs's mean temperature in January is 21.2 degrees F with a mean of 69.1 degrees F in July. The average precipitation in the area is 8.5" and average snow fall is around 49.2" (WRCC 1948 - 1979).

The proposed Project Area is subject to strong and gusty winds due to the complex terrain. Distinct diurnal changes occur, with surface wind speeds generally increasing during the day and decreasing during the night. Violent weather is common in the area and during the winter with the accompaniment of snow, blizzard conditions are quite frequent. In this particular area of Wyoming, typical wind direction is from West to East at an annual average speed of 11.1 mph (WRCC 1996 - 2006).

3.2.2 Air Quality

3.2.2.1 Wyoming And National Ambient Air Quality Standards

National and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health. State standards must be as strict as, or more strict than, federal standards. Table 3-1 illustrates both the NAAQS and WAAQS. These

standards are reviewed every 5 years and undergo extensive peer review and public comment. The NAAQS specify the maximum concentration level, the averaging time or exposure time, and a statistical form of the standard that defines when an exceedance would occur.

Comprehensive air quality monitoring has not been conducted within the proposed Project Area. However, background concentrations of pollutants recorded in the surrounding area are considered representative of the air quality in the proposed Project Area.

Criteria pollutants for which standards have been set include sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), and particulate matter less than 10 microns in diameter (PM₁₀) and less than 2.5 microns in diameter (PM_{2.5}). All of the surrounding areas measured values are below the NAAQS and WAAQS. A brief description of the regulated Criteria Pollutants follows.

- **Carbon Monoxide.** CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation. Wildland fires are natural sources of CO.
- **Nitrogen Dioxide.** NO₂ is a red-brown gas formed during operation of internal combustion engines. Such engines emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_x). Internal combustion engines emit primarily NO which, in the presence of ambient ozone, forms NO₂ (the regulated pollutant). High concentrations of NO₂ can contribute to the formation of a brown cloud. NO₂ in the presence of ammonia can form a particulate nitrate as well as nitric acid.
- **Sulfur Dioxide.** SO₂ forms during combustion from trace levels of sulfur in coal, natural gas or diesel fuel. It can convert to ammonium sulfate ((NH₄)₂SO₄) and sulfuric acid (H₂SO₄), which can cause visibility impairment and acid rain. Volcanoes are natural sources of SO₂. Anthropogenic sources include refineries and power plants.
- **Ozone.** Ozone (O₃) is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Sources of NO_x and VOC include industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents. The faint acrid smell common after thunderstorms is caused by O₃ formation by lightning. Ozone is a strong oxidizing chemical that can burn lungs and eyes and damage plants at high concentrations.
- **Particulate Matter.** Particulate matter (e.g., soil particles and pollen) is essentially small particles suspended in the air that settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- **PM₁₀ particles**, particles with diameters of less than 10 micrometers, are small enough to be inhaled and can cause adverse health effects.
- **PM_{2.5} particles**, particles with diameters of less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. Particles in this size range are also the main cause of visibility impairment.

Table 3-1. National and Wyoming Ambient Air Quality Standards

| Pollutant | Averaging Time | NAAQS | | | WAAQS | | |
|--------------------------------------|----------------|----------------------|-------|--------|----------------------|-------|--------|
| | | (µg/m ³) | (ppm) | (ppb) | (µg/m ³) | (ppm) | (ppb) |
| Carbon Monoxide CO | 1 hour | 40,000 | 35 | 35,000 | 40,000 | 35 | 35,000 |
| | 8 hour | 10,000 | 9 | 9,000 | 10,000 | 9 | 9,000 |
| Lead Pb | Calendar Qtr. | 1.5 | -- | -- | 1.5 | -- | -- |
| Nitrogen Dioxide NO ₂ | Annual | 100 | 0.053 | 53 | 100 | 0.053 | 53 |
| Ozone O ₃ | 8 hour | 137 | 0.075 | 75 | 157 | 0.08 | 80 |
| Particulate Matter PM ₁₀ | 24 hour | 150 | -- | -- | 150 | -- | -- |
| | Annual | NA | -- | -- | 50 ^a | -- | -- |
| Particulate Matter PM _{2.5} | 24 hour | 35 | -- | -- | 65 ^a | -- | -- |
| | Annual | 15 | -- | -- | 15 | -- | -- |
| Sulfur Dioxide SO ₂ | 3 hour | 1,300 | 0.5 | 500 | 695 | 0.266 | 266 |
| | 24 hour | 365 | 0.14 | 140 | 260 | 0.099 | 99 |
| | Annual | 80 | 0.03 | 30 | 60 | 0.023 | 23 |

3.2.2.2 Hazardous Air Pollutants

There are a wide variety of HAPs, including n-hexane, ethylbenzene, toluene, xylene, formaldehyde, and benzene. Although HAPs do not have regulatory ambient air quality standards, the EPA has issued reference concentrations for evaluating the inhalation risk for cancer and non cancer health effects, known as Reference Concentrations for Chronic Inhalation (RfC).

Any source that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs is considered a major source and will require a Title V, Part 70, operating permit. In addition, WDEQ has a Best Available Control Technology (BACT) requirement that is applicable to minor sources of HAPs.

3.2.2.3 Regulatory Environment

The proposed Project Area falls under State of Wyoming Jurisdiction; therefore, it is subject to the Wyoming Air Quality Standards and Regulations (WAQSR) implemented by the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ-AQD).

3.2.2.4 Prevention of Significant Deterioration

The goal of the Prevention of Significant Deterioration (PSD) program is to ensure that air quality in areas with clean air does not significantly deteriorate, while maintaining a margin for future industrial growth. Under PSD, each area in the United States is classified by the air quality in that region according to the following system:

- **PSD Class I Areas.** Areas with pristine air quality, such as wilderness areas, national parks, and some Indian reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas. PSD Class I Areas are mandatory areas designated by Congress for protection and preservation.
- **PSD Class II Areas.** Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS).
- **PSD Class III Areas.** No areas have yet been designated as Class III. Concentrations would be allowed to increase all the way to the WAAQS and NAAQS.

Federal air quality regulations adopted and enforced by WDEQ-AQD limit incremental emission increases to specific levels defined by the classification of air quality in an area. The PSD Program is designed to limit the incremental increase of specific air pollutant concentrations above a legally defined baseline level. PSD Increments are defined for NO₂, SO₂, and PM₁₀. The incremental increase depends on an area's classification.

The closest federally designated Class I area is Dinosaur National Monument, managed by the U.S. National Park Service. Dinosaur National Monument is classified as a Colorado Class I Area for SO₂. The closest boundary of Dinosaur National Monument is about 34 miles southeast of the proposed Project Area.

3.2.2.5 Regional Haze Regulations

Visibility impairment is an indicator of air pollution concentration. Visibility can be defined as the distance one can perceive color, contrast, and detail. Fine particulate matter (PM_{2.5} - particles 2.5 microns or less in diameter) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the farthest distance a person can see a landscape feature.

Without human-caused visibility impairment, natural visual range is estimated to average about 110–115 miles in the western United States and 60–80 miles in the eastern United States (Malm 1999).

The Regional Haze Regulations were developed by EPA in response to the Clean Air Act Amendments of 1990. They are intended to maintain and improve visibility in PSD Class I areas across the United States. These regulations require states to demonstrate reasonable progress in maintaining or improving visibility in PSD Class I areas. They are intended to maintain visibility on the least impaired days and to improve visibility on the most impaired days in mandatory federal Class I areas across the United States so that visibility in these areas is returned to natural conditions by the year 2064.

3.3 GEOLOGY AND MINERAL RESOURCES

For purposes of this assessment, the geologic analysis area encompasses the area from west of the Rock Springs uplift to Flaming Gorge Reservoir. This includes the Currant Creek portion of the Greater Red Creek ACEC and the Sugarloaf SMA.

3.3.1 Regional Geology

The proposed Project Area is within the southeastern portion of the Green River Basin, the largest subbasin of the Greater Green River Basin. The broad synclinal basin encompasses approximately 10,000 square miles in southwestern Wyoming and is bounded by the Wind River Mountains to the north and northwest, the Rock Springs Uplift to the east, the western Wyoming thrust belt to the west, and the Uinta Mountains to the south.

The Green River Basin consists of approximately 26,000 feet of Paleozoic to Cenozoic age sedimentary rocks overlying crystalline Precambrian basement rock (Bradley 1964; Mason and Miller 2004). The oldest and deepest rocks (Late Cambrian to Cretaceous age) are predominately sandstone, shale, and limestone of marine origin exposed in the uplifted areas around the basin margin. The youngest rock is Tertiary to Quaternary age (Cenozoic) and includes the Green River and Wasatch Formations which are widely exposed at the surface. The Cretaceous and Tertiary strata are major sources of oil and gas, oil shale, coal, and sodium minerals (trona and halite) in the Rocky Mountain Region.

3.3.1.1 Project Area Geology

The majority of the Project Area is underlain by the Tertiary (Eocene) Green River and Wasatch Formations. The estimated combined thickness of the two formations ranges from 3,000 to about 6,200 feet (Roberts 2005). The Green River Formation underlies the western portion of the study area and includes, from west to east, the Laney Member, the undifferentiated Wilkins

Peak-Tipton Shale Members, and the Luman Tongue. The Wasatch Formation interfingers with and underlies the Green River Formation. It is exposed in an arcuate band that extends from the west flank of the Rock Springs uplift south and west to Flaming Gorge Reservoir. The Oligocene Bishop Conglomerate caps many of the ridges and bluffs. Surficial deposits overlie bedrock in many areas and include Quaternary alluvium in the drainage bottoms, numerous landslide deposits, and shallow accumulations of slopewash and colluvium (Case et al. 1998).

The southern third of the Project Area is located near the contact between the Main body of the Wasatch Formation and the undivided Wilkins Peak and Tipton Shale Members of the Green River Formation. The Wilkins Peak Member is noted for an abundance of saline minerals and trona deposits within a succession of sandstone, siltstone, mudstone, clay-shale, and oil shale (Roberts 2005). The thickness of this member is approximately 1,068 feet (Roehler 1992). The Tipton Shale Member consists of shale and organic marlstones and can be several hundred feet thick (Roehler 1992).

3.3.2 Mineral Resources

The primary mineral resources in the Green River Basin include oil and gas, oil shale, coal, and sodium minerals (trona and halite).

3.3.2.1 Sodium Minerals

Economic deposits of trona and halite are found in the Wilkins Peak Member of the Green River Formation (Roehler 1992). The known sodium leasing areas (KSLAs) are outside the proposed Rubicon Project Area, primarily to the west of Flaming Gorge Reservoir. The analysis area is considered to have low sodium development potential (BLM 1997).

3.3.2.2 Oil Shale

The proposed Project Area is near the southeastern limit of the most geologically prospective oil shale resources in the Green River Basin (BLM 2007). The oil shale resources are within the Green River Formation and are generally of lower grade (average 15 gallons/ton or greater than 15 feet thick) than comparable resources in Utah and Colorado (average 25 gallons/ton or greater than 25 feet thick). The thickness of the overburden in this area (greater than 500 feet) would preclude surface mining. BLM land in the analysis area with potential oil shale resources is currently under oil shale withdrawal (BLM 1997). Production of oil shale remains in the development stage and, in conjunction with the lower grades and overburden depths, there appears to be low or no potential for development in the foreseeable future.

3.3.2.3 Coal

The proposed Project Area is in the southwestern corner of the Green River Coal Field and contains potential coal resources in the Wasatch, Fort Union, and Lance Formations and the Mesaverde Group. Strippable coal deposits are not present in the proposed Project Area and the resource value of coal beds in the Wasatch Formation is considered minimal (Root et al 1973). Potential coal resources in the Fort Union Formation, Lance Formation, and Mesaverde Group are buried by several thousand feet deep of overburden and unlikely to be developed.

Large tracts of land in the vicinity of the analysis area are under a coal withdrawal (BLM 1997). The nearest active coal mining is at the Jim Bridger and Black Butte mines along the east flank of the Rock Springs uplift.

3.3.2.4 Coalbed Methane

The Tertiary Green River and Wasatch Formations and the Upper Cretaceous Mesaverde Group (primarily the Almond Formation) are potential targets for coalbed methane exploration in the analysis area. Early-stage gas exploration has targeted the Wilkin Peak Member of the Green River Formation in the Washakie and Great Divide Basin, but there is currently no commercial production from this unit in those areas (Roberts 2005). The extent of coal beds suitable for methane gas generation in the Wasatch Formation west of the Rock Springs uplift is not well constrained. These coal beds are likely of marginal quality because the primary depositional centers for coal beds in the Wasatch Formation are located further east in the Washakie and Great Divide Basins.

The Mesaverde Group occurs in the subsurface in the analysis area and is exposed to the east in the Rock Springs uplift. With the exception of the area on the west flank of the uplift, most of the coal beds in the Mesaverde Group may be buried too deeply for methane gas generation (Johnson et al. 2004). Although there is potential for coalbed methane development in the analysis area, it is more likely that development in the foreseeable future will occur further east, in the eastern portion of the Green River Coal Field (Bryner 2002).

3.3.2.5 Oil and Gas

The majority of exploration and development in the vicinity of the Project Area has been to the west and northwest in the Rock Springs uplift area. The Middle Mountain South gas field is approximately 19 miles east of the South Well and has one producing well.

There have been six exploratory wells drilled within the proposed Project Area (Wyoming Oil and Gas Conservation Commission 2008). All of these wells are located in the Sugarloaf Basin SMA, and were drilled from 1959 to 1968. The well depths ranged from 8,006 feet below ground surface (bgs) to 10,060 feet bgs and have been permanently abandoned. There was no production from any of the wells.

3.3.3 Geologic Hazards

Potential geologic hazards include seismic hazards (fault-related earthquakes, mining-related earthquakes, surface rupture from active faults) and landslides.

There are no active faults within the analysis area and historically there has been very little seismic activity. The nearest known active faults are in the Chicken Springs fault system located in the northeast corner of Sweetwater County (Case et al. 2002). Seismic records show the largest recorded natural earthquake (magnitude 2.2) was located approximately 1.5 miles north of the proposed Project Area. Small earthquakes associated with mining activity have also occurred in the area.

A number of landslides are present near the Project Area, primarily along the steeper slopes of Little Mountain. Numerous small debris-flow type landslide deposits occur along stream drainages (WSGS 2008). The larger landslides are within the mudstones and siltstones of the Green River and Wasatch Formations.

3.4 SOIL RESOURCES

The development of soils is governed by many factors, including climatic conditions (the amount and timing of precipitation, temperature, and wind), the parent material that the soil is derived from, topographic position (slope, elevation, and aspect), geomorphic processes and vegetation type and cover. For evaluation of potential environmental impacts to soils, the key attributes are their erosion potential and ease of reclamation after soil disturbance.

The Green River RMP (BLM 1997) provides management objectives and actions to protect the soil resources. The management objectives for watersheds and soils are:

- Stabilize and conserve soils
- Increase vegetative production
- Maintain or improve surface and groundwater quality; and
- Protect, maintain, or improve wetlands, floodplains, and riparian areas.

Soil mapping conducted by the National Resource Conservation Service (NRCS) under the US Department of Agriculture (USDA) typically provides information about each soil type within the mapped area that can be used to evaluate the erosion potential and reclamation potential of each soil unit. These data include the slope, soil pH range, salinity, and erosion potential.

3.4.1 Erosion Potential

Erosion potential can vary widely among soil units within a given area, and is dependent on the particle size distribution of the soil, the slopes on which it is found, and the amount and type of vegetative cover. The USDA-NRCS typically rates each of the soil units according to its water

erosion potential. The erosion potential indicates the general susceptibility of a soil to sheet and rill erosion. The estimate of erosion potential is based primarily on the percentage of clay, silt, sand and organic matter present in the soil. Erosion hazards become critical issues when protective vegetation is removed during and following activities, such as access road and well pad construction. Typically, soils found on steeper slopes have a higher erosion hazard than those found on gentler slopes. Soils with more fines are at greater risk of wind erosion, and soils with more gravel and/or stones have a lower risk of wind erosion.

3.4.1.1 Slope (%)

The erosion potential of a soil is directly related to the slopes on which it is found. Typically, soils found on steeper slopes have a higher erosion hazard than those found on gentler slopes. According to information available on the USDA-NRCS website, all soils occurring on slopes greater than 40% have poor reclamation potential based upon their high erosion rates.

3.4.1.2 Hydrologic Groups

Hydrologic groups are used to estimate precipitation runoff where soils are not protected by vegetation. The groups (labeled A through D) are based on infiltration of water when soils are thoroughly wet. In general, the slower the rate of infiltration, the greater the amount of run-off. Group A soils have high rates of infiltration when thoroughly wet. These consist mainly of deep, well drained to excessively drained soils or gravelly sands. Group B soils have moderate rates of infiltration. These consist chiefly of moderately deep or deep, moderately well drained or well-drained soils that have moderately fine texture to moderately coarse texture. Group C soils have a slow rate of infiltration. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture. Group D soils have a very slow rate of infiltration. These consist chiefly of clays that have high shrink-swell potential, soils that have a high water table, soils that have a claypan, and soils that are shallow over nearly impervious material.

3.4.1.3 Reclamation Potential

Reclamation potential is dependent on the soil structure, pH conditions, and soil salinity. Excessive salinity (salt content), acidity, or alkalinity can inhibit the growth of desirable vegetation.

3.5 WATER RESOURCES

3.5.1 Surface Water

For purposes of this assessment, the surface water resource analysis area encompasses the area from west of the Rock Springs uplift to the Flaming Gorge Reservoir. This includes the Currant

Creek portion of the Greater Red Creek ACEC and the Sugarloaf SMA. Surface water hydrology is shown on Figure 3-1 in Appendix A.

The proposed Project Area is situated within the Little Mountain/Greater Red Creek watershed, which is situated within the Lower Green River watershed. Precipitation flows via local streams and draws of the relatively small local area watersheds (less than 100 square miles). Most of the streams in the proposed Project Area are intermittent receiving waters from runoff from rainfall, springs, or snow melt that drain from the east, beginning at just over 9,000 feet mean sea level (msl) in the Little Mountain area and flowing westward to Flaming Gorge Reservoir at 6,020 feet msl. Ten major streams and their tributaries are located in the proposed Project Area, including the West fork of Currant Creek, Sugarloaf Marsh Creek, Washam Wash, Jarvies Marsh Creek, Krause Marsh Creek, West Spring Creek, and Spring Creek (Table 3-2).

Table 3-2. Streams in the Proposed Rubicon Seismic Survey Project Area

| Stream Name | Approximate Length Within Project Area (mi.) |
|-------------------------|--|
| West Fork Currant Creek | 2.26 |
| Sugarloaf Marsh Creek | 6.07 |
| Spitzi Creek | 0.1 |
| Washam Wash | 9.24 |
| Jarvies Marsh Creek | 3.17 |
| Krause Marsh Creek | 9.81 |
| West Spring Creek | 2.96 |
| Spring Creek | 3.17 |

Most of the proposed Project Area is within the BLM Sugarloaf Basin Special Management Area (SMA), where improving watershed condition and enhancing watershed value for groundwater recharge is a main management objective (BLM 1997). The eastern portion of the Project Area is located in the Currant Creek portion of the Greater Red Creek ACEC (BLM 1997). The Wyoming Game and Fish Department (WGFD) considers the Little Mountain/Red Creek Watershed a high priority for protection. The East, Middle, and West Forks of Currant Creek are the perennial headwaters on the east flank of Little Mountain and flow north toward the main fork of Currant Creek. The WGFD lists Currant Creek as an important watershed for supporting native (e.g., Colorado River cutthroat trout, speckled dace, and mountain sucker) and sport (e.g., rainbow and brown trout) fish populations, as well as terrestrial wildlife (WGFD 2003). A primary BLM management action is that “all resource and land uses in the area will be managed in support of watershed stability and Colorado River Cutthroat Trout (CRCT) habitat management objectives” (BLM 1997).

Existing land use activities and events in the area that the BLM and WGFD considers as having potential effects on water resources include wildfire, livestock grazing, wild horse range, big game range, unimproved and improved roads, OHV use, dispersed recreation, and fire wood cutting. The overall lack of development or intensive land use activities in the area has resulted in relatively little anthropomorphic impact to surface water quality. However, advanced vegetative succession caused by a combination of fire suppression and improper grazing management practices have more recently accelerated a decline in the quality and function of the Currant Creek watershed (WGFD 2003). The Little Mountain/Red Creek Watershed Project has been ongoing since 1992, and additional project activities are currently identified and being planned with the BLM (WGFD 2003).

The Wyoming Department of Environmental Quality Water Quality Division (DEQ/WQD) classifies Currant Creek as Class 2AB waters. These waters are characterized as “known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable” (DEQ/WQD, 2001). These waters may be protective of water quality that provides support for drinking water, recreation, wildlife, agriculture, industrial use, scenic value, and other aquatic life. DEQ/WQD classifies Sugarloaf Marsh Creek and Washam Wash as Class 3B waters. Class 3B waters are characterized as protective for recreation, wildlife, agriculture, industrial use, scenic value, and other aquatic life, but not game and non-game fishing or fish consumption (DEQ/WQD, 2001). Aquatic life standards are relatively stringent as compared to other uses, such as agriculture, because cold water fisheries are very susceptible to water quality degradation. For example Class 2 waters can be only nominally influenced by human activity for parameters such as turbidity, dissolved oxygen, and temperature.

There is no water quality data for creeks within the proposed Project Area based on a search of the EPA STORET and USGS National Water Information System (NWIS) online databases. The EPA National Aquatic Survey collected one sample for Currant Creek in September 2000 (STORET, 2008). The pH was 8.47 and the temperature was 17.4 degrees Celsius. Currant Creek has relatively low TSS (62.5 mg/L).

There are no gauging station data for the Krause Marsh Creek watershed, which is located within the Project Area. Three discharge records were collected just to the north on Upper Marsh Creek by the USGS over the last 30 years (USGS 2007). Upper Marsh Creek has very similar hydrologic and geologic characteristics to Middle Marsh Creek, although it has more than twice the watershed area. The discharge measurements were 0.6 cfs on March 30, 1.2 cfs on May 13, and 0.1 cfs on June 12 (Mason & Miller 2004). These data suggest that the lower reaches of Middle Marsh Creek are possibly perennial in nature. Krause Marsh Creek is believed to be a perennial stream at its headwaters and becomes intermittent at its lower reaches (D. Doncaster, BLM RSFO Hydrologist, pers. comm. with D. Kane, TEC, Inc., June 5, 2008). The stream

receives water from snow melt on Little Mountain and from rainstorms. Some of the flow into Krause Marsh Creek also comes from springs along the west flank of Little Mountain.

