CHAPTER 4.0

ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental consequences, of the proposed actions on the physical, biological, cultural, and human environment at the Three Rivers Stone Quarry (Proposed Project) from implementation of the alternatives considered in this Draft Environmental Impact Statement (DEIS). The topics discussed are by resource, in the same order as those described in Chapter 3, Affected Environment.

For each topic, the impact analysis follows the same general approach. Criteria for determining impacts are developed for individual resources. Potential impacts are then identified and assessed for each resource by alternative based on available data, quantitative models, where applicable, relevant scientific literature, previously prepared environmental documents, and the best professional judgment of the Interdisciplinary Team (IDT) resource specialists. Impacts are assessed quantitatively and qualitatively, depending on available data, and impact duration definitions (short-term, long-term) and impact type (direct, indirect) are assessed where applicable.

Much of the information on the affected environment and potential environmental consequences is derived from detailed technical reports prepared by Bureau of Land Management (BLM) specialists, the URS Corporation, Inc., the prime consultant, and its subcontractors. These reports are available for review as part of the Analysis File maintained for the Amended Plan of Operations at the Three Rivers Stone Quarry at the Challis Field Office.

Knowledge is, and always will be, incomplete regarding many aspects of the terrestrial species, vegetative communities, the economy, and communities and their interrelationships. The ecology, inventory, and management of ecosystems are a complex and evolving discipline. However, basic ecological relationships are well established, and a substantial amount of credible information about ecosystems in the Proposed Project Area is known. The alternatives were evaluated using the best available information about these ecosystems. While additional information may add precision to estimates or better specify relationships, new information would be unlikely to appreciably change the understanding of the relationships that form the basis for the evaluation of effects.

The numbers generated and used for comparison of impacts are for analysis purposes only. The exact location and size of the Proposed Project features would be determined in the Plan of Operations. Therefore, the exact areas of impact to specific resources are estimates based on the best available information.

4.1 DIRECT AND INDIRECT EFFECTS

Effects are described in general terms and are qualified as short-term and long-term, as appropriate. Effects may also be described as direct or indirect. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by an action and occur later in time or farther removed from the area, but are reasonably foreseeable.

4.2 CUMULATIVE IMPACTS

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) requires assessment of cumulative effects in the decision-making process for Federal projects. Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 Code of Federal Regulations (CFR) 1508.7). Cumulative effects are considered for each resource and are analyzed in Section 4.8 of this document.

Cumulative effects were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions in this area and in the surrounding landscape. All resource impacts would be added to these actions to present the cumulative picture or incremental contribution this Proposed Project would have on the resources.

4.3 PAST/PRESENT ACTIONS

Past use of the Proposed Project Area has included the flagstone quarry operations. This use continues through the present and is anticipated to continue into the reasonably near future. Other past and present actions in the Proposed Project Area and vicinity include rural residential living, ranching and agriculture, grazing, power line and road right-of-ways, off-highway vehicle use, and general recreation along the Salmon River and East Fork Salmon River.

4.4 FUTURE FORESEEABLE ACTIONS

At the Three Rivers Stone Quarry, future foreseeable actions would be limited to the expansion of the Proposed Project, reclamation following completion of mining activities, and removal of waste rock as salable mineral from a community pit.

4.5 PHYSICAL RESOURCES

4.5.1 Air Quality

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the site would be reclaimed. The cessation of mining activities would eliminate mining-related air pollution caused by vehicle emissions, blasting, excavation, and road travel. Wind-generated dust would continue to generate above natural levels from surface-disturbed portions of the site until reclamation activities are completed and vegetation has been reestablished. Reclamation activities would create low-level, short-term impacts to air quality in the form of emissions from vehicle exhaust and fugitive dust, but would reduce long-term, wind-generated fugitive dust over the project site. Dust suppression techniques, such as application of water to roads, would be used during reclamation and would reduce the levels of particulate matter in the air. Once successful vegetation reclamation has occurred, the generation of coarse particulate matter from the site would be similar to that generated prior to mining operations.

Alternative B

Existing mining operations would continue under Alternative B for 3 to 5 years, with a total of 100,000 tons of material (flagstone and waste rock) removed per year from two pits with an increase in surface disturbance of approximately 8 acres. The sources (vehicle emissions, blasting, excavation, and road travel) and levels of air pollution created from these operations would not be notably different than current conditions. Emissions would continue to be released by the regular use of heavy mine equipment, daily commute to the quarry by approximately 37 employee vehicles (based on 2 commuters per vehicle), and by the annual transport of materials from the quarry by 800 to 1,200 trucks. Emissions are not expected to materially degrade air quality because of the low level of vehicular traffic and equipment use. Carbon monoxide, nitrogen oxide, sulfur dioxide, and course particulate matter (dust) would continue to be released by the detonation of ammonium nitrate fuel oil (ANFO) during the 16 blasts per month proposed to remove overburden and expose flagstone; however, the emissions would be quick, temporary, and would have negligible impact on air quality.

Dust would continue to be generated from blasting, excavation, and vehicle travel on unpaved roads and could produce dust clouds up to several hundred feet in diameter. These pollutants would temporarily degrade air quality in the Proposed Project Area and immediate vicinity and would then dissipate. Dust suppression techniques, such as application of water to roads and other disturbed sites, would be used that would reduce the levels of particulate matter in the air (see Appendix B). The impact to air quality of dust emissions from vehicle travel is expected to be minor because of the relatively few vehicles and small size of the

Proposed Project Area as compared to the number of vehicles and size of areas producing dust throughout Custer County. Fugitive dust from wind erosion of the existing gravel roads and disturbed areas in the quarry would continue to be generated, but would be reduced or eliminated in areas that are reseeded as part of reclamation.

Federal and state air quality regulations (40 CFR; IDAPA 58:01.01.000 *et seq.*) would be complied with during mining operations. Despite these temporary impacts, it is anticipated that the air shed in the vicinity of the quarry site would continue to be classified as an attainment area with respect to Idaho Department of Environmental Quality (IDEQ) and U.S. Environmental Protection Agency (EPA) air quality regulations.

Alternative C

The sources (vehicle emissions, blasting, excavation, surface stripping, and road travel) of air pollution created from mining operations would be similar to Alternative B. However, the levels would be greater due to the increase in material (flagstone and waste rock) removed (240,000 tons per year compared to 100,000 tons per year) and area disturbed. These activities would occur over a 30-year time period. Vehicle emissions would be released at an increased rate by the regular and increased use of heavy mine equipment for material removal, the daily commute to the quarry by approximately 50 employee vehicles (as compared to 37), and the annual transport of materials from the quarry by 1,200 to 1,500 trucks (as compared to 800 to 1,200 under current operations). However, emissions are not expected to materially degrade air quality given the overall low level of use of vehicles and equipment in the quarry and its vicinity. Carbon monoxide, nitrogen oxide, sulfur dioxide, and course particulate matter would be temporarily released at the same level as under Alternative B. Dust would continue to be generated from blasting, excavation, surface stripping, and vehicle travel on unpaved roads. However, daily and annual amounts of dust would increase due to the increase in use of heavy equipment, amounts of material (flagstone and waste rock) removed, and acres of surface disturbed. Additional dust would be generated from exploration activities (construction of roads, drill pads/drill holes, trenches, test pits, and/or general surface stripping) over 31 additional acres. Reclamation activities would create low-level, short-term impacts to air quality in the form of emissions from vehicle exhaust and fugitive dust, but would reduce long-term, wind-generated fugitive dust in reseeded areas over the project site.

These sources of pollutants would temporarily impact air quality in the Proposed Project Area and immediate vicinity and would then dissipate. Implementation of dust suppression techniques, primarily water application, on mining roads, pits and other areas of surface disturbance would reduce the levels of particulate matter released in the air (Appendix B).

Dust suppression efforts would be more efficient than under Alternative B through the use of the proposed well at the administrative area. As under Alternative B, it is anticipated that the air shed in the vicinity of the quarry site would continue to be classified as an attainment area with respect to IDEQ and EPA air quality regulations.

Alternative D

The sources of air pollution created from mining operations under Alternative D would be the same as under Alternative C, but the levels would be elevated. Traffic to and from the quarry would increase under Alternative D, primarily due to the transport and delivery of quarried flagstone (1,500 to 2,000 truck trips leaving the quarry annually versus 1,200 to 1,500), and to a minor extent from the increase in workforce. This would result in an increase in emissions of vehicle exhaust at and in the vicinity of the quarry. The increase in emissions from the additional 12 employees would likely be negligible given the low number and many workers would carpool to the site (approximately 2 people per vehicle). Years of anticipated operation (40 years verses 30 years), acres of new surface disturbance (73 acres verses 49 acres), number of pits (three verses two), and amount of material (flagstone and waste rock) removed (300,000 tons verses 240,000 tons) would be greater under Alternative D than under Alternative C. This would result in increased use of heavy machinery and associated emission of exhaust and generation of dust. The number of monthly blasts would be greater under Alternative D than under Alternative C (22 verses 16). However, the associated increase in dust and emissions of carbon monoxide, nitrogen oxide, and sulfur dioxide is expected to be negligible.

Reclamation of disturbed areas would occur, reducing long-term, wind-generated fugitive dust in reseeded areas over the project site. Although the acres of disturbance are greater under Alternative D, the impacts to air quality in the Proposed Project Area and immediate vicinity from resulting pollutants would be temporary and would dissipate. Implementation of increased dust suppression techniques, primarily water application, on mining roads, pits and other areas of surface disturbance would reduce the levels of particulate matter released in the air (Appendix B). As under Alternative C, dust suppression efforts would be more efficient than under Alternative B due to the proposed on-site water source (well). It is anticipated that the air shed in the vicinity of the quarry site would continue to be classified as an attainment area with respect to IDEQ and EPA air quality regulations.

4.5.2 Geology and Minerals (Leaseable, Locatable, Saleable)

The Proposed Project would have direct impacts on geologic and mineral resources. Impacts would be limited to excavating and transporting flagstone off-site, along with excavating and

relocating waste rock on-site. In addition, waste rock would be transferred off-site from the community pit. For all of the action alternatives, waste rock would be excavated to expose flagstone. This waste rock would be transported and placed in the Pit 2 rock storage area. This would bury, but not eliminate, future access to geologic and mineral resources beneath the Pit 2 waste rock storage area.

Alternative A (No Action Alternative)

Mining activities would cease under Alternative A and no additional rock would be disturbed at the site. Locatable and saleable minerals would no longer be mined, exploration for locatable minerals would not occur, and demand for Three Rivers Flagstone would not be met. No additional waste rock would be added to the Pit 2 waste rock storage area. Up to 20,000 cubic yards of waste rock per year would become available to the public in the form of a community pit.

About 32 acres of geologic and mineral resources would be buried beneath the existing Pit 1 and Pit 2 waste rock storage areas. This would eliminate recovery of 500,000 to 12 million tons of flagstone and waste rock from the geologic resource at the quarry site.

Alternative B

Under Alternative B, mining would occur on about 44 acres (37 existing and 7 proposed new acres in Pit 1 and Pit 2) for a period of 5 years. About 100,000 tons of flagstone and waste rock would be removed annually from the quarry, for a total of 500,000 tons. About 33 acres of geologic and mineral resources would be buried beneath waste rock removed from Pit 1 and Pit 2. This would limit, but not eliminate, future access to geologic and mineral resources beneath the Pit 1 and Pit 2 rock storage areas. This would be about a 1-acre increase of geologic and mineral resources over the No Action Alternative. Up to 20,000 cubic yards of waste rock per year would become available to the public in the form of a community pit.

Alternative C

Under Alternative C, mining would occur on 56 acres (37 existing and 19 proposed new acres in Pit 1 and Pit 2) for a period of 30 years. About 240,000 tons of flagstone and waste rock would be removed annually from the quarry, for a total of 9.6 million tons of flagstone. This would be an increase of 140,000 tons of flagstone annually and 9.1 million total tons removed over Alternative B. About 62 acres of geologic and mineral resources would be buried beneath waste rock removed from Pit 1 and Pit 2. This would limit, but not eliminate, future access to geologic and mineral resources beneath the Pit 2 rock storage area. This would be an increase of about 30 acres of geologic and mineral resources over the No Action

Alternative and an increase of about 29 acres over Alternative B. Up to 20,000 cubic yards of waste rock per year would become available to the public in the form of a community pit.

Alternative D

Under Alternative D, mining would occur on 75 acres (37 existing and 38 proposed new acres in Pits 1, 2, 2-E and 3) for a period of 40 years. About 300,000 tons of flagstone and waste rock would be removed annually from the quarry, for a total of 12 million tons. This would be an increase of 200,000 tons of flagstone annually and 2.4 million total tons over Alternative B. About 67 acres of geologic and mineral resources would be buried beneath waste rock from Pit 1 and Pit 2. This would limit, but not eliminate, future access to geologic and mineral resources beneath the Pit 2 rock storage area. This would be an increase of about 35 acres of geologic and mineral resources over the No Action Alternative, an increase of about 34 acres over Alternative B, and an increase of about 5 acres over Alternative C. Up to 20,000 cubic yards of waste rock per year would become available to the public in the form of a community pit.

4.5.3 Soils

The quarry expansion would result in an increase of between 8 and 73 acres of surface disturbance (Table 4.5-1) over the existing 92 acres of disturbance. This area of surface disturbance includes the quarry pit areas, haul roads, flagstone storage areas, waste rock disposal area, soil stockpile area, and access roads.

Table 4.5-1. Surface Disturbance in the Project Area by Action Alternative.

Disturbance Area	Acres Disturbed		
	Alternative B	**Alternative C**	**Alternative D**
Not previously disturbed (vegetated and rock outcrops)	4	37	59
Previously Disturbed (predominantly unvegetated)	4	12	14
Total	**8**	**49**	**73**

Potential impacts to soil resources would occur during soil salvage operations and soil redistribution activities. Impacts to soil during salvage and stockpiling operations include physical loss of soil from excavating and handling the soil, along with interrupting soil biological, physical, and chemical activity as a result of placing soil in the stockpile. Additional soil loss would occur during reclamation when soil is re-handled from the stockpile and distributed on disturbed areas.

Soil would remain in the stockpile over the duration of mining activity. Stockpiling of soil destroys soil aggregates, buries biological soil crusts, and removes vegetative cover and litter. Stockpiled soil would be subject to wind and water erosion resulting in some loss of soil over the life of the quarry operations. Stockpiled soil would also exhibit decreased biological activity, along with altered physical and chemical characteristics. The primary mechanism for direct soil loss is wind erosion. Wind erosion typically increases when soil is stockpiled, because the surface soil that contains more organic matter (and thereby reduces wind erosion susceptibility) is mixed with subsoil and substratum that contain less organic matter.

Chemical changes would result from mixing surface soil horizons with subsoil during salvage and stockpiling of soil from Pit 2 and the Pit 2 rock storage area. Mixing soil horizons during salvage and stockpiling would reduce the amount of organic matter contained in the surface horizon by diluting the surface horizon with subsoil. Redistributed soil would have lower organic matter content as a result of salvage and stockpiling. Soil biological activity would be reduced or eliminated during stockpiling as a result of anaerobic conditions created in deeper portions of stockpiles. After soil redistribution, biological activity would increase and eventually reach pre-salvage levels. Impacts to physical characteristics of soil include mixing of horizons (loss of soil structure), along with compacting and pulverizing soil as a result of equipment handling and traffic. Compacting and pulverizing soil would result in decreased permeability, water-holding capacity, and loss of soil structure.

On disturbed areas, water erosion of soil could occur during periods of heavy precipitation. This would occur primarily on unpaved road surfaces where the compacted soil helps to create sheet flow of water during heavy precipitation events. These “hardpack” roads may increase rates of soil erosion, and also change drainage patterns. The end result would be a potential increase in soil transported into ephemeral drainages and eventually into the Salmon River or East Fork Salmon River. Under the Proposed Project, Best Management Practices (BMPs) would be continued in order to control soil loss by inhibiting the effects of sheet flow on hardpack roads (see Appendix B).

The BLM determined that the waste rock contains no visible sulfide minerals, and only trace amounts of oxidized iron minerals, and that there is no visible evidence of acidic drainage from the waste rock, such as dead vegetation, color stains, or sulfurous odors (Gardner 2006). Results of trace element testing of rock and soil (Chapter 3, Section 3.1.2) show that soil derived from mining activities would not generate trace elements in soil above levels that already exist in undisturbed native soil.

Alternative A (No Action Alternative)

Implementation of the No Action Alternative would limit the disturbed area to the 92 previously disturbed acres. Minor amounts of soil loss could occur during reclamation activities. Once vegetation becomes successfully established in reclaimed areas, the amount of soil loss from disturbed areas would decrease.

Alternative B

Alternative B would result in approximately 8 acres of new surface disturbance over existing conditions, for an approximate total of 100 acres of surface disturbance. This disturbance and stockpiling of topsoil could lead to a loss of soil and reduced biological activity structure of soil, as described above. This could lead to reduced or slowed establishment of vegetation on reclaimed areas resulting in a prolonged period of potential erosion and a delay in the reestablishment of wildlife habitat.

Alternative C

Alternative C would result in approximately 49 acres of new surface disturbance over existing conditions, for an approximate total of 141 acres of surface disturbance, and an increase in the amount of topsoil disturbed and stockpiled. This would result in an increase in the potential for soil loss from the topsoil stockpile and from disturbed areas due to wind and water erosion over Alternative B. The potential impacts to biological activity and soil structure would be similar to those described under Alternative B but would be of greater magnitude due to the increased acres of surface disturbance.

Alternative D

Alternative D would result in approximately 73 acres of new surface disturbance over existing conditions, for an approximate total of 165 acres of surface disturbance, and an increase in the amount of topsoil disturbed and stockpiled. Potential impacts to topsoil from wind and water, reduced biological activity, and changes in soil structure would be similar to Alternative C but would be of greater magnitude due to the increased acres of surface disturbance.

4.5.4 Hazardous Substances and Petroleum Products

No acutely hazardous materials/waste or "listed wastes" as defined by the EPA are used or stored at the project site. This section addresses the potential for impacts of the Proposed Project related to chemicals and petroleum products, as described in Section 3.1.5, Chapter 3.

Alternative A (No Action Alternative)

Under Alternative A, mining operations would cease and the site would be reclaimed. During cleanup and reclamation activities, there is the potential for chemicals and petroleum products stored on site, as described in Section 3.1.5, Chapter 3, to leak or spill on site or off site during removal and transport of removed materials. This risk would be reduced through the implementation of the current Chemical Spill Prevention, Control, and Countermeasures Plan. Once reclamation activities are completed, there would be no risks of spills or leaks of chemicals and petroleum products on public lands.

Alternative B

Under Alternative B, there would be the potential for fuel and lubricant leaks and spills to occur during storage and transport of materials and maintenance and operation of vehicles and heavy equipment. There would also be the potential for leaks and spills during the storage, transport, and mixing of ammonium nitrate and fuel oil. Leaks and spills could range from small, such as those potentially occurring during equipment malfunctions to large, such as from the potential, but unlikely, rupture of a storage tank. Storage and delivery of these materials is described in Chapter 2, Section 2.4.3. A Chemical Spill Prevention, Control, and Countermeasures Plan would be prepared and followed for the life of the quarry which would ensure proper storage of fuels, lubricants, and chemicals, and reduce the risk of leaks or spills of chemicals and petroleum products on public lands.

The areas most vulnerable to impact from a leak or spill of chemicals and petroleum products would be the East Fork Salmon River Bench Area of Critical Environmental Concern/Research Natural Area (ACEC/RNA), the East Fork Salmon River, and the Salmon River. The greatest risk of a leak or spill reaching one of these sites would be during transport of fuel and chemicals on State Highway 75 (SH-75). It is improbable that a leak or spill from mining operations would ever reach these areas due to the use of containment areas for fuel and chemical storage and use, topography of the quarry site, the ephemeral nature of the two drainages in the project site, and the adherence to the Chemical Spill Prevention, Control, and Countermeasures Plan. Fuel storage Area #1 would be located on the east side of the administration area. Due to the grade of this area, leaks or spills from this site would not reach the ephemeral stream to the north that eventually drains into the Salmon River. Containment of this storage site by earthen berms would preclude fuel leaks or spills from entering surface runoff during rainfall events. Fuel Storage Area #2 would be located on a saddle between the Salmon River and the East Fork Salmon River. It is separated from the ACEC/RNA to the south by the backside of Pit 1. The containment area and road pullout in which it resides is graded so that runoff flows in the opposite direction of the ACEC/RNA

and East Fork Salmon River. Fuel Storage Area #3 would be located in the Pit 2 rock storage area near the end of the main mining road. The topography and grade in which this area is located would preclude fuel leaks or spills from entering surface runoff during rainfall events.

Alternative C

The potential impacts of Alternative C would be the same as under Alternative B. However, the risk of leaks or spills of chemicals and petroleum products would exist over a longer time period due to the extended life of mining operations (up to 30 years). Even though the storage quantities would be the same, the amount of fuel and lubricants used for operations would be greater than under Alternative B. There would also be the potential for increased delivery and use of ammonium nitrate if blasting is to be used during mineral exploration. However, the maximum quantity of pre-mixed ANFO that would be stored at the quarry at one time would not change. There would be an increased risk of fuel spills during truck transport of materials (flagstone, fuel, and other supplies) due to the increased number of trucks leaving the quarry. However, as under Alternative B, it is improbable that a leak or spill from mining operations would reach the ACEC/RNA due to the use of containment areas for fuel and chemical storage and use, topography of the quarry site, the ephemeral nature of the drainage in the ACEC/RNA, and the adherence to the Chemical Spill Prevention, Control, and Countermeasures Plan.

Alternative D

The potential impacts of Alternative D would be similar to Alternative C with the following exceptions. The use of explosives would be slightly greater, thus the amount of ANFO used and number of deliveries of ammonium nitrate to the site could be greater. There would be an increased risk of fuel spills during truck transport of materials (flagstone, fuel, and other supplies) due to the increased number of trucks leaving the quarry. The area where potential small-scale incidents could occur (such as fuel leaks from machinery or vehicle fuel tanks) would be increased to include the Pit 2 expansion area and Pit 3. However, due to containment and use of buffers and additional measures proposed to direct runoff and prevent it from reaching the ACEC (i.e. a new stormwater detention basin and BMPs), the likelihood that materials would reach the adjacent ACEC/RNA is extremely small.

4.5.5 Water Quality

Impacts to water quality are assessed by qualitatively or quantitatively determining if the Proposed Project would cause sediment delivery to the East Fork Salmon and mainstem Salmon Rivers, increase the risk of a fuel or chemical spill into these river systems, and result

in the interception of ground water. Ground water levels are not currently available for the Proposed Project Area. Therefore, the surface water levels of the Salmon River and East Fork Salmon River are used with the assumption that ground water levels are at or below these levels. The term "chemicals" refers to small quantities of chemicals used on site, as described in Section 3.1.5, Chapter 3.

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the site would be reclaimed and potential impacts to water quality associated with mining operations under the action alternatives would not occur. There would be potential for some erosion to occur during reclamation activities which could result in sediment delivery to the Salmon and East Fork Salmon rivers. However, erosion control measures to reduce the potential for sediment delivery to these water bodies would be implemented during reclamation, as described in Appendix B. The goal of these measures would be to eliminate sediment delivery above natural levels. Success of these measures would be contingent on effectiveness, maintenance, and monitoring of erosion control features. Once reclamation is complete and vegetation reestablished, the potential for erosion and sediment delivery to the rivers would be greatly reduced and would be similar to pre-mine conditions. There would also be the potential for fuel spills during the removal and transport of storage tanks and operation of equipment used during reclamation. However, these risks would be short-term, lasting only the duration of reclamation, and the risk would be reduced by implementing BMPs (Appendix B) and the current Chemical Spill Prevention, Control, and Countermeasures Plan.

Alternative B

The projected elevations of the final pit floors in the Three Rivers Stone Quarry under Alternative B (5,425 and 5,900 feet for Pit 1 and Pit 2, respectively) would be a minimum of 65 feet above surface water levels of the Salmon and East Fork Salmon rivers. Currently the water table in the vicinity of the quarry site intersects the ground surface in the valley floors at the Salmon and East Fork Salmon rivers at approximately 5,360 feet above mean sea level. Existing mining operations have not intercepted ground water to date and future operations would not be anticipated to. If ground water were intercepted in one of the pits, all mining operations in the pit would be stopped. No dewatering of the pit would occur and no impacts to levels of ground or surface water levels would result.

As discussed in Section 3.1.2, results of the rock geochemical analyses showed that there is no leaching of chemicals from the rock at the quarry. Therefore, no impacts to the quality of

ground or surface water from chemicals in the rock would result if ground water were intercepted.

Indirect impacts to the surface water and to the stream substrate could occur through the delivery of fine sediment from the quarry site. As discussed in Chapter 3, Section 3.1.6, sediment currently enters the Salmon and East Fork Salmon rivers through surface runoff during large rainfall events. Despite this delivery of sediment, the Salmon River has been found to be in full support of aquatic life beneficial uses and the stretch of this river below the quarry site has not been recently listed as impaired by pollutants (IDEQ 2002). It is anticipated that current levels of sediment delivery would continue under Alternative B, occurring primarily during infrequent large rainfall or rain-on-snow events, but would not notably increase due to the minor increase in surface disturbance proposed. BMPs for erosion control would be implemented.

Indirect impacts to surface water of the Salmon and East Fork Salmon rivers could also occur through the delivery of fuel, lubricants, nitrate, or pre-mixed ANFO. It is unknown what level, if any, of fuels and chemicals from the quarry site enter the rivers. It is likely that trace amounts of residual fuel and oil might be present in the administrative area, on the mining roads, or on SH-75 and could enter the rivers via runoff during large rain events. However, a notable increase in the amount of fuel, lubricants, or chemicals delivered to the rivers over that which may be presently occurring from existing operations is not anticipated to occur. A Chemical Spill Prevention, Control, and Countermeasures Plan would be prepared and followed for the life of the quarry which would reduce the risk of fuel, oil, and chemicals used in mining operations from entering the rivers. There is the potential, however, that the existing detention ditch could be breached during an extreme precipitation and runoff event. If this were to occur, trace amounts of residual fuel and chemicals potentially transported from the administrative area and mining roads to the detention ditch, could be delivered in a highly diluted form to the Salmon River. See Section 4.6.4, under Salmon, Steelhead, and Trout, for further discussion about the potential for contaminants to reach the Salmon and East Fork Salmon rivers.

Water for dust abatement purposes would continue to be obtained from the Salmon River north of the Proposed Project Area. The amount of water required under Alternative B is not anticipated to change notably from current operations and would fall within that allowed under L&W Stone's IDWR water use permit. Reductions in flow of the river, if any from water withdrawal, would have negligible effects on water quality.

Alternative C

Potential impacts to ground water quality would be the same as those described under Alternative B. Indirect impacts to the surface water and to the stream substrate could occur through the delivery of fine sediment and residual fuels or chemicals from the quarry site as under Alternative B. However, due to the increase in surface disturbance, hardened surfaces, and quantity of fuel and lubricant use proposed under Alternative C, the risk and the levels of fine sediment and fuels or chemicals potentially reaching the Salmon River and East Fork Salmon River would be increased.

Under Alternative C, the existing, improperly-functioning stormwater detention ditch would be improved, the grade of the administration area would be modified, a new stormwater detention pond located north of the administration area would be constructed, and BMPs for erosion control (Appendix B) would be implemented. These project features would reduce the potential for sediment-laden water crossing SH-75 or entering the culverts under SH-75 and reaching the Salmon River. The new stormwater detention pond would provide an area to hold water and settle suspended sediment. The improvements to the existing detention ditch and the new detention pond would be monitored to ensure that they are functioning properly. There is the potential, however, that the detention ponds could be breached during an extreme precipitation and runoff event. If this were to occur, a surge of sediment-laden water could be delivered into the Salmon River. A small amount of chemicals and petroleum products, as described in Section 3.1.5, Chapter 3, could potentially be transported from the mining roads, pit floors, and administrative area to the stormwater detention ponds in the event of a leak or spill. If the detention ponds were breached, water containing a small, diluted amount of chemicals and petroleum products could potentially be delivered into the Salmon River. The potential for sediment to reach the East Fork Salmon River via the ACEC/RNA during heavy rain events would still exist and could occur at an elevated level compared to Alternative B due to the expanded operations proposed under Alternative C.

Water for dust suppression would be obtained by a proposed well under Alternative C. It is estimated that maximum daily use of water would approximate 87,000 gallons, as opposed to the 55,000 gallons under Alternative B. Water would be withdrawn under an approved water right for a maximum volume of 340 acre-feet per year. No impacts to water flow in the Salmon and East Fork Salmon rivers would result.

Alternative D

The projected elevations of the final pit floors of Pit 1 and Pit 2 under Alternative D would be the same as under Alternatives B and C. The elevation of the final pit floors of Pit 2-E and

Pit 3 would be 5,760 feet. All final pit floor elevations would be a minimum of 65 feet above surface water levels of the Salmon and East Fork Salmon rivers. Therefore, there would be no impacts to ground water from the proposed quarry pit expansions. As under Alternatives B and C, if ground water were intercepted in one of the pits, all mining operations in the pit would be stopped.

