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OVER THE RIVER

Chapter 5. Affected Environment, Impact, and Mitigation Issues

Chapter 5. Affected Environment, Impact, and Mitigation Issues

5.1 Introduction

Chapter 5 describes the affected environment and identifies some impacts and mitigation issues for the OTR Proposed Action and the No Action alternative. The Proposed Action is described in Chapter 4 and Appendix J. The required No Action alternative provides for analysis and disclosure of the impacts of not implementing the Proposed Action or an alternative action. The OTR resource investigations presented in this chapter are the result of studies that have been conducted by the JFSA study team from 1997 through 2007 in coordination with the BLM and other agencies. Each of the 33 individual resource sections provides the following information:

- Affected Environment
- Impacts and Mitigation Issues
- Recommendations for Further Study

The affected environment sections include descriptions of the current conditions of each resource and relevant characteristics that may be subjected to impacts from the Proposed Action and No Action alternative. The impact and mitigation sections present initial descriptions of impacts from the Proposed Action and No Action alternative as related to each resource and proposed mitigation strategies. The section on recommendations for further study provides the BLM with areas of additional analysis and data gathering that are suggested to complete the analysis for the OTR Draft EIS. Some sections also include a subsection describing mitigation measures already taken.

A summary of OTR resource studies in Table 5.1-1, Summary of OTR Resource Studies, includes the following:

- Issues Addressed and Agency Coordination
- Impact Approaches, Findings, and Status
- Mitigation Strategies
- Recommendations for Further Study

The following are general areas of study that have not been conducted for any of the resource studies:

- Cumulative impacts
- Impacts of the full set of alternatives
- Impacts of many details contained in the OTR operations plans (for example, the installation and event management plans, including impacts of visitation by rail should such a plan be enacted)

The resources inventoried and described in this chapter include the following:

- 5.3 Biological Resources
- 5.3.1 Threatened, Endangered, and Special Concern (TES) Species
- 5.3.2 Aquatic Wildlife
- 5.3.3 Terrestrial Wildlife
- 5.3.4 Migratory Birds
- 5.4 Water Resources
- 5.4.1 Wetlands and Riparian Areas
- 5.4.2 Hydrology and Water Rights

- 5.4.3 Water Resources, Surface and Ground
- 5.4.4 Floodplains
- 5.5 Physical Resources
- 5.5.1 Paleontological Resources
- 5.5.2 Geology and Mineral Rights
- 5.5.3 Soils
- 5.5.4 Vegetation
- 5.5.5 Invasive, Non-native Species
- 5.5.6 Forest and Woodland Management
- 5.5.7 Range Management
- 5.5.8 Fire Management
- 5.6 Aesthetic Resources
- 5.6.1 Air Quality
- 5.6.2 Noise
- 5.6.3 Visual Resources
- 5.7 Social Resources
- 5.7.1 Transportation and Access
- 5.7.2 Recreation
- 5.7.3 Public Art
- 5.7.4 Socioeconomics
- 5.7.5 Community Resources and Public Safety
- 5.7.6 Engineering Safety for Extreme Weather Events
- 5.7.7 Nonhazardous Waste
- 5.7.8 Regulated and Hazardous Materials
- 5.7.9 Land Use
- 5.8 Other Critical Elements of the Human Environment
- 5.8.1 Cultural Resources (Historical and Archeological)
- 5.8.2 Native American Religious Concerns
- 5.8.3 Environmental Justice
- 5.8.4 Wilderness, Areas of Critical Environmental Concern, Wild and Scenic Rivers
- 5.8.5 Farmlands, Prime and Unique

GIS resource mapping is a key component of the assessment of the Proposed Action. Resource data were compiled and mapped for environmental resources and an extensive GIS database was prepared. Resource maps are located in Appendix D.

Table 5.1-1. Summary of OTR Resource Studies

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.3 Biological Resources				
5.3.1 Threatened, Endangered, and Special Concern (TES) Species	Effects on habitat—mammals, birds, fish, amphibians, and plant species. Coordination included E. Brekke and J. Backstrand, BLM; Stephanie Neid, CNHP; J. Aragon, J. Vayhinger, R. Carochi, and L. Gatlin, CDOW.	Determination of potential effects on TES species used a presence/absence approach—if present, how could they be affected. Fifteen species of bats, furbearers, passerines, raptors, fish, amphibians, and reptiles and 12 species of plants were evaluated. The significance of effects is described. Effects range from "no effect" to "likely to adversely affect individuals but not likely to adversely affect populations."	Mitigation was recommended for bird-cable collisions, seasonal installation restrictions, and specific siting of anchor locations. For plant species it is recommended to do clearance surveys and minimize ground disturbance during installation.	Field clearance surveys for TES plants at anchor locations are recommended.
5.3.2 Aquatic Wildlife	Effects on aquatic resources based on potential changes to water quality resulting from increased sedimentation. Coordination was with Dave Gilbert of the BLM.	Increased sedimentation could occur during installation due to placement of anchors along the river corridor. Soil disturbance could occur at a staging area and crew-training area near Texas Creek. No appreciable changes to water quality would be expected.	Recommended mitigation is to control erosion, use sediment fences to minimize installation footprints to minimize sedimentation into the river.	Recent macroinvertebrate studies should be incorporated into the Draft EIS.
5.3.3 Terrestrial Wildlife	Effects on species by installation, viewing, and removal of OTR temporary work of art. Coordination included all individuals from the TES coordination (4.2.1) plus S. Moss of Arkansas Valley Audubon Society.	The focus of the assessment is on bighorn sheep and bird-cable collisions. There is potential for disturbance of bighorn sheep, but the magnitude is not known. The same situation occurs for bird-cable collisions. The impact approach used a literature review of similar wildlife studies.	Mitigation for bighorn sheep includes employing seasonal installation, avoiding sensitive areas, using buffer zones, limiting human presence on the north side of the river, providing supplemental food and water sources, and doing pre- and post- project monitoring. Using devices to make cables as visible as possible will reduce the potential for bird-cable collisions.	Most recent BLM and CDOW data should be incorporated into the Draft EIS.
5.3.4 Migratory Birds	Bird collision with cables, installation activities near foraging, breeding, and nesting sites. Coordination included all individuals in TES and terrestrial wildlife sections.	Significance criteria for potential impacts on protected birds include creating a new hazard to birds, removing habitat, and causing a loss of high-value bird populations. Activities would disturb birds but are not expected to reduce the viability of any populations. Some birds may collide with the cables.	Mitigation includes increasing the visibility of cables, minimizing the loss of habitat, and using seasonal restrictions to avoid losing reproductive success.	Measures should be evaluated to reduce bird-cable collisions.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.4 Water Resources				
5.4.1 Wetlands and Riparian Areas	Effects on wetlands and riparian areas. Coordination was with Dave Gilbert of the BLM.	The impact approach used GIS overlays on recent aerial photos. The amount of wetland and riparian areas in the corridor potentially affected is estimated to be 0.04 acres due to anchor installation and 0.03 acres from other installation impacts, foot traffic, and equipment access.	Mitigation includes the use of sediment control plans, including sediment fences, restriction of locations for rafting rest and lunch stops, and restriction of public access in wetland and riparian areas.	No additional studies are recommended.
5.4.2 Hydrology/Water Rights	Effects on water rights issues as they are related to surface water hydrology in the Arkansas River basin. Coordination was with John Smeins of the BLM.	The impact approach was to review the temporary work of art to define any activities that would consume water, and to determine that such water use was not in violation of existing water rights. The OTR would not affect the quantity of water available to other users.	In case of a drought (and low flows) during the project viewing period, coordination will be pursued to use BLM water rights to augment flows.	It is recommended that the Record of Decision identify members of a working group to coordinate augmentation of flow in the river if deemed necessary (if a drought year occurs during the OTR viewing window).
5.4.3 Water Resources, Surface and Ground	Effects on surface water or ground water issues as they are related to surface water flow, quantity, or quality in the Arkansas River basin. Coordination was with John Smeins of the BLM.	The impact approach was to review the temporary work of art to define any activities that would consume surface water or ground water, and to determine whether that use would not change flow characteristics, water quantity, or quality in the Arkansas River. The work of art would not create any appreciable changes.	Recommended mitigation is erosion control, including sediment fences, minimization of installation footprints, and restrictions of foot traffic on banks and upland slopes to minimize sedimentation into the river.	No additional studies are recommended.
5.4.4 Floodplains	Any action by the temporary work of art that would increase the potential for flooding along the Arkansas River. Coordination was with personnel of FEMA and John Smeins of the BLM.	Potential impacts that could increase flooding were addressed by evaluating historical flood elevations and comparing them with elevations of anchors and cables. No elements of the temporary work of art would be expected to interfere with the passing of flood waters.	No mitigation measures are deemed necessary.	Additional study is recommended to fully document base river elevations and cable elevations (to address sag in the cables). Discussions and coordination should be initiated with AHRA and BLM to possibly close the river to all rafting, both private and commercial, if flood stage conditions occur during OTR.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.5 Physical Resources				
5.5.2 Paleontology	Effects potentially disturbing paleontological resources. Coordination was with Dan Grenard of the BLM.	BLM provided paleontological resource mapping for the entire river corridor. All mapping units present a low likelihood that resources are present. The temporary work of art would not impact these resources.	No mitigation measures are deemed necessary.	Additional study is recommended to clarify the unit type definitions, because those that are included are approximate. It would also be helpful to clarify the potential for fossils in five specific proposed project locations/formations.
5.5.3 Geology and Mineral Rights	Effects on geological formations and potential intrusion on mineral rights. Coordination was with Dan Grenard of the BLM.	Impacts were evaluated by reviewing technical literature and the database of the Colorado Geological Survey. No damage to area geological features or the creation of a geological hazard is expected. No mineral rights would be encumbered by the temporary work of art, but some interference with truck and rail traffic carrying mined materials could be expected in the short term.	Mitigation measures include removing all anchors, filling all holes with color-matching grout, and leaving caissons in place at least 12 inches below ground level.	Although highly unlikely, it is recommended that the Transportation Plan for the temporary work of art include the case for evacuation in case of earthquake or other geological hazard.
5.5.3 Soils	Effects on soil quantities and quality. Coordination was with Ernie Gillingham of the BLM.	The impact approach was to overlay anchor locations on aerial photos and calculate areas of disturbance. It is estimated that about 5 acres of soil would be disturbed by the temporary work of art.	Mitigation measures include minimizing soil disturbance to the extent possible, using rubber mats and treads on equipment, covering disturbed soils during work cessation, using horizontal drilling, using areas of railroad fill and highway fill to the extent possible, restricting public access to minimize surface disturbance, and restoring the land contours and revegetating the disturbed sites following OTR removal.	No additional studies are recommended.
5.5.4 Vegetation	Potential loss of upland vegetation. Coordination was with Tom Grette of the BLM.	Impacts were described using mapping and field observations. Primary mapping was a cooperative effort between CDOW and the BLM in 2003. Fieldwork was done in 2000, 2005, and 2006. Vegetation patterns and species were overlaid on aerial photos. It is estimated that about 5 acres of upland vegetation would be disturbed, and most of that would be reclaimed.	Mitigation measures include avoiding and protecting vegetation to the extent possible; avoiding spills and cleaning up those that occur; restricting public access to minimize trampling; and restoring the land contours and revegetating the disturbed sites following removal of the temporary work of art.	No additional studies are recommended.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.5.5 Invasive, Non-native Species	Actions contributing to the spread of noxious weeds. Coordination was with Tom Grette of the BLM.	Impacts were assessed using existing weed mapping efforts and coordination with weed management programs. Weed occurrences in Fremont County were mapped in 1995 cooperatively among BLM, CDOT, NRCS, and Colorado Parks, and more by BLM in 1998 and 1999. Infestations on the Royal Gorge Planning Area are relatively rare.	Mitigation measures focus on minimizing disturbance of soils, re-establishing native vegetation, using weed-free materials, washing equipment before it enters the site, monitoring for new sites of infestation, and educating the public on weed prevention.	Monitoring for sites with weeds is recommended for the biologists that are proposed to clear sites for TES species.
5.5.6 Forest and Woodland Management	Effects on the piñon-juniper woodlands in the corridor. Coordination was with Ken Reed of the BLM.	Forest type in the corridor is largely piñon -juniper woodland (62 percent), but it is not considered a commercially marketable stand. Effects could include removal or trimming of a small number of trees.	Mitigation measures include avoiding damage to trees to the extent possible and, if limbs are broken, trimming them properly.	No additional studies are recommended.
5.5.7 Range Management	Activities that would degrade allotments or interfere with allotment operations. Coordination was with Tom Grette of the BLM.	The impact approach was based on review of the Royal Gorge Grazing EIS (BLM 1995). OTR activities would occur near some cattle. Temporary traffic congestion could interfere with movements of stock trucks.	No mitigation measures are deemed necessary.	No additional studies are recommended.
5.5.8 Fire Management	Activities that would contribute to increased threat of fire. Coordination was with Ed Skerjanec of the BLM.	The impact approach included review of fire management goals for the Arkansas Subregion #1 of the Royal Gorge Planning Area of BLM and the 2004 Fire Management Plan. Ninety-five percent of fires in this subregion are less than 10 acres. Fire intensity levels are expected to be low. No impacts are expected that would affect fire potential, with the exception of firefighter travel impediments in the corridor during the viewing period.	No mitigation measures are deemed necessary.	No additional studies are recommended.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.6 Aesthetic Resources				
5.6.1 Air Quality	Effects on National Ambient Air Quality Standards (NAAQS) and haze. Coordination was with Mike Gaylord of the BLM.	Impact approach included review of the NAAQS and information from the Colorado Department of Public Health and Environment. The temporary work of art would create vehicular emissions and dust during installation and removal. Vehicular emissions would temporarily decrease air quality during daytime in the viewing period. No air quality standards would be exceeded.	Because no standards would be exceeded, mitigation measures will be used to control fugitive dust. Measures include controlling foot traffic, wetting large areas of installation, reducing vehicular emissions by routing and scheduling, maintaining emission control devices and exhaust systems, and using clean fuel.	No additional studies are recommended.
5.6.2 Noise	Effects of noise from the temporary work of art on people and wildlife.	Traffic on Hwy 50 dominates the river corridor noises, but the drill rigs for anchors create temporary noise ranging from 80 to 90 dBA that can be heard up to 1,000 feet. Drivers in vehicles are not expected to hear the drill rigs. Traffic noise is expected to decrease during viewing because speeds would be much less than normal.	Mitigation measures will minimize installation noise, including using well-maintained mufflers, acoustical shrouds, and quieter backup alarms.	Activities at the Texas Creek training and staging area should be more fully examined for possible noise effects at that location.
5.6.3 Visual Resources	Effects on the visual resources of the river corridor. Preliminary coordination was with John Nahomenuk of the BLM.	Visual resources are addressed by the Visual Resource Management (VRM) program of the BLM. The purpose of the temporary work of art is to place art in the natural environment.	No mitigation measures are deemed necessary.	A full visual inventory of the river corridor should be completed if deemed necessary. However, the temporary nature of the impacts might not deem necessary such an inventory.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.7 Social Resources				
5.7.1 Transportation and Access	Limited traffic congestion for the roadway users, including truckers, local residents, recreationists, interstate travelers, and emergency response vehicles during installation, viewing, and removal of the temporary work of art. Preliminary coordination has been with Pete Zwanefeld, formerly of BLM; Dave Walker of the BLM; and with several members of CDOT, including Tim Harris, Mike McVaugh, Sasan Delshad, and Keith Flowerdew.	Impacts during most of the installation would be limited to eight locations where lane closures are anticipated. Impacts from traffic during the visitation period were based on 2.5 persons per vehicle, from which vehicle numbers were developed. Resultant volume estimate would be sufficient to overwhelm the capacity of US 50 for much of the day. Traffic impacts during removal and restoration would be similar to those encountered during installation.	Some of the following forms of travel mitigation will be necessary: signing, striping, closure of turnouts and pullouts, installation of median rumble strips, and installation of temporary traffic lights. Manual intersection control and restrictions against making certain turning movements might be necessary. Vehicle trip reduction incentives may be aimed at OTR viewers or canyon residents. News releases with details of congestion during peak hours will encourage use of alternate routes, car pooling, or alternate modes of transportation such as bicycles, buses, and trains.	It is recommended that there be further study regarding traffic impacts and transportation management.
5.7.2 Recreation	Effects on recreationists during the installation, viewing, removal, and restoration of OTR. The following recreational activities may be affected: boating, angling, wildlife viewing, bird watching, camping, hiking, rafting, rock climbing, sports, special local events, and other local attractions. Preliminary coordination was with John Nahomenuk of the BLM and Rob White of Colorado State Parks.	The installation, removal, viewing, and restoration of OTR may have impacts on recreationists throughout the presence of working crews, a large increase in human presence, and noise. This presence may decrease the quality of the experience for recreationists seeking peace and tranquility.	Some fabric panels from the original 10.4-mile design of OTR were removed to address the rafting community concerns. Some panels were located in areas that are used for water rescue and were removed to address these concerns. The current design of OTR includes 5.9 miles of fabric panels.	Full impacts from the installation, viewing, and removal of OTR need to be identified for all recreational activities and mitigation measures designed.
5.7.3 Public Art	Effects on public art and the general viewing public.	OTR will attract many thousands of viewers wanting to experience the event. The viewing period will bring joy, beauty, and peace to viewers, and the OTR and permitting process would stir public debate, which will lead to improvements in society.	No mitigation is necessary for this resource.	No additional studies are recommended.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.7.4 Socioeconomics	Effects on employment, income, economy, population, housing, community services, fiscal summaries for affected government jurisdictions, and social attitudes. Preliminary consultation was with Jeanette Pranzo and Chuck Romaniello.	Social impacts include additional requirements for community services and governmental agencies for visitors, employees of OTR, and contractors; and a temporary disruption to a routine way of life for local residents. Economic impacts include employment opportunities for local people during all phases of OTR. Negative economic impacts may be experienced by some particular sectors that rely on certain types of customers who come to the region for a more peaceful experience. The largest economic impact will come from the visitors' expenditures. The largest economic impact would come from the visitors' expenditures, estimated at more than $50 million.	The traffic plan needs to identify measures to be taken to minimize delays in traffic movements through the project area. Measures need to be designed to ensure that community services can provide extended services to handle the influx of visitors and that community infrastructure and groups can handle all local emergencies along the valley.	Further research could be conducted to identify which sectors might experience a negative economic impact from the temporary work of art and to determine what mitigation measures would be possible to reduce impacts on these sectors.
5.7.5 Community Resources and Public Safety	OTR public safety issues include staffing and equipment needs for event, traffic, and emergency response management; emergency management (CDEM, AHRA, county and local EMS), fire protection, and law enforcement (state and county). Issues also include public endangerment as the temporary work of art is installed or if engineering failures occur. River access for user safety and rescue.	The Operations Plans (Appendix J) provide the specific details for meeting community services and public safety needs during the installation, viewing, and removal of OTR. These plans are expected to fully mitigate any identified needs for personnel, equipment, and logistics.	Some fabric panels from the original 10.4-mile design of OTR were removed to address public safety concerns. Some panels had been located in areas that are used for water rescue/emergency response and were removed to address these concerns. The current design of OTR includes 5.9 miles of fabric panels.	All information in this section should be updated in detail for the Draft EIS. The Draft EIS should also include a map of the various service areas for the agencies. To assess project impacts for these resources, the number of projected visitors would need to be compared to the No Action projected visitors. Then additional staffing needs for both viewing time and during installation, removal, and restoration would need to be calculated. Staffing and equipment estimates would be needed for each resource from state to local level. Likelihood of river-related public safety issues based on number of visitors compared with current safety issues could be calculated.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.7.6 Engineering Safety for Extreme Weather Events	Extreme weather events such as wind, precipitation, floods, fire, earthquakes, or hailstorms occurring while OTR is being installed, viewed, removed, or restored.	The OTR team conducted four life-size prototype tests on private property near Mack, northwest of Grand Junction, Colorado, over a period of three years. RWDI (2000) conducted a study of the aerodynamic stability of the proposed fabric panels and the wind loads for the design of the cables and anchors. A fabric rainfall test was performed on an installed fabric panel. The panel fabric is not fireproof but is fire-resistant polypropylene.	Diagonal cables in the Red Rocks and Three Rocks areas are designed for a higher (more than 42 mph) wind speed because of their diminished sensitivity to the wind direction. Because these members are essential components in the cable system, they are treated with an extra measure of conservatism (Golder 2000). Natural hazards associated with heavy rain, snow, floods, and earthquakes are very unlikely to impact the project components during the project viewing period and thus mitigation beyond the measures discussed in Chapter 5 are not considered necessary.	It is recommended by Golder (2000) that although the billowing effect of wind during potential hailstorms would most likely prevent collection of hail on the fabric panels, this condition should be considered during the final design of the work of art to ensure that such hazards are minimized. An evacuation and contingency plan should be created to ensure procedures are in place to allow timely evacuation during the viewing period if extremely high wind storms or severe hailstorms occur, and to provide measures to ensure minimal damage to the surrounding environment and communities from OTR.
5.7.7 Nonhazardous Waste	Availability of wastewater treatment, solid waste transfer stations, and landfills along the project area and, where applicable, restroom availability in the project area.	Based on the lack of existing facilities in this rural corridor, the Proposed Action will need to provide sanitation and trash/recycling services for the duration of OTR.	After provision of required services, no mitigation will be needed.	The information presented in this section needs detailed verification. Existence of services between Salida and Cañon City needs verification. Calculations of the number of Port-o-sans and trash/recycling services are needed.
5.7.8 Regulated and Hazardous Materials	OTR installation and removal activities could increase chances for the accidental release of fuel or other materials from equipment. During the viewing period, increased visitor traffic might increase the risk of highway accidents that could lead to hazardous materials spills.	A reconnaissance of the project area and a database search were performed to identify regulated and hazardous materials, including hazardous or solid wastes potentially occurring within the project area.	All petroleum products and other hazardous materials used for installation purposes will be handled and stored to prevent accidental spillage or other harm to the project area.	The original hazardous materials database search was performed in 1997 and updated in January 2006. However, a full database search should be performed as part of the Draft EIS to update and augment the information provided to date. The database search should be conducted near the completion of the Draft EIS in order to present the most up-to-date information possible.
5.7.9 Land Use	Effects on land use, including residential, small commercial, recreational, and small-scale ranch-based agricultural activities in the project area.	The information regarding land ownership and jurisdiction in the project area was obtained from the BLM and Chaffee and Fremont counties.	No mitigation is required for this resource based on information available at this time.	Impacts and actions related to the Proposed Action and specific accesses to BLM and adjacent private lands need to be identified.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.8 Other Critical Elements of the Human Environment				
5.8.1 Cultural Resources (Historical and Archeological)	Protection of the prehistoric sites in the canyon and the Denver & Rio Grande Western Railroad. Coordination was with Monica Weimer of the BLM.	File and literature searches (Class I survey) and the Class III survey were conducted for the 1997 OTR area of potential effect (APE). Subsequent to changes in the alternative definitions, a 2006 OTR APE has been defined. A flexible APE has been identified for OTR.	Because of the level of traffic and crowd management controls anticipated for OTR, no indirect effects on the identified NRHP Eligible Historic Properties are anticipated. All visual and noise effects on those properties will be temporary. Based on the 1997 survey data available, no mitigation measures will be required.	The 2006 OTR APE definition must be reviewed and approved by the BLM, Colorado SHPO, and other consulting parties. A methodology update would be required upon completion of expanded Class I and III surveys. The OTR APE Class III Survey must be completed for an expanded APE.
5.8.2 Native American Religious Concerns	This proposed temporary work of art must comply with the requirements under the American Indian Religious Freedom Act (AIRFA) and the National Historic Preservation Act (NHPA) that mandate public input from American Indian Tribes when BLM projects may affect Indian religious practices or sacred areas. Coordination was with Monica Weimer of the BLM.	Potentially affected tribes were contacted by the BLM for this project. The tribes were notified of the area of potential effect (as defined under Section 106 of the National Historic Preservation Act) and asked for input. However, the BLM inadvertently destroyed OTR project records of Native American Consultation; thus, Native American Consultation for OTR must start over.	To be completed once Native American Consultation process is redone.	Consultation with potentially affected tribes must be conducted again.
5.8.3 Environmental Justice	This resource is evaluated to ensure that minority and low-income populations and minority-owned businesses do not receive "disproportionately high and adverse effects" as a result of federal actions.	The impact approach determines whether the potentially affected area includes minority and/or low-income populations. If there are minority and/or low-income populations who would be affected, the analysis would determine whether the adverse environmental impacts are likely to fall disproportionately on either population.	If it is confirmed that no direct impacts or disproportionate impacts would occur to minority or low-income populations from the Proposed Action, no mitigation would be required for this resource. However, if direct or disproportionate impacts are identified, then mitigation measures will be needed.	Should there be direct impacts on residents in the low-income areas, it would be necessary to examine the likelihood that impacts would fall disproportionately on the low-income populations.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.8.4 Wilderness/Areas of Critical Environmental Concern/Wild and Scenic Rivers	Potential effects on special management areas, including Areas of Critical Environmental Concern (ACECs) and Wild and Scenic Rivers or Wilderness Study Areas (WSA), from activities related to the proposed temporary work of art.	The impact approach includes identifying special management areas and Wild and Scenic Rivers in the project area and determining potential effects related to the proposed temporary work of art. The McIntyre Hills WSA is located on the south side of the Arkansas River between Texas Creek and Parkdale. About 109,000 acres of the Arkansas River corridor are currently managed as the Arkansas River Special Recreation Management Area by the BLM. A portion of the Arkansas River corridor, about 5,000 acres, is currently managed for recreation as the Arkansas Headwaters Recreation Area (AHRA). There are no Wild and Scenic Rivers in the OTR area.	Mitigation beyond existing management is not recommended at this time. Under the BLM's interim management guidelines, proposed activities in WSAs must (1) be temporary, (2) not cause any substantially noticeable impact following reclamation, and (3) not impair the suitability of the WSA for wilderness designation. Day-to-day management of the AHRA is conducted by the Colorado Division of Parks and Outdoor Recreation in partnership with BLM.	Further investigation as to the status and appropriate documentation of ACECs in the vicinity of OTR should be performed during followup studies. Such investigation should include consultation with BLM.
5.8.5 Farmlands, Prime and Unique	Effects on prime and unique farmlands.	There are no prime and unique farmlands in the corridor (NRCS 1995).	No mitigation measures are deemed necessary.	No additional studies are recommended.

Resource	Issues Addressed and Agency Coordination	Impact Approaches, Findings, and Status	Mitigation Strategies	Recommendations for Further Study
5.9 Unavoidable Adverse Impacts	Potential disturbance to bighorn sheep and potential bird-cable collisions, disruptions to residents' way of life, increases in travel/commuting times, and increases in solid wastes, crowd control, and provision of emergency services.	The impact approach for wildlife impacts used literature review of similar projects. Effects on local communities compared current conditions with existing population, and projected conditions from a short-term, very large population. Crowd control and emergency services were designed using ingress and egress for the canyon, travel times along US 50, and previous experience with large, short-term events.	Wildlife mitigation includes luring sheep away from the river with food and water, maintaining buffer areas, and using devices on the cables to increase visibility. Mitigating crowds includes promoting mass transportation and well-defined driving patterns for area roads, and other means of moving people through the area. Multiple emergency providers will be stationed at intervals along the canyon, including ambulances and helicopters.	Traffic engineering studies should continue to be refined.
5.10 Short-Term Uses versus Long-Term Productivity	Whether any use of natural resources for the short-term work of art would result in any long-term loss of productivity in those same or other natural resources.	Impact assessment involved a checklist approach to describing the natural resources used by the work of art in the short term, then using the checklist again to define which resources would be affected in the long term. All impacts on natural resources will be temporary and/or mitigable, and will not have any long-term effects on productivity.	Various mitigation measures were developed as appropriate for air quality, water quality, soils, vegetation, and wildlife, and these were presented in the respective sections of the Report.	No additional studies are recommended.
5.11 Irreversible or Irretrievable Commitment of Resources	Any irreversible commitment of nonrenewable resources (meaning once committed it is "gone forever"). Irretrievable commitments of resources involve lost use or productivity of resources.	A checklist approach was used to determine whether any committed resource could be reclaimed or returned to its ecological function. If so, it is reversible. Similarly, any resources used or taken out of production during the life of OTR are irretrievable only for its life, but can be restored following removal. No resource commitments were found to be irreversible or irretrievable.	The recycling of steel cables, the fabric panels, and perhaps the concrete anchors is a means of keeping resources in use and preventing them from being irreversibly committed. Reclamation and restoration of the anchor sites will keep those sites from being irretrievably lost.	No additional studies are recommended.

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5.2 Benefits of OTR Studies

The studies that have been accomplished for planning and examining the impacts of OTR have been conducted at no cost to the public or government agencies. These studies will continue to be performed throughout the OTR permitting and operating processes and will provide significant benefits to local communities. Through these studies, OTR has provided and will continue to provide an increase in knowledge about the dynamics of the Arkansas River corridor, including baseline conditions and trends of various environmental and human aspects. For example, OTR has funded the completion of studies on birds, bighorn sheep, soils, and geology, among others. OTR has partnered with the Colorado Natural Heritage Program in funding a study of sensitive plant species in the area. Traffic analyses have been conducted by the OTR team, providing updated data on traffic issues in the corridor. OTR funded research will provide long-term benefits to the canyon communities.

5.3 Biological Resources

5.3.1 Threatened, Endangered, and Special Concern (TES) Species

5.3.1.1 Affected Environment

State- and federal-listed plant and animal species must be protected according to laws such as the Endangered Species Act of 1973. In addition to species listed as threatened and endangered (T&E), those of special concern, including species listed as BLM-sensitive, occur on public lands and have been designated by the state director as having the potential to become endangered or extinct in the state. State species of special concern often were formerly on the state or federal TES lists, are proposed for listing, have experienced a downward trend in numbers or distribution, or are otherwise determined to be vulnerable in Colorado (CNHP 1999a). Often the appropriate federal agency will require presence-absence surveys for these species, as well as for federal candidates, before a ground-disturbing project can take place. This management is to prevent a future federal listing for a species, if possible.

TES species that are known to occur, or are likely to occur, in the project area were determined from USFWS lists (USFWS Letter of February 3, 2006) for Chaffee and Fremont counties and from BLM and state sensitive species listed for these counties (BLM 2000a). The initial list of TES species was evaluated further using data from field observations made by JFSA biologists, coordination with CDOW and BLM biologists, and an evaluation of habitats and distributional ranges of the species in question in relation to the project area.

Animal Species

Table 5.3-1 presents a summary of wildlife species listed as threatened, endangered, candidates for listing, or species of special concern that may inhabit the project area. This table also includes the federal, state, or other special status for each species and potential for the species to occur in the project area. Reasons why a species is not considered to occur in the project area are also indicated in the table. Because breeding, foraging, and hunting habitats are of primary importance for the continued success of these species, a brief description of preferred habitats and their potential to occur in the project area follows for each species not screened out in the table.

Table 5.3-1. Threatened, Endangered and Special Status Wildlife that May Have Habitat within the Arkansas River Valley

Species – Common Name	Species – Latin Name	Status	Excluded from Analysis and Why
Mammals			
Townsend's big-eared bat	*Corynorhinus townsendii* spp. *pallescens*	SC, BLM, USFS	No
Black-tailed prairie dog	*Cynomys ludovicianus*	FC, SC	Yes; there is no preferred habitat of expansive, open plains grassland present in the river corridor.
Northern river otter	*Lutra canadensis*	ST	No
Canada lynx	*Lynx canadensis*	FT, SE, USFS	No
Black-footed ferret	*Mustela nigripes*	FE, SE	Yes; no open plains habitat or prairie dog towns present
Fringed myotis	*Myotis thysanodes*	BLM	No
Yuma myotis	*Myotis yumanensis*	BLM	No
Big free-tailed bat	*Nyctinomops macrotis*	BLM	No
Swift fox	*Vulpes vulpes*	FC, USFS, SC	Yes; no short grass prairie habitat in project area and not recorded in Fremont County (Fitzgerald et al. 1994).
Birds			
Northern goshawk	*Accipiter gentiles*	USFS	Yes; is moderately widespread in the western 50 percent of the state in coniferous forests above 7,500 ft. No observations have been made in Fremont County.
Barrow's goldeneye	*Bucephala islandica*	SC	Yes; it is a non-breeding resident in the western half of the state; is imperiled because of its rarity due to restricted range and few populations (NatureServe 2006).
Ferruginous hawk	*Buteo regalis*	SC, USFS	Yes; the majority of sightings in Colorado have been on the eastern plains with rare to uncommon sightings in San Luis Valley, South Park and Colorado Plateau (CDOW 2003). It might only occur as a transient.
Gunnison sage grouse	*Centrocercus minimus*	FC	Yes; this smaller sage grouse is heavily dependent on large expanses of sagebrush (CDOW 2006d). Populations in Colorado include the Poncha Pass area west of the project area, but there are no large areas of sagebrush in the river corridor.
Mountain plover	*Charadrius montanus*	SC, USFS	No
Western snowy plover	*Charadrius alexandrinus nivosus*	SC	Yes; this bird is critically imperiled in Colorado from rarity and loss of habitat. There are records in 7 southeastern counties only (NatureServe 2006). This plover is not expected in the river corridor.
Black tern	*Chlidonias niger*	USFS	Yes; these birds prefer shallow marshes and open plains. In Colorado, they are known from the southeastern plains, San Luis Valley, North Park and the Western Slope. Breeding is known only from San Luis Valley and Arapaho NWR (USFWS 2006). They nest on floating plant material (NatureServe 2006), so nesting in a riverine habitat is unlikely. Black terns have not been recorded in Fremont County.
Peregrine falcon	*Falco peregrinus anatum*	SC	No
Bald eagle	*Haliaeetus leucocephalus*	FT, ST	No
Long-billed curlew	*Numenius americanus*	SC, USFS	Yes; this bird prefers prairies and grassy meadows, often near water. They nest on short grass prairies. These habitats are not present in the river corridor. NatureServe (2006) has no records of the bird in Fremont or Chaffee counties, but has records of the bird in the Arkansas drainage only at John Martin Reservoir.

Key: FE = federally endangered, FT = federally threatened, SE = state endangered, USFS = US Forest Service sensitive species, ST =State threatened, BLM = Bureau of Land Management sensitive species, FC = federal candidate for listing, SC = state species of special concern.

Species – Common Name	Species – Latin Name	Status	Excluded from Analysis and Why
White-faced ibis	*Plegadis chihi*	USFS	Yes; this is a long-legged wading bird that prefers freshwater marshes, swamps, ponds and rivers. They occur in 12 counties across Colorado, but not in Fremont or Chafee (NatureServe 2006). They occur along the middle Arkansas R. at John Martin Reservoir.
White pelican	*Pelecanus erythrorhynchos*	SC	Yes; pelicans are water birds on rivers, lakes, reservoirs and coastal waters, and primarily eat fish. They are reported from 5 counties in Colorado, in the Platte, upper Colorado, and Gunnison river basins, but not the Arkansas basin (NatureServe 2006), nor from Fremont or Chaffee counties.
Mexican spotted owl	*Strix occidentalis*	FT, ST	Yes; this owl is rare in Colorado and known only from the Mesa Verde Natl Park area (RMBO 2006). Colorado is at the northern periphery of its breeding range (Kingery 1998). None have been observed in the project area.
Fish			
Arkansas darter	*Etheostoma cragini*	FC, SE, USFS	Yes; the range for this fish is from Arkansas and Missouri up the Arkansas River to El Paso and Pueblo counties in Colorado (NatureServe 2006). The largest population is in Missouri. There are no records in Fremont or Chaffee counties.
Iowa darter	*E. exile*	SC	Yes; this fish prefers clear, sluggish vegetated headwaters of creeks, small to medium rivers and marshes and lakes (NatureServe 2006). There are no records for this species in the Arkansas R. basin and records in only one county in northern Colorado (NatureServe 2006).
Orangethroat darter	*E. spectabile*	SC	Yes; this small fish prefers slow to swift riffles in headwaters and creeks and seems to avoid swift currents (NatureServe 2006). The fish is present in the lower Arkansas River basin in Kansas, Oklahoma, and Arkansas, but no records are shown in the Arkansas R. basin in CO.
Plains topminnow	*Fundulus sciadicus*	SC, USFS	Yes; this member of the killifishes is well distributed in tributaries of the South Platte River in Nebraska and downstream, but only 21 to 100 occurrences are estimated in Colorado, all in the South Platte basin (NatureServe 2006). There are no records from the Arkansas R. basin in Colorado.
Flathead chub	*Hybopsis gracilis*	SC, USFS	Yes; this fish ranges from Canada to Texas but only occurs in the S. Platte and Rio Grande rivers in Colorado (NatureServe 2006). It was historically in the Arkansas R., but no longer occurs there.
River shiner	*Notropis blennius*	SC	Yes; centered in the Missouri and Mississippi River basins, it ranges from Hudson Bay to Texas. It occurs in Colorado only in the S. Platte basin (NatureServe 2006). It does occur in the lower Arkansas R. basin in Kansas and Oklahoma.
Stonecat	*Noturus flavus*	SC	Yes; this catfish ranges from Canada to Oklahoma, from Vermont to Montana, but only occurs in Colorado in the S. Platte R. basin (NatureServe 2006).
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	FT, ST, USFS, BLM	No
Southern redbelly dace	*Phoxinus erythrogaster*	SE	No

Key: FE = federally endangered, FT = federally threatened, SE = state endangered, USFS = US Forest Service sensitive species, ST = state threatened, BLM = Bureau of Land Management sensitive species, FC = federal candidate for listing, SC = state species of special concern.

Species – Common Name	Species – Latin Name	Status	Excluded from Analysis and Why
Amphibians			
Northern cricket frog	*Acris crepitans*		Yes; this frog is declining in the northwest of its range and is presumed extirpated in Colorado (NatureServe 2006). It occurs in Nebraska and Kansas and the lower Arkansas R. basin.
Boreal toad	*Bufo boreas boreas* pop 1 (Southern Rocky Mt. population)	SE, USFS	No
Northern leopard frog	*Rana pipiens*	USFS, BLM, SC	No
Plains leopard frog	*R. blairi*	SC	No
Reptiles			
Common kingsnake	*Lampropeltis getula*	SC	Yes; while this snake is very cosmopolitan in habitat selection, there are only records from Bent, Montezuma and Otero counties in Colorado, and at Lake Meredith and John Martin Reservoir on the Arkansas R. (NatureServe 2006).
Utah milksnake	*L. triangulum taylori*	SC, USFS	Yes; the potential distribution of this snake in Colorado is unclear. It is known from 4 northern counties in Arizona and several drainages tributary to the Colorado R. (NatureServe 2006). No records exist from southeast Colorado. Observations may be confused with the common milksnake which is widespread in the east half of Colorado.
Texas horned lizard	*Phrynosoma cornatum*	FC, SC, USFS, BLM	No
Massasauga	*Sistrurus catenatus*	SC	Yes; this small rattlesnake is very cosmopolitan in habitats and there is a relatively large population in Colorado (NatureServe 2006). Records are present in 10 southeastern counties but not Fremont or Chaffee, including Lake Meredith and John Martin Reservoir along the Arkansas R.
Invertebrates			
Uncompahgre fritillary butterfly	*Boloria acrocnema*	FE	Yes; it is endemic to alpine meadows in the San Juans and lives in patches of snow willow (NatureServe 2006). This habitat is not present in the river corridor.

Key: FE = federally endangered, FT = federally threatened, SE = state endangered, USFS = US Forest Service sensitive species, ST = state threatened, BLM = Bureau of Land Management sensitive species, FC = federal candidate for listing, SC = state species of special concern.

Source: BLM 2000a

Mammals

Townsend's big-eared bat *(Corynorhinus townsendii)*. All Colorado bats are protected as nongame mammals, and Townsend's big-eared bat is on the BLM and Forest Service sensitive list. The BLM considers it imperiled in the state because of its rarity (BLM 2000a). This bat species inhabits semidesert shrublands, piñon-juniper woodlands, and open montane forests. These bats predominantly use caves, abandoned mines, rocky crevices, and buildings as day roosts and hibernacula (Burt and Grossenheider 1980; CNHP 1998; K. Navo, CDOW, pers. comm. 1999). They are relatively sedentary and are not known to travel far from hibernacula to summer roost or forage sites (Fitzgerald et al. 1994). Winter retreats to hibernacula start in August and peak in September, subsiding with the onset of colder weather. A second increase in activity occurs in April as bats disperse to summer use areas. Bat activity increases from April to July when the bats are giving birth and feeding young. Townsend's big-eared bat was documented within the Royal Gorge region of the Arkansas River during surveys in 1993 (K. Navo, CDOW, pers. comm. 1999). A winter hibernaculum has been documented in the vicinity of Tallahassee Creek north of the river, and two roost sites have been documented within the project area. One is a maternity roost documented east of Salida near Longfellow Gulch, and the second is a summer roost in the Royal Gorge area (K. Navo, CDOW, pers. comm. 1999). The winter hibernacula could be within a ½ mile of the Parkdale Area; the maternity roost could be within 1/2 mile of the County Line Area.

Northern river otter *(Lutra canadensis)*. Historically, northern river otters were widely distributed in the major waterways of Colorado, but it is believed that the species was extirpated from the state during the 1900s, primarily through a combination of human activities. Since river otter habitat still exists in the state, CDOW started a reintroduction program in the otter's historical range beginning in 1976. Otters were introduced to the South Platte, Gunnison, Piedra, and Dolores rivers, and to the headwaters of the Colorado River. Reproduction appears successful in the Rocky Mountain National Park population and colonization is occurring outside the park (USDA 2005). Current surveys and sightings suggest that the species is surviving. The eventual goal is to establish breeding populations that will result in the removal of the river otter from the state endangered species list. Reduced stream flows and riparian habitat destruction, however, can be deterrents to recovery in some locations (CDOW 2001).

River otters inhabit riparian areas covering a variety of habitats ranging from semidesert shrubland to montane and subalpine forest. Suitable otter habitat is composed of a perennial water source of high quality, access to shores, and an abundant fish population (Fitzgerald et al. 1994). River otters are not known to use the main stem of the Arkansas River, but they are present within the headwaters of the drainage basin and therefore potentially could occur within the project area.