The DEQ/WQD collected one water sample in Upper Marsh Creek in 1997 (STORET, 2008). Based on similar climactic, hydrologic, geologic, and land use conditions, the water quality in Krause Marsh Creek should be similar to Upper Marsh Creek. Upper Marsh Creek is characterized as having moderate to high hardness (mean = 560 mg/L), moderate to high alkalinity (mean = 337 mg/L), near neutral pH (mean 8.0), and a fairly high TSS (mean = 565 mg/L).

According the EPA EnviroMapper there are no water discharge permits, toxic waste release sites, hazardous waste sites, CERCLA-related sites, or impaired streams in the proposed Project Area (EPA 2008).

3.5.2 Groundwater

For purposes of the ground water assessment, the analysis area includes the Currant Creek portion of the Greater Red Creek ACEC and the Sugarloaf SMA. These areas are within the Flaming Gorge Subbasin of the Green River watershed. Ground water resources are relatively undeveloped in the analysis area, primarily because landownership is almost entirely federal. As a result, information on aquifer properties, well yields, recharge/discharge relations, and water quality is limited and primarily available for wells from outside the proposed Rubicon Project Area. The most comprehensive assessment of ground water resources in this area was completed by the U.S. Geological Survey (USGS) in 2004 (Mason and Miller 2004).

3.5.2.1 Regional Ground Water Aquifers

The primary aquifers in the proposed Project Area are in the Tertiary Green River and Wasatch Formations. These units form the majority of bedrock surface exposures and are the most widely used aquifers in Sweetwater County (Mason and Miller 2004). Static water-level depths are generally less than 200 feet below ground surface (bgs) and most aquifers are confined and contain water under artesian conditions. In the Tertiary aquifers, ground water flows to the west toward Flaming Gorge Reservoir (Mason and Miller 2004). The Bishop Conglomerate is potentially an unconfined aquifer, but in most places the deposits are topographically high and probably well-drained. Unconfined Quaternary aquifers may be present locally in alluvium along perennial reaches of Currant Creek or Marsh Creek and in landslide deposits.

In the southern part of the Sugarloaf SMA, the Tertiary Fort Union Formation and the Upper Cretaceous Mesaverde Group (primarily the Ericson Sandstone and Rock Springs Formation) are important aquifers. Aquifers are also present in older Mesozoic and Paleozoic strata throughout the region. However, they are deeply buried (greater than 2,600 feet) and water quality is generally poor (Mason and Miller 2004).

According to the Wyoming State Engineers Office (WSEO) groundwater database, there are no ground water wells that have been drilled within the proposed Project Area (WSEO 2008); however, a few miscellaneous use wells have been installed to the south and southeast of the proposed Project Area. One monitoring well was drilled by the BLM in 1992 on the southwestern flank of Little Mountain. The well was drilled to approximately 330 feet below ground surface (bgs) (presumably into the Laney Member of the Green River Formation) and was a dry hole. The well was subsequently abandoned and cancelled (A&C).

Wells in the vicinity of the proposed Project Area are near the contact between the Green River (undifferentiated Wilkins Peak-Tipton Shale Members) and the Main body of the Wasatch Formation. The predominant lithologies in the Wilkins Peak Member are mudstone, marlstone, oil shale, and trona beds. The potential for ground-water development is considered poor except near recharge areas (Mason and Miller 2004; Welder 1968).

3.5.2.2 Groundwater Quality

Regionally, groundwater quality is highly variable and tends to deteriorate with increasing distance from recharge areas and with increasing depth below land surface (Mason and Miller 2004). Total dissolved solids (TDS) concentrations tend to be marginally high (greater than 500 mg/L) to high in most areas and many samples contained relatively high sulfate, boron, iron, and manganese (compared to USEPA and WDEQ drinking water standards). The shallower Tertiary aquifers, especially near recharge areas, contain water that can be suitable for most uses (domestic, livestock, irrigation, and industrial). At depths greater than a few thousand feet, ground water tends to have TDS concentrations that make it moderately saline (TDS greater than 10,000 mg/L) to briny (TDS greater than 35,000 mg/L) and unsuitable for most uses.

There are twelve water-quality samples that were collected by the USGS near the proposed Project Area (Mason and Miller 2004). Eleven of the twelve samples are from springs and a single sample is from a well located in the headwaters of Sage Creek. The samples represent water from the Green River Formation (6 samples), the Wasatch Formation (4 spring samples, 1 well sample), and the Bishop Conglomerate (1 sample). Table 3-3 provides a summary of key water quality parameters for the Wasatch and Green River samples.

Table 3-3. Groundwater Quality Summary

| Parameter | Wasatch Formation | | Green River Formation | |
|-----------------------------------|-------------------|----------|-----------------------|---------|
| | Median | Range | Median | Range |
| TDS (mg/L) | 413 | 287–2380 | 550 | 246–987 |
| Sulfate (SO ₄) (mg/L) | 130 | 50–1400 | 141 | 30–490 |
| Manganese (Mn) (µg/L) | <10 | <10–20 | <10 | <10–10 |
| Iron (Fe) (µg/L) | 120 | 20–410 | 30 | <10–30 |

The sample from the Bishop Conglomerate had a TDS of 298 mg/L. In general, the results indicate that water from the springs and wells is suitable to marginally suitable for domestic use and suitable for livestock and industrial purposes. Most of the samples were collected near recharge areas and may be biased toward better water quality. None of the samples were collected from the spring in Krause Marsh Creek drainage, but presumably water quality would be within the ranges observed for the USGS samples, since both proposed wells are near recharge areas and in similar geologic settings.

3.5.2.3 Recharge/Discharge

Recharge to ground water occurs by infiltration of precipitation on outcrop areas, infiltration of snowmelt runoff, and leakage from streamflow. The estimated groundwater recharge per year to the Tertiary aquifers in the proposed Project Area is less than 0.5 inches per year, although higher altitude areas generally have higher precipitation and greater recharge. The higher-altitude areas in the proposed Project Area (primarily Little Mountain and vicinity) receive an estimated 12–16 inches of precipitation per year; lower altitude areas typically receive around 7–8 inches per year (Mason and Miller 2004). May is usually the month with the highest precipitation.

Groundwater discharge occurs mainly as seepage to streams and the Flaming Gorge Reservoir, and discharge to springs, evaporation, and as underflow along streamways and aquifers that extend out of the Green River Basin (Mason and Miller 2004). Springs are common around Little Mountain and most have perennial discharge (Dennis Doncaster, BLM RSFO Hydrologist, pers. comm., on June 5, 2008). Withdrawal of ground water from wells for domestic, agricultural, and industrial (oil and gas) purposes is currently negligible, because there are very few water wells in this area and no nearby oil and gas production.

During June 2008, potential springs and seeps were field-checked in the vicinity of the proposed Project Area (O&G Environmental 2008e). Results of the survey indicated that 59 springs and seeps occurred in the proposed Project Area. Of these, 55 springs and seeps had perceptible flows, ranging from one gallon per minute (gpm) to approximately 15 gpm. Devon survey crews also initially identified 23 springs and seeps in the proposed Project Area. However, 11 of those sites were field-checked by O&G Environmental, and no spring or seep characteristics were identified (O&G Environmental 2008e). Results of the survey also suggested that at least 11 other sites were not likely to exhibit characteristics of springs or seeps (O&G Environmental 2008e).

3.5.3. Floodplains

The Green River RMP Waters and Floodplain map does not show floodplains within the proposed Project Area. There are no known FEMA floodplain maps covering the proposed Project Area.

3.6 VEGETATION

Vegetation resources within proposed seismic exploration Project Area are best understood in terms of plant communities and key species within those communities. Several data sources were evaluated to best understand the current vegetation communities. The composition of those communities is provided below. The unpublished NRCS Sweetwater County Wyoming Soil Survey (SCS 1979) provides mapping unit, soil series, and range site descriptions for the proposed Project Area. This soil information is used to interpret ecological sites and the plants found within those ecological groupings. While this particular Soil Survey was conducted in the late 1970s, it is still a draft and subject to change.

BLM's Instruction Memorandum No. 2007-202 (BLM 2007) notes that "the BLM utilizes ecological sites as the method to divide rangeland into basic units for study, evaluation and management". Ecological sites best describe plant communities and are used to understand Historic Climax Plant Communities (HCPCs). For the purposes of this EA, the NRCS-developed ecological site information for Wyoming was the primary source of information regarding plant communities (NRCS 2005).

No field inspections have taken place to verify plant communities.

3.6.1 Vegetation Communities

In the NRCS Shallow Breaks 10-14W ecological site description report (USDA 2008), the plant communities in the proposed seismic exploration area occur in three ecological states. The Historic Climax Plant Community (HCPC) is a bluebunch wheatgrass/juniper state. The second results from heavy season-long grazing and are in the juniper/Wyoming big sage state. The third is the cheatgrass state. The HCPC evolved with grazing by large herbivores. In addition to the three primary ecological states, there is an area along the east central side of the project boundary in the Little Mountain area that rises in elevation west to east. In the higher portion of this area, the vegetation changes to lodgepole pine, subalpine fir, and quaking aspen stands. Vegetation state descriptions are included below (WYNDD 2008).

3.7 WETLANDS AND RIPARIAN AREAS

3.7.1 Wetlands

Wetlands are subject to a variety of federal and state regulations including the Clean Water Act (CWA), Rivers and Harbors Act, and the Wyoming Water Quality Regulations and the related Surface Water Quality Standards. In addition, Executive Order (EO) 11990 and federal statutes require federal agencies to take action to minimize the destruction, loss, or degradation of wetlands. The Corps of Engineers (COE), through Section 404 of the CWA and Section 10 of the Rivers and Harbors Act, is the lead permitting and regulatory agency with jurisdiction over activities in waters of the United States, including wetlands.

The National Wetlands Inventory (NWI) was queried to determine the location of mapped wetlands in the Rubicon Project Area. According to the NWI maps, several wetlands are located within the proposed Project Area. They consist of the springs in the area, shown on Figure 3-1 in Appendix A. Because these springs are in an arid environment, they are of greater importance to local wildlife.

3.7.2 Riparian Areas

Riparian areas are defined as lands between open water and upland areas. Riparian areas in the proposal area are generally characterized by willow or cottonwood woody vegetation and are important wildlife habitat for many of the species present in the area. Riparian areas are located along perennial parts of Currant Creek, but occur only sporadically along the ephemeral Krause Marsh Creek and the other seasonal creeks running east to west into Flaming Gorge Reservoir that cross the proposed Project Area (Appendix A, Figure 3-1).

3.8 INVASIVE NONNATIVE PLANT SPECIES

Noxious and invasive weeds inhabit about 1.3 million acres in Wyoming. They pose a significant threat to Wyoming crop lands, rangelands and natural areas. Wyoming has long recognized the importance of managing noxious weeds, with its first noxious weed law legislated in 1913 (Wyoming Weed Management Strategic Plan 2003). Noxious weeds, as defined by the Wyoming Weed and Pest Control Act of 1973, are weeds, seeds or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect, or as carriers of diseases or parasites that exist within this state. The Sweetwater County Weed and Pest Control District has identified four weeds of concern for the county, including black henbane, foxtail barley, lady's bedstraw and mountain thermopsis (Table 3-4).

Table 3-4. Invasive Non-Native Plant Species Potentially Occurring in the Proposed Rubicon 3D Seismic Survey Project Area.

| Common Name (Scientific Name) |
|---|
| Black henbane (<i>Hyoscyamus niger</i>) |
| Foxtail barley (<i>Hordeum jubatum</i> L.) |
| Lady’s bedstraw (<i>Galium verum</i> L.) |
| Mountain thermopsis (<i>Thermopsis montana</i> Nutt) |
| Cheatgrass (<i>Bromus tectorum</i>) |
| Halogeton (<i>Halogeton glomeratus</i>) |

Source: J. Glennon, BLM RSFO Botanist, pers.comm., with Marion Fischel, TEC, Inc, July 1, 2008.

There has been no formal noxious weed mapping in the proposed Project Area. However, cheatgrass, halogeton, and henbane are probably present in the proposed Project Area (J. Glennon, BLM, July 1, 2008).

3.9 SPECIAL STATUS SPECIES

The BLM is required to protect and manage threatened, endangered, proposed, and sensitive species on land administered by the agency. BLM also provides protection and manages for sensitive species jointly with the Wyoming Game and Fish Department and the U.S. Fish and Wildlife Service. Table 3-5 lists the federally listed threatened and endangered species, and BLM listed sensitive species that could potentially occur in the proposed Project Area.

Table 3-5. Federally Listed and BLM Listed Sensitive Animal and Plant Species Potentially Occurring in the Proposed Rubicon 3D Seismic Survey Project Area.

| Common Name (Scientific Name) | Family | Global Rank ¹ | State Rank ¹ | Federal Status | BLM Status |
|---|------------------|--------------------------|-------------------------|----------------------------------|---------------|
| Animal Species | | | | | |
| Black-footed ferret (<i>Mustela nigripes</i>) | Mustelidae | G1 | S1 | USFWS Endangered | Same as USFWS |
| Canada lynx (<i>Lynx canadensis</i>) | Felidae | G5 | S1 | USFWS threatened | Same as USFWS |
| Pygmy rabbit (<i>Brachylagus idahoensis</i>) | Leporidae | G4 | S1 | USFWS petitioned for ESA listing | Sensitive |
| Wyoming pocket gopher (<i>Thomomys clusius</i>) | Geomyidae | G2 | S2 | USFS R2 Sensitive | Sensitive |
| Gray wolf (<i>Canis lupus</i>) | Canidae | G4 | S1 | Recently delisted from ESA | Sensitive |
| Townsend’s big-eared bat (<i>Corynorhinus townsendii</i>) | Vespertilionidae | G4 | S2 | USFS R2 sensitive, | Sensitive |

CHAPTER 3: AFFECTED ENVIRONMENT

| Common Name (<i>Scientific Name</i>) | Family | Global Rank ¹ | State Rank ¹ | Federal Status | BLM Status |
|---|------------------|--------------------------|-------------------------|--|---------------|
| | | | | USFS R4 Sensitive | |
| Spotted bat (<i>Euderma maculatum</i>) | Vespertilionidae | G4 | S3 | USFS R2 Sensitive, USFS R4 Sensitive | Sensitive |
| Yellow-billed cuckoo (<i>Coccyzus americanus</i>) | Cuculidae | G5 | S1 | USFWS ESA Candidate, USFS R2 Sensitive | Sensitive |
| Greater sage grouse (<i>Centrocercus urophasianus</i>) | Phasianidae | G4 | S4 | USFWS ESA petitioned, USFS R2 Sensitive | Sensitive |
| Sage sparrow (<i>Amphispiza belli</i>) | Emberizidae | G5 | S3 | USFS R2 Sensitive | Sensitive |
| Brewer's sparrow (<i>Spizella breweri</i>) | Emberizidae | G5 | S5 | USFS R2 Sensitive | Sensitive |
| Ferruginous hawk (<i>Buteo regalis</i>) | Accipitridae | G4 | S4B | USFS R2 Sensitive | Sensitive |
| Sage thrasher (<i>Oreoscoptes montanus</i>) | Mimidae | G5 | S5 | N/A | Sensitive |
| Colorado pikeminnow (<i>Ptychocheilus lucius</i>) | Cyprinidae | G1 | SX | USFWS Endangered | Same as USFWS |
| Razorback sucker (<i>Xyrauchen texanus</i>) | Catostomidae | G1 | SX | USFWS Endangered | Same as USFWS |
| Humpback chub (<i>Gila cypha</i>) | Cyprinidae | G1 | SX | USFWS Endangered | Same as USFWS |
| Bonytail chub (<i>Gila elegans</i>) | Cyprinidae | G3 | S3 | USFS R2 Sensitive | Sensitive |
| Colorado River cutthroat trout (<i>Onchorynchus clarki pleuriticus</i>) | Salmoninae | G4/T2 | S1 | USFWS petitioned for ESA listing, USFS R2 Sensitive, USFS R4 Sensitive | Sensitive |
| Midget faded rattlesnake (<i>Crotalus concolor</i>) | Viperidae | G5/T3 | S1 | N/A | Sensitive |
| Ownbey's thistle (<i>Cirsium ownbeyi</i>) | Asteraceae | G3 | S2 | N/A | Sensitive |

¹**Heritage Rank:** WYNDD uses a standardized ranking system originally developed by The Nature Conservancy and its network of natural heritage programs (now coordinated by Nature Serve [Arlington, Virginia]) to indicate the probability of extinction, at both the global and state scales, of each plant and animal taxon. The following letters denote the spatial scale at which a taxon's status is scored: G = Global rank: refers to the range-wide probability of extinction for a species; S = State rank: refers to probability of extinction from WY for a given species. These letters are each followed by a numeric, 1-5 score: 1 = Critically imperiled because of extreme rarity (often <5 extant occurrences) or because some factor makes it highly vulnerable to extinction; 2 = Imperiled because of rarity (often 6-20 extant occurrences) or because of factors making it vulnerable to

extinction; 3 = Rare or local throughout its range or found locally in a restricted range (often 21-100 known occurrences); 4 = Apparently secure, although it may be quite rare in parts of its range, especially at the periphery; 5 = Demonstrably secure, although it may be rare in parts of its range, especially at the periphery.

Source: Wyoming Natural Diversity Database <http://uwadmnweb.uwyo.edu/wyndd/>

3.9.1 Federally Listed Species

The Endangered Species Act of 1973 (ESA), as amended, requires that Federal agencies protect those species listed under the Act. The endangered or threatened species listed by the U.S. Fish and Wildlife Service that are potentially present in the proposed Project Area include the black-footed ferret, Canada lynx, Ute ladies'-tresses, and four endangered Colorado River fish (bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker). Three species that may occupy habitat in the area are currently being petitioned for federal listing. The pygmy rabbit, Wyoming pocket gopher, and greater sage-grouse are both in the status review process, which is the initial step to possible ESA listing. The yellow-billed cuckoo is an ESA candidate species that is found in the region, but is not expected to be found in the proposed Project Area. Both the pygmy rabbit and yellow-billed cuckoo have been identified as occurring in the proposed Project Area (WYNDD 2008). The nearest population of white-tailed prairie dogs, the primary prey species of black-footed ferrets, is the Baxter Basin prairie dog colony located north of I-80 in central Sweetwater County.

3.9.1.1 Greater Sage-grouse

A status review process by the USFWS is currently underway for the greater sage-grouse (*Centrocercus urophasianus*) to determine if it warrants listing under the ESA. It is also a BLM Sensitive Species. The greater sage-grouse, (sage-grouse) is highly dependent upon sagebrush-steppe habitat. It relies on sagebrush not only for forage but also for cover from predators, brood-rearing, and shelter from the elements year-round (Schroeder et al. 2004; Aldridge and Boyce 2007). Sage-grouse also require open locations with high visibility and adequate escape cover for courtship and mating. Mating areas are referred to as "leks" (Connelly et al. 2000).

The greater sage-grouse has been extirpated from approximately half of its pre-settlement range (Schroeder et al. 2004). Threats include conversion of grasslands and sagebrush-steppe habitat to dry-land farming as well as invasion of weedy species, such as cheatgrass. Most recently, outbreaks of West Nile virus have been major contributors to the sage-grouse decline (Naugle et al. 2005; Schroeder et al. 2004, Holloran 2005, Naugle et al. 2006, and Walker et al. 2007). In recent studies to determine how sage-grouse respond to gas field and coal bed methane development considering multiple variables, including male lek attendance, nesting success, - egg-laying success, juvenile survival, and overall population vigor, Holloran (2005) and Naugle et al. (2006) concluded that sage-grouse populations are highly likely to decline from extensive

energy field development, when there is extensive surface occupancy. Naugle et al. (2006) concluded that when drilling was conducted near active leks and nesting areas, declines would be expected at least two miles from the drilling site. There are four leks outside, but adjacent to the proposed Project Area. Two are southeast of the proposed Project Area boundary, one is southwest and one is northwest. All are more than the two-mile avoidance distance required by BLM outside the proposed Project Area.

3.9.2 BLM Sensitive Species

Sensitive migratory birds that may occur in the proposed Project Area include the loggerhead shrike, sage thrasher, sage sparrow, and Brewer's sparrow.

3.9.2.1 Raptors

The BLM has mapped raptor nest sites in the Green River planning area. An additional field survey of raptor nest sites within the proposed seismic exploration area was conducted by on April 22, 2008 (O&G Environmental, 2008c).

Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) is found in Sweetwater County, Wyoming. The hawk is protected by the Migratory Bird Treaty Act of 1918. The ferruginous hawk's breeding and nesting habitat is found in the prairie shrublands, plains in the foothill grasslands, riparian areas and rocky outcrops. No nests were identified within the proposed seismic exploration area (O&G Environmental, 2008a).

Golden Eagle

The golden eagle (*Aquila chrysaetos*) is found in Sweetwater County, Wyoming. The eagle is protected by the Bald and Golden Eagle Act of 1962. The golden eagle's breeding and nesting habitat occurs in open areas near trees or cliffs. One active nest was observed during the raptor survey less than a mile outside the proposed seismic exploration area and one inactive nest was observed along the southern boundary of the area (O&G Environmental, 2008c).

Northern Harrier

The northern harrier (*Circus cyaneus*) is found in Sweetwater County, Wyoming. The harrier is protected by the Migratory Bird Treaty Act of 1918. The northern harrier's breeding and nesting habitat can be found in the prairie or the foothills and often occurs in grasslands and marshlands. No nests were identified within the proposed seismic exploration area (O&G Environmental, 2008c).

Prairie Falcon

The prairie falcon (*Falco mexicanus*) can be found in Sweetwater County, Wyoming. The falcon is protected by the Migratory Bird Treaty Act of 1918. The falcon's breeding and nesting habitat is found on cliffs, rocky outcrops, ledges and holes overlooking open areas. One active nest was identified less than one mile outside the proposed seismic exploration area (O&G Environmental, 2008c).

Red-tailed Hawk

The red-tailed hawk (*Buteo jamaicensis*) is found in Sweetwater County, Wyoming. The hawk is protected by the Migratory Bird Treaty Act of 1918. The red-tailed hawk's breeding and nesting habitat occurs below 9,000 feet and is associated with open foraging areas with nearby trees or cliffs. The raptor nest survey identified a total of 10 active nests, three of the nests within the proposed Project Area and seven within approximately one mile outside of the project boundary. One inactive nest also was identified within a mile outside of the proposed Project Area boundary (O&G Environmental 2008c).

3.9.2.2 Mammals***Gray Wolf, Townsend's Big-eared Bat, and Spotted Bat***

BLM sensitive mammal species that potentially occur in the proposed Project Area include the gray wolf (*Canis lupus*), Townsend's big-eared bats (*Corynorhinus townsendii*), and spotted bats (*Euderma maculatum*).