Indirect impacts to the surface water and to the stream substrate could occur through the delivery of fine sediment and fuels or chemicals from the quarry site as under Alternative B and C. Due to the increase in surface disturbance, hardened surfaces, and quantity of fuel, lubricants, and pre-mixed ANFO proposed for use under Alternative D, the risk and the levels of fine sediment and fuels or chemicals potentially reaching the Salmon River and East Fork Salmon River would be increased. Additional project features are proposed under Alternative D to reduce the potential for quarry-generated runoff, which could include sediment and fuels and other contaminants, from reaching the rivers. As under Alternative C, the administration area would be regraded, the existing, improperly-functioning stormwater detention ditch would be improved, and a new stormwater detention pond located north of the administration area would be constructed to capture runoff and reduce the potential for sediment delivery to the Salmon River. In addition, another stormwater detention pond would be constructed between Pit 2-E and Pit 3 and additional drainage ditches would be constructed to deliver surface runoff to this new detention pond. These additional features would direct and capture surface runoff from the main mine access road in the vicinity of Pit 2-E and Pit 3, preventing runoff from flowing into the ACEC/RNA and subsequently into the East Fork Salmon River. The improvements to the existing detention ditch and the new detention ponds would be monitored to ensure that they are functioning properly. There is the potential, however, that the detention ponds could be breached during an extreme precipitation and runoff event. If this were to occur, a surge of sediment-laden water, and water containing small, dilute quantities of chemicals and petroleum products could be delivered into the Salmon and East Fork Salmon rivers.

Under Alternative D, water for dust suppression would be obtained by a proposed well, as described under Alternative C. It is estimated that maximum daily use of water would approximate 95,000 gallons. Water withdrawal levels would still fall within the allowable volume under the approved water right.

4.5.6 Noise

This section describes the predicted noise impact in the vicinity of the Three Rivers Quarry from various sound sources associated with the Proposed Project.

Background

For explanations of acoustical descriptors and terms to be used in this section, refer to the background discussion in Section 3.1.7, Noise, in Chapter 3.

Applicable Noise Abatement and Control Criteria

Human Receptors

Thresholds used to evaluate potential noise and/or vibration impacts on people are based on applicable criteria. In the absence of Federal, state, county or local ordinances, the EPA document "Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety," USEPA Report Number 550/9-74-04, is a guideline for determining acceptable sound levels for residential land use. The recommended level at residential receivers is 55 A-weighted sound level (dBA) day-night average noise level (L_{dn}). This level is used for this analysis.

Wildlife Receptors

Guidelines for determining acceptable sound levels for wildlife have not been recommended by the EPA. Thresholds for noise impacts on wildlife vary based on the species and their sensitivity to this type of disturbance. Guidelines for acceptable sound levels for the Least Bell's vireo and other songbirds have been developed (Mock and Tavares 1997). These have been modified slightly for this analysis, as described below, and used as a baseline for evaluating potential impact to raptors and other wildlife. A general discussion of the effect of noise on wildlife follows.

Effects of Noise on Wildlife Background

Noise is an unwanted sound that usually is caused by human actions and interferes with normal activities or otherwise diminishes the quality of the environment. Noise can be either stationary or transient. Stationary sources generally are related to land developments such as housing tracts and industrial plants. Transient sources move through the environment either along established paths such as railroads and highways, or randomly through the environment, such as low-altitude military training aircraft. The total acoustical environment at a site is the blend of the background or natural acoustics with man-made noise.

Human-generated noise is known to affect animals in a range of ways, from annoyance, to chronic stress, to hearing loss. Noise may directly affect reproductive physiology or energetic consumption as individuals incur energetic costs or lose mating or foraging opportunities by repeatedly reacting to or avoiding noise. Animals may also be forced to retreat from

favorable habitat in order to avoid aversive anthropogenic noise levels. Though the direct effects of noise on wildlife may be the most obvious, noise may also have indirect effects on population dynamics through changes in habitat use, foraging, predator avoidance, courtship and mating, reproduction and parental care, and possibly local patterns of wildlife movement. Excessive or persistent noise may also affect mortality rates of adults by causing hearing loss, a serious hazard in predator-prey interactions. Other effects of noise on wildlife are likely to be subtler, such as those affecting intra-specific and inter-specific communication. In species that rely on acoustic communication, anthropogenic noise may adversely affect individual behavior by making signal detection difficult and thus altering the dynamic interaction between the producers and perceivers of communicative signals (Larkin 1997).

However, it cannot always be assumed that human-generated noise will necessarily have a negative effect. One reason is that, although natural environments can be quiet (i.e. low 20's dBA in desert, Brattstrom and Bondello 1983), natural noise is part of the natural world (Ryan and Brenowitz 1985) and adaptations to a noisy environment predate modern day noises generated by humans. For instance, certain species of frogs avoid vocalizing during loud calling by cicadas (Páez *et al.* 1993). Similar avoidance of acoustic interference is found in songbirds (Popp 1989).

In addition, habituation of animals to their environment also is a significant factor in assessing impacts of noise. The definition of habituation is "the elimination of the organism's response to often recurring, biologically irrelevant stimuli without impairment of its reaction to others". Habituation is ubiquitous in the animal kingdom (Peeke and Petrinovich 1984). No study takes place without subjects habituating to their natural or experimental environments to some degree. More predictable sources of disturbance can lead to greater apparent habituation in field situations than less predictable ones. Situations in which similar noise-producing activities occur in the same habitat at frequent intervals may affect locally-breeding wildlife less than less-frequent or less-predictable activities.

One might therefore classify two types of effects as follows:

- Acute – otherwise known as a "startle" response to infrequent and/or unfamiliar noise; and,
- Chronic – response to frequently occurring noise that may interfere with daily behaviors or activities.

Some literature exist that reports qualitative and quantitative knowledge of these effects for the peregrine falcon, bald eagle and golden eagle (collectively, "raptors"). This information,

coupled with a threshold level for assessing chronic effects, are used as the basis for the assessment of potential noise impact of mining operations on raptors known to inhabit the vicinity of the Proposed Project Area.

A commonly-observed threshold for assessing chronic effects ranges from 60-65 dBA hourly Equivalent sound level (L_{eq}), with the higher end suitable for habituated species. This range is reasonably consistent with conditions that can be found in human-populated environments and supported by Larkin (1997), who writes that the peregrine falcon "has been reintroduced into many urban locations, indicating it is not often sensitive to noise."

As for acute effects, should one assume blasting events are comparable to nearby jet aircraft passes and sonic booms, Ellis *et al*. (1991) reports that the latter caused peregrine falcons to fly away from their nests but not abandon them or negatively impact reproduction. However, it should be noted that if these events were visible by nesting peregrines, such as could be the case for the human presence indirectly associated with blasting activities, the falcons could be further disturbed, especially if there was a visible component above the nest.

Similarly for bald eagles, Fleischner and Weisberg (1986) have shown that bald eagles do startle, but that proximity to a visibly perceived threat tends to have greater influence on behavior than noise level (Ellis *et al.* 1991). "As with many other types of disturbance, the intensity of response by raptors to noise depends largely on the familiarity of the noise. For example, White and Thurow (1985) reported that ferruginous hawks and other similar species will tolerate considerable noise (about 80 decibels (dB)) close to their nests if they are familiar with it, especially if humans are not visible or otherwise obviously associated with the noise" (AMEC Americas Ltd. 2005).

The same reference containing the above observation suggests, for raptors in general, a buffer distance of 500 meters (0.31 miles) between the nest and the noise source, which typically is great enough to obscure the visibility of the noise source. Hence, in the absence of additional research to the contrary, and since the presence of raptors in the Proposed Project Area vicinity suggest they are accustomed to blasting and similar acute noise effects, this buffer distance and the aforementioned 65 dBA hourly L_{eq} guideline could define a threshold above which impact is likely.

Mining Operation Noise Effects

The existing noise environment, based on long term sound level measurements conducted at the closest residences to the quarry, is detailed in Section 3.1.7, Noise, in Chapter 3. To summarize:

Monitoring Location 1 (ML1) – L_{eq} ranged from 37.4 dBA to 44.4 dBA during the monitoring period, with short duration levels reaching nearly 45 dBA between 5PM and 6PM and 9AM and 10AM the following morning. The latter of these peaks is coincident with a test blast at the quarry.

Monitoring Location 1 (ML2) – For the duration of the monitoring period, 10-minute average L_{eq} never exceeded 38.9 dBA.

Activities at the Three Rivers Stone Quarry that were audible at the residences included noise from the diesel engines and back-up alarms on the heavy equipment, particularly when the equipment was operating near the top of the pits. Other activities that were audible on occasion included the metal scraping of the loader bucket on the rocks, trucks entering/leaving the site, and "thumps" during blasting.

Noise Prediction Model

The noise impacts associated with the Proposed Project were assessed with a Microsoft Excel-based noise prediction model. User inputs include (1) distances between the modeled acoustic "centers" and the receptors, (2) quantities of equipment or events over a specific time period (i.e. blasts per month) and hours of daytime (up to 12 hours) and (3) the combination of evening and nighttime operation (again, up to 12 hours for this combined "shift"). The sound sources and noise-sensitive receptors used in the model are described in the following subsections. Parameters specific to mining activities at the quarry for each project alternative were input in the model to predict individual sound level contributions with the following equation:

$$L_{eq} = Source\ SPL + 10 * log10\ (Duty\ Cycle) + 10 * log10\ (Quantity) + 10 * log10\ (Hours/12) - 20 * log10\ (Distance\ from\ Source / Reference\ Distance)$$

Where SPL = Sound Pressure Level

The model then logarithmically sums these individual sound levels (equipment-related sources, as defined below) to arrive at "aggregate" L_{eq} values for a mining activity category with respect to a specific reception point. These aggregate values were averaged across activity category for this analysis (see Tables 4.5-2 and 4.5-3). Values for individual mining activity category are displayed in the Noise Analysis Report filed in the Administrative Record.

For product shipments, the Quantity factor for the above equation was modified by a percentage based on the direction of shipment: 88 percent for shipments headed north on SH-75, and 12 percent for remaining shipments headed west.

Source Depiction

Mining activities associated with the Proposed Project could contribute temporary noise effects in and around the Proposed Project Area over a time period as specified by the proposed alternatives under consideration. However, unlike facility processes that involve specified equipment at known (and usually static) locations with scheduled hours of operation, mining activities comprise a host of different mobile sound sources with unique characteristics such as duty cycles and varying locations.

The most prevalent of these multiple sound sources are engine-driven construction equipment. Examples of these are excavators, front-end loaders, bulldozers, graders, trucks and forklifts. The noise prediction model categorizes these equipment-related sources into eight types of activity for which defined sets of equipment apply:

- Rock handling
- Drilling
- Miscellaneous
- Pre-shipment product loading
- Blasting
- Worker commuting
- Site reclamation
- Product shipments

These categories and their respective equipment rosters are shown in the appendix of the Noise Analysis Report filed in the Administrative Record. Product shipments refer to the transportation of product along SH-75 past the noise-sensitive receptors.

Noise-Sensitive Receptors

The model includes the two known human residences near the project site as receptors, ML1 and ML2. Additional non-human receptor locations include the following:

- Two peregrine falcon eyries (PF1 and PF2)
- Four bald eagle winter foraging/roosting perch sites (BE1, 2, 3 and 4)
- One golden eagle nest (GE1)

These seven wildlife locations not only represent potential wildlife impacts to these species from noise, but could concurrently serve as noise impact evaluation points for mule deer and other species that may roam or temporarily reside in the vicinity. Note that the locations of bald eagle perch sites used in the model are approximation. Further information about these wildlife locations is described in Sections 3.2.3 and 3.2.4 in Chapter 3.

Table 4.5-2 depicts the distances between the quarry activity centers and the selected human receptor locations. Note that the distances of the quarry activity centers from the wildlife receptor locations are not disclosed due to the sensitivity of these data. All wildlife nest and perch sites used in this analysis are less than 15,000 feet from the quarry.

Table 4.5-2. Distances between Quarry Activity Centers (Sound Receiver Locations) and Selected Sound Receptors (feet).

	Sound Receiver Location (distance is from location centers)						
Sound Receptor	**Pit 1**	**Pit 2**	**Pit 2E**	**Pit 3**	**Admin. Area**	**Quarry**	**Perpendicular distance from SH-75**
ML1 - Residence #1	4,331	4,043	3,475	2,460	5,913	4,251	6,213
ML2 - Residence #2	5,600	5,975	6,230	7,335	3,847	5,758	3,100

Noise Modeling Assumptions

The Noise Analysis Report details the assumptions used in the noise prediction model. These assumptions are summarized below.

- Sound propagation – The model does not consider any terrain-based attenuation that might result from sound propagation over great distances due to the similarity of vegetation across the Proposed Project Area. Both attenuation and reverberation from ridgelines and rock faces are ignored in the model. The resulting unobstructed line-of-sight sound paths that define all source-to-receptor distances should impart some degree of conservatism in the model (i.e. the actual noise levels are likely to be much less than estimated). The neglect of atmospheric attenuation in the model also provides model conservatism.

- Reference sound pressure levels – Most equipment used in the mining operations have sound pressure level based on the engine horsepower (HP) per the following equation:

*99 + 10 * log10 (HP * 0.75) + 10 * log10 (1) - 20 * log10 (Reference Distance / 3.25) – 11dB*

where the Reference Distance is usually 50 feet. A "noise abatement" factor of an additional -10dB is also applied, which presumes the equipment has some manufacturer-supplied sound attenuating treatment for primary noise emission paths such as air intake, combustion exhaust and engine casing radiation. This factor can be increased to reflect actual attenuation performance or the installation of upgrades as suggested by the manufacturer or required by the BLM as part of a sound mitigation program.

Exceptions to usage of the above equation and noise abatement factor in the base model are the drill rigs, blasting processes and highway vehicles used to transport workers and product. Methods for estimating these reference sound levels are as follows:

Drill rigs – based on test data from reasonably similar equipment. Noise abatement is possible, via engine sound treatment and/or temporary absorptive barriers fabricated and installed around the rig.

Pre-blast and blast – from 10-minute average L_{eq} sound measurements taken at ML1, calculated back to a reference distance of 50 feet and the corresponding sound pressure level.

- Equipment Duty Cycle – For each piece of equipment detailed in the model, duty cycle is derived by dividing current annual hours of operation by total annual hours (i.e., 8,760 total hours for a calendar year). Where applicable, equipment hours are split evenly between Pits where mining activity occurs.

- For blast and pre-blast activity, the duty cycle is the fraction of a daytime shift over which the 10-minute measurement and corresponding L_{eq} was recorded during the site survey. For trucks shipping product along SH-75, the duty cycle is a 2-minute duration pass-by at approximately 60 miles per hour.

- Noise Prediction Inputs – User inputs for Table 4.5-3 reflect considerations discussed in the previous subsection, information contained in Chapter 2 of this report, and client-supplied data available at the time of this analysis.

Prediction Results

Table 4.5-3 presents prediction results based on the model for each of the four project alternatives. Context of these results per alternative appears in the following paragraphs.

The value for "L_{eq} E+N" represents the prediction for both "evening" (i.e., commonly defined as 7PM to 10PM) and "nighttime" (10PM to 7AM) hours from 7PM to 7AM. Based on long-term sound monitoring results in the vicinity of the project, an average L_{eq} of 38 dBA was set for both evening and nighttime ambient sound level. Hence, for Alternatives A and B where there is no anticipated non-daytime activity expected for the quarry, average L_{eq} remains at this 38 dBA average level. For Alternatives C and D, expected evening and nighttime noise from mining activities would increase the average sound energy level and thereby push L_{eq} to 40 dBA and higher.

Table 4.5-3. Quarry Noise Impact Prediction (L_{eq} = equivalent sound level; L_{dn} = day-night average noise level).

	Predicted Sound Pressure Level (SPL), dBA														
	Alt A			Alt B			Alt C			Alt D (1) (Pit 1, 2, 3)			Alt D(2) (Pit 1, 2E, 3)		
Sound Receptors	**L_{eq} Day**	**L_{eq} E+N**	**L_{dn}**	**L_{eq} Day**	**L_{eq} E+N**	**L_{dn}**	**L_{eq} Day**	**L_{eq} E+N**	**L_{dn}**	**L_{eq} Day**	**L_{eq} E+N**	**L_{dn}**	**L_{eq} Day**	**L_{eq} E+N**	**L_{dn}**
ML1	46	38	47	48	38	48	48	47	54	52	50	57	53	50	57
ML2	43	38	46	45	38	47	45	45	51	47	45	52	47	45	52
PF1	38	38	45	41	38	45	41	42	48	43	43	49	43	43	49
PF2	39	38	45	41	38	45	41	42	48	44	43	50	44	43	50
BE1	43	38	46	45	38	47	45	45	51	47	45	52	47	45	52
BE2	38	38	44	41	38	45	41	42	48	43	43	49	43	43	49
BE3	48	38	48	50	38	49	50	49	55	51	49	56	52	49	56
BE4	47	38	47	49	38	49	48	48	54	53	51	58	43	51	58
GE1	38	38	44	38	38	44	38	40	46	40	41	47	40	41	47

Sound Receptors are defined under Noise-Sensitive Receptors subsection above.

Alternative A – (No Action Alternative)

Daytime average L_{eq} at the receptor locations reflects the planned reclamation activity at the project site over the span of only 1 year. After this period, daytime noise impact from the site should be insignificant.

Alternative B

Although reclamation activities are not considered in the modeling of noise impacts for this Alternative, results from Alternative A suggest that noise from such activities subsequent to the 5-year plan would not exceed current sound contribution from the project.

Alternative C

Although daytime average L_{eq} levels are functionally equivalent to those predicted for Alternative B, the extension of operating hours of the quarry into evening hours would result in evening and nighttime L_{eq} being nearly as high.

At ML1, L_{dn} approaches the 55 dBA threshold recommended by the EPA. The noise prediction model was based on 16 blasts per month under Alternative C. It did not account for potential blasting during exploration activities as this value is unknown. Any additional blasting over the modeled 16 per month could result in the L_{dn} exceeding the 55 dBA threshold.

Alternative D

Two sets of levels are presented in Table 4.5-3: Alternative D(1) considers the aggregate of mining activity at Pits 1, 2 and 3; and Alternative D(2) accounts for the transfer of activity at Pit 2 to Pit 2E and the resulting impact on noise. It appears there would be differences in daytime average L_{eq} between these cases for a few of the receptor locations, but they would be no greater than 1dB. In either case, the increased activity related to Pit 3, including additional blasting, would be partly responsible for pushing daytime and evening average L_{eq} above those predicted for Alternative C.

At ML1, L_{dn} exceeds the 55 dBA threshold recommended by the EPA.

Wildlife Impacts

Since the noise prediction model considers all four alternatives having daytime and non-daytime shift durations of twelve (12) hours each, the average L_{eq} prediction results presented in Table 4.5-3 could also reasonably reflect hourly L_{eq} for most mining and related activities that would tend towards the production of chronic noise effects. A pair of exceptions would be the pre-blast and blast events, which should likely produce the loudest hourly L_{eq}.

Table 4.5-4 exhibits the predicted hourly L_{eq} values that, in addition to reflecting usual mining activity during a daytime hour, include a single pre-blast and blasting event like the

one measured during the site survey and detailed in Section 3.1.7, Chapter 3. Note that the values change due largely to the location of the blast for each studied alternative.

Table 4.5-4. Chronic Noise Impact Prediction on Wildlife.

	Loudest Hour L_{eq}, SPL (dBA), including pre-blast and blast					
	Alt. B or C (Pit 1)	**Alt. B or C (Pit 2)**	**Alt. D (Pit 1)**	**Alt. D (Pit 2)**	**Alt. D (Pit 2E)**	**Alt. D (Pit 3)**
PF1	50	51	50	51	51	52
PF2	51	51	51	51	52	53
BE1	55	55	55	55	55	53
BE2	51	49	51	50	50	50
BE3	62	58	62	58	58	57
BE4	60	58	60	59	60	63
GE1	47	48	48	48	48	47

Several locations exhibit levels in the 60-65 dBA range, but none attain the 65 dBA threshold for chronic effects.

A few of the bald eagle receptor locations (perch sites) and the golden eagle nest are less than 500 meters from SH-75 (the distance buffer recommended by some authors to mitigate noise impacts on raptors; AMEC Americas Ltd. 2005). The nearest noise source at these locations is daily traffic on this highway (passenger vehicles and trucks). It is likely that raptors have grown accustomed to the traffic at current levels (i.e., similar to Alternative B). Alternatives C and D would only increase the average magnitude (by increases in commuting and rock hauling traffic), but not above the 65 dBA hourly L_{eq} threshold.

Unless reclamation activities proposed for Alternative A would involve substantially different noise-producing equipment and processes than those currently in place at the quarry site, no new noise sources, and hence unfamiliarity that might create acute effects, would be expected to be introduced by the Project Alternatives under consideration. Potential impacts to noise sensitive wildlife (raptors) from mining operations could still occur, such as flushing or temporary avoidance, but would generally not be considered substantial due to the distance between the noise source and receptor locations (> 500 meters) and the possible habituation to existing activities occurring at the quarry. It could be possible that individual raptors may be more sensitive to the noise and human activity associated with mining operations than others, such as young of the year, and may not forage close to the quarry. However, displacement from the known nest and perch sites would not be expected due to the distance of these locations from the quarry (> 500 meters; i.e. the quarry activities would

not be visible). The 65 dBA hourly L_{eq} would not be expected to be exceeded at the raptor nest and perch sites.

Acute effects of blasting would not be expected to be substantial due to the distance between sensitive raptor receptors and the location of blasting activity. Visual stimuli would likely not be associated with blasting, reducing the potential for disturbance to wildlife. There would be the potential that a raptor could associate human activity in one part of the quarry (such as the administrative area) with blasting heard in another part of the quarry (such as in Pit 2). However, the portions of the quarry where humans would be visible from the river (including from tree height along the river where raptors perch) would be limited.

Ground-Borne Vibration

Background

Vibration consists of waves transmitted through solid material (Beranek and Ver 1992). Unlike in air, there are several types of wave motion in solids including compressional, shear, torsional, and bending. The solid medium can be excited by forces, moments or pressure fields. This leads to the terminology "air-borne" (pressure fields) or "structureborne/groundborne" (forces and moments) vibration.

Ground-borne vibration propagates from the source through the ground by surface waves. Vibration may be comprised of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in hertz (Hz). Most environmental vibrations consist of a composite, or "spectrum" of many frequencies, and are generally classified as broadband or random vibrations. The normal frequency range of most ground-borne vibration which can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz.

Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. High frequency vibrations reduce much more rapidly than low frequencies, so that in the far-field from a source the low frequencies tend to dominate. Soil properties also affect the propagation of vibration. When ground-borne vibration interacts with a building there is usually a ground-to-foundation coupling loss but the vibration can also be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as rattling of windows or items on shelves or the motion of building surfaces. The vibration of building surfaces can also be radiated as sound and heard as a low-frequency rumbling noise, known as ground-borne noise.

Perceptible ground-borne vibration is generally limited to areas within a few hundred feet of railway systems, certain types of industrial operations, and construction activities, especially pile driving. Road vehicles rarely create enough ground-borne vibration to be perceptible to humans unless the road surface is poorly maintained and there are potholes or bumps. If traffic, typically heavy trucks, does induce perceptible vibration in buildings such as window rattling or shaking of small loose items, then it is most likely an effect of low-frequency air-borne noise or ground characteristics.

Building structural components can also be excited by high levels of low-frequency noise (typically less than 100 Hz). The many structural components of a building, excited by low-frequency noise, can be coupled together to create complex vibrating systems. The low frequency vibration of the structural components can cause smaller items such as ornaments, pictures, and shelves to rattle which can cause annoyance to building occupants. Human sensitivity to vibration varies by frequency and by person but generally people are more sensitive to low-frequency vibration. Human annoyance is also related to the number and duration of events. The more events or the greater the duration, the more annoying it will be to humans.

Construction activities can also produce varying degrees of ground vibration, depending on the equipment and methods employed. Ground vibrations from construction activities very rarely reach levels high enough to cause damage to structures, although special consideration must be made in cases where fragile historical buildings are near the construction site. The construction activities that typically generate the highest levels of vibration are blasting and impact pile driving.

Vibration from construction can be evaluated for potential impacts at sensitive receptors. Typical activities evaluated for potential building damage due to construction vibration include demolition, pile driving, and drilling or excavation in close proximity to structures. The ground-borne vibration can also be evaluated for perception to eliminate annoyance. Vibration from blasting propagates according to the following expression, based on point sources with normal propagation conditions:

$$PPV = K\left(\frac{R}{\sqrt{Q}}\right)^{-1.6}$$

Where:

PPV = the peak particle velocity in mm/sec;
K = site and rock factor constant;
R = distance of receptor from charge (i.e., the explosive) in meters; and
Q = maximum instantaneous charge per delay in kg.

The peak particle velocity (PPV) is defined as the maximum instantaneous positive or negative peak of the vibration and is often used in monitoring of blasting vibration because it is related to the stresses experienced by structures. For blasting at this quarry, one might reasonably assume the following values:

K = 1140 (described as "normal confinement");
R = distance from receptor to Pit center; and,
Q = 12.27, or 27 pounds as described in Section 2.4.5, Chapter 2

Agencies such as the Federal Transit Administration (FTA) and the National Park Service (NPS) use PPV as a descriptor because it is related to the stresses experienced by buildings.

Applicable Vibration Criteria

Federal Transit Administration

The FTA has published guidelines for assessing the impacts of ground-borne vibration associated with construction of rail projects, which have been applied by other jurisdictions to other types of projects (FTA 1995). The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 in/sec PPV. Although the FTA does not consider PPV suitable for evaluating human response, it indicates the human threshold of perception of vibration is 0.01 in/sec PPV.

National Park Service

The NPS has published guidelines for assessing the impacts of vibration on historic structures (Sedovic 1984). The following parameters are suggested for safe levels of vibration:

- 0.2 inches/second PPV for structures that exhibit significant levels of historic or architectural importance (typical of Category A and B structures in the NPS's List of Classified Structures), or that are in a poor or deteriorated state of maintenance.

- 0.5 inches/second PPV for all other historic sites.

Blasting Vibration Prediction

Vibration was not measured at the project site nor reported in the existing conditions survey. However, using the aforementioned equation for PPV, and if its factors are considered reasonably accurate, one might conclude that the greatest distance at which a "waste rock blast" could be humanly perceived is approximately 2,200 feet. With respect to this calculation, and since the shortest distance between a listed Pit center point and a noise-sensitive receptor appears to be 2,460 feet (i.e., between ML1 and the approximate geographic center of Pit 3), the blast vibrations—if properly designed and orchestrated—would be unlikely to be perceived by humans. However, should the actual origin position of a "waste rock blast" event be located closer to ML1 by at least 260 feet and yet remain within the understood boundaries of Pit 3, it would be possible that vibration could be perceived.

Even if human vibration perception occurs under the above scenario, PPV should still remain well below the NPS guidelines of 0.2 inches per second. No wildlife receptor sites are close enough to be of concern in regards to blasting-induced vibration.

4.6 BIOLOGICAL RESOURCES

4.6.1 Vegetation

Impacts to vegetation are assessed by determining the amount of vegetation removed and the potential for a plant community to be modified or converted to another type through the loss of productivity of the site or establishment of non-native weed species.

Vegetation community types that would be directly affected from mining activities include shrublands and grasslands (Table 4.6-1). Although not truly a vegetation community type, areas of rock outcrop that support small amounts of vegetation are included here. Likewise, previously disturbed areas that currently do not support vegetation are included. A weed management program would be implemented under all alternatives as part of the Plan of Operations and reclamation to control weeds before they have the opportunity to establish and spread (Appendix B). Weed treatments would be conducted consistent with the Challis BLM Field Office and the Custer County Noxious Weed Control Program.

Table 4.6-1. Ground Disturbance in the Project Area by Alternative.

Plant Community/Cover Type[1]	Acres Disturbed		
	Alternative B	Alternative C	Alternative D
Shrublands (sagebrush)	2	32	51
Grasslands	0	3	3
Rock Outcrop	2	2	5
Previously Disturbed (unvegetated)	4	12	14
Total	**8**	**49**	**73**

[1]As described in Chapter 3, Section 3.2.1.

Alternative A (No Action Alternative)

Under Alternative A, mining would cease, eliminating any further associated disturbance to the vegetation communities at the quarry. Reclamation activities would occur which would increase the number of vegetated acres within the Proposed Project Area. However, since there would be large piles of waste rock left on site that would not support vegetation, the total amount of vegetation at the quarry would be less than existed prior to the beginning of mining activities. The vegetation composition of the reclaimed acres could be somewhat different than pre-mining conditions due to the potential reduction in topsoil and site productivity, the availability of seed sources, the suitability of some species for planting, and the potential presence of noxious or invasive species.

Alternative B

Under Alternative B, approximately 2 acres of shrublands would be disturbed by mining activities (Table 4.6-1). This area and the majority of areas previously disturbed by mining would be reclaimed, where feasible, during or following completion of mining operations. However, there is the potential that noxious weeds and other invasive non-native species could become established prior to reclamation. The composition of the reclaimed vegetation community could be somewhat different than the currently existing community due to the potential presence of weeds, potential reduction in topsoil and site productivity, availability of seed sources, and the difficulty of regenerating some native species. It could take 20 to 40 years or more for reclaimed areas to return to their pre-disturbance community types, therefore, impacts to vegetation would be long-term in duration.

Mechanical effects to soil from mining activities, such as surface disturbance or soil compaction, would indirectly affect vegetation by impacting soil structure and function. Surface disturbances from excavation and blasting could lead to increased erosion potential and the loss of topsoil. The loss of this soil layer could result in: diminished structural support for, and exposure of, root systems; a reduction of available nutrients for established

plants; and a diminished seed bank. Soil compaction on the other hand, could reduce water infiltration, restrict root depth, and limit seed germination. Individually, or a compilation of these two impacts, could indirectly lead to further reductions in native plant communities and the potential for reestablishment of vegetation.