Canada lynx *(Lynx canadensis)*. The preferred habitat of the Canada lynx is predominately uneven-aged stands of coniferous forest with an open canopy and well-developed understory. This is also the preferred habitat of the snowshoe hare (*Lepus americanus*), the primary food source for the Canada lynx (Fitzgerald et al. 1994). CDOW initiated a reintroduction program in 1999, and 204 lynx had been released in the southwestern portion of the state through 2005. CDOW currently tracks 110 lynx via radio collars, and they plan to release up to 15 additional lynx each year from 2006 to 2008 (CDOW 2005). According to Dr. Tanya Shenk (CDOW, pers. comm.), lynx dispersal is not restricted by physical barriers and therefore the species has the potential to be found in all habitat types within Colorado.

The distribution of lynx in North America is closely associated with the distribution of North American boreal forests (Agee 2000), including the Rocky Mountains. Within the boreal forests, lynx are most likely to persist in areas that receive deep snow, to which the lynx is highly adapted (Ruggiero et al. 2000). In Colorado, the southern boreal forests become naturally fragmented as they transition into other vegetation types. In the Arkansas River corridor east of Salida, coniferous forests transition into more open piñon-juniper forests, which are unlikely to support resident populations of lynx and their primary prey species.

Lynx location maps of all the radio locations and physical sightings include sightings south and west of Cañon City and a small number of sightings in the river corridor around Texas Creek and Salida. Recorded lynx sightings then increase dramatically west of Salida. The lynx sightings in the river corridor may be considered random, transient animals that were in the process of dispersal, but it is unlikely they were residents.

Fringed myotis *(Myotis thysanodes)*. The fringed myotis, a BLM sensitive species, is primarily found in western North America from southern Canada to southern Mexico. They occur in 14 states, including Colorado (Keinath 2004). Throughout their range, fringed myotis use caves, mines, and buildings as maternity colonies, solitary day and night roosts, and hibernacula (Keinath 2004). They regularly roost underneath bark and inside hollows of tree snags, particularly ponderosa pine and Douglas-fir in medium stages of decay (Keinath 2004). They feed on a variety of insect classes when they become abundant, but beetles always constitute a large portion of their diet (Keinath 2004).

A collecting survey was conducted in southeastern Colorado during 1977 and 1978. Ellinwood (1978, cited in Keinath 2004) collected 231 bats, 3 of which were fringed myotis. They were captured at elevations ranging from 3,400 to 9,095 feet above mean sea level all in piñon-juniper habitat near cliffs and canyons. This kind of habitat is very common in the Arkansas River corridor. While this bat uses

other types of habitats, the most common are oak, piñon, and juniper woodlands or ponderosa pine forest. A general characterization of their preferred habitat is that it is dry and has open areas interspersed with mature forests, creating complex mosaics with ample edges and abundant snags (Keinath 2004). There is potential habitat for this myotis along the Arkansas River corridor, but the numbers of individuals is expected to be low.

Yuma myotis *(Myotis yumaensis)*. The Yuma myotis is a small bat that ranges along the west coast of North America from Canada to Mexico and inland to Idaho and Colorado. They are concentrated in the southwestern part of the state. The Colorado Natural Heritage Program estimates there are 21 to 100 occurrences in Colorado (NatureServe 2006). This bat is more commonly associated with water than most bats, but uses a wide variety of habitats from deserts to woodlands. It is a low-flying bat and predominantly feeds on moths over water. It comes out after dark to feed and roosts during the day. Nursery colonies use buildings, caves, mines, and the underside of bridges (NatureServe 2006). There is potential habitat for this myotis along the Arkansas River corridor.

Big free-tailed bat *(Nyctinomops macrotis)*. This bat is a large bat that ranges from southwestern North America to South America. Colorado and Utah are at the northern extent of its range. Trapping results include 34 in UT and 13 and 69 in Big Bend, Texas, in 1996 and 1997, respectively. They occur in colonies of less than 150 individuals (NatureServe 2006). They roost singly or in small groups. The bat is a powerful flyer and can forage over 100 miles in a night (NatureServe 2006). Preferred habitat is rocky areas in rough country, especially in southwestern United States and Mexico. Potential habitat may occur in the Arkansas River corridor, but the bat would be expected only as a rare migrant.

Birds

Mountain plover *(Charadrius montanus)*. Colorado is the primary breeding ground for the mountain plover; more than half the world's population nests in the state (CDOW 2006b). Despite their name, their preferred habitat is shortgrass prairies, arid plains, and fields. Nesting plovers choose shortgrass prairies grazed by prairie dogs, bison, and cattle, and overgrazed tallgrass and fallow fields. In Colorado, major breeding areas are in the Pawnee National Grasslands in northeastern Colorado and in southeastern Colorado. There are breeding records from 28 counties in Colorado, primarily in the eastern half of the state, but including several southern and Western Slope counties. There are, however, no breeding records in Chafee, Fremont, or Teller counties (NatureServe 2006). Very little of the shortgrass habitat extends up the Arkansas River valley from the eastern plains, so mountain plover would not be expected in the river corridor.

Peregrine falcon *(Falco peregrinus anatum)*. After a precipitous decline in populations nationwide, the peregrine falcon is rebounding after extensive reintroduction efforts. In fact, the species has been removed from the federal and state endangered species lists and currently is a species of special concern in Colorado. Peregrine falcons nest predominately in sheltered overhangs on high cliffs. Preferred habitats include piñon-juniper or ponderosa pine (*Pinus ponderosa*) forests (Kingery 1998) in the vicinity of rivers or lakes where they can hunt (Udvardy and Farrand 1994). The cliffs along the Royal Gorge of the Arkansas River provide high quality nest sites for the peregrine falcon (J. Craig, CDOW, pers. comm. 1999).

Three nests have been located in the project area since 1987 (BLM 2000b). The nest locations are shown on the wildlife resources map in Appendix D1.

1. An active peregrine falcon nest occurs in the Royal Gorge, approximately 7 miles east of Parkdale. One pair of falcons is known to have reoccupied a historical nest site along the cliffs of the Royal Gorge since 1988 and has successfully fledged young every year to the present, although no observations of the nest were made in 2005 (B. Bibles, CDOW, pers. comm. 2006). The typical clutch size for peregrine falcons is two or three chicks annually. Birds nesting in the Royal Gorge,

however, have successfully fledged up to four offspring in a given year, probably due to the high quality of the surrounding habitat for peregrines.

2. A nest was located northeast of the highway intersection of US 50 and Colorado 9 (BLM 2000b).
3. A third nest has been located north of Echo Canyon in an area northwest of the Three Rocks Area (BLM 2000b).

Additionally, a peregrine aerie was established near Granite below Clear Creek reservoir on the east side of the Arkansas River. The site is approximately 45 miles north of Salida. Falcons have successfully fledged young from that nest for several years since its establishment in 1996 (AHRA 1996).

While the cliffs of the Royal Gorge are not in the project area, the temporary work of art is within hunting range of nest sites in the gorge. Peregrine falcons typically hunt within 10 miles of their nest site (J. Craig, CDOW, pers. comm. 1999). This species is known to feed on pigeons, starlings, blackbirds, ducks, flickers, jays, and mourning doves, some of which would be found in riparian habitats such as the Arkansas River drainage. Besides river bottoms, preferred hunting habitats include cropland, meadows, marshes, and lakes. Peregrine falcons have a wide foraging range and most likely hunt the Arkansas River at least through the lower part of the project area near Parkdale.

Bald eagle *(Haliaeetus leucocephalus)*. Bald eagles are seldom seen far from water. In Colorado they are often found near reservoirs, especially when fish are abundant. In 2001, there were about 51 nesting pairs of bald eagles in the state (CDOW 2006c). Colorado populations of bald eagles use large cottonwood trees and Colorado blue spruce (Kingery 1998) that are located along rivers and reservoirs for their nest sites. Bald eagle densities reach their peak in the winter when populations receive a boost due to the influx of migrants from the north (J. Craig, CDOW, pers. comm. 1999). The San Luis Valley in the southern part of the state is one of their favorite places because of its supply of fish and waterfowl from open water as well as its high population of rabbits and rodents (CDOW 2006c). Eagles also hunt over prairie dog towns in winter.

From late November to March in a typical year, no more than four to five bald eagles winter along the river from Parkdale to Salida (E. Brekke, BLM, pers. comm. 2006). Much of the bald eagle use in the river corridor occurs along private lands in the Howard, Coaldale, and Swissvale areas where there are many large trees along the river. The area from Texas Creek to Parkdale does not experience as much use by bald eagles because the highway and traffic disturbance occurs close to the river and there are few large trees for perching. There are usually too few eagles in the river corridor for them to gather at "communal roosts" in the winter. No bald eagle nests have been documented along the Arkansas River (E. Brekke, BLM, pers. comm. 2006), but a bald eagle nest occurs approximately 10 miles north of Cañon City on Four-mile Creek (B. Bibles, CDOW, pers. comm. 2006).

Fish

Greenback cutthroat trout *(Oncorhynchus clarki stomias)*. The greenback is native to the headwaters of the South Platte and Arkansas River drainages within Colorado and a small segment of the South Platte drainage within Wyoming (USFWS 1998). The greenback cutthroat trout is a federally and state-listed threatened species that has been reintroduced into smaller secondary streams and now occurs in 61 sites in the upper tributaries of the South Platte and Arkansas River drainages. As of 1998, three stable, self-sustaining populations of greenback cutthroat trout occurred in the Arkansas River drainage headwaters (USFWS 1998). This trout is adapted to cold, clear, well-oxygenated mountain streams with moderate gradients, rocky to gravelly substrates, and abundant riparian vegetation. They may also occur in ponds and lakes in the high country. Several TES fish species are present within the Arkansas River watershed; however, according to the CDOW, none of the species is likely to be present within the project area (USFWS 1998). Any occurrences of the greenback cutthroat trout in the main stem of the Arkansas River would be considered rare.

Southern redbelly dace *(Phoxinus erythrogaster)*. The redbelly dace is a small (2.5 in.) fish that is an herbivore, feeding on algae and detritus (NatureServe 2006). In Colorado, this dace is confined to the St. Vrain River in Boulder County and the Arkansas River in Fremont and Pueblo counties. Much of the total population occurs in Oklahoma and Arkansas (NatureServe 2006). The preferred habitat for this small fish is small streams and ponds over sand or silt (CDOW 1994), in headwaters, and in upland creeks. These fish are critically impaired in Colorado, are rare, and are restricted to a few localities. Because of their small size and preference for low currents or calm water, they are not expected in the Arkansas River corridor.

Amphibians

Boreal toad *(Bufo boreas)*. The boreal toad ranges from southern Alaska to Utah and portions of the mountains in Colorado. Their range includes the west coast states into northern California (Baxter and Stone 1985, cited in CDOT 2006a). This species is currently listed by Colorado as endangered and is a Forest Service sensitive species. In 1995, the USFWS determined that federal listing was warranted but the southern Rocky Mountain population (SRMP) was precluded from listing due to the need for action on higher priority species (NatureServe 2006). The USFWS issued a final notice on September 29, 2005, that listing the toad as endangered was not warranted because the SRMP does not constitute a species, subspecies, or distinct population segment, so the SRMP was withdrawn from candidate status (CDOT 2006a).

Within Colorado, the boreal toad occurs in most high elevation mountain ranges including the Front, Gore, Mosquito and Ten Mile ranges, and the White River Plateau (Keinath and McGee 2005, cited in CDOT 2006a). The elevation range for this species within the southern Rocky Mountains is between 7,000 and 12,900 feet (Nesler and Goettl 1994, cited in CDOT 2006a), and is usually found between 8,000 and 11,000 feet. This population is unique from other North American populations in its precipitous, well-documented population decline over the past 15 to 20 years. Given the paucity of numbers of individuals and the typical elevation range for this toad, any occurrence of the toad in the Arkansas River corridor would be considered rare.

Northern leopard frog *(Rana pipiens)*. This frog species occurs throughout much of Colorado, except for the southeastern and east-central portions of the state (Hammerson 1999, cited in CDOT 2006a). They may be found from below 3,500 feet to over 11,000 feet. The northern leopard frog is a BLM- and USFS-sensitive species and a Colorado species of special concern due to population decreases. Typical habitat for the northern leopard frog includes wet meadows and shallow areas of marshes, ponds, lakes, reservoirs, streams, and irrigation ditches. Usually, leopard frogs occur at the water's edge, but they may roam far from permanent water in wet meadows or during mild wet weather (Hammerson 1999, cited in CDOT 2006a). Although observations of northern leopard frogs have not been documented along the Arkansas River, suitable habitat (moist riparian forest, wetlands below 11,000 feet elevation) exists within the project area for the amphibian. However, because no observations have been recorded, occurrences of the leopard frog along the river corridor would be considered rare.

Plains leopard frog *(R. blairi)*. The range of this frog is confined to 11 states in the center of the country and eastern Colorado represents the western edge of that range. There are records of the frog (over 100 sites) in 13 southeastern counties in Colorado but not in Fremont or Chaffee counties (NatureServe 2006). They occur in the lower Arkansas River drainage (below 5,400 feet elevation), especially at Lake Meredith and John Martin Reservoir. The preferred habitat for the plains leopard frog is flat water of lakes, ponds, and reservoirs, but will occur in low gradient streams and almost all categories of wetlands. Individual frogs travel to different locations on a year-to-year basis, covering average distances of 1.8 miles (NatureServe 2006). In eastern Colorado, *Rana blairi* hybridizes with *R. pipiens.* Because of their preference for calm water habitats at lower elevations, occurrences of the plains leopard frog are not expected in the Arkansas River corridor.

Reptiles

Texas horned lizard *(Phrynosoma cornatum)*. The Texas horned lizard is a BLM and USFS sensitive species as well as a Colorado species of special concern. This species prefers arid and semiarid open country where vegetation is sparse and ranges up to 6,000 feet in elevation (Stebbins 1966). This lizard occurs across the south-central United States and northern Mexico. Harvester ants comprise 69 percent of the typical lizard's diet (NatureServe 2006). The Texas horned lizard is documented from eight southeastern counties in Colorado but not Fremont or Chaffee (NatureServe 2006). Despite the lack of documented populations in either county, suitable habitat is present and there is a possibility an extant population could occur in the project area.

Plant Species

Three sources were used to prepare the list of sensitive plant species (Table 5.3-2): the BLM State Director's Sensitive Species List (2000a), the BLM Cañon District Plant List (N.D.a), and the CNHP element occurrence records. Both BLM sources had separate and different lists for the Royal Gorge Field Office. Additionally, a sensitive plant species field survey was conducted in summer 2006 (CNHP 2006, unpublished).

Table 5.3-2. Threatened, Endangered, and Special Status Plants that May Have Habitat within the Arkansas River Valley

Species – Common Name	Species – Latin Name	Status	Excluded from Analysis and Why
Rock-loving aletes	Aletes lithophilus (*formerly* Neoparrya lithophila*)*	*FC, SR, BLM, FS	No
Golden columbine	*Aquilegia chrysantha* var. *rydbergii*	*FC, SR	Yes; plants known only from 3 to 5 locations in Colorado (depending on definitions) and about 1,500 individuals (NatureServe 2006). Prefers riparian habitats and rocky ravines in mountainous regions of Fremont and El Paso counties (CNHP 1999b). Plants are fairly abundant in a 60-sq.-mi. area between Colorado Springs and Cañon City. USFWS listed the species in Notice of Review for Listing as Endangered or Threatened in 1985 (NatureServe 2006). It is not expected in the river corridor.
Dwarf milkweed	*Asclepias uncialis*	*FC, SR, BLM, FS	Yes; TNC ranks this species critically imperiled because of rarity. Preferred habitat is shortgrass prairie on mesa tops and on the plains (Weber 1999, CNHP 1998). Is most commonly found on sandstone-derived soils or on gravelly/rocky slopes between 4,000 and 6,500 feet. The species occurs in eastern Fremont County, but habitat is not present in the Arkansas R. corridor and the species is not expected to occur in the project area.
Low northern sedge	*Carex concinna*	SR, BLM	No
Livid sedge	*C. livida*	SR, FS	Yes; species ranges from Canada south to Colorado where it is critically imperiled and very rare (NatureServe 2006). The preferred habitat is bogs and it is known only from Jackson, Larimer, and Park counties in the Platte R. drainage (NatureServe 2006). It is not expected in the Arkansas R. corridor.
Grassy slope sedge	*C. oreocharis*	BLM	No
Little green sedge	*C. viridula*	*FC, SR, BLM, FS	Yes; species ranges from Canada to NM and is critically imperiled in Colorado. It occurs in Gunnison, Jackson, LaPlata, Park, and San Juan counties and in the drainages of the Platte and Colorado Rivers (NatureServe 2006). It is not expected in the Arkansas R. corridor.
Brandegee wild buckwheat	*Eriogonum brandegei*	*FC, SR, BLM, FS	No

BLM=BLM sensitive; *FC=formerly candidate species; FE=federal endangered; FS=Forest Service sensitive; FT=federal threatened; FE=federal endangered; SR=state rare.

Species – Common Name	Species – Latin Name	Status	Excluded from Analysis and Why
Slender cottongrass	*Eriophorum gracile*	SR	Yes; Species ranges from Alaska to California and Colorado, where it is imperiled. It is known from Grand, Gunnison, Jackson and Park counties, and in the Platte and Colorado River headwaters (NatureServe 2006). It is not expected in the Arkansas R. corridor.
Showy prairie gentian	*Eustoma grandiflorum*	*FC, SR, BLM, FS	Yes; species ranges from Colorado and Nebraska to Mexico. It occurs in 10 counties in CO, including Fremont (USDA 2006). The plant is native to prairies and fields and is not expected in the Arkansas R. corridor.
Penland's alpine fen mustard	*Eutrema edwardsii* ssp. *penlandii*	SR, FT, BLM	Yes; species is endemic to a 24-mile length of the Continental Divide near the border of Park and Summit counties. This taxon is the only *Eutrema* in the US (NatureServe 2006). It is known from Mosquito Pass west of the river corridor but fens are not present in the Arkansas R. corridor.
Northern twayblade	*Listera borealis*	SR, BLM	No
Golden blazing star	*Nuttalia chrysantha* formerly *Mentzelia chrysantha*	SR, BLM, FS	Yes: Species is categorized by TNC as critically imperiled and is vulnerable to extirpation from the state. Plant is endemic to the Arkansas R. Valley between Pueblo and Cañon City. Preferred habitat is on barren slopes of limestone, shale, or clay at elevations from 5,120 to 5,700 feet (CNHP 1998). Because this habitat is not present and elevations are too high, this species is not expected to occur in the Arkansas R. corridor.
Arkansas Canyon stickleaf	*Nattalia densa* formerly *Mentzelia densa*	*FC, SR	No
Few flowered ragwort	*Packera pauciflora* formerly *Senecio pauciflorus*	SR, BLM	Yes; this member of the Aster family is critically imperiled in Colorado, which is the southern extent of its range. It is known only from Park County in the S. Platte River drainage (NatureServe 2006). It is not expected in the Arkansas River corridor.
Arkansas River feverfew (formerly Barnaby's feverfew)	*Bolophyta tetraneuris* formerly *Parthenium tetraneuris*	*FC, SR	No
Degener beardtongue	*Penstemon degeneri*	*FC, SR, FS, BLM	No
Greenland primrose	*Primula egaliksensis*	SR, BLM, FS	Yes; this primrose family member only occurs in Wyoming and Colorado in the US where it is critically imperiled and imperiled, respectively. In Colorado, it occurs only in Park County in the S. Platte River drainage (USDA 2006). It is not expected in the Arkansas River corridor.
Porter feathergrass or false needlegrass	*Ptilagrostis porteri*	*FC, SR, FS	Yes; this grass is endemic to Colorado in Park, Summit and El Paso counties. It is in the Fountain Cr. Drainage but not known in the Arkansas mainstem (USDA 2006). Habitat is subalpine meadow, willow bogs, and boggy wetlands elevated above the water table (NatureServe 2006). Habitat is not present in the Arkansas R. corridor and the plant is not expected.
Silver willow or sageleaf willow	*Salix candida*	SR	Yes; this shrub willow ranges from Canada to Colorado. It is known from four counties in Colorado but not Chaffee or Fremont. Is known to be in the upper S. Platte R. drainage and upper tributaries to the Colorado R. (NatureServe 2006). It is not expected in the Arkansas R. corridor.
Low blueberry willow	*S. myrtifolia*	SR, FS	No
Autumn willow	*S. serissima*	SR, FS	No

BLM=BLM sensitive; *FC=formerly candidate species; FE=federal endangered; FS=Forest Service sensitive; FT=federal threatened; FE=federal endangered; SR=state rare.

Species – Common Name	Species – Latin Name	Status	Excluded from Analysis and Why
Weber saw-wort	*Saussurea weberi*	*FC, SR, BLM	Yes; this member of the aster family is native to CO, where it is imperiled. It occurs in Lake, Park and Summit counties at high elevation (USDA 2006). Preferred habitat is limestone derived substrates in subalpine to alpine gravelly tundra slopes in scree (NatureServe 2006). It occurs in tundra, alpine wetlands, meadows, and cushion plant communities from 8,000 to 12,000+ ft. elevation. This is alpine habitat; thus the plant is not expected in the Arkansas R. corridor.
Pale blue-eyed grass	*Sisyrinchium pallidum*	*FC, SR	No
Little bulrush	*Trichoforum pumilum* formerly *Scirpus rollandii*	SR, FS	No

BLM=BLM sensitive; *FC=formerly candidate species; FE=federal endangered; FS=Forest Service sensitive; FT=federal threatened; FE=federal endangered; SR=state rare.

Rock-loving aletes *(Aletes lithophilus,* formerly *Neoparrya lithophila)*. The Nature Conservancy ranks this species as imperiled because of rarity. The rock-loving neoparrya is endemic to Chaffee, Conejos, Fremont, Huerfano, Rio Grande, and Saguache counties. It is most common in igneous outcroppings or sedimentary rock derived from volcanic parent material on north-facing cliffs. It is associated with piñon-juniper woodlands between 7,000 and 10,000 ft. This species has been reported in Longfellow Gulch, just east of Salida in the river corridor (BLM 2000a).

Low northern sedge (also beautiful sedge) *(Carex concinna)*. Species ranges from northern Canada south to Colorado, which is the southern extent of its range. It is critically imperiled in Colorado, where it is known only from Chaffee, Clear Creek, and Summit counties (NatureServe 2006). It is present in the headwaters of the Arkansas River, and associated with cool, moist forests with mosses on rich peaty soil. It has potential, but is unlikely to be present in the river corridor in Fremont County.

Grassy slope sedge *(Carex oreocharis)*. TNC ranks this species as vulnerable throughout its range or found locally in a restricted range and critically imperiled in Colorado because of extreme rarity. It is known from Boulder, Conejos, Custer, El Paso and Park counties. It is known from the Arkansas River headwaters and Fountain Creek (NatureServe 2006). This sedge prefers rather dry, upland slopes and grassland hills in granite soils (Hermann 1970). There is a known location recorded near Cotopaxi (CNHP 1998).

Brandegee wild buckwheat *(Eriogonum brandegei)*. This species is federally listed as endangered. It is critically imperiled in Colorado because of rarity and is especially vulnerable to extirpation (CNHP 1998). Preferred habitat is on dry limestone or shale soils between 5,700 and 7,600 ft above mean sea level (AMSL). The largest known population of the plant is in the proposed Droney Gulch Natural Area, about 1 mile west of Salida. The population closest to the Arkansas River is approximately 2 miles south of Salida and approximately 4 miles west of the County Line Area. Because dry limestone and shale-derived soils do not occur along the banks of the Arkansas River, this species is not expected to occur close to the river itself.

Northern twayblade *(Listera borealis)*. This plant is in the orchid family and is a native perennial forb/herb that ranges from Alaska to the central United States. Colorado is the southern extent of its range. Its conservation status is not ranked but it is imperiled in Colorado (USDA 2006). It is associated with moist spruce forests and is known in Chaffee County along the headwaters of the Arkansas River, but has not been reported in any counties downstream (NatureServe 2006). Its presence in Fremont County is possible, but it is unlikely to occur within the Arkansas River corridor.

Arkansas Canyon stickleaf *(Nuttallia densa,* formerly *Mentzelia densa)*. The TNC ranking for the Arkansas Canyon stickleaf is that it is imperiled globally and in Colorado due to rarity. The BLM also

lists this species as sensitive. This species is known to occur only in a small portion of the Arkansas River drainage in Fremont and Chaffee counties, where it is locally abundant (S. Neid, CNHP, pers. comm. 2006). The Arkansas Canyon stickleaf flowers during July and early August and sets fruit from early August into September (CNHP 1999b). It has a tumbleweed growth form. The Arkansas Canyon stickleaf occurs in washes, in naturally disturbed areas, and on rocky, dry open slopes (for example, gravel and scree). These habitats are often dominated by piñon pine, sagebrush, or mountain mahogany between 5,800 and 7,200 feet AMSL. This habitat type is located in upland regions of the Arkansas Valley in the project area (CNHP 1998).

Extensive populations of stickleaf were observed during field investigations in August 2005 and summer 2006 near Cotopaxi (north of the river at Henthorn Gulch and Bernard Creek and extending east of Cotopaxi for approximately 2 miles), around Texas Creek (north of the river between Reese Gulch and Texas Creek), near milepost 257 (south of the river), between mileposts 261 and 262 (south of the river), and in much of the length of the Spike Buck and Parkdale areas (south of the river).

The stickleaf occurs on both sides of the river and even on the south side of US 50, in some locations. It is often abundant on the north side but is sporadic and with low numbers of individuals on the south side (S. Neid, CNHP, pers comm. 2006). This plant occurs at all of the planned panel locations on the north side of the river. It occurs on the south side of the river at the panel locations at Vallie Bridge, Texas Creek, Three Rocks, Maytag, Spike Buck, and Parkdale. It occurs south of the highway at the panel locations for Vallie Bridge, Spike Buck, and Parkdale (S. Neid, CNHP, pers. comm. 2006).

Arkansas Canyon feverfew, (*Bolophyta tetraneuris*, formerly Barnaby's feverfew, *Parthenium tetraneuris)*. The TNC considers this species "vulnerable" throughout its range or "found locally" in a restricted range. It is known to occur in eastern Fremont County, Chaffee County, and western Pueblo County. The preferred habitat for the Arkansas Canyon River feverfew is on the tops of cliffs and bluffs of a variety of rock types. This species is usually associated with open piñon-juniper woodlands from 4,800 to 5,600 feet AMSL. These elevations are somewhat lower than in the river corridor but habitat may be present in the project area.

Degener beardtongue *(Penstemon degeneri)*. The Degener beardtongue is a native perennial forb in the figwort family. It is endemic to central Colorado and is listed by the TNC as imperiled globally and in Colorado (NatureServe 2006). The plant occurs in coarse gravelly or rocky soils with igneous bedrock and in cracks of large rock slabs at elevations between 6,000 and 9,500 feet AMSL. The species is generally associated with piñon-juniper woodland and montane grassland upland habitats (NatureServe 2006), but has a broad range of adaptability. Known populations are concentrated in the area of Royal Gorge and to the west, with one population occurring south of US 50 near milepost 259 in the Arkansas River canyon near the western extent of the Spike Buck area (BLM 2000a).

Blueberry willow *(Salix myrtifolia)*. The blueberry willow ranges across Canada but extends into the United States only in Wyoming and Colorado (USDA 2006). In Colorado, there are records for this willow only in Park County, in the headwaters of the Arkansas River drainage. Preferred habitat includes muskegs, fens, lakeshores, and stream banks (USDA 2006). Being present in the headwaters of the Arkansas River drainage means this species could be present in the river corridor in Chaffee County, but because it occurs in calcareous fens, is not expected to occur in the project area.

Autumn willow *(S. serissima)*. This tall shrub ranges across boreal North America south to Colorado, where it is critically imperiled (NatureServe 2006). There are records in Colorado from seven counties, including Park and Custer in the Arkansas River drainage. Preferred habitat includes cold, calcareous bogs, limy swamps, boggy meadows, lakeshores, and stream banks at elevations from 7,800 to 9,300 feet AMSL (USDA 2006). They grow in marshes and fens under aspen and with other willows, rushes, and

ash. Being present in the headwaters of the Arkansas River drainage means this species could be present in the river corridor in Chaffee County, although it may prefer higher elevations.

Pale blue-eyed grass *(Sisyrinchium pallidum)*. This perennial member of the iris family is a regional endemic in southeast Wyoming and north-central Colorado. It is locally abundant and increasing in Wyoming with the increase in flooded hay meadows (NatureServe 2006). In Colorado, it is known from Chaffee, Jackson, Larimer, Park, and Saguache counties. The plant is present in the North and South Platte River headwaters as well as the Rio Grande and Arkansas River headwaters. Preferred habitat is wet, poorly drained meadows, stream banks, road ditches, and flooded hay meadows from 8,000 to 9,500 feet AMSL (NatureServe 2006). It is more common in less inundated areas of wetlands in water that is slightly alkaline (NatureServe 2006). Being present in the headwaters of the Arkansas River drainage means this species could be present in the river corridor in Chaffee County, although it seems to prefer higher elevations than those in the eastern part of the County, and is unlikely to occur within the project area.

Little bulrush *(Trichoforum pumilum,* formerly *Scirpus rollandii)*. This species of bulrush is in the sedge family and ranges across Canada to Alaska and south to California, Idaho, Montana, Wyoming, and Colorado. It is known only from Park County in Colorado in the headwaters of the Arkansas River drainage (USDA 2006). Preferred habitat is moist to wet coniferous swamps, bogs, and stream banks with calcareous substrates, from 9300 to 1,000 feet AMSL (Spackman et al. 1997). Its presence in the headwaters of the Arkansas River drainage means this species could be present in the river corridor in Chaffee County, but because of elevation of its habitat, it would not be expected to occur in the project area (Spackman et al., 1997).

5.3.1.2 Impact and Mitigation Issues

Proposed Action

Animal Species

Of the TES animal species of the general area, those most likely to occur, or known to occur in the area, include peregrine falcon, bald eagle, Townsend's big-eared bat, and northern leopard frog. The northern river otter and Canada lynx may travel into the area, but are not known to reside in the project area and would not be expected to remain any length of time. Both the otter and lynx are shy creatures and if they were present in the area, the noise and activity of installation and the high levels of vehicular and boat traffic for the viewing of the work of art would very likely temporarily frighten away any individual animals.

Townsend's big-eared bat may be affected by crowd and traffic disturbance, especially at sundown and shortly thereafter, as they begin to forage for food. Roosting may also be affected by the increased amount of traffic and activities. A winter roost site occurs near Parkdale, north of the river near the confluence with Tallahassee Creek. Bats start using winter roosts in August, so a potential impact from increased traffic and activities is possible.

Bats may potentially collide with the cables after the cables have been erected and before the panels are attached, and after the panels are removed before the cables are taken down. Bats forage at night but they do so using echo-location. It is very possible that bats would be aware of the presence of the cables through their echo-location. The potential for impacts on bats from possible collision with cables is expected to be low for two primary reasons: one, the numbers of individual bats in the corridor are expected to be very low, and two, echo-location may allow the bats to avoid the cables. No potential impacts on bats from installation and removal are expected because such activities will occur only during daylight hours, when bats are roosting.

Determination of effect on T&E bats: Using mitigation measures that have been suggested for bare cables, bats will most likely be affected only by construction and viewing disturbance and this impact is not likely to adversely affect the population of the various species of bats.

Peregrine falcons also have the potential to be affected by striking cables that are strung across the river before and after the panels are installed. The greatest potential for collisions is be in the Parkdale Area, which is near the hunting range limit for peregrines from the Royal Gorge nest site. Young birds are more susceptible to colliding with such objects during the period when they are learning to fly and hunt. Thus, collisions with cables are most likely to involve young birds hunting near the edge of their range in the river corridor. Potential impacts from peregrine collisions with the cables are considered low for two reasons: the river corridor is at the edge of their hunting range and the maximum number of peregrines that might use the river corridor is less than five (the nesting pair and an average of three fledglings).

A similar potential occurs for bald and golden eagles to collide with the cables. Three golden eagle nests and one bald eagle nest occur within foraging range of the river. Eagle fledglings might be in the area during the time the cables are in place. Golden eagles and their young have been observed during the summer months although bald eagles have not. The potential for impacts from eagle collisions with the cables is considered low for two reasons: (1) golden eagles do not often hunt for fish or waterfowl, and (2) bald eagles are most common in the river corridor during the winter when the cables would not be in place.

In summary, the potential for bird collisions with the cables is impossible to predict. This was pointed out in an EIS for a large power transmission line as follows: “It is impossible to estimate the number of waterfowl, raptors, and other birds that are likely to collide with transmission line structures over any period of time because collision rates depend on site-specific settings and conditions” (Rural Utilities Service [RUS] 2001). The cables to be used for OTR are of larger diameter than elevated power lines and thus may be somewhat more visible. The situation is similar for OTR, however, because there are too many variables that cannot be quantified, such as numbers of resident birds in the corridor, numbers of foraging birds in the corridor, the visibility of cables to birds, the changing visibility of cables during the day, and how low-level cables might be compared with greatly elevated cables (power lines), among others. It is reasonable to assume some bird-cable collisions may occur, but the number cannot be estimated.

One measure that could be implemented to mitigate the potential for T&E bird collisions with the cables is to increase the visibility of the cables by placing brightly colored foam tubes on the cables (which also provides some protection when a collision occurs) or by hanging different kinds of marking devices on the cables (see following discussions on effectiveness).

Determination of effect on T&E birds: The temporary work of art is not likely to adversely affect the populations of the various species.

Potential impacts on the greenback cutthroat trout are not expected because the trout are known only from locations in the headwaters of the Arkansas River drainage. Individual greenback cutthroat trout could occur in the river corridor but it would be considered a rare event.

Determination of effect on greenback cutthroat trout: No effect is expected on greenback cutthroat trout.

The potential for impacts on amphibian species is considered low. The boreal toad and the plains leopard frog are not expected to occur in the river corridor. The northern leopard frog has been recorded in the river corridor but in low numbers. Northern leopard frogs, if present, would be expected along the stream banks and in wetland areas. No installation or activities for the temporary work of art are planned along the edge of the water, but there may be some incidental foot traffic during cable and panel installation that

would cause leopard frogs to flee from their location. Such flight could result in additional stress on individual frogs.

Suitable habitat exists for the horned lizard in the river corridor. Their natural history includes burrowing in dry, shallow surface soils, which makes them susceptible to trampling. In the absence of known locations of the lizard in the river corridor, the potential for impacts is considered low.

Determination of effect on T&E amphibians: The temporary work of art is likely to affect amphibians through disturbance but is unlikely to adversely affect the populations of the various amphibian species.

Plant Species

Specific effects from OTR on plant species are not known at this time. Plants or suitable habitat may be affected by various anchor locations, but will be avoided if possible. The most significant impacts on plants will result from crushing by wheeled vehicles (a track-mounted drill rig or a bobcat-mounted drill rig) and by associated foot traffic of workers. It is calculated that all the anchor locations plus vehicle and foot pathways will disturb approximately 5.5 acres, plus the equipment staging areas and crew training areas will disturb approximately 10.4 acres. It is reasonable to assume that some TES plants (i.e., Arkansas Canyon stickleaf) could be crushed or removed in the 15.9 acres of activity, but it is impossible without site-specific information of equipment access routes to determine which species or how many individuals would be affected. Crushing by equipment can kill a plant immediately or injure it severely enough that it does not recover. Damaging a plant before its seeds are mature could reduce the numbers of the next generation, which may be a significant impact on rare species. These potential impacts put stress on the reproductive health of the plant population. Loss of individual plants is direct and immediate. Loss of reproductive vigor is indirect and may not be apparent for a period of time as the viability of the population maintains itself or declines.

Sensitive plant species that have potential to occur within the project area include state species of special concern and BLM sensitive species. Those with known distributions near the project area include rock-loving neoparrya, Barbaby's feverfew, low northern sedge, grassy slope sedge, Arkansas Canyon stickleaf, Brandegee wild buckwheat (federal endangered), northern twayblade, Degener beardtongue, low blueberry willow, autumn willow, Rolland's bulrush, and pale blue-eyed grass. These plant species are associated with three different general habitats: headwaters of the Arkansas River, wetlands and moist river benches, and upland scrub and piñon-juniper habitat along the Arkansas River valley. Habitats for some of these species include upland ridges some distance away from the river itself.

Headwaters species. Several of the species are known from the headwaters of the Arkansas River drainage and therefore have low potential for occurring in the river corridor, including low northern sedge, low blueberry willow, autumn willow, Rolland's bulrush, and pale blue-eyed grass. Potential for effects on these species is considered unlikely because they are not known to be in the area of the Proposed Action.

Wetland species. Other species prefer wetlands or low river benches, or in the case of the northern twayblade in cool moist ravines and spruce forests. The potential for effects on this species is considered unlikely because no installation activities are proposed in moist spruce forests.

Upland species. Other species prefer drier, upland communities, including rock outcrops and cliffs. Species located in these drier environments include grassy slope sedge, Arkansas Canyon stickleaf, Barnaby's feverfew, and Degener beardtongue. The potential for effects on these upland species is considered medium because the installation of some anchors may take place in habitats suitable for these species.

The Arkansas Canyon stickleaf is the most likely sensitive plant species that may experience direct disturbance by the installation of anchors and installation of cables and panels because this species is very common in certain localities of the project area. The Arkansas Canyon stickleaf flowers during July and

early August and sets fruit from early August into September (CNHP 1999b). This aspect of its life history could overlap with the timing for OTR and make any disturbance to the plants more problematic for their continued existence. The potential for this disturbance exists at all panel locations. The potential for disturbance will be greatest on the north side of the river where the plants occur between the river and the railroad tracks. Populations on the south side of the river are considered less vulnerable because most installation will require that equipment remain on the highway right of way. Populations of the plant south of the highway on the north-facing slopes will be a safe distance south of the drilling operations and cable and panel installation activities on the north of the highway, and no impacts are expected.

Determination of effect on the Arkansas Canyon stickleaf: The temporary work of art is likely to adversely affect individuals, but not the population.

There is a population of Degener beardtongue within 0.25 miles south of the river between mileposts 259 and 260. This population overlaps with the Three Rocks Area. This population occurs on the north-facing slopes some distance south of the highway. The population of Degener beardtongue will be a safe distance south of the drilling operations and cable and panel installation activities that will occur north of the highway, and no impacts are expected.

Determination of effect on the Degener beardtongue: No effect is anticipated.

Significance Criteria

Significance of potential impacts is determined by the context of the impacts and their intensity, as described in NEPA regulations at 40 CFR 1508.27. The context for OTR is 6.1 miles within a 42-mile reach of the Arkansas River within 140 miles of the river's headwaters from Leadville to Pueblo. Habitat outside those 6.1 miles will not be directly affected. Threatened and endangered species occupying habitat outside those 6.1 miles will not be affected. When a species occurs both inside and outside those 6.1 miles, potential effects of the project on that species are less likely to be significant. If a threatened and endangered species occurs only in the 6.1 miles, potential effects are likely to be much more significant.

Nine criteria determine the intensity or severity of a potential impact. Three of those criteria could apply to potential impacts on threatened and endangered species: (1) If there is a potential impact to an animal or a plant that is protected by the Endangered Species Act and the impact cannot be mitigated, then the impacts would be judged significant. (2) If the Proposed Action creates a hazard to wildlife not currently present in the environment, including species of concern, which causes a downward trend in the population and cannot be mitigated, the effect would be significant. (3) Whether the action would have significant cumulative effects would affect the significance, e.g., cause a downward trend in population.

Mitigation Measures for TES Animal Species

To minimize the potential for bird-cable collisions, the OTR Corporation will investigate ways to make the cables more visible to birds. Certain wire marking techniques (known as bird flight diverters [BFD]) have proven to be effective while other marking techniques have been inconclusive. Attempts to make power lines more visible with luminous orange tape were inconclusive (Scott, Roberts and Cadbury 1972 as cited in CEC 1995). Other techniques have proven effective in reducing bird mortality (Alonso et al. 1994, Beaulaurier 1980, Brown and Drewien 1995, and Morkill and Anderson 1993, all as cited in RUS 2001) and have been acceptable as a mitigation action for "take" as defined in the Migratory Bird Treat Act (Lewis 1993, as cited in RUS 2001). Marking of power lines where they cross over rivers was required in Alaska (RUS 2001). Some of the marking devices evaluated, and their effectiveness, include the following:

- Colored PVC spirals, 30 cm × 100 cm, rolled around static wires at 10 m intervals (Alonso et al. 1994): effective
- Yellow plastic spirals (DeLaZerda and Rosselli 2003): effective

- Yellow aviation balls (Morkill and Anderson 1991, as cited in RUS 2001): effective
- Thin black stripes, 0.8 cm × 70 cm, on conductors at 12 m intervals (Brown and Drewien 1995, as cited in RUS 2001): not effective
- Black crossed bands, 35 cm × 5 cm, on conductors (Brown and Drewien 1995): effective
- White spirals at 5, 10, and 15 m intervals (Brown and Drewien 1995): all effective but proportionately less effective at the increased intervals
- Red spiral with 11 cm diameter at 10 m intervals (Brown and Drewien 1995): effective
- Red spiral with 11 cm diameter (Heijinis 1980 as cited in Brown and Drewien 1995): not effective
- Yellow spiral vibration dampers, 1.3 cm diameter × 120 cm length and 3.3 m apart (Brown and Drewien 1995): effective

Actions needed to address potential effects from OTR on bird species include the following:

- Consult with the USFWS.
- Avoid installation around known nests during the nesting season of April to mid-July to avoid loss of nests, direct mortality of nestlings, and disruption of nesting activities.
- Avoid installation activities within 0.25 mile of golden eagle nests during the nesting period of March through August.
- As necessary, fine-tune anchor locations to avoid unnecessary disturbance in wetland or riparian communities that are important bird habitat, such as areas of large trees.

Additionally, limiting the time between cable installation and fabric installation in the Parkdale Area could reduce the potential for peregrine falcons to collide with bare cables. Installing the cables in this area last, and installing the fabric panels here first, may achieve this. Moreover, within this project area, the eastern-most cables and fabric panels of this area could be installed last to further shorten the time when only bare cables would be in place. These recommendations will be given consideration in development of the Installation, Removal, and Restoration Plan (see Appendix J1).

Mitigation Measures for TES Plant Species

Because of the distance from project activities and the rough terrain in many areas where TES plants are distributed, some species may be affected by project activities. That is why the major mitigation measure will be the clearance surveys at each panel site and at the equipment staging and crew training areas conducted before actual drilling operations. The survey of panel locations was conducted in summer 2006. Because some sensitive plants are quite numerous in certain areas, some disturbance of plants may be necessary.