Townsend's big-eared are dependent upon caves or mine entrances for shelter (Sherwin et al. 2000). There is some evidence they may utilize trees as temporary day roosts (Miller et al. 2003). Within the proposed seismic exploration area, large diameter juniper or pinyon pine trees are most likely to provide such roosts.

Spotted bats are known to occur in wide variety of habitats from desert scrub to coniferous forest, although it most often observed in low deserts and basins and juniper woodlands (WGFD 2008b). It generally roosts in cracks and crevices on cliffs and canyons (Wai-Ping and Fenton 1989; WGFD 2008b). It also may occasionally roost in buildings, caves, or abandoned mines, although cliffs are the only roosting habitat in which reproductive females have been documented (WGFD 2008b). Its distribution in Wyoming is still unknown, although it may be expected to occur throughout western Wyoming and perhaps statewide in suitable habitat (WGFD 2008b). The steeper ridges near Little Mountain and scattered rock outcroppings in the proposed Project Area may provide some, albeit, marginal habitat.

3.9.2.3 Reptiles and Amphibians

Midget Faded Rattlesnake

The midget faded rattlesnake (*Crotalus concolor*) is a BLM Sensitive Species and Wyoming Special Status Species (WYNDD 2008), and is the smallest member of the nine western rattlesnakes. It makes short seasonal movements and can be found in the vicinity of its den throughout the active season (Ashton and Patton 2001; Ashton 2003; Parker and Anderson 2007). Though population densities are lower than other subspecies of the western rattlesnake, populations still remain relatively dense around rock outcrops used for communal denning sites (Parker and Anderson 2007). Midget faded rattlesnakes were observed at approximately 25% of known Green River Basin sites containing rock outcrops (Parker and Anderson 2007). They conducted a study of the ecology and behavior of midget faded rattlesnakes in the Flaming Gorge area from 2000 to 2002 and observed 13 den locations and over 400 snakes. The elevation range for the dens was between 1,840 m and 1,975 m and snakes were located between 1,840 m and 2,125 m. Figure 3-4 (Appendix A) shows the suitable elevation ranges in relationship to the proposed Project Area.

3.9.2.4 Fish Species

Colorado River Cutthroat Trout

The Colorado River Cutthroat Trout (CRCT) (*Oncorhynchus clarki pleuriticus*) is a BLM listed Sensitive Species and a State Species of Special Concern (WYNDD 2008). The CRCT is of primary management concern in the Currant Creek and Sage Creek watersheds, and both watersheds are part of the BLM's Greater Red Creek ACEC established, in part, to reestablish and protect the CRCT and its native habitat. The CRCT is the only trout native to the Green and Little Snake river drainages in Wyoming. The CRCT now occupies less than 1% of its historic range (CDOW 2006). The CRCT is currently being evaluated by the U. S. Fish and Wildlife Service (USFWS) for listing under the Endangered Species Act (ESA).

The Currant Creek portion of the Greater Red Creek ACEC lies in the northeastern portion of the proposed Project Area, and is separated from the majority of the proposed Project Area by a higher elevation ridge along the western flank of Little Mountain. One stream that runs north into Currant Creek lies within the proposed Project Area boundary near the northeast corner. According to *Range-wide Status of Colorado River Cutthroat Trout* (CDOW 2006) there is a population of CRCT in the Currant Creek watershed. This population is considered to be an isolated conservation population that is at risk of hybridizing or has already hybridized with non-native rainbow and cutthroat trout. Most of the CRCT occupied habitat throughout the Currant Creek watershed is in fair condition (CDOW 2006). There is an estimated **xx miles** of potentially occupied CRCT habitat in the Currant Creek watershed. Since 1992, the WGFD,

BLM, and Trout Unlimited have jointly been involved in restoration of the Currant Creek watershed to reconnect populations in isolated head waters into a large interconnected population. In Currant Creek there is an estimated CRCT population density of xxx-xxx fish per stream mile, with that number decreasing further upstream.

According to the Green River RMP, all resource and land uses are to be managed in support of watershed stability and CRCT habitat management objectives because watershed function has been degraded in many headwater stream habitats by a variety of anthropogenic activities and fire suppression resulting in the decline or loss of aspen and beaver (BLM 1997 and WGFD 2008b). CRCT begin spawning on the declining side of high flows in the late spring and continuing through early July at higher elevations (WGFD 2008b). To protect CRCT populations, the WGFD closes fishing on Currant Creek from April 1 through June 30 (WGFD 2008a). The WGFD requires that all cutthroat trout caught after June 30 be released to the water immediately and only artificial flies and lures can be used to fish Currant Creek.

3.9.2.5 Sensitive Plant Species

Ownbey's thistle

Ownbey's thistle (*Cirsium ownbeyi*) is the only known sensitive plant species in the proposed project. (J. Glennon, BLM RSFO Botanist. pers. comm.. with L. Moore, O&G Environmental, May 13, 2008, and M. Fischel, TEC, Inc., July 1, 2008). Ownbey's thistle is often found at the base of shale cliffs, but can also be found along shale flats and rim tops at elevations ranging from 6,440 to 8,200 feet. It is frequently associated with soils consisting of loose shale and sandy clay soils covered by slate fragments, and in sparsely vegetated areas generally associated with desert shrub communities. It can also be found in areas along dirt two-track roads with loose shale soils. The population is thought to be stable, but long-term monitoring information is not available. Based on this information, a focused field survey was conducted in June 2008 (O&G Environmental 2008e).

3.10 WILDLIFE AND FISHERIES

3.10.1 Big Game Species

The term big game includes those large mammals that are typically hunted for recreational purposes and, in the proposed Project Area, include mule deer, pronghorn and elk. Habitat for these species is typically defined by the ranges that are used seasonally, i.e. winter range, spring range, or summer/fall range.

3.10.1.1 Big Game Migration Corridors

Big game migrate seasonally to find suitable foraging and thermal conditions, i.e. warmer, low elevations in winter, and cooler, high elevations in summer. Forage availability, ambient temperatures that minimize stress, avoiding impediments to movement (i.e. deep snow), suitability of parturition areas, and avoidance of predation are all factors influencing seasonal habitat selection (Marcum 1975). Migration corridors are routes between seasonal ranges. In the Little Mountain area, elk groups consisting of bulls and groups consisting of cows, yearlings, and calves converge as they migrate west and east to lower elevations during late summer and fall (M. Zornes, WGFD Green River Wildlife Management Coordinator, pers. comm., June 27, 2008). The groups separate again returning to the higher elevations in late spring and early summer as snows recede and preferred forage becomes more available.

3.10.1.2 Pronghorn

Pronghorn (*Antilocapra americana*) occur in the proposed Project Area. The WGFD (2007) has designated three ranges utilized by pronghorn antelope in the vicinity of the area: Spring/summer/fall pronghorn range, winter/yearlong pronghorn range, and crucial winter/yearlong pronghorn range. About one-third of the proposed Project Area falls contains pronghorn spring- summer-fall range (Appendix A, Figure 3-4).

The pronghorn population in the proposed Project Area is designated by WGFD as the South Rock Springs Herd (Herd Unit #412, Hunt Area #112). The proposed Project Area occurs within the pronghorn hunt area (Appendix A, Figure 3-5). The population size was estimated to be 5,900 individuals in 2006, slightly below the WGFD objective of 6,500 individuals. From a sample of 1,812 pronghorn, the ratio of fawns to bucks to does was 63:46:100, respectively (WDGF 2006).

3.10.1.3 Elk

Elk (*Cervus canadensis*) are common throughout the proposed Project Area and are part of the South Rock Springs Herd. The WGFD considers this herd as an interstate herd, with groups moving between Wyoming, Utah and Colorado (M. Zornes, WGFD Green River Wildlife Management Coordinator, personal communication on June 27, 2008). The population size of the herd was approximately 1,500 animals in 2006, above the WGFD objective of 1,000 animals. Accurate population estimates and management in this area are problematic because the herd ranges into Colorado and Utah. Aggressive management through hunting has been utilized, with targeted harvests of 200 bulls, 235 cows, and 40 calves during the 2007 hunting season. Average age of bulls harvested in 2006 was 4.2 years, down slightly from the 2005 average of 4.4. The proposed Project Area is located within Hunt Units 31 and 32 (Table 3-6).

The WGFD has designated two elk ranges in the area: yearlong elk range and crucial winter/yearlong elk range. In addition, there is a parturition area (an area with seasonally high concentrations of birthing animals) located in the northern and eastern portion of the proposed Project Area and extending across Little Mountain. The peak calving period occurs between May 15 and June 15. The western portion of the proposed Project Area overlies crucial winter/yearlong elk range (Appendix A, Figure 3-6).

3.10.1.4 Mule Deer

Mule deer (*Odocoileus hemionus*) are a common inhabitant of the proposed Project Area. The proposed Project Area is within crucial winter/yearlong mule deer range (Appendix A, Figure 3-7). The mule deer population in the proposed Project Area is designated by WGFD as the South Rock Springs Herd (Unit # 424 and Hunt Unit 102; Appendix A, Figure 3-7). This herd size is below the WGFD objective of 11,750 individuals, with an estimated population of 6,600 individuals in 2006 (WFD 2006). The population is slowly increasing due to natural fires and BLM prescribed burns (WGFD 2006). However, the recent drought has decreased fawn survival and mature buck recruitment. Average age of sampled bucks has decreased by almost one year from 4.7 in 2005 to 3.9 in 2006. A sample of 1,254 deer had a ratio of fawns to bucks to does of 62:32:100, respectively.

3.10.2 Upland Game Birds

Upland game birds that may occur in the proposed Project Area include sage grouse, blue grouse, chukar, mourning dove, and occasionally ruffed grouse and gray (Hungarian) partridge (WGFD 2004).

3.10.3 Migratory Birds

Some of the more common migratory bird species that may be present in the vicinity of the proposed Project Area during the breeding season or migration include various species of waterfowl, turkey vulture, various species of warblers, raven, magpies, crows, western scrub jay, swallows, spotted and green-tailed towhees, vesper sparrow, western meadowlark, and horned lark. The presence of the gray flycatcher (*Empidonax wrightii*), juniper titmouse (*Baeolophus griseus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Poliophtila caerulea*), and black-throated gray warbler (*Dendroica nigrescens*) represents an assemblage typically associated with mature pinyon-juniper stands (Pavlacky 2000; Pavlacky and Anderson 2001; WYNDD 2008). However, the 60,000-acre (approximate acreage) Sheep Creek wildfire substantially reduced the habitat suitability for these species in the project vicinity.

3.10.4 Fisheries

BLM-administered public lands in the area contain waterways ranging from those that flow only intermittently early in the spring and summer to relatively large rivers such as the Green River west of the Project Area. There are also major reservoirs in the vicinity of the Project area including Flaming Gorge, Fontenelle, and Big Sandy. Most of the smaller streams contain only non-game fish like speckled dace, fathead minnow, mottled sculpin or Bonneville redbreast shiner. Larger streams, such as the Green River, contain game fish which could include rainbow, brown, brook or cutthroat trout, kokanee salmon and mountain whitefish. The large reservoirs may also contain these species along with lake trout, channel catfish and smallmouth bass. The Wyoming Department of Environmental Quality Water Quality Division (DEQ/WQD) classifies Currant Creek as Class 2AB.

Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters include all permanent and seasonal game fisheries and can be either “coldwater” or “warm water” depending upon the predominance of cold water or warm water species present. All Class 2AB waters are designated as cold water game fisheries unless identified as a warm water game fishery by a “ww” notation in the “Wyoming Surface Water Classification List.” Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value uses.

Prior to restoration efforts that included reintroduction of beavers to the creek in the 1980’s, Currant Creek was characterized as having submarginal trout habitat as a result of heavy livestock grazing and water diversions for irrigation (WDEQ/WQD, 2008). Currant Creek is currently closed to fishing from April 1 through June 30 in an effort to increase the Colorado River cutthroat trout population. The WGFD requires that all cutthroat trout caught after June 30 be released to the water immediately and only artificial flies and lures can be used to fish Currant Creek (WGFD 2008).

The Middle Marsh Creek watershed, which includes Krause Marsh Creek, likely does not support a fishery. It is apparently perennial at its headwaters and intermittent in the lower reaches. However, at least seasonally, some fish may move into lower Middle Marsh Watershed from the Flaming Gorge Reservoir. The DEQ/WQD classifies the waters Middle March watershed as Class 3B waters which are tributary waters that are not known to support fish populations, and where that use is not attainable. However, Class 3B waters can support and

sustain aquatic life communities including invertebrates, amphibians, and other flora and fauna, which inhabit the creek of this watershed at some stage of their life cycle (DEQ/WQD 2001).

3.11 CULTURAL RESOURCES AND NATIVE AMERICAN RELIGIOUS CONCERNS

3.11.1 Cultural Resources

Class III cultural resource inventories were conducted for the Rubicon 3-D seismic survey. Approximately 27,000 acres were included in the study area, all of which are administered by the BLM Rock Springs Field Office (RSFO). Of these, 1,473 acres were included in the APE and surveyed for cultural resources. The cultural resource Inventory objectives were to locate, document, and evaluate the extent of cultural resources that may be affected by geophysical seismic exploration and attendant proposed access routes. Information garnered from the Class III inventory is used to predict possible impacts to historic and archaeological resources that may result from oil and gas exploration and development in the area.

The Class III inventory was carried out in compliance with Federal and State legislation including Section 106 of the amended National Historic Preservation Act of 1966 (NHPA), the National Environmental Policy Act of 1969, the Archaeological and Historic Conservation Act of 1972, the American Indian Religious Freedom Act of 1978, and the Archaeological Resources Protection Act of 1979. The NHPA, in particular, promulgates national policy and procedures with regard to “historic properties,” which comprise regions, sites, buildings, structures, and objects that are included in or eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 of the NHPA requires the head of any Federal agency to take into consideration the effects of proposed undertakings on “historic properties” following regulations issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR 800).

The criteria for eligibility for nomination to the NRHP provide a systematic, definable means to evaluate historic and cultural properties. Site significance is evaluated based on the criteria set forth in Title 36 of the Code of Federal Regulations Section 60.4 (36 CFR 60.4) as supplemented by established guidelines (36 CFR 800). The criteria specified in 36 CFR 60.4 are as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or*
- (b) That are associated with the lives of persons significant in our past; or*

- (c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*
- (d) That have yielded or may be likely to yield information important in prehistory or history.*

In the region encompassing the proposed 3-D seismic operation, two prehistoric cultural sequences are recognized. These include the northern Great Plains sequence and the Great Basin sequence (Frison 1991; Metcalf 1987). While the former is generally associated with in situ cultural development based on large game hunting, the latter is associated with hunter-gatherer traditions that appear to have come from the deserts of Nevada and Utah (Ireland 1986: 55).

The historic period in the region encompassing the proposed 3-D seismic operation begins in the mid-eighteenth century with the explorations of French traders who entered the area from the north, likely following the Missouri River southwestward from the Mandan Villages near what is now Bismarck, North Dakota. As early exploration and westward migration expanded across Wyoming, several well-traveled routes were established that are today recognized as important historic properties. Examples of historic trails in Wyoming include the Sublette Cutoff of the Oregon Trail; Emigrant Springs, an historic campsite that is listed on the NRHP; the Hockaday Dempsey Trail; the Overland Migration Trail; and the Cherokee Trail, which lies to the north of the study area for the proposed 3D seismic project.

Survey Methods

Prior to starting the field work for the proposed 3-D seismic operation, a Class I files and literature search was conducted on April 29, 2008 at the Wyoming State Historic Preservation Office (SHPO) Cultural Records Office (CRO) for the Sections to be affected by the proposed Devon Energy Rubicon 3-D seismic project. The file search was conducted for Sections 1-6, T12N, R106W; Section 1, T12N-R107W; Sections 1-36, T13N - R106W, Sections 1,12-13, 24-25 and 36, T13N - R107W; Sections 31-36, T14N - R106W and Section 36, T14N - R107W. Results of the records search and pertinent highlights of current cultural resource knowledge of the proposed Project Area are summarized below.

The Green River Washakie Class II Inventory, a BLM-contracted sampling study conducted in 1982, comprises, by far, the largest of the previously conducted cultural resource inventory projects in the files search area. Within the (ca. 27,000-acre) Rubicon 3-D project boundary, ten separate 160-acre blocks were included in the 1982 study. *(SHPO-CRO records indicate that a half dozen other cultural resource projects have been conducted within the Rubicon 3-D files*

search area, but these are comparatively small and inventory acreage is not documented for the linear projects among them.) The referenced 1,600 acres of Green River-Washakie block survey comprises approximately 6% of the land within the Rubicon 3-D seismic project boundary. The vast majority of land to be affected by the currently proposed undertaking thus had not been subjected to cultural resource inventory prior to the 2008 field season.

In connection with the 1,600-acres of previously conducted block inventory, 18 cultural resource sites have been identified and recorded. This calculates to a moderately low site density of approximately 1 cultural resource site per 88 acres of inventory. Including all past inventory projects, a total of 24 cultural resource sites have been previously recorded within the proposed 3D seismic Project Area. Of these 24 sites, one contains both an historic and prehistoric component. Thus, the 25 previously recorded cultural manifestations consist of: 10 (40%) prehistoric lithic scatter sites, 8 (32%) prehistoric open camps containing fire-cracked rock and/or hearth features (one of which is notable as it contains Shoshonean ceramics), 5 (20%) historic debris scatter sites, and 2 (8%) historic structure sites. This ratio of site types is generally considered to be representative of the kinds of cultural resources found in the area. Other site types may also be present.

As the 24 previously known sites in the proposed Project Area were recorded more than 20 years ago, their agency/SHPO eligibility consultation is considered outdated. The National Register of Historic Places (NRHP) eligibility status of these sites is, therefore, treated as “Unknown.” As a matter of note, the original site records recommended 11 of the 24 subject sites as not eligible for the NRHP, 8 as eligible, and 5 as unevaluated. This demonstrates that significant sites are known to exist in the area covered by the files search. In addition, the presence of as yet undocumented significant sites is strongly suspected.

An intensive, 100 percent pedestrian survey was performed for the proposed Project Area comprising primarily linear survey areas. Linear access rights-of-way (ROW) were inventoried by walking a series of parallel transects spaced on both sides of the centerline within a 100-foot (approximately 30-meter) wide corridor. The seismic transmission lines were also covered by walking a series of transects within a 100-foot (approximately 30-meter) wide corridor. In addition, a 100' diameter area around each heli-portable shot-hole point was also included in the survey area. Block inventory areas, if identified, were surveyed in transects spaced no more than 30 meters apart. This included five 1-acre base station locales and one 500 x 500 foot (6-acre) helicopter landing zone (LZ) on BLM administered land. Special attention was given to areas of enhanced subsurface visibility such as erosion cuts and pans, drainage side profiles, road ditches, anthills, and the back dirt of animal burrows.

Summary of Inventory Results

The cultural resources inventory of the proposed 3D seismic Project Area and attendant access ROWs determined that no eligible historic properties occur within the surveyed areas. In addition, there is low potential for encountering intact buried cultural remains within sandy silt residuum and slopewash within the proposed Project Area. Within the inventoried areas, 23 ‘new’ sites were encountered and recorded and one previously recorded site was re-identified and fully updated. Of newly recorded sites, 16 are recommended as unevaluated and 8 are recommended as not eligible for nomination to the NRHP. In addition, four isolated finds and a single isolated resource were also recorded. By definition, isolated finds are considered not eligible for the NRHP. All of the sites identified as a result of the Rubicon 3-D seismic project will be avoided by project design.

3.11.2 Native American Religious Concerns

Prehistoric rock imagery, rock alignments, cairns, stone circle and potential funerary sites are considered highly sensitive by Native American groups historically associated with the proposed Project Area. If present, resources of these types may be eligible for inclusion on the NRHP or may be considered Indian Sacred Sites not as yet identified by Tribal representatives.

3.12 PALEONTOLOGY

The proposed Project Area is underlain by bedrock of the main body of the Wasatch Formation and the Wilkins Peak Member of the Green River Formation, the two formations interfingering with one another in strata. Bedrock underlying the proposed Project Area is for the most part overlain by a varying thickness of surficial deposits of alluvium, colluvium and aeolian sediments of Quaternary (Recent) age.

The high paleontological potential of the Wasatch Formation southern Wyoming is well known (Holroyd, 1999). Fossils of plants, invertebrates, and vertebrates have been reported from the Wilkins Peak Member. However, few fossil localities are known from the Wasatch Formation and Wilkins Peak Member in the vicinity of the proposed Project Area.

3.1 RECREATION

3.13.1 Dispersed Recreation

The Green River RMP provides Management Objectives and Actions for each applicable resource area. The RMP objectives for recreation management are to:

- Ensure the continued availability of outdoor recreational opportunities sought by the public while protecting other resources:

- Meet legal requirements for the health and safety of visitors; and
- Mitigate conflicts between recreation and other types of resource uses.

The proposed Project Area encompasses a portion of the Little Mountain Recreation Use Area. The area is managed to assure its continuing value for recreational opportunities. The area contains several popular mountain bike trails and a relatively long segment of the Little Mountain Back Country Byway.

The Little Mountain Recreation Use Area provides a wide array of year-long, motorized and non-motorized dispersed recreation opportunities. The most popular recreational pursuits include, but are not limited to: driving for pleasure, viewing scenery, wildlife viewing, Off Road Vehicle (ORV) riding, mountain bike riding, horseback riding, camping, hiking, hunting, and fishing. There are no developed recreation sites, such as campgrounds or picnic areas, in or in close proximity to the proposed Project Area; rather, dispersed camping and picnicking are emphasized instead. Part of the proposed Project Area is relatively close to State Highway 191. Information on vehicle and truck traffic on U.S. Highway 191 is provided in Section 3.16 (Access and Transportation). The State of Wyoming does not have a specific category for recreational vehicles. In Sweetwater County, County Roads 34 and 36 receive little traffic, though no specific information on recreational use of the county roads is available.

The Recreation Opportunity Spectrum (ROS) is a tool and a framework the BLM uses to inventory, plan, and manage recreational opportunities on public lands. The ROS classifies BLM-administered lands into six classes, based on three principal components: the environmental setting, the activities possible or managerial setting, and the experiences that can be achieved. The proposed seismic exploration area is classified as semi-primitive motorized and can be described as a predominantly natural or natural-appearing environment of moderate to large size where motorized recreation opportunities exist, are provided and can be experienced.

The Cherokee Historic Trail passes north of the proposed Project Area.