Surface disturbances from construction activities could also indirectly impact vegetation by creating potential habitat for invasive species. The establishment and spread of these species would lead to increased direct competition for limited resources (nutrients, water, space, etc.) with native and desired plant species. Indirectly, invasive and noxious weed species could augment the amount and continuity of fuels, which could lead to decreased fire return intervals (Peters and Bunting 1994; Whisenant 1990). The compilation of decreased fire return intervals and competition for resources could alter community dynamics (fire frequency and severity, soil stability, nutrient cycling, etc.); therefore, surface disturbances would likely have short-term as well as potentially long-term impacts on vegetation.

Alternative C

The impacts of Alternative C on vegetation would be similar to those described for Alternative B, but at an increased level. Approximately 32 acres of shrublands, 3 acres of grassland, and 2 acres of rock outcrop would be disturbed by mining activities (Table 4.6-1). Additionally, disturbance would occur over a longer period of time (30 years) resulting in a greater chance of noxious weeds and other non-native plant species becoming established and spreading prior to reclamation activities, particularly alongside new mining roads.

Alternative D

The impacts of Alternative D on vegetation would be similar to those described for Alternative B and C, but at an increased level. Approximately 51 acres of shrublands, 3 acres of grassland, and 5 acres of rock outcrop would be disturbed by mining activities (Table 4.6-1). Disturbance would occur over a longer period of time than under Alternative C (40 years) resulting in a greater chance of noxious or invasive species establishment.

4.6.2 Special Status Plant Species

No Idaho BLM special status plant species are known to occur within the Proposed Project Area. However, the entire Proposed Project Area has not been surveyed for these species. The special status plant species that could potentially occur in the quarry site are Lemhi milkvetch, wavy-leaf thelypody, Challis crazyweed, Challis milkvetch, and white eatonella. Since the entire Proposed Project Area has not yet been surveyed for these species and

suitable habitat occurs in portions of the quarry site, it is assumed for this analysis that these plants are present.

Alternative A (No Action Alternative)

There would be no impacts to special status plant species under Alternative A. Mining activities would cease and there would be no additional new surface disturbance in potentially suitable habitat for these species. It is unlikely that reclaimed areas would overlap suitable habitat for these plant species due to their disturbed nature.

Alternative B

Up to 4 acres of potentially suitable habitat for special status plant species would be disturbed under Alternative B. Use of heavy equipment for drilling, excavation, and surface stripping, etc. would have a high likelihood of destroying individuals or populations of plants, if present. Site-specific surveys would be conducted prior to any new ground-disturbing activities where surveys have not been previously completed to determine the presence of special status plant species. If special status plant species are found, the BLM would evaluate the site and determine the appropriate action to maintain viable populations of the observed species.

Alternative C

The potential impacts to special status plant species under Alternative C would be similar to Alternative B with the following exceptions. Under Alternative C, approximately 37 acres of potentially suitable habitat for special status plant species would be disturbed and up to 31 acres of potentially suitable habitat would be disturbed through exploration activities.

Alternative D

The potential impacts to special status plant species under Alternative D would be similar to Alternative C with the following exceptions. Under Alternative D, approximately 59 acres of potentially suitable habitat for special status plant species would be disturbed, as opposed to 37 acres under Alternative C. Exploration activities would be reduced from a 31-acre area under Alternative C to an 18-acre area under Alternative D.

4.6.3 Fish and Wildlife

Four types of potential impacts to terrestrial wildlife from the Proposed Project are considered in this analysis, where applicable. They are vegetation removal, noise from mining operations (explosives, heavy equipment operation, etc.), visual disturbance (of

employees on foot and in vehicles and equipment), and human encounters. Many of these factors may be interdependent, depending on the location of the animal (i.e. an animal may see and hear mining activities concurrently). A comprehensive analysis of the impacts of noise on wildlife is addressed above, in Section 4.5.6 and only an abbreviated discussion of this impact is addressed in the following sections. Potential impacts to aquatic wildlife include impacts to water quality from sediment and petroleum products, and reductions in stream flow.

Big Game

Alternative A (No Action Alternative)

Under Alternative A, noise, visual disturbance, and human/wildlife encounters from mining operations would cease with the closure of the quarry. Forage and browse for big game would improve once forbs, grasses, and shrubs become established from reclamation activities. The potential for disturbance to wintering big game would occur during reclamation efforts if they occurred during the winter months, but this impact, if any, would be short-term and would cease upon completion of reclamation.

Alternative B

Under Alternative B, mining would continue at its current rate, as outlined in the Interim Mining Plan. Due to the infrequent use of the Proposed Project Area by pronghorn antelopes and elk, potential impacts to these species are anticipated to be negligible.

The existing quarry and areas proposed for new mining activities overlap mule deer crucial winter range, as described in Chapter 3, Section 3.2.3. Direct impacts to browse and forage for mule deer in the crucial winter range would occur from mining activities but would likely not be substantial since only minimal new surface disturbance would result (see Table 4.6-1). This surface disturbance would equate to a loss of less than 1 percent of the crucial winter range along the Salmon and East Fork Salmon rivers, as mapped in the RMP (USDI-BLM 1999, Map 32). Habitat would be maintained for big game consistent with IDFG management objectives. Indirect impacts to mule deer habitat could also result from the mining operations. Deer using the quarry site during mining operations could be temporarily displaced, especially new individuals in the herd or young of the year that are not accustomed to the existing level of disturbance.

Mining activities would create a potential visual disturbance and could increase the chance of human/big game encounters. Responses to such encounters could range from temporary startle and flight to short-term avoidance of the area. The response to a visual disturbance

would depend on the distance between the animals and the visual stimuli (Freddy *et al*. 1986). Repeated disturbance and encounters could lead to increased metabolism and energy expenditure of the animals which could reduce their fat stores and lower their body weight, and could lead to long-term avoidance of the area (Geist 1971). Under severe winters, additional mule deer may be forced to use the Proposed Project Area and immediate vicinity. Increased stresses to these already stressed animals could occur as a result of quarry operations during severe winters, specifically in the latter months of winter, and could potentially lead to reduced reproduction or winter mortality (Thomas 1982 and Hobbs 1989). The existing use of SH-75 for hauling flagstone would continue at its current rate and could pose a risk of vehicle/big game collisions.

Noise from blasting could impact big game species wintering in the area, primarily deer. Blasting would occur up to 16 times per month, with no more than two blasts occurring on a given day. Responses of big game to blasting are poorly studied. However, literature does exist describing the impacts of aircraft noise and sonic booms on big game (Manci *et al.* 1988). Impacts vary depending on the species, group size, sex, season, previous exposure to noise source, and distance from the noise source. The distance from the noise source will influence both the noise intensity and whether the animal can locate the noise source. The literature indicates that the visibility of the noise source also influences the animal's reaction. For example, reindeer's response to sonic booms were moderate, irrespective of boom level, and included slight startle responses, raising of head, pricking the ears, and scenting the air. Panic reactions were not observed (Espmark 1972 *in* Manci *et al.* 1988). Conversely, responses of caribou to noise from low-altitude aircraft in remote areas resulted in running (escape), and panic responses, when aircraft (the visual stimuli) were within 200 feet (Klein 1973 *in* Manci *et al.* 1988).

Since occasional blasting is an existing condition that has occurred throughout the operation of the quarry, it is possible that many of the deer using the Proposed Project Area and immediate vicinity are habituated to some degree to this noise source. Although there is no direct visual stimuli associated with blasting, deer may associate other activities at the quarry outside of the blasting zone (e.g. at the administration area or in the waste rock storage areas) with the noise of blasting. Depending on the distance of the visual stimuli to the animal, this could lead to reactive conditioning where the blast and subsequent observation of humans induces an automatic negative response to every blast. Responses of big game to the blast could range from a short-term alertness, where the animals would stop what they were doing and look in the direction of the noise and human activity, to a flight response or long-term displacement. If flight responses repeatedly resulted, this would expend needed energy of big

game in the winter. If long-term displacement were to occur, it could result in deer using less suitable areas or being more susceptible to predation.

Alternative C

The types of impacts to big game species under Alternative C would be similar to Alternative B but the magnitude of potential impacts would be greater. New surface disturbance would result in a reduction in forage and browse by approximately 35 acres. Exploration activities could further reduce forage and browse on up to 31 acres. This surface disturbance would equate to a loss of less than 1 percent of the crucial winter range along the Salmon and East Fork Salmon rivers, as mapped in the RMP (USDI-BLM 1999, Map 32). The number of employees working on site would increase by 33 percent, and areas where activities would occur (mining and mineral exploration) would expand, increasing the activities in winter range and the potential for a human/animal encounter. It is likely that mule deer in the Proposed Project Area are currently habituated to some degree to the presence of humans at the quarry site. However, the expansion of areas proposed under Alternative C where human would be present would result in human activities occurring in areas that the deer are not accustomed to. The increase in number of people on site and the decrease in vegetation would reduce the area of effective available habitat, which would result in additional stressors to deer, especially during severe winters. The amount of material removed and associated use of heavy equipment would increase, increasing the potential visual and noise disturbance. Increased potential for reaction to visual stimuli, noise, and human encounters and number of encounters could amplify the responses of mule deer to the disturbance. It could result in more frequent and longer distance flights and avoidance periods. This could lead to greater expenditures of energy which could lower body weight and affect reproduction, and could result in a greater likelihood of displacement than under Alternative B. Displacement would increase the stress to these animals and could render them more susceptible to wolf predation, if displaced to areas used by wolves. Use of SH-75 for hauling flagstone would increase over Alternative B and could pose an increased chance of vehicle/big game collisions.

Alternative D

The types of impacts to big game under Alternative D would be similar to Alternative B and C but the magnitude of potential impacts would be greater. New surface disturbance would result in a reduction in browse and forage by approximately 54 acres. Exploration activities could further reduce forage and browse on up to 18 acres. However, this surface disturbance would equate to a loss of less than 1 percent of the crucial winter range along the Salmon and East Fork Salmon rivers, as mapped in the RMP (USDI-BLM 1999, Map 32). The number of

employees working on site would increase by 49 percent over Alternative B and 12 percent over Alternative C, and would increase the potential for a human/wildlife encounter. As discussed for Alternative C, the expansion of areas proposed under Alternative D where humans would be present would result in human activities occurring in areas that the deer are not accustomed to. The increase in number of people on site and the decrease in vegetation would reduce the area of effective available habitat, which could result in additional stressors to deer, especially during severe winters. The amount of material removed and associated use of heavy equipment would increase, increasing the potential for visual and noise disturbance. Increased potential for reaction to visual stimuli, noise, and human encounters and number of encounters could amplify the responses of mule deer to the disturbance, potentially resulting in more frequent and longer distance flights and avoidance periods. This could lead to greater expenditures of energy which could lower body weight and affect reproduction, and would have a greater likelihood of leading to displacement than under Alternatives B and C. Displacement would increase the stress to these animals and could render them more susceptible to wolf predation, if displaced to areas used by wolves. Use of SH-75 for hauling flagstone would increase over Alternatives B and C which could pose an increased chance of vehicle big game collisions. The number of blasts per month would increase over the other action alternatives, increasing the potential for resulting displacement and susceptibility to predation.

Upland Game Birds

Impacts to sage-grouse from mining are described in Section 4.6.4.

Alternative A (No Action Alternative)

Future habitat for upland game birds would improve under Alternative A once shrubs from reclamation activities become established and are large enough to provide cover. Forage availability would increase for upland game birds earlier than cover once grasses and forbs become established.

Alternative B

Up to 2 acres of potential habitat for upland gamebirds (sagebrush and grasslands) would be removed or damaged under Alternative B. Removal of shrubs would decrease available loafing and escape cover and nesting habitat for upland gamebirds and removal of grass would reduce their available food source. It is also possible that gamebirds would be disturbed and displaced by the noise and presence of people and heavy equipment used during mining activities. However, potential impacts to upland gamebird populations in the general vicinity of the quarry site are considered minor due to the availability of suitable

habitat within portions of the Proposed Project Area that would not be affected and areas outside of the quarry boundary.

Alternative C

The types of impacts to upland game birds under Alternative C would be similar to those described for Alternative B except the amount of vegetation that would be removed or damaged would be greater. Up to 35 acres of potential habitat for upland gamebirds (sagebrush and grasslands) would be removed or damaged under Alternative C. Exploration activities could modify habitat for these species over the proposed 31-acre exploration area.

Alternative D

The types of impacts to upland game birds under Alternative D would be similar to Alternative C except that the amount of vegetation that would be removed would be greater. Up to 54 acres of potential habitat for upland gamebirds (sagebrush and grasslands) would be removed under Alternative D. Exploration activities could modify habitat for these species over the proposed 18-acre exploration area.

Furbearers

Alternative A (No Action Alternative)

Under Alternative A, current potential impacts to furbearers from mining activity would cease due to the proposed quarry closure. Habitat for small furbearers such as jackrabbits would increase slightly after the successful completion of reclamation activities.

Alternative B

Given the large territories of larger furbearers (such as bobcats and red fox) and the fact that they are not dependent on habitat within the Proposed Project Area, the removal of vegetation associated with mining activities, although it would be considered a negative impact, would not be considered adverse to these species. Due to the presence of people working on site, the potential of a human encounter with a furbearer exists. This type of disturbance would have a greater likelihood of negatively impacting furbearers, causing animals to startle or flee from the source of disturbance and potentially abandoning the area. These reactions would increase energy expenditure, and depending on the time of year of disturbance, could potentially decrease fitness. However, the Proposed Project Area is only a small portion of the home ranges of large furbearers, these potential impacts would occur only when furbearers were traveling through or foraging in the area.

The potential impact on furbearers from noise generated from the use of explosives is difficult to predict, as no studies examining this disturbance are known. Probable impacts of the noise from blasting could range from no response to a temporary startle response. Noise from use of heavy equipment and travel on mining roads would likely result in a similar response coupled by potential change in habitat use pattern (avoidance of the area) due to the associated visual disturbance.

The impacts of removing 2 acres of sagebrush would be considered negligible to smaller furbearers that rely on sagebrush shrubs for cover, such as jackrabbits. The chance of human encounters with small furbearers would be greater than for large mammals due to their smaller home ranges. Responses of these encounters could cause animals to startle or flee from the source of disturbance and potentially abandon the area. Impacts of noise and visual disturbances from mining activities on smaller furbearers would be similar to those of larger furbearers.

Alternative C

Impacts to large furbearers would be similar to Alternative B. However, due to the increased mining activities under Alternative C, the potential for a human/wildlife encounter and associated impacts would be greater.

Removal of approximately 32 acres of sagebrush under Alternative C could potentially impact smaller furbearers that rely on sagebrush shrubs for cover, such as jackrabbits. This would make them more vulnerable to predators and would reduce the thermal protection provided by the shrubs. The degree of impact would depend on the size of home range territories and availability and configuration of adjacent habitat. Concurrent reclamation activities would restore some of the sagebrush habitat once specific mining activities were completed. However, it could take at least 10 years before the planted sagebrush was large enough to provide cover for small furbearers. Impacts of the other types of disturbances would be similar to those of larger furbearers.

Alternative D

Impacts to furbearers under Alternative D would be similar to those described under Alternative C. Chances of human/wildlife encounters would be slightly greater since the number of workers would be greater, and the area where human/wildlife encounters could occur during mining operations would be expanded to the south due to the proposed mining in Pit 2-E and Pit 3. The amount of vegetation removed under Alternative D (54 acres) would

be the greatest of all action alternatives, decreasing cover habitat for jackrabbits and other small furbearers.

Non-game Birds

The analysis of impacts of the Proposed Project on non-game birds is focused on Idaho high priority bird species defined by the Idaho Bird Conservation Plan (ID PIF 2000) that utilize sagebrush habitat. All alternatives would be in compliance with Executive Order 13186 for migratory birds. A detailed discussion of these species is contained in Section 3.2.3 of this document.

Alternative A (No Action Alternative)

Under Alternative A, habitat for Idaho high-priority bird species that use sagebrush vegetation communities would increase after successful reclamation of the quarry site.

Alternative B

Up to 2 acres of potential nesting or foraging habitat for Idaho high priority bird species would be removed under Alternative B. If birds were nesting in the areas proposed for ground surface-disturbing activities, nests could be abandoned, and/or nests and individual birds could potentially be destroyed. Areas proposed for further ground disturbance under this alternative are small and localized, and the likelihood of birds nesting in these areas which are in close proximity to Pit 1 and Pit 2 would be low. However, sagebrush obligate bird species have been documented avoiding areas around those that are directly disturbed (i.e. avoiding a buffer around roads and other edges; Ingelfinger and Anderson 2004), thus a larger area than that specifically disturbed by mining operations could be avoided or abandoned. Noise generated by equipment is not likely loud enough to interfere with vocal communication of bird species. Hearing damage to birds as a result of blasting would be unlikely to occur. Birds would be unlikely to use areas of the quarry where blasting would occur due to the disturbed nature of these areas and presence of quarry workers both before and after blast events. Birds could also be disturbed outside of the nesting period by noise from blasting and human presence, but impacts would be temporary and less severe such as temporary startle responses (flushing) and short avoidance flights.

The loss of habitat and potential impacts to individuals would not be anticipated to adversely affect populations of non-game birds due to the presence of undisturbed sagebrush habitat in the vicinity of the quarry, specifically in the East Fork Salmon River Bench ACEC/RNA. This undisturbed habitat would be available to other individuals in the populations, and possibly to displaced individuals, to use as nesting and foraging habitat. However, birds

would be unlikely to re-nest in this habitat during the same season of potential displacement. Reclamation activities would restore some of the sagebrush habitat once mining activities are completed.

Alternative C

Ground surface-disturbing activities would be increased under this alternative relative to Alternative B. Up to 32 acres of potential nesting or foraging habitat for Idaho high priority bird species would be removed under Alternative C. This would reduce the availability of nesting and foraging habitat in these areas and fragment the habitat to some degree. Fragmentation of shrub steppe habitat has been documented as significantly influencing the presence of shrub-obligate bird species (Knick and Rotenberry 1995). The reduction in habitat could potentially displace individuals as well as deter sagebrush-obligate bird species from moving into the area. Birds could also be displaced from areas of suitable habitat that would be unaltered by quarry activities but would be rendered unusable due to their proximity to the activities. However, the presence of suitable sagebrush habitat in the vicinity of the quarry would still be available for other individuals of high-priority bird populations for foraging and nesting. Although impacts to individuals would likely result, impacts to populations would not be expected.

Alternative D

Up to 51 acres of potential nesting or foraging habitat for Idaho high priority bird species would be removed under Alternative D. This would further fragment the potential habitat, reduce the availability of nesting and foraging habitat, and likely result in displacement of sagebrush obligate species from the Proposed Project Area and potentially deter new individuals from moving into the quarry site. A greater area of habitat adjacent to the quarry activities would likely be rendered unusable to these bird species than under Alternative C. However, the presence of suitable sagebrush habitat in the vicinity of the quarry would be available for other individuals of high-priority bird populations for foraging and nesting. Although potential impacts to individuals would likely result, impacts to populations would not be expected.

Small Mammals

Alternative A

Under Alternative A, habitat for small mammal species that use sagebrush and grassland habitats would increase after successful reclamation of the quarry site.

Alternative B

Up to 2 acres of potential foraging habitat and thermal and hiding cover for small mammals (other than bats) would be removed under Alternative B. The loss of habitat and potential impacts to individuals would not be anticipated to adversely affect populations of small mammals. This is due to the small amount of habitat that would be removed, the presence of undisturbed sagebrush and grassland habitat within and in the vicinity of the quarry that would be available for use by other individuals in the populations, and the high reproductive rates of these animals. Reclamation activities would restore some of the sagebrush and grassland habitat once mining activities are completed.

Bats inhabiting the rock outcrops in and adjacent to the Proposed Project Area would not be expected to be impacted from noise associated with the use of explosives. This is because the sound frequency (pitch) of the blasting noise would be much lower than the levels used by bats for communicating and locating their prey (echolocation) and would not interfere with their behavior. Approximately 2 acres of potential rock outcrop habitat would be altered, which could result in impacts to roosting bats.

Alternative C

Impacts to small mammals under Alternative C would be similar to those described for Alternative B with the following exceptions. Up to 35 acres of potential small mammal habitat (other than bats) would be removed. Burrows and den sites could be destroyed if located in areas proposed for pit expansion and mineral exploration. The amount of area disturbed could encompass individual territories of some small mammal species and the disturbance could impact individuals and their reproductive potential for a given season. However, given the availability of suitable habitat in the vicinity of the quarry that would be available for use by other individuals of small mammal populations and the high reproductive rates of these animals, impacts to populations would not be expected.

Under Alternative C, impacts to bats would be the same as those discussed for Alternative B.

Alternative D

Impacts to small mammals under Alternative D would be similar to those described for Alternative B and Alternative C with the following exceptions. Up to 54 acres of potential small mammal habitat (other than bats) would be removed. Burrows and den sites could be destroyed if located in areas proposed for pit expansion and creation and mineral exploration. Although there could be impacts to small mammal individuals, impacts to populations are not expected.

Impacts to bats under Alternative D would be similar to those described under Alternative B, but would be greater in magnitude, because up to 5 acres of rock outcrop habitat would be altered.

Fish

Alternative A (No Action Alternative)

Under Alternative A, mining would cease and potential impacts to fish habitat associated with mining operations under the action alternatives would not occur. See Section 4.6.4 below for further discussion.

Alternatives B, C, and D

No direct effects to stream channel features or to individual fish populations are anticipated since there are no riparian areas within the Proposed Project Area. Potential indirect impacts to habitat quality for game- and non-game fish species could result from the potential delivery of sediment and chemicals and petroleum products from surface runoff to the East Fork Salmon and Salmon rivers (Section 3.1.5). The impacts by alternative would be the same as those described for special status fish species in Section 4.6.4, and are not further described here. Since no underwater noise would be produced in the rivers as a result of the mining operations, no noise impacts to fish would result (Section 4.6.4).

4.6.4 Special Status Fish and Wildlife Species

This section addresses the potential impacts of the Proposed Project on threatened, endangered, and sensitive wildlife and fish species. A Biological Assessment (BA) for aquatic species was prepared for the 2004 Three Rivers Stone Quarry Expansion Environmental Assessment (EA) (USDI-BLM 2003a) and was reviewed and concurred with by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). Since Alternative D involves actions not described in the BA upon which consultation was based in 2003, consultation would be undertaken with the USFWS and NMFS to update concurrence for threatened and endangered fish species. Since no impacts to Federally listed terrestrial species would result from implementation of the proposed alternatives, a BA for terrestrial species would not be submitted to the USFWS.

Special Status Wildlife

Four types of potential impacts to special status wildlife species from the Proposed Project are considered in this analysis, where applicable: vegetation removal, noise from explosives

and heavy equipment operation, visual disturbance, and human encounters. Disturbance acres by vegetation community type are displayed in Table 4.6.1 above.

Bald Eagle

There are no bald eagle nest sites within the vicinity of the quarry site, so no impacts to nesting bald eagles would result from any of the alternatives.

Alternative A (No Action Alternative)

Mining activities and potential associated disturbance to wintering bald eagles along the Salmon and East Fork Salmon rivers would cease. The potential for disturbance would continue to occur during reclamation efforts if conducted during the winter months, but this impact, if any, would be minor and would cease upon completion of reclamation.

Alternative B

Mining activities and associated noise from equipment operation and blasting could disrupt behavior of bald eagles foraging and perching in the vicinity of the quarry during the winter. The magnitude of behavior modification would vary depending on the distance of the disturbance from the eagles and the intensity and duration of the disturbance. Responses could vary from temporary startle responses (flush) and short avoidance flights, causing them to avoid commonly used perch or forage sites, to longer-term avoidance of the area. Impacts would be greatest if the eagles were foraging in the immediate vicinity of the quarry where many of the quarrying activities would be above the eagles, potentially increasing the perceived threat to these birds. These actions could stress eagles, causing them to use more energy during a time when their energy levels are low. The consequences could be lower reproduction rates the following spring, increased susceptibility to disease, and predation. Wintering bald eagles have reportedly habituated to human activity (pedestrian and boating) along rivers with degree of habituation depending on the level and type of human activity and the sensitivity of individual eagles (Stalmaster and Newman 1978 and Knight and Knight 1984). Therefore, some habituation by eagles to activities, especially those occurring continuously or predictably, could occur.

Mining activities would not result in the removal of any habitat for bald eagles. Wintering bald eagles along the Salmon and East Fork Salmon rivers could potentially be disturbed by the continuation of mining activities (noise and visible human presence) under Alternative B. Blasting to remove overburden would represent the greatest potential noise impact and could flush perched or roosting eagles. These potential impacts would be short-lived and infrequent. In addition, the continued presence of eagles during the winter months in this area

indicates some degree of tolerance or habituation to human activities in the Proposed Project Area. Noise of most mining activities would be muted and masked to some degree by the sound of the wind, rivers, and traffic on SH-75. The distance of eagle roosts from the quarry (0.4 to 1.7 miles) would reduce the potential visual disturbance and chance that the birds would flush or leave the area and would eliminate the potential for human encounters. Volume of noise reaching the roosting eagles would also be reduced from the original level produced at the blast site. Because of these factors, the noise level at the location of the bald eagle winter perch sites from the mining operations would not attain the threshold level for chronic effects (Section 4.5.6).

Alternative C

Impacts to wintering bald eagles under Alternative C would be similar to those for Alternative B except the number of year-round workers on site would increase by about 33 percent, potentially increasing visual disturbance to wintering eagles. The number of seasonal workers would also increase, but the period worked by the majority of the workers would only overlap the beginning of the eagle wintering period in the area. Noise levels would increase due to an increase in use of heavy equipment and traffic from commuters and shipping trucks, and from exploration activities (construction of roads, drill pads, drill holes, trenches, test pits, local surface stripping, and potential additional blasting). However, the noise level at the location of the bald eagle winter perch sites from the expanded mining operations would not attain the threshold level for chronic effects (Section 4.5.6). If additional blasting were used for exploration activities, the potential for adverse effects to eagles would increase. Potential impacts to wintering eagles would occur for up to 30 years and could lead to long-term avoidance of the immediate area. However, some habituation to activities, especially those occurring continuously or predictably, could occur, with some birds likely being more tolerant of mining activity than others. Conversely, it is possible that the eagles would become subject to a conditioned response to noise from blasting, if associated with the visual stimuli of other human activities in the Proposed Project Area. If this occurred, the eagles would potentially respond to each blast. The response (flushing, avoidance flights, and displacement etc.) would vary by individual and by the distance from the eagle to the visual stimuli.

Alternative D

The types of impacts to wintering bald eagles under Alternative D would be similar to Alternative C but the magnitude and duration of potential impacts would be greater due to the slight increase in number of seasonal employees, two-fold increase in the number of monthly blasts, and project duration of up to 40 years. Because of the increase in noise from

blasting, this alternative would have the greatest potential to impact wintering eagles in the area.

Gray Wolf

Alternative A (No Action Alternative)

Mining activities would cease under Alternative A and disturbed areas would be reclaimed, increasing the potential forage and browse for key wolf prey species (elk and deer) in the future. Intensive human activity in the area would cease and use of the area by wolves and their prey could potentially increase.

Alternative B

Mining activities would likely continue to discourage use of the Proposed Project Area by gray wolves. Up to 2 acres of potential forage and browse for wild ungulates would be removed during mining operations. Although the amount of forage removed would not notably affect use of the area by big game, noise and presence of humans could increase the stress to mule deer and lead to temporary displacement, as described in Section 4.6.3. Given the presence of wolf packs in the vicinity of the quarry site, the mobility of wolves, and the size of their territories, displacement of mule deer outside of the quarry would increase predation opportunities for wolves in the region.

Alternative C

Under Alternative C there would be an increased amount of potential forage and browse for wolf prey (35 acres versus 2 acres under Alternative B) and an increase in noise and visual disturbance. This would increase the potential for deer displacement from the Proposed Project Area as described in Section 4.6.3. Therefore, prey availability for wolves would potentially increase with implementation of Alternative C if big game were redistributed as a result of quarry activities to areas used regularly by wolves.

Alternative D

Under Alternative D there would be an increased loss of potential forage and browse for wolf prey (54 acres versus 2 and 35 acres under Alternative B and C, respectively) and an increase in noise and visual disturbance. This would increase the potential for deer displacement from the Proposed Project Area over the other alternatives as described in Section 4.6.3. Therefore, prey availability for wolves would potentially increase with implementation of Alternative D if big game were redistributed as a result of quarry activities to areas used regularly by wolves.

Canada Lynx

Alternative A (No Action Alternative)

The Proposed Project Area does not contain suitable habitat for Canada lynx. Quarry closure and reclamation proposed under this alternative would not benefit, or adversely impact, Canada lynx.

Alternative B

The Proposed Project would not impact the Canada lynx, as this species has not been documented in the quarry site or its immediate vicinity, and primary habitat is lacking. Any use of the quarry site by lynx would be transitory, occurring between adjacent Lynx Analysis Units. Due to the crepuscular and nocturnal nature of lynx, there would be little overlap, if any, between traveling lynx and mining operations, reducing the potential for encounters with quarry employees.

Alternative C

The potential for impacts to Canada lynx would be similar to Alternative B, with one exception. Since mining activities could potentially occur 24 hours per day, as opposed to the 10 to 12 expected under Alternative B, the potential for encounters with quarry employees would be increased. However, this potential would still be small, since any use of the Proposed Project Area by lynx would be transitory.

Alternative D

The potential for impacts to Canada lynx would be the same as discussed for Alternative C.

Pygmy Rabbit

Alternative A (No Action Alternative)

The Proposed Project Area does not contain suitable habitat for the pygmy rabbit thus quarry closure and reclamation proposed under this alternative would not benefit, nor adversely impact, this species.

Alternative B, C, and D

The Proposed Project would not impact the pygmy rabbit, as this species has not been documented in the quarry site or immediate vicinity, and suitable habitat is lacking.