Reducing the potential for impacts on sensitive plant species will best be accomplished by restricting foot traffic throughout the planned panel areas. After clearance surveys have been completed, sensitive plant locations will be marked with high-visibility tape to avoid foot traffic during installation. If sensitive plants are located in proposed anchor locations, the anchor design will be reviewed for flexibility of final location. Additionally, strict management of locations where parking and hiking could be allowed will be enforced during the viewing period. Such locations will need to be on stable terrain, and will have clearance surveys conducted during the planning phase to ensure that no sensitive plant species were present. Restricted areas for foot traffic will be well-marked and identified with high-visibility tape.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing will be installed. There will be no new activities or new elements in the environment with the potential to cause effects on threatened or endangered or sensitive species. No new ground disturbance will occur. The TES animals and plants identified in the area will not experience any potential disturbance beyond what is already occurring in the Arkansas River corridor. The most common current impacts that will continue without OTR include trampling of T&E plants and potential trampling of Texas horned lizard by hikers, mountain bikers, ORV

riders, and rafters that exit their rafts along the shore. Picnickers and campers also will continue to use the area and contribute to foot traffic.

5.3.1.3 Recommendations for Future Study

To better determine potential impacts, field surveys for TES plants should be conducted at appropriate phenological times for species identification of all sensitive species in areas proposed for project activities. Using the plant occurrence data developed by the CNHP in the summer of 2006, surveys should include mapping of populations encountered within the area of potential effect for all anchor locations at each panel location. The survey strategy will allow flexibility for impact avoidance, minimization, and mitigation efforts for species of concern.

Also, plant surveys should be conducted on approximately 10.4 acres proposed for the staging area and crew training area north of the river near Texas Creek.

5.3.2 Aquatic Wildlife

5.3.2.1 Affected Environment

Information regarding the aquatic resources in the immediate vicinity of OTR was gained from reviews of pertinent literature and from various agency personnel knowledgeable about the aquatic conditions of the upper Arkansas River. The CDOW publications *Colorado's Little Fishes—A Guide to the Minnows and Other Lesser Known Fishes in the State of Colorado* (Woodling 1985) and *Game Fish of Colorado* (Woodling 1984) were reviewed for general information on fishes inhabiting the Arkansas River. More specific information on fish species and angler utilization was obtained by contacting CDOW and BLM personnel.

Habitats and Fisheries

The Arkansas River upstream from Cañon City is a typical coldwater mountain stream. Such streams consist of cold, clear, rapidly flowing water with alternating pools and rapids or riffles. The substrate of this mountain stream consists primarily of gravel-to-boulder size rubble. The river flows through rapids and riffles and over large boulders, continually mixing with the atmosphere and thus creating high dissolved oxygen concentrations within the water. The low water temperatures help retain dissolved oxygen concentrations, creating an excellent environment for brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*). Nongame fish such as suckermouth minnow, suckers, flathead, and speckled chub could potentially inhabit the Arkansas River in the vicinity of the proposed work of art; however, most of these species occur downstream from Cañon City. Moreover, the speckled chub is considered extirpated in Colorado (NatureServe 2006). Table 5.3-3 presents a list of fish species in the OTR area.

Table 5.3-3. Fish Species in the Arkansas River Corridor

Common Name	Scientific Name	Status and Distribution
Native Species		
Arkansas darter	*Etheostoma cragini*	ST (see Section 5.3.1, Threatened, Endangered, and Special Concern (TES) Species)
Black bullhead	*Ameiurus melas*	The native range of this fish in Colorado has been all warm water streams of the eastern plains, and it has been introduced elsewhere. Habitat includes small to large streams, ponds and reservoirs. Reaches lengths from 8 to 15 inches.
Channel catfish	*Ictalurus punctatus*	This sport fish is native in much of the US east of the Continental Divide but widely introduced across Colorado in rivers, ponds, and reservoirs. Maximum length of 20 to 50 inches.

FT = federal threatened, SE = state endangered, ST = state threatened.

Common Name	Scientific Name	Status and Distribution
Creek chub	*Semotilus atromaculatus*	Native to the Platte River basin, it has been introduced into the Arkansas and Yampa basins. Found in small, clear streams and rivers. Reaches lengths of 8 to 12 inches.
Fathead minnow	*Pimephales promelas*	Found in cool to warm water in most of eastern and northern North America. In all basins in Colorado, and thrives where there are no predators. Lengths of 3 to 4 inches.
Flathead chub	*Platygobio gracilis*	Species ranges from North Canada to Texas. Is reported as secure in Colorado but no records are reported (NatureServe 2006). Range map shows it occurring in headwaters of Arkansas River, then in Kansas and downstream (NatureServe 2006). Majority of population is in the Missouri River basin. May or may not be present in river corridor.
Greenback cutthroat trout	*Oncorhyninchus clarki stomias*	FT, ST (see Section 5.3.1, Threatened, Endangered, and Special Concern (TES) Species)
Longnose sucker	*Catostomus catostomus*	Most widespread sucker in North America. Common in lakes and rivers, cold or warm, often together with white sucker. Lengths of 20 to 30 inches.
Plains killifish	*Fundulus zebrinus*	Common in Great Plains streams; native to the South Platte, Republican, and Arkansas rivers. Prefers shallow, quiet water near margins of streams or in pools over sand or silt substrate. Lengths of 2 to 4 inches.
Red shiner	*Cyprinella lutrensis*	A small, deep-bodied fish native to river reaches in the plains, but not in impoundments. Tolerates extreme environmental conditions. Occasionally in pet stores as rosy-sided dace.
Southern redbelly dace	*Phoxinus erythrogaster*	SE (see Section 5.3.1, Threatened, Endangered, and Special Concern (TES) Species)
Suckermouth minnow	*Phenacobius mirabilis*	Historically in South Platte River system but no more. In the Arkansas River below Cañon City. Is a plains river species tolerant of turbidity in streams with low to moderate gradient and sand, gravel, boulder substrate (NatureServe 2006). May not be present in the river corridor.
River carpsucker	*Carpiodes carpio*	In Colorado restricted to plains reaches of the South Platte and Arkansas rivers. Is a bottom-dweller in deep, quiet runs and pools over sand and silt. Also in reservoirs. Lengths of 14 to 18 inches.
White sucker	*Catostomus commersoni*	Native to eastern slope of Colorado, one of most abundant fish in Colorado lakes and rivers. Tolerates a wide variety of conditions. Has negatively impacted trout when introduced into mountain lakes and streams. Lengths to 23 to 30 inches.
Cutthroat trout	*Oncorhynchus clarki*	Three subspecies of this cold-water game fish (Rio Grande, Colorado, greenback). Their range is decreasing and CDOW is making recovery efforts.
Non-Native Species		
Brown trout	*Salmo trutta*	Introduced to Colorado in the 1890s; are now omnipresent. They tolerate warm water and are more resistant to whirling disease than rainbows.
Brook trout	*Salvelinus fontinalis*	Introduced in Colorado in the late 1800s; are usually found in higher lakes, beaver ponds, and smaller streams. A prolific fish that out-competes most other trout and can create overpopulation and small-sized fish.
Rainbow trout	*Oncorhynchus mykiss*	Introduced to Colorado in the 1880s, it is a mainstay of the hatchery system in Colorado. Millions are stocked annually. Susceptible to whirling disease.

FT = federal threatened, SE = state endangered, ST = state threatened.

Source: CDOW 1994.

The mountain stream conditions of this segment of the Arkansas River (i.e., steep gradient, well-oxygenated water, and good water quality) also provide excellent habitat for a variety of aquatic invertebrates. Although less than 3 percent of all species of insects have aquatic life stages, insects often constitute more than 90 percent of the macroinvertebrates (animals that are large enough to be seen with the unaided eye and live at least part of their life on or within available substrate in a body of water) in

mountain streams (Ward and Kondratieff 1992). The groups of invertebrates typically inhabiting mountain streams are the mayflies (order Ephemeroptera), stoneflies (order Plecoptera), and caddisflies (order Tricoptera). These three groups are often referred to as the EPT invertebrates because they are frequently the most common orders found in streams. Other groups of aquatic invertebrates typically represented in streams similar to the Arkansas River are water beetles (order Coleoptera); flies, mosquitoes, and midges (order Diptera); dragonflies and damselflies (order Odonata); and true bugs (order Hemiptera). These macroinvertebrates constitute a major component of the diet for most fish (particularly game fish) that occur in the Arkansas River.

The headwaters of the Arkansas River (in Lake County) have received historical pollution by heavy metals (cadmium, lead, and zinc). Primary sources were the Leadville Mine Drainage Tunnel (LMDT) and California Gulch (draining the Yak Tunnel–California Superfund Site) (Clements and Ranville 2002). The heaviest pollution has been documented in the 11-mile reach immediately below the LMDT. Remediation efforts at the LMDT began in 1992. Metals levels downstream from the LMDT have decreased significantly since 1993 and macroinvertebrate communities have increased significantly as indicated by heptageniid mayflies (Clements and Ranville 2002). Metals levels in California Gulch, however, remain elevated and macroinvertebrates below that stream have shown only modest improvement (Clements and Ranville 2002).

Under the USEPA Index of Watershed Indicators (IWI), the Arkansas River in the area of OTR is classified Better Water Quality–Low Vulnerability. The watershed scored better (the highest classification) for water quality with the exception of indicators for ambient water quality. Dissolved copper and zinc concentrations were in excess of reference levels 11 to 50 percent of the time. See Section 5.4.3 on Water Resources for additional information.

Angling is a popular recreation activity throughout the Arkansas River valley. Anglers use certain segments of the river to a greater extent than others. Typically, the more heavily fished areas are those providing public access and those where US 50 approaches the river. Detailed information on sport fishing, including creel census, fishing days, and other game fish information, is presented in Section 5.7.2 on Recreation.

5.3.2.2 Impact and Mitigation Issues

Proposed Action

The potential for the Proposed Action to affect aquatic resources is similar to that discussed for water quality (see Section 5.4.3) because water quality affects aquatic wildlife. The most likely impact is that of sedimentation from disturbance of surface soils by drilling and installing anchors, associated foot traffic by installation crews, and activities at the equipment staging area and crew training area.

No appreciable changes to water quality are expected from the Proposed Action. Installation the anchors will cause local disturbance of the soils along the river corridor, but this disturbed material will be confined to the area immediately near the anchor point, which will be above the floodplain of the Arkansas River. However, potential effects include sedimentation from erosion and run-in of disturbed soil and spoil from drill sites by overland flow during high-intensity rainstorms. Additional soil disturbance will occur at the staging area and crew training area north of the river near Texas Creek. Total disturbance of soils will affect approximately 5.5 acres along the corridor; the total area disturbed is composed of very small areas of disturbance at approximately 2,500 sites. The average area of disturbance at a single anchor location will be less than 50 square feet. Additionally, the areas of disturbance will be above and away from the river's edge because the anchors must be placed so as to gain elevation above the water surface for the cables. The staging area and crew training area will disturb approximately 10.4 acres, but mostly in an upland area. The disturbance of soils at anchor locations will occur over a period of 1 year at a rate of approximately 0.10 acre per day (15 sites per day). Soil disturbance at the staging area and crew training area could also occur up to 1 year before the temporary

work of art is completed, and will continue for several months following the viewing period. Because of the longer term of operations at the staging and crew training areas, the sites will be stabilized with best management practices to control sediment such as silt fences, graveled driveways and walkways, and straw bale sediment traps, among others. These measures are expected to control sedimentation from the sites to levels near natural conditions.

The potential exists for increased foot traffic on the banks of the river during project installation, viewing, and removal to erode side slopes of the river channel, thereby increasing the potential for sedimentation to the river. However, foot traffic during viewing might be restricted depending on BLM direction. Some erosion during project installation and removal might be unavoidable, but volumes of sediment are expected to be small enough that it will not result in sediment concentrations in excess of normal river sediment loads. River bank disturbance will be minimized during all project phases. Riverbanks may also be disturbed during viewing by some controlled foot traffic of the general public. However, restrictions are expected to be in place during viewing, and such activity will be minimized to the extent possible.

Excavated material resulting from anchor installation will be contained at the excavation site and placed in large canvas bags to reduce the potential for sediment to leave the site. The canvas bags will be lettered and numbered according to the identification number of the anchor. The canvas bags of site materials will be transported off-site to a warehouse for the duration of the installation and viewing period. During anchor removal, the canvas bags of site materials will be brought back to the appropriate anchor location and the soils used in site restoration.

Erosion control is especially needed during high-intensity rainstorms. Mitigation methods include installing sediment fences in a semicircle below each anchor site (if warranted by site conditions), covering newly exposed soil and rock with fabric, and not working on slopes during high-intensity rainstorms. Grout used to place some anchors will be nontoxic and will also be contained at the site of application. Any spills will be cleaned up and immediately removed from the site for proper disposal. Sites where vegetation cover is damaged will be revegetated following project removal with a BLM-approved seed mix of native species (in compliance with North American Weed-Free Forage Program certification standards), and erosion-control measures (such as erosion control fabric) will be installed where needed (such as on steep slopes and erosive soils).

Uncontrolled access to the riverbanks and floodplain will not be allowed and will be controlled to the extent possible by the monitors, who will be spaced approximately 300 feet apart on the highway side of the river during the viewing period. In addition, access to the railroad side of the river will be fully restricted. Security personnel will also be on site during installation, viewing, and removal.

The presence of dissolved copper and zinc above reference levels in the river can be a source of stress to macroinvertebrates and fish because they may tend to concentrate in various tissues and impair normal function. The presence of elevated copper and zinc levels in the river will not be aggravated by the temporary work of art, because no significant increase in sedimentation is expected and sources of heavy metals are not known to occur within the project area.

A major issue of public concern is the potential for the fabric panels to increase the amount of shade to the extent that biotic production could be affected. Light is able to pass through the proposed translucent fabric, and the effect on the river and adjacent vegetation communities may be similar to that of a cloudy day. If the river is flowing at a velocity of 1 foot per second, then the entire trip from the County Line Area to the east end of the Parkdale Area would take approximately 73.3 hours (approximately 45 hours of daylight and 28 hours of dark). During those daylight hours, the river water would be in the partial shade of the panels for approximately 8 hours, or less than 20 percent of the time. Having the river water in partial shade for less than 20 percent of the time is not expected to significantly alter its temperature regime or the photosynthetic activity of the algal or emergent vegetation communities. Photosynthesis

continues in reduced light, but at a slower rate than under full light. As a result, impacts on the aquatic food chain are considered unlikely.

Other mitigation measures to reduce impacts on aquatic resources include controlling erosion during anchor placement, especially during high precipitation events, as discussed previously; controlling and cleaning up any fuel spills and other materials used during installation; and controlling foot traffic during the viewing period to the extent possible, especially in areas that contain erosive soils and steep slopes.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. There would be no new activities or new elements in the environment with the potential to cause erosion or sedimentation into the Arkansas River, and thus aquatic species identified in the area would not experience any impacts beyond what is already occurring in the Arkansas River corridor. Fishing pressure by anglers would continue as it has in the past. Sedimentation would continue to be generated by hikers, mountain bikers, ORV riders, picnickers and campers, and rafters that exit their rafts along the river. Sediments would continue to contribute to river turbidity.

5.3.2.3 Recommendations for Further Study

Macroinvertebrate studies on the Arkansas River in Fremont County conducted by CDOW or CNHP should be obtained and summarized in the Draft EIS.

5.3.3 Terrestrial Wildlife

5.3.3.1 Affected Environment

Information regarding terrestrial wildlife in the immediate vicinity of OTR in the Arkansas River Canyon was obtained by reviewing pertinent literature and contacting knowledgeable personnel. Publications were reviewed for general information on the wildlife inhabiting the project area and included *Mammals of Colorado* (Fitzgerald et al. 1994), *Colorado Breeding Bird Atlas* (Kingery 1998), and *Amphibians and Reptiles in Colorado* (Hammerson 1999). More specific information on terrestrial species was obtained from CDOW and BLM personnel and from pertinent literature published by both land management agencies and by private sources. This information was supplemented by a number of field investigations by JFSA biologists since 2000.

Large Mammals

The predominant large mammal species occurring along the Arkansas River and its tributaries are bighorn sheep (*Ovis canadensis canadensis*), mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), and mountain lion (*Felis concolor*). Black bear (*Ursus americanus*) also are present to a lesser extent within the vicinity of the project area. No migration corridors exist for any large mammals that occur along or across the Arkansas River or US 50 in this area, although animals cross the highway to access the river (E. Brekke, BLM, pers. comm. 1998; CNHP 1999b).

Bighorn Sheep

The Arkansas River Canyon herd of bighorn sheep is the large mammal species of primary management concern for the BLM and CDOW. Besides being an economically important game species, the bighorn sheep is the state mammal and an important species for wildlife watchers visiting the area. Because the Arkansas River corridor contains rough, rocky, and relatively open topography, it is attractive to bighorn sheep. Opportunities to observe bighorn sheep in their natural habitat are excellent along the Arkansas River. Bighorns generally rut in November through December and lambing occurs in May through late June (Fitzgerald et al. 1994). Bighorn sheep prefer open, grassy areas as habitat, but also inhabit shrublands. Grasses and sedges as well as shrubs constitute most of their diet (Fitzgerald et al. 1994). Piñon-juniper woodland and areas of scrub oak reduce the habitat quality of the Arkansas River canyon

because the forage in those plant communities is less preferred or suitable, and also because those plant communities reduce the openness of the view-shed, which is important as a defense against predators (Reed et al. 1994).

The Arkansas River bighorn sheep population has been estimated to be approximately 375 to 400 individuals that spend all or a portion of the year in or near the canyon (BLM 2000b). Observations from 1990 through 1994 tallied 549 individuals or groups of sheep, and annual counts ranged from 61 to 200 (Reed et al. 1994). These lower elevation sheep have become an important part of bighorn sheep management in Colorado and have established themselves into three herds: the Arkansas Canyon, Grape Creek, and Browns Canyon herds. Although some interchange between the herds has occurred, it is not common (Reed et al. 1994, Baker et al. 1999).

The Browns Canyon herd (approximately 100 sheep) was established after reintroduction efforts in the early 1980s. The main herd, approximately 50–60 head, is located primarily in the Turret, Long Gulch, Railroad Gulch, and Stafford Gulch areas on BLM and USFS lands east of the Arkansas River north of Salida (BLM 2000b). A smaller herd of about 30 sheep inhabits the lower end of Browns Canyon throughout the year and may move into areas east of Salida.

The Arkansas Canyon north herd, which numbers approximately 70 sheep (L. Gatlin, CDOW, pers. comm. 2006), is located north of the river and uses the south-facing slopes between Big Hole and Parkdale year-round. Ewes generally move to higher elevation and rougher terrain to lamb in the spring. Because the area lacks natural springs, this herd uses the Arkansas River as a water source, often in mid-morning to mid-afternoon (BLM 2000b).

The Grape Creek herd consists of approximately 115 sheep and is located south of the Arkansas River. Also established in the 1980s, this herd primarily uses two areas: lower Grape Creek between Temple Canyon and Bear Gulch and along US 50 south of the river just west of Texas Creek (milepost 252) to Baker Gulch.

The north herd occurs most frequently between Pinnacle Rock and the railroad siding at Parkdale (Baker et al. 1999). However, a smaller group of sheep has also been detected along the east side of the river in the vicinity of Wellsville (Reed et al. 1994). According to Baker et al. (1999), most sheep have been sighted in areas that were adjacent to suitable escape terrain (steeper than 30° to 45° slopes). The main group of bighorn sheep from the north herd concentrates along the river's edge and the railroad tracks in the spring in a portion of the river corridor east of Cotopaxi. This area presumably is the first to provide high quality green forage in the spring. Bighorn sheep also can be observed along the roadside year-round taking advantage of road salts and forage. According to Boyd et al. (1986), low-growing, abundant vegetation is the preferred forage of bighorn sheep, with browse species used primarily as a winter food source. Reed et al. (1994), however, reported that little-leaf mockorange and mountain mahogany constituted a large part of the herd's diet in the Arkansas River canyon.

Further, Reed et al. (1994) indicated that sheep habitually were observed in several areas between Parkdale and Echo Canyon. Included are areas north of Pinnacle Rock (milepost 257) to Three Rocks rapids (milepost 259) and from north of Five Points picnic area to 0.5 mile east. The north side of the river between the Parkdale siding and Pinnacle Rock encompasses winter and lambing range for the northside herd of sheep as well as access to the river for drinking, and possibly movement routes. Winter range was delineated primarily along the north side of the river west of Cotopaxi where the river bends northwest toward Salida. At this location there is a large open area several hundred yards wide along the river that is heavily used by sheep. Another wintering area occurs west of the Spike Buck Area (milepost 263) and eastward almost to Cedar Gulch (CNHP 1999a). Mixed piñon-juniper woodland and grassland, with a secondary component of mountain shrub, dominate areas of winter range. The areas used for summer and winter range are shown on the wildlife resources map (Appendix D1).

Other observations of the sheep population in the canyon were made by Baker et al. (1998) as part of an evaluation of the impact of human disturbance on bighorn sheep in the Arkansas River Canyon. They made 46 total sheep observations in the month of October 1998. Generally, groups of sheep north of the river were located from Coaldale to Cotopaxi and east of Echo Canyon to the long pulloff at West Cedar Gulch. South of the river, 15 total sheep observations were made.

Additional records of observations of sheep in the river corridor have been made by other CDOW personnel (Gatlin 2006). The records include both study observations and opportunistic sightings and hunter notes on both sides of the river, and they present a clear record of where sheep are most commonly found in the eastern part of the river corridor. The records do not indicate whether the sheep were at the river or simply visible on adjacent slopes. All observations were made between mileposts 252 and 268, which includes the easternmost 16 miles of the river corridor including the areas where the Texas Creek, Maytag, Three Rocks, Spike Buck, and Parkdale panels would be installed. The observation records are presented graphically in Figure 5.3-1, Sheep Observations, North Side Herd, and Figure 5.3-2, Sheep Observations, South Side Herd.

Figure 5.3-1 presents sightings of the herd on the north side of the river and Figure 5.3-2 for the herd on the south side of the river. The figures clearly show the heaviest usage between mileposts 257.75 and 264.0 Peak sightings occurred at mileposts 259.5 and 260.0 for the north and south sides of the river, respectively. This area overlaps in part with the Three Rocks Area.

Areas commonly inhabited on the south side of the canyon include an area east of the curve near Pinnacle Rock and southeast of the Five Points Picnic area (Reed et al. 1994). A northwest-exposed area roughly 8 miles southeast was used for lambing. No large areas of winter range exist within 1 mile of the project area along the south side of the river (Reed et al. 1994).

Bighorn sheep typically range within 2 miles of free water and are highly dependent on reliable water sources, especially during the hot season (BLM 2001b). Constant or frequent human use at or near water sources, particularly during the summer months, may adversely affect sheep and may cause them to abandon the water source in favor of less disturbed areas (Blong 1967, DeForge 1972, Cunningham 1982, Miller and Smith 1985, all as cited in BLM 2001b). Bighorn sheep also modify their behavior to avoid predictable human interactions around water holes, timing visits to coincide with periods when humans are not present (Campbell and Hamilton 1982, Hamilton et al. 1982, all as cited in BLM N.D.b).

During the spring/summer lambing season (May–June), the timely use of watering areas is critical for lactating ewes and new lambs (Reed et al. 1994). Bighorn sheep were observed in the rugged terrain that is characteristic of the area between Pinnacle Rock and Three Rocks Gulch. This area is considered optimal lambing range for the north herd (Boyd et al. 1986, Baker et al. 1999). The Three Rocks Area also was identified as a water access point during the summer months (Reed et al. 1994, Baker et al. unpublished data). Another lambing area was identified north of the river northeast of Cotopaxi between mileposts 247 and 249. Other lambing areas were documented at the lower end of Browns Canyon (milepost 227) and at Sugarloaf Mountain near Green Gulch along the east side of the Arkansas River near Wellsville (milepost 228) (Reed et al. 1994).

The Parkdale Area has several important watering areas for bighorn sheep, including milepost 263 (near Bootlegger) and milepost 264. These watering areas, along with other factors, contributed to the definition of “sensitive sectors” by CDOW (D. Finch, CDOW, pers. comm., 1997). Finch’s “sensitive sectors” (1997) are shown in Map 5.3-1, CDOW “Sensitive Sectors” for Bighorn Sheep. The use of openings in the panels (0.25-mile opening every mile) has been discussed by CDOW and BLM as a means of allowing the sheep access to these sensitive sectors (Vayhinger, Aragon, Carochi, Gatlin, Backstrand, CDOW and BLM, pers. comm. 2006).

Figure 5.3-1. Sheep Observations, North Side Herd 2/24/04-7/24/06

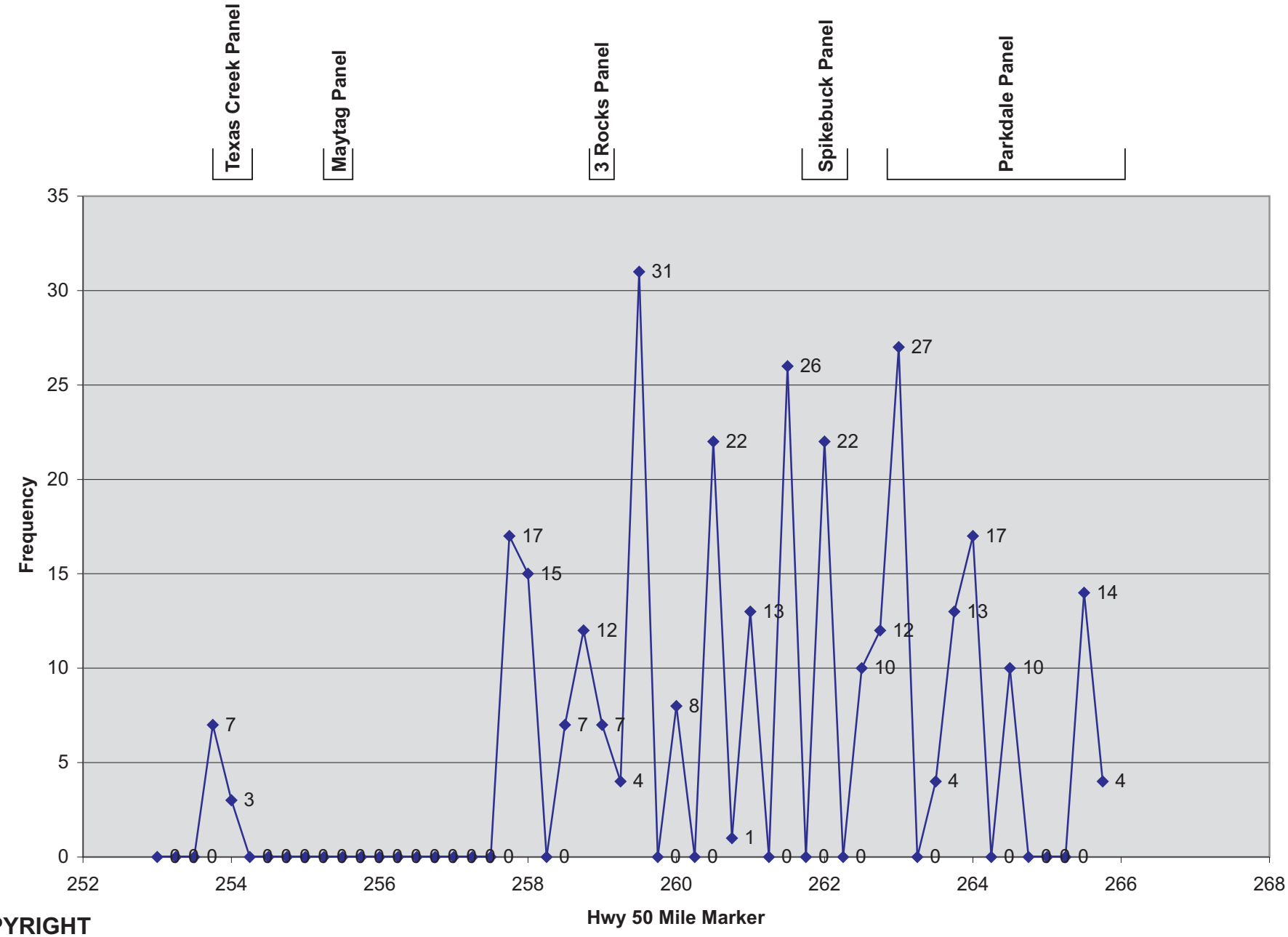
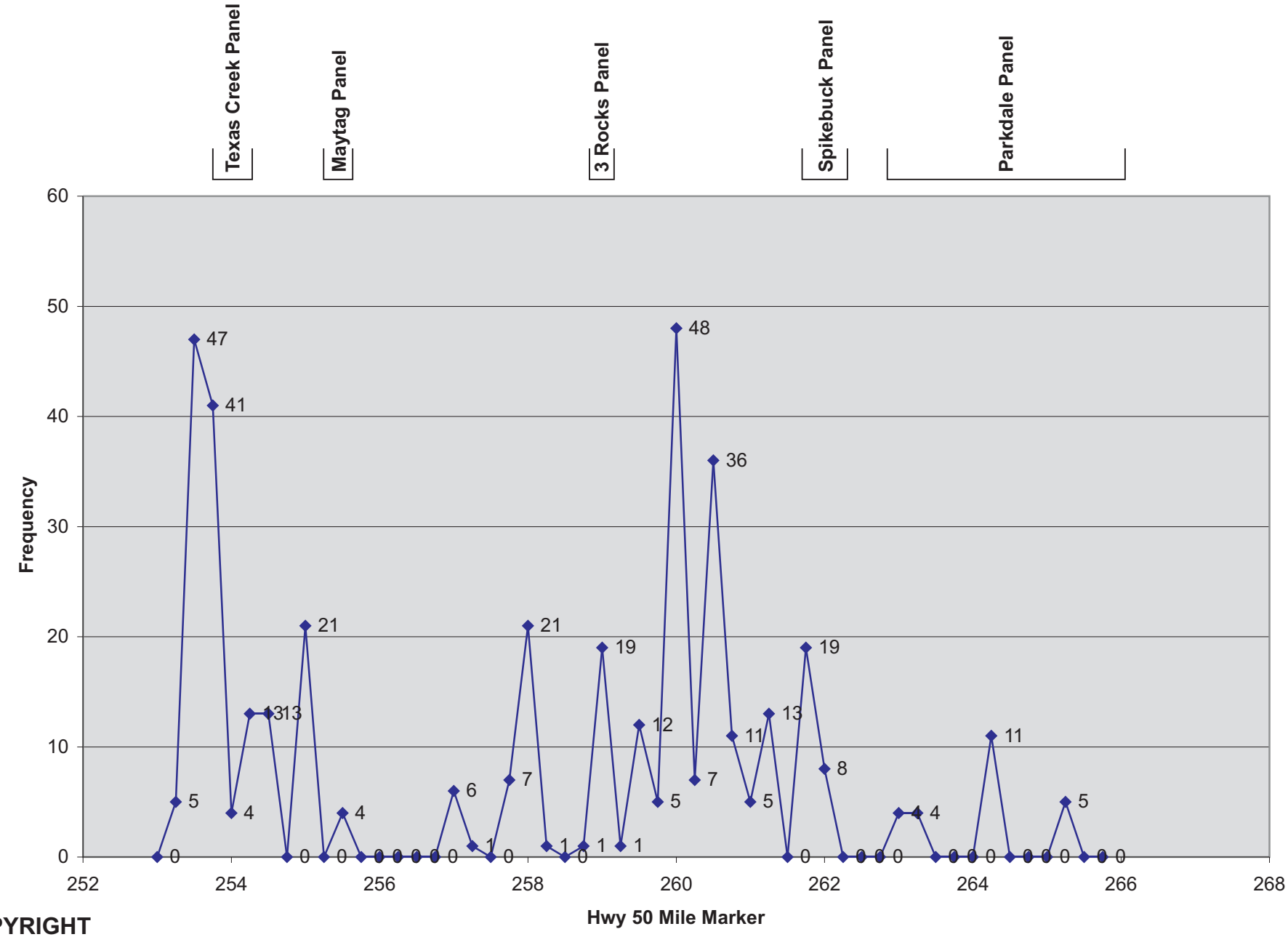


Figure 5.3-2. Sheep Observations, South Side Herd 2/24/04-7/24/06



There Are No "Sensitve Sectors"
Upstream (West) From Spike Buck

OTR Parkdale Area

OTR Spike Buck Area

1- Begins At US 50 Milepost 265 For 800' Westerly.

2- Eastern Border At 264.2; Extends 500' Westerly; Drains Cedar Gulch.

3- Eastern Border At 263.8 Extends 300' Westerly To Cottonwoods.

4- Eastern Border At 263.2 Extends 1000' Westerly To Milepost 263; Has Low Banks

5- Eastern Border At 262.4 Extends 1600' Westerly Has Both Low Banks & Trees

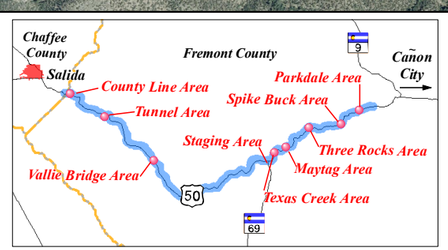
All Locations Provide Easy Access To River For Big Horn Sheep

LEGEND

- CDOW Senstive Sectors For Bighorn Sheep
- Panel Location
- US Highway 50 Mile Posts
- Railroad

N
W E
S
0 1,500 Feet

SCALE - 1:18,000 or 1" = 1,500'



SOURCE - 2005 1 meter pixel resolution aerial photography provided by USGS. Railroad data provided by CDOT. Panel locations provided by Golder and Associates. Sensitive sectors information provided by D. Finch

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.3-1. CDOW "Sensitive Sectors" For Bighorn Sheep

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\CDOW_SentiveSectors_11x17_061106.mxd)
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Watering areas other than the Arkansas River are present in East Cedar Gulch (milepost 264.2), in the drainage above Sharks Tooth Rapids (milepost 263.3), and near Big Hole (above mileposts 261 to 262). However, these areas are not reliable year-round sources of water. The majority of use in these areas occurs during the summer when afternoon thunderstorms are most frequent. In addition to the ephemeral nature of these water sources, another deterrent to their use is exposure to predation by mountain lions. Two bighorn sheep carcasses, apparently killed by lions, were found in the spring of 1999 (Baker et al. 1999). Mountain lions were previously documented stalking bighorn sheep within viewing distance of the river in this area (Reed et al. 1994).

Bighorn sheep use much of the river corridor on both sides of the river and they cross the highway and the river from time to time. As a result, there have been animal–vehicle collisions (AVCs). Such AVCs have occurred around milepost 247 northeast of Cotopaxi, and in the Texas Creek, Maytag, and Spike Buck areas (L. Gatlin, CDOW, pers. comm. 2006). The AVCs have been rare for sheep and bear and quite common for deer, but most AVCs have been listed as unknown species. Table 5.3-4 summarizes AVCs for bighorn sheep, deer, and bear for 1993 through 2004.

Table 5.3-4. Animal–Vehicle Collision Data on US 50, 1993–2004

Highway Segment	Unknown species	Deer	Bear or Sheep
Salida to County Line	10	2	0
County Line to RR Tunnel	2	2	1 bear
Tunnel to Howard	10	1	0
Mileposts 234 to 237	12	13	1 bear
Vallie Bridge to milepost 240	6	1	0
Mileposts 240 to 244	9	5	0
Mileposts 244 to 248.5 (Cotopaxi)	6	1	2 sheep
Milepost 240 to Texas Creek	2	6	0
Texas Creek to Milepost 257	0	0	0
Mileposts 258 to 261.5 (Three Rocks)	0	0	0
Mileposts 261.5 to 266 (Spike Buck and Parkdale)	1	2	0
Total	**58**	**33**	**2 bear, 2 sheep**

Disturbance Effects on Sheep

During the last century, populations of bighorn sheep declined in distribution and abundance throughout their North American range (Buechner 1960, as cited in Baker et al. 1999). Bighorn sheep are very susceptible to pneumonia and it is thought that pneumonia is a principal cause of the bighorn sheep decline. There is consensus that increased frequency, duration, and intensity of environmental stress is a primary catalyst for pneumonia. Chronic exposure to environmental disturbances resulting in excessive stimulation of the endocrine system is believed to suppress immune function and thereby increase the probability that populations of bighorn sheep will succumb to pneumonia (Kelly 1980, as cited in Baker et al. 1999). Bighorn sheep are also susceptible to lungworm infestation, the larvae of which are transmitted via the feces. Lungworm infestation can stress the heart muscle and degrade the sheep's general viability.

In some cases, bighorn sheep have abandoned habitats when human disturbance was high, but other studies have shown the ability of these animals to habituate to various disturbances (Baker et al. 1999). Some of the bighorn sheep habituated so well to the trains running through the canyon that one ram failed to get out of the way in time and was killed (J. Aragon, pers. comm. 2006). Bighorn sheep may habituate to various human activities as long as those activities are predictable and occur gradually over an extended period of time. It is not known, however, how well these sheep will habituate to stimuli that are infrequent and unpredictable (Baker et al. 1999).

Table 5.3-5 summarizes a variety of sheep disturbance reactions observed by CDOW personnel from June 1990 to December 1993 (Reed et al. 1994). NOTE: Table distances are in meters.

Table 5.3-5. Disturbance Reactions of Bighorn Sheep

Year	Stimulus	Average Distance from Stimulus when Flight Initiated (m)	Average Distance of Flight (m)	Number of Observations
1990	Raft	15	10	1
	Kayak	27.5	70	2
	People	37.5	85	2
1991	Raft	33.5	5	7
	Train	98	17.5	5
	People	58	103	7
	Mountain lion	110	40	2
1992	Raft	28	3	3
	Train	174	13	17
	People	52.5	35	8
1993	Raft	38	2	9
	Train	146	22	5
	People	25	3	1
	Deer	12.5	4.5	2

Source: Reed et al. 1994.

Additional site-specific information on the effects of disturbance of bighorn sheep in the Arkansas River Canyon is also available. CDOW personnel witnessed two episodes of human disturbance of sheep and reported them in Baker et al. (1999). In November 1998, a single ewe with a heart monitor approached the river to drink. Eight people were yelling and whistling at her from across the river. Her initial heart rate was 75 beats per minute (bpm) but rose to 85 bpm after the noise started. She drank for several minutes and her heart rate rose to 120 bpm but she did not leave. After the people drove away, her heart rate returned to 70 bpm. The ewe's reaction is analogous to entering a vigilant state, or state of heightened awareness. The second occurrence happened in July 1999 when a group of five ewes and two lambs was foraging within 15 feet of the river's edge. One ewe had a heart monitor and her heart rate was normal for foraging. A convoy of 12 rafts passed by the herd, but the ewe's heart rate did not change.

Sheep along the river are exposed to variable background noise levels. A noise survey was conducted near Brown's Landing on June 24, 2006. That survey documented three kinds of background noise levels: (1) near the river with calm flow, (2) near the river with rapids, and (3) near US 50. In addition, noise

levels when vehicles passed by were measured at the three locations. Background noise levels were lowest near the river with calm flows (55 dBA), followed by near the highway (67.5 dBA), and the highest background levels were near the river with rapids (70 dBA). Vehicle traffic on US 50 can be considered part of the background noise except that traffic is not constant. Passage of a vehicle on the highway created similar levels of noise at both kinds of river sites (calm and rapids: 64 dBA) and the highest noise level was near the highway (80 dBA) (Hankard Environmental 2006).

Mule Deer

Colorado has a population of mule deer numbering approximately 700,000, and they occur statewide in almost any "edge" habitat, including suburban residential areas (CDOW 2006a). Mule deer habitat maps (NDIS 2004) indicate that there are no winter concentration areas for mule deer in the Arkansas River corridor, but that severe winter range for mule deer includes the north side of the river throughout the entire length of the river corridor, but only west of Texas Creek on the south side of the river. The entire area is considered summer range for mule deer.

Mule deer are most common in the upland areas approximately 250 yards away from the Arkansas River floodplain when the terrain is appropriate and supports some shrub habitat. They predominantly use the upland piñon-juniper habitats along the north side of the river. Mule deer winter range and winter concentration areas overlap with the bighorn sheep winter and spring concentration range in the vicinity of Cotopaxi. Mule deer, however, are more likely to use the scrub-shrub riparian habitats along the river for foraging, while bighorn sheep prefer open, grassy areas. Mule deer also range through the agricultural areas from Salida to Gobblers Knob. CDOW has identified two specific areas where deer frequently cross US 50: in Howard, from milepost 233.5 to milepost 235.5, and in Coaldale, from milepost 241 to milepost 242.2. Deer cross the highway in many other places as well, as indicated in Table 5.3-4, Animal–Vehicle Collision Data on US 50, 1993–2004, which shows that at least 33 deer have been killed on the road between 1993 and 2004.

Elk

Elk are the largest of the native Colorado deer and range throughout the mountainous parts of the state (CDOW 2006a). They forage principally on grasses in the summer and on shrubs, exposed vegetation, and haystacks in the winter. Elk are present in the forested and open grassy habitats in the upper elevations west and north of the project area. Elk periodically use the piñon-juniper habitat frequented by mule deer and bighorn sheep, although they rarely are observed within the river corridor. Elk habitat maps (NDIS 2001–2004) indicate that there are no winter concentration areas or severe winter range for elk in the river corridor. Normal winter range is indicated south of the river east of Texas Creek that extends to the southeast. Similar to mule deer range, the entire corridor area and adjacent counties are considered elk range, but the area from the river corridor and higher elevation areas for several miles to the north are distinguished from the overall range only as "suitable habitat" (NDIS 2001–2004).

Mountain Lion

Mountain lion are common in much of the western two-thirds of the state and are the major predators of bighorn sheep, mule deer, and elk, and occasionally small mammals (NDIS 2001–2004). They are primarily nocturnal mammals and likely use the river corridor for hunting and access to water. Mountain lion are known to occur in the corridor and two bighorn sheep were apparently killed by lions in the spring of 1999 (Baker et al. 1999).

Black Bear

Black bear are locally common in the western two-thirds of the state in forested uplands and shrublands at moderate elevations (NDIS 2001–2004). Their populations are greatest in mountain shrublands from Walsenburg and Trinidad west to the San Luis Valley, in the San Juan Mountains, and in the canyon country of west-central Colorado. They are documented in Fremont and Chaffee counties and the river corridor is included in their range (NDIS 2001–2004). Two bear were killed crossing US 50, at

mileposts 226.5 and 234.2. Their diet depends largely on what is seasonally available, typically including grasses, forbs, berries, fruits, acorns, insects, small mammals, young ungulates, and carrion. However, they often supplement their natural diet with trash and garbage generated by local residents and campers visiting the area.