There are no numeric data available regarding recreation use in the proposed Project Area. The “BLM Wyoming 2005 Recreation Statistics” indicates there were 1,890,126 recreation visitor-days on BLM-administered lands in Wyoming in 2005. The northeastern portion of the proposed Project Area adjoins a Special Designation Management Area known as the Sage Creek Watershed portion of the Greater Red Creek ACEC. The recreation objectives for the entire ACEC are to:

- Provide opportunities for dispersed recreation uses in the area that are consistent with the primary watershed, riparian, and fisheries management objectives, and

- Allow the recreation user the opportunity to have a high degree of interaction with the natural environment, to have moderate challenge, and to use outdoor skills.

Part of the proposed seismic exploration area overlies the Sugarloaf Basin Special Management Area which is not an ACEC, but is maintained as a geographic management unit. The recreation objective for this area is “to provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives” (BLM 1997).

3.13.2 Hunting

The area is a popular for hunting, especially for big game trophy elk and mule deer, and to a lesser extent pronghorn. According to the Wyoming Game and Fish Department, demand for big game permits, especially elk and mule deer, in the area is extremely high. The Little Mountain area is well known for its trophy bull elk and buck mule deer. Upland game birds are also hunted in this area.

The proposed Project Area includes portions of the following herd units and hunt areas: South Rock Springs Elk Herd Unit 424 and Elk Hunt Areas 31 and 32; South Rock Springs Mule Deer Herd Unit 424 and Hunt Area 102; South Rock Springs Antelope Herd Unit 412 and Hunt Area 112; and Upland Game Hunt Unit 6. Elk Hunt Area 31 is relatively small and surrounded by Hunt Area 107 to the west; Hunt Area 30 to the northeast; and Hunt Area 32 to the east. The southern boundary of Hunt Area 31 is the Wyoming-Colorado state line. Mule deer Hunt Area 102 is much larger than Elk Hunt Area 31. Hunt Area 132 is the nearest other Mule Deer Hunt Area located over a township away to the west. The Pronghorn Hunt Area 112 is bordered by Hunt Area 95 to the west and northwest, and Hunt Area 59 to the north and northeast (Appendix A, Figures 3-5, 3-6 and 3-7). Hunting season information for each of the hunt area is shown in Table 3.13-1

The popularity of hunting for elk and mule deer in the area is largely due to the high hunter success (Table 3.-6) in the hunt areas within and adjacent to the proposed Project Area.

Table 3-6. 2006 Harvest for Elk and Mule Deer in the Vicinity of the Proposed Seismic Exploration Area.

| ELK | | | | | |
|------------------|------------------------|----------------------|-----------------------|---------------------|--------------------|
| Hunt Area | License/Hunters | Total Harvest | Hunter Success | Days/Harvest | Hunter-Days |
| 31 Little Mt. | 210 | 184 | 87.6% | 7.9 | 1452 |
| 32 Pine Mt. | 188 | 100 | 53.2% | 15.1 | 1515 |
| MULE DEER | | | | | |
| 102 Aspen Mt. | 374 | 282 | 75.4% | 7.9 | 2216 |

Source: WGFD <http://gf.state.wy.us/downloads/pdf/HarvestRpt/2006%20Elk.pdf>
 WGFD <http://gf.state.wy.us/downloads/pdf/HarvestRpt/2006%20Deer.pdf>

The WGFD provides information depicting the drawing odds and draw results by hunt area for the past three years (2005–2007). A general summary of 2007 data indicates a non-resident had less than a 1.40% chance of drawing an Any Elk license for Elk Hunt Areas 30, 31, or 32, and less than 0.43% chance of drawing a license in Elk Hunt Area 31. A resident had less than 6.00% chance of drawing an Any Elk license in Elk Hunt Areas 30 and 31 and about a 16.52% chance in Area 32. A nonresident had a 0.60% chance of drawing an Antlered Deer License in mule deer Hunt Area 102 and a resident had only a 9.45% chance. Nonresident antelope chances were 1.61% and resident odds were 61.26% for an Any Antelope License. More than 700 nonresidents applied for the quota of two Any Elk licenses in Hunt Area 31 and approximately 2,400 residents applied for the 83 available Any Elk licenses in Hunt Area 31. Approximately 2,100 nonresidents applied for the 11 Antlered Deer licenses available in Hunt Area 102 and over 3,500 residents applied for the available 300 licenses in the same hunt area. The data indicate the high demand for elk and mule deer permits in the vicinity of the proposed seismic exploration. In addition, some of the Governor’s and Wyoming Game and Fish Commissioners’ special big game licenses are used in this area.

The hunting seasons for upland game birds generally begins in September (blue grouse, sage grouse, and ruffed grouse) and depending on the species may extend to December (roughed grouse) or January (chukar and gray partridge) (Table 3-7). Sage grouse hunting is the shortest game bird season, extending 11 days from September 20-

Table 3-7. 2008 Upland Game Bird Hunting Seasons by Species

| Species | Hunting Season |
|----------------|----------------------------|
| Chukar | October 1 – January 31 |
| Gray partridge | October 1 – January 31 |
| Blue Grouse | September 1 – November 30 |
| Sage grouse | September 20 - 30 |
| Ruffed grouse | September 20 – December 31 |

3.13.3 Off-Highway Vehicle (OHV) Management

The Green River RMP management objective for OHV management is “to provide opportunity for off-road vehicle use in conformance with other resource management objectives.” The term ORV is used in the RMP, but has since been formally replaced with the term “off-highway-vehicle” or OHV.

OHV travel within the proposed Project Area is limited to designated roads and trails by the Green River RMP (Table 13). Designated roads and trails are those that are depicted on the current BLM land status map for the area. This limitation applies to all activities involving motorized vehicles. Most OHV use in the area occurs in late summer and throughout the fall during hunting season.

There are no seasonal OHV use restrictions in the area. Generally, over-the-snow vehicle use is subject to the restrictions above unless a site specific analysis determines that exceptions can be allowed. Snowmobile use is very sporadic due to limited snow cover. The winter of 2007/2008 was one of the first where snowmobiling has been possible over an extended time period. However, road access was limited or restricted, due to very limited snowplowing. No BLM transportation planning has been done for the area.

3.14 VISUAL RESOURCES

The BLM is required to manage public lands in a manner that will protect the quality of the visual (scenic) values in accordance with Section 102(a)(8) of FLPMA. The BLM Visual Resource Management (VRM) system provides the BLM with a methodological approach to identify visual (scenic) values, establish objectives through the RMP process or on a case-by-case basis for managing those values, and provide input into proposed surface-disturbing projects to ensure that the assigned objectives are met or intrusions are sufficiently mitigated. The VRM process considers the scenic quality of the landscape, the sensitivity of the viewer, and the distance from the viewer to the landscape. Based upon these characteristics, the BLM assigns a VRM class to the lands under their jurisdiction. The VRM classes and corresponding objectives are provided in Table 3.15-1.

Table 3-8. BLM Visual Resource Management (VRM Objectives)

| VRM Class | VRM Objective |
|-----------|---|
| I | To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention. |
| II | To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. |
| III | To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Contrasts to the basic elements of form, line, color and texture caused by management activity may be evident and begin to attract attention in the characteristic landscape. The changes should remain subordinate to the existing characteristic landscape. Structures located in the foreground distance zone often create a contrast that exceeds the VRM Class even when designed to harmonize and blend with the characteristic landscape. |
| IV | To provide for management activities that require major modification of the existing character of the landscape. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements of form, line, color, and texture inherent in the characteristic landscape. Structures located in the foreground distance zone often create a contrast that exceeds the VRM Class even when designed to harmonize and blend with the characteristic landscape. |

All surface disturbing actions, regardless of the visual resource management class, are required to be mitigated to reduce visual impacts (Green River RMP, pg 21). The proposed seismic exploration area is located in VRM Classes II and III according to the Green River RMP, Map 24 (BLM 1997). Most of the proposed Project Area is located in VRM III where the landscape can best be described as gently rolling juniper woodlands with rock outcroppings with adjacent sagebrush and mountain shrub habitats, with lesser amounts of riparian habitats. The eastern portion of the proposed Project Area is in VRM II, where the viewshed includes the higher elevations of Little Mountain and encompasses more rugged terrain, consisting of pinyon-juniper and aspen-conifer habitats with little human disturbance.

3.15 SOCIOECONOMICS

The proposed Project Area is located in Sweetwater County, Wyoming, which has a population of 39,305 residents (U.S. Census Bureau, 2007).

3.15.1 Local Economy and Employment

In 2005, per capita income in Sweetwater County was estimated to be \$38,039 (Headwaters Economics 2007), compared to the statewide value of \$32,808, and the national value of \$31,632 (U.S. Census Bureau, 2007). Unemployment in 2006 was 2.5%, below the state average of 3.2% and the national average of 4.6% (U.S. Census Bureau, 2007). The top five employment sectors are manufacturing, mining, accommodations and food service, health care, and retail. Employment is highest in the accommodations and food service sector followed by mining, manufacturing, health care, and retail. Average 2005 wages were greatest for those employed in manufacturing and mining.

3.15.2 Hunting and Recreation

Recreation, including big game hunting, is a major economic driver in Wyoming. In Wyoming, big game hunt units provide a significant source of revenue to the state and counties through fees and expenditures. For example, based on the WGFD 2006 Annual Report and the *Wyoming Resident and Nonresident Deer, Elk and Antelope Hunter Expenditure Survey* (2004), average per hunter total season expenditure for elk, deer, and pronghorn hunting units within the proposed Project Area was in excess of \$1,100 in 2005, with adjustment for inflation.

Exact figures on expenditures for other recreationists, including ORV users, camping, and fishing are unavailable. However, a survey conducted on resident and non-resident ORV users recreating statewide in Wyoming estimated that the average per user expenditure in 2005 was \$1,600 (Foulke et al. 2006).

3.16 AREAS OF SPECIAL DESIGNATION

3.16.1 Greater Red Creek Area of Critical Environmental Concern (ACEC)

The ACEC designation is an administrative designation used by the BLM that is accomplished through the land use planning process. It is unique to the BLM in that no other agency uses this form of designation.

The Federal Land Policy and Management Act (FLPMA) of 1976 states that the BLM will give priority to the designation and protection of ACECs in the development and revision of land use plans. BLM regulations (43 Code of Federal Regulations part 1610) define an ACEC as an area “*within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.*” Private lands and lands administered by other agencies are not included in the boundaries of ACECs. ACECs differ from other special management designations, such as wilderness study areas, in that designation by itself does not automatically prohibit or restrict other uses in the area (with the exception that a mining plan of operation is required for any proposed mining activity within a designated ACEC). In order to be designated, special management beyond standard provisions established by the plan must be required to protect the relevant and important values.

As part of the process for developing the Green River Resource Management Plan, BLM planning team members reviewed all BLM-administered public lands in the planning area to determine if any areas should be considered for designation as Areas of Critical Environmental Concern (ACEC) or if any existing ACEC designations should be modified or terminated. Only BLM-administered public lands (i.e., public land "surface") can be considered for ACEC designation.

One of the ACECs in the Green River resource area is the Greater Red Creek ACEC covering 131,890 acres (Appendix A, Figure 3-8). It is located in the southwest part of Wyoming east of the Flaming Gorge Reservoir and recreation area. Originally this ACEC was referred to as the Red Creek ACEC, but it was expanded by the revision of the RMP in 1997 to include the Sage Creek and Currant Creek drainages. The northeast part of the proposed Rubicon Project Area overlies the southeastern section of the Currant Creek portion of the Greater Red Creek ACEC.

The Greater Red Creek ACEC meets Relevance Criteria 1, 2, 3, 4 and Importance Criteria 1, 2, 3, described below. The relevance and importance criteria for this ACEC include unstable fragile soils; unique ecological features; watershed and cultural values; and sensitive species of regional, national, and international importance.

Relevance Criteria:

1. A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).
2. A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).
3. A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities which are terrestrial, aquatic, or riparian; or rare geological features).
4. Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of a natural process.

Importance Values:

1. Has more than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
2. Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
3. Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of the Federal Land Policy and Management Act as amended (Public Law 94-579, Section 102 (8) and (11)).

3.16.2 Sugarloaf Basin Management Area

The Sugarloaf Basin Management Area (SBMA) consists of 85,880 acres of BLM administered public lands (Appendix A; Figure 3-8). The proposed seismic exploration area overlies the northeastern portion of the SBMA. The SBMA is not designated as an ACEC, but is maintained as a geographic management unit. The area was not recommended as part of the Greater Red Creek ACEC because the BLM determined that the SBMA does not contain the same sensitivity of resources found in Greater Red Creek ACEC, even though the watershed resources in the area are interconnected with those of Greater Red Creek area. In addition, the area does not contain populations of the Colorado River cutthroat trout that are present in the Greater Red Creek ACEC, and thus does not need to receive the same management emphasis. The watershed, scenic, and wildlife resources are determined not to be more than locally significant nor fragile, sensitive, or rare, when compared to those values found in Currant, Sage, and Red Creeks.

The management objectives for the SBMA are to: 1) improve watershed condition and enhance watershed values; 2) improve riparian areas to proper functioning condition, as a minimum; 3) provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives; and 4) maintain and protect important wildlife habitat (BLM 1997).

The area is open to mineral leasing and related exploration and development activities with appropriate mitigation requirements applied to protect all other resource values. Restrictions for protection of raptors, big game crucial winter range, and big game calving/fawning areas will apply to proposed development in the SBMA.

Aquifer recharge zones in the SBMA will be managed to protect groundwater quality and aquifer function. Protection includes limiting road density, surface disturbing activities, and surface occupancy in identified recharge zones to maintain them in a healthy and functioning condition.

New road construction will be reviewed on a case-by-case basis for conformance with area and transportation plan objectives. In some cases, consideration of a "no net gain in roads" factor may be an effective way to help meet objectives in the area.

The SBMA is open to consideration of activities that conform to objectives for the area. Such activities may include fencing, interpretive signs, construction or placement of transportation barriers, and sediment or erosion control structures to meet resource management objectives. Any actions proposed in the SBMA will be considered and analyzed on a case-by-case basis. Controls may be placed on the amount, sequence, timing, or level of activity or development that may occur to assure that the actions will be consistent with or help to meet the management objectives for the area. This may result in such things as limiting the number of roads and other construction or other surface disturbing activities or deferring activities or development in some areas until other areas have been reclaimed and restored to previous uses (BLM 1997).

3.16.3 Wilderness Resource Management and Wilderness Study Areas

The objective for management of the wilderness resource is to retain the wilderness quality and manage the Wilderness Study Areas (WSAs) in the planning area in accordance with the Interim Management Policy and Guidelines for Lands under Wilderness Review until Congress acts on designation. The BLM recommendations on WSAs in the Resource Area have been made to the Secretary of the Interior. The proposed Project Area is not located in, adjacent to or in close proximity to any congressionally designated Wilderness or WSA, or WSA recommended for wilderness.

3.17 ACCESS AND TRANSPORTATION

Wyoming State Highway 191 (SH 191) serves as the primary access to the proposed Project Area from Rock Springs. SH 191 can be accessed from Interstate Highway 80, via exit 99. SH 191 receives, on average, approximately 600-700 vehicles per day and 110 to 130 trucks per day (T. Thomas, WDOT, pers. comm., March 10, 2008). The stretch of SH 191 from Interstate 80 to the Utah Stateline is also subject to recurrent winter weather closures. The highway is a secondary route and may not get cleared until after a winter storm. As a result SH 191 may be closed for days at a time during the winter months.

The 51-mile section of SH 191 from I-80 to the Utah Stateline has a higher accident rate (average = 2.2) than other Class 2 roads (multilane highways, and other important roadways) in Wyoming (average = 1.3), as calculated by the WDOT. On average, there are 26 accidents per year along this segment of U.S. Highway 191. A majority of the automobile accidents involve wildlife or livestock (WDOT 2008).

The existing access roads in the proposed Project Area range from improved dirt roads to two-tracks. There are very limited improved roads, most of the main transportation corridors are semi-improved, with two-tracks leading off of them.

Access vehicles will primarily be made up of pick-up trucks and ATV mules. Larger trucks will bring equipment and supplies to the main staging area. Most of the equipment will be carried to and from the project sites using a helicopter. Helicopter use will be extensive during the project.

3.18 RANGE RESOURCES

The Project Area includes portions of three grazing allotments that are administered by BLM. All of these grazing allotments are managed under the direction of the following documents:

- Green River Resource Management Plan (BLM 1997)
- Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming (BLM 2008)
- Allotment Management Plan (AMP).

The affected environment for these grazing allotments (Appendix A, Figure 3-9) is detailed in the following sections.

3.18.1 Sugarloaf Allotment

The Sugarloaf Allotment consists of seven pastures: Big Ridge, Sand Knoll, Jarvies, Janes Meadow, Upper Currant Creek, Middle Marsh Creek, and Winter Pasture. The main pastures for the growing season are the Big Ridge on the North, Sand Knoll in the middle and Jarvies on the south which is fenced-in with the North Pasture of the Spring Creek Allotment. Grazing in 2008

started in the Big Ridge Pasture, until July 15, when cattle will be moved into the Sand Knoll Pasture until September 30. From October 1 to February 28, the cattle will be in the Winter Pasture. The Jane's Meadow and Upper Currant Creek Pastures are Special Use Riparian Pastures that not scheduled for use in 2008. Middle Marsh Creek Pasture is used as a gathering pasture in the spring and the fall. The Sugarloaf Allotment has 4177 Active AUMs in a total of 91,985 acres. The acreage ownership is: BLM, 75,940 acres; Flaming Gorge NRA, 9,951 acres; State, 4,714 acres; and 1,380 acres are privately owned.

The Little Mountain Pipeline is the only pipeline for livestock water with the project boundary. It is. It starts in T. 13N R. 106 Section 14 SESE and consists of a well and solar pump with a storage tank at the wellhead. The pipeline runs approximately north along the Currant Creek Ridge with two spur lines, one on Sugarloaf Ridge and the other on Big Ridge. The other pipeline within the proposed Project Area is the Iron Mountain Pipeline which runs from the southeastern edge of the Sugarloaf Allotment within the proposed Project Area southwest into the Spring Creek Allotment. Both pipelines are shown in Figure 3-1.

The Ramsay Pipeline Little Mountain Well project is located east of Currant Creek about one mile from the project Boundary.

3.18.2 Spring Creek Allotment

The Spring Creek allotment is 38,634 acres and consists of five pastures (North, Central, South, Gathering, and Winter). The allotment is within the Sugar Loaf Basin Special Management Area, which has a grazing objective that states: "Livestock grazing objectives will be re-evaluated and, as needed, modified to be consistent with the watershed, water quality, fisheries, recreation, and riparian management objectives. Grazing systems will be designed to achieve desired plant communities and proper functioning condition of watersheds (upland and riparian)."

This allotment has a permitted stocking rate of 3,134 AUMs which the equivalent of 0.08 AUM/Acre (3,134 AUM/38,634 Acres) or 12.5 Acres/AUM (1 Acres/0.08 AUM). The period of use for the allotment is year round. One permittee has 2,820 AUMs for the period of March 16th thru February 28th of the following year and the other permit is for 314 AUMs for the period of May 16th through October 31st. In order to maintain livestock within the appropriate allotment, the permittees monitor the allotment boundary for livestock drift.

There are several range improvement projects within the allotment. There are three springs, one of which supplies water to the Iron Mountain pipeline. An unnamed drainage and Krause Marsh Creek, below the confluence, is the boundary for the Spring Creek and Sugarloaf Allotments.

3.18.3 Red Creek Allotment

The Red Creek Allotment has 3,932 active AUMs over 64,038 total acres. The acreage ownership is: BLM, 53,380 acres; State, 6,577 acres; and 4,081 acres are privately owned. The extreme northwest corner of the Red Creek Allotment falls within the project boundary; however, the small area is not accessible by livestock due to topography and fencing.

3.19 FIRE MANAGEMENT

The proposed Project Area occurs within the Little Mountain Fire Management Unit (FMU), which has the highest fire frequency in the State of Wyoming (USDI BLM 2004). Seventy five percent of all fires within the lands under jurisdiction of the Rock Springs, Kemmerer, and Pinedale Field Offices, occur within the Little Mountain FMU (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008). Of the lands under Little Mountain FMU jurisdiction, the fire season generally extends from June 1 to October 30. From 1980 to 2003 approximately 733 fires burned over 100,000 acres in this FMU (BLM 2004). In the Little Mountain FMU two fires alone in 2000 burned 70,000 acres (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008). A fire in 1995 burned over t a portion of the southeastern quarter of the proposed Project Area.

The majority of fires in the Little Mountain FMU are lightning-caused. Major fuels in the area include juniper, Wyoming big sage brush, basin big sage brush, and mountain big sage brush. Juniper is the primary ignition source from lightning strikes and the majority of fires in the area are less than 20 acres in size and the great majority of suppression actions are on “single tree fires” (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008).

3.19.1 Fire Regulatory and Management Direction

There has been an active prescribed burning program within the Little Mountain FMU in the past, but there are not any planned burns for the immediate future (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008). Direction for fire management comes from the Green River RMP Record of Decision (ROD), and the Fire Management Plan (BLM 1997, 2004). The BLM Green River RMP gives broad direction for fire management, stating that: Fire management, suppression needs, and prescribed burning in timber stands will be evaluated on a case-by-case basis to ensure timber stands are maintained in healthy condition and the "snowfence effect" is preserved. Fire management in other areas will be evaluated on a case-by-case basis to ensure that area objectives are met.

The Green River RMP ROD (BLM 1997) states that immediate fire management suppression actions “will be used only in cases of arson, direct threat to public safety, or a strong potential to threaten structural property.”

More specific direction on the BLM fire response for the proposed Project Area is defined within the Fire Management Plan (BLM 2004, p. 65–69):

- No more than 25 percent of this FMU would be burned or treated in the next 20 years.
- Provide for human health and safety first, while minimizing loss of property, threats to private land, and maximizing the ecological benefit of wildland fire.
- Minimize suppression impacts by identifying opportunities to use roads, riparian areas, and natural barriers for control lines depending on resources at risk.

3.19.2 Fire Environment

The proposed Project Area occurs within fire prone-vegetation communities consisting of grassland, sagebrush, juniper, and subalpine conifer vegetation types. These vegetation communities have well-documented fire occurrences recorded in historical accounts and evidenced in fire scars on trees (Fischer et al. 1983, USDA Forest Service 2008).

Sagebrush communities (including Wyoming big sagebrush, basin big sagebrush, and mountain big sagebrush) in this FMU are considered unaltered to slightly altered from historic fire regimes (BLM 2004). Natural fire regime intervals in sagebrush are generally from 10 to 70 years with longer fire intervals associated with less productive sites (Forest Service 2008). The big sagebrush communities are fairly susceptible to fire, as compared to other sagebrush species, though at least Wyoming big sagebrush-decadent communities rely on fire for regeneration (Blank et al. 1994).