Greater Sage-Grouse

Alternative A (No Action Alternative)

Under Alternative A, mining would cease and disturbed areas at the quarry would be reclaimed. This would reduce the human disturbance in the area and improve potential nesting and/or wintering habitat for sage-grouse. Potential brood-rearing habitat in the riparian areas adjacent to the Proposed Project Area would not be altered by reclamation activities.

Alternative B

If sage-grouse were present within the Proposed Project Area, they could potentially could displaced by the proposed mining activities. Up to 2 acres of potential sage-grouse nesting or wintering habitat would be removed under Alternative B. Concurrent reclamation activities would restore some of the sagebrush habitat once specific mining activities were completed, but it could take at least 10 years before the sagebrush was large enough to provide cover for sage-grouse. Potential brood-rearing habitat in the riparian areas adjacent to the Proposed Project Area would not be directly impacted. However, if activities associated with the mining operation disturbed and altered the movements of sage-grouse, the suitability of this habitat could be reduced.

Alternative C

The potential for impacts to sage-grouse would be similar to those discussed under Alternative B. Mining would increase in the Proposed Project Area, further increasing the noise and activity in the area, which could potentially displace sage-grouse, if present, over a larger area than under Alternative B. Up to 32 acres of potential sage-grouse nesting or wintering habitat would be removed under Alternative C; an increase of 30 acres over Alternative B. This would fragment sagebrush in the area, and when combined with human disturbance, would reduce the suitability of the Proposed Project Area as potential habitat for sage-grouse. As under Alternative B, concurrent reclamation activities would restore some of the sagebrush habitat once specific mining activities were completed, but it could take at least 10 years before the sagebrush was large enough to provide cover for sage-grouse. Potential impacts to brood-rearing habitat in the riparian areas adjacent to the Proposed Project Area would be the same as those discussed under Alternative B.

Alternative D

Human disturbance associated with mining would increase in the Proposed Project Area slightly more than Alternative C, increasing the noise and activity in the area. If sage-grouse

were present, they could potentially be displaced by the mining activities over a larger area than under Alternatives B and C. The potential for displacement would be greatest under this alternative due to the increase in activity and human presence proposed. Up to 51 acres of potential sage-grouse nesting or wintering habitat would be removed or disturbed under Alternative D, resulting in the greatest potential fragmentation of sagebrush habitat in the area of all action alternatives. This fragmentation, when combined with the increase in human disturbance, would reduce the suitability of the area as potential habitat for sage-grouse. As under Alternatives B and C, concurrent reclamation activities would restore some of the sagebrush habitat once specific mining activities were completed, but it could take at least 10 years before the sagebrush was large enough to provide cover for sage-grouse. Potential impacts to brood-rearing habitat in the riparian areas adjacent to the Proposed Project Area would be the same as those discussed under Alternative B.

Peregrine Falcon

Alternative A (No Action Alternative)

Under Alternative A, mining and associated noise disturbance from explosive use would cease, eliminating potential disturbance to the peregrine falcon territory to the southeast of the quarry. It is possible that in the absence of mining, peregrines could nest on the rock faces within Pit 1 that have been exposed from the mining operation.

Alternative B

Mining operations and potential disturbance to the peregrine falcon territory, if occupied, would continue. Falcons foraging along the Salmon and East Fork Salmon rivers could be disturbed by noise from blasting and general mining activity, potentially resulting in temporary startle responses (flush) or avoidance of this area. However, disturbance from blasting (the loudest mining activity) would be temporary and infrequent. The noise level at the location of the peregrine falcon territory would not attain the threshold level for chronic effects, as discussed in the wildlife subsection of Section 4.5.6. Peregrine falcons have been reported nesting and foraging in close proximity to mining and other human disturbances and often habituate to human environments (White *et al.* 1988), and may not respond to the noise from blasting. Due to the distance of the quarry from the falcon territory (approximately 2.0 miles) and the obstructed view of much of the mining activities from these locations, it is unlikely that mining activity would disturb falcon reproductive behavior or preclude them from nesting there in the future. If the eyrie sites continue to be unoccupied, mining would have no impact on the falcons. Once mining activities cease, it is possible that peregrines could nest on the rock faces within Pit 1 that have been exposed from the mining operation.

Alternative C

The impacts of Alternative C on the peregrine falcons in the vicinity of the quarry site would be similar to Alternative B. However, since mining activity would increase (increased area and increased number of workers) and exploration activities would occur (construction of roads, drill pads, drill holes, trenches, test pits, local surface stripping, and potential additional blasting), the potential for disturbance to foraging falcons would be greater. The nesting territory is not below the quarry, and the distance of the nesting territory from the proposed exploration area would be great enough that impacts to falcon nesting are not expected. The noise level at the location of the peregrine falcon territory would not attain the threshold level for chronic effects, as discussed in the wildlife subsection of Section 4.5.6.

Alternative D

The impacts of Alternative D on the peregrine falcons in the vicinity of the quarry site would be similar to Alternative B and Alternative C. However, since mining activity would increase and limited exploration activities would occur, the potential for disturbance to foraging falcons would be greater. The nesting territory is not below the quarry, and the distance of the nesting territory from the new pits and proposed exploration area would be great enough that impacts to falcon nesting are not expected. The noise level at the location of the peregrine falcon territory would not attain the threshold level for chronic effects, as discussed in the wildlife subsection of Section 4.5.6.

Special Status Fish

Salmon, Steelhead, and Trout

Potential project impacts to the Snake River sockeye salmon, Snake River spring and summer Chinook salmon, Snake River Basin steelhead, Columbia River Basin bull trout, and westslope cutthroat trout would be similar and are addressed together. No direct effects to stream channel features or to individual fish populations would be anticipated since there are no riparian areas within the Proposed Project Area. Potential indirect impacts to special status fisheries habitat could result from sedimentation from erosion and surface runoff, fuel or chemical spills, and water acquisition for dust suppression. These potential impacts would be directly associated with potential impacts to water quality (see Section 4.5.5). Of these potential impacts, sedimentation poses the greatest risk to salmonids. Increased sediment deposition can adversely affect salmonid spawning and rearing habitat. Excessive sediment interferes with water flowing through spawning gravel and reduces the transport of oxygen to incubating eggs, lowering egg and fry survival (Burton *et. al* 1990; Chapman 1988; Stowell *et al.* 1983). Fine sediments in cobble substrate fills interstitial space and pools, reducing the amount of summer and winter rearing habitat as well as the abundance and diversity of

macroinvertebrates, which provide food for juvenile salmonids (Chapman and McCleod 1987).

Alternative A (No Action Alternative)

Under Alternative A, mining would cease and the potential impacts to aquatic biota, special status fish, and fisheries habitat associated with mining operations under the action alternatives would not occur. There would be potential for some erosion to occur during reclamation activities which could potentially result in sediment delivery to the Salmon and East Fork Salmon rivers. However erosion control measures to reduce the potential for fine sediment to enter fish bearing streams would be implemented during reclamation efforts. Once reclamation is complete and vegetation reestablished, the potential for erosion and sediment delivery to the rivers would be greatly reduced; it would be similar to pre-mine conditions, but somewhat greater due to the piles of waste rock that will no longer support a vegetation community.

Alternative B

Under Alternative B, mining operations and associated risks to aquatic biota, special status fish, and fisheries habitat would continue at a level slightly above the current rate. Sources of erosion from the existing roads and from the administrative area would occur at a slightly elevated level and pose an increased risk of fine sediment delivery to the Salmon and East Fork Salmon rivers. New surface disturbance would occur on approximately 2 acres of vegetated and 6 acres of previously disturbed land as a result of expanding Pit 1 and Pit 2 and would result in an additional, but short-term, risk of erosion. Since the removed topsoil would be stockpiled in a protected area, the risk of fine sediment entering the rivers from this disturbance would be reduced. BMPs would be in place to manage surface water and erosion potential as described in the Idaho Department of Environmental Quality's Catalog of Stormwater BMPs and the Idaho Department of Lands (1992) Manual of BMPs (see Appendix B). Proper implementation and adherence to these BMPs would greatly reduce the potential for sediment to leave the project site and reach the rivers. As portions of the quarry are reclaimed during operations, the potential for sediment reaching the rivers would lessen. It is expected that fine sediment could still reach the rivers over the life of the quarry, particularly during large storm events. In the unlikely event of failure of the stormwater detention trench by the administrative area, sediment, and potentially residual chemicals and petroleum products, as defined in Section 3.1.5, would be delivered to the Salmon River.

Potential sources of contaminants associated with the quarry include fuel, lubricants, degreasing solvents, vehicle maintenance fluids, fuel oil, ammonium nitrate, and pre-mixed

ANFO. As discussed in Section 4.5.5, there is the potential that these materials could spill during mining operations. Depending on the location and degree of spill, there is the potential that these contaminants could reach the East Fork Salmon River or Salmon River over the life of the project. However, the risk of this occurring would be low due to the adherence to a Spill Prevention, Control and Countermeasures Plan, proper storage and containment facilities, and the presence of spill clean-up kits near storage area. If contaminants were to reach one or both of the rivers, the contaminants would be diluted from their original concentration at the site of the spill, and would further dilute once they entered the water, reducing the degree of impact. The amount of time that the concentration of contaminants would be measurable in the water would be short and the associated impact to aquatic biota important to special status fish (i.e. macroinvertebrates and algal communities) would be short-term, and would not be expected to adversely impact fish populations.

Under Alternative B, water for dust suppression would be obtained from the existing screened diversion on the Salmon River. Approximately 10 acre-feet per year of water would be needed each year of operation, with maximum daily use estimated at 55,000 gallons, which would result in a minor reduction in flows in the river. Reductions in flow of the Salmon River would be accounted for by the existing IDWR water use permit. Since water would be pumped through a screen and the reduction in flow would be small, no impacts to fish or fish habitat are expected.

There is no known literature on the effect of noise and vibration from blasting on fish, but there have been some studies on the hearing of salmon and on the effects of sonic booms on fish. Sound measurements made in a study by Popper and Clarke (1976) led to the conclusion that salmon are unlikely to detect sounds originating in the air unless the source is nearly directly overhead, but that they are sensitive to substrate-borne sounds. They also stated that hearing of salmon is poor when compared with carp and cod and speculated that hearing is likely to be masked by ambient noise in a turbulent river. Research on the effects of sonic booms on fish behavior and egg development indicated that yearling trout elicited no or very slight reactions to this disturbance and that sonic boom exposure caused no increase in egg mortality (Rucker 1973). In light of this research, and since the noise and vibration from blasting at the quarry site would dissipate before nearing the Salmon and East Fork Salmon rivers, and since noise would be masked by ambient noise levels in the rivers and would not originate in the stream substrate, noise and vibration from blasting would not be expected to impact fish in these rivers.

Alternative C

Under Alternative C, potential impacts to aquatic biota, special status fish, and fisheries habitat would be similar to Alternative B. However, new surface disturbance would occur on approximately 49 acres of vegetated and previously disturbed land as a result of mining in Pit 1 and Pit 2. Also, new disturbance would occur on up to 31 acres from exploration activities such as road construction and surface stripping. The amount of erosion generated and potential for sediment reaching the Salmon and East Fork Salmon rivers would be greater under Alternative C due to the increase in the area of surface disturbance. The quantity of fuel and lubricants used on site would also be greater and could result in an increased risk of leaks or spills reaching the rivers. However, the existing stormwater detention trench along the northeastern edge of the administration area would be modified. New stormwater detention basin would be constructed adjacent to the existing stormwater trench, providing an expanded area for stormwater runoff to collect and sediment to settle before draining into the Salmon River, reducing the risk of sediment and contaminant delivery to this river. As under Alternative B, implementation of BMPs and adherence to a Spill Prevention, Control and Countermeasures Plan would reduce the chance and extent of impacts. However, the risk of sediment and residual chemicals and petroleum products entering the East Fork Salmon River would still exist. There would be no stormwater detention basin in this portion of the Proposed Project Area, specifically during extreme precipitation events. In the unlikely event of failure of the stormwater detention basin by the administrative area, sediment and residual chemicals and petroleum products (fuels and lubricants, etc.) could be delivered to the Salmon River.

Water for dust suppression would be obtained from a proposed well under Alternative C as opposed to directly from the Salmon River. It is estimated that a daily maximum of approximately 87,000 gallons of water would be needed from the well. Water would be withdrawn under an approved water right for a maximum volume of 340 acre-feet per year. Water withdrawal from the well would likely have no effect on flow in the Salmon River or on habitat for salmonids.

Alternative D

Under Alternative D, potential impacts to aquatic biota, special status fish, and fisheries habitat would be similar to Alternative C with the following exceptions. An additional 24 acres of new surface disturbance would occur over Alternative C on vegetated and previously disturbed land as a result of mining in Pit 2-E and Pit 3 for a total of 73 acres of new surface disturbance. Additional disturbance could be created by exploration activities in an 18-acre area. The amount of erosion generated and potential for sediment reaching the rivers would

be the greatest under this alternative due to the increase in total new surface disturbance. However, a new stormwater detention pond would be constructed southeast of Pit 2-E. This new detention pond, coupled with the proposed expansion of the existing stormwater trench by the administrative area and the construction of a new stormwater detention basin adjacent to this stormwater trench would provide two areas for stormwater runoff to collect and sediment to settle before draining into the Salmon and East Fork Salmon rivers. This would reduce the risk of sediment delivery to these river systems. In the unlikely event of failure of the stormwater detention basins during large precipitation events, sediment and residual chemicals and petroleum products could be delivered to the Salmon and East Fork Salmon rivers.

Under Alternative D, water for dust suppression would be obtained from a proposed well under an approved water right for a maximum volume of 340 acre-feet per year. It is estimated that a daily maximum of approximately 95,000 gallons of water would be needed from the well. Water withdrawal from the well would likely have no effect on flow in the Salmon River or on habitat for salmonids.

4.6.5 Wild Horses and Burros

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the site would be reclaimed. The appropriate management level of 185 animals in the Challis Herd Management Area (HMA) would be retained. There would be the potential for increased use of the project site by wild horses in the Challis HMA once reclamation is completed due to the reduction in mining operations and associated noise and human presence. However, its use for forage would be limited due to the low cover of vegetation on the site. Because frequency of use of the site by horses did not decrease significantly with the commencement of mining, it is unlikely that a substantial increase in use would be realized once mining operations cease.

Alternative B

Under Alternative B, use of the quarry by wild horses is expected to continue at its current low level. The appropriate management level of wild horses in the Challis HMA would be retained. Once mining operations cease, an increase in use could occur (see Alternative A).

Alternative C

Under Alternative C, use of the quarry by wild horses during the period of operation could potentially decline over current conditions due to increased mining activity and the removal of up to 35 acres of potential forage. However, given the current low level of use by horses,

and since the quarry site does not contain crucial habitat, no impacts to the viability of the wild horse population would result. It is anticipated that the appropriate management level of wild horses in the Challis HMA would still be retained.

Alternative D

Potential impacts under Alternative D are similar to those described under Alternative C. However, increases in mining activity under this alternative would be slightly greater, resulting in the removal of approximately 54 acres of potential forage.

4.7 OTHER RESOURCES

4.7.1 Cultural Resources

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the site would be reclaimed. Based on past surveys of the quarry site for archaeological and historic resources, no known cultural resources would be disturbed by reclamation activities.

Alternative B

Only two cultural resources were identified in the Proposed Project Area during past surveys of the quarry site for archaeological and historic resources. These sites are not eligible for the National Register and one of the sites (10CR984, lithic scatter) has been mostly obliterated. Mining activity would not be in proximity to the other site (10CR508), a rock overhang/shelter, and no impacts to cultural resources would result.

Alternative C

Proposed exploration activities under Alternative C would overlap the rock overhang/shelter documented in the Proposed Project Area and could potentially damage or destroy it. However, this resource is not eligible for the National Register because of lack of evidence of occupation or use, and the overhang is generally unsuitable for habitation because of steep rock floors. Otherwise, impacts to cultural resources would be the same as those described under Alternative B.

If additional cultural resources are documented in the Proposed Project Area during surveys of previously unsurveyed areas, as described in Section 3.3.1, Chapter 3, then potential impacts to these resources would be assessed in the Final EIS.

Alternative D

Impacts to cultural resources under Alternative D would be the same as those described under Alternative C.

4.7.2 Tribal Treaty Reserved Rights and Interests

The goal of the Challis Resource Area regarding Tribal treaty rights is to identify and consider Native American issues and concerns in order to accommodate treaty and other legal rights of appropriate Native American groups in the multiple-use management of public lands. Government-to-government consultation with the Shoshone-Bannock Tribes is ongoing regarding the Proposed Project, and is detailed in Section 5.1.1. Issues and concerns that the Tribes have for the natural environment, such as the affect of sedimentation on salmon spawning habitat, are addressed under specific resources in this chapter.

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the site would be reclaimed. There would be no negative impacts to Tribal rights and interests. However, the topography and visual quality of the site would be permanently modified (change in shape, height, and presence of peaks) from past alteration of the landscape from mining operations. The view and experience of future generations of Tribal members using land in the vicinity of the quarry would be different from the past view and experience of previous generations of Tribal members.

Alternative B

Gates would remain at the entrance to the quarry site from SH-75 and on the existing power-line road to the south of the Proposed Project Area and would be locked during hours when the quarry was not operating. Locked gates after hours and mining during operating hours would limit uninhibited access of the quarry site by Shoshone-Bannock Tribal members, impacting the opportunity for Tribal members to freely exercise treaty reserved rights within the active quarry area. The BLM would work with the Shoshone-Bannock Tribal members regarding access needs so that treaty rights are honored.

The topography and visual quality of the site would continue to be modified, and modifications would be permanent (see Section 4.7.4). The experience of Tribal members that used cultural and traditional use sites in the vicinity of the quarry prior to mining activities would be modified and the view and experience of future generations of Tribal members using land in the vicinity of the quarry would be different from the view and experience of previous generations.

Alternative C

Impacts to Tribal treaty rights and interests would be similar to those under Alternative B. The impacts to topography and visual quality would be greater due to the proposed expansion of Pit 1 and Pit 2.

Alternative D

Impacts to Tribal treaty rights and interests would be similar to those under Alternative B and C. The impacts to topography and visual quality would be greater under Alternative D due to the proposed expansion of Pit 1 and Pit 2 and the addition of Pit 2-E and Pit 3.

4.7.3 Social and Economic Conditions

The study area for the social and economic analysis includes the greater Challis area (Challis area), which comprises the Challis, Patterson and Clayton ZIP code areas (83226, 83253, and 83227). This area includes the Three Rivers Stone Quarry and the area where most of the quarry employees reside. Economic impacts resulting from mining operations also may be felt in other communities outside the Challis area. These effects, however, are believed to be minimal and are only evaluated qualitatively.

The following sections address the direct economic, total economic, and social impacts of the four proposed alternatives on the greater Challis area, the fiscal impact on the City of Challis and Custer County, and Environmental Justice in Custer County. The economic analysis is for all three action alternatives at their maximum capacity (maximum employment). Since the No Action Alternative would only employ workers for a short period (during reclamation), this alternative is analyzed at its final capacity, when workers are no longer employed.

Direct Economic Effects

Direct effects include the economics of jobs directly associated with the quarry, such as equipment operators and splitters. It does not include other jobs in the Challis area generated by the quarry, such as truckers who transport the rock from the quarry to distribution areas. The baseline used for this analysis are the number of jobs proposed by alternative (summarized in Chapter 2, Table 2.8.1) and the wage rates of quarry employees (summarized in Chapter 3, Table 3.3-3). The wage rates disclosed in Chapter 3 were averaged and adjusted for the economic model to include benefits. These data were used to compute industrial output for the Three Rivers Stone Quarry by alternative.

Table 4.7-1 depicts the direct impacts of the four alternatives on the economics of the Three Rivers Stone Quarry. Direct impacts are reported by alternative as a percent change in earnings and industrial output from baseline conditions. Dollar figures are not reported because of the confidential nature of these data. Changes in employee numbers are reported in both numbers and percentages.

Table 4.7-1. Direct Economic Effects of the Three Rivers Stone Quarry by Alternative.

	Alternative A	Alternative B	Alternative C	Alternative D
Number of Employees	Loss of 75 jobs (100% decrease)	75 (0 % change; baseline)	Gain of 25 jobs (33% increase)	Gain of 37 jobs (49% increase)
Earnings (Three Rivers payroll output)	-100%	0 % change	+ 32%	+ 48%
Industrial Output	-100%	0 % change	+ 33%	+ 50%

Alternative A (No Action Alternative)

Under Alternative A, there would be a loss of 75 jobs and a 100 percent decrease in earnings and industrial output associated directly with the quarry.

Alternative B

Under Alternative B, the quarry would continue to employ approximately 75 workers for the duration of the proposed operations (3 to 5 years) and the earnings and industrial output associated directly with the quarry are expected to stay the same as current conditions. At the end of the 3- to 5-year proposed operation period, the impacts to employment, earnings, and industrial output would be similar to those under Alternative A.

Alternative C

Under Alternative C, there would be a gain of 25 jobs and a 32 percent and 33 percent increase in earnings and industrial output associated directly with the quarry, respectively. These increases would be realized over the duration of the proposed operations (up to 30 years).

Alternative D

Under Alternative D, there would be a gain of 37 jobs and a 48 percent and 50 percent increase in earnings and industrial output associated directly with the quarry, respectively. These increases would be realized over the duration of the proposed operations (up to 40 years).

Total Economic Effects

This section addresses the economics of jobs that are both directly and indirectly associated with the quarry (community level economics). Jobs that are indirectly associated with mining operations fall into the following sectors: agriculture, mining, construction, manufacturing, TCU (transportation, communication, and utilities), trade, FIRE (finance, insurance, and real estate), services, and governments. The services sector includes social services, education outside of the school, child care, personal services, businesses such as phone and internet, motels, eating establishments, etc. The trade sector includes wholesale and retail such as grocery stores, sporting good stores, etc. The government sector includes taxes and public schools. The transportation sector includes trucking (for the shipping of rock), communication, and utilities, etc.

The direct economic impacts described above were entered into a community-level input-output model developed for the Challis area to determine the total economic effects to this area. The general assumptions used in the community economic model are described below and are followed by the results of this model, which are addressed by alternative in terms of employment and income impacts. Additional model detail is documented in the administrative record (Economic Model Development Process).

- Economic activity outside of the greater Challis area would not be significantly affected by change in the Three Rivers Stone Quarry operations.

- The future economic structure of the county in the study area, including the economic base, wage rates, productivity, commuting patterns, local consumption patterns, and labor markets, would be similar to the existing structure.

- Commuting patterns would be similar to current patterns.

- Future spending patterns would remain similar to current trade patterns throughout the life of the project.

- All employee earnings would stay within the Challis area (e.g., proportion of earnings sent out of the country were not incorporated in the model as accurate figures for these numbers are difficult to obtain).

Alternative A (No Action Alternative)

Under the No Action Alternative, the existing quarry would not be expanded and mining operations would cease. Some reclamation activity would continue for a few years but would not involve significant employment. Closure of the Three Rivers Stone Quarry would result in the loss of 75 jobs directly related to the quarry, and would eventually cause the loss of another 106 jobs indirectly related to the quarry, associated with the payroll and purchase of supplies for the quarry for a total of 181 jobs lost (Table 4.7-2). The majority of the jobs lost would be in mining, but the transportation sector would also show considerable impacts. Overall, the impact would be about a 12 percent change of total employment in the Challis area.

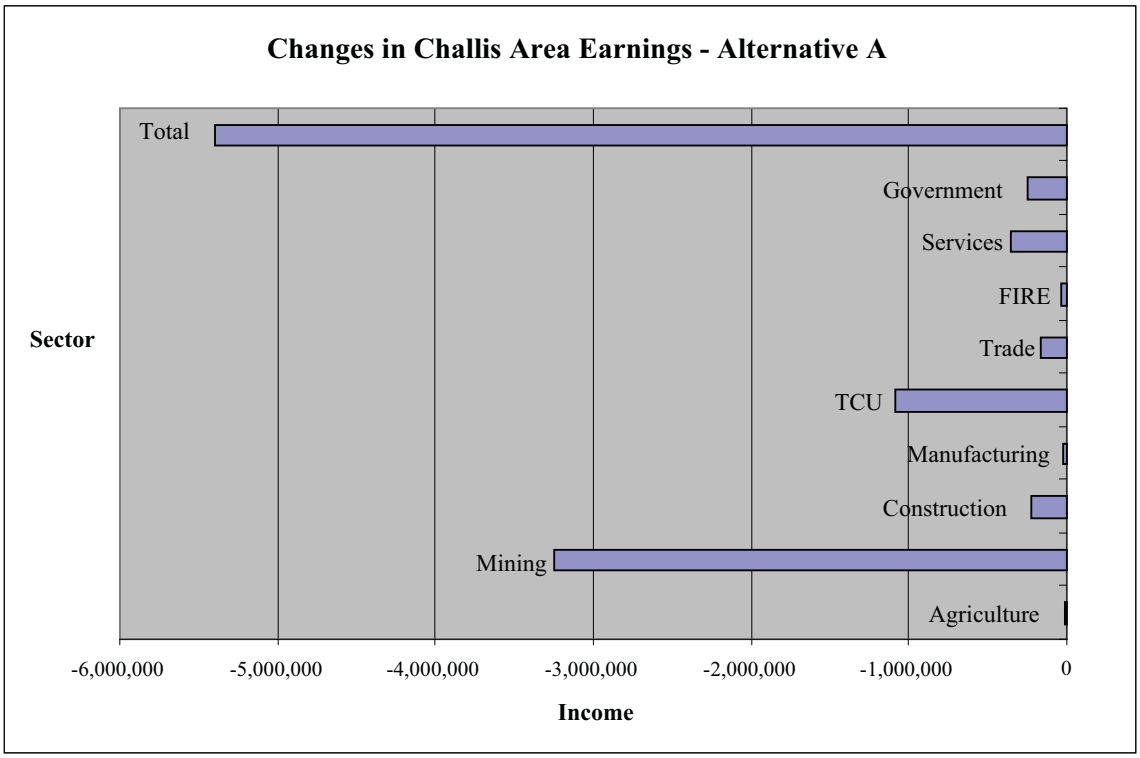
Table 4.7-2. Employment Impacts to the Challis Area Under Alternative A.

Employment Sector	Employment Impact (# Jobs Lost)	Percent Change to Challis Economy
Agriculture	1	0
Mining*	-87	-33
Construction	-7	-6
Manufacturing	-1	-11
TCU	-47	-82
Trade	-9	-5
FIRE	-2	-5
Services	-18	-3
Government	-9	-3
Total	**-181**	**-12**

*Includes 12 additional mining jobs indirectly related to the quarry, such as rock crushing; all other mining jobs are directly related to operations at the Three Rivers Stone Quarry.

Jobs at the Three-Rivers Stone Quarry are some of the highest paying jobs in the area, so the income loss would be considerable (see Figure 4.7-1). The Challis area would lose about $5.4 million in annual income if the quarry closed. The average wage rate of jobs lost would be about $30,000 per year.

Figure 4.7-1. Alternative A – Impact on Income (bars represent income loss).



Alternative B

Adoption of Alternative B would result in the continuation of current mining operations for 3 to 5 years with only limited expansion of activities. It is assumed for this analysis that the existing number of employees, earnings, and industrial output would stay the same and would not result in any changes to the Challis area economy (Table 4.7-3). The percent change in number of jobs in the Challis area related to the quarry and to the Challis economy would be zero.

Alternative B most accurately reflects current conditions at the quarry. This alternative was used as the baseline for comparing the other alternatives. Table 4.7-3 depicts the current and projected number of jobs directly and indirectly associated with the quarry, the current and projected earnings in the Challis area, and the percent change to the job numbers and economy projected under Alternative B.

Table 4.7-3. Employment and Economic Impacts to the Challis Area Under Alternative B.

Employment Sector	Current and Projected Employment (# Jobs)	Current and Projected Income in Challis Area (thousands)	Percent Change in Jobs and to the Challis Economy
Agriculture	1	$15	0
Mining*	87	$3,246	0
Construction	7	$230	0
Manufacturing	1	$27	0
TCU	47	$1,083	0
Trade	9	$162	0
FIRE	2	$36	0
Services	18	$351	0
Government	9	$243	0
Total	**181**	**$5,393**	**0**

*Includes 12 additional mining jobs indirectly related to the quarry, such as rock crushing; all other mining jobs are directly related to operations at the Three Rivers Stone Quarry.

Once the mining operations and reclamation proposed under Alternative B are completed (in 3 to 5 years), the impacts to the number of jobs and the changes to the Challis area economy would be similar to Alternative A.