Small Mammals

Many species of small mammals inhabit the riparian areas and floodplains bordering the Arkansas River along the length of the temporary work of art. These species constitute the prey base for birds of prey, other mammals, and reptiles. Some small to medium-sized mammals that are likely to inhabit the river corridor are mice (*Peromyscus* spp., *Reithrodontomys* spp.), voles (*Microtus* spp.), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilis*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), bobcat (*Lynx rufus*), ringtail (*Bassariscus astutus*), Norway rat (*Rattus norvegicus*), Mexican woodrat (*Neotoma mexicana*), and coyote (*Canis latrans*). A field survey for the rock quarry near Brown's Landing documented the presence of northern pocket gopher (*Thomomys talpoides*), rock squirrel (*Spermophilus variegatus*), least chipmunk (*Neotamias minimus*), bushy tailed woodrat (*Neotoma cinerea*) and Nuttall's (or mountain) cottontail (*Sylvilagus nutallii*) (EMS 1997). Additionally, there is suitable habitat for bats in the area, including natural caves, mine shafts, and rock crevices. These represent potential roost or maternity sites for bats, including the western small-footed myotis *(Myostis ciliolabrum*), fringed myotis *(M. thysanodes),* long-legged myotis *(M. volans),* and spotted bat (*Euderma maculatum*) (CDOW 1984, as cited in EMS 1997). Also see Section 5.3.1 on threatened, endangered, and special concern species for discussion of other mammals.

Reptiles and Amphibians

Several species of reptiles and amphibians inhabit the Arkansas River, its tributaries, and their associated riparian zones. Some species, including lizards and some snakes, use upland habitats away from the river. The most important species, however, when considering riverside activity, is the prairie rattlesnake (*Crotalus viridis*). The prairie rattlesnake is typically considered an upland species, but it also inhabits the thick undergrowth that proliferates in riparian systems, where it preys on rodents and birds. This species is generally passive, preferring to warn intruders well in advance of its presence rather than confront a threat. Other reptile and amphibian species that can occur in the project area include the eastern collared lizard (*Crotaphytus collaris*), short-horned lizard (*Phrynosoma hernandezi*), Texas horned lizard (*Phrynosoma cornutum*), milksnake (*Lampropeltis triangulum*), bullfrog (*Rana catesbeiana*), bull snake (*Pituophis melanoleucos*), checkered garter snake (*Thamnophis marcianus*), western smooth green snake (*Liochlorophis vernalis*), and western garter snake (*Thamnophis elegans*). Potential amphibian residents of the Parkdale Area include tiger salamander (*Ambystoma tigrinum*), red-spotted toad (*Bufo punctatus*), Woodhouse's toad (*Bufo woodhouseii*), and boreal chorus frog (*Pseudacris triseriata*) (EMS 1997). Also see Section 5.3.1 on threatened, endangered, and special concern species for other reptiles and amphibians of this area.

5.3.3.2 Impact and Mitigation Issues

Proposed Action

Numerous wildlife species inhabit the areas that could be affected by the installation, viewing, and removal of the proposed temporary work of art. Many of these are mammals, songbirds, waterfowl, reptiles, and amphibians that drink from the river or use the riparian habitat along the river. Generally, such species will be displaced during the Proposed Action, with most impacts expected to result from the drilling at anchor locations and installation of cables and panels, during the 14-day viewing period, and during the removal of the panels, cables, and anchors. These activities are considered short term because none of these activities will occur at any single location for any appreciable amount of time. Activities will occur at more than 2,500 individual locations and would not remain at any single location for more than a few hours before moving to the next location. The exception to this is the viewing period when the

fabric panels will be in place for two weeks. Therefore, the displacement of animals also is considered short term, although additional stress could be expected if the habitats used by the displaced individuals are of lesser quality or already occupied by conspecific animals. The land area in which panels would be placed comprises approximately 150 acres between the highway and the railroad tracks. Of those 150 acres, approximately 5.5 acres will be disturbed by installation activities, or approximately 3.6 percent of the panel location land areas. A staging area and a crew training area will be established north of the river near Texas Creek. Those two areas will disturb about 10.4 acres.

Large Mammals

Bighorn Sheep

Bighorn sheep have potential to be disturbed by work crews during the drilling, as OTR is put in place, and as it is dismantled, primarily on the north side of the river. Disturbance to the sheep will include drilling noise and workers on foot. The drill rigs and work crews will average approximately six sites per day, or about 270 feet per day parallel to the river, or approximately 0.25 miles in five days. CDOW personnel have indicated that 0.25 miles (440 yards) may be enough distance between panels that sheep might approach the river (Vayhinger, Aragon, Carochi, Gatlin, Backstrand, pers comm. 2006). It is not known whether sheep will approach the river when work crews are 0.25 miles away. In the observations listed in Table 5.3-5, sheep were observed allowing people to get within 110 to 165 yards before fleeing. This indicates that a work crew at 440 yards is not likely to prevent the sheep from going to the river to drink.

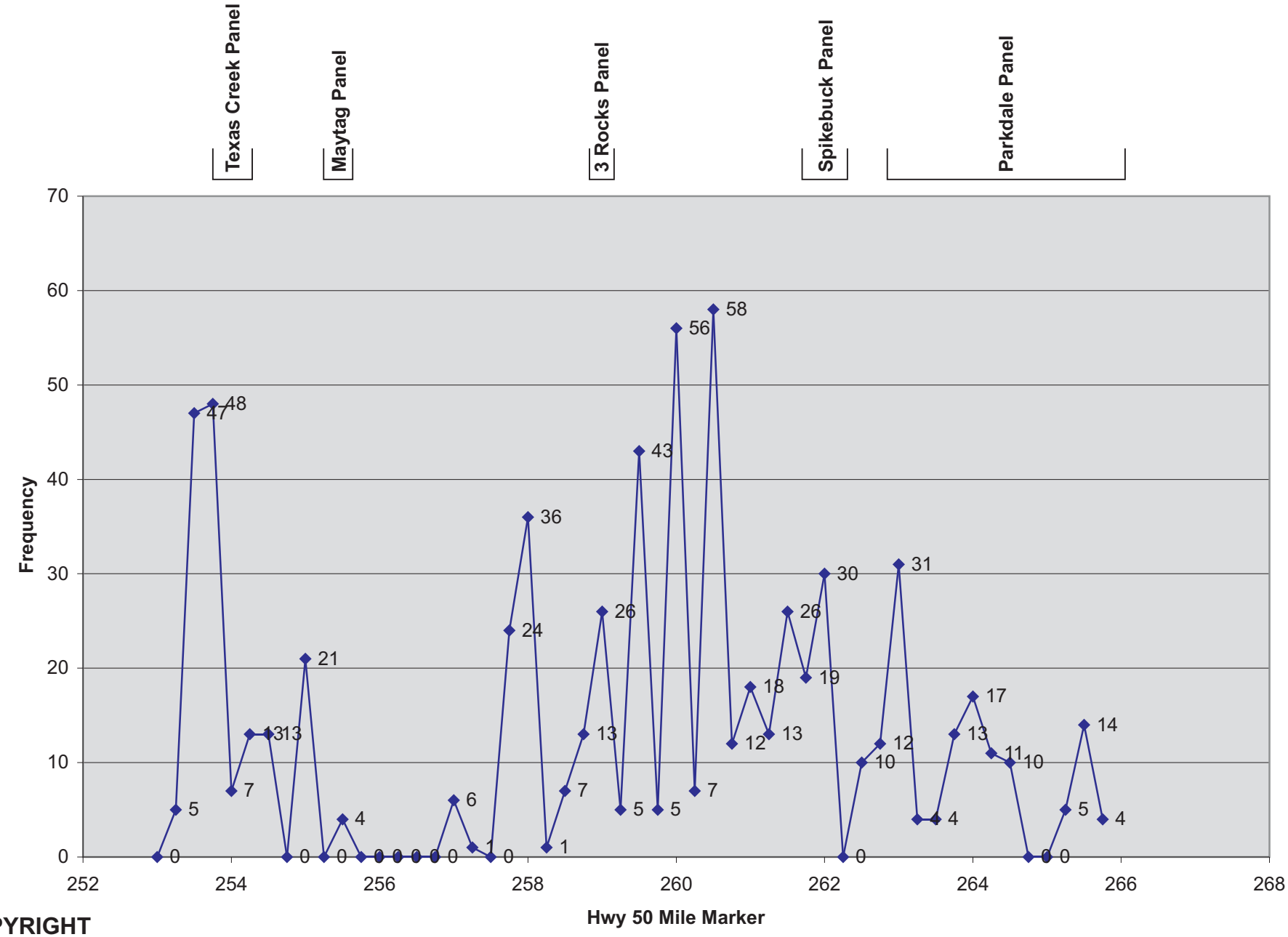
In the next installation season after the anchors are installed, work crews will return to the same locations to install cables. The potential for disturbance to sheep will be repeated, but without rock drill noise. Test lines may be “shot” across the river using a low-decibel .22-caliber rifle. The .22-caliber rifle will create noise disturbance for any sheep in the area. It is considered likely, however, that the presence of the work crews will displace the sheep to a distance where the noise of a rifle shot will have little or no effect. Approximately one month later, work crews will return to install the panels.

As was shown in Figure 5.3-1 and Figure 5.3-2 regarding sheep observations, the peak sightings of sheep by CDOW personnel occurred at mileposts 259.6 and 260 for the north and south sides of the river, respectively. Figure 5.3-3, Combined Herd Sheep Observations, compares the peak sightings of the north and south herds combined with the proposed panel locations. It can be seen how the proposed Spike Buck and Parkdale panel areas overlap with numerous sheep sightings of the north herd, and there appears to be little overlap of the panel placement and sheep sightings for the south herd.

Potential disturbance to sheep during the 14-day viewing of the temporary work of art is likely to occur primarily from the physical presence of the fabric and from an increase in rafting traffic. The fabric panels will constitute a new element in the sheep’s environment, and the panels will move in response to the wind. It is anticipated that the sheep will watch the panels from a distance. It is not known whether or not the sheep will acclimate to the panels at all, or approach the river within view of the panels.

In initial discussions about the Proposed Action between Christo and Jeanne-Claude and the BLM, the proposed design involved 10 miles of fabric panels. Following public meetings and the comments received from the BLM and the public, Christo and Jeanne-Claude reduced the length of the temporary work of art to 5.9 miles of fabric panels. Panels were removed from many sections of the river to protect and enhance conditions for bighorn sheep. The reduction in the number of fabric panels by more than 40 percent was based on direction from the BLM and from public concerns about areas of public safety and areas where sheep accessed the river. However, impacts on sheep in the Parkdale and Texas Creek project areas from the proposed project are likely during the two-week viewing period from the presence of the fabric and possibly from human activity as well. These impacts include restrictions of water and forage during certain periods of time that the sheep normally access the Arkansas River.

Figure 5.3-3. Combined Herd Sheep Observations 2/24/04-7/24/06



The potential for sheep to attempt to cross the highway and risk an AVC during the viewing period is considered very slight. The heavy volume of traffic that is anticipated is expected to be a significant stimulus by itself (noise and motion) to repel the sheep on the south side of the river away from the corridor.

All the increased activity is expected to affect sheep, depending on the activity and the threat that sheep discern from that activity. Sheep generally do not exhibit flight behavior from rafts, although they may watch the rafts. In observations made by Reed et al. (1994), however, if the raft was closer than 33 feet (30 m) from the sheep, flight was observed, but only for approximately 11 feet (10 m). Conversely, if sheep were approached by people (on the same side of the river), they exhibited flight behavior for a considerable distance. Sheep across the river generally exhibit "alert" behavior only in response to people who are walking or observing them from the highway (Reed et al. 1994).

Following the viewing period, similar disturbance as described for installation will be repeated when work crews remove the panels and cables, but without the noise of a rock drill. Following removal of the cables and panels, the anchors will be removed. This activity will also involve work crews and truck-mounted cranes or skid-steer vehicles capable of lifting the anchors onto trucks. The activity of the work crews and vehicles is likely to displace the sheep on the north side of the river some unknown distance away where they felt safe. Removal will be accomplished quicker than installation because no drilling would be involved. Anchors might be removed at a rate of up to 10 per day per work crew, and the work crews will move along the corridor at a rate of 0.25 miles every three days. Sheep are mobile enough that they will be able to leave the area of a work crew and access the river elsewhere, depending on site conditions.

The result of disturbance to bighorn sheep is likely to manifest itself in increased heart rate, decreased foraging or decreased rate of foraging, and an alteration in their daily schedule of bedding down versus foraging and drinking. All disturbances could contribute to additional stress on the sheep and perhaps contribute to decreased immune system function and susceptibility to disease. Further, the results of these effects might not be seen immediately, but could manifest themselves in the following season or two, in the form of increased mortality or decreased fecundity. The disturbances will be short term, however, when work crews move through the area for installation and for removal. The disturbance from the panels will be short term during the 14-day viewing period. The sheep herd has been self-sustaining for more than 20 years and has been so despite trains, minor big-game hunting, increasing traffic on US 50, and increasing raft traffic on the river. Even with multiple episodes of short-term disturbances to the sheep, the Proposed Action is not considered a threat to the viability of the Arkansas River Bighorn sheep herd.

In the area east of Texas Creek, five panel areas are planned: Texas Creek, Maytag, Three Rocks, Spike Buck, and Parkdale. These areas are where most of the sheep herd occurs. These five areas encompass approximately 111.3 acres of dry land between US 50 and the railroad tracks. The disturbance resulting from installation of the anchor points and access paths to those points is estimated at 4.90 acres, or approximately 3.6 percent of the total area of 111.3 acres. This level of disturbance is not considered significant. Additionally, 10.4 acres will be disturbed north of the river at Texas Creek for a staging area and crew training area. The area is just north of the store, restaurant, and boat launch. It is not considered good sheep habitat because of the proximity of people and activities and relatively sparse grass and forb vegetation.

Mitigation measures to be considered to eliminate or minimize potential effects on bighorn sheep include the following:

1. Undertake no installation or removal activities in areas designated as sensitive, lambing, wintering, or drinking areas by the CDOW or BLM during the time of year when these areas are most likely to be used.

2. Impacts on lambing have been minimized by scheduling the viewing period when disturbance to this critical period would be avoided. Avoid lambing areas and other areas of critical bighorn sheep habitat via the use of additional gaps between panels if absolutely necessary.
3. Provide an adequate buffer zone around CDOW/BLM-designated sheep areas to minimize the effects of human activities. CDOW has suggested a buffer of 0.25 miles (440 yards).
4. Ensure that human presence on the north side of the river is kept to an absolute minimum. Monitors would be located only at points of access to the north side (Brown's Hole, Texas Creek). Access should also be controlled on the south side of the river (certain hiking and ORV access points such as Big Hole and Table Mountain area) to prevent safety and fire issues.
5. Provide supplemental water, food, and mineral sources for the north sheep herd to lure them away from their dependency on the river. Existing water holes could be maintained with water drops by air. Guzzlers (watering devices for sheep) were placed in areas north of the river in 2000. These guzzlers will have been in place long enough before the viewing period that sheep should be accustomed to using them. This would help reduce the dependency of the sheep on the river.
6. Overseed or fertilize selected areas to improve native grassland species forage. Supplemental feed could be dropped by air. Mineral licks could be established. Piñon-juniper areas could be thinned by burning or cutting selected trees to improve visibility for the sheep as they watch for predators and to also open up areas to provide more grass.
7. Conduct pre- and post-project monitoring of populations for activity levels and reproduction as a response to activities related to the temporary work of art. This would be funded cooperatively by OTR Corporation, CDOW, and BLM.
8. If monitoring determines that post-project fecundity decreases or mortality increases as a result of OTR, develop a plan to import bighorn sheep from other Colorado herds to reestablish a self-sustaining herd. OTR Corporation would fund the transplant effort.

Mule Deer

Mule deer most likely feed in the shrub-scrub riparian areas of the river corridor in the early to late evening and in the early morning hours. Outside these time periods, mule deer most likely spend their days in the piñon-juniper uplands or away from the river corridor. For the Proposed Action, managers of drilling and installation work crews will ensure that no project activities occurred before dawn or after sunset. Because the normal crepuscular (occurring in twilight) behavior of mule deer takes them out of the riparian areas during the day, few impacts on mule deer are anticipated for the Proposed Action and mitigation measures for mule deer are not deemed necessary. If an alternative is selected that entails night-time project activity, then impacts will need to be assessed and mitigation measures determined.

Elk

The temporary work of art will take place entirely in the Arkansas River corridor and essentially outside of normal elk range. It is therefore not expected that OTR will negatively affect the local elk population, and mitigation measures are not deemed necessary.

Mountain Lion

Mountain lions are largely nocturnal and secretive by nature. Although they occur in the river corridor, it is unlikely that they will be active during the day. Therefore OTR is not expected to negatively affect the local mountain lion population. The temporary loss of 5.51 acres of lion habitat in the river corridor is not considered significant and mitigation measures are not deemed necessary.

Bear

Generally, bear are shy creatures except when they are emboldened by readily available food sources associated with people such as garbage dumps or garbage cans. Bear are not considered numerous in the river corridor, judging by only two bear–vehicle collisions in 11 years of records. The potential for disturbance to bears is most likely during the drilling activities as part of the anchor installation. The drilling noise will carry for some distance and is likely to displace any bears in the area. But since that noise source will move along the corridor rather than remain in a single location, the displacement of any bears most likely will be short term and not permanent.

The potential for human–bear conflicts as a result of the temporary work of art is difficult to predict because there are two variables to consider. If there were a sudden increase in campers and visitors to the river corridor, the waste receptacles in campgrounds and along the roadside might suddenly contain larger amounts of edible garbage that could attract bears. A sudden increase in campers, visitors, and their vehicles in the river corridor, however, might disturb the bears and displace them into the upland areas or out of the river corridor altogether. In light of the potentially small population of bears and the small scale of potential effects on bears (short-term noise displacement), the potential for disturbance to bears is considered low.

Mitigation measures will still be warranted to minimize potential human–bear conflicts. As part of the transportation plan and crowd control (see Appendix J, OTR Operations Plans), the OTR Corporation will be providing many trash receptacles throughout the corridor. Small trash containers will be emptied daily. The larger collection containers will be bear-proof. Monitors will direct members of the public to trash containers to minimize littering.

Small Mammals

Small mammals are mobile and free-ranging animals that generally will be displaced from the areas around the work locations by the noise and activity, but will be expected to repopulate the area after work crews had moved to more distant locations. An exception to this phenomenon might be those small mammals that burrow in the soils or live in burrows dug by other animals, such as mice, voles, and cottontails. There is some potential that these species might experience some mortality in their burrows if the wheeled or tracked drill rigs crush their burrows. The number of burrows containing animals that could be crushed is expected to be small given that most drilling locations will not require overland travel by the drill rigs. The loss of 3.7 percent of available habitat in the panel areas is not considered significant because of the relatively low amount and short-term nature of the disturbance. The loss of 10.4 acres of potential habitat for the staging and crew training areas near Texas Creek also is not considered significant because the area is near considerable human activity and provides very little cover. The overall potential for small mammal mortalities is considered low.

A mitigation measure for small mammals will involve prohibiting access to upland piñon-juniper habitats where animals den and forage. Monitors will enforce this prohibition. This measure will be pursued in conjunction with other efforts to minimize viewer access into the upland areas to avoid impacts on native vegetation and the spread of noxious weeds.

Birds

Disturbance to birds will result from noise, the activity of work crews along the river corridor, the short-term presence of cables, and the short-term presence of the fabric panels. The drill rigs have a maximum noise level of 66 dBA at 100 feet. Compared with background noise levels near the river of 55 to 70 dBA (calm water versus rapids) (Hankard Environmental 2006; see Appendix H, Noise Measurement Report), bird communities may experience noise levels greater than or less than background, depending on their distance from the drill rigs. The drill rigs would be moving several times each day, so the noise disturbance is considered short term and temporary.

Work crews along the river would generally be working along the edge of the highway on the south side of the river and at varying distances from the river along the north side. The crews have the potential to create disturbance, however, by being in the proximity of riparian shrub and tree habitats where birds forage and nest. Such disturbances will be short term and localized during installation, which will minimize effects. Removal of cables and panels also has potential to affect birds because it could occur over three to four weeks during the beginning of the fall migration.

A low-decibel .22-caliber gun might be used to send lines across the river during the cable installation process. This will not add appreciably to wildlife disturbance beyond that of work crews already working along the river corridor.

There is potential for birds to collide with cables before the fabric is installed. The presence of bare cables across the river will occur for approximately 60 days before panel installation when water fowl densities are low, which reduces the potential for collisions. Removal of the cables will require approximately 60 days following the viewing period and could possibly overlap with waterfowl gathering to begin fall migration. If large numbers of waterfowl gather in the corridor, the potential for collisions with cables could increase during that period of time. Songbirds and raptors could be active in the corridor all summer long and also have the potential for collisions with cables.

The period when cables will be in place across the river without fabric has been reduced to the extent possible. The cables must be strung before fabric installation to ensure that tension and geometry meet project design standards. The cables could be made more visible by using brightly colored foam insulation tubes on the cables, or hanging cable marking devices from the cables, or other means, all of which could help reduce the potential for waterfowl collisions. See Section 5.3.1, Threatened, Endangered, and Special Concern Species, and Section 5.3.4, Migratory Birds, for additional information on potential bird–cable collisions.

Other mitigation measures for birds will include timing the work to occur outside the nesting period within a recognized distance of an active nest site (e.g., golden eagle). There are numerous work locations that are in areas of poor bird habitat where crews could work during the nesting season. Work will occur in the areas of quality bird habitat either before or after the nesting season.

Reptiles and Amphibians

Reptiles and amphibians are mobile and free-ranging animals that generally will be displaced from the areas around the work locations by the noise and activity, but they are expected to repopulate the area after the work crews move to more distant locations. Some lizards, snakes, and toads live in dry, upland habitats, but many snakes, frogs, toads, and salamanders require moist habitats. In the drier habitats, the animals most likely would be displaced until the work crews had moved on and then would repopulate the area. Reptiles and amphibians requiring moist habitats might be more restricted in their ability to relocate while the work crews were present. The moist-habitat-dependent animals might only have the option of moving upstream or downstream or very short distances to stay in preferred habitat. Although it is unlikely to occur, if they were displaced into drier habitat it could increase their stress levels and perhaps even cause them physical distress if they were out of their preferred habitats for too long a time. Mitigation for this potential impact to moist-habitat animals will involve minimizing foot traffic to the extent possible along the edge of the river and in all moist substrates. All vehicle traffic will be prohibited in moist substrates (such as floodplain) to the extent possible.

Given that most, if not all, anchor locations are away from the river's edge and elevated above the water level, the potential for impacts on reptiles and amphibians is considered low. The Proposed Action is projected to disturb approximately 5.51 acres out of roughly 150 acres, or 3.7 percent. Of those 5.5 acres, some portion is potential habitat for reptiles and amphibians. This level of disturbance is not considered

significant. The loss of 10.4 acres of potential habitat for the staging and crew training areas near Texas Creek also is not considered significant because the area is not near the river, is near considerable human activity, and provides very little cover.

Significance Criteria

Nine criteria are defined to determine the intensity or severity of a potential impact. Five could apply in this section: (1) If there is a potential impact on an animal that is protected by a state or federal law and the impact cannot be mitigated, then the impacts would be judged significant. (2) If the project creates a hazard to wildlife not currently present in the environment, which causes a downward trend in the population and cannot be mitigated, the effect would be considered significant. (3) If the action occurs in an area with unique characteristics (ecologically sensitive areas) effects could be determined significant. (4) The degree to which potential effects are likely to be controversial affects the severity of the potential impact. (5) Whether the action would have significant cumulative effects is also a factor in determining intensity of impacts.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. There would be no new activities or new elements in the environment with the potential to cause effects on terrestrial wildlife species. No new ground disturbance would occur. The large and small mammals, birds, and reptiles and amphibians identified in the area would not experience any potential disturbance beyond what is already occurring in the Arkansas River corridor. Larger forms of wildlife would still be disturbed by visitors in the canyon when visitors exit their vehicles or rafts. Animal–vehicle collisions would still occur at or above historical levels.

5.3.3.3 Mitigation Measures Already Implemented

Some panels from the original 10.4 mile design of OTR were removed from the design based on coordination with BLM, other agencies, and public comments to address wildlife concerns. The Fivepoints/Sheep Basin area included in the original design was removed based on BLM and DOW guidance to protect bighorn sheep. This area was identified as a major sheep watering hole and thus impacts on this area were avoided. The current design of OTR includes 5.9 miles of fabric panels, a reduction of approximately 40 percent (see Section 4.3.6 Other Alternatives Considered but Not Selected for Detailed Study, for further information).

5.3.3.4 Recommendations for Further Study

More recent data (since 2004) on animal–vehicle collisions are available from CDOW and should be obtained for the Draft EIS. Guzzler locations mentioned in the text above must be obtained from Seth McClain (CDOW–Colorado Springs) for inclusion in the Draft EIS. Information on bear-human interactions should be obtained from CDOW for the Draft EIS.

5.3.4 Migratory Birds

5.3.4.1 Affected Environment

Bird species must be addressed in all BLM NEPA documents to fulfill the requirements of the Migratory Bird Treaty Act of 1918 (MBTA). Under the MBTA, it is illegal to import, export, sell, buy, barter, take (hunt, shoot, poison, wound, kill, capture, trap, or collect), or take any part, feather, or nest of migratory bird species.

BLM Field Offices are required to incorporate analysis of effects of programs BLM authorizes or carries out that may affect migratory bird species or bird species of conservation concern (BCC) as defined in 50 CFR 17.11 and 50 CFR 10.13 and in Executive Order 13186. BCC for the southern Rockies and

Colorado Plateau Region have been listed by the USFWS (2002), and must be evaluated as part of the MBTA in NEPA documents. This evaluation included developing a list of species from field observations that are protected by the MBTA as well as an assessment of habitats and distribution to determine which BCC species are likely to occur in the project area.

Bird species that occur along the project corridor were identified from field surveys that were conducted during the course of several years (unpublished field notes of JFSA biologists R. Magill from 2000, D. Beringer from 2002, and S. Yarbrough from 2005). The project area also was surveyed by Knoor and Knoor (2001). The information from the field observations was supplemented by the BCC list (USFWS 2002), information from CDOW (J. Craig, CDOW pers. comm. 1999), BLM observations and records, especially on raptor species, and observations from S. Moss, Arkansas Valley Audubon Society (pers. comm. 2006).

Species on the BCC list for the Southern Rockies/Colorado Plateau that occur in the vicinity of the project area include golden eagle, flammulated owl, prairie falcon, black swift, Lewis's woodpecker, gray vireo, piñon jay, Virginia's warbler, and black-throated gray warbler. The peregrine falcon, which is on the BCC list, is addressed in Section 5.3.1, Threatened, Endangered, and Special Concern (TES) Species, even though the species has been delisted.

Bird species that were observed along the Arkansas River in the vicinity of the project area are discussed according to the broad categories of diurnal raptors, passerines, shorebirds/wading birds, and waterfowl. Species observed during fieldwork conducted during summer by JFSA biologists and Knoor and Knoor (2001) are listed in Appendix E2 in Table E2-1, Bird Species Observed in the Over the River Project Area.

Raptors

Raptor species that have been recorded nesting either along the corridor or in the vicinity of the river include the golden eagle and the red-tailed hawk. A golden eagle nest occurs near the Vallie Bridge Area, on cliffs just south of the highway, and was active during 2006. Other golden eagle nests occur south of the highway approximately 1 mile southwest of the staging area, and another approximately 0.5 to 1 mile northeast of the Three Rocks Area (see map in Appendix D1). Other raptor nest sites in the corridor include a prairie falcon site approximately 2.5 miles east, northeast of the Tunnel Area, and a peregrine falcon site 3 to 3.5 miles north of the Three Rocks Area (Appendix D1). Other peregrine falcon nest sites in the region occur near the Royal Gorge and one northeast of US 50 between Cañon City and Parkdale.

Bald eagles (see Section 5.3.1) and ospreys have been observed using the river corridor for feeding during fall and spring migrations. The bald eagle, osprey, golden eagle, red-tailed hawk, and other raptor species feed on fish in the river and small mammals that inhabit the riparian corridor and adjacent uplands. Other raptor species observed within the Arkansas River corridor of the project area included American kestrel, turkey vulture, and sharp-shinned hawk (Appendix E2). The great-horned owl, western screech owl, and flammulated owl (which occurs on the BCC list) are likely to occur in the project area but were not observed during the studies.

Bald eagle use of the corridor was documented by Erik Brekke during the winter of 2005–2006 (E. Brekke, pers. comm. 2005, 2006) and by Bibles (pers. comm. 2005). Much of the bald eagle use in the river corridor occurs along private lands in the Howard, Coaldale, and Swissvale areas, where there are many large trees along the river (see map in Appendix D1). Osprey can also use these trees as well. Bald eagles do not use the area from Texas Creek to Parkdale as much because the highway is so close to the river, there are few large trees for perching, and the river also runs quite fast in this reach. Bald eagles are usually in the river corridor from early December to the end of March. In a typical year, no more than

four or five eagles winter along the river. Bald eagles' use of the corridor is also addressed in Section 5.3.1, Threatened, Endangered, and Special Concern (TES) Species.

Ospreys have been observed in the river corridor in the spring and fall during migration. No bald eagle or osprey nests have been located in the corridor from Salida to Cañon City (E. Brekke, pers. comm. 2006).

Passerines

Many small, inconspicuous bird species use riparian corridors in the west as seasonal migrants, as spring and summer breeders, and as year-round residents. Many of these birds are secretive, insectivorous species (warblers, wrens, sparrows, tanagers, American dippers, and so on) that require the dense undergrowth or closed canopy forest typically present in a healthy riparian system to successfully complete a breeding cycle. Other species, such as the belted kingfisher, use the riverside vegetation and banks as feeding perches and nest sites. Forty passerine species were observed during field observations (Appendix E2). Of the passerines on the BCC list, only the gray vireo and piñon jay were observed during field activities. However, Moss (2006) noted a Lewis' woodpecker approximately 0.5 miles southeast of the Vallie Bridge Area near the bridge of County Road 45. American dippers were observed in this area as well as near the bridge at Texas Creek, approximately 1 mile west of the Texas Creek Area, which is thought to be a nest site (S. Moss, pers. comm. 2006). A black phoebe also was reported neat the Texas Creek Bridge. Another dipper nest site occurs approximately 2.5 miles west of the Vallie Bridge Area near milepost 236 (Appendix D1). This species often nests under bridges (Cornell Lab of Ornithology Website November 10, 2006) and is affected by river-oriented human intrusion or recreational use (S. Moss, pers. comm. 2006).

Shorebirds/Wading Birds

Many species of shorebirds and wading birds use the slower portions of the river (eddies, backwater sloughs) for feeding. The great blue heron is the most notable of the species and feeds on frogs, fish, and crayfish, but also is known to feed on mice and the nestlings of ground-nesting birds (Erlich et al. 1988). Other birds in this category observed in the project area include killdeers and sandpipers.

Waterfowl

Waterfowl use the river primarily during spring and fall migration; however, some winter use of the river also occurs. Sandbars along the river and the river itself are used as resting and feeding areas and may provide some nesting cover. With the amount of recreational use the river receives during the spring and summer months, it is unlikely that many species of waterfowl use the area for nesting purposes. Canada geese, mallard, and double-crested cormorant were the only waterfowl observed during field studies.

5.3.4.2 Impact and Mitigation Issues

Proposed Action

During drilling at the anchor locations and the actual anchor installation, there will be noise, foot traffic by workers, and machinery in some parts of the canyon during most seasons of the year. This disturbance may stress individual birds, interfere with their foraging, cause them to be displaced to other habitat areas, or interfere with breeding and nesting. If reproduction is disturbed, the next generation may be diminished. Activity disturbance will also occur during panel installation and removal, and similar impacts are expected, although the period of occurrence is short and no drilling noise would occur.

CDOW has established recommendations on buffer zones for raptor species that include seasonal restrictions for human activity (Craig 1996). The size of the buffer areas and the restriction periods vary with the species' sensitivity to human intrusion and length of time for nesting and fledging. Those that apply to species in the project area are as follows:

- Bald eagle winter roost restriction is a 0.25-mile radius between November 15 and March 15. A larger buffer of 0.5-mile radius is recommended if there is a direct line of sight from the roost to the activities. Approximately 40 roost trees have been identified that are regularly used by bald eagles in the winter. These trees are located between Texas Creek and Wellsville, but are largely concentrated between Texas Creek and Cotopaxi. Their locations are shown on the biological resources map in Appendix D1.
- Golden eagle nest site restrictions are recommended within a 0.5-mile radius of a nest site from February 1 to July 15. Such restrictions would affect work in the Vallie Bridge Area, and possibly in the staging area and the Three Rocks Area. More precise nest site locations are necessary to determine if the staging area and Three Rocks Area are within the buffer area.
- Peregrine falcon buffer area restrictions are similar to the golden eagle at a 0.5-mile radius, but the seasonal restrictions are March 15 to July 31. No nest sites are close enough to any project areas where buffers for this species would be required.
- Passerine species such as the Lewis woodpecker and American dipper are also sensitive to human intrusion, but no buffer area suggestions were designated by CDOW (Craig 1996).

In all cases, it will need to be determined whether the roost sites and nest sites are active or not, to decide whether buffer areas are warranted.

Bird collisions with cables may occur, primarily after the cables are strung and before the fabric is in place, and again after the fabric has been removed. There is extensive literature on bird collisions with power transmission lines, with guy wires supporting communication towers, with wind turbines and their guy wires, and even with fixed objects such as tall smokestacks (CEC 1995, Kerlinger 2000). The literature contains many references to bird deaths from power transmission lines. However, not all reports distinguish between collisions with the lines and electrocution when landing or leaving perches on poles or towers. Unfortunately, there is no literature about bird collisions with low-level cables suspended above ground or above a river. Much of the following discussion deals with power transmission lines and guy wires, but is included as a background on situations and on bird behavior that can lead to collisions to determine if an impact from OTR is likely or not.

At one extreme, Weir (1976, as cited in CEC 1995) stated that “nocturnal bird kills are virtually certain wherever an obstacle extends into the air space where birds are flying in migration. The time of year, siting, height, lighting, and cross-sectional area of the obstacle and weather conditions will determine the magnitude of the kill.” At the other extreme, a draft environmental impact statement for a 230 kV power transmission line concluded, “It is impossible to estimate the number of waterfowl, raptors, and other birds that are likely to collide with transmission line structures over any period of time because collision rates depend on site-specific settings and conditions” (RUS 2001). In general, large-bodied birds and species that congregate in large flocks are more susceptible to collisions (Anderson 1978, Colson & Associates 1994, Faanes 1987, all as cited in RUS 2001.) The potential for collisions increases during periods of low light visibility, including early morning and evening hours, and during periods of precipitation, fog, or low ceiling clouds (Bevanger 1994, Colson & Associates 1994, all as cited in RUS 2001). Panic flight in response to disturbance can also result in birds colliding with electrical transmission lines (Avian Power Line Interaction Committee [APLIC] 1994, as cited in RUS 2001). It is not expected that flocks of migrating birds will use the Arkansas River canyon in August. However, there may be periods of low light visibility when summer resident birds would be flying about the canyon.

Power transmission lines have a static wire (the nonconducting topmost wire on a power line used to minimize power outages from lightning strikes) that is normally smaller than the conductors and appears to be the wire most often struck by birds in flight (Brown et al. 1987, as cited in CEC 1995). Approximately 80 to 93 percent of avian collisions with transmission lines have been shown to involve

the static wires (Faanes 1987, as cited in RUS 2001). Conductors are of much larger diameter and more visible compared to static wires, and it has been suggested that birds in flight see the conductors, flare upward to avoid them, and collide with the static lines (Alonso et al. 1994, Colson and Associates 1994, Faanes 1987, James and Haak 1979, all as cited in RUS 2001). Cables for OTR panels will vary from 3/4-inch diameter for those on the ends of the sections to 7/16 inch for those in the interior of the sections, and to 3/8 inch for the diagonal cables. These diameters are larger than most static lines. All of the cables would all be suspended at the same relative height, and flare collisions that occur with static lines would be avoided.

Power transmission lines are a hazard to peregrine falcons because their attack dives may exceed 150 mph, and collisions with wires are well known (Enderson and Kirven 1979, as cited in CEC 1995). Young falcons are particularly susceptible to wire collision (Olsen and Olsen 1980, as cited in CEC 1995). In general, inexperienced birds are more prone to collide with wires than are older birds (Riegel and Winkel 1971, as cited in CEC 1995).

As of 2000, there were more than 50,000 communication towers with lighting across the United States that were more than 199 feet in height (Kerlinger 2000). These towers can be as tall as 2,000 feet. Such tall structures require numerous guy wires surrounding them. Such towers can kill large numbers of birds. The species affected most seem to be night migrating songbirds (warblers, thrushes, vireos, tanagers, cuckoos, sparrows, and so on), although smaller numbers of waterfowl, shorebirds, and other species have also been documented. Current estimates of numbers of birds killed annually by communication towers range between 4 and 10 million (Kerlinger 2000). Unpublished studies conducted in three states suggest that towers less than 400 to 500 feet in height are not as dangerous to migrating songbirds, especially neotropical species, as towers greater than 500 feet in height (Kerlinger 2000).

The risk of collision by migratory birds is considered small for high-flying migratory waterfowl, but increases for low-flying nocturnal migrants such as songbirds (Phillips 1979, as cited in CEC 1995). There is considerable variation, but for most small birds the favored altitude appears to be between 500 and 1,000 feet (Lincoln et al. 1998). Radar studies have shown that nocturnal migrants fly at different altitudes at different times during the night. Birds generally take off shortly after sundown and rapidly gain maximum altitude. This peak is maintained until around midnight, when the travelers gradually descend until daylight (Lincoln et al.1998).

Information on bird collisions with wires in Colorado is sparse. A wind power station (Ponnequin) had 29 turbines, 275 feet tall with red lights. In a 1-year study, only five songbirds were killed, none of which appeared to be migrants (Kerlinger 2000). A 230 kV transmission line from Colorado Springs to Limon was surveyed before, during, and after construction. Avian mortality due to collisions with conductors and the ground wire was slight: one mourning dove and five horned larks. Because other birds may have fallen on parts of the ROW that were not searched and others may have been taken by scavengers, bird losses may have been greater (Stahlecker 1975, as cited in CEC 1995).

While OTR is being viewed, there will be additional traffic on both the highway and on the river, but with the panels in place, the potential for collision with cables will be greatly reduced. Additional traffic on the highway should not greatly affect local birds that are acclimated to vehicular traffic. Additional rafts and kayaks on the water may indirectly disturb birds along the river by keeping the birds in a state of wariness longer than with normal boating numbers. There is some potential that more rafters will exit their rafts to walk along the shore, thus creating direct disturbance to resident birds.

Removal of the panels and cables will create direct and indirect effects very similar to the installation process. After the panels are removed, the potential for bird collision with the cables will be present again

until the cables are removed. Cable and anchor removal will have direct and indirect impacts much like the installation process but without rock drills operating.

Significance Criteria

Three criteria relate to significant impacts on birds: (1) If there is an impact on a bird that is protected by law and the impact cannot be mitigated, then the impacts would be judged significant. Many of the birds in the canyon are protected by the MBTA or the Bald and Golden Eagle Protection Act. (2) If the project creates a hazard to birds not currently present in the environment, which causes a downward trend in the population and it cannot be mitigated, impacts would be considered significant. (3) If the project removes habitat of high value to birds, causing a downward trend in the population, impacts would be judged significant.

Mitigation

Increasing the visibility of cables while they are strung without fabric is the best means of mitigating potential bird collisions. Collisions by bald eagles and peregrine falcons (see Section 5.3.1 for more discussion) that are foraging along the river would be considered a significant impact, because these species are considered to be rare, although they have recovered sufficiently to be removed from listings as endangered. Similarly, collisions are considered to be "takes" as defined by the MBTA and the potential for this to occur would need to be coordinated between the BLM and USFWS. Certain wire marking techniques (known as bird flight diverters [BFD]) have proven to be effective, while other marking techniques have been inconclusive. Attempts to make power lines more visible with luminous orange tape were inconclusive (Scott et al. Cadbury 1972, as cited in CEC 1995). Other techniques have proven effective in reducing bird mortality (Alonso et al. 1994, Beaulaurier 1980, Brown and Drewien 1995, and Morkill and Anderson 1993, all as cited in RUS 2001) and have been acceptable as a mitigation action for "take" as defined in the MBTA (Lewis 1993, as cited in RUS 2001). Marking of power lines where they cross rivers was required in Alaska (RUS 2001). Some of the marking devices evaluated, and their effectiveness, included:

- Colored PVC spirals, 30 cm × 100 cm rolled around static wires at 10 m intervals (Alonso et al. 1994): effective
- Yellow plastic spirals (DeLaZerda and Rosselli 2003): effective
- Yellow aviation balls (Morkill and Anderson 1991, as cited in RUS 2001): effective
- Thin black stripes, 0.8 cm × 70 cm on conductors at 12 m intervals (Brown and Drewien 1995, as cited in RUS 2001): not effective
- Black crossed bands, 35 cm × 5 cm on conductors (Brown and Drewien 1995): effective
- White spirals at 5, 10, and 15 m intervals (Brown and Drewien 1995): all effective but proportionately less effective
- Red spiral with 11 cm diameter at 10 m intervals (Brown and Drewien 1995): effective
- Red spiral with 11 cm diameter (Heijinis 1980 as cited in Brown and Drewien 1995): not effective
- Yellow spiral vibration dampers, 1.3 cm diameter × 120 cm length and 3.3 m apart (Brown and Drewien 1995): effective

Actions needed to address potential effects on bird species from OTR include the following:

- Consult with the BLM and USFWS.
- Determine in conjunction with BLM biologists best measures to protect birds from collisions with bare cables during project installation and removal.

- Avoid installation and removal activities within buffer areas for raptor species (for example, within 0.5 mile of golden eagle nests at Vallie Bridge Area) during the nesting period of March through August.

Potential loss of individual birds, especially among ducks, geese, shore birds, songbirds, and raptors, as a result of collisions with cables could affect birds for the project period, but adverse effects on local populations are not expected. Impacts on birds from collisions with the cables could be locally significant but are not expected to be regionally significant due to the limited amount of habitat and limited number of birds that could be affected by activities in 7 miles of the 50-mile-long canyon. Implementing measures to increase the visibility of the cables while bare is expected to reduce the impact to less than significant levels.