Juniper provides the primary ignition source within the Little Mountain FMU (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008). Juniper communities for the FMU are considered unaltered to slightly altered from historic fire regimes (BLM 2004). Juniper communities typically experience fire intervals of less than 35 years. Both juniper and Wyoming big sagebrush communities are prone to cheatgrass invasion following wildfires.

A forested area of subalpine fir, lodgepole pine, Douglas-fir, and aspen lies on the eastern edge of the proposed Project Area. There have not been many historical fire starts within this forested environment (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008). Fires occurring within these vegetation types are typically mixed or high severity often resulting in the generation of new cohorts. Fire suppression in this area can be difficult due to vertical fuels structures and potentially large flame lengths.

In the areas that burned in the 1995 and 2000 fires, forbs and grasses are thriving and form a fairly continuous fine fuel layer. There is less continuity in the immediate vicinity of the southern third of the proposed Project Area (T. Stephenson pers. comm., with D. Kane, TEC,

Inc., June 5, 2008). In the last decade grazing pressure has decreased and currently the area in the southern third of the proposed Project Area has been very lightly grazed.

Currently cheatgrass is considered a minor component of the onsite fuels, but there have been noticeable increases in recent years (T. Stephenson pers. comm., with D. Kane, TEC, Inc., June 5, 2008). Cheatgrass tends to favor more frequent fires throughout most of its range in the Rocky Mountain West and it also thrives in post-fire environments. Cheatgrass is a fire hazard concern, as it forms a fine, flashy fuel which is easily ignited after it completes its life cycle and desiccates early in the fire season. It is abundant throughout most of the proposal area landscape and is especially prevalent along roads and other areas of ground disturbance. Frequent fires can encourage cheatgrass establishment, survival, persistence, and dominance (Forest Service 2008).

3.20 WASTES, HAZARDOUS AND SOLID

BLM defines hazardous materials as any substance, pollutant, or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 USC 9601 et seq., and its regulations. Under CERCLA, the definition of hazardous substances includes any hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 USC 9601 et seq., and its regulations. The definition does not include petroleum including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCLA Section 101(14), 42 USC 9601 (14); it also does not include oil and gas. The Emergency Planning and Community Right-to-Know Act (EPCRA) was passed by Congress in 1986. EPCRA was included as Title III of the Superfund Amendments and Reauthorization Act (SARA) and is sometimes referred to as SARA Title III. EPCRA provides for the collection of information regarding the use, storage, production, and release of hazardous chemicals, thereby helping to increase emergency planners, responders, and the public's knowledge and access to this information. States and communities, working with facilities, can use the information to improve emergency planning, chemical safety and protect public health and the environment.

The Environmental Protection Agency (EPA) has exempted certain waste materials generated in oil and gas exploration and production from regulation as hazardous wastes (EPA 1988). These materials must be intrinsic or uniquely associated with the production of oil and gas to classify as exempt waste. Examples of exempt wastes include drilling fluids and drill cuttings. Although not regulated as hazardous wastes, these materials are considered to be solid wastes and must be disposed in ways that protect human health and the environment.

3.21 NOISE

Noise is generally described as unwanted sound, and noise intensity (or loudness) is measured as sound pressure in units of decibels (dBAs). The decibel scale is logarithmic, not linear, because the range of sound that can be detected by the human ear is so great that it is convenient to compress the scale to encompass all the sounds that need to be measured. Each 20-unit increase in the decibel scale increases the sound loudness by a factor of 10.

The EPA established an average 24-hour, day-night sound level (Ldn) noise level of 55 dBA as a guideline for acceptable environmental noise (EPA 1974). This established EPA environmental noise level is used as a basis of evaluating noise effects when no other local, county, or state standard has been established. It is important to understand that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value for the public health and welfare. Furthermore, this noise level is directed at sensitive receptors, where people would be exposed to an average noise level over a specific period of time. In this context, public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms, such as hearing loss or demonstrable physiological injury. Therefore, the 55 dBA noise level is recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise. Loud noises can negatively impact wildlife populations in many ways, causing some wildlife species to avoid otherwise functional habitats and reducing breeding success of some wildlife species that initiate courtship by using sounds.

Sound levels have been calculated for areas that exhibit typical land uses and population densities. In rural recreational areas, ambient sound levels are expected to be approximately 30 to 40 dBA (EPA 1974, Harris 1991). The proposed action would be located in a rural, unpopulated area with few potential noise sources. Noise levels from human activity are mostly associated with vehicular traffic. Interstate 80 is the only high-speed road within the vicinity of the proposed Project Area, and it does not contribute to the existing noise levels because of its distance from the proposed Project Area. Roadway traffic on State Highway 191, county roads and BLM roads in the proposed Project Area contribute to noise, but this source is transient, produced primarily by vehicles used for recreation and road maintenance.

The BLM has compiled typical noise levels for familiar indoor and outdoor sources, measured in decibels (dBA) (Table 3.19-1).

Table 3-9. Typical Sound Levels of Common Noise Sources

| Sound Pressure Level (dBA) | Common Indoor Noise Levels | Common Outdoor Noise Levels |
|----------------------------|--------------------------------------|--|
| 105 | -- | Jet flyover at 1,000 ft |
| 95 | -- | Gas lawn mower at 3 ft |
| 90 | Food blender at 3 ft | -- |
| 80 | Garbage disposal or shouting at 3 ft | Urban daytime noise |
| 70 | Vacuum cleaner at 10 ft | Gas lawn mower at 100 ft |
| 60 | Normal speech at 5 ft | Commercial area, heavy traffic at 300 ft |
| 60 | Large business office | -- |
| 50 | Dishwasher in next room | Quiet urban daytime |
| 40 | Small theater, large conference room | Quiet urban nighttime |
| 35 | -- | Quiet suburban nighttime |
| 33 | Library | -- |
| 25 | Concert hall (background) | Quiet rural nighttime |
| 15 | Broadcast and recording studio | -- |
| 5 | Threshold of hearing | -- |

Topography in the proposed Project Area is dominated at lower elevations by relatively open areas and gently sloping terrain with juniper and shrublands. As elevations increase, the topography becomes steeper and the dominant aspen on Little Mountain, east of the proposed Project Area, creates a more closed canopy. Upper elevations on Little Mountain are also mixed with some flat, open areas dominated by shrubs and grasses, and also dense spruce-fir stands along the steepest and wettest drainages. Overall, the topography would tend to disperse noise generated by seismic survey activities.

Overall, noise levels experienced by a receptor depend on the distance between the receptor and the equipment, the topography, vegetation, and meteorological conditions (e.g., wind speed and direction, temperature, humidity). Ambient sound levels within the vicinity of the proposed Project Area are likely to be slightly elevated above the typical levels for rural recreational areas. Loud noise may reduce a person’s opportunity to enjoy solitude. Noise disturbance can annoy people to differing degrees, depending on their expectations, attitudes towards development activities, magnitude and duration of the noise, the activity they are pursuing, and the time of day. Sensitive noise receptors include wildlife and recreationists and hunters visiting the area for solitude and a sense of remoteness.

3.22 REALTY AND LAND USE

About 89 percent of the surface acres within the Project Area are managed by BLM. The results of a query of the BLM's Legacy Rehost System (LR2000) database indicated that 33 BLM-authorized land use authorizations exist in the vicinity of the proposed Project Area. Authorizations for public lands managed by BLM or on federal mineral estate include minerals related to oil and gas leasing; rights-of-ways for roads, water facilities (pipelines), electrical transmission and communications; and mineral materials development (BLM 2008). A portion of the oil and gas leases are held by Devon.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

Chapter 4 provides comparative analyses of the direct and indirect consequences on the affected environment (Chapter 3) resulting from implementation of the Proposed Action and the No Action Alternative.

A variety of laws, regulations, and policy directives mandate the evaluation of the effects of a proposed action and alternative(s) on certain critical environmental elements. Not all of the critical elements that require inclusion in this EA are present or, if they are present, they may not be affected by the proposed action and no action alternative. The mandatory critical elements that were identified as present (Table 3-1) are described and analyzed in Chapter 4.

The analysis area is defined for each resource and is based on the nature of the resource. For some resources, the analysis area is the proposed Project Area, and for other resources the analysis area encompasses a larger area. For example, a larger area is analyzed for wildlife species, which are mobile, versus plant species, which are stationary. The Proposed Action and activities are analyzed in terms of short-term and long-term effects, as described below:

- Long-term impacts result from seismic activities that would extend beyond the life of the project. The life of the proposed project is estimated to extend up to two years.
- Short-term impacts include temporary disturbances occurring during the life of the project including staging areas, and other impacts that would be limited to the shot hole drilling and seismic survey activities. Generally, implementation of the short-term project activities would last from one to two years.
- The effect of a particular project activity may have short-term or long-term effects depending on the specific natural resource addressed; therefore, in the Environmental Consequences sections of this document the duration of impacts are evaluated on a resource basis and specifically defined where they differ from the durations described above.

The impact analyses take into account the Applicant-Committed Environmental Protection, Conditions of Approval (COAs), best management practices (BMPs), and any additional recommended mitigation measures for the Proposed Action and, if applicable, the No Action Alternative.

4.2 AIR QUALITY AND CLIMATE

4.2.1 Proposed Action

Although no air monitoring data are available for the proposed Project Area, it can be assumed that the air quality is good. The area characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

The principal air quality parameter likely to be affected by the Proposed Action would be the inhalable PM₁₀ (Particle Matter ten microns or less in diameter) that can be associated with fugitive dust. While fugitive dust may or may not contain PM₁₀ it will be assumed to occur in this case. Fugitive dust concentrations would increase with additional vehicle and helicopter traffic on the roads, but would be short-term in duration, local in nature, and negligible in extent.

Vehicle, helicopter, and compressor motor emissions would result from work crews commuting to and from the work sites and from the transportation and operation of equipment to drill shot holes. Ground vehicles and helicopter emit nitrous oxides (NO_x), sulfur dioxide (SO₂), volatile organic compounds (VOC), carbon monoxide (CO), and small amounts of PM₁₀ as they travel in and around the Project Area. The emissions from this project are relatively limited as there are few vehicles operating (less than 10) and the project short in duration (less than 9-0 days).

Upon completion of the seismic operations, total emissions would return to pre-project levels.

4.2.2 No Action

Under the No Action Alternative, the BLM would not select the Proposed Action and no seismic activities would occur. Since, there would be no change in current conditions, impacts to air quality from the No Action Alternative would not occur.

4.2.3 Additional Mitigation

No additional mitigation measures would be necessary.

4.3 GEOLOGY AND MINERAL RESOURCES

4.3.1 Proposed Action

Given the transitory nature of geophysical exploration program and the minimal to negligible surface disturbance, adverse impacts to geological resources and other mineral authorizations and/or operations would not occur.

Conversely, geophysical operations could be beneficial to geological and mineral resources, and energy production. Adoption of the Proposed Action would allow Devon to obtain and utilize

3D geophysical data, resulting in the greater likelihood of drilling producing wells, more efficient field development, and would be consistent with the National Energy Policy.

Exploratory drilling for fluid minerals is not dependent upon geophysical operations. However, such operations can indicate areas where to concentrate future exploratory drilling as well as where not to, and would likely eliminate surface disturbance for non-productive wildcat wells. Public lands in the proposed Project Area are leased for oil and gas and it is expected that some exploratory drilling would occur on open lands. Should exploratory drilling result in commercial quantities of hydrocarbons being found, development wells could occur. The extent of future development is unknown at this point. Any future proposals for individual exploratory wells and/or development wells would be analyzed at that time. The seismic surveying would allow for the acquisition of subsurface geophysical data that would promote an understanding of the subsurface stratigraphy and structure. Such information would be beneficial to selecting exploration targets and drill sites. Geophysical exploration, such as seismic surveying, would be a key component of natural gas exploration, and without such methodology, the exploration for hydrocarbons would be greatly limited. In the long-term, subsurface geophysical interpretations could be released and published in geologic forums and would promote a geologic understanding of Southwestern Wyoming.

4.3.2 No Action Alternative

Under the No Action Alternative the seismic activities proposed in this EA would not occur. Project-related impacts to geological and mineral resources would not occur on BLM lands under the No Action Alternative. Impacts on BLM lands would likely continue at present levels, and would include impacts from existing and future oil and gas development, livestock grazing, and recreational use. Adoption of the No Action alternative is likely to result in the drilling of more wildcat exploratory wells and possibly 'dry holes' than would occur following completion of the proposed geophysical project. Dry holes, in addition to being a financial loss, would result in greater surface disturbance caused by construction of well pads and roads. If, under the No Action Alternative, Devon pursues approval for seismic exploration on State and private lands, impacts to geologic and mineral resources would be similar to those described under the Proposed Action, but would be restricted to State and private lands.

4.3.3 Additional Mitigation

Based on the regulatory requirements, Applicant-Committed Environmental Protection Measures (Chapter 2, Section 2.2.3), and conditions of approval (COAs; Appendix D) that would be incorporated into the Proposed Action, potential impacts to geological and mineral resources would be low and no additional mitigation measures would be necessary.

4.4 SOILS

4.4.1 Proposed Action

Assuming that drilling shot holes requires a three-foot radius (approximate area of shot hole and scattered cuttings), total temporary surface disturbance would be 1.8 acres. The helicopter staging area would require an additional 10 acres to mobilize and store equipment and also mobilize personnel. Laying source and geophone receiver lines on the ground would not cause any surface disturbance because no vegetation or soil would be removed. Potential impacts to soils in the proposed Project Area from the Proposed Action include the mixing of soil horizons from drilling the shot holes and contamination of soils from accidental spills. Some negligible mixing of the soil horizons can occur when shot holes are back filled with the soil cuttings. Uprooting of vegetation in a three-foot radius of the drill hole would also expose soils until vegetation becomes reestablished. Blowouts of drill holes have a low probability of occurrence, but would likely result in limited disturbance to the soil surface.

Soil loss from shot hole drilling would generally be higher on sloping surfaces and sparsely vegetated slopes over 25 percent. To protect soils, existing BLM standards limit surface disturbance on slopes greater than 25%. With implementation of the slope restriction, the project would result in minimal impacts.

An emergency response plan would be in place that covers non-petroleum product spills, such as hazardous materials. Other steps that Devon would take to reduce risk are included in Applicant-Committed Environmental Protection Measures (Section 2.2.3). While adherence to the plan and regulatory requirements reduces the possibility of a spill, there would still be a small risk of soils becoming contaminated from an accidental spill.

Impacts to soils in the form of additional soil compaction and subsequent erosion could be created, principally by the proposed vehicle traffic on existing two-tracks. Compaction reduces the capacity for soils to absorb moisture and can also reduce soil productivity due to structural changes, increase the risk of erosion, and reduce infiltration capacity. These changes could result in reduced seed germination and root expansion and growth.

Other minor amounts of compaction would occur on about 10 acres at the helicopter staging area. Impacts to soils would not occur at the alternative staging area due to previous disturbance from gravel mining operations. Impacts to soils may also occur as a result of surface rutting caused by vehicle operations on wet soils. Existing BLM standards call for closure during such conditions. With implementation of the saturated soil restriction, the project should not result in significant impacts to wet soils. Compaction under normal conditions also reduces capacity for soils to absorb water, and results in increased runoff. However, overall soil compaction and erosion from vehicular traffic, as well as potential vegetation damage, would be minimal because

on-the-ground travel and access and the small number of vehicles used in the proposed Project Area would be restricted to existing roads and two-tracks (Appendix A, Figure 2-2).

BLM compliance reviews of recent heli-portable 3-D seismic surveys conducted in the BLM Vernal Field Office (Utah) indicated that it was difficult to locate where heli-portable seismic work had been performed approximately one week after drilling, and such activity was only visible at close range (BLM 2005). Compliance reports also indicated that soil compaction and significant erosion were not long-term issues (BLM 2003).

4.4.2 No Action Alternative

Under the No Action Alternative the seismic activities proposed in this EA would not occur. Project-related impacts to soils would not occur on BLM lands under the No Action Alternative. Impacts on BLM lands would likely continue at present levels, and would include impacts from existing and future oil and gas development, livestock grazing, and recreational use. If, under the No Action Alternative, Devon pursues approval for seismic exploration on State and private lands, impacts to soils would be similar to those described under the Proposed Action, but would be restricted to State and private lands.

4.4.3 Additional Mitigation

Based on the regulatory requirements, Applicant-Committed Environmental Protection Measures, and COAs (Appendix D) that would be incorporated into the Proposed Action, potential impacts to soil resources would be minimal. Areas disturbed would be restored and reclaimed and no additional mitigation measures would be necessary.

4.5 WATER RESOURCES

4.5.1 Proposed Action

4.5.1.1 Surface Water

Potential impacts to surface water resources from the proposed action would include accidental spills of fluids and/or fuel from equipment. For this project, the required best management practices and mitigation measures that would be implemented to protect surface waters are covered in a number of documents and regulations. These include but are not limited to:

- Onshore Oil and Gas Orders.
- Green River RMP
- Surface Operation Standards and Guidelines for Oil Exploration and Development (Gold Book).
- Wyoming Water Quality Regulations and the Clean Water Act.

- Applicant Committed Environmental Protection Measures

Because a 500 ft buffer from riparian areas would be required, the riparian vegetation community would remain intact and reduce the potential for disturbance to surface waters on the major creeks in the proposed Project Area. A 100 ft. buffer would also be imposed on other drainages within the proposed Project Area.

Accidental Spills

There is a potential for contamination of water resources from spills or discharges of fuels or other chemicals used for drilling the shot holes. The risk of uncontrolled spills reaching surface water exists throughout the implementation of the proposal. An emergency response plan would be in place that covers non-petroleum product spills, such as hazardous materials. Other steps that Devon would take to reduce risk are included in Applicant-Committed Environmental Protection Measures, Ch. 2, Section 2.2.3. While adherence to the plan and regulatory requirements reduces the possibility of a spill, there would still be a small risk of surface waters becoming contaminated as the result of an accidental release.

4.5.1.2 Groundwater

The Proposed Action is located within the Sugarloaf Special Management Area (SMA). The SMA was established to protect important groundwater recharge. Protecting water quality is a priority in the SMA. Groundwater resources of most concern are the springs located within the Project Area. Detonation of shot holes too close to springs/seeps could change the flow of the spring/seep. The locations of 59 springs are known in the proposed Project Area (O&G Environmental 2008e). Using the location information provided in the 2008 survey report, Devon would implement BLM's requirement for a ¼ mile buffer zone around each known spring and seep. Implementation of the ¼ mile buffer would reduce the likelihood that project activities would result in negative impacts on local seeps and springs in the proposed Project Area.

4.5.1.3 Floodplains

Floodplains would be avoided through the implantation of the 500 foot riparian area buffers and the 100 foot stream buffers.

4.5.2 No Action Alternative

Under the No Action Alternative, the proposed seismic survey would not be conducted. Therefore, no change to current conditions would result and no additional impacts to surface and groundwater resources would occur. Drainage channels would remain in their current condition unless affected by changes in intensity of current uses of Project Area roads.

4.5.3 Additional Mitigation

Based on the regulatory requirements, Applicant-Committed Environmental Protection Measures (Ch. 2, Section 2.2.3), and COAs (Appendix D) that would be incorporated into the Proposed Action, potential impacts to water resources would be low and no additional mitigation measures would be necessary. Devon would withdraw from conducting drilling shot holes and exploding charges in the Currant Creek ACEC further reducing the potential for negative impacts to surface water in the watershed.

4.6 VEGETATION

4.6.1 Proposed Action

Project activities using heli-portable equipment would result in a total short-term surface disturbance of 11.8 acres. This represents about 0.05 percent of the total vegetation cover for all plant communities within the proposed 42-square mile Project Area. The overall long-term effect on vegetation would, therefore, be negligible.

Assuming a three-foot radius for drill holes, shot hole drilling would potentially result in the short-term loss of about 1.8 acres of native vegetation. Excess cuttings that are not returned and recompacted following explosive detonation would be spread over the general area. Long-term effects would be negligible.

Foot-traffic from seismic crews would trample vegetation during surveying, drilling, laying of source and receiver points and lines, and data collection along receiver lines. Perennial grasses and herbaceous species would be flattened, but because most species are resilient the effect would be short-term. Woody species, such as sagebrush, could be damaged where older, more brittle stems are broken off. The impact would be minimal and short-term as most crews would walk around shrubs. Any disturbed vegetation would likely recover in one to two growing seasons. Linear receiver lines would affect about a three-foot wide area and be removed following completion of the seismic data collection program. Though some vegetation may be trampled, recovery would be expected in no more than two growing seasons.

Impacts from ATVs and other service vehicles would not occur because travel would be restricted to BLM-approved roads included in the travel management plan (Appendix A, Figure 2-2). Use of the staging area to prepare, service, and store equipment to support field operations would result in the short-term disturbance of 10 acres. No blading or grading would occur on the site; however, vegetation would be trampled and some soil compaction would occur. Site selection criteria included level sites with little or sparse vegetation. Reclamation of the site would occur immediately following completion of the seismic study minimizing the potential for

long-term effects manifesting as soil erosion and compaction, invasion by nonnative plant species, and loss of vegetative cover and productivity.

4.6.2 No Action Alternative

Environmental consequences for vegetation resulting from selection of the No Action Alternative would be the same as conditions described for the Affected Environment. There would be no impact to vegetation with the selection of the No Action Alternative.

4.6.3 Additional Mitigation

Based on the regulatory requirements, Applicant-Committed Environmental Protection Measures, and COAs (Appendix D) that would be incorporated into the Proposed Action, potential impacts to vegetation resources would be minimal. Areas disturbed would be restored and reclaimed and no additional mitigation measures would be necessary.

4.7 WETLANDS AND RIPARIAN AREAS

4.7.1 Proposed Action

No wetland and riparian areas would be directly impacted by the Proposed Action because those areas will be off limits to drilling and seismic shots. While riparian and wetland areas will be open to foot traffic and the placement of seismic lines and associated equipment, this impact is limited very minor vegetation trampling. BLM requires that all seismic exploration activities (including vehicle use, helicopter use, and drilling) avoid wetland and riparian area by 500 feet from either side of the streambank. A 100 ft. buffer would further reduce potential impacts to drainages and ephemeral streams.

Onsite surveys and an analysis of aerial photography and topographic maps indicate that minor impacts to wetland and riparian vegetation would result from equipment and vehicle crossings at the upper tributaries of Washam, Jarvies Marsh, Krause Marsh, and Spring creeks. The most likely impact would be dust and other particulate matter that could cover riparian vegetation that could contribute to the existing sediment load of area creeks and possible transport of sediment from vehicle crossings. The overall contribution from the Proposed Action would, however, be minor.