Alternative C

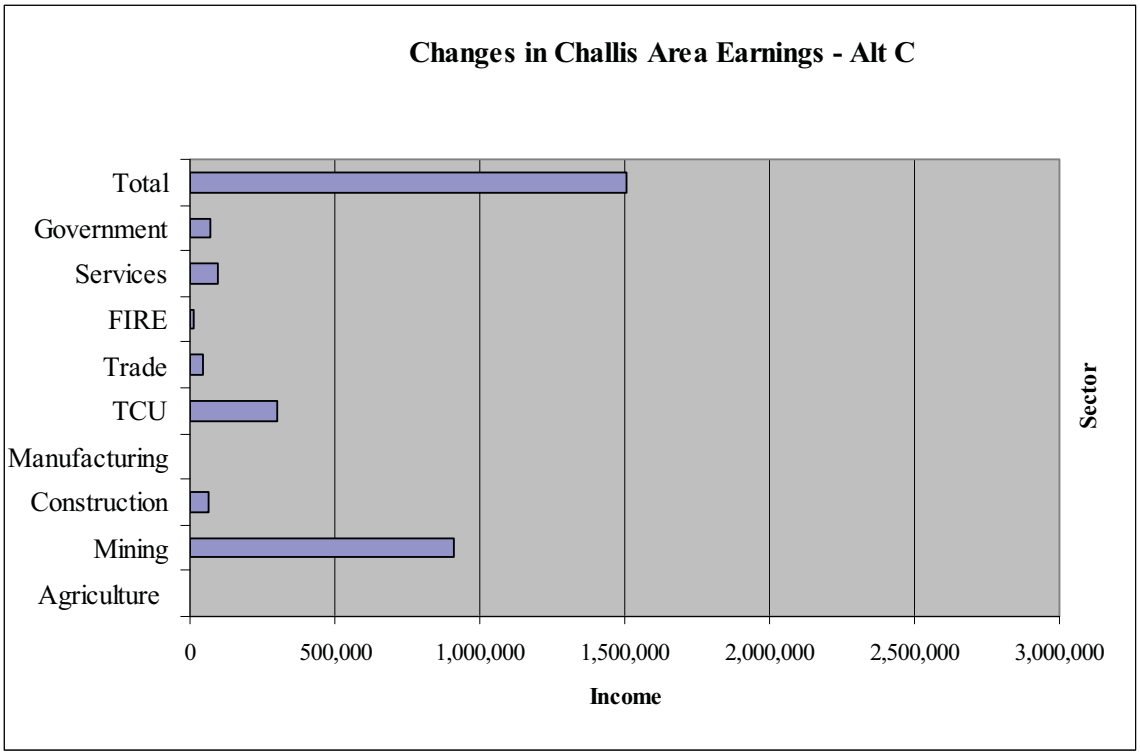
Alternative C would allow for an expansion of mining operations and would result in an increase in employment in the Challis area. Table 4.7-4 depicts the number of jobs that would be gained as a result of implementing Alternative C, total number of mining-related jobs (direct and indirect) projected for the Challis area, and the percent change to the economy in terms of all employment in the Challis area over current conditions. Expansion of the quarry would result in the gain of 25 jobs directly related to the quarry, and would eventually create an additional 26 jobs indirectly related to the quarry, for a total of 51 new jobs. This would equate to a total of 232 jobs when combined to the approximately 181 existing jobs). The impacts to the Challis area would be most evident in the mining, transportation, and service sectors, although the percent increase in new services jobs in the community would be relatively minor. Overall the project would result in about a 3 percent increase in total employment (mining- and non-mining-related) in the Challis area.

Table 4.7-4. Employment and Economic Impacts to the Challis Area Under Alternative C.

Employment Sector	Employment Impact (# Jobs Gained)	Total Jobs (Current + Projected New)	Percent Change to Challis Economy
Agriculture	0	1	0
Mining	25	112	9
Construction	2	9	2
Manufacturing	0	1	3
TCU	13	61	23
Trade	3	12	1
FIRE	0	2	1
Services	5	23	1
Government	2	11	1
Total	**51**	**232**	**3**

Most of the jobs created by the quarry expansion would be high paying jobs (mining and transportation) when compared to other jobs in the Challis area, with about half of the jobs paying $30,000 or more per year. The quarry expansion would generate about $1.5 million in new income annually to the area (Figure 4.7-2).

Figure 4.7-2. Alternative C – Impact on Income (bars represent income gain).



Alternative D

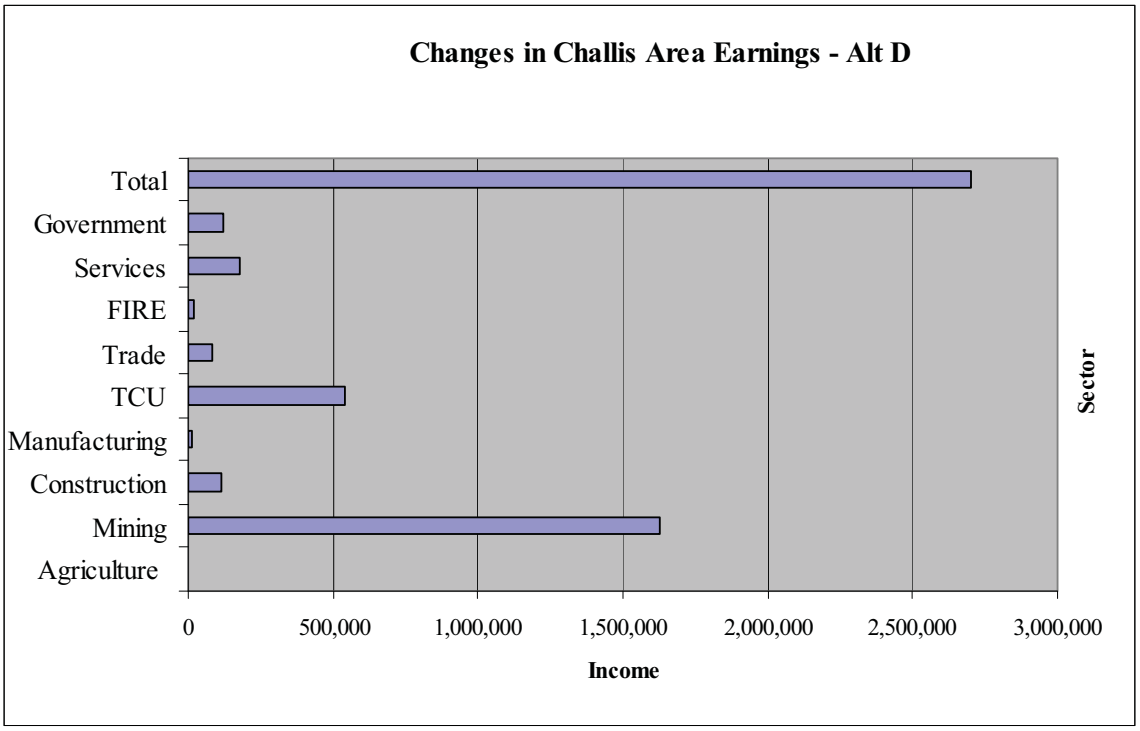
Alternative D would allow for long-term expansion of operations at the quarry. As new pits are developed, the quarry would gradually expand resulting in an increase in employment of about 49 percent over current operations. Table 4.7-5 depicts the number of jobs that would be gained as a result of implementing Alternative D, total number of mining-related jobs (direct and indirect) projected for the Challis area, and the percent change to the economy over current conditions in terms of all employment in the Challis area. Expansion of the quarry would result in the gain of 37 jobs directly related to the quarry, and would eventually create an additional 48 jobs indirectly related to the quarry, for a total of 85 new jobs. This would equate to an approximate total of 266 jobs when combined with the approximately 181 existing jobs). Most of the jobs created would be in mining, transportation and services, although the percent increase in new services jobs in the community would be relatively minor. There would also be some impacts on construction associated with building new housing for workers. The local government sector would also see some change due to the demands on schools and other community services. Overall the quarry expansion would result in about a 6 percent increase in total employment (mining- and non-mining-related) in the Challis area, as compared to the 3 percent increase estimated for Alternative C.

Table 4.7-5. Employment and Economic Impacts to the Challis Area Under Alternative D.

Employment Sector	Employment Impact (# Jobs Gained)	Total Jobs (Current + Projected New)	Percent Change to the Challis Economy
Agriculture	0	1	0
Mining	37	124	14
Construction	4	11	3
Manufacturing	1	2	6
TCU	24	71	41
Trade	5	14	3
FIRE	1	3	2
Services	9	27	2
Government	4	13	2
Total	**85**	**266**	**6**

The quarry expansion would generate about $2.7 million in new income to the area, as compared to $1.5 million under Alternative C (Figure 4.7-3). Like employment, impacts on income would also be realized primarily in the mining and transportation sectors. Income from government, services, trade, and construction jobs would also increase. The only sectors that would not see appreciable impacts from the quarry expansion are agriculture, manufacturing and financial services (FIRE).

Figure 4.7-3. Alternative D – Impact on Income (bars represent income gain).



Social Impacts

Merchants, public officials, and community leaders were interviewed in 2006 to gain insight into how the quarry and its workers affect social conditions in the Challis area. Challis is an isolated community with strong social cohesion and a strong sense of community. Most residents interviewed have lived in the community for many years and expect to retire in Challis.

Mining has a long history in the Challis area and residents who were interviewed support local mining operations. In particular, they value the good jobs and income that are provided by the mines. The 1997 closure of the Hecla Mine in Custer County had a significant impact on the community and surrounding area.

Local business leaders indicated that Three Rivers Stone Quarry workers were an important source of income for most area businesses. Merchants commented that they had modified their selection and advertisements to cater to quarry workers. Realtors indicated that the quarry had a positive impact on the market and that rental housing was difficult to find in Challis or Clayton. The quarry owners have responded to this problem by purchasing rental housing in Challis for quarry workers. Several merchants commented that they hoped

seasonal workers with Work Visas or Resident Cards would be allowed to bring their families as the quarry expanded operations.

Population

The Challis area is relatively isolated from other employment and population growth, so workers laid off at the Three Rivers Stone Quarry under Alternative A would have few options for work in the region. Most quarry workers are young and could possibly leave the area. As the full impact of the closure settled in the Challis area, a total of up to 307 people could possibly leave the area (including the families of quarry workers) due to the loss of approximately 181 jobs directly and indirectly associated with the quarry. This is based on the assumption that each job equates to approximately 1.7 residents. However, it is likely that less people would leave the area in the short-term due to the recent increase in employment opportunities at the Thompson Creek Mine. Long-term reduction in population would depend on continued employment at the Thompson Creek Mine or other unforeseen changes to the employment base in the area. The only other significant source of population and economic growth in the area that would remain would be retirement and property development, and these are not robust enough to offset the impact of the proposed quarry closure.

Under Alternative B, the rate of population growth is projected to remain the same since no new jobs would be created by the mining operations. Once the mining operations are completed under Alternative B (i.e. in 3 to 5 years), the population would likely decrease over time as under Alternative A. Long term population growth under Alternative C and D is projected to be about 87 people, and 145 people, respectively, depending upon the family size of new workers. This growth in population would result from the new jobs that would be created at and associated with the quarry and is based on the assumption that each new jobs would result in approximately 1.7 new residents.

Many of the new workers at the quarry would be young workers due to the hard physical labor involved in mine operations. Over time some would settle in the area with their families. The demographics of the new seasonal and year-round splitters are projected to stay the same as under current operations, thus there would be an increase in the number of Hispanic residents in the Challis area. Currently, about 14 percent of the splitters are year-round residents with their families. It is expected that this rate of residency for splitters would continue under all action alternatives.

Housing

The availability of housing in the Challis area, both rental and for sale, would likely increase over time under Alternative A, due to the projected decrease in population related to the loss of jobs associated with the closure of the quarry. Under Alternative B, the availability of housing is expected to remain at the current levels, with the demand for rentals exceeding the supply. Once the mining operations are completed under Alternative B (i.e. in 3 to 5 years), the availability of housing would likely increase, as under Alternative A. Demand for housing would increase under Alternative C and D due to the projected increase in population and seasonal jobs, and there would be a need for the purchase of new rental housing units, and given the low number of unoccupied homes in the Challis area, potentially for the construction of new homes.

Community Services

Due to the reduction in population projected over time for the Challis area under Alternative A, there would likely be a reduction in the number of children enrolled in the schools in Challis and Clayton. This would result in a reduction in the amount of funding that these schools would receive from the State of Idaho. Under Alternative B, the need and use of community services would be similar to current levels for up to 5 years, and then there would likely be a reduction in school enrollment and funding as under Alternative A. Under Alternative C and D, because of the projected increase in population in the Challis area and the assumption that the rate of workers bringing their families with them would stay the same as under current conditions, the number of children attending schools is expected to increase. This could potentially increase the demand for teachers and would increase the amount of school funding from the state. Currently the Challis School District has a vacant school building, so the District could house additional students. The Limited English proficiency program currently in place in the District would likely need to expand given the expected increase in Spanish speaking students. The increase in population would also increase the demand for healthcare workers and could increase the number of police incidents.

Fiscal Impacts on the City of Challis and Custer County

The four alternatives for the project were examined to estimate their potential fiscal impacts on Custer County. The estimated fiscal impacts were not significant for any of the alternatives.

Property taxes would not be impacted by mining operations on BLM land, because BLM land is not subject to property taxes. No off-site improvements are planned for the quarry.

The quarry has direct access to State Highway 75, so the quarry would not incur costs to local road maintenance districts.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Population and Low-income Populations," mandates that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, policies, and activities on minority populations and low-income populations," (Federal Order 12898, 2/11/94). Evidence shows that areas of low income or minority populations suffer a disproportionate risk of succumbing to adverse environmental conditions in their community. Some examples of this problem include toxic waste facilities, garbage disposal areas, or unmonitored factory dumping in impoverished, ethnic areas. In order to protect the rights and health of these populations, this Executive Order establishes, within the NEPA framework, a system to analyze the demographics of a proposed location.

Before a policy or proposal is instated, the proposed area must be checked to see whether it will disproportionately affect minority or low-income populations. The standards used to analyze a given location are as follows: if the demographics of a proposed location show a minority or low-income population greater than two times that of the state average, then that area is considered one of potential environmental injustice. If the demographics of a proposed location show a minority or low-income population greater, but not two times greater, than the state average and there are community-identified environmental justice related issues, the case should be identified and addressed as a potential environmental justice case. If the demographics of a proposed location demonstrate minority or low-income populations is equal to or less than that of the state average, then the area is not considered a potential for environmental injustice and there is no reason to disregard the proposal due to ethnic or financial discrimination.

The demographic and income data for Custer County and Idaho State are described below. Based on these data, the Proposed Project would not result in the potential for environmental injustice. Although the low-income population in Custer County is greater than the state average, there have been no community-identified environmental justice related issues associated with this project. Although the minority population in Custer County is less than the state average, a large proportion of the people employed by L&W Stone Corporation at the quarry (primarily the seasonal workers) are minorities, and gain financially and socially by the mining operations.

Custer County

Tables 4.7-6 and 4.7-7 compare the ethnic demographics and poverty levels for Custer County to the Idaho State averages. These tables show that Custer County demonstrates ethnic populations less than that of the state average, and low-income population (below poverty level) greater, but not two times greater, than the state average. The percent of minority populations in Custer County is 6.2 percent less than the state average. The percentage of individuals in Custer County with income in 2003 below the poverty level is 0.2 percent greater than the state average.

Table 4.7-6. Demographics for Custer County in Comparison to Idaho State Average (%).

	American Indian	African American	Asian	Hispanic	Two or more races	Total Minority
Custer County	0.6	0.0	0.0	5.9	0.6	7.1
Idaho State	1.4	0.6	1.0	8.9	1.3	13.3

(U.S. Census Bureau, 2006b)

Table 4.7-7. Poverty Levels for Custer County in Comparison to Idaho Average.

Region	% Individuals Below Poverty Level
Custer County	12.0
Idaho State	11.8

(U.S. Census Bureau 2006b)

4.7.4 Visual Resources

Past and current operations at the Three Rivers Stone Quarry have created changes to the landscape that are visible to varying degrees, depending upon the perspective, to users of the area. The visual resource analysis was conducted from the six Key Observation Points (KOPs) described in Chapter 3, Section 3.3.4 of this EIS. Depending on the alternative selected, additional changes to the landscape would occur and would be visible from these KOPs. The KOPs attempt to characterize the landscape from areas where the landscape is frequently visible by travelers, recreationists, residents, and other users of the area. Contrasts that are not visible from any of the KOPs would only be viewed by mine personnel and the occasional recreationist, such as a cross country hiker, hunter, or horseback rider. Therefore, visual contrasts arising from proposed actions that would not be visible from the six KOPs are not discussed in this analysis.

Impacts in this visual resources analysis are described as short-term or long-term and direct or indirect. Short-term visual impacts are those that would be visible for up to 5 years following the origin of impact. Long-term impacts would be visible 10 years after the origin of impact. Direct visual impacts are visible at the same time and location where the activity that caused the impact occurred. Indirect visual impacts become visible in areas or at times removed from the origin of the impact.

The analysis of visual impacts is based on the Visual Resource Management (VRM) system outlined in the Visual Resources Section 3.3.4. Visual impacts are described in terms of form, line, color, and texture. The analysis also considers perspective, line-of-sight obstructions, and observer activity based on the various land uses of the surrounding area. The photographs presented in Section 3.3.4, depict past visual impacts associated with mining operations at the quarry site. The visual simulations presented in Appendix C depict what the landscape would look like after the quarry expansion is completed and site reclaimed. These simulations represent how the Proposed Project Area would look under Alternative D and represent the "worst case scenario" in terms of potential visual impacts. A combination of the photographs, visual simulations, and site visits were used as the basis for this analysis.

The impact analysis describes increases or decreases in visual contrasts in terms of form, line, color, and texture. Some project actions would increase visual contrasts and other project actions would reduce visual contrasts. The analysis describes degrees of contrasts using criteria outlined in BLM Manual 8431; descriptive terms used include none, weak, moderate, and strong. Where elements of the proposed project would not be visible or perceived, there would be no impact. A weak degree of contrast would be seen but would not attract attention. A moderate degree of contrast would begin to attract attention and would begin to dominate the characteristic landscape. A strong degree of contrast would demand attention, would not be overlooked, and would be dominant in the landscape.

Existing Conditions versus Environmental Baseline Conditions for Visual Resources

The existing conditions represented in Section 3.3.4 from KOP 1 through KOP 6 (Figures 3.3-7 through 3.3-12) would typically be used as environmental baseline conditions for the assessment of visual impacts. An exception has been made for this EIS due to activities that have occurred at the quarry site in the recent past. This distinction becomes necessary because site conditions in 1992 represent the most recent level of disturbance analyzed under NEPA by the BLM. Visual impacts that have occurred at the site between 1992 and 2005 (Figures 3.3-1 through 3.3-5, Chapter 3) have not been formally analyzed. This analysis

attempts to analyze those impacts that have occurred at the quarry site since the last BLM-approved level of disturbance.

Alternative A (No Action Alternative)

Direct Impacts

Direct visual impacts to visual resources would occur as a result of reclamation activities for approximately 2 years. Reclamation activities would result in moderate visual contrasts over the short-term and weaker visual contrasts over the long-term as equipment is removed and reclamation projects have time to take effect. Various degrees of visual contrast would be evident at the Proposed Project Area from perspectives associated with KOPs 1, 2, 3, and 6. A return to visual baseline conditions is impossible now due to permanent alterations to the landscape.

Administrative Area and Mining Roads

Surface disturbance at the administrative area and on the main mine access road (Figure 2.1-1) would increase over the short-term as reclamation activities are implemented. The increase in contrasts of line and texture at the administrative area would be moderate over the short-term when viewed from KOP 6 and weak when viewed from KOP 1 and 2. The areas would be roughened in order to prepare a seedbed. The texture would become coarser and line contrast could become increased along margins of the reclaimed areas adjacent to existing plant communities. Long-term visual contrast in line and texture at the administrative area and mining roads would eventually become weak as vegetation becomes established. Seeded vegetation could begin to resemble adjacent plant communities after approximately five growing seasons (specifically grasses and forbs) but sagebrush would not be completely established for at least ten years (Monsen 2000). Contrasts at the administrative site would be visible only from KOP 6. Contrasts associated with mining roads would be visible from KOP 1, KOP 2, and KOP 6 but would not be visible from other perspectives due to line-of-sight obstructions.

The appearance of heavy equipment used during reclamation activities would create moderate contrasts in the shape of certain forms on the landscape when viewed from KOP 6 over the short-term and weak contrasts when viewed from KOP 1 and KOP 2. Reclamation equipment would increase the appearance of regular standard geometric figures (e.g. squares, circles, cubes) in a landscape dominated by complex irregular geometric forms under baseline conditions. Over the long-term heavy equipment would be removed and there would be no direct visual contrasts associated with them.

Pit 1

The removal of mineral material at Pit 1 since 1992 has altered the appearance of landscape form, texture, line, and color. The reduction in dimensional mass of Pit 1 has altered the shape of the area from a shallow concave depression with scattered irregular rock outcrops to a deep slot-cut with angular, smooth textured rock features (Figures 3.3-1 through 3.3-3). The rock faces on either side of the slot cut are referred to in Figure 2.3-1 as the footwall and highwall. The smooth texture of the Pit 1 highwall and footwall promote increased color and texture contrasts by being more reflective than the more rugged rock outcrops that once appeared on this landscape. Recently exposed mineral materials display lighter hues of the browns and grays than the darker, more weathered rock outcrops and talus of the vicinity. The increased degree of visual contrasts at Pit 1 depends on proximity, perspective, and reclamation. Contrasts at Pit 1 would continue to be visible from KOPs 1, 2, 3, and 6. The increase in form, color, and texture contrast over the short-term would be strong when viewed from KOP 6, moderate when viewed from KOP 2, and weak when viewed from KOP 1 and KOP 3. Reclamation at Pit 1 would partially diminish some color and texture contrasts over the long-term. Coloring the highwall and footwall of Pit 1 could reduce the appearance of smooth-textured rock faces and reflectivity at Pit 1. If rock coloring is effective at reducing color and texture contrasts, the long-term contrasts at Pit 1 would move from strong to moderate at KOP 6, from weak to none at KOP 3, and from moderate to weak at KOP 1 and KOP 2.

Pit 2

None of the visual contrasts at Pit 2 would be visible from any of the KOPs due to perspective and line-of-sight obstructions.

Waste Rock Storage Areas

Reclamation associated with the Pit 1 rock storage area would increase the appearance of talus slopes over the long-term. Mineral material accumulation at the Pit 1 rock storage area since 1992 has resulted in a noticeable alteration of form in the localized landscape. The existing volume of rock piles would result in localized areas of short-term visual contrasts in the form, texture, and color elements of the landscape. Long-term contrasts from the Pit 1 rock storage area would be partially diminished as a result of reclamation activities. For example, contouring of the talus would diminish contrasts in landscape form and line while rock coloring could diminish some color contrasts over the long-term. However, long-term visual contrasts at the Pit 1 rock pile would persist from the increased amounts of talus, greater dimensional mass of the hillside, and the burial and removal of vegetation. The Pit 1 rock pile would become a more prominent feature of the landscape than it was under baseline

conditions because talus slopes are more complex features than the surrounding shrub-steppe vegetation. The long-term increase in visual contrast at the Pit 1 rock storage area would depend on perspective and proximity. Until reclamation was complete, the short-term increase in form and texture contrasts would be strong when viewed from KOP 6 and moderate from KOP 1 and KOP 2. Upon completion of reclamation, form and texture contrasts from KOP 6 would be diminished from strong to moderate, while these contrasts from KOP 1 and KOP 2 would be diminished from moderate to weak. These contrasts would not be visible from perspectives associated with KOPs 3, 4, and 5.

None of the visual contrasts at the Pit 2 rock storage area would be visible from any of the KOPs due to perspective and line-of-sight obstructions.

Indirect Impacts

Indirect visual impacts from reclamation would include the appearance of heavy equipment along SH-75 (The Salmon River Scenic Byway) as traffic moved into and out of the reclamation site. Traffic on the highway would result in a weak increase in visual contrast over the short-term. These contrasts are expected to cease after the 2-year reclamation period.

Dust plumes from reclamation activities would continue to temporarily and partially obscure views of the landscape in the vicinity of the quarry site during periods of high winds. Visual contrasts arising from fugitive dust would generally be of short duration but would ultimately depend on the duration of the corresponding wind event. Dust would occasionally be visible over the short-term from up to 2 miles away depending on wind direction, aspect, and line-of-site. Indirect visual impacts from dust would be visible most often from the north and east of the project site, a result of the northwesterly wind pattern. Short-term contrasts from dust would occasionally be moderate from KOPs 2 and 6, and weak from KOPs 1, 3, 4, and 5. The appearance of dust originating from the quarry site would decrease incrementally over the long-term as reclamation activity is reduced and vegetation becomes established in disturbed areas. Long-term contrast from fugitive dust would be weak and is expected to return to baseline levels after all seeded vegetation becomes completely established (i.e., at least 10 years after planting). Dust suppression techniques would diminish the potential for dust to obscure the landscape for extended periods.

Implementation of the proposed weed management program would help achieve a return of naturalness at the quarry site by preventing establishment of vegetation that could otherwise contrast with the surrounding plant communities and limit the growth and vigor of new seedlings.

Summary

In summary, reclamation would diminish some visual contrasts relative to existing conditions and some contrast would persist long-term. Certain portions of the quarry site (i.e. Pit 1 footwall and Pit 1 waste rock storage) would continue to present moderate to weak increases of texture, form, and line contrasts over the long-term despite reclamation efforts. Meanwhile, reclamation would eliminate visual contrasts on other portions of the quarry. The mining roads and administration staging area, for example, would blend with the surrounding landscape resulting in weak or no visual contrast after successful reclamation. Short-term visual contrasts in landscape form, color, texture, and line at Pit 1 and the Pit 1 rock storage area would be strong. Reclamation would diminish some of these visual contrasts over the long-term. For example, contouring of the talus slope at the Pit 1 rock storage area would reduce the degree of visual contrast in form and line features. Rock coloring at Pit 1 and at the Pit 1 rock storage area could diminish the degree of visual contrast in the element of color. Long-term visual contrasts would move from strong to moderate at KOP 6, from weak to none at KOP 3, and from moderate to weak at KOP 1 and KOP 2. Reclamation would diminish visual contrasts at the quarry site, and the site would begin to match the surrounding landscape after approximately 5 years.

Alternative A, over the short-term, would meet VRM Class II objectives when viewed from KOP 1, KOP 3, KOP 4, and KOP 5 but would not meet those objectives when viewed from KOP 2 and KOP 6. Upon completion of reclamation, Alternative A would meet VRM Class II objectives from all KOPs.

Alternative B

Direct Impacts

Direct visual contrasts under Alternative B would be similar to those described under Alternative A but would be greater in duration because mining operations would continue for 3 to 5 years. Short-term visual contrasts at the quarry would continue as portrayed in the photographs of existing conditions (Figures 3.3-7 through 3.3-13). Reclamation would occur during and following completion of specific mining operations and would be completed after approximately 5 years. As with Alternative A, reclaimed vegetation could begin to resemble adjacent plant communities approximately five growing seasons after seeding (specifically grasses and forbs), but shrubs would not be completely established for at least 10 years from the seeding date (Monsen 2000).

Administrative Area

Structures (e.g. trailers and storage facilities) and equipment during the operational period would continue to increase form and color contrasts from the appearance of regular standard geometrical figures (e.g. squares, circles, cubes) relative to baseline conditions. Of the six KOPs analyzed, direct visual impacts at the administration area would be visible only from KOP 6. Items visible would include personal vehicles, industrial vehicles, mining equipment, pallets, trailers, storage facilities, tents (if assembled), an electrical transmission line, power poles, and flagstone material. Features and activities at the administration area would result in strong visual contrasts in the color and form elements of the landscape when viewed from KOP 6 over the short-term and the area would appear as an industrial site during the operational period with a corresponding reduction in naturalness. Most motorists traveling past KOP 6 would have view durations of approximately 30 seconds based on average rates of travel along SH-75. Motorists traveling from north to south would have a greater likelihood of experiencing contrasts at the administrative area than those traveling from south to north due to perspective. Visual impacts associated with reclamation in the administration area would be the same as those described under Alternative A.

Pit 1

The visual contrasts that have occurred at Pit 1 since 1992 are the same as those discussed under Alternative A. However, Pit 1 would continue to operate under this alternative, so the reduction of color and texture contrasts that results from reclamation would occur 5 years later than under Alternative A. Visual contrast at Pit 1 would increase over the short-term from the appearance of heavy equipment, structures, workers, removal of mineral material, and surface disturbance. There would be an increase in form contrasts visible at the footwall of Pit 1 relative to Alternative A because more mineral material would be removed there. Meanwhile, color and texture contrasts associated with the highwall from KOP 3 would decrease relative to Alternative A because mining activities would reduce the height of that feature, making its smooth reflective face less visible. The short-term increase in form, texture, and color contrasts at Pit 1 would be strong when viewed from KOP 6 and moderate when viewed from KOP 1 and KOP 2. Reclamation activities at Pit 1, such as coloring the highwall and footwall, would partially diminish visual contrasts over the long-term for the same reasons discussed under Alternative A. Contrast at Pit 1 would move from strong to moderate at KOP 6 and moderate to weak from KOP 1 and KOP 2.

Pit 2

Visual contrasts associated with Pit 2 would not be visible from any of the KOPs.

Waste Rock Storage Areas

The Pit 1 waste rock storage area would present observers with contrasts in landscape form, texture, and color as material accumulated there. The benches of the Pit 1 waste rock storage area would reduce the naturalness of the area because the terraced benches would create regular horizontal lines in the upland landscape where irregular vertical lines often dominate. The area would also present alterations in landscape color and texture, relative to 1992 conditions, as vegetated areas that appeared as fine textured browns and greens have since become covered by rock resulting in coarse slopes of darker browns. The short-term increase in form and color contrasts would be strong when viewed from KOP 6 and moderate when viewed from KOP 1 and KOP 2. Reclamation would diminish some of the contrasts of the Pit 1 rock storage pile for the same reasons discussed under Alternative A. After reclamation, long-term form and color contrast at KOP 6 could be diminished from strong to moderate, while contrasts at KOP 1 and KOP 2 could move from moderate to weak. Contrast at KOP 3 would be weak. The Pit 2 rock storage area would not be visible from any of the KOPs due to line-of-sight obstructions.

Mining Roads

Mining roads would continue to present observers with localized areas of moderate visual contrast. The movement of vehicles along these roads during mine operation would occasionally draw the attention of casual observers. These contrasts would be moderate when viewed from KOP 6, and weak when viewed from KOP 1 and KOP 2 during the operational period of the quarry (3 to 5 years). These contrasts would begin to diminish after reclamation. Long-term visual impacts from reclamation of mining roads would be the same as those described for Alternative A.