Impacts on birds related to habitat loss are expected to be local and minor. Impacts on birds on a regional level are expected to be even less noticeable in this larger population. Drilling and anchor placement will occur largely at the edges of the riparian corridor that constitutes the most desirable bird habitat along the river. Direct impacts will be restricted to disturbance of individual birds present within localized areas of drilling or anchor placement.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. Effects on migratory birds from the No Action alternative are those that currently affect these species. These include effects from existing recreational activities, including disturbance of birds along the river by rafting and, to a lesser degree, from fishing activities and camping-picnicking. These activities occur primarily during summer, although fishing is common in late summer and fall. Summer use especially affects passerine species that nest in the riparian habitat, although some waterfowl species (for example, Canada geese) are affected by these activities as well.

5.3.4.3 Recommendations for Further Study

The selection of effective mitigation measures to reduce the potential for bird collisions with bare cables needs to be coordinated with BLM biologists. Bald eagle roost sites and raptor nest sites that have potential to be affected by OTR will need to be observed to determine if they are active or not for that particular season, and whether buffer area and seasonal restrictions are necessary in relation to these sites.

5.4 Water Resources

5.4.1 Wetlands and Riparian Areas

5.4.1.1 Affected Environment

Wetlands and riparian vegetation of the project area were described using a combination of existing maps and file data as well as data collected during fieldwork conducted in 2000, 2005, and 2006. Fieldwork consisted of characterizing the plant communities, including the dominant or characteristic species, and verifying the wetland and riparian units on aerial photography of the Proposed Action.

Wetlands

Wetlands provide a number of functions that are important to riverine systems, from bank stabilization and flood control to wildlife habitat. Wetlands are also partially protected by the Clean Water Act. Discharge of dredged and fill material into waters of the United States, including wetlands, is regulated by Section 404 of the Clean Water Act, as amended in 1972. According to Section 404, all activities within the delineated boundaries of waters of the United States (for example, Arkansas River), including wetlands, may require specific permits.

A variety of palustrine (all nontidal wetlands dominated by trees, shrubs, persistent emergents, and small ponds) wetland classes occur within the proposed project areas along the Arkansas River. These wetlands were identified, classified, and mapped during a concerted wetland inventory effort by the USFWS, National Wetlands Inventory (NWI) in the 1970s and 1980s. Riparian and wetland communities were also mapped at a larger scale along the Arkansas River between Leadville Junction and Pueblo Reservoir in a cooperative effort between the Colorado Division of Wildlife, BLM, and USDA Forest Service (BLM 2001a). This information was incorporated into the GIS database for the OTR project area and also used as a reference to identify wetland and riparian community types. The geology of the river was used in the BLM (2001a) study to identify relatively uniform segments. The project area occurs within Segment 9 (Salida Stockyards to Swissvale), Segment 10 (Swissvale to Coaldale), and Segment 11 (Coaldale to Parkdale).

Field inspections were conducted in August 2005 and in summer 2006, and dominant species of the wetlands and the map units were noted on aerial photographic field maps. Other data were obtained during fieldwork to characterize wetlands and included soil conditions (moisture regime and saturation depth, and general soil texture). Wetlands were classified according to Cowardin et al. (1979), which has been used for the NWI mapping and for other federal land applications.

Dominant communities of Segment 9 were described (BLM 2001) as equal amounts of a narrowleaf cottonwood/coyote willow community that occurs in isolated pockets throughout the segment, as well as continuous bands of a coyote willow/mesic graminoid community. Other less prominent communities that occur in small patches include narrowleaf cottonwood/Rocky Mountain juniper, river birch/mesic forb, water sedge, and mesic graminoid. Segment 10 is also dominated by communities characterized by coyote willow, including coyote willow/mesic graminoid and narrowleaf cottonwood/coyote willow communities, mostly in continuous bands and in moderate densities. Other, less prominent communities of this segment include a Rocky Mountain juniper alliance, coyote willow/bare ground, river birch/mesic forbs, water sedge, mesic graminoid, and several narrowleaf cottonwood and plains cottonwood communities (BLM 2001a).

The long Segment 11 that extends to Parkdale is dominated almost entirely by a coyote willow/mesic graminoid (mostly water sedge) community. Secondary communities include water sedge, river birch/mesic forb, and river birch/mesic graminoid (BLM 2001a). The wetland types (Cowardin et al. 1979) and plant communities (BLM 2001a) that dominate each of the project areas are listed in Table 5.4-1. Plant species that were observed in the riparian and wetland communities in the project area are listed in Table 5.4-2. Scientific nomenclature follows Weber and Wittmann (2001).

Table 5.4-1. Wetland Types and Plant Communities by Area, West to East

Project Area	Wetland Type*	Dominant Communities
County Line	PFO/SS	Narrowleaf cottonwood/coyote willow
	PSS/EM PEM	Coyote willow/reed canarygrass–redtop–arctic rush: alder/arctic rush Reed canarygrass
Tunnel	PSS/EM PEM	Coyote willow/reed canarygrass–spikerush–scouring rush Reed canarygrass–spikerush
Vallie Bridge (Red Rocks)	PFO/EM PSS/EM PEM	Narrowleaf cottonwood/sedge-grass Coyote willow/reed canarygrass–spikerush Reed canarygrass–spikerush

Project Area	Wetland Type*	Dominant Communities
Texas Creek	PSS/EM PSS/EM PEM	Coyote willow/reed canarygrass – spikerush – saltgrass River birch-coyote willow/reed canarygrass – hardstem bulrush Reed canarygrass – hard-stem bulrush-spikerush
Maytag	PSS/EM PSS/EM	Coyote willow/reed canarygrass – sedge – spikerush River birch/reed canarygrass
Three Rocks	PFO/SS/EM	Narrowleaf cottonwood/coyote willow/reed canarygrass – sedges
	PSS/EM	River birch - coyote willow/reed canarygrass – sedges: coyote willow/sedges
Spike Buck	PSS/EM PEM	Coyote willow/reed canarygrass – sedges Reed canarygrass - sedges
Parkdale	PFO/EM	Narrowleaf cottonwood/reed canarygrass – spikerush
	PSS/EM	Coyote willow/reed canarygrass – spikerush – arctic rush
	PSS/EM PEM PEM	River birch – coyote willow/reed canarygrass – sedges Reed canarygrass – bulrush – sedges Cattail – bulrush

*P = Palustrine: all nontidal wetlands dominated by trees, shrubs, persistent emergents, as well as small ponds. FO = forested; SS = scrub-shrub; EM = emergent: of erect, rooted, herbaceous hydrophytes.

Table 5.4-2. Characteristic Wetland and Riparian Plant Species along the Arkansas River in OTR Areas

Wetland/Riparian Plant Species		Area/Mileposts							
Common Name	**Scientific Name**	**County Line 225.3-225.9**	**Tunnel 230.0-230.9**	**Vallie Bridge 237.6-237.9**	**Texas Creek 253.6-254.3**	**Maytag 254.9-255.5**	**Three Rocks 258.7-259.3**	**Spike Buck 260.8-262.4**	**Parkdale 263.0-266.0**
Alder	*Alnus incana* spp. *tenuifolia*	X	X						X
Arctic rush	*Juncus* spp.	X							
Box-elder	*Negundo aceroides*	X			X				
Broad-leafed Cattail	*Typha latifolia*								X
Chokecherry	*Padus virginiana*	X							
Common purslane	*Portulaca oleracea*						X		
Coyote willow	*Salix exigua*	X	X	X	X	X	X	X	X
Goldenrod	*Solidago* spp.		X						
Hardstem bulrush	*Schoenoplectus lacustris* spp. *acutus*				X				X
Idaho fescue	*Festuca idahoensis*		X						
Mullein	*Verbascum thapsis*				X				
Narrowleaf cottonwood	*Populus angustifolia*	X		X			X		X

Wetland/Riparian Plant Species		Area/Mileposts							
Common Name	Scientific Name	County Line 225.3-225.9	Tunnel 230.0-230.9	Vallie Bridge 237.6-237.9	Texas Creek 253.6-254.3	Maytag 254.9-255.5	Three Rocks 258.7-259.3	Spike Buck 260.8-262.4	Parkdale 263.0-266.0
Needle-and-thread	*Hesperostipa comata*							X	
Orchardgrass	*Dactylis glomerata*	X	X		X				
Plains Cottonwood	*Populus deltoides*							X	
Ponderosa pine	*Pinus ponderosa*	X							
Quackgrass	*Elytrigia repens*		X						
Redtop	*Agrostis stolonifera*	X		X					
Reed canarygrass	*Phalaroides arundinacea*	X	X	X	X	X	X	X	X
River birch	*Betula fontinalis*				X	X	X		X
Saltgrass	*Distichlis stricta*				X				
Scarlet gaura	Gaura coccinea				X				
Scouring-rush	*Hippochaete* spp.	X	X				X		
Sedge	*Carex* spp.					X	X	X	X
Spikerush	*Eleocharis* spp.		X	X	X	X	X		X
Squirreltail	*Elymus elymoidoes*								X
Tall wheatgrass	*Thinopyrum ponticum*				X				
Three-awn	*Aristida purpurea*		X						
White sweet-clover	*Melilotus albus*				X				
Wild rye	*Elymus* spp.							X	
Willows	*Salix* spp.								X

County Line Area

Wetlands of the County Line Area are dominated by coyote willow (Table 5.4-1) with a thin understory of reed canarygrass, redtop, and arctic rush. This wetland type often occurs on a rocky substrate, which appreciably reduces the herbaceous cover. Areas where deposition instead of scouring has occurred are characterized by more soil development and a higher cover of herbaceous species under the willow overstory. This shrub wetland type occurs in a variety of hydrologic conditions: from up to 1 foot of surface water in late summer flows to approximately 1 foot above the active flow channel. In the latter case, the community contains a better-developed soil and graminoid understory. In these areas, the willow type is generally bordered by a narrow emergent wetland of reed canarygrass with lesser amounts of arctic rush, and a forested narrowleaf cottonwood community occurs in a few sites behind the willows in a relatively stable part of the floodplain.

The narrowleaf cottonwood wetland type is prominent at a number of sites in this area, with a large stand at milepost 225.32 on both sides of the river. Smaller stands occur at approximately mileposts 225.36, 225.44, 225.50, and 225.81. Several smaller stands of alder occur in a similar position of the floodplain as narrowleaf cottonwood behind coyote willow stands, which are able to withstand higher flows.

Tunnel Area

The wetlands of the Tunnel Area are dominated by an emergent type of reed canarygrass that occur in long, narrow (2 to 3 feet wide) strands along the active flow channel. Although reed canary dominates these areas, spikerush is often associated with it, mostly adjacent to the channel. Soils are of sand and silt, and saturated at 6 inches below the surface (late summer conditions). Coyote willow dominated wetlands also occur here but are scattered, with the largest stand on the north side of the river at approximately milepost 230.5. Other characteristic species of this wetland type include reed canarygrass, spikerush, and scouring rush.

Vallie Bridge Area

The wetlands of the Vallie Bridge Area are scattered, because much of the area along the channel is quite rocky. However, coyote willow stands occur prominently on the south side of the river from approximately milepost 237.67 to milepost 237.80 and also from milepost 237.89 to milepost 237.91. Although coyote willow characterizes the wetlands (Table 5.4-1), reed canarygrass and spikerush are also prominent in this wetland type if soil has developed. Conversely, areas of rock support nearly monotypic stands of willow, and these areas are often within the active part of the channel, which is heavily inundated during spring flows.

Texas Creek Area

The wetlands in the Texas Creek Area are composed of nearly equal parts of shrub-scrub (coyote willow) and emergent (reed canarygrass) types (Table 5.4-1). In most areas, these two types occur separately, with reed canarygrass occupying relatively wide, lower terraces of the river. This wetland type is also characterized by hard-stem bulrush and spikerush (see Table 5.4-2). Exceptions do occur, however, where coyote willow occurs on a second terrace behind the emergent wetlands. In these situations, the emergent type forms a narrow band along the active channel and is heavily dominated by reed canarygrass (for example, milepost 253.70).

A second shrub community occurs in this area as a river birch–coyote willow association (for example, milepost 254.10). River birch generally occurs on a second terrace of the floodplain on soils that contain moisture at depths of 1 foot or more. Soils here are unconsolidated sand and silt.

Maytag Area

Wetlands of the Maytag Area are dominated by dense stands of coyote willow that occur between rock outcrops. This community is especially prominent at the beginning (milepost 254.92) and end (milepost 255.05) of the first section of this area, where it occurs on stable sand bars. Because of this stability and soil deposition, a well-developed herbaceous stratum of reed canarygrass, sedges, and spikerush also characterizes this wetland type.

Another wetland scrub type of river birch and reed canarygrass is present, but is much more restricted, occurring in several sites near the end of the area (milepost 255.37).

Three Rocks Area

Wetlands of the Three Rocks Area are similar to those described for the Maytag Area, although more disjointed because of the amount of rock, including riprap that occurs along the channel. Thus, coyote willow dominated wetlands are present as long narrow stands on both sides of the river (for example,

milepost 259.08–259.10). River birch forms small areas of wetlands in several sites near milepost 259.01 on the south side of the river, and again near milepost 259.26 on the north side of the river where it occurs near a large stand of narrowleaf cottonwood. This latter species forms a forested wetland type on a wide terrace that also includes coyote willow, and sedges nearer the channel. The soils of this wetland were relatively well-drained during late summer and of unconsolidated sand and silt, although the area of coyote willow occurs in conjunction with a higher water table.

Spike Buck Area

Wetlands of the Spike Buck Area are relatively simple, with only shrub-scrub of coyote willow and one small emergent wetland (milepost 262.85) of reed canarygrass represented (Table 5.4-1). This area is rocky, which minimizes wetland development to a few locations (for example, mileposts 261.0, 262.20, 262.31, and 262.39).

Parkdale Area

The Parkdale Area is the longest of the proposed areas and contains a variety of wetland types ranging from forested to emergent (Table 5.4-1). Narrowleaf cottonwood forms a forested wetland at approximately milepost 263.58 on the north side of the river. Other emergent wetlands are formed by sedges and reed canarygrass, especially adjacent to the channel. This latter species occurs in narrow bands at the outer edge of the low terrace, but where soil is present.

Shrub-scrub of coyote willow, with reed canarygrass, spikerush, and arctic rush, is by far the most prominent wetland type throughout this area. Several small shrub-scrub wetlands of river birch also occur here. As observed in the other project areas, wetlands are often limited by rock, although coyote willow occurs on this substrate in some areas (for example, mileposts 264.55 to 264.78). The more robust willow stands, however, are associated with areas of sand deposition and some soil development.

Riparian Zones

Riparian habitats have the highest wildlife species diversity of all habitats encountered in Colorado (Fitzgerald et al. 1994). This diversity of wildlife species is due to the abundant resources the habitat offers: cover, food, movement corridors, and water. These habitats are limited in distribution and are considered by the Colorado Natural Heritage Program (CNHP) to be “rare and imperiled communities.”

Riparian communities were identified using the BLM (2001a) descriptions, and this information was supplemented with data obtained during field investigations and aerial photography interpretation. The communities described in Table 5.4-1 also form riparian communities along the OTR areas.

Within the Arkansas River corridor, riparian habitats are valuable for wildlife but vulnerable to disturbance (Cooper and Merritt 1996). Healthy riparian systems provide habitat diversity through structural diversity or vegetation layers that often include a grass or meadow understory, lower shrub canopies, and tall shrub and/or tree canopies. The diversity of the communities in the project area, however, depends on the stability and age of the substrate and the deposition and erosional processes of the river. Riparian vegetation has developed along the inside of river meanders where the first and second terraces are best defined. Secondary vegetative development exists along most riverbanks.

Herbaceous cover of reed canarygrass occurs on the lower, first terrace where inundation from the river is more frequent. However, the herbaceous cover also occurs in conjunction with the shrub component and floodplain areas such as sloughs and ponds where run-in is supplied by secondary channels. Other herbaceous species associated with backwater channels include Canada reedgrass (*Calamagrostis canadensis*) and shore buttercup (*Ranunculus cymbalaria*).

The most prominent vegetation type along the secondary river terraces is riparian-shrub (coyote willow) with a variety of herbaceous understory (reed canarygrass and broadleaved cattail, sedges, rushes [*Juncus* spp.], spikerush [*Eleocharis* spp.], hard-stemmed bulrush [*Scirpus* spp.], and scouring-rush). Coyote willow is the dominant shrub species and commonly occurs on the secondary terraces where soils are more stable and have slightly better drainage than on lower, primary terraces. As mentioned in the wetland descriptions, however, coyote willow also occurs adjacent to the channel and in rocky areas that may have been scoured out by flooding.

Trees occur sporadically on the more stable parts of the floodplain and, in addition to narrowleaf cottonwood, include ponderosa pine, plains cottonwood, Rocky Mountain juniper (*Juniperus scopulorum*), box-elder, river birch, and hoptree (*Ptelea trifoliate*) observed in the Parkdale Area (Table 5.4-1). Narrowleaf cottonwood stands are common between 5,000 and 8,000 feet AMSL (BLM 2001a) where the required soils and hydrologic conditions exist. Thus, in the project areas these stands are restricted to the wider, more stable parts of the floodplain and do not form any large, continuous galleries. The largest narrowleaf cottonwood stand near the proposed project area occurs in the Three Rocks Area at approximately milepost 259.26 on the north side of the river. Associated herbaceous species of the riparian forest on the better drained parts of the terrace include Canada wild rye (*Elymus canadensis*), coyote willow, and alkali sacaton (*Sporobolus airoides*). Grape (*Vitis riparia*) also is common within the riparian forests.

5.4.1.2 Impact and Mitigation Issues

Proposed Action

Potential Impacts

In most instances, installing anchors is not expected to directly affect wetlands because anchor points for the cables would occur primarily on upland banks. Based on the vegetation maps (Appendix D4) and engineering design, however, some anchors will be placed in riparian vegetation and areas of coyote willow and reed canarygrass. This occurs primarily in the Parkdale Area (see Table 5.4-2). However, the amount of area is small, with an estimated 0.04 acres of anchor installation impacts on all wetland and riparian areas. Wetlands and riparian habitats of the Arkansas River also are likely to be affected directly by trampling from workers during installation and removal. Approximately 0.01 acres are estimated to be affected by foot traffic during installation and removal.

Equipment pathways used to access anchor points will not often affect wetlands or riparian vegetation. An area of river birch is predicted to be affected, however, totaling approximately 0.03 acres in the Three Rocks Area. The damage to vegetation and soils from equipment access from the railroad ROW would be reduced by using thick mats on the access paths, and large shrubs and trees would be avoided.

Trampling of vegetation and soils from people viewing OTR from within the floodplain of the Arkansas River may result if viewer access is not restricted. The herbaceous wetlands of sedges, spikerush, scouring rush, and cattail are the most susceptible to trampling damage. Shrub-dominated wetlands of sandbar willow are generally more resilient to trampling because these communities are associated with coarse soils and are adapted to withstand high intensity flows of the river.

Increased use (camping or rafting stops) in riparian areas may also damage vegetation, degrade habitat quality, and provide an opportunity for weed invasion (for example, leafy spurge and knapweed). Riparian areas that contain a multistructured vegetation community are valuable habitat, and too much use from rest and lunch stops and trampling would reduce habitat value. Riparian cottonwood forests are considered to be rare in this area of the Arkansas River, and because of the relatively large number of niches and proximity to water, are used as habitat for numerous wildlife species. The County Line, Vallie Bridge, Three Rocks, and Parkdale areas contain small stands of riparian forests.

Other indirect impacts on wetlands and riparian vegetation include erosion and sedimentation from drilling operations to place anchors and disturbance of soils from people if hiking to view OTR occurs on banks of the river. Sediment deposition may occur from disturbance of the soil surface on slopes above the flood plain when subsequent high-intensity precipitation occurs and is carried by overland flows to wetland and riparian areas of the floodplain.

Similarly, fuel and other equipment-related materials have potential to be carried into wetland and riparian areas if fueling and maintenance activities occur close to these areas.

Mitigation Measures

Mitigation measures are proposed to reduce both direct and indirect effects on wetlands and riparian vegetation of the project areas. Rock and soil that are loosened from sites during placement of anchors would be controlled, collected, and placed in heavy duty plastic bags to reduce the potential for sediment to be transported into wetland and flood plain sites. The plastic bags would be labeled with the anchor location, and then stored in a warehouse off-site. At the time of anchor removal, the plastic bag of removed soil would be returned to the site and used in reclamation of the site.

Hiking on the slopes above the Arkansas River floodplain would be controlled to the extent possible by project monitors and law enforcement personnel. Event policies would specify what activities are not allowed, and which areas may be off limits to viewers on foot. Such policies will be developed more fully by the event management plan (Appendix J2.2).

Wetlands that are considered to be valuable or sensitive, such as areas of cottonwoods, would be cordoned off to reduce the amount of use and trampling these areas receive. Currently no regulations limit or prohibit camping from certain areas. Thus, some use restrictions would be required during all project phases, but especially during viewing, when the largest number of people is anticipated to be in the area.

Specific mitigation measures to avoid or minimize impacts on wetlands and riparian areas may include the following:

- Control spoil from drilling operations and use erosion control to curtail overland flow from drill sites into wetland and riparian areas.
- Service equipment at least 100 feet from wetland areas and use best management practices to control and clean up spills (for example, absorbent material).
- Restrict rafting rest and lunch stops in narrowleaf cottonwood and river birch areas.
- Restrict public access to the banks and the river floodplain during project viewing.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. Effects on wetland and riparian areas from the No Action alternative are the current effects. These include effects from recreational activities, including high use at rafting stops that has caused disturbance and loss of vigor to some areas. Examples include the understory of cottonwood groves, which contain trampled areas and pathways. Some weed incursions have occurred in these areas as well, and include smooth brome and squirreltail and one observed occurrence of tamarisk, a noxious weed, near Parkdale.

5.4.1.3 Recommendations for Further Study

Analysis is needed on the alternatives and on information contained in the OTR Operations Plans to determine if Section 404 of the Clean Water Act is applicable for project activities. If wetlands that are jurisdictional to Section 404 are likely to be affected, a permit from the U.S. Army Corps of Engineers will be required prior to such effects being impemented.

5.4.2 Hydrology and Water Rights

5.4.2.1 Affected Environment

This section focuses on precipitation and water rights issues and their relation to project area surface water hydrology. The surface water hydrology of the Arkansas River is described in the water resources section of this Report (see Section 5.4.3) and in Section 5.4.4, which addresses floodplains.

Precipitation

The project area climate is semiarid and receives an average of only 10.13 inches (Salida) and 12.77 inches (Cañon City) of precipitation per year. However, approximately 75 percent of the streamflow and total surface runoff is derived from mountain snowmelt within the Arkansas watershed. During the winter, snowfall accumulates from October to April, acting as a frozen reservoir. The snowpack begins to melt in April, causing stream levels to rise, peak in June, and again reach base flow conditions in August and September. Reservoir storage, which primarily takes place between April and July, is also a factor in Arkansas River streamflow. Winter snowpack, however, ultimately determines how much water will be available for recreation, industry, farming, drinking, and other uses. Table 5.4-3 lists monthly average precipitation for Salida and Cañon City (NCDC 2006). The summer months, and especially August, receive the most precipitation, from afternoon thunderstorms. Based on data over the 57-year period of record for Salida, daily precipitation can reach 2.4 inches in June and July and 1.6 inches in August. Based on data over the 57-year period of record for Cañon City, daily precipitation can reach 3 inches in May, June, and July and 2.1 inches in August. The probability of receiving a short-term extreme storm event is highest in August, when a 0.01 inch daily storm has a 30 percent probability and a 0.2 inch daily storm event has a 10 percent probability. A daily storm of 0.5 inches or greater drops below a 1 percent probability (a 100-year event).

Table 5.4-3. Area Precipitation – Monthly Averages

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Salida: Average total precipitation (in.)	0.28	0.39	0.69	0.94	1.13	0.78	1.51	1.58	0.84	1.1	0.51	0.38
Cañon City: Average total precipitation (in.)	0.45	0.44	0.96	1.45	1.59	1.23	1.8	1.93	1.01	0.82	0.67	0.43

Snowfall records for Cañon City from 1971 to 2000 indicate an average annual snowfall of 39.4 inches. Snowfall was recorded between September and May, with average monthly snowfall over 2 inches from October to April. The highest monthly snowfall within this period reached 22.5 inches in February 1997. Snowfall records for Salida from 1971 to 2000 indicate an average annual snowfall of 46.1 inches. Snowfall was recorded between September and May, with average monthly snowfall over 3 inches from October to April. The highest monthly snowfall within this period reached 42 inches in October 1984.

Water Rights

Water management and water rights in the upper Arkansas River Basin are regulated under the authority of the State Engineer (Colorado Division of Water Resources and the Colorado Water Conservation Board). The doctrine of prior appropriations is the principal means of allocating the usage (agricultural, municipal, industrial, and other uses) of the waters of the state. Under this doctrine, a water right is established by taking steps to put water to beneficial use and is administered on the basis of the seniority of the date of beneficial use. Water rights are property rights, and can be sold. Any change in use or point of diversion, however, must be approved by the water court, and cannot result in injury to other water right holders.

In response to the large numbers of demands placed on it, the Arkansas River is one of the most intensively managed rivers in the United States. Population growth along the Front Range beginning in the 1980s resulted in increasing demand, and cities began to buy agricultural water rights. Other entities have been acquiring water rights for environmental purposes such as in-stream flows and wetlands.

Flow in the Arkansas River includes both native water originating within the basin and water imported from the Western Slope (Colorado River Basin) into the basin by the US Bureau of Reclamation's Fryingpan-Arkansas Project and several other nonfederal diversion projects. Although the operation of the transbasin diversion projects, in-basin reservoirs, and other management activities directly affect Arkansas River flows, these activities have not dramatically changed the annual flow characteristics of the river. In general, peak spring runoff flows have been maintained at approximately the same level, late summer and early fall flows have increased slightly, and October through March flows have increased by an average of 100 cubic feet per second (cfs) (BLM 1999).

A Water Needs Assessment (BLM 1999) was conducted for the Arkansas River to better assess and address the competing demands for water in the watershed. The assessment provides information to better understand the "effects to various resources and carefully weigh the user preferences, environmental requirements, and legal and administrative constraints associated with decisions that affect water uses, stream flow, and reservoir levels." According to the needs assessment, it is unlikely that any surface water remains available for appropriation in the Arkansas River Basin. However, opportunities for users to obtain and enhance water supplies remain available and include negotiated agreements for reservoir releases, special-use permit stipulations, river exchanges, reservoir release substitutions, and point of diversion transfers. Arrangements have been negotiated in the past to enhance certain water-dependent resource values (that is, fisheries and float-boating activities on the Arkansas River), and there have been several instances when the rafting industry has requested augmented flows on the Arkansas River from water rights owners (BLM 1999).

The BLM and the Colorado DNR signed an agreement in 1990 to better support natural resource values with surface water flows. Although the BLM has no legal obligation to provide the flows, and the program must be operated within the context of legally required storage and deliveries for water users, DNR makes annual flow recommendations to BLM in an effort to cooperatively monitor and protect these resources. The annual recommendations generally include the following components:

- Minimum year-round flow of at least 250 cfs to protect the fishery
- Flows from mid-November through April not less than 5 feet below the height of the river between October 15 and November 15 to protect and incubate brown trout eggs
- Flows April 1 through May 20 between 250 and 400 cfs for egg hatching and fry emergence
- Augmented flows during the July 1 to August 15 period to create flows of at least 700 cfs for recreational purposes
- Limit of daily flow changes to 10–15 percent of flows
- If possible, reduced flows after Labor Day to levels recommended by Colorado Division of Wildlife

Water rights conflicts relating to Arkansas River water are predicted to intensify in the future because the resource is limited and the demands for its use are increasing. Although water rights owners are legally allowed to use their water as needed, sometimes their activities can conflict with other users of the river. Imported water has extended the boating (kayaking, canoeing, rafting) season on the Arkansas River. However, fishermen generally object to these flows. Flows required for rafting and fishing recreational uses are further discussed in Section 5.4.3, Water Resources, Surface and Ground.

In 2001, in response to requests for water rights associated with the protection of water for recreational purposes, the Colorado General Assembly passed Senate Bill 216. The bill provided that local governmental entities could apply for water rights for recreational in-channel diversions (RICDs), but limited these types of water rights to the "minimum stream flow for a reasonable recreational experience in and on the water." Section 37-92-102, CRS, requires applicants for RICD water rights to provide a copy of the application to the Colorado Water Conservation Board for review. The board then provides findings and recommendations to the water court. A recent ruling (*The Coloradoan* 2006) approved a Chaffee County request to guarantee water in the Arkansas River for kayakers, rafters, and other whitewater enthusiasts. The decree was signed in October 2006 and will provide for minimum flows in the Salida and Buena Vista areas from March 15 to November 15 each year. The decree would maintain minimum flows in the river if enough water were available (based on senior water rights holders' needs). Two years of negotiation with various entities, including the Southeastern Colorado Conservancy District, the Colorado Division of Natural Resources, Division of Wildlife, Arkansas River Outfitters Association, Colorado Springs, and Pueblo Board of Water Works, led up to the decision.

5.4.2.2 Impact and Mitigation Issues

Proposed Action

Flow in the Arkansas River is directly affected by water management activities. Based on the historical records, these activities have not dramatically altered flows, and the proposed OTR two-week viewing window occurs during a period in which river flow is generally enhanced through imported water.

If there is a drought in the Arkansas River Basin during the OTR viewing, flow in the river might be compromised below levels deemed necessary for rafting and/or aesthetic preferences. In such a case, OTR Corporation might consider coordinating with BLM and the rafting industry to augment river flow during the viewing period. The Proposed Action itself, however, will not affect the quantity of water available for various uses, including public supplies and agricultural uses. Rafting and other recreational activities associated with Arkansas River flows are also discussed in Section 5.7.2, Recreation. Potential impacts from flooding and precipitation events are discussed in Sections 5.4.4, Floodplains, and 5.7.5, Community Resources and Public Safety.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not affect area water use or water rights appropriations.

5.4.2.3 Recommendations for Further Study

It is recommended that the Record of Decision identify members of a working group to coordinate the augmentation of flow in the river if deemed necessary (if a drought year occurs during the OTR viewing window).

5.4.3 Water Resources, Surface and Ground

5.4.3.1 Affected Environment

This section provides an overview of water resources in the project area. The watershed characteristics and hydrologic regime are described to gain a perspective of the river environment in the vicinity of the project area. Published climatic and hydrologic data for the study area were reviewed and summarized. General water quality conditions are described according to EPA's index of watershed health. River water management considerations with respect to OTR are also discussed. This section contains discussion of water resources in the project area, including streams, stream flow records, water supplies, and water quality. Project area precipitation and water rights issues are addressed in Section 5.4.2, Hydrology and Water Rights. Section 5.4.4, Floodplains, addresses floodplains and historic floods in the project area. See

also Section 5.7.6, Engineering Safety for Extreme Weather Events, which discusses climate and addresses precipitation effects on project structural components.

Watershed Characteristics

The Arkansas River is the major drainage system that extends through southeastern Colorado. Its headwaters are located in the Sawatch and Mosquito mountain ranges near Leadville and the Sangre de Cristos located to the south between Salida and Cañon City. In the project area, the river flows through a canyon/foothills environment that serves as a transition between the high mountain ranges west and north of Salida and the eastern plains east of Cañon City.

The climate is semi-arid in the project area, with average precipitation ranging from 12 to 16 inches annually. The landscape is rugged as the river flows through narrow canyons and open parks. Within the project area, the river passes through an incised canyon environment with bedrock outcrops in many areas. Vegetation ranges from coniferous forests at the higher elevations outside the canyon to juniper and shrublands at the lower elevations within the river canyon. The contributing drainage area in the vicinity between Wellsville to Parkdale is 1,063 square miles (USGS 2006a).

At the upstream end of the project area near Wellsville, the elevation of the Arkansas River is 6,883 feet AMSL. The river drops to an elevation of 5,720 feet AMSL near the downstream end of the project area at Parkdale. This elevation drop of 1,163 feet occurs over a distance of 35 miles for an average gradient of 33 feet per mile (0.6 percent). By comparison, the average gradient of the Arkansas River upstream of Salida is greater than 0.9 percent, whereas downstream of Cañon City the gradient is less than 0.5 percent.

Principal landforms in the watershed include the Sangre de Cristo Mountain Range in the southwest area and Waugh Mountain in the northern area. The Sangre de Cristos rise abruptly to the south with elevations up to more than 13,000 feet AMSL. Peak elevations on Waugh Mountain reach up to 11,700 feet AMSL, but the extent of high elevation peaks is far less than in the Sangre de Cristos. Thus, although smaller in contributing drainage area than the Waugh Mountain area, the Sangre de Cristo range contributes substantial stream flow volume to the Arkansas River in the project area, mainly from high-elevation snowmelt runoff.

Several tributaries drain the Sangre de Cristos south of the project area and contribute stream flow to the Arkansas River. The largest such tributary is Texas Creek, although no flow records or drainage area estimates are available. Texas Creek joins with the Arkansas River in the middle portion of the project area, approximately 14 miles upstream from Parkdale near the village of Texas Creek.

Several tributaries draining the area north of the project area contribute stream flow to the Arkansas River. The largest are Badger Creek and Long Gulch. Badger Creek joins with the Arkansas River near Howard at the upstream end of the project area. Long Gulch drains the Waugh Mountain area and joins the Arkansas River near the center of the project area, 3 miles downstream of Cotopaxi and approximately 18 miles upstream of Parkdale.

Tallahassee Creek joins the Arkansas River from the north just above Parkdale at the downstream end of the project area. Although this tributary does not affect stream flows in the Arkansas River within the project area, it drains a large area, including the Cottonwood Creek and Current Creek watersheds to the north. Tallahassee Creek is included in the drainage area of the Arkansas River at the Parkdale stream gauge.

Runoff from the Arkansas River watershed is a major contributor to eastern Colorado water supply, including the Denver metro area, Colorado Springs, and Pueblo. Salida and Cañon City also obtain all or part of their municipal water from watershed streams. Currently, agriculture accounts for the largest

amount of water usage in the watershed. There are 14 reservoirs with storage capacities exceeding 1,000 acre-feet in the Arkansas River watershed above Pueblo. The largest of these are Sugar Loaf (Turquoise Lake), Twin Lakes, Mt. Elbert Forebay, Clear Creek, and Pueblo.

Groundwater is also used in the project area. Aquifers are varied and depend on localized conditions, and water yields depend on aquifer thickness and materials. Alluvial deposits are present along the Arkansas River except in narrow canyons. Sedimentary and crystalline rock aquifers are also present in the project area. Water in Precambrian crystalline rocks occurs only where the rock has been fractured.

Stream Flow Regime

Arkansas River monthly stream flow data for the project area are provided in Table 5.4-4. Statistical data from four USGS stream gauges are available through 2004 (USGS 2005). The proposed project viewing period is highlighted in the table. May, June, and July are typically the months of highest flows.

Table 5.4-4. Mean Monthly Stream Flow (cubic feet per second)

Station	Period of Record	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cañon City	1888 – 2004	348	345	353	421	1,098	2,253	1,449	841	443	369	376	370
Parkdale	1946 - 2004	391	384	375	456	1,114	2,325	1,610	974	542	451	463	416
Wellsville	1961 - 2004	354	348	335	385	1,026	2,044	1,412	859	496	402	415	379
Salida	1909 - 1980	233	225	226	346	963	1,988	1,400	845	463	343	311	260

Arkansas River stream flow in the project area is highly seasonal and reflects the mountain climate. Snow accumulations begin to melt in April and continue melting through May, with peak snowmelt runoff occurring in early to mid-June. During the spring runoff period, daily mean stream flow in the project area can increase by one order of magnitude, from approximately 400 to 4,000 cubic feet per second (cfs). Additionally, natural stream flow in the Arkansas River is affected by transmountain diversions, storage reservoirs, power developments, diversions for irrigation, and return flows from irrigated areas. Daily stream flow data for 2000 through 2004 are plotted for the Wellsville and Parkdale stations in Figure 5.4-1 and Figure 5.4-2. The general period of peak flow, beginning in May and tapering off in July and August, is apparent on the graphs. Also apparent is the 2002 drought, during which river flow following spring runoff was very low, falling short of 500 cfs for the most part.

Figure 5.4-1. Arkansas River Streamflow, 2000 to 2004, Wellsville Station

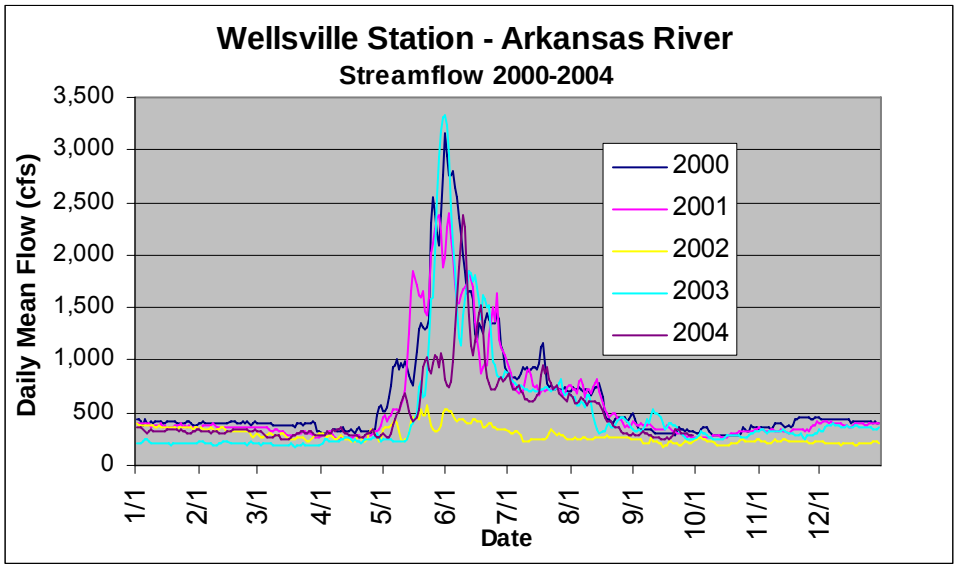
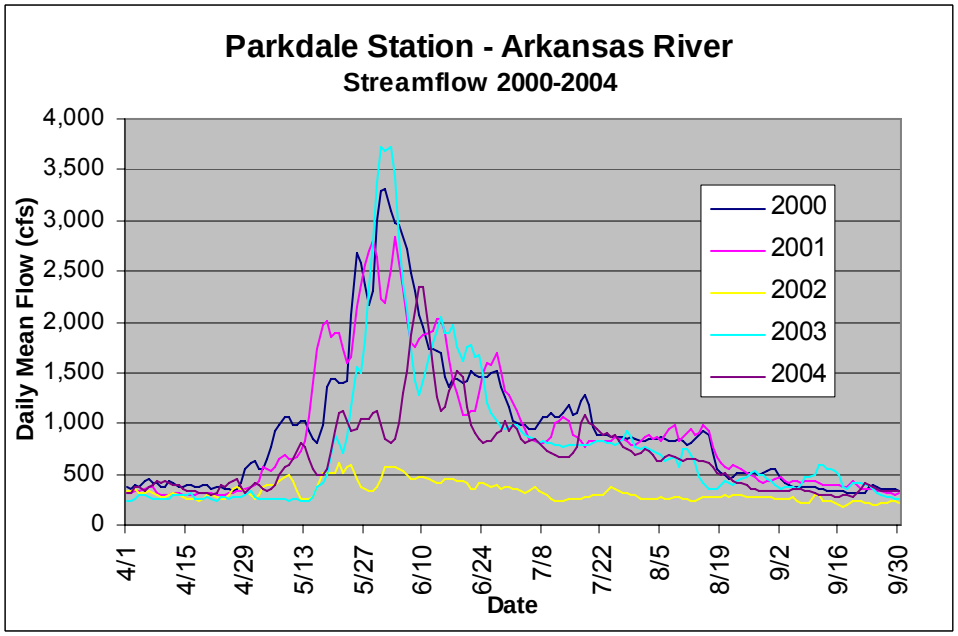


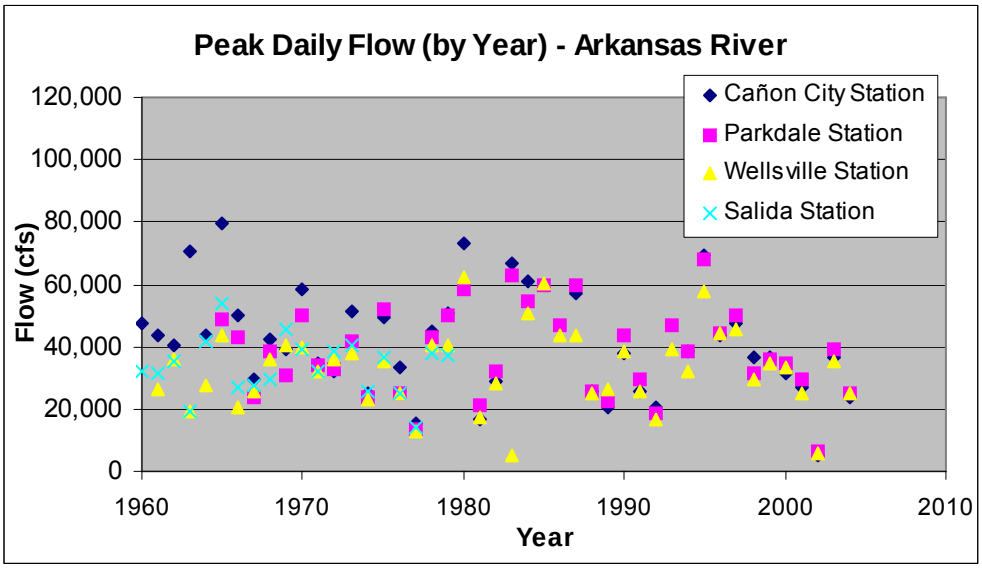
Figure 5.4-2. Arkansas River Streamflow, 2000 to 2004, Parkdale Station



The data provided in Table 5.4-4 are mean monthly values. On average, flows in July were about 1,600 cfs and in August about 950 cfs through the study area. Daily flows during the summer could be significantly different, depending on rainstorm events and transmountain water diversions that affect the Arkansas River system.