4.7.2 No Action Alternative

Under the no action alternative, none of the proposed drainage crossings and adjacent wetland or riparian zones crossing or adjoining existing roads and two-tracks would be utilized. Wetlands, riparian areas, and drainage channels would remain in their current condition unless affected by changes in intensity of current uses of roads and two-tracks. Ongoing impacts that could

continue under the no action alternative include the potential for loss of sustaining hydrology for wetland and riparian vegetation due to downcutting, impacts to riparian vegetation and bank stability from grazing by cattle, and periodic transport of sediment from existing disturbed areas at the crossings.

4.7.3 Additional Mitigation

Based on the regulatory requirements, Applicant-Committed Environmental Protection Measures (Section 2.2.3) and COAs (Appendix D) that would be incorporated into the Proposed Action, potential impacts to wetland and riparian resources would be low and no additional mitigation measures would be necessary. Devon will withdraw from conducting drilling shot holes and exploding charges in the Currant Creek ACEC further reducing the potential for negative impacts to riparian zones in the watershed.

4.8 INVASIVE NONNATIVE PLANT SPECIES

4.8.1 Proposed Action

Ground disturbing activities associated with the construction and detonation of seismic shot holes would expose approximately 1.8 surface acres to potential invasive nonnative plant infestations. Impacts from drilling and detonating shot holes would, therefore, have a negligible indirect effect in contributing to any potential nonnative species invasions. The effect of personnel and equipment mobilization at the 10 acre helicopter staging area would indirectly contribute to the spread of invasive nonnative plant species if seeds attach to clothing and equipment and transported to other areas within the Project Area. Similarly, vehicles used to mobilize equipment and personnel on existing roads and approved two-tracks could indirectly contribute to the transport of invasive nonnative plant species from one area of the proposed Project Area to another. Human activities associated with the Proposed Action could act as vectors for invasive nonnative plant species, which would have potentially long-term, negative effects on the proposed Project Area. However, the intensity and degree of these effects would likely contribute no more than the effects currently contributed by non-project related activities in the Project Area.

4.8.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be approved. The existing environment would remain in its current condition and there would be no new environmental consequences resulting in the transport and spread of invasive nonnative plant species from selecting this alternative. Because the No Action alternative would not disturb any area, there would be no disturbance to soil and plant communities, wetlands or riparian areas which would expose the area to further infestation by invasive nonnative plant species.

4.8.3 Additional Mitigation

All equipment should be thoroughly cleaned prior to be brought on-site. Service vehicles should be kept clean, especially if they are used at multiple sites where invasive nonnative plant seeds may have adhered to the undercarriage of the vehicle. Based on the regulatory requirements, Applicant-Committed Environmental Protection Measures, and COAs (Appendix D) that would be incorporated into the Proposed Action, potential impacts that could increase the potential for invasive nonnative plant species in the proposed Project Area would be minimal. Areas disturbed would be restored and reclaimed immediately following completion of seismic data collection activities. Development of the applicant-committed invasive nonnative plant and weed management plan would also reduce the potential for additional invasions in the proposed Project Area.

4.9 SPECIAL STATUS SPECIES

4.9.1 Proposed Action

The Proposed Action may result in direct and indirect, short- and long-term effects. Effects are addressed at both the local and landscape scales, depending on the home range and distribution of individual species.

4.9.1.1 Federally Listed

Black-footed Ferret - Because the black-footed ferret is not present in the proposed Project Area, the Proposed Action would have **no effect** on the black-footed ferret. Potential future colonization by white-tailed prairie dogs, the principal prey species for ferrets, would not be impacted due to the short-term nature of seismic activities associated with the Proposed Action. Travel within the proposed Project Area would also be limited to using existing roads.

Canada Lynx – The analysis area does not provide quality habitats for Canada lynx or snowshoe hares, the lynx’s primary prey species. The area is also located outside of any boreal areas where lynx are known to occur. Therefore, the proposed action would have **no effect** on Canada lynx or their habitats.

Yellow-Billed Cuckoo - The Proposed Action would avoid seismic activities within 500 ft. of riparian areas and with 100 ft. of drainages where suitable, mature cottonwood habitat could occur. Therefore, the Proposed Action would have **no effect** on the yellow-billed cuckoo or their habitats.

Colorado River Fish - The four endangered species of Colorado River fish, the Colorado pike minnow, razorback sucker, humpback chub, and bonytail chub may occur approximately eight miles west of the proposed Project Area in the Green River, south of the Flaming Gorge

Reservoir. In May 1994, BLM prepared a Programmatic Biological Assessment (BA) that addressed their water-depleting activities in the Colorado River Basin and the effects of these depletions on the endangered Colorado River fish species. No water depletion would occur as a result of the Proposed Action. Therefore, there would be **no effect** from the Proposed Action to the endangered Colorado River fish.

Ute Ladies-tresses Orchid - The Ute ladies'-tresses orchid (*Spiranthes diluvialis*) is known to occur in the region, but has not been reported near the proposed Project Area. If runoff occurs, it could cause siltation in riparian areas, which could result in a "may affect not likely to adversely affect" determination for the Ute ladies'-tresses. However, seismic activities associated with the Proposed Action would not occur within 500 ft. of riparian areas and within 100 ft. of drainages. Therefore, the Proposed Action would have a **no effect** on Ute ladies'-tresses orchid and any potential habitats in the proposed Project Area.

4.9.1.2 Species Petitioned For listing

Pygmy Rabbit – Because suitable pygmy rabbit habitat exists throughout the proposed Project Area (O&G Environmental 2008d), a survey was conducted in June 2008 on nearly 80 percent of the proposed Project Area with a medium to high probability for supporting pygmy rabbit. The survey did not locate any burrows or result in the observation of the species. If pygmy rabbits are present in the area, direct impacts could include vehicle-related mortality. Another direct effect is the short-term loss of 1.8 acres of vegetation due to shot hole construction and the detonation of the seismic charges, and another 10 acres for helicopter staging. A potential indirect impact would be habitat fragmentation. Because of these factors, the project may indirectly impact individuals, but would not likely contribute to federal listing.

Wyoming Pocket Gopher - Because Wyoming pocket gophers are confined to upland drier ridge tops with gravelly loose soils and greasewood habitats, there is some potential for occurrence in the Project Area and potential for disturbance by the Proposed Action. Direct impacts include a temporary loss of few acres of marginal habitat from shot hole construction and charge detonation. A potential indirect impact would be habitat fragmentation. However, the habitat loss is minor at the landscape scale. For these reasons, the Proposed Action may impact individuals, but would not contribute to federal listing.

Greater Sage Grouse - A recent compendium of sage-grouse findings plotted sage-grouse habitat present in the proposed Project Area (WGFD 2007). The results, based on research conducted by Holloran 2005, Naugle et al. 2006, and Aldridge 2007 suggests the adverse impacts on sage-grouse lek attendance extend for two miles from human disturbance. There are two potentially occupied leks southeast of the proposed Project Area located south of Highway 191. Both are

more than two miles outside the boundary of the Project Area. In addition there are no known leks in the Project Area.

The Proposed Action could occur during sage grouse strutting season (March – May), early brood rearing period (May – late June/early July), or during sage grouse late brood rearing (late June/early July – August). Potential disturbance to the grouse may not be completely avoided; however, disturbance would be minimized as there are no known leks in the Project Area, and because the Proposed Action would avoid seismic activities within 500 ft. of riparian areas and 100 ft. of drainages. Noise from helicopter activity and human presence could temporarily cause broods to flush. However, these nesting and brood rearing areas generally occur within two to three miles of leks. Also no project activities would occur during the critical winter period.

Potential disturbance to sage grouse from project activities associated with Proposed Action is expected to be short-term and minimal in extent. The greatest potential for disturbance would occur in those areas in southeastern quarter of the proposed Project Area where potential nesting and brood rearing habitat could occur in association riparian areas and moist drainages associated with Spring Creek.

4.9.1.3 BLM Sensitive Species

Migratory Passerine Birds – Nesting loggerhead shrike, sage thrasher, sage sparrow, and Brewer’s sparrow would likely occur in the proposed Project Area. However, project activities associated with the Proposed Action in 2008 occur after the nesting season. Seismic activities that may occur in 2009 would conflict with nesting if these activities occur during the nesting period from mid-March/early April - July 15. Impacts from the short-term loss of sagebrush and herbaceous cover important to sagebrush obligate species (sage thrasher, sage sparrows, and Brewer’s sparrows) would be negligible as there will be no vegetation removal and only minimal vegetation trampling. Shot hole drilling and the staging area would result in the short-term loss of about 11.8 acres of potential habitat over Project Area. Project activities would, to the extent possible, avoid densely shrub areas and vegetation removal. Because there would be no long-term effects on BLM sensitive migratory passerine birds and their habitats, the Proposed Action would not contribute to conditions that would warrant federal listing.

Raptors – Potential new and existing nest sites for raptors are known to occur throughout the proposed Project Area (O&G Environmental 2008c). Aerial nesting surveys conducted during May and early June 2008 located 32 nest sites within a one-mile buffer area around the proposed Project Area and 17 sites were active (O&G Environmental 2008c).

Depending on the species, BLM requires that project activities avoid active nest sites within a ½ to one mile radius of active nests during raptor nesting season from February 1 – July 31 (Table

2-2). Project activities occurring in 2008 within a one mile radius of the active golden eagle nest would be avoided if they occur prior to the conclusion of the nesting season. Inactive nests would not be removed or destroyed. Given these protection measures, impacts to nesting raptors would be minor and short-term. Foraging raptors and fledglings that would occur in the Project Area after nesting would be expected to be temporarily displaced by helicopter noise and associated human presence.

Depending on nest success, and hatching and fledging dates, fledgling raptors would be expected to occur in the proposed Project Area. Any project activities that occur during the raptor nesting season (February 1-July 31) would require a fledging survey to determine chick age. If young birds are present, no shot holes will be drilled within the identified species specific buffer area. No overflights will occur over any nests with young birds. Any dead young birds found in nests known to be occupied will be considered a "taking". Given these protection measures, the Proposed Action would not contribute to conditions that would warrant raptor species' federal listing.

Gray Wolf – While wolves may exist in the vicinity of the proposed Project Area, there are not currently any known den sites (N. Kaczor, BLM Wildlife Biologist, pers. comm., July 2008). Although wolves in Wyoming have been known to expand south and range into Utah and across the Red Desert to Colorado, Wyoming's recent wolf management plan (WGFD 2007) would reduce the potential for wolves to occur in the proposed Project Area. Any wolves present in the proposed Project Area would avoid project activities and related human disturbance. The short-term duration of the Proposed Action would not result in significant impacts to the wolf prey base. Consequently, there are no direct or indirect impacts expected to the gray wolf.

Townsend's Big-Eared Bat - Because the Townsend's big-eared bat's prey base is limited to airborne insects, the direct, temporary loss of 11.8 acres of native vegetation would not measurably affect this species. Day roosting on rock outcrops would not be expected to be affected by the Proposed Action because shot holes and geophone lines would not be located adjacent to rock outcrops. For these reasons, the Proposed Action may result in short-term impacts to individuals, but would not contribute to federal listing.

Spotted Bat - Because the spotted bat's prey base is limited to airborne insects, the direct, temporary loss of 11.8 acres of native vegetation probably would not measurably affect the insect prey base. Day roosting opportunities within nearby juniper or pinyon pine trees may be affected in the vicinity of shot holes and detonation of charges may cause bats to flush from roost sites. No juniper trees would be removed, and bats flushed from roost sites would likely return following the completion of daily project activities. For these reasons, the proposed action may impact individuals over the short term, but not contribute to federal listing.

Midget Faded Rattlesnake - Suitable habitat for the midget faded rattlesnake occurs within and near the northwestern portion of the proposed Project Area (O&G Environmental 2008d; Appendix A, Figure 3-3). It was assumed that rock outcrops in the northwestern portion of the proposed Project Area would contain sites suitable for communal denning. However, the survey conducted in May and June 2008 did not locate any active den sites or individual midget faded rattlesnakes. Assuming a limited potential for midget faded rattlesnake occurrence, direct effects would include a low risk of mortality from vehicle collisions. Minimal direct effects could occur where the short-term loss of 11.8 acres from shot hole drilling, detonation, and helicopter staging provides potential cover and forage for dispersing snakes. A potential indirect impact could be small amounts of habitat fragmentation, but the short-term nature of surface disturbance would be negligible. Therefore, the Proposed Action would have a low potential to impact individuals, and would not contribute to federal listing.

Colorado River Cutthroat Trout - The Colorado River cutthroat trout populations are found in Currant Creek and west of the proposed Project Area in Sage, Trout and Gooseberry creeks. Applicant-Committed Environmental Protection Measures would protect Colorado River cutthroat trout and the cooperative agency (WGFD, BLM, and Trout Unlimited) habitat restoration in the watershed efforts by avoiding any project activities in the Currant Creek ACEC. Avoidance of the ACEC would reduce any potential for increased sedimentation in the watershed. In addition, implementation of 500 ft. buffers on riparian areas and 100 ft. buffers on drainages would further minimize the potential for downstream sedimentation that could impact waters suitable for restoration of the Colorado River cutthroat trout.

4.9.1.4 BLM Sensitive Plant Species

Ownbey's Thistle

Suitable habitat for Ownbey's thistle (*Cirsium ownbeyi*) is known to occur in the proposed Project Area (J. Glennon, BLM RSFO Botanist, pers. comm. with L. Moore, O&G Environmental, May 13, 2008). Field surveys conducted in the proposed Project Area in late May and early June 2008 found 57 sites, varying from a single individual to an area covering more than 10 acres (O&G Environmental 2008d). Devon would be required use a qualified botanist to identify, delineate and monitor plant sites that could be impacted by project activities. No project activities, including vehicle and foot-traffic, shot hole drilling, and detonation of charges, within a 50-ft. radius of the boundary of identified sub-populations will occur. Such buffer restrictions would ensure that impacts to Ownbey's thistle would be avoided and that project activities would be unlikely to contribute to federal listing.

4.9.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be selected, and no shot hole drilling or detonation operations would occur. Therefore, there would be no change to existing conditions, and no new impacts to federally listed, proposed or candidate species and no impacts to BLM sensitive species.

4.9.3 Additional Mitigation

Breeding bird and raptor nesting surveys should be considered within one mile of proposed ground-disturbing activities during the spring nesting season (February 1 – July 20), if the Proposed Action were to continue in 2009. Applicant-Committed Environmental Protection Measures (Chapter 2, Section 2.2.3), and COAs (Appendix D) that would be incorporated into the Proposed Action would reduce impacts or completely avoid vegetation removal. Areas disturbed would be restored and reclaimed to provide long-term protection for special status species. No additional mitigation measures would be necessary.

4.10 WILDLIFE AND FISHERIES

4.10.1 Proposed Action

4.10.1.1 Big Game

The sensitivity of big game to noise from helicopter activity and light vehicles would potentially have the greatest impact on big game in the proposed Project Area. A more detailed discussion on the impacts of noise is in section 4.21.

Helicopters appear to be the most stressful intruder, based on telemetry and heart monitor studies (Larkin 1996) and are likely to be startling and upsetting to big game resulting in avoidance and displacement behaviors (Gunn 1983, Krausman et al. 1986, McKechnie and Gladwin 1994). Such avoidance and displacement also reduces foraging efficiency (Stockwell et al. 1991). Studies have demonstrated that the distance that big game have fled from human disturbances related to aircraft is variable, and often dependent on the type, size, intensity and duration of the disturbance as well as the sex, age, season, and experience of the animal, and terrain, topography, and wind (Luz and Smith 1976, Fancy 1982, Bleich et al. 1990, Harrington and Veitch 1992). Physiological adaptations to helicopters appear to be unlikely for exposure to this stressor for such a short-term period (Larkin 1996). Individuals and small groups of pronghorn, elk, and mule deer would be expected to be disturbed and temporarily displaced during seismic operations, but sufficient suitable habitat is available throughout and adjacent to proposed Project Area. The effects on big game would, therefore, be short-term and minor. Big game

disturbed by helicopter and increased human activity would be expected to return to the proposed Project Area following the completion of the proposed seismic survey.

The western edge of the proposed Project Area is within WGF-designated big game crucial winter range for elk (Appendix A, Figure 3-5), and the entire Proposed Project area is in crucial winter range for deer (Appendix A, Figure 3-6). Spring, summer, and fall seasonal ranges are generally considered less limiting to big game populations, but researchers have suggested that having access to productive summer forage results in animals being in better condition for the winter, and increases their chances for over-winter survival (Marcum 1975; Grover and Thompson 1986; Edge et al. 1988). The Proposed Action would likely disturb and disperse pronghorn from the area, and similar to mule deer the loss of forage would be short-term and negligible. No direct impacts to wintering elk and mule deer on crucial winter range would occur because seasonal restrictions on project activities would be implemented from November 15 through April 30.

Shot hole drilling would have a short-term and negligible effect on available forage in crucial winter range because shot holes would be reclaimed. The 10-acre helicopter staging area would occur in mule deer crucial winter. Project activities associated with the use of the staging area would trample vegetation; however, the loss would be short-term and negligible. Because no blading or grading of the staging area would occur, and the area would be reclaimed immediately following the completion the seismic survey, direct impacts to forage from project activities would be minimal. Removal of vegetation, especially those preferred shrubs (e.g., mountain mahogany, antelope bitterbrush, and Wyoming big sagebrush) and herbaceous material with a high nutritional value would be avoided by equipment and crews. The limited effect of seismic activities on vegetation and soil are discussed in sections 4.5 and 4.6, respectively.

Disturbance During Parturition

Most elk, mule deer, and pronghorn typically give birth around June 1, plus or minus two weeks (Toweill and Thomas 2002), although there can be significant variation in some populations. An elk parturition area covers the northeastern quarter of the proposed Project Area. Human disturbance during parturition places newborn animals at risk. Most of the research on this topic has focused on elk. Disturbance during and immediately after calving may increase elk calf vulnerability to malnutrition and predation (Kuck et al. 1985; Phillips and Alldredge 2000). These studies indicated that disturbance during and soon after the calving period can increase mortality of calves, and disturbance after the calving period increases movement of calf/cow pairs and may cause displacement. Studies by Shively et al. (2005) showed that within two years after removal of disturbing activities, the calf/cow pair numbers were back to predisturbance levels. Because elk calves are extremely vulnerable to predators during the first few weeks of life, disturbance during the calving season creates a potential for increased calf mortality.

Seismic exploration activities within the parturition area would not occur during the elk calving period, May 1 – June 30, 2008. Should Devon request an exemption to the elk parturition stipulations in June 2009, field surveys would be required to determine animal presence and consultation with the WGFD would occur prior to the approval of the resumption of any seismic exploration activity in the parturition area (Figure 2-3 in map pocket). Should an exemption be granted, helicopter flights would commence from the west and progress eastward towards Little Mountain, unless otherwise agreed upon.

Impacts to Migration Corridors

Given the location of the migration corridors within the proposed Project Area, the impact on migration routes would be minimal. However, increased traffic throughout the proposed Project Area may disturb migrating animals where migration routes cross roads or two-tracks. The use of light vehicles on existing roads and two-tracks would also increase the risk of human-wildlife collisions. The risk of human-wildlife collisions would remain low where vehicles obey the appropriate speed limits and minimize travel during pre-dawn and post-sunset periods when animals are more active.

4.10.1.2 Upland Game Birds

Nesting upland game birds would likely occur throughout the proposed Project Area. However, project activities associated with the Proposed Action would occur in 2008 after the nesting season. Seismic activities that may occur in 2009 would conflict with nesting if these activities occur during the nesting period from mid-March/early April - July 15. Impacts from the short-term loss of vegetation important to ground- and shrub-nesting birds would be negligible if seismic activities have no shrub removal and herbaceous species are only trampled. Shot hole drilling and the staging area would result in the short-term loss of about 11.8 acres over the life of the project. Project activities would, to the extent possible, avoid dense shrub areas and vegetation removal impacts from source and geophone receiver lines would be minimal. Impacts from project activities would, therefore, have a short-term, negligible effect on nesting upland game birds or their habitats, and there would be no readily observable long-term effects resulting from the Proposed Action that would result in either the decline in either local subpopulations or populations as a whole.

4.10.1.3 Migratory Birds

The Migratory Bird Treaty Act of 1918 requires treaty participants (USA, Canada, and Mexico) to protect birds that migrate between the three countries. Nesting migratory birds would likely occur throughout the proposed Project Area. However, project activities associated with the Proposed Action would occur in 2008 after the nesting season. Seismic activities that may occur

in 2009 would conflict with nesting if these activities occur during the nesting period from mid-March/early April - July 15. Impacts from the short-term loss of vegetation important to ground- and shrub-nesting birds would be negligible if seismic activities have no shrub removal and herbaceous species are only trampled. Shot hole drilling and the staging area would result in the short-term loss of about 11.8 acres over the life of the project. Because project activities would, to the extent possible, avoid dense shrub areas and vegetation removal, impacts from source and geophone receiver lines would be minimal. Impacts from project activities would, therefore, have short-term, negligible effects on nesting migratory birds or their habitats, and there would be no readily observable long-term effects resulting from the Proposed Action that would result in either the decline of local subpopulations or populations as a whole.

4.10.1.4 Fisheries

Game and non-game fish populations in Currant Creek, Sugarloaf Marsh Creek, Upper Marsh Creek, Jarvies Marsh Creek, Krause Marsh Creek, and Spring Creek that flow east to west into Flaming Gorge Reservoir could potentially be impacted by activities related to the Proposed Action. Potential direct impacts to fisheries would include exposure to contaminants from accidental spills or increased runoff and sedimentation from shot hole drilling, detonation and geophone placement, and fugitive dust from vehicles using roads and two-tracks that intersect creeks and drainages with the proposed Project Area. Adherence to the mitigation practices described in the Applicant-Committed Environmental Protection Measures for developing an ERP and a SPCC Plan and other relevant compliance documents (such as the COA's), regulations, and policies would substantially reduce the risk of contaminants or sediment discharge from reaching area surface waters. Additionally, all riparian areas would be avoided by 500 feet, and all streams would be avoided by 100 feet during the layout of shot holes. This, too, will reduce the possibility of an impact on local fisheries.

4.10.2 No Action Alternative

Under the No Action Alternative the project would be denied and no new impacts would occur to wildlife and fisheries resources within the proposed Project Area.

4.10.3 Additional Mitigation

No additional mitigation measures are necessary.

4.11 CULTURAL RESOURCES AND NATIVE AMERICAN RELIGIOUS CONCERNS

4.11.1 Proposed Action

4.11.1.1 Cultural Resources

Direct and indirect impacts to cultural resources may occur as a result of conducting the Rubicon 3D geophysical seismic exploration project. The cultural resources inventory of the proposed Project Area determined that no eligible historic properties occur within the surveyed areas. In addition, there is low potential for encountering intact buried cultural remains within the proposed Project Area.