Indirect Impacts

Vehicle traffic along SH-75 would continue at its current rate from the hauling of flagstone from the quarry and workers commuting to and from the quarry, as described in Section 4.7.5 below. This traffic would result in a weak increase in visual contrasts along the highway as the appearance of trucks and personal vehicles would be increased (primarily between the quarry and Challis and Challis and Arco) relative to 1992 conditions for 3 to 5 years.

The visual contrasts from fugitive dust plumes would be similar to those described under Alternative A, but dust would temporarily and partially obscure views of the landscape over a longer operational time period. Increased contrasts from dust could result in temporary but recurring moderate visual contrasts from KOPs 2 and 6, and weak visual contrasts from KOPs 1, 3, 4, and 5. Fugitive dust would begin to subside at the site as vegetation on

reclaimed areas becomes established on bare soils. This would take up to 5 years longer than under Alternative A, due to the 3 to 5-year operational period. Dust would generally be visible from up to 2 miles away from the quarry site depending on wind direction. Ongoing dust suppression efforts would diminish the potential for dust to obscure the landscape for extended periods.

Summary

In summary, visual contrasts at the quarry site would be similar to those discussed under Alternative A but operational impacts would continue for up to 5 years resulting in a prolonged duration of visual contrasts arising from land form alteration, vehicles, structures, and surface disturbance at the site relative to Alternative A. Increased contrast in landscape form and texture would be strong when viewed from KOP 6, and moderate when viewed from KOP 1 and 2. Reclamation would partially diminish the degree of short-term contrasts at the site for the same reasons as those discussed under Alternative A but alterations in landscape form would be visible at Pit 1 and the Pit 1 rock storage area over the long-term. Long-term visual contrasts at the site could move from strong to moderate when viewed from KOP 6 and moderate to weak when viewed from KOP 1 and 2. Direct visual contrasts would not be visible from the perspectives of KOPs 3, 4, or 5. After 5 years of operation plus 2 years of post-operational reclamation, visual contrasts would diminish and prominent features at the site could begin to match the surrounding landscape after approximately 10 years.

Alternative B, over the short-term, would meet VRM Class II objectives when viewed from KOPs 1, 3, 4, and 5 but would not meet those objectives when viewed from KOP 2 and KOP 6. Upon completion of reclamation, Alternative B would meet VRM Class II objectives from all KOPs.

Alternative C

Direct Impacts

Administrative Area

The visual contrasts associated with the administrative area would be similar in nature but greater in duration than those described under Alternative B. Operational contrasts would be visible for up to 27 years longer than those described under Alternative B and there would be some increased visual contrasts from grading and stormwater management activities. Grading the administrative area and constructing a stormwater detention pond, in addition to the structures and vehicles present at the site would result in a strong increase in the form, color, and texture elements of the landscape over the long-term when viewed from KOP 6.

The area would not be visible from any other KOPs considered in this analysis. Visual impacts associated with reclamation of the administration area would be the same as those described under Alternative A.

Pit 1

Direct visual contrasts from mining activity at Pit 1 would be similar but more extensive than those described under Alternative B. Pit 1 would extend to the north into what is now the Pit 1 rock storage area. Surface disturbance and removal of mineral material would reduce the dimensional mass and complexity of the landscape over the long-term. The footwall along the northwest portion of Pit 1 would become smooth and angular under this alternative. However, there would be less contrast in color and texture relative to Alternatives A and B from KOP 3 because the highwall feature would be leveled (see Appendix C, Figures 5 through 8). Leveling the highwall would decrease landform complexity from perspectives associated with KOPs 1, 2, 4, and 6 because the vertical highwall feature would become flatter. In place of the highwall, more background landscape would be visible (Appendix C, Figures 9 and 10). The floor of Pit 1 would become deeper relative to Alternative B but the pit floor would not be visible from any of the KOPs due to line-of-sight obstructions. The degree of contrasts would depend on proximity and perspective. The removal of mineral material at Pit 1 would strongly increase land form and texture contrasts over the long-term when viewed from KOP 6. These contrasts would be moderate when viewed from KOP 1 and KOP 2, but weak when viewed from KOP 4. There would be no contrast visible from KOP 3 and KOP 5. The visual contrasts from reclamation at Pit 1 would be the same as those described under Alternative A. Coloring of the footwall, if applied, could diminish color and texture contrasts for the same reasons as those discussed under Alternative A.

Pit 2

There would be no direct visual contrasts visible at any of the KOPs from the operations at Pit 2 due to line-of-sight obstructions.

Waste Rock Storage Areas

Visual contrasts at the Pit 1 waste rock storage area would be similar to those described under Alternative B. Operational impacts could be visible over the long-term under this alternative if reclamation is not employed within 10 years. Some of the waste rock present at the Pit 1 waste rock storage area would be moved to the Pit 2 waste rock storage area, reducing the appearance of talus near Pit 1. Although there would be reduced talus at the Pit 1 waste rock storage area, visual contrasts would not necessarily be reduced there because mining activity and surface disturbance would occur where the transferred waste rock once

rested. Form, texture, and color contrasts at the Pit 1 waste rock storage area would be strong over the long-term when viewed from KOP 6, while these contrasts would be moderate when viewed from KOP 1 and KOP 2. Reclamation would diminish visual contrasts at KOP 6 from strong to moderate, while contrasts from KOP 1 and 2 would be diminished from moderate to weak. These contrasts would not be visible from perspectives associated with KOP 3, KOP 4, and KOP 5 due to line-of-sight obstructions.

Visual impacts associated with the Pit 2 waste rock storage area would be the same as those described under Alternative B. Although the Pit 2 waste rock storage area would be expanded under this alternative relative to Alternative B, the expansion area would not be visible from any of the KOPs due to line-of-sight obstructions.

Mining Roads

Visual contrasts associated with mining roads would be similar to those described under Alternative B except that operational impacts would appear on the landscape for up to 27 additional years due to an increased operational period. The degree and extent of visual contrast from mining roads under this alternative would be the same as Alternative B, but the duration of those contrasts would be greater under this alternative. Reclamation would diminish contrasts associated with the main mine access road for the same reasons discussed under Alternative A.

Exploration

The area proposed for exploration would not be visible from any of the KOPs. However, there could be a weak increase in form and color contrasts associated with equipment in this area that could be visible from KOP 4, depending on the height of the equipment used for exploration. A drill rig for example, could potentially draw the attention of the casual observer from KOP 4, particularly if there was movement associated with the equipment. Direct visual contrasts at the exploration area would be short-term if exploration activities were complete within 5 years or long-term if exploration activities occurred beyond the 10-year time frame.

Indirect Impacts

Some indirect visual contrasts would be greater under Alternative C relative to Alternative A or Alternative B due to the proposed expansion of and increased duration of operations in the quarry. Indirect visual contrasts would result during the mining process from vehicle traffic and dust.

The appearance of traffic along SH-75 would increase, as described in Section 4.7.5 below, from the hauling of flagstone from the quarry and workers commuting to and from the quarry, resulting in similar but greater visual contrasts over a longer time period. This would increase the appearance of trucks and personal vehicles on the highway (primarily between the quarry and Challis and Challis and Arco) relative to 1992 conditions for up to 30 years.

Although the amount of dust generated during daily and annual operations under Alternative C would be potentially greater than under Alternatives A and B, the appearance of dust and level of associated visual contrast would be similar. However, the potential for dust to obscure views of the landscape would be extended under this alternative relative to Alternatives A and B due to the proposed increase in operational period. Concurrent reclamation activities would reduce the amount of fugitive dust associated with wind-exposed bare ground and dust suppression efforts would diminish the potential for dust to obscure the landscape for extended intervals. Visual contrasts from dust would occasionally be moderate from KOPs 2 and 6, and weak from KOPs 1, 3, 4, and 5. Dust plumes would occur for short intervals, primarily during the dry season (June-September) for up to 30 years. Increased dust would temporarily be visible during high wind events from up to 2 miles away from the quarry.

Summary

In summary, visual contrasts at the KOPs would depend on perspective and the stage of operations/reclamation at the quarry. There would be a strong increase in landscape form, color, and texture contrasts visible from KOP 6 until reclamation was complete. These contrasts would be moderate when viewed from KOP 1 and KOP 2. Reclamation activities would diminish some of the contrasts visible from KOPs 1, 2, and 6. For example, contrast in landscape line, form, and color would be partially diminished as the remaining rock at the Pit 1 waste rock storage area was contoured to match the topography of the existing landscape and colored, or modified in another BLM-approved manner, to better resemble the weathered talus of the region. Direct contrasts would be weak when viewed from KOP 3 moving to none once the Pit 1 highwall became reduced in height and exploration activities ceased. There would be a long-term weak increase in landscape form contrast at KOP 4 from leveling of the Pit 1 highwall. There would be no direct contrast visible from KOP 5 but indirect impacts would occasionally cause weak contrasts there over the long-term. After reclamation was successfully completed, some contrasts would be partially diminished. Contrasts in landscape color and texture could move from strong to moderate at KOP 6, and from moderate to weak at KOP 1 and KOP 2, but alterations in landscape form would be visible at Pit 1 and the Pit 1 waste rock storage area over the long-term. Some reclamation at the site would be concurrent with operations and would diminish contrasts once completed.

The quarry site would begin to match the surrounding landscape after approximately 35 years.

Alternative C, over the short-term, would meet VRM Class II objectives when viewed from KOPs 1, 3, 4, and 5 but would not meet those objectives when viewed from KOP 2 and KOP 6. Upon completion of reclamation, Alternative C would meet VRM Class II objectives from all KOPs.

Alternative D

Direct Impacts

Administrative Area

Visual contrasts associated with the administrative area would be similar to those described under Alternative C in terms of type and extent but would be greater in terms of duration due to the increased operational period (40 years) proposed under this alternative. Long-term form and color contrasts from KOP 6 would continue to be strong for up to 40 years and would begin declining once equipment is removed and reclamation is implemented. Visual contrasts from reclamation of the administration area would be the same as those described under Alternative A.

Pit 1

Direct visual contrasts from mining activity at Pit 1 would be the same as those described under Alternative C in terms of type and extent but could be greater in terms of duration due to the increased operational period proposed under this alternative.

Pit 2 and Pit 2-E

Visual contrasts associated with Pit 2 would not be visible from any of the KOPs, as under Alternatives A, B, and C. However, direct visual contrasts from the operation of the Pit 2 expansion area (Pit 2-E) would occur because contrasts in the form, color, and texture at Pit 2-E would be visible from KOP 6 and KOP 2. Specifically, the rock outcrop knob that appears on the horizon from these perspectives would be reduced in height and eventually removed as mining activity progressed, (see Appendix C, Figures 5 and 6). Surface disturbance near the top of the knob would moderately increase color and texture when viewed from KOP 6 and KOP 2 because the knob would display lighter hues of browns and grays as weathered mineral materials were removed. After reclamation, contrasts in color would be diminished but there would be a localized reduction in landscape complexity, as the rocky outcrop would become level and the horizon would become partially smoothed.

Landscape texture at the rocky outcrop knob would be altered from coarse to fine and shadows would be less apparent. There would also be a weak increase in horizontally trending lines where the rock outcrop once stood and a weak increase in texture and color contrasts when viewed from KOP 6 and KOP 2 over the long-term. Contrasts at Pit 2 would not be visible from KOPs 1, 3, 4, or 5.

Pit 3

Direct visual impacts from mining activity at Pit 3 would not be visible from any of the KOPs due to line-of-sight obstructions. However, there could be weak contrasts in form visible from KOP 4 depending on the height of equipment used for mining operations. For example, a drill rig may temporarily increase contrasts, particularly if there was movement associated with the equipment.

Waste Rock Storage Areas

Direct visual contrasts at the Pit 1 waste rock storage area during operations and after reclamation would be the same as those described under Alternative C. Reclamation would be concurrent with operations under Alternative D, so reclamation of the Pit 1 waste rock storage area would occur under the same schedule as Alternative C. Visual impacts at the Pit 2 waste rock storage area would not be visible from any of the KOPs due to line-of-sight obstructions.

Exploration

Although the exploration area would be smaller under Alternative D, visual contrasts associated with the exploration area would be the same as those described under Alternative C. Surface disturbance would not be visible from any of the KOPs. Equipment of a certain height would occasionally be visible from KOP 4, resulting in a weak increase in form, and possibly color contrast.

Mining Roads

Visual contrasts associated with mining roads would be similar to those described under Alternative B but duration of those impacts would be greater under this alternative. The degree and extent of visual contrast from mining roads under this alternative would be the same as Alternative B, but the main mine access road would not be reclaimed for 40 years.

Indirect Impacts

Some indirect visual contrasts would be greatest under Alternative D relative to the other alternatives due to the proposed increased expansion of and duration of operations in the quarry. Indirect visual contrasts would result during the mining process from vehicle traffic and dust.

Although the amount of dust generated during daily and annual operations under Alternative D would be potentially greater than under the other alternatives, the appearance of dust and level of associated visual contrast would be similar. However, the duration of indirect visual contrasts from fugitive dust would be greater due to the proposed increase in operational period under this alternative. Contrasts from dust in the vicinity of the quarry site could occur for up to 40 years. Dust suppression efforts would diminish the potential for dust to obscure the landscape for extended intervals.

The appearance of traffic along SH-75 would increase for the same reasons discussed under Alternative B and C resulting in similar visual contrasts but over a longer time period. Trucks and personal vehicles on the highway (primarily between the quarry and Challis and Challis and Arco) would increase the most under this alternative.

Summary

In summary, visual contrasts at the KOPs would depend on perspective and the stage of operations at the quarry. There would be a strong increase in landscape form, color, and texture contrasts visible from KOP 6 over the long-term resulting from landform alterations at Pit 1 and Pit 2 and from activities and structures at the administrative area. These impacts would be moderate when viewed from KOP 1 and KOP 2. Reclamation activities would diminish some of the contrasts visible from KOPs 1, 2, and 6. For example, contrast in landscape form would be partially diminished as rock from the Pit 1 waste rock storage area would be used as backfill for Pit 2. Contrasts in line, form, and color would be partially diminished as the remaining rock at the Pit 1 waste rock storage area was contoured to match the topography of the existing landscape and colored, or modified in another BLM-approved manner, to better resemble the weathered talus of the region. After successful reclamation, contrasts in landscape color and texture could move from strong to moderate at KOP 6 and from moderate to weak at KOP 1. Contrasts at KOP 2 would continue to be moderate even after reclamation due to permanent alterations in landscape form. Direct contrasts in form and color from KOP 3 and KOP 4 would be weak moving to none once the Pit 1 highwall became reduced in height and exploration activities ceased. There would be no direct contrast visible from KOP 5 but indirect impacts would occasionally cause moderate to weak

contrasts there over the long-term. The major feature that would increase visual contrasts under Alternative D relative to Alternatives B and C is Pit-2E (Figure 2.7-1). Activities at Pit 2-E would reduce landscape complexity by removing a rock outcrop feature, and would increase the appearance of horizontal lines in an area where vertical lines are common. Some reclamation at the quarry site would be concurrent with operations and would diminish contrasts once completed. The quarry site would begin to match the surrounding landscape after approximately 45 years.

Alternative D, over the short-term, would meet VRM Class II objectives when viewed from KOPs 1, 3, 4, and 5 but would not meet those objectives when viewed from KOPs 2 and 6. Upon completion of reclamation, Alternative D would meet VRM Class II objectives from all KOPs.

4.7.5 Transportation, Access and Public Safety

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and all roads associated with the operations, except the power-line access road, would be ripped, recontoured to blend with the natural slope, and revegetated. The power-line access road would be reclaimed to a single-lane road for future public access, and gates, which currently limit Tribal and restrict public motorized access, would be removed. Traffic associated with mining operations on SH-75 would no longer occur, resulting in a reduction of current daily traffic on SH-75 by about 7 percent.

Alternative B

Under Alternative B, a portion of the existing power-line access road and other access roads would continue to be used and constructed, as needed, to facilitate extraction of flagstone. Access roads would be upgraded, where needed, to ensure compliance with mine safety regulations (see Chapter 2, Section 2.4.9). The roads would be adequate for quarry production, motorized access and safety. These roads would be reclaimed once no longer necessary for operations. Due to liability and safety concerns, public access to or through the site would continue to be restricted for the life of the quarry (5 years) as under the current operating plan. Members of the public, government, and private organizations (i.e. the power company) would be able to obtain access to or through the site during operating hours by check-in with quarry personnel; access would not be available during periods of non-operation. Tribal members would work directly with the BLM regarding access (see Section 4.7.2).

Alternative B is considered the baseline for traffic counts and impacts of quarry-generated traffic on SH-75 as it represents the existing mine operation (See Section 3.3.5). Under Alternative B, daily traffic associated with the mine operation accounts for approximately 10 percent of the daily vehicle use on SH-75 between the bridge over the East Fork of the Salmon River and US-93. The current 10 percent of the total daily traffic volume associated with mining activities would not be expected to result in a deterioration of safety conditions on SH-75.

Under all action alternatives, explosives would be stored safely on site in two, secure magazines set back from public roads and haul roads, and from each other, as detailed in Chapter 2, Section 2.4.4 and in Appendix B.

Alternative C

Under Alternative C, access roads would continue to be used and constructed as needed to facilitate extraction of flagstone, and several additional small, "two-track" roads would be constructed for exploration activities. The roads would be adequate for quarry production, motorized access and safety. These roads would be reclaimed once no longer necessary for operations. As under Alternative B, current public access policies initiated by Three Rivers Stone Quarry and authorized by BLM would continue to be enforced at the site, but for a longer period (up to 30 years).

Daily vehicle use associated with mining operations would increase traffic volume on SH-75 by about 3 percent over Alternative B. This increase in traffic would not result in a noticeable increase in congestion on the highway or risk to drivers.

Alternative D

Under Alternative D, access roads would continue to be used and constructed as needed to facilitate extraction of flagstone. A new road would be constructed to the south of current operations so that Pit 3 could be accessed. Additional small, "two-track" roads would be constructed for exploration activities, but the number would be lower than under Alternative C. The roads would be adequate for quarry production, motorized access and safety. Roads would be reclaimed once no longer necessary for operations. As under Alternative B and Alternative C, current public access policies would continue to be enforced at the site for the life of the mining operation, but for a longer period (up to 40 years).

Daily vehicle use associated with mining operations would increase traffic volume on SH-75 by about 5 percent over Alternative B. Impacts would be the same as described under Alternative B and Alternative C.

4.7.6 Land Uses and Private Property

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the existing Interim Mining Plan for the project site would be terminated. The power line right-of-way (ROW) agreement between BLM and Salmon River Electric Cooperative would still be maintained for access to electric power lines. Likewise, the state highway ROW agreement proximal to the Proposed Project Area would continue. Grazing would still be allowed in the project site under the terms of the current Split Hoof Allotment grazing permit, although cattle generally do not utilize forage at the site. Recreation would no longer be restricted in the quarry site by locked gates and mining operations (see Section 4.7.7). Private property rights of land owners outside of, but in the vicinity of, the current quarry site would not be altered.

Alternative B

Under Alternative B, existing mining operations would continue under the Interim Mining Plan. Access to the electric power lines in the Proposed Project Area would still be granted to the Salmon River Electric Cooperative through the ROW agreement with the BLM, and cattle grazing would still be permitted under the terms of the current 10-year grazing permit for the Split Hoof Allotment (see Section 4.7.8). The state highway ROW agreement would not be affected. Access would continue to be restricted for public safety purposes in the quarry site by locked gates (see Section 4.7.7) and land would not be available for other uses or ROW applications, with the exception of the ROW application described below.

Under all action alternatives, a ROW application for the proposed 14.4 kV transmission line would be submitted by L&W Stone to the BLM. This ROW application would be included in the proposed Plan of Operations and would be made part of the Record of Decision for this EIS.

Alternative C

Existing mining operations would be expanded under an approved Plan of Operations. Impacts under Alternative C would be similar to those described under Alternative B. However, additional areas, specifically those proposed for exploration, may have access restricted for public safety purposes.

Alternative D

Existing mining operations would be further expanded over that proposed under Alternative C by an approved Plan of Operations. Areas in the vicinity of Pit 2E and Pit 3 would become unavailable for use by the public. Additional areas in the vicinity of Pit 2E and Pit 3 and the area proposed for exploration may have access restricted for public safety purposes. Impacts to land use and private property would be the same as under Alternative C.

4.7.7 Recreation

This section addresses impacts of the Proposed Project on recreational opportunities at the quarry site and in its vicinity. Impacts to visual resources and public access are addressed in Sections 4.7.4 and 4.7.5, respectively.

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease, access gates would be removed, and the site would be reclaimed. Recreational use of the quarry site (rockhounding, hunting, and Off-Highway-Vehicle (OHV) use, etc.) would likely increase. Additional recreational activities (hiking, camping, and wildlife viewing) in the immediate project vicinity that are potentially displaced because of mining activities could resume which would enhance the recreational values of the Upper Salmon River Special Recreation Management Area (SRMA). Recreational activities along the Salmon and East Fork Salmon rivers would continue unchanged.

Alternative B

Mining activities on approximately 100 acres would continue under Alternative B (of which approximately 92 are already disturbed). Recreational use of the Proposed Project Area would continue to be restricted in the areas of operation and road access to the quarry would continue to be closed for up to 5 years. Mining operations could also discourage recreation in the near vicinity (because of noise and visual disturbance); potentially shifting such activities to a distance where mining activities would no longer affect the user's experience.

Recreational activities along the Salmon and East Fork Salmon rivers (kayaking, rafting, fishing, camping, etc.) would continue unchanged. Recreationists may occasionally hear noise that is generated from mining operations. The noise from the loudest of these operations (blasting) would be short-term and temporary and would likely be masked to some degree by the noise of the river. Noise generated from the quarry would not likely impact recreational activities on the two rivers or alter the users' experience.

Mining activities at the quarry would only result in minor impacts to the Upper Salmon River SRMA. Opportunities for river recreation and access to the river would not be affected by the actions proposed under Alternative B. However, the scenery viewed from a short stretch of the Salmon River and SH-75 would be altered by the quarry operations, as described in Section 4.7.4, and public access to the quarry site would be restricted, as described in Section 4.7.5. The objectives of the SRMA would still be met. Potential impacts to the SRMA from quarry operations would occur in an area consisting of less than 1 percent of the entire SRMA. The Proposed Project could draw additional visitors that are interested in seeing an active mining operation.

Alternative C

Impacts to recreation would be similar to those described under Alternative B, but the visual impacts would occur for a longer duration. In addition, there would be a greater portion of the quarry site that public access would be restricted to for a longer period, as described in Sections 4.7.4 and 4.7.5, respectively.

At present the Proposed Project Area and the area immediately surrounding it are primarily dark at night. Existing light is generated primarily from the lights of the few residences in the area. If mining operations were to occur at night, the addition of lights at the quarry would introduce a new element into the nighttime environment of quarry site and its vicinity. These lights could potentially alter the ambient evening light level at the East Fork Campground and be visible to travelers on SH-75.

Although the objectives of the Upper Salmon River SRMA would still be met, the scenic values would be reduced to some degree over Alternative B because of the longer duration of the proposed operations. As discussed under Alternative B, potential impacts from the quarry to the SRMA would occur in an area consisting of less than 1 percent of the entire SRMA.

Alternative D

Impacts to recreation would be similar to those described under Alternatives B and C, but would have greater visual impacts for a longer duration and a greater area of and a longer-term access restriction to the quarry site, as described in Sections 4.7.4 and 4.7.5, respectively. As under Alternative C, if mining operations occurred during the night, glare from the lights could potentially alter the ambient evening light level at the East Fork Campground and could be visible from the SH-75 travel corridor. Although the objectives of the Upper Salmon River SRMA would still be met, the scenic values of the Salmon River corridor in the vicinity of the Proposed Project Area would be reduced over Alternative B

and C because of the increase in visual impacts and longer duration of the proposed operations. However, the impacts to the scenic values would still occur in less than 1 percent of the entire SRMA.

4.7.8 Livestock Grazing

Alternative A (No Action Alternative)

Under Alternative A, mining activities would cease and the site would be reclaimed. Once vegetation becomes reestablished in reclaimed areas, there is the potential for cattle forage in the Split Hoof Allotment to increase. However, the increase in terms of animal unit months (AUMs) would be small, at around 4 to 5 AUMs. This increase in AUMs would not likely lead to use of the quarry area by cattle given the steep topography, lack of access (due to cliffs, roads, and rivers), and overall low forage productivity of the area.

Alternative B

Existing mining operations would continue under Alternative B. The amount of forage available for cattle in the Proposed Project Area and in the Split Hoof Allotment would be reduced by less than 1 AUM, based on 12 to 15 acres per AUM. The permit for the Split Hoof Allotment would be expected to be maintained by the same permittee who has mostly left the allotment ungrazed since 2000. Due to the low forage productivity of the area, it is likely that the allotment would continue to be ungrazed. No impact to livestock grazing would be expected under Alternative B.

Alternative C

Impacts under Alternative C would be similar to Alternative B. The Split Hoof Allotment would be reduced by less than 3 AUMs. This would not result in a reduction of permitted livestock numbers for the allotment. It is likely that, as described under Alternative B, the allotment would continue to be ungrazed given the current and future low availability of forage, the steep topography, and general lack of access.

Alternative D

Impacts under Alternative D would be similar to Alternative C. The Split Hoof Allotment would be reduced by less than 5 AUMs and the number of permitted livestock would not change. Otherwise, potential impacts under Alternative D would be the same as under Alternative C.

4.7.9 Special Designations

Wild and Scenic Rivers

The Challis Resource Management Plan (RMP) requires that public land uses within corridors eligible for further study for possible inclusion in the National Wild and Scenic Rivers System be managed to maintain the level of development that resulted in the river segment's tentative classifications, ensure non-degradation of outstandingly remarkable values, and maintain free-flowing characteristics. The RMP requires a plan of operations for any mineral activity exceeding casual use in these areas.

Alternative A (No Action Alternative)

Mining activity was occurring at the Three Rivers Stone Quarry at the time (1993) that the East Fork Salmon River and the Salmon River were both found eligible for further study for possible inclusion in the National Wild and Scenic Rivers System. Although the quarry has expanded since this time, the scenic, recreational, and fishery qualities enjoyed along the East Fork Salmon River, and the recreational, fishery, and geologic qualities enjoyed along the Salmon River have not changed substantially. However, mining has permanently altered the geologic features of the quarry site.

Under Alternative A, mining operations would cease and the site would be reclaimed. Following reclamation activities the Proposed Project Area would appear less altered and would mostly blend in with the surrounding landscape. The scenic, recreational, and fishery qualities of the East Fork Salmon River and the recreational, fishery, and geologic qualities of the Salmon River would not be affected under Alternative A. The free-flowing nature of the rivers would also not be affected.

Alternative B

As described in Section 3.3.9, the outstandingly remarkable values for the East Fork Salmon River are scenic, recreational, and fisheries. The quarry would not be visible from the East Fork Salmon River and recreational opportunities along the river would not change with continued mining. Degradation of these remarkable values would not result from continued mining under Alternative B. Although there could be short-term impacts to habitat for fisheries from the mining operations, as described in Section 4.6.4, degradation of fisheries would not be anticipated with continued mining. The free-flowing characteristic of the East Fork Salmon would not be affected by the mining operations under this alternative.

As described in Section 3.3.9, the outstandingly remarkable values for the Main Salmon River are recreational, fisheries, and geologic. Recreational opportunities along the river

would not change with continued mining; degradation of this remarkable value would not result with continued mining under Alternative B. Although there could be short-term impacts to habitat for fisheries from the mining operations, as described in Section 4.6.4, degradation of fisheries would not be anticipated. Even though the Proposed Project would result in alterations to geology through the removal of flagstone and waste rock, degradation of the overall geology along the Salmon River would not be anticipated with continued mining. Following reclamation activities, the quarry would appear less altered and would mostly blend in with the surrounding landscape, reducing the potential for any impacts to the geologic quality of the Salmon River. The free-flowing characteristics of the Salmon River would not be affected by the mining operations under this alternative.

Alternative C

Although mining would be expanded under Alternative C above the rates that occurred when the rivers were tentatively classified under the National Wild and Scenic Rivers System, and above the rates proposed under Alternative B, degradation of the outstandingly remarkable values of the East Fork and Salmon rivers in the vicinity of the quarry would not be anticipated. Although the scenery would be modified by the mining operations, the quarry would not be visible from the East Fork Salmon River; degradation of this remarkable value would not result. Some of the expansions would be visible from specific locations along the Salmon River for a brief period of time (Section 4.7.4). However, scenic quality is not an outstandingly remarkable value for the Main Salmon River. As under Alternative B, impacts to fisheries habitat could occur, but degradation of fisheries values for the East Fork Salmon River and Salmon River would not be anticipated with expanded mining. As under Alternative B but to a greater degree, impacts to geology would be realized through expanded mining under Alternative C, but would not result in degradation of the overall geology along the Salmon River. The free-flowing characteristics of the East Fork Salmon River and the Salmon River would not be affected.

Alternative D

Impacts under Alternative D to wild and scenic rivers would be the same as those described under Alternative C. Degradation of the outstandingly remarkable values of the East Fork Salmon River and Salmon River would not occur and the free-flowing characteristics of these rivers would not be affected.

Areas of Critical Environmental Concern/Research Natural Areas

One management decision in the RMP (USDI-BLM 1999) common to all ACECs (including the East Fork Salmon River Bench ACEC/RNA) is to develop a land use activity plan to

manage ACEC values in coordination with other resource uses and values in the ACEC, unless management would be addressed through an existing activity plan. Applicable to this management decision are the following goals and stipulations for mineral management, as stated in the RMP:

> **Goal 2:** Provide saleable and non-energy leasable minerals to meet local demand while minimizing adverse impacts to other resource values.
>
> **#4:** Mineral material disposals and non-energy mineral leasing would be allowed in ACECs when the actions are determined through the ID team and NEPA process to be consistent with maintenance of ACEC values.
>
> **Goal 3:** Maintain the availability of public lands for locatable mineral exploration and development. Minimize adverse effects of locatable mineral development activity on other resources.
>
> **#4:** ACECs would be open to locatable mineral entry, subject to approval of a plan of operations.