Flood flow events on the Arkansas River resulting from thunderstorms are common during the summer. Real-time peak flows, which typically occur during June, July, and August, are plotted in Figure 5.4-3. As is evident, stream flow in the project area can increase by another order of magnitude for short periods of time following major snowmelt and storm events. The instantaneous peak flows measured for the period of record (as shown in Figure 5.4-3) generally occur during June and range from more than 6,000 to 70,000 cfs within the study area.

Figure 5.4-3. Arkansas River peak daily flow, 1960 to Present



Arkansas River streamflow generally recedes in July and August from peak flow conditions, with seasonal low-flow conditions by September each year. Summer thunderstorm events can cause flows in the Arkansas River to suddenly increase. Stream flow data from the Wellsville stream-gauge suggest that flows are typically less than 500 cfs from October through March, when most precipitation is in the form of snow.

Instantaneous peak flows were evaluated for the four gauging stations' periods of record to determine the likelihood that such flows might occur during August (the proposed viewing period) as shown in Table 5.4-5. The chances of occurrence in August over the viewing period range from 3.4 to 15.5 percent. It is important to note that these peak flows do not necessarily indicate flood conditions, but provide an indication of significant summer storm events and their effects on streamflow in August. Floodplains and flooding are discussed further in Section 5.4.4.

Table 5.4-5. Instantaneous Peak Flows in August

Station	Period of Record	Years of Record	Peak Flow Occurrences in August (no.)	Peak Flow Occurrences in August (%)	Flow Range (cfs)
Cañon City	1888–2004	116	18	15.5	2,620 to 190,006 (in 1921)
Parkdale	1946-2004	58	2	3.4	26,706 (1955), 42,906 (1966)
Wellsville	1961-2004	43	3	7.0	20,806 to 36,006 (1972)
Salida	1909- 980	71	7	9.9	25,006 to 41,806 (1964)

Although the drainage area of the Arkansas River at Parkdale is 1.7 times greater (2,548 square miles) than at Wellsville (1,485 square miles), the runoff per square mile is only about 63 percent of that at Wellsville. For example, in July the mean discharge per square mile was 0.65 cfs at Parkdale and 1.02 cfs at Wellsville. These data indicate that, within the project area, tributaries contribute relatively little flow

to the river. This is corroborated by the relatively small mean flow of less than 10 cfs in Badger Creek from April to September (USGS 2006a).

The preliminary findings of the Arkansas River Water Needs Assessment were published in April 1999 (BLM 1999). The purpose of this assessment was to provide information about the water-dependent biological, recreational, legal, and institutional water resource values that are of significance. The assessment relates river flows or reservoir levels in the upper Arkansas River basin to these water resource values. A summary of identified water needs for a resource value is provided in Table 5.4-6 for the proposed viewing period.

Table 5.4-6. Summary of Optimum Water Needs for Resource Values

Arkansas River July–August Flow (cfs)						
Monthly Flow Range	**Fisheries Needs**	**Rafting**	**Kayaking**	**Fly Angling**	**Spin Angling**	**Float Angling**
904–1509	300–500	1500–2000	1300–1500	400–500	700–1200	900–1200

Source: BLM 1999

As shown, about half of the river recreational activity flow needs are met during the July–August period, given average flow conditions on the Arkansas River. Flow conditions are not optimum for rafting, fisheries, and fly angling—being too low for rafting and too high for fisheries and fly angling—but are suitable for most other recreational needs identified in the study. During the 2002 drought, flow in the Arkansas River at project area stations in August (below 500 cfs) did not meet the needs for rafting, kayaking, spin angling, or float angling.

As part of the annual flow management program for the Arkansas River, in 1990 the US Bureau of Reclamation and the Colorado Department of Natural Resources signed an agreement under which the US Bureau of Reclamation would attempt to provide flows (through storage releases) to support natural resource values. Of relevance to the temporary work of art is the requirement to augment stream flow during the July 1 to August 15 period, creating flows of at least 700 cfs (at Wellsville) for recreational purposes. Another relevant component of this agreement is the limiting of daily flow fluctuations (caused by storage releases) to 10 to 15 percent of the mean daily flow. It should be noted that these requirements are not legally binding and that senior water rights could prevent flow augmentation in cases of drought (see Section 5.4.2 for further discussion of water rights issues).

Water Quality

The Water Quality Control Commission (WQCC) and Colorado Department of Public Health and Environment (CDPHE) have identified water quality impaired streams and streams with classifications and standards to protect these resources under Section 305(b) of the Clean Water Act (CWA). Waters are classified according to the uses for which they are currently suitable or intended to become suitable. Numeric water quality standards apply for protection of these designated uses. One segment of the Arkansas River in the project area has surface water classifications and standards (CDPHE Regulation #32). Segment 3 is identified as the Arkansas River mainstem from a point above the confluence with Lake Creek to the inlet to Pueblo Reservoir and covers the entire project corridor. Segment 3 is classified for the following uses: Cold Water Aquatic Life Class 1 (waters that are capable of sustaining a wide variety of cold water biota); Recreation Class 1A (streams generally unsuitable for primary contact recreation because of water temperatures and stream flows); Water Supply; and Agriculture. There are more than 30 water quality standards in effect for this segment.

Segments identified as impaired are those in which one or more classifications or standards are not, or may not be, fully achieved. As necessary for the protection of the water resource to meet the requirements of the CWA, total maximum daily loads (TMDLs) are established by the Water Quality Control Division of CDPHE to set the maximum amount of pollutant that may be allowed while still complying with water quality standards. Segment 3 has been designated as impaired and is on the current CDPHE TMDL list (CDPHE Regulation #93). The impaired portion of Segment 3 of the Arkansas River mainstem from Lake Creek to Badger Creek is present in the very western edge of the project area from Salida to about 2 miles southeast of Wellsville. This segment is impaired due to zinc concentrations from upstream historical mining activities and natural sources.

The US EPA Index of Watershed Indicators (IWI) provides an overall IWI score for the Arkansas River watershed based on several indicators of current condition and future vulnerability. Condition indicators are designed to show existing watershed health based on criteria such as water meeting state or tribal designated uses, contaminated sediments, ambient water quality, and wetland loss. Vulnerability indicators are designed to indicate where pollution discharges and other activities put pressure on the watershed, causing future problems to occur. Activities in this category include pollutant loads discharged in excess of permitted levels, pollution potential from urban and agricultural lands, and changes in human population levels.

Following these criteria, the Arkansas River within the project area has been classified by EPA as Better Water Quality–Low Vulnerability. The watershed condition scored better (the highest classification) for water quality indicators, with the exception of the indicator for Ambient Water Quality (Toxic) and Wetlands. Data from the 1990–1998 period indicated that dissolved metal concentrations were in excess of reference levels 11 to 50 percent of the time. The metals exceeding reference levels were copper and zinc. Sediment loads, however, were not indicated to be a water quality concern according to the EPA IWI or the CDPHE TMDL list.

A water quality management plan for Chaffee County was completed in 2001 for partial fulfillment of the Section 208 requirements within the CWA, which promulgates the inventory, evaluation, and assessment of pollution sources within watersheds of variable use in a given county. The plan identifies point sources of watershed pollution regulated under National Pollutant Discharge and Elimination System (NPDES) permits by CDPHE as including fish hatcheries, a lodge, a hot springs pool, a ski resort, and rural residential developments. Municipal NPDES permits include the Buena Vista Sanitation District and the City of Salida Wastewater Facility, both of which discharge directly to the Arkansas River.

The plan also identifies concerns relating to nonpoint pollution sources such as runoff from roads or lands where the vegetation and soil have been disturbed, seepage and direct runoff from agricultural lands and forest harvest areas, clusters of individual sewage disposal systems, solid waste disposal sites, urban and construction areas, inactive mines and mine waste areas, recreational use areas, and active mineral exploration and production sites. Land uses within the headwaters of the Upper Arkansas River Basin are residential, commercial, agriculture, mining, milling, silviculture, and recreation. The majority of mining and milling activities took place during the middle and late 1800s, and very few mines or mills currently operate. Recent silviculture techniques used by the USFS have been designed to enhance forest health. Urban development continues to be a nonpoint source issue due to a growing residential population, tourism/recreation, and service industry demands.

5.4.3.2 Impact and Mitigation Issues

Proposed Action

No appreciable changes to stream-flow characteristics, water quantity, or quality are expected from the Proposed Action. Installing the anchors will cause local disturbance of the soils on the banks, but this

material will be confined to the area immediately near the anchor point, which will be above the floodplain of the Arkansas River.

The potential exists for increased foot traffic on the banks during project installation, viewing, and removal to erode side slopes of the river channel, thereby increasing the potential for sedimentation into the river. However, foot traffic during viewing is likely to be restricted, depending on direction from BLM. River bank disturbance will be minimized during all phases of OTR. Restrictions are expected to be in place during viewing, and activity would be controlled to the extent possible. Management of vehicle traffic and foot traffic is discussed in Section 5.7.1, Transportation and Access.

Excavated material resulting from anchor placement will be contained at the excavation site to reduce the potential for sediment to enter the river. Erosion control is especially needed during high-intensity rainstorms that would wash exposed material downslope. Methods of control include covering newly exposed soil and rock with fabric and not working on slopes during high-intensity rainstorms. Similarly, grout used to place some anchors will be nontoxic and contained at the site of application. Any spills will be cleaned up and immediately removed from the site for proper disposal. Sites where vegetation cover is damaged would be revegetated with a BLM-approved seed mix of native species (in compliance with North American Weed-Free Forage Program certification standards), and erosion-control measures (such as erosion control fabric) would be installed where needed (for example, on steep slopes and erosive soils). Erosion control measures and mitigation of disturbed vegetation are discussed in Section 5.5.4, Vegetation.

Access to the riverbanks and floodplain will be controlled to the extent possible by monitors, who will be spaced approximately 300 feet apart on the highway side of the river during the viewing phase of the OTR. In addition, access to the railroad side of the river will be restricted. Security personnel will also be on site during installation and removal of the temporary work of art (see further discussion in Section 5.7.6).

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not involve any changes (temporary or otherwise) to the Arkansas River corridor and would not affect area water resources including water quality.

5.4.3.3 Recommendations for Further Study

Final mitigation plans should include sufficient detail to ensure water quality protection.

5.4.4 Floodplains

5.4.4.1 Affected Environment

This section discusses the potential for flooding to occur along the Arkansas River and the project corridor, and the potential effect on the installation, viewing, and removal of OTR. Copies of Federal Emergency Management Agency (FEMA) maps depicting the predicted floodplain for the Arkansas River (map panels 200, 325, and 300 of 500 for Fremont County) were acquired from the Federal Center in Denver to assist with identifying areas that might be at risk if a flood were to occur during the timeframe of OTR. Flood hazard boundaries on the maps were revised in 1978. According to the FEMA maps, the entire length of the Arkansas River is in an area of special flood hazard from a 100-year flood. No base-flood elevations for a 100-year flood have been determined for this specific length of the river (FEMA maps, Zone A), however, and the accuracy and scale of the maps are not considered appropriate for use in determining the possibility of flooding. Therefore, an evaluation of flooding potential in the OTR corridor was done based on water level and discharge records accessed from the USGS (2006a) and NOAA (2006) web sites and on historical accounts.

Arkansas River Flood Data

Three USGS river gauges provide pertinent flood data. The first is a gauge on the Arkansas River near Wellsville. The drainage area above this gauge is 1,485 square miles. This gauge is no longer in service, but had a period of record from 1961 to 1994. Two major floods were recorded in Wellsville, one in June 1980 and one in June 1985. The 1980 flood height was 8.02 feet above the base of the gauge and the discharge rate was 6,240 cfs. This flood was severe enough that it was estimated to have a recurrence interval of 90 to 100 years (the 100-year flood). During the second major flood in Wellsville, in 1985, the water height above the gauge was 8.12 feet (higher than in 1980) and the discharge rate was 6,020 cfs (lower than 1980). This flood was given a recurrence interval of 50 to 60 years. During both floods, the river was being regulated by operations of dams and by diversions (USGS 2006a).

The second gauge of importance is located at Parkdale. The gauge datum (base elevation) at Parkdale is 5,720.0 feet AMSL and the drainage area for the gauge is 2,548 square miles. Peak maximum stage and discharge for this gauge over the period of record from 1946 to 2004 occurred in June 1983 and was 6,310 cfs at a water height of 8.06 feet (USGS 2006b). The next highest values occurred in June 1985, when the crest was 9.13 feet on the gauge (higher than in 1983) but the discharge was 5,960 cfs (lower than in 1983) (USGS 2006a). Other historical crests are shown in Table 5.4-7 (NOAA 2006).

Table 5.4-7. Gauge Records at Parksdale

Rank	Gauge Height (ft)	Date
1	9.13	6-9-1985
2	9.02	6-22-1947
3	8.94	6-8-1952
4	8.82	6-18-1995
5	8.80	6-19-1949
6	8.07	6-12-1980
7	8.06	6-26-1983
8	7.84	6-10-1987
9	7.31	6-21-1970
10	7.12	5-25-1984

When the river water level reaches 7.0 feet on the gauge at Parkdale, it is considered an action level and emergency personnel are put on alert. Nine feet on the gauge is considered flood stage, when water will begin leaving the banks in various locations along the river (NWS 2006). The Arkansas River water level exceeded 7.0 feet at Parkdale in 17 events during the period of record. One of these events occurred in May, 14 events took place in June, and two occurred in July (USGS 2006b). In contrast, 2002 was a drought year: the peak flow in the river occurred in May and was 651 cfs at a gauge height of 3.2 feet (USGS 2006b). Streamflow in early August 2006 was approximately 850 cfs at a gauge height of approximately 3.5 feet (NWS 2006).

The third river gauge of interest is near Cañon City, approximately 8 miles below Parkdale. Cañon City is far enough downstream so that rainstorms in the drainage basin above the city can contribute to flooding independent of the flow in the Arkansas River. The base datum for the Cañon City gauge is 5,342.1 feet, or about 378 feet lower than Parkdale. At the Cañon City gauge, the action stage occurs when river waters

reach 8.0 feet, but the flood stage is 9.0 feet (NWS 2006). In early August 2006, the Arkansas River at Cañon City was flowing at approximately 800 cfs at a gauge height of 6.4 feet (NWS 2006). The 10 highest historical crests at Cañon City are shown in Table 5.4-8 (NOAA 2006).

Table 5.4-8. Gauge Records at Cañon City

Rank	Gauge Height (ft)	Date
1	10.90	6-18-1995
2	10.70	8-2-1921
3	8.66	7-13-1941
4	8.28	7-24-1965
5	8.12	7-4-1944
6	7.80	8-13-1942
7	7.52	8-3-1933
8	6.80	6-29-1957
9	6.35	8-29-1937
10	6.25	9-2-1930

Consideration of Diversions and Withdrawals

The Arkansas River has been subject to numerous diversions and withdrawals since before the turn of the 20th century. Additionally, water from the Western Slope is diverted into the Arkansas drainage basin through the operations of the Fryingpan-Arkansas and the Homestake II diversion projects (including four storage reservoirs and a pump-back storage unit with electrical power generation) of the US Bureau of Reclamation. These diversions and withdrawals (for agriculture, industries, municipalities), and additions of Western Slope water and return flow from irrigated areas, can have a significant effect on peak flows in the river and can be manipulated, to some degree, to moderate the potential effects of floods.

Project Corridor Historical Record

Major floods, although infrequent, have occurred along the Arkansas River, with the flooding in 1921 noted for significant damage from Penrose through Pueblo, when much of the Atchison, Topeka and Santa Fe railroad grade was washed out (Cañon City Public Library 2006), and in 1965 in the Pueblo area, primarily from entry of floodwater from Fountain Creek (NCAR 2006). Comparison of the peak streamflows of the Parkdale and the Cañon City gauges shows that Cañon City experienced major floods in 1921 and 1965 whereas the area near the Parkdale gauge did not experience peak streamflows during those same flood periods. The floods in 1921 were estimated to have recurrence intervals of from 25 years to more than 100 years, depending on location (Paulsen et al. 1990). The flood events of 1965 were concentrated in the lower Arkansas River drainage and caused only the fourth highest peak streamflow at Cañon City (NCAR 2006), but not one of the 10 highest crests at the Parkdale gauge. This can be considered an example of the localized nature of major storm events that lead to flooding.

5.4.4.2 Impact and Mitigation Issues

Proposed Action

Potential flooding of the Arkansas River and tributaries could affect people visiting the corridor during the viewing period, structural components, and area communities. However, flooding (9-foot river levels)

is very infrequent (100-year or above event) and that existing water diversions and withdrawals during the summer months can affect river levels significantly (either decreasing or increasing flows).

The presence of the cable anchors along the river banks and cables across the river is not expected to constitute an impediment to flood waters, and these components are expected to be well above normal river flow elevations. Based on preliminary field evaluations, the fabric panels are expected to be 8 to 25 feet above the normal water level in August. The river normally flows about 4 feet above the base gauge during August, and 9 feet above the base gauge is considered flood stage. Therefore it is estimated (based on preliminary data) that if flooding occurred, the fabric panels would still be approximately 5 to 20 feet above flood level and would not interfere with the passage of floodwaters.

Mitigation during a potential flood would include evacuation of Arkansas River Valley communities, residents, and visitors (during viewing) as well as measures for minimizing potential damage from structure components. These procedures could be detailed in a contingency plan.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not have any impacts to floodplains.

5.4.4.3 Recommendations for Further Study

Future studies should include a clearance study that would obtain the following data: base river elevations, anchor elevations, cable elevations, and panel elevations. These data are needed to ensure that the cables and fabric are above flood water levels so that water can pass through the canyon umimpeded. These elevations, as well as August river levels and potential flood levels in relation to the structural components, should be evaluated to ensure that acceptable clearances for rafters, potential flooding, or other conditions exist.

Future studies should also include a more detailed evaluation of the potential for corridor bridges and roadways to be affected by flood conditions. This information is integral to a contingency plan that should be created to address evacuation and other procedures that would be taken during potential catastrophic conditions during viewing.

Discussions and coordination should be initiated with AHRA and BLM to possibly close the river to all rafting, both private and commercial, if flood stage conditions occur during the viewing.

5.5 Physical Resources

5.5.1 Paleontological Resources

5.5.1.1 Affected Environment

BLM has provided paleontological resource mapping for the Arkansas River Canyon for the entire OTR area. The BLM database includes a Paleontological Classification from 1 to 5 identifying the likelihood of fossil remains in identified geologic layers with 1 as the least likely and 5 as the most likely. All mapping units located adjacent to the Arkansas River and Canyon are classified as 1 or 2.

Table 5.5-1, Summary of OTR Resource Studies, lists the unit type identified on the map, its geologic age, classification, and a brief description. Map 5.5-1, BLM Paleontology Classification, shows the locations of these unit types in the project study area.

Table 5.5-1. Likelihood of Paleontological Resources in Arkansas River Canyon

Unit Type	Paleo Classification	Description
Pmb (Minturn and Belden Formations, Pennsylvanian Age) PPs (Sangre de Cristo Formation, Permian and Pennsylvanian Age) Tbc (Tertiary Volcanic Rocks) Kn (Niobrara Formation, Cretaceous Age) Kcgg (Carlile Shale, Greenhorn Limestone and Graneros Shale, Cretaceous Age) Mor (Ordicician Formations)	2	Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.
Qpo (Quaternary Formation) Qbo (Quaternary Formation)	1	Glacial deposits not likely to contain recognizable fossil remains.
Qf (Quaternary Formation)	1	Alluvial fan deposit not likely to contain recognizable fossil remains.
Xgd (Granitic rocks of Precambrian Age) Xgn (Granitic rocks of Precambrian Age) Xqd (Granitic rocks of Precambrian Age) Xvs (Precambrian Age volcanic rocks)	1	Not likely to contain recognizable fossil remains due to Precambrian formations.
Xg (Granitic rocks of Precambrian Age)	1	Igneous and metamorphic geologic units not likely to contain recognizable fossil remains.

5.5.1.2 Impact and Mitigation Issues

Proposed Action

No direct effects, indirect effects, or cumulative effects on paleontological resources are anticipated as a part of OTR at this time, and therefore no mitigation measures are anticipated. However, a few outstanding issues remain as discussed in the following section.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not have any impacts to paleontological resources.

5.5.1.3 Recommendations for Further Study

Additional clarification is needed on the unit type definitions (as BLM did not provide definitions with the mapping database). Definitions included are approximate.

Also, conflicting information has been found in an excerpt from Arkansas River Recreation Management Plan (January 2001). Its Chapter 3 paleontology discussion identifies the following areas of concern:

- Bear Creek to Wellsville – Dyer Dolomite and Parting Quartzite Formations
- Railroad Tunnel to Howard – Sangre De Cristo Formation
- South of Howard near West Creek – Dry Union Formation
- Howard Cemetery to Vallie Bridge – Sangre De Cristo Formation
- Parkdale – South Morrison Formation

Chaffee County

Fremont County

Salida

Cleora

OTR County Line Area

225

OTR Tunnel Area

Wellsville

Swissvale

230

Howard

235

50

OTR Vallie Bridge Area

Vallie

240

Coaldale

Pleasanton

245

Cotopaxi

Arkansas River

250

OTR Staging Area

OTR Texas Creek Area

Texas Creek

255

OTR Maytag Area

Echo

260

OTR Three Rocks Area

OTR Spike Buck Area

265

OTR Parkdale Area

Fink

270

9

50

275

Cañon City

69

LEGEND

- Cities
- Counties
- US Highway 50 Mile Posts
- Highways

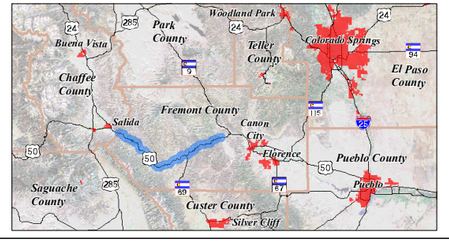
BLM Paleontology Classificaiton

- Class I
- Class II
- Class III
- Class V

N W E S

0 2.68 Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. Paleontology classification data provided by BLM.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.5-1. BLM Paleontology Classification

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\PaleontologyClassification_11x17_061106.mxd)
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These formations were considered as having a high potential for scientifically significant fossils although some areas would be more significant than others. This information could change the impact discussion.

5.5.2 Geology and Mineral Rights

5.5.2.1 Affected Environment

The project area traverses several major Colorado tectonic and geographic features. The western portion of the project area is located along the eastern flank of the Sangre de Cristo Mountain Range, where US 50 and the river valley follow the trend of the mountain range southeastward through Coaldale. The tectonic feature denoted as the Thirtynine Mile volcanic field is located north of the river valley in this area. As the river valley veers east-northeast from here, US 50 crosses the northern edge of the Wet Mountain Valley and continues across the DeWeese Plateau to the south with the Front Range proper located to the north. The Wet Mountains (a southern expression of the Front Range) trend from the Parkdale Area southeastward toward Walsenburg, with elevations just over 12,000 feet AMSL. The eastern edge of the project area near Cañon City is in the very western edge of the tectonic feature known as the Cañon City embayment, a basin area west of the Denver Basin that separates the Front Range from the Wet Mountains to the west.

The Arkansas River Canyon is generally flanked on both sides by steep slopes or exposed bedrock walls, although open valleys occur in many areas. The elevational difference from Salida to Cañon City is approximately 1,830 feet, declining from 7,160 feet AMSL above mean sea level to approximately 5,330 feet AMSL. In general, sedimentary rock, along with valley fill deposits, are present in the project area from east of Salida to east of Coaldale. As the project area continues eastward, Precambrian metamorphic and igneous rock, along with valley fill deposits, characterize the valley to the eastern project entrance near Parkdale. According to topographic maps, numerous gravel pits are located in the Arkansas River floodplain southeast of Salida (and west of the project area).

In general, Colorado is not considered to be at risk from significant earthquake damage (CGS 2003), and the state is ranked 30th in the nation in terms of Annualized Earthquake Losses by the Federal Emergency Management Agency (FEMA). However, the catalog of Quaternary faults (evidence of activity within the last 1.6 million years) in Colorado has steadily increased from zero in 1960 to more than 90 in 2003, with many areas of the state unexamined. The Sangre de Cristo Fault, which lies at the base of the Sangre de Cristos along the eastern edge of the San Luis Valley, and the Sawatch Fault, which runs along the eastern margin of the Sawatch Range, are two of the most prominent potentially active faults in Colorado. The strongest earthquake in Colorado during the past century and a half had an epicenter near Estes Park and was magnitude 6.6 (1882); over 100 miles north of the project area. (Magnitude is a standardized measure of the total energy released in an earthquake by seismographs.)When strong earthquakes (usually greater than magnitude 6.5) occur, they commonly rupture the surface. Therefore, when geologists see that a particular fault has broken the surface in the recent past, we can be fairly certain that it was the result of a strong earthquake. Earthquakes and faulting in the project corridor are discussed based on information from the Colorado Geological Survey (CGS) Colorado Late Cenozoic Fault, Fold and Earthquake Database (CGS 2006). This database contains information compiled from available literature about faults and folds that are known or suspected to have moved during the late Cenozoic (approximately the last 23.7 million years). Late Cenozoic faults are common in the western two-thirds of Colorado. The database search revealed several fault structures within 5 miles of the project corridor that are of Late Cenozoic age. Three recent earthquake epicenters have been recorded within 10 miles of the project corridor. These are located north of the western part of the corridor and had magnitudes of 2.5 to 3.2. The earthquakes occurred in 1985, 1987, and 1994.

Geological information is described below by project area, based on information contained in Chronic (2002), project geotechnical engineering data (Golder 2000), general information available from the CGS

website (2005), geologic and tectonic mapping available from the CGS, and topographic maps. Maps in Appendix D2 provide geologic mapping of formations in the project area based on CGS GIS map layers (2006). Mining information is also described by section based on review of topographic maps and a search of the Colorado DNR permitted mines database (October 2005).

County Line Area

The western project entrance (County Line Area) is located along the eastern flank of the Sangre de Cristo Range where US 50 traverses a narrow canyon that trends east-west. The southern canyon wall is steeper than the northern slope in this area. Precambrian schist transitions to brownish Devonian limestone and Ordovician limestone, sandstone, and shale from west to east in the area of the Fremont-Chaffee County line (Chronic 2002). According to CGS GIS geologic map layers, the western portion of the panels is located in an area of gneisses, including interlayered metamorphic rocks derived principally from volcanic rocks. The eastern panels are located in formations that could include the Leadville Limestone, Williams Canyon Limestone, Fremont Limestone, Harding Sandstone, and Manitou Limestone. Engineering field reports confirm that the project area traverses sedimentary rock (limestone, dolomite, sandstone, shale) and river valley deposits. Possible metamorphic rocks were observed at the western end of the section (Golder 2000).

Two large gravel quarries are shown on topographic maps east of the project area within the bedrock above the river valley. Historical mines are also denoted immediately north of the project area at about 7,100 feet up an unnamed drainage. There are no mining operations on the DNR's list of permitted mines located within 1 mile west of the County Line Area in Chaffee County. One terminated granite-gneiss mining operation was located upland in the eastern vicinity of the County Line Area in Freemont County. Quarries near milepost 227 (just east of the County Line Area) reportedly obtain travertine from recent Pleistocene hot spring deposits for use as soil conditioner (Chronic 2002).

Two east-west trending parallel fault features with evidence of activity during the Late Cenozoic are present south of US 50 along the County Line Area. These are named the Box Canyon and Quarry faults.

Tunnel Area

This area of US 50 enters a canyon area from the west and opens to the river valley as the highway turns south at a 90° angle. The project area here is located within Pennsylvanian-age bedrock. In the immediate area of OTR, the rocks are reportedly a warm red color and are clearly cyclic; that is, there are often-repeated sequences of sandstone-shale-sandstone-shale or limestone-shale-limestone-shale. Interspersed coal beds indicate that these rocks were deposited in near-shore lagoons, bays, and swamps (Chronic 2002). Just east of the Tunnel Area (milepost 232), the shales become more abundant and thicker and the sandstones are replaced by gray limestone. CGS GIS geologic mapping confirms that the OTR fabric panels would be located in an area of clastic sedimentary rocks of the Minturn and Belden formations. Engineering field reports also confirm that this section is located in an area of sedimentary bedrock and valley fill deposits. According to these field observations (Golder 2000), most of this area has sedimentary bedrock outcrops (sandstone and conglomerate, with occasional shale) along both banks, although the bedrock changes to limestone/dolomite at the west end. The sediments dip about 30 degrees to the southeast in this area.

According to topographic maps, an upland gravel quarry is located northwest of the project area, and an upland mining prospect (a prospect would indicate that there has been some disturbance associated with an initial exploration of an area for minerals, but that actual mining did not take place) is shown immediately north of the project area. One terminated anhydrite/gypsum mining operation was located upland, southwest, and within a mile of the Tunnel Area based on DNR's list of permitted mines (CDNR 2005).

Two fault features with evidence of activity during the Late Cenozoic are present south of US 50 along the Tunnel Area. One of these constitutes the eastern terminus of the Box Canyon and Quarry faults, and the other fault is named the Coaldale-Wellsville fault.

Vallie Bridge/Red Rocks Area

This section of US 50 cuts close to the canyon wall bedrock (Permian- and Pennsylvanian-age dark red sandstone [redbeds] and shale) to the southwest with a gently sloping river valley transition to the northeast, cresting with a steep bedrock cap. The steeply dipping red rocks formed from the sand and mud, pebbles, and cobbles washed westward off the west side of the ancestral Rocky Mountains (Chronic 2002). Fine grains of iron oxide—the mineral hematite—give them a distinctive red color. The redbeds are about 20,000 feet thick here, as measured perpendicular to the beds or layers (they may be doubled up by faulting). As travelers proceed east of this area, there is a dramatic change in scenery as the Pleasant Valley Fault (east of Coaldale) is traversed. The fault area separates the Permian- and Pennsylvanian-age sedimentary rocks from Precambrian granite rocks. According to CGS GIS geologic map layers, the western panels of the Vallie Bridge Area are located in arkosic conglomerate sandstone and siltstone of the Sangre de Cristo Formation, and eastern portions are located in gypsum siltstone and shale of the Minturn and Belden formations. Field observations and measurements (Golder 2000) confirm the existence of sedimentary rock and alluvial/colluvial deposits in this section. According to the field study, area bedrock is steeply dipping (60 to 70 degrees to the southwest) well-cemented, competent sandstones and conglomerates, with softer, weathered shale layers, typically less than 3 feet in thickness making up an estimated 10 to 20 percent of the rock mass.

According to Colorado DNR's permitted mines database (2005), one active clay (bentonite) mining operation (LBC Bentonite Pit) is located upland and to the immediate southwest of the Vallie Bridge Area. Two active sand and gravel pit operations (Vallie Gravel and Fremont Gravel) are located in the river valley about 0.5 miles to the southeast of the Vallie Bridge Area.

Two fault features with activity during the Late Cenozoic are located both north and south of US 50 along the Vallie Bridge and Red Rocks areas. One of these is a continuation of the Coaldale-Wellsville Fault with an inferred location south of US 50. The other fault is named the Pleasant Valley Fault, located north of US 50.

Texas Creek and Maytag Areas

After leaving the eastern flank of the Sangre de Cristos, US 50 veers eastward across the northernmost edge of the Wet Mountain Valley, which parallels the Sangre de Cristo Range. The Wet Mountain Valley contains the upper reaches of Texas Creek. The Texas Creek Area is located immediately northeast of the creek's convergence with the Arkansas River in a narrow canyon. This area is characterized by Precambrian gneiss and schist and valley fill deposits. The Maytag Area also traverses a narrow valley formed from Precambrian gneiss and schist. Both of these areas are located in a geographic region known as the DeWeese Plateau, located between the Wet Mountain Valley and the Wet Mountains (a southern extension of the Rocky Mountains). According to CGS GIS geologic map layers, the area of the western-most panels of the Texas Creek Area contains granitic rocks (granites, quartz monzonites, granodiorites) of the 1,700 million year age group. Most of the panels of this area, however, are located in felsic and hornblendic gneisses, including interlayered metamorphic rocks derived principally from volcanic rocks. The Maytag Area is entirely within the area mapped as gneiss described above for the Texas Creek Area. The engineering field studies (Golder 2000) confirm the existence of outcrops of metamorphic bedrock and alluvial deposits along these areas. In addition, much of the riverbanks in this area have large rock riprap covering the surface of finer-grained alluvial and colluvial deposits and fills, as well as areas of huge rounded boulders or outcrops.

There are no mining operations on the DNR's list of permitted mines located within a mile of the Texas Creek and Maytag areas. According to topographic maps, an upland prospect is located approximately 0.5 mile northwest of the Texas Creek Area.

The Texas Creek Fault runs parallel to and generally follows SH 59 along the Texas Creek valley to its northern terminus near the intersection of US 50.

Three Rocks, Spike Buck, and Parkdale Areas

These areas are located within the DeWeese Plateau/Wet Mountain Range geographic transition area. The Three Rocks Area traverses a narrow canyon of Precambrian gneiss, schist, and granite. The canyon walls are reportedly cut by black and white dikes in this area (Chronic 2002). The Spike Buck and Parkdale areas are all located in narrow valleys characterized by Precambrian granite. The eastern entrance (Parkdale Area) opens into a faulted valley area where Tallahassee Creek, Cooper Gulch, and Bumback Gulch converge and drain into the Arkansas River. According to GIS geologic map layers, the Three Rocks Area is located entirely in felsic and hornblendic gneisses, including interlayered metamorphic rocks derived principally from volcanic rocks. The western and eastern portions of the Spike Buck Area panels are located in granitic rocks (granites, quartz monzonites, granodiorites) of the 1,700 million year age group. Middle portions of the panels of this area are located in an area of felsic and hornblendic gneisses, including interlayered metamorphic rocks derived principally from volcanic rocks. GIS mapping indicates that the Parkdale Area is entirely contained in an area of granitic rocks described above for the Spike Buck Area. Engineering field observations (Golder 2000) confirm the existence of metamorphic bedrock outcrops and alluvial and colluvial deposits in the Three Rocks Area, while igneous bedrock is reported in the Spike Buck and Parkdale areas.

There are no mining operations on the DNR's list of permitted mines located within 1 mile of the Three Rocks Area. According to topographic maps, a prospect is located along the north side of the river valley, approximately 1 mile southwest of the area. One active sandstone mining operation (Front Range Aggregates–Parkdale Project) is located east of the Parkdale Area. There are no other mining operations on the DNR's list of permitted mines located within 1 mile of the Spike Buck and Parkdale areas. According to topographic maps, a gravel quarry and a mining prospect are located upland and within 1 mile south of the areas. Numerous gravel pits are denoted on the topographic map in the river valley area between Parkdale and the eastern project entrance.

Agile Stone System currently operates a gravel quarry in Parkdale (located more than 1 mile east of the OTR). Materials are transported from the quarry primarily by rail but also by truck. All haul routes are eastbound. Agile Stone System owns and operates Rock & Rail Railroad. The train operates approximately two times per week during the night. The train hauls the material to Pueblo, where it is transferred and sent throughout the country. Trucks are usually used when gravel is transported to Colorado Springs from this operation.

The Ilse Fault trends north-south across the Parkdale Area within the Tallahassee Creek and Copper Gulch valleys. The Parkdale faults are present east of the Ilse Fault and are structurally connected.

5.5.2.2 Impact and Mitigation Issues

Proposed Action

Geology

Cable anchors will be installed using a variety of methods depending on the various soil and rock conditions. The hole may be as small as 3 inches where the anchor will be embedded in solid rock, or it may be as large as 10 inches where the anchor must be secured in blasted fill rock. The anchor holes will

be drilled approximately 25–35 feet apart and, where bedrock is not available, caissons will be installed below ground for anchor attachment.

Every effort will be made to minimize disturbance of rocks during the anchor installation phase. All fabric panels have been specifically positioned to avoid such contact. Engineering studies have been conducted to ensure that all materials and structures (anchors, steel wire cables, and fabric panels) meet structural requirements to prevent damage to area geological features and prevent any geologic hazard issues. A Colorado engineering firm will test and provide certification for all components. All installation work will be completed by professional contractors. Mitigation activities will include removal of anchors. All holes left in bedrock by rock anchors will be filled with matching color mortar. Where caissons are present, anchors will be removed and caissons will remain in place at least 12 inches below ground level.

Earthquakes

The probability of a significant (damaging) earthquake occurring during the viewing period is extremely low. Although there is some evidence of fault movement within 5 miles of the corridor during the last 23.7 million years, the small amount of time for which the OTR would be active pales in comparison.

Mining

The Proposed Action does not directly affect any identified mining operations. Active mining operations identified within 1 mile of the OTR area include the LBC Bentonite Pit, Vallie Gravel, and Fremont Gravel—all near the Vallie Bridge Area. Many other active mining operations are located along the Arkansas River Valley, including operations near Salida and Parkdale (such as Agile Stone). There is the possibility that traffic interruptions during installation and removal periods would affect traffic from mining operations that use US 50 to transport materials. The 14 viewing days are likely to encompass the greatest effects on commercial traffic on US 50. Traffic access and mobility impacts and mitigation plans are further addressed in Section 5.7.1, Transportation and Access, and in Section 5.7.4, Socioeconomics, in terms of potential economic impacts on quarry operations.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not involve any intrusive activities into area geological features and would not entail any impacts on geological resources.

5.5.2.3 Recommendations for Further Study

Although the chances of an earthquake occurring during the project viewing period are extremely low, it may be recommended that an evacuation and contingency plan be included in the Final EIS that will include appropriate procedures for evacuation in the case of an earthquake event or other geologic hazard event (such as a landslide or rock fall).

5.5.3 Soils

5.5.3.1 Affected Environment

Soil types were identified within 0.25 miles of the project corridor areas based on soil mapping information available from USDA (1968a, 1968b) NRCS maps (see Appendix D3). General soil information is provided in order of OTR area in Table 5.5-2. Soil information was also obtained on March 29 and 30, 2000, during a field surface reconnaissance of the project area performed by Golder (2000; see Appendix J1.1, Installation, Removal, and Restoration Engineering Plan). Soils are described here by OTR area based on the field reconnaissance and mapping information.

Table 5.5-2. Soil Types in the Project Area

Type Name	OTR Area	Slope (%)	Erosion Hazard	Depth	Association
Rockland	County Line	15–60	Moderate	Shallow	Rock outcrop: granite, gneiss, schist
Redcameron-rock outcrop–Teaspoon complex	County Line, Tunnel	20–70	Very high	Shallow; well-drained	Rock outcrop on hogbacks; sandstone, siltstone
Rentsac very channery loam	County Line	20–55	Very high	Shallow; well-drained	Derived from limestone and some sandstone
Mussel-Bronell complex	County Line, Tunnel, Vallie Bridge	2–15	Slight to very high	Deep; well-drained	On foot slopes, fans, and fan terraces;
Amalia very gravelly loam	Tunnel	25–50	High to very high	Deep	Derived from andesite and breccia
Bronell gravelly sandy loam	Tunnel, Vallie Bridge	2–15	Slight to high	Deep; well-drained	On fan terraces and fans; formed in alluvium
Rock outcrop	Tunnel	NA	NA	NA	85 percent rock outcrop: sedimentary, metamorphic, igneous rocks
Querida gravelly sandy loam	County Line, Tunnel, Vallie Bridge	2–8	Slight or moderate	Deep; well-drained	On fans and stream terraces; formed in alluvium
Ustic Torriorthents, bouldery-rock outcrop complex	Vallie Bridge, Texas Creek, Maytag, Three Rocks, Spike Buck, Parkdale	35–90	High or very high	Shallow to moderately deep; well-drained to excessively drained	30 percent rock outcrop; derived from gneiss and granite
Riverwash	Vallie Bridge	NA	NA	NA	In channels of the arkansas river; subject to scouring and fresh deposition
Swissvale-Rentsac complex	Tunnel, Vallie Bridge	20–55	High or very high	Shallow; well-drained	Derived from sandstone and siltstone
Cascajo Variant gravelly sandy loam	Vallie Bridge, Texas Creek, Spike Buck	5–12	Moderate to very high	Deep; excessively drained	Formed in alluvium
Shrine loam	Texas Creek	2–8	Slight to high	Deep; well-drained	On fan terraces and fans; formed in alluvium

Type Name	OTR Area	Slope (%)	Erosion Hazard	Depth	Association
Haploborolls, very stony-rock outcrop complex	Texas Creek, Maytag, Three Rocks, Spike Buck, Parkdale	40–90	High	Shallow to moderately deep; well-drained to excessively drained	Derived from gneiss and granite;
Nunn clay loam	Parkdale	0–2	Slight	Deep; well-drained	On fans and fan terraces; formed in loess and alluvium
Kim loam, cool	Parkdale	3–8	Moderate or very high	Deep; well-drained	On fans and fan terraces; formed in alluvium
Sedillo cobbly sandy loam	Parkdale	4–25	Slight to very high	Deep; well-drained	On fan terraces; formed in alluvium or landslides
Otero loamy fine sand	Parkdale	3–8	Slight or moderate	Deep; well-drained	Formed in alluvium and eolian deposits

County Line Area

The Arkansas River alluvial deposits are predominantly surrounded by gneiss and granite rock outcrops within Chaffee County. Shallow rocky soils in Fremont County are derived from limestone and some sandstone. These rock outcrop areas and shallow soils have moderate to very high erosion hazard. Gravelly sandy loam with a very high erosion hazard is located north of the river within Fremont County. According to field observations (Golder 2000), this area contains shallow colluvial fill covering both riverbanks and abundant bedrock outcrops. Alluvial fan deposits are present along a portion of the north bank (railroad side).

Tunnel Area

In the area surrounding the Tunnel Area, soils are primarily shallow and are derived from sandstone and siltstone bedrock. Slopes are steep and erosion hazards are high or very high. Areas of deep soils on fans and fan terraces are generally located within meanders north of the Arkansas River. This soil type has a wide range of erosion hazard from slight to very high. According to field observations (Golder 2000), most of this area contains sedimentary bedrock outcrops along both riverbanks. Where bedrock is covered, the overburden appears thin and generally consists of cobbly alluvium on the north bank and coarse rockfill (of local materials) on the south bank.

Vallie Bridge Area

Soils south of the river and at the eastern end of the area are primarily shallow and derived from bedrock. Soils south of the river and at the western end of the area are formed from alluvium on fans and fan terraces with much gentler slopes. Soils north of the river along this area are formed from alluvium, are deep and well drained, and have low erosion hazard. According to field observations (Golder 2000), the south bank (road side) of this area is dominated by colluvial fill. The north bank (railroad side) is characterized by alluvium/fan deposits with rounded cobbles in the eastern portion, and sedimentary bedrock outcrops in the western portion.