The proposed shot hole drilling and subsequent detonation operations could cause impacts to sites eligible for the NRHP. These effects could be in the form of direct, indirect or cumulative impacts. Direct impacts are physical, and can adversely affect a site or its setting. Direct impacts would occur from the proposed shot hole drilling and subsequent detonation operations. These impacts would include the formation of two-track trails, surface soil displacement, and/or soil compaction. If exploration activities are carried out in wet weather, rutting could also occur. Indirect effects would occur through the inadvertent creation of trails, which might be subsequently used by recreationists and ranchers potentially increasing erosion. The creation and use of trails may affect the setting of extant sites, for which viewshed is a component of site significance. Moreover, by providing access into areas containing archaeological resources, public use may result in artifact collection, which could radically influence site interpretation and result in the loss of important scientific data. Cumulative effects would consist of a gradual degradation of the cultural landscape through erosion and illicit artifact collection. With the implementation of the proposed mitigation measures prescribed below, effects to significant cultural resources may be reduced or eliminated.

4.11.1.2 Native American Religious Concerns

As related above, no prehistoric stone circle sites, cairns, rock alignment or rock imagery sites have been recorded by past inventories in the area covered by the files search. Furthermore, SHPO records do not indicate the presence of sites in the proposed Project Area considered potentially eligible for inclusion on the NRHP as a Traditional Cultural Properties. Moreover, Indian Sacred Sites, as defined and protected by E.O.13007, are not known to be located in the proposed Project Area.

If identified, Indian Sacred Sites, as defined and protected by E.O.13007, may suffer adverse affects to their integrity of setting, feeling, and/or association or by interfering with their ceremonial use. Based on BLM guidelines and past consultations with Northern Ute, Eastern Shoshone and Northern Arapaho Tribal representatives following examples from similar

projects, the following special site avoidance measures should be applied. With implementation of these measures, the project should cause no significant impact in this regard.

It is always possible that deeply buried archaeological deposits may remain undetected by the survey process, only to be exposed by later construction or other ground disturbing activities. Inadvertent discovery means the unanticipated encounter or detection of cultural resources that may qualify as historic properties, human remains, funerary objects, sacred objects, or objects of cultural patrimony found under or on the surface of Federal or Tribal lands.

4.11.2 No Action Alternative

Under the No Action Alternative the project would be denied and no new impacts would occur to cultural resources and Native American religious concerns within the proposed Project Area.

4.11.3 Additional Mitigation

- The operator shall engage an archeological consultant approved by the BLM. The consultant shall plot onto a project map all previously recorded cultural resource sites in the proposed Project Area regardless of ownership. This map will be provided to the operator, who is requested to arrange avoidance of these sites.
- The operator's consultant shall conduct a Class III cultural resource inventory of all areas on federal lands where motorized equipment operations are proposed. The inventory shall cover areas within a 50 foot radius of all proposed drill-holes on federal land and also all areas within 50 feet of the centerline of two-track trails on federal land to be used as project access. Cultural resource inventory will not be required on upgraded roads. Class III inventory will not be undertaken on non-federal lands.
- The inventory will be designed to locate and prescribe avoidance routes or other mitigation for all significant sites recorded. Standard site avoidance entails a 32.8 meter (100 foot) or more buffer zone around all eligible and unevaluated sites. Sites of potential Native American concern are subject to special avoidance measures described below.
- In the event that an inadvertent discovery is made during any construction, excavation, or shot hole activities, the operator will temporarily discontinue activities in the immediate area of the discovery and the BLM Rock Springs Field Office Archaeologist will be immediately notified in order to evaluate the discovery and determine the appropriate action.

4.12 PALEONTOLOGY

4.12.1 Proposed Action

The Wasatch Formation comprises bedrock underlying the Project Area. This formation has a high sensitivity for containing fossils of scientific significance (Probable Fossil Yield of 4 or 5). Ground disturbance, including shot hole drilling could result in the possible destruction of fossil resources of scientific significance as a result of shot hole drilling and detonation.

Ground disturbance could also result in beneficial effects in that new fossils of scientific significance may be discovered. Such fossils would need to be properly recovered, catalogued into the collections of a museum repository and made available for study and scientific evaluation. An additional positive benefit would be increased access for professional, permitted paleontologists and geologists, for the purpose of making scientifically significant discoveries.

4.12.2 No Action Alternative

Under the No Action Alternative, the BLM would not select the Proposed Action and no seismic activities would occur. Because there would be no change from current conditions no positive or negative impacts from the No Action Alternative would occur.

4.12.3 Additional Mitigation

No additional mitigation measures are necessary.

4.13 RECREATION

4.13.1 Proposed Action

4.13.1.1 Dispersed Recreation

The recreation effects analysis area for the Proposed Action includes the proposed Project Area and also the Little Mountain Recreation Use Area. The analysis area serves as the geographic basis for assessment of impacts resulting from the actions proposed under each alternative.

The Proposed Action will have minor direct effects on the wide array of dispersed motorized and non-motorized recreation opportunities offered and available in the Little Mountain Recreation Use Area. The minor impacts that may occur would be short term due to the short time period needed to conduct the seismic exploration activities. The potential effects from the Proposed Action on most recreation activities will consist mainly of lost or diminished recreation opportunities or experiences in the proposed Project Area due to the drilling and detonation of shot holes and placement of geophones. The visual impact and/or noise from these activities would affect recreation experiences in the immediate area where they are visible and/or audible.

Recreation experiences for persons in the Little Mountain area may also be diminished by the sights or sounds of the seismic exploration activities from helicopter overflights and detonation of charges, especially for those individuals seeking quiet, solitude, and unchanged natural landscapes. Traffic associated with the proposal on access roads in the proposed Project Area would be minimal, and limited to existing roads and two-tracks. The impact on county roads is unknown, as there are no specific data on numbers of recreation users utilizing the county roads. The potential impact on traffic on U.S. Highway 191 is provided in Section 4.14. Because the Proposed Action would occur over about 45 days in 2008, as many as 90 days in 2009, impacts would be short term in nature, and temporary.

4.13.1.2 Hunting

The analysis area for hunting includes the respective designated WGFD Hunt Areas for elk, mule deer, and pronghorn antelope in which the proposed Project Area is located. These include Pronghorn Hunt Area 112 (Appendix A, Figure 3-5), Elk Hunt Areas 31 and 32 (Appendix A, Figure 3-6), and Mule Deer Hunt Area 102 (Appendix A, Figure 3-7). Hunting for these three species in the area occurs for about two months, with archery opening approximately on September 1 and lasting for a month, and rifle season opening on about October 1 and lasting for about 30 days.

The proposed Project Area encompasses Pronghorn Antelope Hunt Area 112, and also includes Mule Deer Hunt Area 102. In particular, the proposed Project Area includes large sections of Elk Hunt Areas 31 and 32, which are relatively small compared to the mule deer and pronghorn hunt areas. Both Elk hunt units are part of Elk Herd Unit 424 made up of the South Rock Springs Elk Herd.

Hunting, as an important component of tourism, has a positive impact on the local, regional, and state economy. Some comments received during scoping expressed concern that the Proposed Action could have a negative impact on hunting and the revenues from these activities. The WGFD, for example, receives most of its annual revenues directly from the sale of hunting and fishing licenses. Because of the very high demand for and very limited number of licenses available in the respective hunt areas, licenses only rarely go un-issued, and successful license lottery recipients are unlikely to forego the opportunity to hunt in the affected hunt areas. Therefore, the economic impacts to the tourism economy would result in some short-term loss if hunters were to forego hunting opportunities. The WGFD revenues would not be directly affected because the lottery for 2008 limited quota licenses for residents and non-residents wanting to hunt in these big game hunt units has already been completed. However, if project activities continued in 2009 past August 31, impacts to hunting could occur.

If the Proposed Action occurs during either the archery or rifle seasons, or both, direct affects would include displacement of big game animals from the immediate vicinity of Little Mountain

and areas west of Little Mountain where big game begin to congregate as the late summer/fall season progresses. Displacement would largely result from helicopter noise and overflights, and also from the increased presence, noise, and movement of personnel and equipment in the proposed Project Area. As game species are displaced, displacement of hunters would also occur. The distance and duration of displacement will depend largely on the animal species, individual animal, and type, duration, and intensity of disturbance. The WGFD believes that because Elk Herd Unit 424 is an interstate herd, some animals could be displaced to more secure areas in Colorado and Utah. Some hunters in the area could benefit from project activities if big game were displaced to areas with less security and cover, but with increased animal density due to displacement.

4.13.1.3 OHV

The area of effects analysis for OHV use would be the same as that identified for recreation. The direct affects of the Proposed Action would be minimal and negligible on OHV use in the Little Mountain Recreation Area and the proposed Project Area. Motorized travel for the public, including OHV travel, is limited to designated roads and trails (RMP 1997) which means motorized vehicles must stay on designated roads and trails, which are those currently depicted on the current BLM land status map for the area. The Proposed Action would impact these roads or trails only during equipment mobilization, shot hole detonations, and seismic data collection. There would be increased traffic on those existing roads used to access the proposed Project Area, but public use would not be restricted except during shot hole detonations. The affects would be short term. The sights and sounds of the exploration work would not be as visible or audible as it is to persons engaged in non-motorized recreation pursuits due to their mostly continuous movement and the sound of the OHV itself muffling other sounds.

4.13.2 No Action Alternative

Under the no action alternative, the Proposed Action would not be selected. The existing environment would remain in its current condition and there would be no new impacts on the recreational resources and opportunities as a consequence of selecting this alternative.

4.13.3 Additional Mitigation

Applicant-Committed Environmental Protection Measures would include the cessation of helicopter flights and detonation of shot holes by August 31, 2008 to reduce impacts to hunting and the displacement of game species. Although efforts to remove most field personnel and crews would occur by this date, weather and other unforeseen delays may require that the Devon continue removing equipment for several days following this deadline. Under such conditions, the Devon would continue using existing access roads and approved two-tracks. Applicant-Committed Environmental Protection Measures (Chapter 2, Section 2.2.3), and COAs (Appendix

D) that would be incorporated into the Proposed Action for other resources would further reduce potential impacts to recreation resources and opportunities. No additional mitigation measures would be necessary.

4.14 VISUAL RESOURCES

Unmodified, natural scenes are common in the vicinity of the proposed Project Area, with human modifications including oil and gas wells, bladed and two-track roads, transmission lines and facilities, pipelines, water impoundments, fences, grazing cattle and wildlife comprising minor components of the overall proposed Project Area landscape. Residential developments, minerals development and associated upgraded access roads are also minor components of the landscape. A few shorter seismic line scars also exist in the proposed Project Area. Few, if any of these components are readily visible from Highway 191, the major roadway through the proposed Project Area. Motorized travel is also restricted to existing established roadways and two-tracks.

4.14.1 Proposed Action

Visual resource concerns may be subject to brief conflicts in the proposed Project Area. Heli-portable drilling rigs that would be used for the shot holes are significantly smaller than a standard oil and gas drilling rigs; and therefore would only be visible over relatively short sight distances. Helicopters flying into and out of the area from the shot hole and geophone lines to the staging area would be visible for 45-50 day in 2008, and up to 90 days in 2009, and would be the principal visual intrusion and major focal point for observers. Other activities associated with seismic exploration will not be visible over extended distances and would not impact visual resources over the long term.

4.14.2 No Action Alternative

Under the No Action Alternative, the BLM would not select the Proposed Action. Since no drilling operations or other seismic survey activities would occur, there would be no change from current conditions; therefore, no impacts would occur to the viewshed in the area beyond existing conditions.

4.14.3 Additional Mitigation

Visual impacts are required to be minimized in all resource development activities on BLM-administered lands. No additional mitigation is necessary.

4.15 SOCIOECONOMICS

4.15.1 Proposed Action

Implementation of the Proposed Action would generally have positive socioeconomic effects for Sweetwater County including increased employment opportunities for county residents and a minor demand for housing and public services primarily in Rock Springs and Green River.

The Proposed Action would have moderate impacts on the attitudes and opinions regarding the use of public lands. Numerous comments were received regarding the value of this area for hunting, recreation, wildlife viewing, open space and unobstructed views.

4.15.1.1 Local Economy and Employment

Implementation of the Proposed Action would create additional employment opportunities in Sweetwater County during the life of the project. However, the contribution resulting from increased opportunities for direct employment (e.g., positions hired for seismic exploration activities), and indirect employment (jobs available in support industries) would be short-term and negligible. When feasible, local contractors and workers would be hired for the proposed project. The nonlocal population would consist of short-term seismic exploration contractors and field personnel. Some non-local workers would likely reside in Rock Springs or Green River, Wyoming. Temporary housing is available, but limited, in Rock Springs and Green River, which has historically offered accommodations for the oil and gas industry. Non-local populations would contribute to the local economy of these cities through the rental of motel rooms, or other accommodations, as well as meals, groceries, gasoline, and various other goods and services. There would be a corresponding increase in demand for the service sector from the increased nonlocal population. The Proposed Action would result in a minor increased demand for local services (e.g., housing, law enforcement, fire protection, medical, and social services). In addition, the proposal would result in increased wear on U.S. Highway 191, and other county infrastructure. Overall the effect of an increased nonlocal population would be short-term and negligible.

Analysis indicates that the effect on employment, personal income, housing, facilities and services, and local, state and federal government fiscal conditions would be negligible.

4.15.1.2 Hunting and Recreation

There could be a short-term impact to the recreational experience as a result of the proposed seismic exploration activities displacing animals. Persons may see and hear the helicopter and shot hole drilling or detonation during hiking, hunting, biking or sightseeing and decide to avoid the area to recreate and expend income in other available local settings.

In 2007, a total of 2,898 applications were submitted by resident and nonresident hunters for 384 permits to hunt elk in Hunt Units 31 and 32. A total of 343 applications for 343 permits to hunt mule deer in Hunt Unit 102, and 154 applications were submitted for 154 permits to hunt pronghorn in Hunt Unit 112. Because these are permit-only areas, the number of hunters would have a localized effect on revenues.

Significantly fewer hunters hunt during the archery season as compared to the rifle hunting season. However, given the importance of the local area for hunting, Devon would discontinue helicopter activity and detonation of seismic charges during the first phase of the Proposed Action by August 31, 2008. Cessation of such activities would reduce impacts on hunting resulting from human activity and noise disturbance due to helicopter activity, shot hole drilling, and detonation of charges. Devon would coordinate and time project activities by beginning on the western side of the proposed Project Area to reduce impacts to hunters' experience. Project activities would proceed in a south to north direction before moving eastward to reduce dispersing game concentrated in habitats on and around the western side of Little Mountain.

Although the cessation of the first phase of seismic exploration activities would occur by August 31, 2008, economic impacts could occur to hunters during the September 1-30 archery season. The economic impact would be greatest in the earliest part of the season until big game, expected to be dispersed during project activities, return to the Project Area. Archery hunters with limited time and personal resources could be individually affected to a greater degree if they discontinue their hunt due to game dispersed by project activities. The economic impact to individual hunters would be moderate, especially if they traveled from outside the local area. The economic impact to the local communities of Rock Springs and Green River would be negligible and short-term, given that there are significantly fewer archery hunters as compared to rifle hunters. Economic impacts would be expected to be greater if big game do not return to the Project Area during the September portion of the season.

Rifle hunting commences October 1, and provided big game return to the Project Area, the economic loss during rifle hunting should be negligible. The economic impact to individual rifle hunters would be moderate, but short-term if big game should choose not return to the proposed Project Area following the discontinuance of project activities. The overall effect on local economies from the loss of hunting opportunities during rifle season would be negligible and short-term.

4.15.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be selected by BLM. Additional employment and use of local services would not be realized. Impacts to

socioeconomics, including population, housing, goods and services, hunting, and recreation, would remain unchanged from existing rates of change.

4.15.3 Additional Mitigation

No additional mitigation measures are proposed.

4.16 AREAS OF SPECIAL DESIGNATION

The Proposed Action consists of a 42 square mile area that overlaps much of the Sugarloaf Basin Management Area and part of the Currant Creek portion of the Greater Red Creek Area of Critical Environmental Concern (ACEC). Section 103 (a) of the Federal Land Policy and Management Act of 1976 (FLPMA) defines areas of critical environmental concern as “*areas within public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.*”

4.16.1 Proposed Action

4.16.1.1 Sugarloaf Basin Special Management Area

The Proposed Project area overlaps much of the Sugarloaf Basin SMA. The management objectives for the Sugarloaf Basin SMA are to: 1) improve watershed condition and enhance watershed values; 2) improve riparian areas to proper functioning condition, as a minimum; 3) provide opportunities for dispersed recreation uses in the area consistent with the primary watershed, riparian, and wildlife objectives; and 4) maintain and protect important wildlife habitat. The Sugarloaf Basin SMA contains an important aquifer recharge zone associated with Little Mountain. Protection measures in the Sugarloaf Basin SMA include limitation of road density, surface disturbing activities, and surface occupancy to maintain the area in healthy and functioning condition.

4.16.1.2 Currant Creek Portion of the Greater Red Creek ACEC

The proposed Project Area overlaps part of the Currant Creek portion of the Greater Red Creek ACEC and most of the Sugarloaf Basin Special Management Area (SBSMA). This ACEC meets the relevance and importance criteria for unstable fragile soils, unique ecological features, watershed and cultural values, and sensitive species of regional, national, and international importance. Implementation of the Applicant-Committed Environmental Protection Measures (2.2.3) would contribute avoidance or minimization of potential impacts from the Proposed Action as no drill holes and detonation of charges would occur in the Currant Creek portion of

the Greater Red Creek ACEC. Geophone lines would, however, be laid in portions of the Currant Creek portion of the ACEC in an east-west configuration. Geophone lines would not however, be located within 500 ft. of any creeks to protect riparian values along Currant Creek and its tributaries.

Implementation of the Applicant-Committed Environmental Protection Measures (Section 2.2.3) and COAs would result in avoidance or minimization of potential impacts from the Proposed Action.

4.16.1.3 Wilderness Resource Management and Wilderness Study Areas

The Proposed Action would have no affect on existing wilderness areas or Wilderness Study Areas (WSA) as the Project Area is not in, adjacent to, or in close proximity to any congressionally designated Wilderness or BLM WSA.

4.16.2 No Action Alternative

Under the No Action Alternative, the BLM would not select the Proposed Action. Therefore, no direct or indirect effects on special management areas or ACECs would occur.

4.16.3 Additional Mitigation

With the implementation of the Applicant-Committed Environmental Protection Measures and COAs, no additional mitigation measures are necessary for the protection of the Currant Creek portion of the Greater Red Creek ACEC and Sugarloaf Basin Special Management Area.

4.17 TRANSPORTATION AND ACCESS

4.17.1 Proposed Project

Under the Proposed Action no new roads would be constructed or upgraded. Access vehicles would primarily be made up of light trucks and ATV mules. Daily traffic would generally involve less than 10 light trucks and ATVs traveling in the proposed Project Area. Large trucks would mobilize and demobilize the equipment and supplies to the project staging area, and would periodically bring additional supplies to the project during project operations. Devon may use a bus to carry workers from Rock Springs to the Project Area. Helicopter use would be extensive during the project. Most of the equipment would be carried to and from the project sites using a helicopter. While, helicopters would carry equipment to the field sites most of the time, light trucks can be used to haul equipment and supplies when there is nearby road access. The helicopter would run through the work day for the duration of the project and land mainly in the proposed staging area, but could be used to carry field crews to project sites.

All the unimproved roads and two-tracks that would be used have had a Class III archeological clearance performed. A transportation map which specifically lays out which roads and two-tracks that Devon and their contractors can use was developed. This map, along with the Applicant-Committed Environmental Protection Measures and COAs, serves as a travel plan (Appendix A, Figure 2-2). No off-road vehicle use would be allowed for this project. No road improvements or upgrades would be required on the proposed Project Area roads. No dust suppressants would be required. Devon would be responsible for the maintenance of existing access roads per BLM road standards for the duration of the project. Vehicle use would be suspended if there rutting greater than four inches in depth occurring.

One issue brought up in the scoping process is the possibility of re-opening of unused two-tracks to increase public use. This is a possibility; however Devon would only be driving on two-tracks that are otherwise already open for public use, and areas that are grassed-over would not to be used.

Another issue is that resource damage could result from the use of the unimproved roads and two-tracks. This is possible as the unimproved roads and two-tracks would not be engineered to reduce stormwater runoff or control erosion. Devon would be required to repair road damage and to avoid roads when wet ruts can form.

In summary, transportation issues would be related primarily to the use of light trucks and ATV's and their associated impacts to unimproved roads and two-tracks which could increase the risk of soil damage, erosion, fugitive dust, and the sediment load to creeks and drainages. Given the requirements to mitigate transportation impacts, short-term impacts would be minimized, and there would not be any long-term, adverse effects.

All the unimproved roads and two-tracks that will be used have had a Class III archeological clearance performed. A transportation map which specifically lays out which roads and two-tracks that Devon and their contractors can use was developed. This map along with the Applicant-Committed Environmental Protection Measures and Conditions of Approval (COAs) acts as a travel plan (Appendix A, Figure 2-2; and Figure 2-3 in the map pocket). No off road vehicle use is allowed for this project. No road improvements or upgrades are required on the proposed Project Area roads. No dust suppressants are required. Devon will be responsible for the maintenance of existing access road per BLM road standards, while it is being used for the proposed action. Vehicle use will be suspended if rutting greater than four inches in depth occurs.

4.17.2 No Action Alternative

Under the No Action Alternative, the BLM would not select the Proposed Action and no additional traffic would occur. Therefore, there would be no change to existing conditions, and no potential transportation impacts.

4.17.3 Additional Mitigation

No additional mitigation measures would be necessary.

4.18 RANGE RESOURCES

4.18.1 Proposed Action

Impacts of the Proposed Action on rangeland resources would result in a total short-term loss of 11.8 acres of forage for grazing due to vegetation removal resulting from shot hole drilling and use of the proposed staging area. Other potential impacts could include an increased risk of cattle/vehicular conflicts during shot hole drilling, detonation of charges, and geophone placement, and increased potential for invasion by nonnative plant species. Helicopters in the area would also disturb grazing cattle and cause some temporary displacement from areas of seismic activity. These impacts would be mitigated through reclamation, coordination between the Devon and permittees, and the timing of the drilling relative to the grazing season of use.

4.18.2 No Action Alternative

Under the No Action Alternative, the BLM would not select the Proposed Action. Because there would be no seismic exploration activities, no impacts to range resources would occur.

4.18.3 Additional Mitigation

The following are additional mitigation measures to protect livestock and rangeland under the Proposed Action:

- Coordinate with livestock permittees during seismic exploration activities.
- Coordinate with livestock permittees on the shot hole drilling and detonation schedule to reduce or eliminate interactions with cattle (e.g., design grazing schedule to defer the areas until seismic activities are complete.
- Locate and mark range improvements such as stock waterlines, springs and tanks that may be in proximity to shot holes to alert permittees using the area. A 250 ft. buffer on all stock waterlines would be implemented for shot holes.