Alternative A (No Action Alternative)

Under Alternative A, mining operations would cease and disturbed areas would be reclaimed. However the portion of Pit 1 that overlaps the East Fork Salmon River Bench ACEC/RNA would not be reclaimed. This would result in a continued permanent alteration of this portion of the ACEC/RNA. However, this permanent alteration to the ACEC/RNA would not be expected to alter the values of the ACEC/RNA or impact the resources it was designated to protect. An appropriate buffer would be maintained during reclamation activities to prevent any rockfall into, or disturbance of, the ACEC/RNA adjacent to the quarry.

Alternative B

Under Alternative B, the southern end of Pit 1 would continue to be located in the northern end of the East Fork Salmon River Bench ACEC/RNA. This activity has not and would not compromise the cliffs that preclude livestock entry to the ACEC/RNA. The proposed operations would not expand further into the ACEC/RNA. Due to the depth of Pit 1, there would be no potential for rock fall into the ACEC/RNA from continued mining operations in Pit 1. Measures would be in place to prevent and contain potential fuel spills and associated impacts to the ACEC/RNA (see Chapter 2, Section 2.4.15). No roads would be created in the ACEC/RNA. A weed management plan would be implemented to monitor and control the

potential spread and establishment of invasive weeds from the quarry site into the ACEC/RNA (see Appendix B, BMPs).

Impacts from reclamation would be the same as those described under Alternative A.

Alternative C

Although Pit 1 would be expanded under Alternative C, it would not expand further into the ACEC/RNA. Impacts under Alternative C and measures to prevent potential impacts would be the similar to those described under Alternative B. In addition, a 50-foot buffer zone would be maintained between the proposed exploration area and the cliffs to minimize potential rockfall into the ACEC/RNA.

Alternative D

Pit 1 would be expanded under Alternative D, as under Alternative C, and a new pit, Pit 3, would be excavated adjacent to a portion of the East Fork Salmon River Bench ACEC/RNA. Since the flagstone in Pit 3 extends to the cliffs within the ACEC/RNA, a 50-foot buffer zone would be maintained between the pit and the cliffs to mitigate visual impacts. This would also serve to protect the plant communities in the ACEC/RNA from potential rockfall, although occasional rockfall in the ACEC/RNA from operations in Pit 3 could still occur. As under the other action alternatives, the potential for the spread and establishment of non-native plants in the ACEC/RNA would exist, and would be addressed under a weed management plan (see Appendix B).

Impacts from reclamation would be the same as those described under Alternative A.

4.8 CUMULATIVE EFFECTS (IMPACTS)

Cumulative impacts result when the effects of an action are added to or interact with the combined effects of all other ongoing actions in a particular place and within a particular time. While impacts can be differentiated as direct and indirect, and short-term and long-term, cumulative impacts consider the compounding effects of all actions over time and space. The cumulative impacts of an action can be viewed as the total combined effects of all activities on a particular resource, ecosystem, or human community, no matter what entity (Federal, state, or private) is taking the actions.

This cumulative impacts section provides a general description of regional influences and then discusses the cumulative impacts for each resource by alternative. A region of influence or cumulative effects analysis area is defined for each individual resource. The cumulative

impact discussion combines the regional influences (influences outside the quarry site) with the individual resource impacts (influences inside the quarry site as a result of the Proposed Project) as discussed in the previous sections of Chapter 4, Environmental Consequences.

Regional influences discussed include: mining; recreation; invasive species and noxious weeds; livestock grazing; and lands and realty actions (projects). Each discussion of cumulative impacts begins with a description of the region of influence for that resource followed by a discussion of past and current trends, as well as future anticipated trends. Past and current trends describe the current regional status of the resource being discussed, as well as noteworthy events from the past that contributed to the current situation. Future anticipated trends discuss the potential outcomes of current trends in the foreseeable future. Following the past, current and future trends section is a description of cumulative impacts for each of the alternatives. This part of the analysis addresses the region-wide affect that management proposed could have on the resource being discussed.

The time of influence for which cumulative impacts are analyzed for the Proposed Project is from 1997 to the year 2047. The year 2047 was selected as an end-point because in that year, full quarry expansion under Alternative D would be complete and the operators of the Proposed Project would need to submit a new plan of operation or stop operations and reclaim the quarry site.

4.8.1 Regional Influences

Mining and Mineral Exploration

Minerals were first discovered in Custer County in 1873, with the discovery of gold, which started a mining boom that lasted into the early 1900s. Large-scale mining (gold, silver, copper, lead, etc.) has become a part of the history for most of Idaho's mountainous regions, and many abandoned mines and associated "ghost towns" are scattered in this region. Custer County, however, has ridden the surging waves associated with the boom-and-bust nature of the industry with some operating mines still present today (Idaho Mountain Express 2005).

Several small mining claims in the vicinity of the Proposed Project Area were mined for minerals in the last half of the century, but most were closed in the 1980s and 1990s (USDI-BLM 2007). In 1967, Cyprus Minerals Corporation staked claim to hundreds of mining claims at Thompson Creek in Custer County, about 12 miles west of Clayton, Idaho. In 1981, the Thompson Creek Mine began developing a molybdenum mine, with commercial production beginning in 1983. Mining continues today in a large open pit within an overall mine footprint of approximately 2,500 acres of mixed land ownership (private and public).

Approximately 16,000 acres around the mine are covered by mining claims controlled by Thompson Creek Mining Company (USEPA 1992). The mine was Custer County's largest private employer for most of the 1980's and 1990's, and after a short period where employment was cut due to low prices of molybdenum, the mine, is once again Custer County's largest private employer. During peak operations, the mine's annual production of 15 million pounds represented 8 percent of the world molybdenum supply. Production at this mine is anticipated to continue at least through 2014, with quantities depending on market demand, and more developmental drilling is planned to explore the extent of molybdenum at the mine (Challis Messenger 2007).

A block of mining claims controlled by L&W Stone covers approximately 310 acres associated with the Three Rivers Stone Quarry. Mining for building stone/landscape rock has occurred on these claims since the late 1970s. The quarry is now one of the largest single flagstone quarries in the U.S. with its products sold in 33 cities (Challis Messenger 2003). The demand for this resource has been increasing and is expected to continue due to increases in home building.

Recreation

The natural beauty and outstanding recreation opportunities draw thousands of visitors to Idaho annually. As the U.S. and Idaho populations grow, so too does demand for outdoor recreation opportunities. In addition, changing industries and lifestyles in Idaho and the surrounding region are contributing to a shift in natural resource use and management away from traditional product-oriented industries to more amenity-based industries. Tourism is the fastest growing economic activity in Idaho, and will likely intensify over the next 5 to 10 years based on current population estimates (IDPR 2003). While outdoor recreational activities and tourism can help many rural communities diversify or supplement a reduction in historic consumptive, industrial-based activities, proactive management will be needed to minimize the social and environmental costs associated with increased non-consumptive uses. Maximizing benefits while minimizing or mitigating the costs to natural resources is vital to the sustainability and health of these communities.

The 2003-2007 Idaho Statewide Comprehensive Outdoor Recreation and Tourism Plan (SCORTP), developed under the direction of the Idaho SCORTP Task Force (IDPR 2003), ranked the relative importance of 19 issues associated with outdoor recreation. Idahoans ranked the following as their top 10 issues:

1. Protecting water quality
2. Protecting existing access to public lands

3. Protecting natural resources on public lands
4. Educating youth about natural resources and the environment
5. Controlling invasive species
6. Educating adults about natural resources and the environment
7. Providing recreation safety instruction to youth
8. Providing outdoor recreation education for youth
9. Providing access for the disabled
10. Rehabilitating outdoor recreation facilities

In addition to these issues, several key outdoor activities have increased appreciably in Idaho and are likely to continue to increase in the future (Cordell *et al.* 2004; IDPR 2003). These activities were also found to be more prevalent in Idaho and other rural states than the rest of the nation as a whole. They include, but are not limited to motorized vehicle use, hunting, and water-based recreation. A number of other activities, including non-pool swimming, canoeing, and visiting a beach or waterslide are generally associated with water-based activities and were therefore included (Cordell *et al.* 2004). According to a national study by Cordell *et al.* (2004), the Rocky Mountain Region will see a significant demand increase for water-based activities over the next several years.

The demand for OHV use has grown significantly. In 1960, when the first of the U.S. national survey was done for the Outdoor Recreation Resources Review Commission, off-road motorized recreation was not even on the "radar" as a recreational activity. However, from 1982 to 2001, OHV use became one of the fastest growing activities in the country, growing in number of participants greater than 12 years old by over 100 percent (Cordell *et al.* 2004). Based on their survey (from fall 1999 to summer 2000), an estimated 37.6 million people 16 years of age or older (17.6% of the population) had ridden or driven motor vehicles off-road at least once in the past 12 months. That number increased to an estimated 49.6 million by Fall 2003 to Spring 2004 (rising to 23.2% of the population).

Similarly, according to the 2002 SCORTP report, Idahoans participate in more wildlife-based activities than the rest of the nation, with hunting being the number one activity. Idahoans hunt big game four times as often as the national average, and hunt waterfowl nearly six times as often. Non-consumptive wildlife activities, such as viewing animals, were also higher than the national average (IDPR 2003).

Recreation activities in the vicinity of the Proposed Project Area include boating, camping, fishing, hunting, hiking, mountain biking, rock hounding, OHV use, and scenic driving. Most

recreation is concentrated along the main Salmon River and East Fork Salmon River, and SH-75 is part of the Salmon River Scenic Route.

Based on current population trends, the demand for these and other outdoor recreational activities in Custer County and surrounding regions in Idaho is likely to increase in the future. As a result, the region will need resources for biking, picnicking, walking, camping and family gatherings in coming years to meet population projections (IDPR 2003). Based on these estimates, a greater emphasis is likely to be placed on facilities development and management of recreational activities in order to reduce the overall potential impacts to natural resources and conflict between user groups.

Invasive Species and Noxious Weeds

Invasive species and noxious weeds are harmful, non-native plant species that damage our economy and environment by displacing ecologically or economically valuable native rangeland species or agricultural crops or threaten the integrity of streams and lakes. As international commerce and travel increases, so does the threat that unwanted species will arrive in Idaho or infest areas where they are not now established.

Over the years, Idaho, like all other states, has enacted statutes and created programs designed to prevent and manage a wide variety of invasive species. Often, these programs are administered in cooperation with various partners and range from monitoring site-specific populations to landscape-wide trends. The agencies involved in this important work include: Custer County Weed Department; Idaho Department of Lands; Idaho Department of Fish and Game; Idaho Transportation Department (ITD); BLM, U.S. Forest Service (USFS), Idaho Power Company; private landowners; and U.S. Department of Agriculture's Animal, Plant Health Inspection Service.

In addition, the University of Idaho colleges of Agriculture and Natural Resources and the Cooperative Extension Service play important research and educational roles. Local governments, industries and their associations, various interest groups and individuals work cooperatively in control and educational efforts. These groups often come together to develop cooperative weed management areas and the Idaho Weed Awareness Campaign.

The Idaho Strategic Plan for Managing Noxious Weeds was released in February of 1999, which created Statewide Cooperative Weed Management Areas (CWMA) that develop and integrate weed management plans. These weed management programs are responsible for identifying local and regional invasive species and noxious weed concerns and educating local landowners on treatments and government aids. Currently there are 32 successfully

functioning CWMA that cover approximately 82 percent of the state, including the area surrounding the Three Rivers Stone Quarry (Custer County CWMA). This cooperative process has since lead to the establishment of the Idaho Invasive Species Council (IISC), which was established by Executive Order No. 2001-11. The primary task of IISC is to "provide policy level direction and planning for combating harmful invasive species infestations throughout the state and for preventing the introduction of others that may be potentially harmful". In addition to these and other invasive species and noxious weed management programs implemented by the state, and on a county-by-county basis, various Federal statutes have been put in place to combat invasive species and noxious weeds.

Noxious weed treatments in the Proposed Project Area could result in cumulative benefits within the larger region of influence. Eradication of new populations of noxious weeds in the Proposed Project Area would eliminate the potential spread of weeds into the adjacent ACEC/RNA and a possible seed source for this and other areas in the region. This would reduce crop losses, decrease wildlife habitat degradation, and improve recreational site quality.

Livestock Grazing

Approximately 771,224 acres (97.3%) of the 792,567 acres of BLM-administered public lands in the Challis Field Office are currently allocated for livestock grazing. This area is divided into 62 grazing allotments for administrative purposes. The Three Rivers Stone Quarry is within the 9,263-acre Split Hoof Allotment, which is permitted for grazing by cattle. Additional grazing allotments surround this allotment, including the Bald Mountain Allotment to the west of the Salmon River, above the confluence with the East Fork, and the Spud Creek Allotment on the south side of the Salmon River and west side of the East Fork Salmon River, below the confluence. Grazing is not permitted on the 78-acre East Fork Salmon River Bench ACEC. Livestock grazing in 40 of the 62 allotments, including the three listed above, is managed under the terms and conditions of an Allotment Management Plan (AMP). Each AMP contains management objectives for the allotment, prescribes the manner and extent of grazing allowed, describes range improvements necessary to implement grazing practices, and details a monitoring system to determine whether the objectives are being met. Range condition and trend in the Split Hoof, Bald Mountain and Spud Creek allotments ranges primarily from fair to poor, with condition in the Proposed Project Area rated poor (USDI-BLM 1999). However, these allotments have been categorized as "Maintain" in the Challis RMP, meaning that they are proposed for retention, the range condition and trend is satisfactory, site potential for improvement is moderate or low, there are no significant resource problems, and management is achieving management goals.

Private land flanks the Salmon River and East Fork Salmon River for the majority of its length in the Challis Resource Area, and some of this land is grazed by livestock. Where livestock operators on private lands in the region do not implement BMPs, riparian area vegetation and downstream water quality could be adversely affected. For example, where livestock are allowed unrestricted access to stream banks, or where upland grazing increases off-site erosion and sedimentation, pollutants could be increased locally and travel downstream. Unmanaged grazing in riparian areas may also reduce stream bank stability, resulting in blowouts during high run-off events and increased sediment loads that reduce water quality further downstream. Infestations of invasive species including noxious weeds on private lands, which is sometimes a result of improperly managed grazing, could become a seed source for lands elsewhere. Riparian vegetation would be adversely affected by invasion of noxious and other weed species. Riparian areas could improve where land managers install range improvements, such as fences, cattle guards, pipelines, and water developments to enable livestock use while protecting water quality and riparian vegetation.

Land and Realty Actions (Projects)

Cumulative impacts are an aggregate of many direct and indirect effects and include actions, which have occurred or can reasonably be expected to occur both within and outside of the Proposed Project Area. The following are key land and realty cumulative actions within the vicinity of the quarry site assessed in this EIS (Table 4.8-1). Projects include proposed activities on land administered by the BLM Challis Field Office, land administered by the Challis National Forest (Challis District) and Sawtooth National Forest, and on state highways and other roads maintained by the Idaho Transportation Department in the Upper Salmon River Subbasin.

Table 4.8-1. Land and Realty Actions (Projects) Located in the Vicinity of the Three Rivers Stone Quarry.

Project	Status	Purpose	Expected Completion/ Decision	Agency
Idaho State Highway 75	**Proposed for FY 2007**	Bridge Replacement	2007 or later	ITD
	Description: Replacement of existing Salmon River Bridge west of Clayton, Idaho.			
	Location: Project begins at milepost 220.2 and ends at milepost 220.8, west of Clayton, Idaho.			

Table 4.8-1. Land and Realty Actions (Projects) Located in the Vicinity of the Three Rivers Stone Quarry.

Project	Status	Purpose	Expected Completion/ Decision	Agency
Idaho State Highway 75	**Proposed for FY 2008**	Bridge Replacement	2008 or later	ITD
	Description: Replacement of existing bridge over the East Fork Salmon River.			
	Location: Project begins and ends at milepost 227.0, just east of Clayton, Idaho.			
Challis Bridge Sand and Gravel Pit (BLM Project #ID-330-2007-CE-352)	**Completed**	Mineral material disposal	Completed	BLM
	Description: Dispose of up to 50,000 cubic yards of sand and gravel to Idaho Transportation Department during the next 40 years. Initial disposal would be by free use permit to Custer County Road and Bridge for 6,000 yards.			
	Location: Approximately 3 miles SE of Challis, Idaho.			
Redbird Mine Land Sale EA, #ID-330-2006-EA-1480	**Draft Under Preparation**	Land Sale	June 2008	BLM
	Description: FLPMA sale of 298 acres of public land.			
	Location: 3 miles west of Clayton, Idaho			
Clayton Water Development (BLM Project #ID-330-2007-EA-3267)	**New Proposal/ Scoping in Progress**	Water pipeline	October 2007	BLM
	Description: Installation of a 200-foot water pipeline, 60,000 gallon water storage tank, a 500-foot access road, a new well, pump, and fire hydrants.			
	Location: Clayton, Idaho			
Morgan Creek Allotment (BLM Project #ID-330-2007-EA-3272)	**Draft EA Under Preparation**	Grazing permit renewal	May 2007	BLM
	Description: Ten year grazing permit renewal.			
	Location: Located approximately 6 miles north of Challis**.**			

Table 4.8-1. Land and Realty Actions (Projects) Located in the Vicinity of the Three Rivers Stone Quarry.

Project	Status	Purpose	Expected Completion/ Decision	Agency
Persistence Mine (BLM Project #ID-330-2006-EA-1461)	**Draft EA Under Preparation**	Amend Plan of Operations	January 2007	BLM
	Description: Continued mining operations at what was formerly called Rat's nest mine for specimens of mineral crystals with new waste rock disposal area.			
	Location: 13 miles southeast of Challis, Idaho.			
Travel Management Plan for the Challis Field Office (BLM Project #ID-330-2006-EA-2403)	**Draft EA Under Preparation**	Travel Plan	December 2007	BLM
	Description: Comprehensive travel planning effort to address a designated route system (roads and trails).			
	Location: Field Office-wide			
Salmon-Challis National Forest Travel Management Plan EIS	**In Progress**	Recreation Management	August 2008	USFS
	Description: Prepare an environmental impact statement to designate a portion of the National Forest roads, trails, and areas open to public motor vehicle use on the Salmon-Challis National Forest, and assign the type of use(s) and season of use allowed on each road and trail or portion thereof.			
	Location: Forest Wide			
Eight Mile Dredging EA	**On Hold**	Mineral and Geology	N/A	USFS
	Description: Use of a small 2.5-inch suction dredge to extract gold bearing gravels from Eight Mile Creek.			
	Location: Eight Mile Creek within the Yankee Fork Salmon River Drainage. Yankee Ranger District.			
Garden Creek Fuels Reduction (USFS Project)	**In Progress**	Fuels Management	June 2007	USFS
	Description: Treat approximately 4,000 acres with prescribed fire and 350 acres with mechanical thinning to reduce hazardous fuels. Wildland Interface.			
	Location: Garden Creek drainage 6 miles southwest of Challis, Challis Ranger District.			

Table 4.8-1. Land and Realty Actions (Projects) Located in the Vicinity of the Three Rivers Stone Quarry.

Project	Status	Purpose	Expected Completion/ Decision	Agency
Reauthorization Of Grazing on the Spud Creek and Marco Creek Allotments	**In Progress**	Grazing Management	May 2008	USFS
	Description: Authorize continued livestock grazing on the Spud and Marco Creek Allotments consistent with existing management in order to continue to meet or move toward desired resource conditions.			
	Location: East Fork of the Salmon River, Challis Ranger District, Idaho.			
Morgan Creek and Eddy Creek Range Allotments EIS (USFS Project)	**In Progress**	Grazing Management	June 2008	USFS
	Description: Authorize continued livestock grazing on the Morgan Creek and Eddy Creek Cattle and Horse Allotments.			
	Location: Morgan Creek and Eddy Creek Allotments, Challis Ranger District.			
Mosquito Flat Dam Outlet Pipe Sleeving and Special Use Permit Renewal EA (USFS Project)	**On Hold**	Special Use Management	N/A	USFS
	Description: Issue a special use permit of the Mosquito Flat Water Users to replace the outlet pipe and to operate and maintain the dam for 5 years**.**			
	Location: Upper Challis Creek, Challis Ranger District, Morgan, Idaho**.**			
Forest-wide Noxious Weed EIS (USFS Project)	**In Progress**	Watershed Management	September 2007	USFS
	Description: Control noxious and invasive, non-native exotic weed species. Use an integrated pest management approach throughout Salmon-Challis NF.			
	Location: Salmon-Challis NF except Frank Church River of No Return Wilderness.			
Challis Creek Sediment Reduction (USFS Project)	**Completed**	Watershed Management	Implemented 2006	USFS
	Description: Restoration of the original alignment of FS Road #40537 and decommissioning of the existing alignment to reduce sediment delivery to an unnamed tributary of Challis Creek.			
	Location: Road #40537 adjacent to tributary of Challis Creek. Challis Ranger District.			

Table 4.8-1. Land and Realty Actions (Projects) Located in the Vicinity of the Three Rivers Stone Quarry.

Project	Status	Purpose	Expected Completion/ Decision	Agency
Morgan Creek Water Developments (USFS Project)	**Completed**	Grazing Management	November 2006	USFS
	Description: Construct Ellis Creek Pipeline; reconstruct Watts Spring Pipeline on the Morgan and Hat Creek Allotments**.**			
	Location: Ellis Creek and Watts Spring Creek ~14 miles north of Challis, Idaho. Challis Ranger District.			
Garden Creek Prescribed Burn DM (USFS Project)	**Completed**	Fuels Management	September 2006	USFS
	Description: Treat approximately 4,000 acres with prescribed fire to reduce hazardous fuels. Wildland Urban Interface.			
	Location: Garden Creek drainage 6 miles west of Challis, Idaho. Challis Ranger District.			
Eddie Basin Prescribed Burn (USFS Project)	**Completed**	Fuels management	June 2005	USFS
	Description: Prescribe burn a mosaic pattern over 30 to 70 percent of approximately 13,280 acres over a 3 to 5 year period.			
	Location: Eddy Basin Area, Challis Ranger District**.**			
Special Use Pasture Permit Renewal DM (USFS Project)	**In Progress**	Grazing management	September 2005	USFS
	Description: Reissuance of Special Use Permit for continued use of a pasture. Pasture use will be reduced from 30.6 acres to approximately 9.5 acres.			
	Location: Challis Creek Drainage, Challis Ranger District.			
Alturas Ski Trail Bridge Replacement	**Developing Proposal**	Recreation Management	April 2007	USFS
	Description: Replace the existing ski trail bridge over Alturas Lake Creek. With the existing Murphy Bridge on the Harriman Trail at a new location. Construct ski trail on each side of bridge. Rehab. Ski trail by old bridge site.			
	Location: Alturas Ski Trail north of Alturas Lake Creek Road 205. Sawtooth National Recreation Area (SNRA).			

Table 4.8-1. Land and Realty Actions (Projects) Located in the Vicinity of the Three Rivers Stone Quarry.

Project	Status	Purpose	Expected Completion/ Decision	Agency
Casino Creek Trail Relocation EA	**In Progress**	Recreation Management	June 2007	USFS
	Description: Reconstruct approximately 2 miles of Martin-Big Casino Trail #646 in Big Casino drainage, 4 miles of Little Casino Trail #232, and 0.5 miles of Sunny Gulch Trail #616.			
	Location: Northwest corner of White Cloud Mountains, 5 miles east of Stanley, Idaho. SNRA.			
Obsidian 1 & 2 Cattle and Horse Allotment Management Plan DM	**In Progress**	Grazing management	September 2007	USFS
	Description: To authorize continued grazing use within the Obsidian 1& 2 Cattle and Horse Allotment. SNRA.			
	Location: Challis Creek Drainage, Challis Ranger District**.**			
Road 682 Valley Creek Ford Closure and Site Restoration DM	**On Hold**	Wildlife, Fish, Rare Plants; Watershed Management	N/A	USFS
	Description: Remove and rehabilitate the Road #682 ford through Valley Creek, including 500 feet of approach west within the floodplain.			
	Location: Near Blind Summit, 9.5 miles northwest of Stanley, Idaho, SRNA.			
Rough Creek Culvert Replacement Project DM	**In Progress**	Wildlife, Fish, Rare Plants	May 2007	USFS
	Description: Replace undersize culvert on the lower end of Rough Creek with one that spans the creek to improve fish passage and reduce impact to habitat and water quality from potential diversion of stream flows.			
	Location: Rough Creek off the Salmon River, 3 miles west of Sunbeam and 8 miles north of Stanley, Idaho. SNRA.			

Additional land and realty actions are anticipated by private individuals in the reasonably foreseeable future. Such actions include increased construction of homes and rental units in the Challis area as well as recreational homes in the greater Custer County area.

4.8.2 Cumulative Impacts by Resource

Physical Resources

Air Quality

The region of influence of the cumulative effects analysis for air quality is Custer County. The Proposed Project would result in release of dust particles into the atmosphere due to surface disturbance during excavation, vehicle travel, and blasting, the emission of carbon monoxide during the use of commuter and transport vehicles and operation of heavy equipment, and the release of minor amounts of ANFO. These impacts would be temporary, and levels of particulate matter in the air would be reduced by dust suppression techniques. Other actions in Custer County that could add cumulatively to the effects of the Proposed Project on air quality include increased use of recreational vehicles and scenic driving, prescribed fire, road construction and restoration projects, housing construction, and continued mining at other mines. Impacts to air quality from these other projects are typically temporary and site-specific. The Proposed Project under all alternatives, combined with other past, current, and reasonably foreseeable future projects are not expected to result in measurable cumulative impacts and would not affect Custer County's attainment status.

Geology, Minerals, and Soil

The region of influence for the cumulative effects analysis for geology, minerals, and soil is the Upper Salmon River Subbasin. Cumulative environmental impacts to these resources from the Proposed Project would be limited to potential increased loading of sediment to the Salmon River. Unfortunately, there is no "cookbook" method on how to examine the cumulative effects of potential sediment loading by mining at the Three Rivers Stone Quarry within the broader category of all sediment-producing human activity within the Upper Salmon River Subbasin. One simple way would be to compare the area of surface disturbance created by mining to the overall area of surface disturbance created by all individual human activities in the watershed that may cause additional sediment loading to the Salmon River. However, all such potential sediment-producing activities do not add up to a cumulative effect because of thresholds and compensation in natural systems. This refers to the ability of natural systems (such as the Salmon River drainage) to cope with a certain level of disruption. If the threshold level is not exceeded, then the system can compensate. The small increase in area of surface disturbance under all action alternatives over existing conditions represents a minimal cumulative effect to potential increased loading of sediment to the Salmon River. No cumulative effects would be generated under Alternative A since there would not be an increase in surface disturbance.

Hazardous Substances and Petroleum Products

The region of influence of the cumulative effects analysis for hazardous substances is Custer County. The Proposed Project would not use or generate any acutely hazardous materials or wastes or "listed wastes". This section addresses the potential for cumulative actions related to chemicals, as defined in Section 3.1.5, Chapter 3, and petroleum products including antifreeze, brake fluid, radiator flushing fluids, hydraulic fluid, fuel de-icing additives, degreasing solvents, packaging material from explosives, ammonium nitrate, fuel oil, and fuel. The Proposed Project under all alternatives could result in potential spills of these materials. However, because of the topography and hydrology of the site and the adherence to the Chemical Spill Prevention, Control, and Countermeasures Plan, it is improbable that a leak or spill from mining operations would reach the rivers or ACEC/RNA adjacent to the Proposed Project Area. Many of the realty actions described above in addition to other mining operations also create the potential for chemical and petroleum spills and possible contamination of Upper Salmon River Subbasin rivers and tributaries and other areas with special designation. However, BMPs and a Spill Prevention, Control, and Countermeasures Plan would typically be required for most of the realty actions and mining operations described above, substantially reducing the risk and the potential for cumulative effects relating to chemicals and petroleum products. The largest potential for fuel or chemical spills would be from vehicles and chemical or fuel transport trucks traveling on SH-75.

Water Quality

The region of influence for the cumulative effects analysis for water quality is the Upper Salmon River Subbasin. This region was selected because the Salmon River, which is adjacent to the Proposed Project Area, runs through the entire length of this subbasin. The floodplain of the Salmon River has been modified considerably by conversion to cropland, and riverbanks have been altered by the construction of numerous dikes and diversions associated with residential development, agriculture, and SH-75, US-93, and SH-21. Recreation, especially river floating in rafts and drift boats, is an increasing use of the river corridor and there are several associated developed campgrounds and day use area. Other past, current, and future impacts to this river or its tributaries, could add to the cumulative impacts to the Upper Salmon River Subbasin. Although impacts several miles upstream may not be detectable in the river in the immediate vicinity of the Proposed Project Area, impacts to salmonids migrating through the river could be realized.

Water quality, native fish populations, and riparian habitat conditions have been issues of concern in the Upper Salmon River Subbasin. The cumulative effects of mining, grazing in riparian areas, timber harvest and associated roads, exotic fish and plant introduction,

residential and recreational development, and human-caused stream alteration and diversion of surface waters have combined to limit the production and survival of native resident and anadromous fishes throughout the subbasin. There are also numerous restoration projects that have been completed, are under construction, or are planned in the subbasin to offset historic management and land use impacts on fish and fish habitat. These projects have resulted in an improvement in water quality and fisheries to many miles of streams in the subbasin.