Texas Creek Area

A small portion at the easternmost area is composed of deep, well-drained, gravelly loam soil formed in alluvium. Erosion hazard for this soil is moderate to very high. The remainder of this area is surrounded by shallow soils derived from granite and gneiss bedrock and bedrock outcrops. This soil type is formed on steep slopes and has a high to very high erosion hazard. Based on to field observations (Golder 2000),

frequent outcrops of metamorphic bedrock occur along this area and bedrock is overlain/covered by alluvium containing rounded cobbles (and a few boulders) at the eastern area.

Maytag Area

This area is surrounded by canyon walls covered by shallow soils derived from granite and gneiss bedrock and bedrock outcrops. This soil type is formed on steep slopes and has a high to very high erosion hazard. According to field observations (Golder 2000), much of the banks of this area have large rock riprap covering the surface of finer-grained alluvial and colluvial deposits/fills. There are also areas of huge rounded boulders and/or outcrops.

Three Rocks Area

This area is surrounded by canyon walls covered by shallow soils derived from granite and gneiss bedrock and bedrock outcrops. This soil type is formed on steep slopes and has a high to very high erosion hazard. According to field observations (Golder 2000), this area is dominated by coarse rockfill and very rocky colluvium/fill, with metamorphic bedrock outcrops appearing to be shallow below the surface cover. Outwash fans from the side drainages are composed of relatively coarse, angular debris.

Spike Buck Area

This area is predominantly surrounded by canyon walls covered by shallow soils derived from granite and gneiss bedrock and bedrock outcrops. This soil type is formed on steep slopes and has a high to very high erosion hazard. A narrow strip of gravelly sandy loam forming a terrace within a meander north of the river is present at the east-northeast area. Erosion hazard for this soil type is moderate to very high. According to field observations (Golder 2000), this area is dominated by rockfill with occasional outcrops of igneous rocks. Colluvial-based fills are present in some areas, particularly at the mouths of gullies on the south bank, and in a few areas fan deposits are found along the north bank.

Parkdale Area

This area is predominantly surrounded by canyon walls covered by shallow soils derived from granite and gneiss bedrock and bedrock outcrops. This soil type is formed on steep slopes and has a high to very high erosion hazard. The eastern edge of this area opens into a valley with deeper soils and gentler slopes including clay loam, cobbly sandy loam, and other loams. These soils have a wide range of erosion hazard from slight to very high. According to field observations (Golder 2000), banks are characterized by alluvial/fan deposits at the extreme east end of this area. Upstream from this area (westward), banks are characterized by local colluvial materials, in place or used as fill, which are very rocky, with boulders up to 2 feet or more in diameter. Occasional outcrops (igneous rock) are also present and are more frequent toward the western end of the area. Much of the bank materials throughout this area appear to be characterized as rockfill, although greater content of smaller particle sizes occurs at confluences of side canyons with the river, where fan deposits contribute more fine particles to the natural river banks.

5.5.3.2 Impact and Mitigation Issues

Impacts on soils and ground cover include possible erosion from the installation, viewing, and dismantling activities. Soils along the OTR corridor are predominantly shallow over underlying bedrock and derived from granite and related rocks with an abundance of rock outcrops. Since these soils are generally coarse and lacking in fine materials, rainfall is absorbed readily. Moisture retention is low, however, creating prime conditions for both surface and subsurface runoff. Good vegetative cover is essential to hold these soils in place. Disturbance of vegetation from project activities could result in serious erosion, based on overuse (OHV use, livestock grazing) in other similar areas of shallow soils (BLM 1983).

Since soils mapping is highly generalized for the OTR corridor, and information on vegetation is more detailed, the analysis of erosion effects is based on possible effects on vegetation and is presented in

Section 5.5.4, Vegetation. The analysis includes an overlay of all disturbance areas on the different vegetation layers.

Proposed Action

The potential to affect the soils of the area is primarily associated with installing the anchors into the banks and with potential foot traffic during OTR viewing. Drilling to place anchor points into the river banks may cause erosion, especially in unstable material on steep slopes. The type of anchor installed at each point will depend on the specific ground conditions to ensure that engineering strength and stability criteria for securing the cable and fabric would be met. Four types of anchors will be used as described in the Engineering Design Report (Golder 2000; see Appendix J1.1.1). For anchoring in bedrock, the anchor type will depend on the condition of the bedrock and the bedrock surface conditions. Placement of anchors in unconsolidated materials would require another anchor type to be used. Another type of anchor would be required for rockfill.

The soil units that occur along the Arkansas River valley that are not rated as especially erosive are so primarily because of their shallow profiles and coarse gravelly-sandy textures and rock outcrops (NRCS 1995). Moreover, soils on both sides of the river have been extensively disturbed for construction of the highway and the railroad, and construction of the roadbeds has generally increased the stability of the material. The areas above both the highway and the railroad, however, are generally steep and prone to erosion if unduly disturbed by foot traffic.

Disturbance areas include foot traffic associated with anchor, cable, and panel installation and removal; vehicle and equipment traffic associated with installation and removal activities; vehicle and equipment traffic associated with access to anchor points; and the Texas Creek training and staging areas. Estimated disturbance area square footage is shown in Table 5.5-3 by project area. Areas with the greatest disturbance are Spike Buck and Parkdale.

Table 5.5-3. Disturbance Area Estimates*

Area	Disturbed Area (square feet)
County Line	1,694
Tunnel	27,723
Vallie Bridge	15,304
Texas Creek	15,803
Maytag	6,619
Three Rocks	19,318
Spike Buck	49,901
Parkdale	86,505
Total	**240,053**

*Does not include Texas Creek training and staging areas.

As discussed previously, soil disturbance is closely related to vegetation disturbance and further discussion of such effects is provided in Section 5.5.4, Vegetation.

Mitigation Measures

Disturbance areas have been minimized in the OTR design by taking advantage of previously disturbed US 50 shoulders and by using the railroad corridor for equipment and vehicle transport. Best management measures would be implemented during drilling of anchor points and placing anchors. Such practices include controlling rock and soil debris that is generated during drilling, and minimizing to the extent

possible the amount of foot traffic that occurs on these areas. Any topsoil that is excavated during drilling would be preserved for use during restoration upon removal of the project (see Appendix J, OTR Operations Plans, for further discussion). Drilling and placement of anchors typically takes from 3 to 4 hours at any one anchor point. Immediate and ongoing measures would be taken during and after anchor placement to minimize and avoid erosion and disturbance of soil and associated vegetation:

- Placement of mats in work areas
- Use of special treads for drill rigs and associated equipment
- Covering of any disturbed areas or soil during work cessation
- Minimization of disturbance of sensitive soils and vegetation by placing anchors along previously disturbed areas if possible
- Use of horizontal drilling techniques to avoid disturbance of slopes
- Use of the railroad to drill anchors and transport equipment and crews
- Reclamation of areas of disturbance (see Appendix J1, Installation, Removal, and Restoration Planning Documents)

In addition to the measures above that would be performed during installation and removal, measures would be taken during viewing to ensure that soil disturbance from foot traffic and vehicle traffic is minimized. These measures are further described in the Transportation and Events management plans in Appendix J2.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not create conditions beyond those already occurring that would affect soils and soil erosion in the project area, and therefore would not affect soil resources.

5.5.3.3 Recommendations for Further Study

More specific soil mitigation measures should be provided to be consistent with final vegetation mitigation measures and water quality protection.

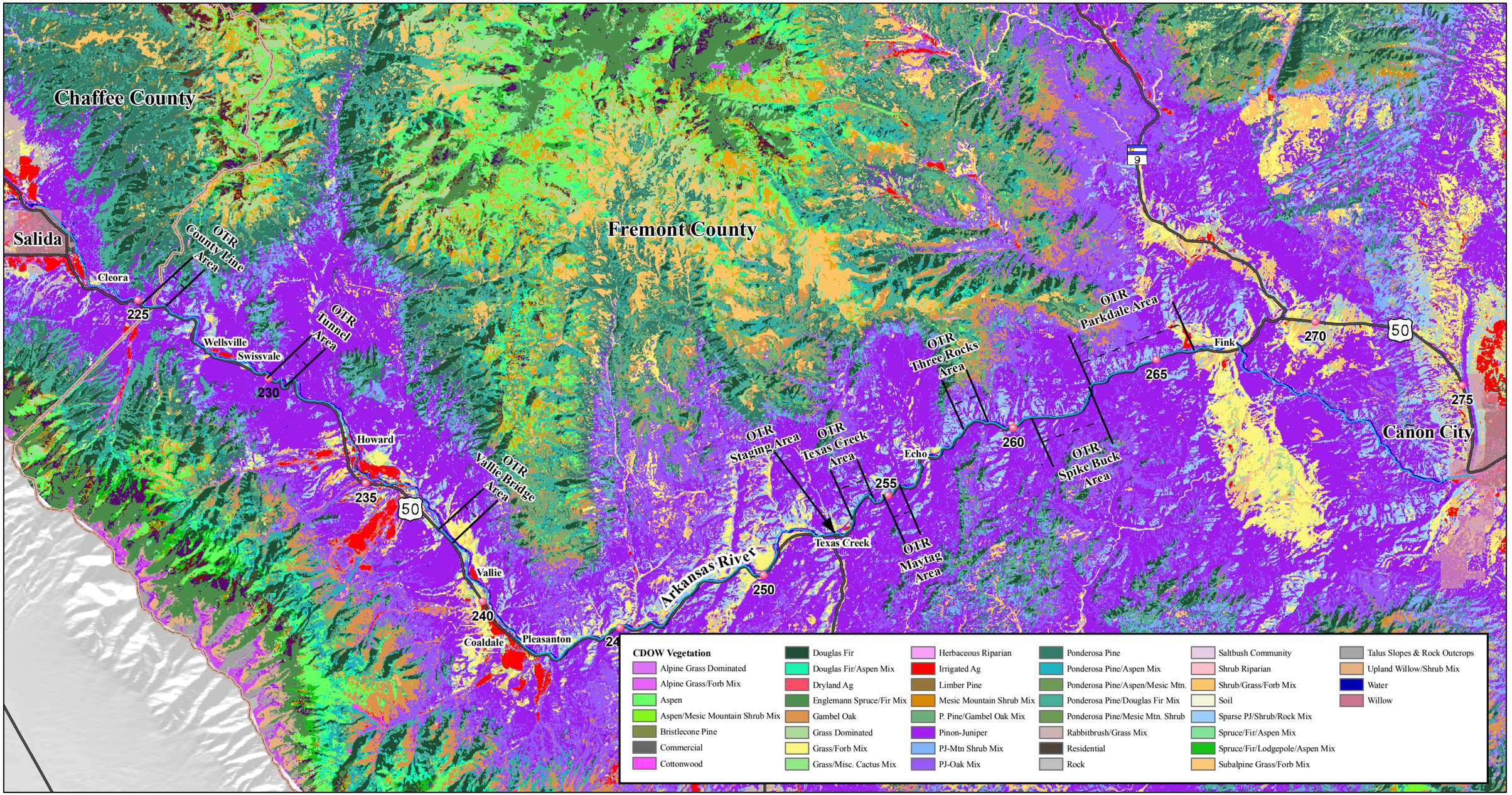
5.5.4 Vegetation

5.5.4.1 Affected Environment

The upland vegetation of the project area was described from literature and from field observations that were made during 2000, 2005, and 2006. The mapping that was done by the Colorado Division of Wildlife (CDOW 2003) in a cooperative effort with the BLM was reviewed and used to identify the dominant plant communities of the OTR areas. This information was supplemented by fieldwork in August 2005 and August 2006 to identify the dominant vegetation patterns and species, which were mapped on aerial photographs for each proposed OTR area. Plant species observed in the vicinity of the proposed work of art are listed in Appendix E1, Upland Plant Species. Common names and scientific nomenclature follow Weber and Wittmann (2001).

Based on the CDOW (2003) map, piñon-juniper, piñon-juniper-mountain shrub, piñon-juniper-oak (scrub oak), and grass/forb mix are the principal vegetation types (Map 5.5-2, Generalized Vegetation). The hillside habitat within the proposed OTR area is predominately composed of piñon-juniper (Rocky Mountain juniper) woodland at lower elevations of the Arkansas River canyon and shrub-dominated habitat that intermingles with the woodland and is composed primarily of scrub oak and rubber rabbitbrush.

Piñon-juniper woodland is the dominant type on the slopes of the canyon, but it varies considerably in tree density among the different slopes, with north-exposed areas supporting thicker stands. Although



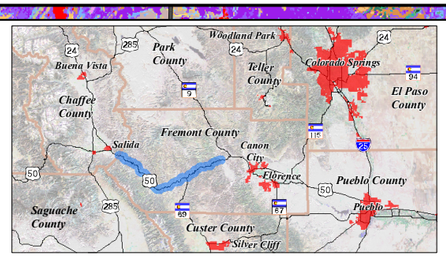
LEGEND

- Cities
- Counties
- US Highway 50 Mile Posts
- Highways

N W E S

0 2.68 Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. Vegetation classification data provided by Colorado Division of Wildlife (CDOW). Jurisdiction information provided by CDOT.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.5-2. Generalized Vegetation

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\CorridorVegetationMap_11x17_061103.mxd)
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piñon- and juniper-dominated vegetation is common along the lower slopes of the canyon near the railroad and the highway, scrub vegetation is also prominent, especially stands of rubber rabbitbrush that occur adjacent to the highway. Other dominant shrubs include currant (*Ribes* spp.), mountain mahogany, and skunkbrush. Ponderosa pine occurs as scattered trees along the banks of the river and the better drained areas of the floodplain. The piñon-juniper habitat type is considered dominant because of the amount of area it covers (CDOW 2003). The mountain shrub habitat (for example, scrub oak) is less extensive than the piñon-juniper; however, it contributes greatly to the wildlife value in the area as nesting cover and winter forage. Prominent species of the more open areas of the canyon include grasses, hedgehog cactus, yucca, cholla, fringed sage, sand sagebrush, common sagewort, and prickly pear (Appendix E1, Upland Plant Species). The woodland and shrub habitats, especially when they include a herbaceous understory, provide winter range for the economically important mule deer and elk. Bighorn sheep forage on the lower canyon and riparian vegetation in conjunction with watering at the river, which occurs year-round.

Open areas, as well as the understory of shrub and piñon-juniper vegetation, are dominated by grasses and increaser and "weedy" species, which provide a highly variable ground cover. Dominant species include blue grama, Indian ricegrass, western wheatgrass, mountain muhly, sand dropseed, needle-and-thread, sedge, and rush species (Reed et al. 1994, BLM 2001a).

County Line Area

Vegetation in this area consists primarily of open piñon-juniper woodland, especially on the north bank of the river, which is also characterized by large stands of scrub oak, prickly pear, yucca, and scattered ponderosa pine. Thinleaf alder occurs at several locations on the lower slopes near the floodplain. The vegetation of the open piñon-juniper woodland consists of a mixed herbaceous ground cover of common sagewort, snakeweed, and various grass species (map in Appendix D4).Vegetation on the south side of the river is characterized by a large, nearly contiguous stand of rubber rabbitbrush that generally borders the upper banks along the highway, as well as more open areas of mixed herbaceous and weedy vegetation. Other prominent species include scattered ponderosa pine, box-elder, skunkbrush, scrub oak, yucca, and piñon-juniper. As with most of the river corridor, grass/forb or mixed herbaceous vegetation occurs in open areas not dominated by trees or shrubs, and includes a number of grass species (blue grama, needle-and-thread, Indian ricegrass, smooth brome), common sagewort, and fringed sage.

Tunnel Area

Vegetation on the north side of the river in this area consists of open piñon-juniper woodland with a sparsely vegetated and rocky ground cover. Ponderosa pine is scattered among the more prominent woodland, often farther down the banks toward the river. Other prominent species include scrub oak, big sagebrush, ground-cherry, and snakeweed (Appendix D4). This area also contains several prominent areas of barren rock outcrops.

Vegetation on the south side of the river is characterized by relatively large areas of piñon-juniper woodland and an understory of mixed herbaceous and grass species. Rubber rabbitbrush occurs as a nearly continuous stand adjacent to the highway. Other common species include scrub oak and mountain mahogany.

Vallie Bridge Area

This area contains relatively large stands of piñon-juniper woodland on the north side of the river, where there is a large, gentle slope between the railroad and the steeper slope to the river. Where the woodland is more disjunctive or open, the vegetation is composed of sparsely vegetated herbaceous and weedy cover (for example, snakeweed) or of rubber rabbitbrush, and scattered patches of poison ivy (map in Appendix D4).

The south side of the river contains many rocky, barren areas that alternate with expanses of rubber rabbitbrush that occur near the highway. This area also contains a few scattered junipers and thickets of clematis.

Texas Creek Area

The Texas Creek area contains a large amount of rock, especially between the railroad and the river on the north side, which includes areas of ballast. Vegetation here consists of scattered piñon, skunkbrush, rubber rabbitbrush, yucca, common sagewort, clematis, and mixed herbaceous grasses and weedy species.

Vegetation on the south side of the river is more continuous, although rocky areas are also prominent. Scrub of rubber rabbitbrush dominates much of this area, but the vegetation is also characterized by scrub oak, piñon-juniper, skunkbrush, cholla, mountain mahogany, and open areas of mixed herbaceous species (snakeweed, blue grama, Indian ricegrass). A disturbed area pullout and parking area occurs in a relatively wide area between the highway and river at milepost 254.22 to the end of the section in this area.

Maytag Area

The Maytag project area is similar to the Texas Creek area in that rock and ballast dominate the north side of the river. The area between the railroad and river is narrow, and the vegetation is sparse, consisting only of sparse clusters of rubber rabbitbrush and a few scattered junipers.

The south side of the river contains better-developed vegetation, although rock outcrops are also prominent. Dominant species include mixed mountain shrub of rubber rabbitbrush, scrub oak, skunkbrush, and an area of grass/forb mix (blue grama, Indian ricegrass, sand dropseed) with cholla and yucca (map in Appendix D4). Junipers are scattered throughout this area.

Three Rocks Area

The vegetation of the Three Rocks area consists of a mosaic of vegetation as well as sparsely vegetated or nearly barren areas of rock. Rock and ballast dominate the narrow area between the river and the railroad on the north side, but stands of rubber rabbitbrush and sparse herbaceous vegetation occur in several areas. A large stand of ponderosa pine, narrowleaf cottonwood, and river birch characterizes the vegetation at milepost 259.20 on a bench where the railroad diverges away from the river.

Although also rocky, the south side of the river here is characterized by long, continuous stands of rubber rabbitbrush, especially near the highway, with occasional ponderosa pine and river birch that occur on the lower slopes nearer the river.

Spike Buck Area

The Spike Buck Area is similar to the Three Rocks Area in that the north side between the river and the railroad is narrow and rocky, consisting mostly of fill material and ballast and containing mostly a few scattered stands of rubber rabbitbrush. Where the intervening area is wider, the vegetation consists of mixed grass/forb vegetation as well as some areas of grape, and mixed mountain shrub of rubber rabbitbrush, scrub oak, mountain mahogany, and widely scattered junipers.

The south side of the river is again more diverse, with large stands of rubber rabbitbrush and scrub oak. Ponderosa pine also is prominent from approximately milepost 262.55 to the eastern end of this section. Other vegetation consists of mixed herbaceous ground cover that consists of grass species (Indian ricegrass, blue grama), but sagewort and cholla provide an aspect dominance to the area. This vegetation interfaces with mountain mahogany scrub.

Parkdale Area

This area is the longest and, as such, contains the greatest species diversity. The vegetation, however, is similar to that described for the Spike Buck and Three Rocks areas. Where the intervening area between the railroad and the river is narrow, barren or sparsely vegetated rock is common. Where this area widens, the vegetation consists of piñon-juniper woodland, scattered ponderosa pine, and mixed mountain shrub of rubber rabbitbrush and cholla (map in Appendix D4). Occasionally, thickets of poison ivy occur in the shade of taller vegetation.

The south side of the river is characterized by nearly continuous, narrow stands of rubber rabbitbrush, especially along the highway. However, ponderosa pine is prominent in some areas (for example, mileposts 265.35, 265.56). Other common species include piñon-juniper-mountain shrub mix of juniper, scrub oak, mountain mahogany, and cholla, and also areas of mixed grass/forb vegetation that intermingles with the shrubs, including cholla.

5.5.4.2 Impact and Mitigation Issues

Proposed Action

Potential Impacts

Impacts on vegetation of the OTR areas would occur primarily during installation and removal of the anchors, with lesser impacts from stringing the cables and placing the fabric. These impacts include breakage or crushing from equipment that is moved from the highway and railroad to access drill points for anchor placement, and trampling of vegetation and the development of pathways to access anchor points and to help string cables and fabric. The disturbance to vegetation from each of these activities was determined as follows:

- A 6 × 8-foot oval area (oriented toward the cables) was used as a conservative estimate of disturbance for each anchor point.
- The equipment access was determined by conducting a site inspection in conjunction with aerial photographic interpretation to estimate the length of access that would be needed from the railroad and from the highway to reach anchor points. The width of the access used was based on the equipment used in field tests:
  - Small rubber tired or tracked drill rig (Bobcat) = 5 feet
  - Larger tracked drill rig = 20 feet
- Pathway development estimates were also determined from site inspections and aerial photographic interpretation to establish human foot access needs that would affect vegetation. Pathway widths were assumed to be 2 feet.

The total impact on vegetation from anchor point clearing, equipment access, and pathways that develop from installation and removal (trampling) is estimated to be approximately 4.7 acres (Table 5.5-4). Clearing for anchors was estimated to affect 1.4 acres, with the largest amount occurring in the Parkdale Area, which has the most anchors. Rubber rabbitbrush would be affected the most in many of the areas, but skunkbrush-rabbitbrush scrub in the Maytag Area and open piñon-juniper in the Vallie Bridge and Tunnel areas, and mixed herbaceous mixed with piñon-juniper in the County Line Area also constitute a large part of the impacts. Impact amounts on various vegetation types and species from anchors, footpaths and equipment paths are provided in Appendix E1, Upland Plant Species.

Effects from equipment access were estimated to total approximately 2.7 acres, with the largest part of this occurring in the Parkdale Area (0.9 acres: Table 5.5-4). The vegetation affected by equipment access varies among the sections: much of the impacts in the County Line Area occurs in sparsely vegetated areas, but a major part of the impacts in other areas includes open piñon-juniper (Tunnel), open piñon-juniper/sparsely vegetated (Vallie Bridge), open areas of rubber rabbitbrush-scrub oak (Texas Creek and

Maytag), open areas of rock and grass (Three Rocks), rock with coyote willow (Spike Buck), and grass-dominated areas (Parkdale). See Appendix E1 for vegetation type impact totals.

Table 5.5-4. Impact Estimates (acres) for Project Areas According to Type of Disturbance

Project Areas	Anchors	Footpaths	Equipment Paths	Totals
County Line	0.09	0.07	0.25	0.41
Tunnel	0.15	0.11	0.35	0.61
Vallie Bridge	0.09	0.05	0.17	0.31
Texas Creek	0.15	0.08	0.01	0.24
Maytag	0.04	0.02	0.04	0.10
Three Rocks	0.09	0.02	0.25	0.36
Spike Buck	0.23	0.07	0.75	1.05
Parkdale	0.52	0.15	0.91	1.58
Totals	**1.36**	**0.57**	**2.73**	**4.66**

Protective material such as thick rubber mats would be used to cushion equipment tracking effects on vegetation. This would help reduce the amount of vegetation that is broken and also reduce loss of vegetative cover and disturbance of soil, which reduces the potential for weed incursions.

Some trampling of vegetation will occur from personnel during stringing of cables and placement of the fabric and again during dismantling. A total of 0.6 acres of impacts was estimated from trampling effects. The affected vegetation in the project areas is similar to the types affected by anchor placement. These effects are considered to be temporary, and trampled vegetation is expected to regrow to near-original conditions in one to two growing seasons; this recovery will be facilitated by reclamation measures. Similarly, effects from equipment access are considered to be temporary if they are limited to crushing versus clearing, and less reclamation and weed control would be needed.

The impacts on vegetation during the viewing period are likely to be minimal. An increase in trampling from rafters in specific stopping points may occur. Current recreational use is curtailing successful re-establishment of understory vegetation near recreation sites such as put-ins, take-outs, lunch stops, and highway pulloffs (BLM 2000b). Additional damage to soils and vegetation may occur from people climbing the canyon slopes for better views. Foot traffic in these areas is likely to cause increased erosion and open areas to weed invasion. Because of the dry conditions and thin, rocky soils, such damage requires considerable time for vegetation to regenerate.

Mitigation Measures

The following measures would be implemented to reduce impacts on vegetation from the installation, viewing, and removal of OTR:

1. Mats would be used to protect vegetation and surface soils from equipment (for example, drill rigs) tracks and tires when the equipment is moved from the highway or railroad to access drill points.
2. Servicing of equipment would take place on the railroad or highway right-of-way. Any spills of fuel, lubricants, hydraulic fluids, or solvents would be cleaned up and properly disposed of.

3. Spoil from drilling operations would be contained and erosion control measures would be employed to curtail overland flow from drill sites.
4. Water and drilling fluids used to drill holes for anchors would be collected.
5. Areas that are sensitive to trampling would be cordoned off from access during the Proposed Action to limit access from viewers, including the rafting public.
6. Specific measures for anchor sites have been developed to reduce impacts on vegetation and soils, and include the following actions: When the anchor sites are constructed, any soil that is excavated to prepare the site would be placed in a large canvas bag. Each anchor would have an identification number, which would be placed on the canvas bag of soil. The bags of soil would be stored in a leased warehouse until after the viewing. During the anchor removal process, the bags of soil would be brought back to the site and placed near the appropriate surface anchor. After the surface anchor is removed, the bagged soils would be used to restore the ground surface to original contours and tamped to stabilize the site. This replacement of soil to its original location is anticipated to speed vegetation recovery because it contains inoculum (seeds and microbes) from the original site, although storage would reduce the viability of some species in this material.
7. Disturbed soil surfaces would be revegetated using BLM-approved seed mixtures of native species. OTR Corporation would purchase certified, weed-free seeds or seed mixtures for use in reseeding operations.
8. Areas that have been compacted (for example, footpaths) would be scarified with hand tools and BLM-approved seed would be spread by hand and lightly raked into the soil. The soil would be tamped by hand to complete the site reclamation.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. Impacts of the No Action alternative are those that currently occur along this corridor of the Arkansas River. These include effects from recreational activities, including high use of rafting stops and impacts from occasional hiking on canyon slopes.

5.5.4.3 Recommendations for Further Study

No additional studies are recommended on the Proposed Action and the No Action alternative. Similar analyses will need to be conducted for any changes to the proposed alternative and on any additional alternatives.

5.5.5 Invasive, Non-native Species

5.5.5.1 Affected Environment

Background

Noxious weeds typically are pioneer species, becoming established on new sites through transportation via wildlife, livestock, house pets, clothing, personal vehicles, and construction machinery. Riparian-associated species also are dispersed during flood episodes. Noxious weeds invade existing vegetation through the production of allopathic chemicals, early germination, accelerated growth rates, high seed production, or a combination of these means. These traits give the species an advantage over their native competitors. When it is introduced into new areas, an invasive plant often out-competes native species because the invader often lacks the natural enemies that kept these plants in biological balance in their native habitat. Once established, noxious weeds degrade the habitat to the point where its ability to support traditional values (wildlife/livestock grazing, habitat/watershed protection) is lessened or eliminated (BLM 1995, Walker N.D.). Disturbed sites are the most susceptible to infestation by noxious

weeds. The most common site disturbances in the project area are associated with recreation use, road maintenance, and construction projects.

Methods

Information regarding invasive and non-native plant species was obtained from agencies that have identified problem invasive species and have implemented control programs for these species. Such agencies include the BLM, Upper Arkansas Regional Weed Management Cooperative, Chaffee and Fremont counties, as well as Colorado state lists that identify invasive species that require control. Other information includes observations by JFSA biologists who noted invasive species as part of vegetation mapping work.

Results

In 1998 the Upper Arkansas Regional Weed Management Cooperative expanded the capacity of local weed management programs across jurisdictional boundaries. Eight counties, including Chaffee and Fremont counties, became active participants in a regional strategic weed management plan to inventory weeds and target weed management and education. The other counties were Custer, Huerfano, Lake, Park, Pueblo, and Teller. The Forest Service and BLM developed a Memorandum of Understanding with the eight cooperating counties. The cooperative focused weed management efforts on nine species targeted for control and eradication. These species included yellow toadflax, Russian knapweed, diffuse knapweed, spotted knapweed, dalmation toadflax, leafy spurge, Canada thistle, hoary cress, and musk thistle. The Forest Service and BLM began an integrated cooperative approach to managing the noxious weed problem. This included educating employees and the general public about noxious weed problems, preventing the introduction of noxious weeds onto public lands by washing equipment used on public land projects, requiring the use of certified weed-free hay/straw and seed, revegetating disturbed sites, and working with adjacent landowners. The most tenacious species such as leafy spurge, toadflax, and knapweeds were given high priority for treatment.

Weed occurrences in Fremont County were mapped in 1995 through a cooperative program with BLM, CDOT, NRCS and Colorado Parks. The most important weed species in the project area between Salida and Parkdale are Russian knapweed, musk thistle, and Canada thistle. Leafy spurge is present in Tallahassee Creek near the eastern end of the project area. Other species may be present, and if infestations become a problem they will be treated as determined necessary. For example, several individuals of tamarisk (*Tamarix ramosissima*) were observed in the Parkdale Area near the bridge at Brown's Landing. This species has recently been added to the state list and has become the focus of a coalition for its eradication. The noxious weeds identified as concern in Fremont County are shown in Table 5.5-5.

Table 5.5-5. Noxious Weeds of Primary Concern in Project Area

Plant Species	BLM National List	State of Colorado	Fremont County
Leafy spurge (*Euphorbia esula*)	X	List B	X
Russian knapweed (*Acroptilon repens*)	X	List B	X
Diffuse knapweed (*Centaurea diffusa*)	X	List B	X
Canada thistle (*Cirsium nutans*)	X	List B	X
Musk thistle (*Carduus nutans*)	X	List B	X
Hoary cress (*Cardaria draba*)	X	List B	X
Spotted knapweed (*Centaurea maculosa*)	X	List B	X

Plant Species	BLM National List	State of Colorado	Fremont County
Yellow toadflax (*Linaria genistifolia*)	X	List B	X
Dalmatian toadflax (*Linaria genistifolia*)	X	List B	X
Houndstongue (*Cynoglossum officinale*)	X	List B	X
Tamarisk (*Tamarix ramosissima*)	X	List B	X
Bull thistle (*Cirsium vulgare*)	X	List B	X

The BLM, as a cooperating agency with the eight counties in the AHRA, addresses those weed species identified by the individual counties as species of concern. In this case the 12 weeds identified by Fremont County are also on BLM's national list of invasive weed species of concern and List B of the Colorado Noxious Weed Act. The county commissioners, in consultation with the state weed advisory committee, local governments, and other interested parties, develop and implement state noxious weed management plans designed to stop the continued spread of these species. The species listed on Table 5.5-5 are those that will receive priority for control (Noxious Weed Management Plan for Fremont County 2006).

Noxious weed infestations on BLM-administered lands in the Royal Gorge Planning Area are relatively rare and have only recently become an issue in the OTR area. Not much is known about their condition or trend (BLM 1995). The BLM began mapping weed infestations in Fremont County in 1998 and 1999 using Geographic Positioning Systems (GPS) and Geographic Information Systems (GIS) to identify areas of concern. Matching funds available from Fremont County and other federal and state cooperating agencies were used to initiate the mapping of noxious weeds. The weed mapping in Fremont County was updated in 2005.

Invasive species known to occur in the OTR area are addressed in the following text.

Russian Knapweed

An invasion of knapweeds decreases the value and carrying capacity of infested rangeland and wildlife habitat. Knapweeds produce allopathic chemicals that deter herbivores, which further increases the competitive edge the species has over other, less durable native plants. Russian knapweed reproduces by seed and horizontal creeping roots via its extensive root system. It is extremely hard to eradicate once established because of taproots that can grow up to 20 feet deep. Diffuse knapweed produces large quantities of seed, which are dispersed by wind and vehicles or attached to fur or clothing. The knapweed species are tolerant of a wide range of temperatures and precipitation, and have no natural population controls in the United States, which enables them to be a prolific competitor with less aggressive native species. Fremont County has had a periodic roadside (herbicide) control program and private landowner (volunteer) weed control off and on since 1989. In accordance with the 1992 weed control plan, leafy spurge, Russian knapweed, and diffuse knapweed have been the primary targets.

Leafy Spurge

Leafy spurge generally occurs in disturbed sites at middle elevations along gullies and riparian corridors at lower elevations. Currently, the only known leafy spurge infested site within the AHRA occurs along Tallahassee Creek, east of the Parkdale railroad siding near the east end of the project area. The greatest impact of leafy spurge is its ability to outcompete native grasses and legumes, resulting in ecosystem changes. Leafy spurge infestations of rangeland may cut forage productivity by up to 75 percent. Because the plant is unpalatable to wildlife or livestock and therefore not grazed, the carrying capacity of the infested range is also decreased by 75 percent. According to the Federal Interagency Committee

(Westbrooks 1998), leafy spurge also causes an indirect impact because of the cost of control or eradication. These costs can exceed the original cost of the land because eradication efforts must be carried out over an extended period of time to be successful. BLM previously used Tordon for chemical control of leafy spurge in the Tallahassee area. Fremont County has been experimenting with biological controls rather than chemical control because of concerns for water quality. In 1991 a root boring flea beetle was released for the first time on a dense infestation of leafy spurge in the Tallahassee Creek drainage, with subsequent releases until 1998. After 12 years the leafy spurge had been reduced by 60 percent.

Musk and Canada Thistles

Musk thistle was the second noxious weed in Fremont County to be targeted for biological control. In 1993 a small seed head weevil was released on a dense stand in western Fremont County. Since then it has become an effective biological control for musk thistle throughout the county. Many other species of insects and stem weevils have been released on musk and bull thistles and found to be somewhat effective. None, however, has shown any appreciable result on Canada thistle. Some chemical control work has been done on Canada thistle, but control of this weed was a secondary priority.

Tamarisk

Tamarisk has become an increasingly problematic invader in the southern half of Colorado through the later part of the last century (CDNR 2004). This invasion is evident by thick stands in many of the rivers, including the lower Arkansas River and its tributaries, including areas near Cañon City. This species is the subject of active eradication programs, as outlined by the Governor's Office for the state in 2003 and 2004.

5.5.5.2 Impact and Mitigation Issues

The spread of noxious weeds on all land within the AHRA is a regional issue and will continue to be of concern regardless of the jurisdictional boundaries of the BLM, Forest Service, state, county, or private ownership. New weed infestations are most likely to occur in areas where the soil has been disturbed by motorized vehicles, road maintenance, and recreation activity. Noxious weeds can be transported into and out of the project area by wind, water, tires, people, and animals, both domestic and wild. The BLM and other cooperating agencies in the AHRA will continue to use an integrated weed management approach to address the noxious weeds of concern for both the No Action alternative and the Proposed Action.

Proposed Action

The increased number of visitors to the corridor increases the possibility for soil disturbance and transport of weed seeds not only within the corridor but also to other areas in and outside of the county from vehicle tires, personnel clothing, and equipment. Installation of OTR will take place when dispersal of noxious weed seed is the highest. The noxious weeds of greatest concern emerge early in the spring, flower in early summer and set seed in mid- to late summer. All the knapweeds and thistles produce an abundance of seed. Any foot or vehicle traffic through one of these weed colonies can easily pick up and transport the seed.

Direct soil-disturbing activities would occur in the area around the cable anchor points. Soil and vegetation disturbance is likely to occur in the panel areas during installation and removal of the cables and fabric panels. The spread of noxious weeds into these disturbed areas is most likely from construction equipment and foot traffic during the installation activities and during OTR.

The best control for weed management is to prevent noxious weeds from being spread into areas of disturbance. The following mitigation measures may be recommended:

- Minimize the area of disturbance.
- Re-establish native vegetation on disturbed areas as soon after disturbance as practicable.

- Use only certified weed-free seed and mulch materials.
- Limit the number of vehicles and traffic pattern in the installation areas to the smallest practical size.
- Wash construction equipment before use within the installation areas.
- Use protective mats when likely to be effective in protecting soil from disturbance from equipment tracks and tires.
- Monitor areas of disturbance for invasion of weed species, especially noxious weeds. Monitoring period should occur over several growing periods. Weed species can lay dormant in the soil for a long period of time until environmental conditions are suitable for plant growth. Diffuse knapweed and musk thistle are biennial plants. They form a rosette the first year and flowering plants the next growing season. Early detection and eradication is the best strategy to prevent the spread of noxious weeds.
- Educational materials on weed prevention, noxious weed species, and non-native invasive plants should be distributed with other information material regarding viewing of the temporary work of art.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. Impacts of the No Action alternative are those that currently occur along this corridor of the Arkansas River. These include the occurrence of weedy species, including several noxious weed species and effects from recreational activities, including high use of rafting stops and impacts from occasional hiking on canyon slopes. Weedy species have spread along the railroad and highway right of ways, especially on the fill, and this incursion is likely to remain, especially along the rail right of way, where no control activities are planned. CDOT does monitor and initiate weed-control programs, but only adjacent to the highway. The BLM and counties also initiate control programs, but only if the weed species occurs on the BLM or county designated list and therefore is part of an action plan. Effects from recreational overuse in some areas are likely to continue, whether or not the OTR permit is granted, unless the AHRA and BLM implement a protection program and designate sensitive areas as off-limits, such as cottonwood stands, which are often preferred stops by rafters.

As mentioned in this Report and at the direction of the BLM, OTR will assist with the recovery of possible adverse effects from OTR, which may include a potential increase in transport of noxious weed seeds. OTR assistance may include aiding in the development of an overall area weed protection program, which would exist after OTR is over. The opportunity to benefit from this assistance will be lost with a No Action decision.

5.5.5.3 Recommendations for Further Study

Field reconnaissance should be conducted to identify new weed infestations in the project area and status of known infestations during the project construction period. Consultation should be made with the BLM weed coordinator to determine if site-specific weed management activities are planned in the corridor during the installation and viewing period.

5.5.6 Forest and Woodland Management

5.5.6.1 Affected Environment

The forest resource within the project area is managed as outlined in the 1990 Ten Year Forest and Woodland Management Activity Plan and Programmatic Environmental Assessment (BLM 1990). The primary objective of that plan is to increase or maintain the productivity of the forest ecosystem as reflected by the condition of the soil, water, and vegetation to avoid long-term adverse effects on productivity. The forest practices used must be biologically, economically, and environmentally feasible.

The total forest and woodland cover type consists of approximately 246,490 acres and occupies 35 percent of the BLM administered land in the Royal Gorge Resource Area. The cover type consists of 38 percent commercial forest (94,874 acres) and 62 percent woodland—piñon-juniper (151,616 acres). The forest type in the project corridor is almost exclusively piñon-juniper woodland located along the banks of the Arkansas River. The crown cover of the piñon-juniper on the south-facing slopes between the river and the Union Pacific railroad ranges from about 5 to 15 percent. The crown cover of the piñon-juniper on the north-facing slopes between US 50 and the river range from 15 to 30 percent, more than double that on the south side of the river.

Management of the piñon-juniper woodland is primarily a direct result of the 1995 Royal Gorge Grazing EIS. Programs to improve the productivity of the woodlands have consisted of chaining, and maintenance through sales of transplants, Christmas trees, and firewood. Areas with disease and insect infestation are to be harvested for firewood to either protect or replace the stand in the case of disease. The piñon-juniper stands in the corridor are mature or approaching maturity and can generally be described as healthy and in stable condition. A productive operable woodland is defined as tree stands that occur on slopes less than 35 percent and have a 1980 crown cover of 40 percent or more. The piñon-juniper woodland in the OTR area along the Arkansas River consists of individual plants or very narrow scattered stands of trees along the banks of the river. The density of piñon-juniper in the panel areas make up less than 15 percent of the vegetative cover and the crown cover ranges from less than 5 percent to 15 percent. The largest stand of piñon-juniper in the panel areas is along the north bank at Vallie Bridge. Based on the size of the stand, slope, and crown cover, the piñon-juniper woodland in the project area would be classified as a nonoperable unit. Woodlands along the Arkansas River are not open for Christmas tree and firewood cutting.

5.5.6.2 Impact and Mitigation Issues

Proposed Action

The piñon-juniper vegetation along the river is not considered an operable stand for woodland management. There are no maintenance activities planned within these areas and they are not open for firewood cutting. Management of other activities such as recreation and fire suppression would continue as described in the resource management plan.

Installation of the cables and placement of the anchor points could result in the removal or trimming of individual trees. If tree limbs are accidentally broken they would be properly trimmed to prevent insect and further damage to the trees.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. Ongoing management of the piñon-juniper vegetation would be the same as is occurring without the Proposed Action.

5.5.6.3 Recommendations for Further Study

No further work is recommended for forest and woodland management.

5.5.7 Range Management

5.5.7.1 Affected Environment

Grazing within the AHRA is currently managed using guidelines set forth in the Royal Gorge Grazing EIS (BLM 1995). Three objectives were defined for range management and how grazing is managed: (1) maintain current resource condition, (2) manage to improve resource conditions, and (3) manage to prevent resource deterioration.

Grazing is authorized on 62 allotments in the Arkansas River subecosystem of the Royal Gorge Planning area. Cattle are the only authorized kind of livestock. Grazing occurs throughout all seasons of the year. The season of use varies among the allotments. Each of the allotments has a rest period to allow time for forage species to recover from the last grazing period before the plants are regrazed. This rest standard allows plants to regrow, regain vigor, and produce seeds and seedlings. Also plant litter accumulates and protects the soil surface from erosion. Most livestock operations are cow-calf or cow-calf-yearling and calving occurs predominately in the spring. Grazing is excluded on developed recreation sites and where conflict with recreation occurs. Livestock drift onto uncontrolled private land will be eliminated through BLM fencing, cooperative projects, or grazing elimination.

Sixteen separate grazing allotments border the proposed project area from Salida east to Parkdale. The allotments are relatively large, ranging from 2,885 to 36,852 acres. The exception is McCoy Gulch, which only conatins 195 acres and is used for grazing for only a short time in the spring. The grazing duration and season of use for the other allotments vary throughout the year from spring grazing to winter grazing as shown in Table 5.5-6, Royal Gorge Resource Area Grazing Allotments, Salida to Parkdale, Mileposts 223–266. Ten of the allotments are categorized for grazing improvement and five are categorized for maintenance.