- Complete reclamation immediately to reduce potential for invasive nonnative species and to restore forage on the sites.
- Carpool crews to the area to reduce traffic and potential for collisions with cattle.
- Strictly enforce speed limits.

4.19 FIRE AND FIRE MANAGEMENT

4.19.1 Proposed Action

Under the Proposed Action there would be an increase in potential for accidental fires. Potential ignition sources include sparks from machinery, contact between hot machinery and vegetation (e.g., vehicle exhaust systems), and cigarette butts. Adherence to the Applicant-Committed Environmental Protection Measures described in Section 2.2.3 would mitigate and preempt the potential increase in fire risk. Any increase in fire risk would be expected to be *de minimus*. Due to the discontinuous nature of fuels on the proposed Project Area, it is not anticipated there would be any noticeable benefit from removing fuels.

4.19.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be selected by the BLM. Since no seismic operations would occur, there would be no increase in fire risk. The ignition potential from humans would remain unchanged from current conditions.

4.19.3 Additional Mitigation

No additional mitigation would be necessary other than the Applicant-Committed Environmental Protection Measures provided in Section 2.2.3.

4.20 WASTES, HAZARDOUS AND SOLID

A variety of materials typical of seismic survey operations could be onsite during the project program. Other solid wastes associated with the Proposed Action would include human waste and trash.

4.20.1 Proposed Action

The principal hazardous materials that would be used in the proposed Project Area would be explosives. Other hazardous materials would include diesel fuel, oil, and petroleum-based lubricants for drilling rigs, jet fuel for the helicopter, cleaners and solvents, and spray paint. Field personnel would be required to follow safe handling, transportation, and storage procedures enforced through the EPA, BLM, and the State of Wyoming. Because explosives and their storage would be handled by personnel licensed and responsible to do so, the potential impacts to

human health and the environment would be negligible. Implementation of the Applicant-Committed Environmental Protection Measures, COAs, and BLM regulations would ensure that an Emergency Response Plan (ERP) and Spill Prevention, Containment and Countermeasure Plan (SPCC) would be implemented.

Field personnel would be required to immediately remove any human and other project-generated trash. Personnel mobilizing on foot would be required to immediately remove and carry out any trash where vehicle or helicopter access is not feasible. Given these required procedures, the impact from human trash would be minimal.

4.20.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be selected, and no explosives or other hazardous materials would be necessary. Therefore, there would be no change to existing conditions, and no new impacts to the proposed Project Area.

4.20.3 Additional Mitigation

With the implementation of the Applicant-Committed Environmental Protection Measures, COAs, ERP, and SPCC Plan, no additional mitigation measures would be necessary.

4.21 NOISE

4.21.1 Proposed Action

During geophysical exploration operations the noise associated with helicopter use, drilling operations, seismic shots, vehicle traffic, and human activity within the proposed Project Area are the primary concern. Of these, the helicopter noise has the potential to cause the most disturbance to humans and to wildlife. The relative quiet of the proposed Project Area in comparison to the project-related noise is also an issue.

Seismic-related activities including the seismic shot points, support traffic, and helicopter noise would create sound disturbance within the immediate area of operations of as much as 90-100 decibels (dBA) for short durations (BLM 2003, U.S. Army 2008). These noises would be transient as the project operations proceed across the proposed Project Area, but would occur for the duration of the project. Away from the project operations area the noise level would diminish considerably. For example using the Inverse Square Law of Noise Propagation to calculate attenuation, a 100 decibel sound would be attenuated to approximately 62 decibels at 1280 feet (BLM 2008). Attenuation also depends on other factors such as vegetation or other physical obstacles.

Helicopters create more noise disturbance than other types of equipment. Noise from helicopters is complex, consisting primarily of engine noise (usually turbine), gearbox noise, blade loading noise, and a host of interaction noises. Helicopter noise is expected to last for approximately 70 to 90 days. Tests by the FAA on helicopters comparable to the ones used for seismic operations indicate 70-80 dBA levels at usual air speed and 1,500-foot flyover altitudes directly underneath the helicopter (BLM 2005). Helicopter noise would occur over much of the proposed Project Area, but would be focused primarily along flight paths, staging areas, at shot hole drill locations. Only one helicopter at a time is expected for the project, which would lessen overall noise impacts.

Explosive detonations occur under the ground and therefore produce little aboveground noise. Noise from the seismic shots is very brief thump sound, and is no louder than a small arms fire. (John Hughes, Devon Energy, Personal Communications, 2008). As a result the impacts from the actual seismic shot should not impact wildlife anymore than recreational small arms use.

There would be drill rig noise for most of the 70 to 90 day project duration. The drill rig noise comes from the diesel engine that powers the compressor, the compressor, and the sound from the rotary drill rig itself. Up to eight drill rigs can be in use at any one time. The drill rig and associated noise can be relatively loud nearby the drill rig, and while the sound would become abated over distance, the drill rig would likely be heard for a quarter-mile or more.

Vehicle traffic noise would be of a limited extent and not create noise levels substantially over current noise levels. Most of the traffic would be from light trucks and ATV's, with some semi-tractor used for moving the equipment and supplies to the staging area.

Direct human noise would be very limited and while disturbing animals in the immediate vicinity is not likely to impact wildlife or recreationists.

Humans related concerns are primarily the effects of noise on recreationists in and near the proposed Project Area. Relative to the background noise levels, the noise from the helicopters and other equipment are likely to lead to a loss of a sense of solitude and remoteness that some recreationists seek. The absolute noise level is not expected to exceed the 55 dBA level except for brief periods and then only if the recreationist is in close proximity (less than a mile) from the operations or near the helicopter flight path. However it is the relative change from background to project level noise that is likely to be of concern. Noise disturbance can annoy people to differing degrees, depending on their expectations, attitudes towards development activities, magnitude and duration of the noise, the activity they are pursuing, and the time of day. Non-project human-caused noise within the proposed Project Area are occasional jet aircraft traffic over-flights at high altitudes and light traffic on area roads, and traffic on State Highway 191. In addition to human-induced noise, the proposed Project Area is subject to a great deal of wind

noise, as it is located in a high wind area. The topography and natural landscape do not offer many breaks from the wind, as the majority of the proposed Project Area exhibits rolling hills and sparse vegetation. These noise sources currently create only modest sound disturbances within the area. Noise level changes during the project would be noticeable to area visitors, and may negatively affect their activities. As a result some area visitors and recreationists would have a negative reaction to the increase in noise levels and may have their activity disrupted as a result of the Proposed Action.

Impacts from noise on wildlife are of primary concern for BLM-listed sensitive species, raptors, migratory birds, and big game species. Other species such as migratory birds may also be impacted by project level noise. The response and impacts from noise to wildlife is extremely varied and general conclusions about the type and magnitude are difficult to reach (Larkin, 1996). Project-related noise may cause individuals or groups of animals to seek shelter or temporarily flee the immediate area of activity and move to adjacent suitable habitat. However, wildlife displacement would be expected to be brief and localized, as activities are concentrated to a couple of areas at any one time, the activity is fast moving, and the duration in any one area is short-term. The potential to reduce habitat effectiveness by disturbing or displacing individual animals during the project does exist; however, due to the nature of the operation such disturbance would be short-term and temporary and effects on individuals would likely be transient. While temporary noise impacts are expected, the noise impacts would not be expected to adversely affect general wildlife species on a population level basis, nor are they expected to result in a loss of viability of general wildlife species in the area.

In summary, overall project noise elevation would be expected to be of moderate level, localized to portions of the proposed Project Area at any one time, and transient in nature. Drill and explosive noise would be expected to impact only wildlife and people near the operations drill. Helicopter noise would be expected to be the biggest generator of noise across a larger area, but would not be expected to have a long-term, detrimental impact to wildlife or recreationists.

4.21.2 No Action Alternative

Under the No Action Alternative, the BLM would not select the Proposed Action and no noise increasing operations would occur. Therefore, there would be no change to existing conditions, and no potential noise-related impacts to area wildlife and human visitors.

4.21.3 Additional Mitigation

Applicant-Committed Environmental Protection Measures would include development of a helicopter flight plan that is intended to minimize impact to big game species.

4.22 REALTY AND LAND USE

4.22.1 Proposed Action

Under the proposed action, Devon would have legal access for conducting geophysical seismic survey operations. Where necessary, they would be required to obtain agreements allowing for crossing existing rights-of-way, or where there is potential for impacts to other leases. Devon would also be required to comply with Conditions of Approval (Appendix D), as well as the approved Decision Record for the Proposed Action. Overall, Devon would not be expected to conflict with or otherwise impact other realty authorizations in the Project Area. BLM is expected to retain all lands in the Project Area that area under BLM management, and is not expected to dispose of them or withdraw them in the Project Area. Devon may also be required to obtain agreements to cross State and private land to access BLM managed land.

4.22.2 No Action Alternative

Under the no action alternative, the proposed action would not be approved and the current land status, uses and ownership would remain unchanged by the Proposed Action. There would be no additional impacts to lands and realty as a consequence of selecting this alternative.

4.22.3 Additional Mitigation

No additional mitigation measures would be necessary.

5.0 CUMULATIVE EFFECTS

Pursuant to NEPA, federal agencies must consider the cumulative effects of the Proposed Action in conjunction with other activities. Cumulative impacts are defined as the impact on the environment resulting from incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects are effects that increase by successive addition, or incrementally by a series of actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

A general perspective of how the Proposed Action relates to the overall cumulative effects can be achieved by asking how the single action proposed contributes to potential threats or changes from all sources in an area over the long-term. This cumulative effects analysis asks the following questions:

- Could the additive effects of the Proposed Action be of such magnitude that it could have significant influence on resource abundance, productivity, condition, or trend over the cumulative effects area well into the future?
- Does the Proposed Action contribute significantly to making conditions worse (negative or adverse)?
- Does the Proposed Action have little bearing or no detectable influence on changes or threats to the resource (neutral)?
- Does the Proposed Action contribute to making conditions better (beneficial)?

Although the cumulative effects analysis requires analysis that is forward looking, it focuses only on the potential additive impact of the Proposed Action when added to the aggregate effects of past, present, and reasonably foreseeable future actions, as required by NEPA. To achieve this, the cumulative effects analysis of this single geophysical exploration was bound temporally and spatially, defining the duration and area for project effects. The time period within which cumulative effects were bounded is roughly from the 1970's through 20 years from project initiation, or about 2028. This timeframe over which the analysis is conducted includes the decision(s) made, and potential follow-up actions that would be implemented and completed. The cumulative assessment includes an analysis of impacts of past, present, and reasonably foreseeable future actions in an area BLM has identified based on big game hunt units, the Currant Creek portion of the Greater Red Creek ACEC, and the Sugarloaf Bain SMA (Figure 4-1).

Past and Present Actions Relevant to this Cumulative Effects Analysis

The major critical elements that contribute to past and present actions relevant to this cumulative effects analysis include minerals activities; vegetation/fire management; road construction, reconstruction, and improvement; recreation; wildlife; and land use and development.

Mineral Activities

- Previous seismic activities have occurred in the general area including portions of the proposed Project Area.
- Mineral leasing for oil and gas exploration and development has occurred.
- Several non-producing oil wells were drilled previously, and two exploratory wells have recently been approved on BLM lands with the proposed Project Area.

Vegetation/Fire Management

- Prescribed burns have occurred on federal lands.
- Commercial livestock grazing has been permitted and has occurred on federal and state lands within the proposed Project Area.
- Invasive nonnative plant species have occurred on federal and state land.
- A BLM fire management plan (FMP) has been in effect and wildland fire suppression has occurred.

Road Construction/Reconstruction/Improvement

- Many miles of new road have been constructed or improved across BLM and State public land to allow better access for public land users, utility access, and mineral exploration.

Recreation

- Motorized recreation use (including ATVs and snowmobiles), as well as nonmotorized recreation use, has occurred and is continuing to occur.
- The Cherokee Trail provides recreational opportunities.
- Big game hunting and fishing has been permitted and historically occurred.
- Outfitting/guiding has been permitted and historically occurred.

Wildlife

- Introduction of exotic fish species and stocking native fish populations has occurred.
- Wolves have been protected, reintroduced, and delisted.

Land Use

- Human use in the area has increased.
- Roads, transmission lines, telephone lines, and ancillary transmission line facilities have been constructed.
- Springs and seeps have been developed, and water diversions and stockwater pipelines have been constructed.

Reasonably Foreseeable Future Actions That Will Likely Occur In Addition to Recurring and Continuing Activities

Additional oil and gas activity could occur in the Project Area as leases have been secured from the federal government and the state of Wyoming. Two exploratory wells were approved in June 2008 for drilling in or near the proposed Project Area on BLM lands, and should they prove to produce, full field development could be proposed which would require new NEPA analysis. Based on existing trends, the demand for dispersed motorized and non-motorized recreation use, including ATV use, would likely increase on public lands.

Cumulative Effects of the Proposed Action When Added to Past, Present, and Reasonably Foreseeable Future Actions

To date, there have been no significant impacts to resources on federal lands within or adjacent to the proposed Project Area that has been identified in NEPA documents prepared for previous actions. A FONSI and Decision Record for two exploratory wells were issued in June 2008. , The BLM has received a Notice of Staking (NOS) for a single well within the Sugarloaf Basin SMA about 2 miles SW of the proposed Project Area. The NEPA analysis for this well has not been completed. BLM has also received notice for another seismic project overlapping and on the southwest corner of the proposed project.

The proposed 3D geophysical seismic exploration or the No Action Alternative would not significantly contribute incrementally to long-term changes or conditions of the major critical elements identified on the previous page.

Any potential adverse long-term cumulative effects of the Proposed Action have been adequately mitigated through project design, Applicant-Committed Environmental Protection Measures, Conditions of Approval (COA), and additional mitigation measures recommended. The effect of these measures renders the Proposed Action to such a degree that project impacts can be considered cumulatively minor.

The 3D geophysical seismic exploration also contributes beneficial impacts by reducing adverse effects on resources over the long term if future oil and gas exploration and development were to occur. Little data is currently available to determine the potential success ratio of wells to develop oil and gas resources. Data collected using 3D seismic exploration

methods could reduce the number of development wells necessary to extract oil and gas resources with a higher success ratio. Fewer wells would result in the long-term reduction in potential disturbances to area resources, activities, and users from well pads, roads and other ancillary facilities.

Although the Proposed Action is neutral from a cumulative effects aspect, the Proposed Action cannot offset or compensate for past, present, and reasonably foreseeable adverse cumulative effects caused by non-Federal actions or actions on non-Federal lands.

6.0 CONSULTATION AND COMMUNICATION

An EA aids a federal agency in making decisions on an action by presenting information on the physical, biological, and social environment of a Proposed Action and alternatives. The Council on Environmental Quality (CEQ) regulations requires that an early scoping process be conducted to determine the issues related to the Proposed Action and the alternatives that the EA should address.

5.1 PUBLIC PARTICIPATION

Public participation is a critical element in the scoping process. A Scoping Notice for the *Rubicon 3D Seismic Survey Proposal* was mailed to government agencies, government officials, public land user groups, private landowners, newspapers, radio stations, environmental organizations, and posted to the BLM website (<http://www.blm.gov/wy/st/en/info/NEPA/rsfodocs.html>). The scoping process included a public comment period from May 12 to June 10, 2008. During the comment period 18 letters were received, which included a total of 296 comments. A list of agencies, organizations, and individuals that submitted comments along with a summary of comments and responses to those comments are provided in Appendix E.

5.2 PREPARERS AND REVIEWERS OF THE EA

This EA was prepared by TEC Inc., a third party contractor, for the BLM. The names and disciplines of the preparers are provided in Table 5-1. The BLM resource specialists who reviewed and approved the Baxter Proposal EA are provided in Table 5-2.

Table 5-1. List of Preparers of this EA

| Resource(s) | Name | Company |
|--|-----------------|----------------|
| Project Manager, QA/QC, Cumulative Impacts | David Kane | TEC, Inc. |
| Project Coordinator, Editor | Marion Fischel | TEC, Inc. |
| Geology/Minerals, Ground Water, Surface Water, Soils, Fire Management, Paleontology, Air Quality | Kristin Brown | TEC, Inc. |
| Realty, Land Use | Derek DeVito | TEC, Inc. |
| Document Processing | Josie Jackman | TEC, Inc. |
| GIS, Maps | Melissa Johnson | TEC, Inc. |
| Rangeland Resources, Noxious Weeds, Visual Resources, Recreation, Wildlife, Special Status Species, Fisheries, Socioeconomics, Vegetation, Wetlands/Riparian, Management Areas | Walt Moore | TEC, Inc. |

CHAPTER 6: CONSULTATION AND COMMUNICATION

| Resource(s) | Name | Company |
|---|-------------|----------------|
| Coordinator public comments/responses, Noise, Transportation, Proposed Action | Chris Rowe | TEC, Inc. |
| Cultural Resources | Joel Tyberg | TEC, Inc. |

Table 5-2. List of BLM Reviewers

| Resource(s) | Name | Office |
|--|-------------------|------------------------------------|
| BLM Project Manager, Fluid Minerals | Jeromy Caldwell | BLM Rock Springs |
| Assistant Field Manager-Minerals & Lands | John MacDonald | BLM Rock Springs |
| Assistant Field Manager-Resources | Bernie Weynand | BLM Rock Springs |
| Economist | Roy Allen | BLM Wyoming State Office, Cheyenne |
| Paleontology | Adam Day | BLM Rock Springs |
| Hydrology | Dennis Doncaster | BLM Rock Springs |
| Recreation/OHV/Visual Resources/Wilderness | Jo Foster | BLM Rock Springs |
| Special Status Plants | Jim Glennon | BLM Rock Springs |
| Fisheries/Riparian/Wetlands | John Henderson | BLM Rock Springs |
| Wildlife/ Special Status Animals | Nick Kaczor | BLM Rock Springs |
| Wildlife/ Special Status Animals | Lorraine Keith | BLM Rock Springs |
| GIS | Douglas Kile | BLM Rock Springs |
| Land Use Planning | Kathryn Lloyd | BLM Rock Springs |
| Realty | Carol Montgomery | BLM Rock Springs |
| Document Editing | Angelina Pryich | BLM Rock Springs |
| Livestock Grazing/Weeds | Jonathon Sheeler | BLM Rock Springs |
| Cultural/Nat American/Trails | Colleen Sievers | BLM Rock Springs |
| Fire Management | Thor Stephenson | BLM Rock Springs |
| Air Quality Specialist | John Zachariassen | BLM Wyoming State Office, Cheyenne |

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8.0 ACRONYMS

ACEC – Area of Critical Environmental Concern

ACHP – Advisory Council on Historic Preservation

AMP – Allotment Management Plan

AUM – Animal Unit Month

AO – Authorized Officer

ATVs – All Terrain Vehicles

BACT – Best Available Control Technology

bgs – blow ground surface

BLM – Bureau of Land Management

CEQ – Council on Environmental Quality

CERCLA – Comprehensive Environmental Response, Compensation and Liability Act

CFR – Code of Federal Regulations

cfs – Cubic Feet per Second

CO – Carbon Monoxide

COA – Conditions of Approval

COE – Army Corps of Engineers

CRCT – Colorado River Cutthroat Trout

CWA – Clean Water Act

dbA - Decibel A-weighted filter

DEQ/AQD – Department of Environmental Quality, Air Quality Division

DEQ / WQD – Department of Environmental Quality, Water Quality Division

Devon – Devon Energy Production Company, L.P.

DOI – Department of the Interior

DR – Decision Record

EA – Environmental Assessment

EIS – Environmental Impact Statement

EPA – Environmental Protection Agency

EPCRA – Emergency Planning and Community Right-to-Know Act

EO – Executive Order

ERP – Emergency Response Plan

ESA – Endangered Species Act

EVG – Erathem Vanir Geological

FLPMA – Federal Land Policy and Management Act

FMU – Fire Management Unit

FONSI – Finding of No Significant Impact

FOOGLRA – Federal Onshore Oil and Gas Leasing Reform Act

GPS – Global Positioning System

HAPs – Hazardous Air Pollutants

HCPC – Historic Climax Plant Community

HMA – Herd Management Area

KSLA – Known Sodium Leasing Area

mg/L – Milligrams per Liter

mmhos/cm – Millimhos per Centimeter

MLA – Mineral Leasing Act

MMPA – Mining and Minerals Policy Act

MSDS – Material Safety Data Sheet

NAAQS – National Ambient Air Quality Standards

NEPA – National Environmental Policy Act

NHPA – National Historic Preservation Act

NMMPRDA – National Materials and Minerals Policy, Research and Development Act

NO₂ – Nitrogen Dioxide

NOA – Notice of Availability

NOI – Notice of Intent

NOS – Notice of Staking

NRCS – Natural Resources Conservation Service

NRHP – National Register of Historic Places
NSO – No Surface Occupancy
NWI – National Wetlands Inventory
NWIS – National Water Information System
O₃ – Ozone
OHV – Off Highway Vehicle
ORV – Off Road Vehicle
OSHA – Occupational Safety and Health Administration
PFYC – Potential Fossil Yield Classification
PILT – Payment In Lieu of Taxes
PM_{2.5} – Particulate Matter less than 2.5 Microns in Diameter
PM₁₀ – Particulate Matter less than 10 Microns in Diameter
PSD – Prevention of Significant Deterioration
RCRA – Resource Conservation and Recovery Act
RfC – Reference Concentrations for Chronic Inhalation
RMP – Resource Management Plan
ROS – Recreation Opportunity Spectrum
ROW – Right-Of-Way
RSFO – BLM Rock Springs Field Office
SAR – Sodium Absorption Ratio
SARA – Superfund Amendments and Reauthorization Act
SBMA – Sugarloaf Basin Management Area
SBSMA – Sugarloaf Basin Special Management Area
SH – State Highway
SMA – Special Management Area
SO₂ – Sulfur Dioxide
STORET – EPA Storage and Retrieval System
TDS – Total Dissolved Solid

TSS – Total Suspended Sediment
USDA – United States Department of Agriculture
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
VOC – Volatile Organic Compound
VRM – Visual Resource Management
WAAQS – Wyoming Ambient Air Quality Standards
WAQSR – Wyoming Air Quality Standards and Regulations
WDEQ – Wyoming Department of Environmental Quality
WDOT – Wyoming Department of Transportation
WGFD – Wyoming Game and Fish Department
WOGCC – Wyoming Oil and Gas Conservation Commission
WRCC – Western Regional Climate Center
WSA – Wilderness Study Area
WSEO – Wyoming State Engineers Office
WSGS – Wyoming State Geological Survey
WYNDD – Wyoming Natural Diversity Database