There are 11 stream and river segments on nine waters in the Upper Salmon River Subbasin that were listed in 1998 under Section 303(d) of the Clean Water Act (CWA), including two reaches of the Salmon River between Hell Roaring Creek and the East Fork Salmon River. These reaches of the Salmon River were listed because of elevated levels of sediment or temperature. However, these reaches are now considered to be in full support of Aquatic Life Beneficial Uses. The Upper Salmon River does not require having a Total Maximum Daily Load (TMDL) developed for sediment or temperature because it is in full support of its beneficial uses. Of the other 10 listed stream and river segments, only Challis Creek is not fully supporting the beneficial uses of salmonid spawning and coldwater biota as defined in the Idaho Water Quality Standards and the CWA. A TMDL has been prepared for this water body to restore full support of these beneficial uses. The other stream segments are listed for sediment, temperature, nutrients, flow alteration, or habitat alteration. TMDLs are not required because the stream segments are either in full support of beneficial uses or best management practices are being implemented for these streams that should result in attainment of water quality standards and beneficial use support in the near future. Upper reaches of the East Fork Salmon River, which is adjacent to the Proposed Project Area, was added to the 2002/2003 Integrated 303(d)/305(b) Report for "unknown" pollutants, but was determined to be in full support of beneficial uses in the Upper Salmon Subbasin Assessment and TMDL (IDEQ 2003).

The largest source of sediment delivery into the Salmon River comes from the Yankee Fork during heavy intensity, long duration precipitation events. Slate Creek also contributes a primary source of upstream sediment. The East Fork of the Salmon River, upstream of the Proposed Project Area receives heavy livestock use, and during heavy precipitation events, can also deliver sediment via erosion to the Salmon River. Natural sources of sediment include Maln Gulch, Bradshaw Basin, and Alkali spring, all located downstream from the Proposed Project Area. Other potential sources of sediment are recreational-related from Bayhorse Creek.

Past land use in the Salmon River Basin including mining, logging, and grazing has likely altered to some degree the amount of sediment discharge into and temperature of the river.

Land owners and land managers have conducted channel management practices including construction of jetties, barbs, and levees, riprapping banks, blocking side or oxbow channels, channel straightening, and removal of riparian vegetation and large woody debris (King 2002).

Present, and reasonably foreseeable future projects occurring in the subbasin include livestock grazing, mining, recreation, and realty actions such as bridge replacement, road closure, water developments, and maintenance and resource management actions such as culvert replacement and watershed management. Impacts of these actions, both negative and beneficial, could add cumulatively to the impacts of the Proposed Project on water quality.

Alternative A

Potential impacts to 303(d) listed streams and other water resources would occur under Alternative A primarily during the period of quarry reclamation. However, reclamation would be localized and short-term and BMPs to avoid impacts would be implemented. Implementation of Alternative A would not generate cumulative negative impacts in the Upper Salmon River Subbasin. Conversely, reclamation of the existing mining roads would stabilize the soil and reduce or eliminate a potential source of sedimentation into the Salmon River and East Fork Salmon River. Therefore, implementation of Alternative A along with other restoration activities in the Upper Salmon River Subbasin would add cumulative, beneficial impacts to the watershed.

Alternative B

Indirect impacts to the surface water of the Salmon and East Fork Salmon rivers and to stream substrate could occur under Alternative B through the delivery of fine sediment, fuel, lubricants, nitrate, and/or pre-mixed ANFO from the quarry site and through continued diversion of surface water for dust abatement. The Proposed Project would use BMPs to avoid impacts to 303(d) listed streams and other water resources. However, the current water detention basins are not sufficient to prevent sediment entry into the Salmon River and East Fork Salmon River during high rain events and snowmelt. Therefore, impacts from the Proposed Project would add cumulatively to those from other management activities occurring in the Upper Salmon River Subbasin.

Alternative C

The Proposed Project would use BMPs to avoid impacts to the Salmon and East Fork Salmon rivers. The existing stormwater detention basin at the quarry would be improved and a new one created near the administrative area to capture surface runoff and sediment from the

proposed mining operations. However, there would still be the risk of sediment delivery to the Salmon River and East Fork Salmon River due to the increase in hardened surfaces resulting from the proposed expansion of the quarry. Therefore, the Proposed Project could add cumulatively to the effects of other past, present, and reasonably foreseeable future projects occurring in the Upper Salmon River Subbasin. Examples of other projects that could result in sediment delivery to the Salmon River and its tributaries are bridge replacement projects on SH-75 and Alturas Lake Creek, grazing permit renewals on Federal lands, continued grazing on private land, the Clayton water development project, mineral projects such as dredging in Eight Mile Creek, and trail reconstruction in Casino Creek. Conversely, some Federal projects have been designed to reduce impacts to streams such as the proposed U.S. Forest Service's Challis Creek Sediment Reduction project, FS Road 682 rehabilitation project, and Rough Creek culvert replacement project.

Alternative D

Under Alternative D, the Proposed Project could add cumulatively to the effects of other past, present, and reasonably foreseeable future projects occurring in the Upper Salmon River Subbasin. Although the cumulative effects of Alternative D would be similar to Alternative C, the risk of potential sediment delivery to the Salmon River and East Fork Salmon River would be increased over Alternative C due to the proposed greater expansion area of the quarry. The risk to the East Fork Salmon River would be reduced to some degree over Alternative C due to the proposed construction of a new stormwater detention basin near Pit 2-E and Pit 3.

Noise

The region of influence for the cumulative effects analysis for noise is Custer County. This area was selected because noise that occurs as a result of the Proposed Project could have a cumulative effect when considered in concert with other projects in the county. The Proposed Project would not contribute cumulatively to noise impacts resulting from projects outside the county. Past and current sources of noise (both natural and anthropogenic) in this area include wind, the East Fork River and Salmon River, wildlife, mining, road maintenance projects, recreational activities, livestock grazing, motorized vehicular traffic, and air traffic. With the exception of noise from vehicular traffic and mining operations, which is fairly regular, the majority of the anthropogenic sources of noise are generally site specific and temporary within the region.

Future management actions and other activities in this area that have the potential to create noise over ambient levels include maintenance of SH-75 and the East Fork Salmon River

road, improvement of SH-75 (bridge replacement projects), road and trail restoration and reconstruction projects, water development projects, mining, dredging, prescribed burning, recreation, air traffic, and motorized vehicular traffic. Of these actions, noise from recreation, mining, and traffic exist currently, but could be elevated in the future. Noise associated with development projects would primarily be from operation of heavy machinery, and potentially some blasting and would be temporary within the region.

Alternative A and Alternative B

No cumulative impacts would be generated from Alternatives A and B because noise levels from these actions would be the same as or less than those that currently exist and would not exceed the 55 dBA threshold recommended by the EPA for determining acceptable sound levels for residential land use at the noise-sensitive receptors described in Section 4.5.6.

Alternative C and Alternative D

Noise from mining activities under Alternative C would approach the 55 dBA threshold recommended by the EPA for determining acceptable sound levels for residential land use at the noise-sensitive receptors described in Section 4.5.6 and noise under Alternative D would exceed this limit. However, the increase in dBA over existing conditions at these sensitive receptors would be small. Mining activities under these alternatives would include the use of explosives and heavy equipment. Blasting would be audible from some areas within the analysis area, and noise from heavy equipment use would be audible within and in the vicinity of the Proposed Project Area. Noise from traffic associated with travel to and from the quarry (commuters and trucks hauling flagstone) would increase due to the increase in number of employees and tons of flagstone removed. The sound of blasting, heavy machinery, and traffic could add cumulatively to other noise in the county if these sounds were heard in concert with heavy equipment and traffic associated with other projects in the analysis area. The potential for cumulative impacts would be greater under Alternative D due to the increase in blasting, heavy equipment use, and traffic, and the increase in duration of operations.

Biological Resources

Vegetation

The region of influence for the cumulative effects analysis on vegetation is the area encompassed by the Split Hoof, Bald Mountain, and Spud Creek grazing allotments. This region was selected based on the primary influences to vegetation (invasive species, livestock grazing, fire and recreation). The vegetation in this region is dominated by Wyoming big sagebrush communities, with a component of mountain big sagebrush and Douglas

fir/woodland communities also present. Condition of the range in this area is primarily fair to poor, with the condition in and in the immediate vicinity of the Proposed Project Area being poor.

Inventories conducted in the late 1990's show that noxious weeds continue to spread within the Resource Area, especially adjacent to major and secondary roadways and along the Salmon River (infestations are generally associated with vehicle traffic and/or ground disturbing practices) (USDI-BLM 1999). Of particular concern are spotted knapweed and leafy spurge.

Other direct and indirect impacts to vegetation in the area would be associated with activities currently outlined in the Challis RMP including: wildlife use, continued livestock grazing, vegetation treatments, range improvement projects, and recreation. These uses and potential modifications are not expected to alter the existing vegetation beyond the levels identified in the Challis RMP. The Proposed Project under all alternatives would not result in cumulative impacts to vegetation.

Special Status Plant Species

The cumulative effects area for special status plant species is defined as the area within the boundary of the Proposed Project Area. This area was chosen given the low dispersal capabilities of the endemic plant species found within the Challis Planning Area. There are no known populations of special status plant species within the quarry boundary. Viable population of special status plant species, if observed in the quarry, would be maintained under all action alternatives. Therefore, there would be no cumulative impacts to special status species from the continuation or expansion of mining activities.

Fish and Wildlife

The region of influence for the cumulative effects analysis on big game species is defined as an approximately 16 square mile area centered on the Proposed Project Area. This area was chosen because it represents the extent of the area that big game using the Proposed Project Area could be displaced by mining activities. It is highly unlikely that negative impacts to big game from the proposed alternatives would extend to an area more than a few miles around the Proposed Project Area, with the sole impact, outside of areas of direct habitat loss, being the displacement of animals. In most cases, this would be beyond the next ridge or around the next bend. This area is also used to analyze cumulative impacts to those wildlife species with less mobility and smaller home ranges. For highly mobile wildlife species, such as migratory birds, the region of influence for cumulative impacts would need to be analyzed throughout

their entire home range, including where they migrate from and where they are migrating to. This could lead to a potentially enormous scale of cumulative impacts analysis. It is not possible to define all projects and potential actions that could have a cumulative impact for the highly mobile species in the analysis area, and specific data are not available regarding highly mobile wildlife found or observed in the Proposed Project Area. Therefore, a region of influence is not defined for these species. The region of influence for the cumulative effects analysis on fish species is the Upper Salmon River Subbasin, since impacts to water quality upstream could impact fish and fish habitat downstream.

Big Game

The management action in the region of influence for the cumulative effects analysis that has the greatest potential to impact big game is recreation. Recreation has been and is expected to increase in the future in this area, thus the potential for human/wildlife encounters and noise from human activities would increase. If these encounters occurred during the winter months, they could increase the energy expenditure of the animals. The Proposed Project under all alternatives would not notably impact elk or antelope, but the noise, surface disturbance, and presence of humans would potentially impact deer wintering in the area. The anticipated increase in recreation would add cumulatively to the effects of the Proposed Project under all alternatives on deer. If other land and realty actions discussed above are located in winter range and would be conducted during winter months, these could also add cumulatively to the potential impacts of mining operations during the winter on big game. Livestock grazing occurs throughout the region of influence and grazing permits have been and are in the process of being renewed. Livestock grazing can result in competition for resources with big game. However, only mule deer regularly use the Proposed Project Area, and because of the difference in food preferences between livestock and deer (grazing verses browsing), livestock grazing is not expected to add cumulatively to the effects of the Proposed Project on mule deer.

Upland Game Birds and Non-game Birds

The potential impacts from the Proposed Project on upland game birds and non-game migratory and resident birds from fragmentation of habitat could add cumulatively to the effects of other management projects that affect sagebrush habitat in the region.

Furbearers

The impacts from the Proposed Project on large furbearers from habitat loss would be minor. Impacts would primarily be those resulting from human/wildlife encounters and noise, and would be limited to the period when these animals traveled through the Proposed Project

Area. Because of the large home ranges of these animals, these impacts are not considered great enough to add cumulatively to other past, current, and future impacts in the area.

Management actions in the region of influence for the cumulative effects analysis that have the potential to impact small furbearers are those projects resulting in the loss and destruction of habitat, such as grazing, mining, fuels reduction/prescribed burn, and development. Under Alternatives B, C, and D, the Proposed Project would add incrementally to the cumulative effects of past, current, and future foreseeable project on small furbearers. Because of the small home ranges of small furbearers, loss of habitat from the Proposed Project would potentially have a greater impact than for the larger furbearers. However, only a small amount of habitat would be disturbed. Under Alternative A, a portion of small mammal habitat would be restored. The cumulative effects generated by this project and other projects in the analysis area to small furbearers in the analysis area would be minor.

Small Mammals

The cumulative impacts to small mammals would be the same as those described above for small furbearers.

Fish

Cumulative impacts to game and non-game fish and their habitat would be the same as discussed below for special status fish species.

Special Status Fish and Wildlife Species

The region of influence for the cumulative effects analysis on special status wildlife species is an approximately 16 square mile area centered on the Proposed Project Area. This area should encompass the home ranges of all special status wildlife that potentially use habitat in the quarry site and its vicinity, with the exception of lynx and wolves which are highly mobile. However, these species would not be negatively impacted by the proposed alternatives. The region of influence for the cumulative effects analysis on special status fish species is the Upper Salmon River Subbasin, since impacts to water quality upstream could impact fish and fish habitat downstream.

Bald Eagle

Regional impacts to bald eagles would result primarily from past, current, and future recreational activity along the Salmon and East Fork Salmon River and to a lesser extent from road construction and bridge replacement projects, road maintenance, and vehicular traffic. These activities could add cumulatively to the effects of the Proposed Project on

wintering bald eagles. The Proposed Project would not generate cumulative impacts to nesting eagles, since no nesting eagles occur in the quarry site or its vicinity.

Gray Wolf and Canada Lynx

The potential for negative impacts from the Proposed Project on wolves and lynx is limited primarily to those resulting from infrequent human/wildlife encounters that could occur if these animals traveled through the quarry site. Wolves may benefit in terms of prey availability if deer are displaced from the Proposed Project Area to areas used regularly by wolves. Given the low likelihood and temporal nature of human/wildlife encounters, the cumulative effects generated by this project and other projects in the analysis area to wolves and lynx are considered minor.

Pygmy Rabbit

The Proposed Project would not result in impacts to pygmy rabbits or their habitat. No cumulative impacts to this species would be generated.

Greater Sage-Grouse

Regional impacts to sage-grouse and their habitat would result primarily from past, current, and future range management treatments, grazing, mining development, construction and development projects, and drought. Under all action alternatives, the Proposed Project would result in a small amount of habitat loss and an increase in human disturbance. This would add incrementally to the cumulative impacts (habitat loss, alteration, and human disturbance) generated from other past, current, and future projects in the analysis area.

Peregrine Falcon

Due to the distance of the peregrine falcon nesting territories from the quarry site, the Proposed Project is not expected to generate impacts that would add cumulatively to those generated from other past, current, and future projects in the analysis area.

Sockeye Salmon, Chinook Salmon, Steelhead, Bull Trout and Cutthroat Trout

Past, present, and reasonably foreseeable future projects occurring in the Upper Salmon River Subbasin include livestock grazing, mining, recreation, and realty actions such as bridge replacement, road closure, culvert replacement, water developments, and watershed management. Impacts of these actions, both negative and beneficial, could add cumulatively to the impacts of the Proposed Project on special status fish species and their habitat. These impacts are directly associated with those described for water quality above.

Alternative A

Implementation of Alternative A along with other restoration activities in the Upper Salmon River Subbasin would add cumulative, beneficial impacts to fish habitat in the watershed (see the water quality subsection above for additional detail).

Alternatives B, C, and D

Potential impacts from the proposed action alternatives to special status fish habitat (potential delivery of fine sediment, fuel, lubricants, ammonium nitrate, and pre-mixed ANFO to the Salmon and East Fork Salmon rivers from the quarry site) would add cumulatively to impacts from other management activities occurring in the Upper Salmon River Subbasin (see the water quality subsection above for additional detail). The degree of impacts potentially generated would be lowest for Alternative B and highest for Alternative D due to the increased risk of sediment delivery to the Salmon River and East Fork Salmon River associated with the proposed increases in mining-related surface disturbance and associated roads and other hard-packed surfaces. However, under alternatives C and D, improvements would be made to the stormwater detention system that would capture a greater percentage of sediment than under Alternative B. The stormwater detention system proposed under Alternative D would capture a greater amount of sediment than the one proposed under Alternative C.

Wild Horses and Burros

The cumulative effects area for wild horses is defined as the Challis HMA. The proposed alternatives would not impact the viability of the wild horse population in the Challis HMA and it is anticipated that the appropriate management level of wild horses in the HMA would be retained. The Proposed Project under all alternatives would not result in cumulative impacts to wild horses in the Challis HMA. There are no burrows in the Challis HMA so there would be no cumulative impacts to burros.

Other Resources

Cultural Resources

Numerous prehistoric and historic sites have been located along the Salmon River Corridor and past management and development activities have had adverse affects on potentially significant sites. However, none of the proposed alternatives would result in impacts to cultural resources eligible for the National Register and would not result in cumulative impacts to cultural resources along the Salmon River corridor.

Tribal Treaty Reserved Rights and Interests

The Challis Field Office area is defined as the cumulative effects area for Tribal rights and interests since this area is comprised of lands (aboriginal, traditional, or unoccupied) on which the Shoshone-Bannock Tribes reserved the right to hunt, fish and gather natural resources in the Fort Bridger Treaty of 1868. Historically, the East Fork Salmon River was an important fishery resource for the Tribes, and fishing on this river continues to this date. According to information provided by the Shoshone-Bannock Tribes during consultation for this EIS, the past creation of the East Fork campground removed an important cultural site for the Tribes and the excavation of Pit 1 at the quarry removed a landmark marking the confluence of the East Fork Salmon and main Salmon Rivers. Further expansion of the quarry would change the visual appearance of the landscape to Tribal members using the area for fishing and other activities. Free access to the land where the quarry is located would also continue to be limited under all action alternatives. However, the BLM would work with the Shoshone-Bannock Tribal members regarding access needs so that treaty rights are honored. Therefore, the expansion of the quarry would not result in any future cumulative impacts to Tribal rights and interests.

Social and Economic Conditions

The cumulative effects area for social and economic conditions is Custer County, as opposed to the smaller Challis area assessed in Section 3.3.3. The population of Custer County increased by approximately 5 percent between 1990 and 2000, and then decreased by approximately 6 percent between 2000 and 2005, for an overall decreasing trend since 1990 of about 1 percent. Populations have fluctuated primarily based on the availability of jobs, with a large portion of jobs in the region being in the mining and forestry industry. Economic conditions in the county have improved over this time period, with the median household income and per capita income increasing 24 percent and 26 percent, respectively, between 1989 and 1999 (U.S. Census Bureau 2007).

It is expected that under Alternative A, the cumulative effects of closing the quarry would result in a slight decrease in population, household income, and industrial output in Custer County. Under Alternative B, the population and economic trends of the Custer County area would remain about the same, with a continued increase in the number of second home owners in the Stanley area. The expansion of the Three Rivers Stone Quarry under Alternatives C and D would reverse the population trend in the county, increasing it due to the increase in jobs associated directly and indirectly with the quarry. The high paying wages at the quarry would also promote an increase in the economy in the county. This would add cumulatively to the increase in spending that is occurring in the county as a result of

increases in recreation from users outside the county and the second home owners in the Stanley and surrounding areas.

Visual Resources

Cumulative visual impacts include those indirect impacts that would result from a proposed action estimated to be negligible in and of themselves but would become significant when considered within the context of past, present, or future actions affecting visual resources in the area.

Direct and indirect visual impacts would become more dispersed at distances increasing from the Proposed Project Area. Line-of-sight analysis indicates that the quarry site would not be directly visible from distances beyond 7 miles in any one direction due to obstruction. Beyond the 7-mile radius, indirect visual impacts such as vehicle traffic and dust from the quarry site could occasionally be visible, but would become dispersed enough to cause no noticeable contrast. The area of analysis for cumulative visual impacts includes the Proposed Project Area itself and that area encompassed within a 7-mile radius from the Proposed Project boundary.

Surface disturbing activities are expected along SH-75 in the future and would be visible to the casual motorist. The visual contrasts to motorists would be in addition to those described for any of the proposed alternatives. Examples of the types of projects that would occur in addition to the impacts from the Proposed Project include bridge replacements and pavement rehabilitation. These projects would add to the number of localized areas of surface disturbance experienced by motorists and the appearance of equipment along SH-75. These impacts would be of short duration, usually less than 1 minute, due to the rates of speed along SH-75.

The appearance of industrial vehicles (semi-trucks, dump-trucks, etc.) along SH-75 is anticipated to increase as a result of projects other than those proposed under this EIS. The Challis Bridge Sand and Gravel Pit would be located along a route proposed by L&W Stone for hauling flagstone to market. The appearance of industrial vehicles along SH-75 would increase cumulatively as a result of the Proposed Project, and the gravel pit. Other mining activities in the Salmon River watershed often utilize SH-75 for access to mines or markets. The appearance of industrial vehicles described under each alternative would be in addition to those used at the Persistence Mine (13 miles southeast of Challis), and the Thompson Creek Mine (12 miles west of Clayton).

Area-wide reductions in visibility could occur as a result of prescribed fire activity, agricultural burning, and wildfire. The appearance of fugitive dust from the Proposed Project Area during operation and reclamation could result in minor cumulative impacts to visibility in the vicinity of the quarry site. The impacts to visibility from fugitive dust are expected to be infrequent and of short duration, however if added to the impacts from smoke in the atmosphere could result in some cumulative reductions of visibility at the local level over the short-term.

The Salmon River Scenic Byway Corridor Management Plan (in progress) is expected to identify the scenic values that local residents want to promote along SH-75. Although the Plan was not complete at the time of this document, it is expected that some cultural modifications would appear along SH-75 as a result of Plan implementation. These modifications could include interpretive signage, custodial facilities, and scenic pull-out areas, for example. The Plan may call for removal or preservation of certain cultural modifications along the SH-75 travel corridor and for preservation of historic structures visible from the road. Removal or alteration of some cultural modifications along SH-75 to coincide with the thematic values identified in the Plan may result in a return to naturalness in some localized areas. However, it could also result in the persistence of historic structures on the landscape. The plan may result in an increase in the number of visitors that travel along SH-75 because one of its main goals is to promote tourism.

Transportation, Access, and Public Safety

The cumulative effects area for Transportation and Access is defined as the SH-75 corridor between Challis and Clayton, the East Fork Salmon River Road, and the Three Rivers Stone Quarry. This area was selected as it represents the corridor traveled daily by quarry employees, is part of the Salmon River Scenic Byway Corridor, and includes the area within the immediate vicinity of the quarry used by recreationists. Traffic on this stretch of the highway has increased and is expected to continue to increase in the future during the snow-free seasons due to the increase in recreation in the area and in the Stanley Basin. Increases in traffic associated with the mining operations, as described in Section 4.7.5, would add cumulatively to this projected increase in traffic. Although roads would be constructed to assist in mining activities under the action alternatives, these would be temporary, would not be available for recreational use, and would be reclaimed when no longer needed so would not add cumulatively to the effect of increased unimproved roads in the area.

Gates restricting public access through the quarry would remain, ensuring continued safety to the public and quarry employees. Because of the restrictions, and adherence to mining safety

procedures, the Proposed Project would not result in any cumulative effects as it relates to public safety.

Land Uses and Private Property

The cumulative effects area for Land Use is defined as Custer County. The Proposed Project Area has had some type of mining claim since the mid-1960s. Land within the quarry boundary would continue to be used for mining for up to 5 to 40 years, depending on the alternative selected. Other past, existing, and potential future land uses within the cumulative effects area include mineral exploration and development, electric power-line rights-of-way, state highway rights-of-way, cattle grazing, recreation, and scattered rural living and associated agriculture. Some of the mines in the area have closed, such as the Hecla Mine, and others continue to be developed, such as the Thompson Creek Mine and Persistence Mine at a rate commensurate with market demand. Impacts of the proposed expansion of the Three Rivers Stone Quarry on land use and private property rights would be minimal, related primarily to restricted recreational access of the quarry and the lack of potential for development of this land for other uses. These impacts would not add cumulatively to the impacts of other land uses and private property development occurring in the area.

Recreation

The cumulative effects area for recreation is defined as the Upper Salmon River SRMA. This area was selected given that dominant recreational activities in the vicinity of the quarry, and overall on the Challis Field Office, are associated with the Salmon River and East Fork Salmon River (camping, floating, boating, fishing, etc.). Recreation within the SRMA would continue to increase over time, and demand for the improvement of and addition of recreational facilities, such as campgrounds, potable water, toilets, pullouts, and trails, would also increase. Cumulative effects to the recreation opportunities in the SRMA from any of the proposed alternatives would be expected to be negligible. Although public access has been and would continue to be restricted within the quarry, this area is not a high-use recreation area and the restricted area would represent less than 0.5 percent of the SRMA. This would not affect the ability to access like areas in the vicinity and would not affect the opportunities for recreating on and immediately adjacent to the Salmon River and East Fork Salmon River. Recreational use and opportunities within the Proposed Project Area have been limited in the past and are not expected to change markedly over time. The site where the quarry is located would still remain important visually to the recreational experience of people using the Salmon River, and as the quarry expands, the visual experience of the recreationists on the river would continue to be modified. However, this impact on the potential visual enjoyment of the area would not cause a change in recreation opportunities.

Livestock Grazing

The region of influence for the cumulative effects area for livestock grazing is the BLM Challis Field Office boundary. Livestock grazing would continue to be one of the primary resource uses of land within the BLM Challis Field Office area, and renewal of several grazing allotment permits are proposed on land administered by both the BLM and USFS in the Upper Salmon River Subbasin. The cumulative effects to livestock grazing as a result of the Proposed Project, under all alternatives, is expected to be negligible given that the impacts would result in no more than an approximated reduction or addition of up to five AUMs in the Split Hoof Allotment (which overlaps the quarry site). Also, grazing for this permitted allotment has not occurred since it was transferred to Bald Mountain Cattle in 2000.

Special Designations

Wild and Scenic Rivers

Portions of the quarry site are visible from the East Fork Salmon River and the Salmon River, which are tentatively classified under the National Wild and Scenic Rivers System. However, the Proposed Project would not result in degradation of the outstandingly remarkable values of the Salmon and East Fork Salmon rivers in the vicinity of the quarry. The Proposed Project, under any alternative, would not result in cumulative impacts to Wild and Scenic Rivers on lands administered by the BLM Challis Field Office.

Areas of Critical Environmental Concern

The region of influence for the cumulative effects analysis for ACEC/RNA is restricted to the East Fork Salmon River Bench ACEC/RNA and the Three Rivers Stone Quarry. The quarry overlaps approximately 4 acres of the northwest corner of the East Fork Salmon River Bench ACEC/RNA. Prior to 2004, mining in a portion of Pit 1 was expanded into this ACEC/RNA and a road was created in the ACEC/RNA to access the southern portion of this pit. During road construction, material fell onto the slopes below, partially covering vegetation in the ACEC/RNA. This road has since been reclaimed and no additional roads exist within the ACEC/RNA boundary. The Proposed Project would not further expand into the ACEC, however, the 4 acres of native vegetation that previously existed prior to expansion of Pit 1 has been permanently removed. Vegetation, although altered, was replanted in the road, and the 4 acres of vegetation that were disturbed were not on the bench proper (the river terrace bordering the East Fork Salmon River), which is the habitat that the ACEC/RNA was ultimately designated to protect.

4.9 UNAVOIDABLE ADVERSE EFFECTS

The Proposed Project design features, BMPs, and proposed reclamation would avoid or minimize many of the potential adverse effects of the mining operation. However, not all adverse effects can be avoided, nor would reclamation be 100 percent effective in remediating all impacts. There would be at least a minimal amount of unavoidable adverse impact on all resources present in the Proposed Project Area for at least a short time, due to the presence of equipment and humans in the area and the time necessary for restoration to be effective. The magnitude of these impacts would vary between each of the alternatives. Unavoidable adverse impacts associated with the Proposed Project would include:

- Short-term impacts to air quality from dust generation and vehicle emissions.
- Soil compaction and destruction of soil textures from road construction and other surface disturbing activities. In addition, soil loss would occur during surface disturbing activities due to wind and water erosion.
- Noise disturbance to humans and wildlife from mine equipment and blasting.
- Loss of vegetation and potential habitat for wildlife.
- Loss of mule deer winter range and operations in winter range during the winter months.
- Potential disturbance to wintering bald eagles.
- Loss of jobs (Alternative A only).
- Changes to the viewshed from the mining activities and construction of roads.
- Restricted access to the quarry site by the public.

4.10 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible and irretrievable impact is defined as a permanent reduction or loss of a resource that once lost cannot be regained. Most mining projects result in an irreversible and irretrievable commitment of the material that is removed (gold, coal, stone, etc.). Flagstone would be removed from the geologic resource at the quarry if any of the proposed action alternatives are implemented. These actions would constitute an irreversible commitment of the geologic resource resulting from removal of flagstone from the quarry.

A portion of waste rock from the Pit 1 waste rock storage area would be made available as a mineral material by sale or free-use permits in the form of a community pit. The amount of waste rock that would be removed as a mineral material from the Pit 1 waste rock storage area is estimated to be as much as 20,000 cubic yards per year. Waste rock removed from the community pit would be dispersed throughout the region as rip rap, construction material, and for other uses.

The Proposed Project would not further expand into the East Fork Salmon River Bench ACEC/RNA, and the road that formerly accessed the southern portion of Pit 1 was reclaimed. However, the 4 acres of native vegetation that previously existed prior to expansion of Pit 1 has been permanently removed.

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