Cattle grazing on the north side of the river relies heavily on the river as a water source during the colder time of the year when other water sources are frozen. This is typically in December, January, and February, when the average low temperature is 25°F (Cañon City Chamber of Commerce 1999). The major allotments on the north side of the river that are grazed during the winter season are Table Mountain, Big Hole, and Lower Tallahassee. During other times of the year the cattle may use alternate water sources. Other than the Arkansas River, there is a total of 10 known water access points for cattle on these allotments. Alternate water sources include Longfellow Gulch (Wellsville allotment), Maverick Gulch (Maverick allotment), Badger Creek (Badger Creek allotment), and Fern Creek (Table Mountain allotment). The Big Hole grazing allotment has Reese Gulch, Texas Creek Gulch, Hindman Gulch, and Echo Canyon as alternate water sources for cattle. Spike Buck Gulch and McCoy Gulch are alternate water sources in the Little Hole and McCoy Gulch grazing allotments, respectively. Other watering areas may exist south of the Arkansas River; however, the locations are currently unknown.

Table 5.5-6. Royal Gorge Resource Area Grazing Allotments, Salida to Parkdale, Mileposts 223–266

Allotment Name	Allotment No.	Location Milepost North/South of the River	Acres	Season of Use Grazing Dates*	Animal Unit Months	Management Category/ Priority No. (1)	Land Treatment (2)
North Side Arkansas River							
Wellsville	5005	223-227 North	4,471	04/10–05/31	91	M 68	None
Maverick Gulch	5091	227-230 North	3,910	05/01–11/15*	147	I 37	None
Badger Creek	5109	230-245 North	36,852	04/16–10/15*	1,203	I 1	Thin 4,054 ac
Table Mountain	15001	245-250 North	15,248	03/01–04/30 10/01–02/28 03/01–03/31	227 48 10	I 6	Thin 1,020 ac
Big Hole	15002	250-259 North	18,890	10/01–3/28 03/01–03/31 10/01–02/29 03/01–03/31	242 49 547 111	I 5	Burn 400ac

Allotment Name	Allotment No.	Location Milepost North/South of the River	Acres	Season of Use Grazing Dates*	Animal Unit Months	Management Category/ Priority No. (1)	Land Treatment (2)
Little Hole	15003	259-262 North	6,612	07/01–10/31* 07/01–10/31*	307 49	I 18	None
Lower Tallahassee	5202	262-266 North	2,883	6/15–2/28*	283	I 58	Thin 400ac
South Side Arkansas River							
Bear Creek	15004	223-227 South	2,885	07/15–09/30* 12/01–02/28 03/01–05/31	123 165 166	M 85	None
West Box Canyon	5179	227-232 South	5,395	05/15–10/15*	217	I 66	Thin 160 ac
Howard Creek	15008	232-237 South	880	03/01–05/31	69	M 34	None
Kerr Gulch Common	5006	237-242 South	5,754	05/01–09/30*	135	I 7	Thin 1,500 ac
Lower Granite	5027	242-245 South	3,454	12/01–04/30	182	M 80	Burn 400ac
Sand Gulch Common	15007	245-248.5 South	3,741	03/01–05/31 12/01–02/28 03/01–05/31	166 180 181	I 56	Burn 1,000ac
McCoy Gulch	15049	248.5-253 South	195	03/01–04/30	35	M 17	None
Texas Creek Common	15043	253-261 South	20,932	06/16–10/15*	1,108	I 4	None
Copper Gulch Common	15036	261-266 South	30,080	07/03–10/15*	207 73 633	I 2	Thin 1,600 ac

Source: Royal Gorge Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement. January 1995. Royal Gorge Resource Area, Cañon City District, Colorado (BLM 1995).

*Dates overlap the proposed viewing period of OTR

(1) Priority Number: Ranking of the "improve (I) and maintain (M)" category allotments for investment of public funds for range improvements. Range improvements include fences, spring development, water catchments, reservoirs, water pipelines, water troughs, cattleguards, wells, and water tanks. The specific type of studies will be determined by the integrated activity plan (IAP) objectives.

(2) Land Treatment: Proposed vegetation treatment to improve forage production, which include prescribed burning and selective thinning.

5.5.7.2 Impact and Mitigation Issues

Proposed Action

Grazing would occur during the fall in the County Line, Tunnel, Vallie Bridge, Maytag, Three Rocks, Spike Buck, and Parkdale areas. Allotments on the north side of the river include Maverick Gulch, Badger Creek, Little Hole, and Lower Tallahassee. Allotments on the south side of the river include Bear Creek, West Box Canyon, Kerr Gulch, Texas Creek Common, and Copper Gulch Common. All of the allotments are large, varying from 2,883 to more than 30,000 acres, and it is expected that cattle are located in areas with more favorable terrain and a greater abundance of grass cover than is found along the river. Aerial photographs and observation during field visits do not show evidence the cattle use the Arkansas River in these panel locations as a water source. Installation and removal activities associated with the Proposed Action would take place near the river and would not affect any land treatment activities being conducted on the allotments to improve the range resource.

The proposed temporary work of art would not preclude access to the grazing allotments from US 50. Increased traffic and possible delays on the highway could, however, be a nuisance for livestock operators during the installation, viewing, and removal periods if they are requiring access to the area to manage herds. This would primarily occur at the staging and crew training area at Texas Creek and at Vallie Bridge. The grazing allotment at Kerr Gulch ends at the end of September and dismantling of the panels at Vallie Bridge could present traffic congestion if cattle are being trucked out of the allotment at the same time.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. Livestock grazing and range management practices identified for these allotments would continue as planned in the 1995 Resource Management Plan.

5.5.7.3 Recommendations for Further Study

Consultation with BLM and grazing allotment operators should take place to determine if there are any issues and concerns for the proposed project. It should be determined whether there are any livestock water access points along the Arkansas River that would be used during installation and viewing of the temporary work of art.

5.5.8 Fire Management

5.5.8.1 Affected Environment

The fire management goals for the Royal Gorge Planning Area are to improve prevention and suppression, reduce fuel hazard, restore fire-adapted ecosystem, and promote community assistance. Protection of human life is the single suppression priority. The unit priority ranking for middle Arkansas is as shown on Table 5.5-7.

Table 5.5-7. Unit Priority Ranking for Middle Arkansas

Unit Priority	Ranking
Suppression	Category B and C
Suppression priority	High
Wildland fire use	High
Fuel treatment	High
Stabilization rehabilitation	High
Community assistance	High

Lightning-caused fire in the Arkansas Subregion #1 accounts for 84 percent of the fire occurrences and the majority of acres burned. The remaining are human-caused occurrences involving the railroad and abandoned campfires. The Denver & Rio Grande Western railroad ran from a junction from the mainline at Tennessee Pass near Leadville to Cañon City from 1879 until 1997, when service was discontinued following the merger of Union Pacific and Southern Pacific railroad companies. These trains were used to haul minerals, timber, and coal products. The 24-mile segment from Parkdale to Cañon City will continue to operate for tourist attraction and transport of rock from the quarry in Parkdale.

Ninety-five percent of the fire occurrences in the resource area are less than 10 acres in fire size class A and B. More than 92 percent of all fires have occurred at fire intensity levels 1 and 3. The fire intensity level ranges from 1 to 6 and relates to the fire behavior and amount of effort needed to contain a fire in a specified fuel type. The majority of suppression fires occur between June 1 and September 5 each year,

but there have been fires in every month of the year. The summer season lightning fires are often accompanied by wetting rains.

Piñon-juniper is the dominant vegetation type in the Arkansas Subregion #1 occurring within 5,000 to 7,000 feet AMSL. Fire in this vegetation type is generally slow moving and has low rates of spread and intensity. A typical piñon-juniper fire ignited by lightning and associated with brief afternoon winds is usually contained within the initial burn period. Fires in piñon-juniper fuel type typically do not exceed 1 acre, even in drought years. A fire in the piñon-juniper woodland generally has a moderate risk for loss of key ecological components. The crown cover for the piñon-juniper along the river is generally less than 15 percent and there is very minimal ground cover, and so any fire intensity level is expected to be very low. The erosion potential on the steeper slopes is generally high, particularly when the vegetative ground cover is removed.

The history of wildfire management in the Royal Gorge area has been fire suppression, regardless of location. The wild fires have been suppressed by BLM forces or by cooperators, including counties and rural fire districts. Under the 2004 Fire Management Plan (BLM, 2004), managers will evaluate each wildfire on a case-by-case basis to determine whether full suppression, monitoring, or management for resource benefit is the best response strategy. For all woodland fires located within a planning objective Category Area A, where fire poses a threat to life or property, or Category B, where wildland fires are not desired, the response strategy would be full suppression. Appropriate management response will also consider weather and fuel conditions, value at risk, and cost efficiencies. Consideration for wildland fire use will be given only within well-blocked and contiguous BLM land parcels, and when natural ignition occurs beyond 1/2 mile of adjoining land jurisdiction and wildland urban interface areas. The management objective is to suppress all wildland fires at fire intensity level 4 and protect adjoining private land from unwanted wildland fire spread to the greatest extent possible. All human-caused ignition will be aggressively suppressed.

The Arkansas Subregion #1 includes livestock grazing, intensive recreational use along the Arkansas River, big game wintering and calving areas, municipal watersheds, and the Kerr Gulch commercial plantation. These areas are subject to Category B fire management strategy: “wildland fire is not desired.” Retardant and foam will not be used within 300 feet of any waterway. The AHRA office must be notified when helicopter water hauling operations are being conducted anywhere on the Arkansas River between Leadville and Cañon City.

5.5.8.2 Impact and Mitigation Issues

The full fire suppression strategy identified in the 2004 Fire Management Plan would be employed in the corridor along the Arkansas River for both the Proposed Action and the No Action alternative.

Proposed Action

The Proposed Action would not change the risk of lightning-caused fires. All of the cables for the fabric panels would be grounded through the cable anchors. The fabric material is fire retardant. The components of the anchor system are prefabricated and metal cutting or welding is not expected to be required on site. An indirect effect of the Proposed Action would be the management of increased traffic on US 50 should this route be needed by federal or local agencies responding to fires on public or private lands accessed from US 50 between Salida and Cañon City.

If passenger trains are used for viewing, they are not expected to have the same fire hazard as the older cargo hauling trains used in the past. The passenger trains should be thoroughly inspected for worn or damaged wheel parts that could ignite a grass fire.

It is recommended that educational materials on fire prevention be included with other informational material being distributed for viewing of the temporary work of art.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. No impacts to fire management are expected for the No Action alternative, except for loss of the potential benefits OTR could bring to coordination and response planning among agencies that are involved in fire management, through preparation of OTR emergency response plans.

5.5.8.3 Recommendations for Further Study

BLM's GIS data information for fire occurrence and fire management activities in the OTR area for the past five years is being tabulated (E. Skerjanec, Front Range Interagency Fire Staff, pers. comm.2006).

5.6 Aesthetic Resources

5.6.1 Air Quality

5.6.1.1 Affected Environment

This section describes the existing air quality of the project area as it relates to the National Ambient Air Quality Standards (NAAQS) for criteria pollutants as set by the US EPA. Documentation provided by the Colorado Department of Public Health and Environment (CDPHE) was reviewed for this assessment.

National Ambient Air Quality Standards

EPA has established NAAQS, in association with the Clean Air Act Amendments of 1990, for each of seven criteria pollutants to protect the public from health hazards associated with air pollution. These seven criteria pollutants are carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), reactive volatile organic compounds (VOCs), lead (Pb), particulate matter less than 10 micrometers in diameter (PM_{10}), and particulate matter less than 2.5 micrometers in diameter ($PM2_{2.5}$) (CDPHE 2005b). CDPHE is the agency with jurisdiction over monitoring the attainment of NAAQS for Colorado.

Three pollutants that have historically violated NAAQS in Colorado are CO, O_3, and PM_{10}. Of these three pollutants, only violations of particulate matter levels were of concern in the project area, all occurring before 1991 (CDPHE 1997-1998). Particulate matter is small solid or liquid particles emitted during combustion or from the grinding of materials. PM_{10} contributes to poor visibility and aggravates respiratory diseases. Sources of particulates include industrial processes, fuel combustion, erosion, and re-entrained dust. Table 5.6-1 presents the primary and secondary standards for this pollutant.

Table 5.6-1. Particulate Matter (PM_{10}) Standards

Standard	Duration	Concentration
Primary	Annual arithmetic mean	50 µg/m^3
Secondary	24 hour*	150 µg/m^3

*The statistically estimated number of days per year with a concentration above this level is not to be greater than one, averaged over a 3-year period.
Source: Colorado Department of Public Health and Environment (CDPHE), Colorado 2005 Air Quality Data Report (CDPHE 2005b)

The primary standard is a "health effects standard." This standard is set at the level to protect the health of the most susceptible individuals in the population: the very young, the very old, and those with respiratory problems. The EPA has designed the secondary standard to protect public welfare. This is the

"quality of life standard." These standards are expressed in concentration and duration of exposure (CDPHE 2005b).

Regional Haze

Regional haze is a term for the veil of white or brown haze that obstructs vistas. The haze is caused by fine particles, including sulfates, carbon, soils, and nitrates. Power plants, industrial sources, motor vehicles, fires, and windblown dust and dirt produce these particles. The particles are carried by the wind, sometimes for hundreds or even thousands of miles. In some scenic areas, the visual range has been reduced substantially by air pollution. The Colorado Air Quality Control Commission adopted a planning process in 2004 to meet the requirements of the 1999 federal Regional Haze Rule. In response, the Air Pollution Control Division is developing a Regional Haze State Implementation Plan to meet the EPA's 2008 deadline (CDPHE 2002, 2005c). The process requires a detailed analysis of regional haze for the 12 wilderness areas and national parks in Colorado that have been designated Class I for visibility protection by EPA. None of these 12 wilderness areas is in or immediately adjacent to the project area.

Colorado Air Quality Regions

Colorado is divided into six air quality regions. The Colorado air quality region that encompasses the study area for the Proposed Action is the Western Slope Region. The Western Slope Region includes 31 counties. Although the region is primarily rural, it also includes several urbanized areas such as Grand Junction and Cañon City. The sources of air pollution found in this region are common in rural areas and include dust from unpaved roads, erosion, motor vehicle emissions, and wood burning. Fugitive dust/particulate matter is a major source of air pollution in the Western Slope Region. However, since 1988, the paving of previously unpaved roads has notably decreased fugitive dust in this region, and ongoing efforts continue to be directed at the pavement of more roadways (CDPHE 1997-1998).

The Western Slope Region is in attainment of all NAAQS (CDPHE 2005b). There were no violations of national or state air quality standards anywhere in the state in 2005. Past violations of the NAAQS for PM_{10} occurred in the region before 1991 for Cañon City. However, EPA redesignated Cañon City as an attainment area for PM_{10} in 2001. The CDPHE currently has no specific air quality concerns for this region.

Air Quality Monitoring

The project area is within Chaffee County and Fremont County. There is no ongoing air quality monitoring in Chaffee County. For Fremont County, the closest operating monitoring station is in Cañon City, at 7th Avenue and Macon Street, which is approximately 15 miles from the eastern project terminus at Parkdale. The station was installed to detect PM_{10} concentrations only (CDPHE 1996). Recent analysis of monitoring data from Cañon City indicated that PM_{10} concentrations were within the NAAQS (CDPHE 2005b) and no violations were recorded for both 24-hour periods and annual averages.

Summary of Area Conditions

Climate

Wind patterns and localized climatic conditions control the means by which air pollutants are dispersed. The generalized wind conditions in the project area include prevailing upper-level winds from the southwest. Localized wind patterns, however, are influenced by the varying groundcover and diverse terrain in the Arkansas River Valley. Upslope winds usually occur on sunny mornings when the air at higher elevations heats rapidly and rises. Downslope winds occur when the air near the ground cools, becomes dense, and sinks along the drainage. Similar light winds occur during the day along the Arkansas River.

Occasional thermal inversions—where warmer air becomes trapped beneath a boundary layer of cooler air—occur in the Arkansas River Valley when winds are weak and local. Under these conditions, less air

is mixing to dilute air pollutants. Thermal inversions are common during fall and winter when wind speeds are low and mixing is limited. However, moderate summer inversions are typical during the evening and dissipate at dawn (winter inversions are stronger and last longer) (BLM 1995).

Air Pollutants

The dry climate in the OTR area is a factor contributing to PM_{10} emissions from windblown dust. Wood burning and re-entrained dust from highway and street sand also contribute to PM_{10} emissions during the winter. According to 2002 emission inventories for Chaffee and Fremont counties (CDPHE 2005b), highway vehicles produce 20 percent and 30 percent of the CO in those counties, respectively, 50 percent and 24 percent of the NO_2, 1 percent and 1 percent of the PM_{10}, and 11 percent and 2 percent of the SO_2.

5.6.1.2 Impact and Mitigation Issues

Proposed Action

The three phases of the Proposed Action would have localized and temporary impacts on air quality in the project area: installation, viewing, and removal.

Installation

Heavy equipment, including flatbed trucks, flatbed rail cars, drill rigs, and a crane, would be used to install anchors. Five flatbed trucks, two coordination vans, one rail vehicle, line guns, and rafts or boats would be used to install cables and fabric panels.

Equipment used for installing OTR (and for removing it) would add minor amounts of emissions to the air and is not considered an appreciable contributor to air quality degradation. These activities would be similar in the amount of emissions to equipment that is routinely used for maintenance on the highway or used previously to maintain the railroad. In addition to emissions from construction equipment and vehicles, windblown dust is also a factor due to the generally dry conditions. Dust can be generated from installation activities involving disturbance to vegetation (exposure of soil) by construction vehicles accessing areas and during installation of anchors.

Because of the proximity of the Parkdale Area to Parkdale Siding, this small community would be most affected by the limited air quality effects from project installation activities. The other project areas are significantly outside community areas. Roadside parks would be temporarily affected by the limited air quality impacts from project installation activities associated with the Texas Creek and Maytag areas.

Viewing

The viewing period is proposed to take place over a two-week period in August. Visitation estimates (Appendix J2.1.2. Visitation Analysis) and a Traffic Operations Analysis (Appendix J2.1.4) were completed for the project area. The analysis (see Section 5.7.1, Transportation and Access, for more discussion) included data for existing traffic conditions as well as predictions for traffic conditions during the OTR viewing period. According to the study, several thousands of additional vehicles are expected to visit the temporary work of art. Because OTR viewing would require natural lighting, sightseeing traffic would be limited to daylight hours (although additional viewers may use their vehicles to attempt to view the work of art at night, especially if a full moon is present). In addition, tour buses may be used to decrease congestion and offer a better viewing experience, buses may be used for transportation of project monitors, and vans may be required to transport project coordinators.

It is possible that the increase in traffic may temporarily decrease air quality during the proposed 14-day period of OTR viewing. This decrease would result from increased vehicular emissions in stop-and-go traffic and from vehicle sources of particulate emissions, including tailpipe exhaust and brake and tire wear. CO emissions are influenced by speed and traffic congestion and are highest at both high, free-flow speeds (60 to 70 mph) and low, congested speeds (15 to 20 mph). It is expected that traffic volumes would peak during weekends and decreases in air quality would be most pronounced during these periods. The roadway level of service (LOS) provides an indication of problem areas where there might be stop-

and-go traffic and, consequently, areas of high vehicle emissions. LOS designations of D, E, and F (in decreasing quality of roadway service) are indications that roadways areas are experiencing congestion issues.

According to the Traffic Operations Analysis, existing roadway segment conditions on US 50 do not show peak traffic on either weekdays or weekends to be worse than LOS C, with one exception of LOS D during weekend middays east of the intersection with CR-3A (Royal Gorge to Cañon City). Existing US 50 intersections do not show peak traffic on either weekdays or weekends to be worse than LOS C, with two exceptions: weekday PM eastbound traffic at SH 115 (movement toward Colorado Springs east of Cañon City) and weekend midday traffic at CR-3A (Royal Gorge).

Roadway segment LOS is expected to decrease by at least one level of service across US 50 during the project viewing period on both weekdays and weekends. All segments would experience LOS C and many would be subject to LOS D. Weekend midday traffic is rated LOS E for five segments: east of CR-1A (Cotopaxi), east of SH 69 (Texas Creek), east of SH 9 (east of Parkdale), west of CR-3A (Royal Gorge), and east of CR-3A. Peak midday weekend traffic at three intersections is expected to experience LOS F. These intersections are CR-1A (Cotopaxi), SH 9 (east of Parkdale), and CR-3A (Royal Gorge).

Because of the temporary nature of OTR and because the area is currently in attainment of all air quality standards, air quality modeling studies for determining impacts were not deemed necessary. The viewing period of two weeks (two weekends, 14 days total) would temporarily cause increased vehicle emissions along segments and intersections of US 50. Increased CO emissions would be expected to occur in areas of decreased LOS as identified above. Direct vehicle sources of particulate emissions and windblown dust are also expected to increase. Windblown dust is a factor due to the area's dry conditions and could result from increased road pulloffs and increased pedestrian/hiking activities during OTR viewing. River valley wind conditions, however, are expected to disperse air pollutants, and traffic mitigation measures (including traffic control plans) are expected to minimize traffic flow problems. In addition, trends for tailpipe emissions of particulates and other pollutants show steady decreases because of stricter standards on vehicle emissions and the lower sulfur content of diesel fuel. Any effects on air quality would be temporary because the viewing period is only two weeks and long-term air quality effects would not occur. The Proposed Action would not affect area air quality and would not result in exceedance of air quality standards.

In summary, emission increases that include CO, O_3, and PM_{10} are expected to be temporary (limited to the two-week viewing period) and would be dispersed by any up-valley or down-valley air movements (winds) that frequent the project corridor during the summer, thereby reducing the potential for buildup of levels greater than the NAAQ standards.

Removal

Heavy equipment, including flatbed trucks, flatbed rail cars, and support vehicles, would be used to remove the panels. Cables would be removed using flatbed trucks, a rail vehicle, winches, line guns, and rafts or boats. The anchors would be removed using 2 flatbed trucks, a flatbed rail car, and drill rigs.

Equipment used for removal would add minor amounts of emissions to the air and is not considered an appreciable contributor to air quality degradation. (See discussion under Installation above for description of effects.)

Mitigation

Because the proposed temporary work of art is not anticipated to cause or result in violations of any NAAQS, mitigation measures for air quality would center on controlling fugitive dust during installation, viewing, and removal and may include some of the following:

- Require OTR workers to minimize trampling vegetation and "all other ground habitat" during all phases.

- Provide a bond to ensure proper restoration of all vegetation.
- Control fugitive dust through a fugitive dust control plan, including wetting any disturbed areas during installation and removal phases.
- Minimize off-site tracking of mud and debris during installation and removal phases by washing construction equipment and providing temporary ground stabilization.
- Reduce emissions (related traffic congestion) by routing and scheduling construction trucks so as to reduce delays to traffic during peak travel times.
- Require appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel to reduce CO and NO_2 emissions in vehicular exhaust.
- Use the cleanest fuels available for construction equipment and other project vehicles to reduce exhaust emissions.
- Maintain construction equipment to ensure the exhaust systems are in good working order.

Mitigation measures to reduce effects on air quality from increased traffic are addressed in Section 5.7.1, Transportation and Access. Reducing the number of individual vehicles by planning for and encouraging the use of mass transit during viewing and reducing the stop-and-go traffic patterns as much as possible are key mitigation measures to reduce air quality impacts. Creating and implementing an effective traffic management plan would limit congestion during all phases and decrease CO emissions.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. If the No Action alternative is selected, the area would still experience some limited increase in traffic, based on general trends of increasing traffic on US 50 over the years. However, the No Action alternative is not expected to adversely affect air quality or cause any exceedance of air quality standards.

5.6.1.3 Recommendations for Further Study

No further analysis is needed for reviewing impacts from the Proposed Action and No Action alternative.

5.6.2 Noise

5.6.2.1 Affected Environment

This section describes the general noise sources and levels associated with the Proposed Action. Because traffic is the main noise source, US DOT, FHWA, and CDOT guidance for noise studies and noise abatement were used for this assessment.

Noise Terminology

Sound is quantified using a logarithmic unit called a decibel (dB). Because the human ear is more sensitive to middle and high frequency sounds than it is to low frequency sounds, sound levels are often weighted to more closely reflect human perceptions. This type of weighting is called “A weighting,” and is expressed as dB(A), which corresponds to the threshold of hearing.

Although a human ear can detect a sound level change as small as 1 dB, 3 dB is considered the smallest noticeable change for a time-varying source. An increase, or decrease, of 10 dB is perceived by most people to be a doubling, or halving, of the loudness of sound. Noise is often defined as “unwanted sound.” Sounds are described as noise if they interfere with an activity or disturb the person hearing them. Sound levels fluctuate with time depending on the sound source audible at a specific location. Additionally, the degree of annoyance associated with certain sounds can vary by time of day, depending on other sound sources affecting a receiver and the activities of the receiver. For example, the interruption of sleep can be very annoying. For these reasons, sound levels are usually reported using statistical or mathematical descriptors of the time history of sound.

Table 5.6-2 presents examples of noise levels common to everyday activities using the dB(A) scale.

Table 5.6-2. Noise Levels for Specific Activities

Sound Level [dB(A)]	Type of Noise
110	Rock band
105	Jet flyover at 1,000 feet
95	Gas lawn mower at 3 feet
85	Diesel truck at 50 feet
80	Same truck at 110 feet
70	Gas lawn mower at 100 feet
65	Normal speech at 3 feet
50	Birds chirping
40	Leaves rustling
30	Very soft quiet whisper
0	Threshold of hearing

Source: US Department of Transportation 1980.

Noise Abatement Criteria

The FHWA procedures for highway traffic noise analysis and abatement for federal-aid highway projects are contained in 23 CFR Part 772. CDOT is responsible for interpretation of this guidance within the state. See Table 5.6-3 for FHWA/CDOT noise abatement criteria (NAC). The criteria are used to identify noise levels at which noise abatement should be considered for general land use activities. To describe or measure the noise levels, $L_{eq}(h)$ is used. The $L_{eq}(h)$ is the equivalent steady-state sound level, which for one hour contains the same acoustic energy as the time-varying sound level during that same time period (US Department of Transportation et al. 1995).

Table 5.6-3. FHWA Noise Abatement Criteria

Land Use Activity Category	$L_{eq}(h)$ dB(A)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	No limit	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: CDOT 1995.

Summary of Area Conditions

The corridor of the Proposed Action is located within a river canyon, with a highway along the river. The roadway traffic is the main source of noise in the corridor, along with the sound of moving water near the river. Land uses within the corridor are predominantly recreation, open space, and residential. There are two small communities in the OTR area—Coaldale and Cotopaxi—as well as smaller unincorporated named enclaves (residential and/or commercial buildings) along the corridor, including Cleora, Wellsville, Swissvale, Howard, Vallie, Texas Creek, Echo, Spike Buck, Parkdale Siding, and Parkdale. The larger communities of Salida and Cañon City form more general west and east boundaries for the corridor.

Noise receptors in the OTR corridor include residents of and visitors to the corridor communities and persons participating in Arkansas River Valley recreational activities, including fishing, rafting, kayaking, hiking, and sightseeing. The project corridor is most representative of land use category B related to FHWA/CDOT noise abatement criteria (see Table 5.6-3). General noise levels are likely to be represented by the descriptions in Table 5.6-3. The proposed work of art would cause only temporary effects on area noise and a noise analysis is not generally considered necessary for such work (CDOT 2006b).

Anchor Test Noise Study

Background noise levels and those from drilling operations associated with proposed anchor installation for the temporary work of art were measured during anchor testing on June 24, 2006. The full report is provided in Appendix H, Noise Measurement Report. As shown in Map 5.6-1, Noise Monitoring, Parkdale Area Map, the test was located in the Parkdale Area along the Arkansas River. Two types of drills were used based on the geological materials where the anchors would be installed. Noise measurements were taken during the drilling operations at specific distances from the drilling and associated compressor equipment as well as at different representative background locations, including near the river and near US 50. Noise levels were also recorded for a nearby gravel pit operation.

Map 5.6-1 displays noise levels and shows the locations of the equipment and in relation to the noise meter distances. The noise study indicated that the drilling noise would be audible at distances of at least 1,000 feet and would be audible along the river within about 300 feet of the drilling operation. It is expected that drilling along the US 50 side of river would be audible to persons traveling in vehicles. When drilling is occurring on the other side of the river, however, people in vehicles would likely not notice the noise from drilling above the traffic noise. Gravel pit noise levels (measured at the property line) were 47 to 48 dBA. It is not known if the pit was in full operation, though some activity was audible. The maximum drill noise levels measured along the river range from 80 to 90 dBA.

5.6.2.2 Impact and Mitigation Issues

Proposed Action

There would be localized and temporary noise impacts during the three phases of activity: installation, viewing, and removal.

Installation

Heavy equipment, including flatbed trucks, flatbed rail cars, drill rigs, and a crane, would be used to install anchors, cables, and fabric panels.

Installation activities would have localized noise impacts on resident and recreation users near and within OTR areas. Because of the proximity of the Parkdale Area to Parkdale Siding, this small enclave would be most affected by removal activities. The other OTR areas are in areas significantly outside community areas. A map layer for residential buildings (rural housing footprints) was obtained from BLM. These building footprints were mapped for areas within 1,500 feet of the panel areas to account for the estimated audible construction noise within 1,000 feet of the noise source. Four residential footprints are located within 1,500 feet of the panels northwest of the Vallie Bridge Area along the southern river valley (see

Map 5.6-2, Noise Monitoring, Vallie Bridge Area Map). Other residential footprints are shown east of the Vallie Bridge Area within a northern river terrace area at a distance greater than 1,500 feet from the panels. Two residential footprints are located within 1,500 feet of the fabric panels east of the Parkdale Area along the southern river valley. Other residential footprints are shown farther south of these footprints at a distance greater than 1,500 feet from the fabric panels. Since the train track would be used for installation activities, there would be some noise from the small train engine that would be used to transport project materials and equipment. Such noise is expected to be intermittent and would not affect any specific area for a prolonged period.

The training and staging areas near Texas Creek (see Map 5.6-3, Noise Monitoring, Texas Creek Staging Area Map) would be the hub of activity during all phases. As such, this area would be a general noise source (additional traffic and persons involved in OTR) for the surrounding area that is not currently present. However, these activities are not expected to generate noise levels that would be objectionable to area residents or recreational users.

According to Colorado statutory authority (25-12-103), construction projects are limited to a maximum noise level of 80 dBA between 7 AM and 7 PM. Noise is limited to 90 dBA for 15 minutes during a 1-hour period between these times. Since drill noise measurements indicated maximum levels in the range of 80 to 90 dBA, mitigation measures would be used to lower audible noise from the drilling operations.

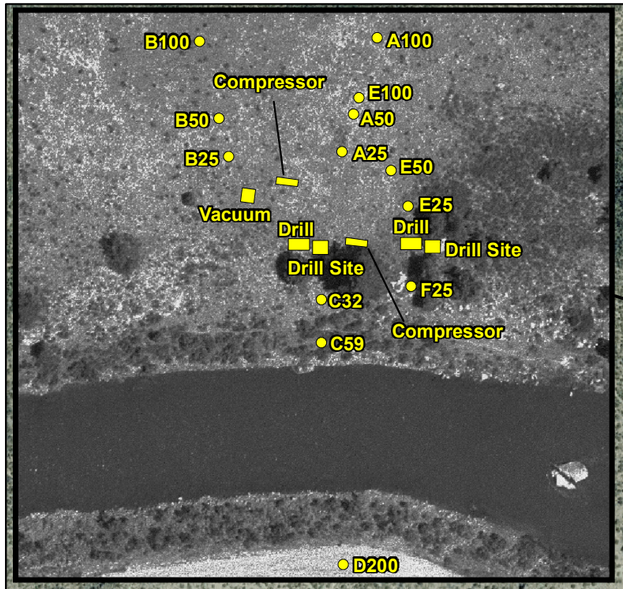
Viewing

The viewing period would take place over a two-week period. This period would involve a temporary increase in traffic (see Appendix J2.1.4, Traffic Operations Analysis, for further information on traffic projections). In addition, tour buses might be used to transport visitors, buses would be used for transportation of monitors, and vans would be required to transport coordinators. Decreased speeds are generally associated with decreased highway noise. Because of the increased traffic as well as vehicles slowing to view the work of art, it is expected that traffic speeds would generally be decreased and as a result highway noise would also be lower than normally occurs in the corridor. In addition, semi-truck traffic might divert to alternate routes during the viewing period, also resulting in a decrease in highway noise. Because viewing requires natural lighting, sight-seeing traffic would be concentrated in daylight hours (and some might occur at night, especially if there is a full moon).

There is also the possibility that the Royal Gorge Route tourist train could use some of the tracks for viewing and this would be another source of noise for certain periods of the day when the train is approaching and leaving the canyon.

As discussed previously, studies have shown that changes in noise levels of 3 dB or less are not normally detectable by the average human ear. An increase of 5 dB is generally readily noticeable by most people, and a 10 dB increase is usually felt to be “twice as loud” as before. Based on numerous studies, a doubling of traffic would result in a 3 dB increase in noise levels (not normally perceivable) and traffic would need to increase at least three times that much in order to result in a readily perceivable (5 dB) increase in noise (CDOT 2006b). During the viewing period, traffic is expected to temporarily increase (during the two-week viewing period) by 120 percent during the weekday and by 155 percent during the weekend. This constitutes a doubling of traffic, but does not equal three times the amount of traffic. Therefore, traffic noise levels are not expected to increase at readily perceivable levels than exists currently.

Parkdale Area Map 1 0f 1



DRILL TYPE - VERTICAL DRILLING (dBA)		
Location	Klemm	TEI
A25	72.3	74.8
A50	68.1	70.3
A100	65.9	66.6
B25	77.6	69.8
B50	72.2	66.7
B100	66.1	62.1
C32	90.2	85.7
C59	80.9	80.1
D200	no data	65.2

TEI DRILL - DRILLING DIRECTION (dBA)		
Location	Vertical Drilling	Horizontal Drilling
E25	74.8	85.0
E50	70.3	78.8
E100	66.6	72.7
F25	87.8	93.0
D200	65.2	64.0

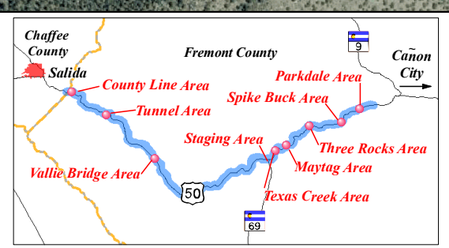
Calm River Background
265.6
265.7
265.8
265.9
266
Highway Background
D1100
265.5
265.4
265.3
265.2
265.1
Rapid River Background
265
264.9
264.8
264.7
264.6
264.5

LEGEND

- Panel Cables
- Panel Location
- US Highway 50 Mile Posts
- Building Inside 1500 feet of Panel Locations Or Staging Areas
- Building Outside 1500 feet of Panel Locations Or Staging Areas
- Texas Creek Staging Areas
- Noise Measurement Locations

N
W E
S
0 650 Feet

SCALE - 1:7,800 or 1" = 650'



SOURCE - 2005 1 meter pixel resolution aerial photography provided by USGS. Panel locations, panel cables and mile posts provided by Golder and Associates. Building data provided by BLM.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.6-1. Noise Monitoring, Parkdale Area

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\Noise_11x17_Parkdale_061128.mxd)
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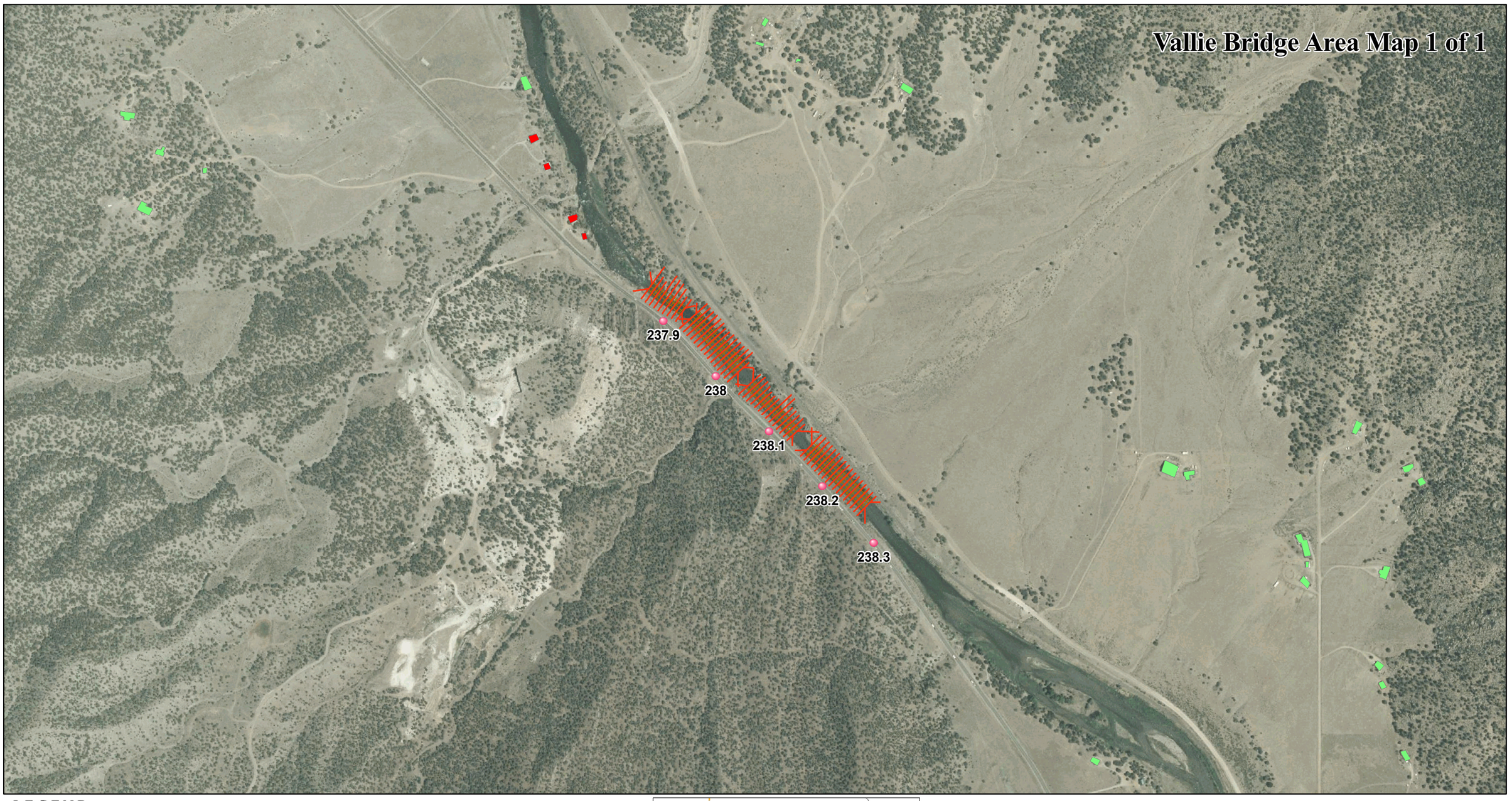
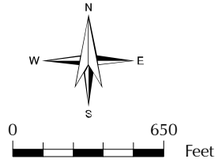
Vallie Bridge Area Map 1 of 1

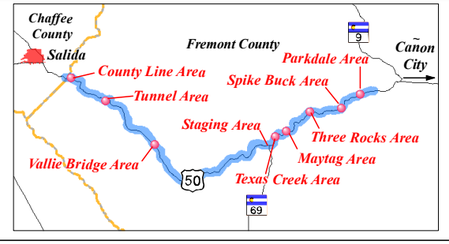


LEGEND

- Panel Cables
- Panel Location
- US Highway 50 Mile Posts
- Building Inside 1500 feet of Panel Locations Or Staging Areas
- Building Outside 1500 feet of Panel Locations Or Staging Areas
- Texas Creek Staging Areas



SCALE - 1:7,800 or 1" = 650'



SOURCE - 2005 1 meter pixel resolution aerial photography provided by USGS. Panel locations, panel cables and mile posts provided by Golder and Associates. Building data provided by BLM.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER
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Map 5.6-2. Noise Monitoring, Vallie Bridge Area

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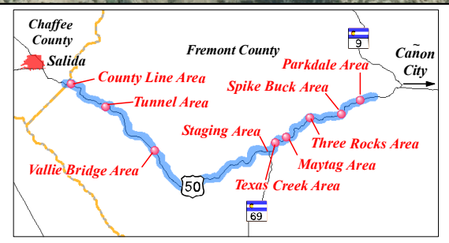
LEGEND

- Panel Cables
- Panel Location
- US Highway 50 Mile Posts
- Building Inside 1500 feet of Panel Locations Or Staging Areas
- Building Outside 1500 feet of Panel Locations Or Staging Areas
- Texas Creek Staging Areas

N
W E
S

0 650 Feet

SCALE - 1:7,800 or 1" = 650'



SOURCE - 2005 1 meter pixel resolution aerial photography provided by USGS. Panel locations, panel cables and mile posts provided by Golder and Associates. Building data provided by BLM.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.6-3. Noise Monitoring, Texas Creek Area

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Removal

Heavy equipment, including flatbed trucks, a flatbed rail car, and support vehicles, would be used to remove the panels immediately following the viewing period. Cables would be removed soon after panel removal using flatbed trucks, a rail vehicle, winches, line guns, and rafts or boats. Within 2 to 3 months of the end of the viewing period, the anchors would be removed using flatbed trucks, a flatbed rail car, and three drill rigs. Project removal activities would have localized noise impacts on residences, enclaves, and communities near and within project segments. Because of the proximity of the Parkdale Area to Parkdale Siding, this small enclave would be most affected by removal activities. The other project areas are in areas significantly outside community areas.

Since the train track would be used for removal activities, there would be some noise from the small train engine that would be used to transport materials and equipment. Such noise is expected to be intermittent and would not affect any specific area for a prolonged period.

Mitigation

For the Proposed Action, installation and removal activities would be performed only during daylight hours, when occasional loud noises are more tolerable. No one receptor would be expected to be exposed to construction noise of long duration; therefore, extended disruption of normal activities is not anticipated. Provisions would be included in the plans and specifications, however, requiring the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and maintenance of muffler systems. Noise mitigation of drilling operations would include the use of acoustical shrouds around the drill or entire operation, mufflers, and quieter backup alarms. These measures would significantly reduce audible noise to people using the river for recreation, people at nearby residences or commercial operations, and area wildlife. Increased sightseeing traffic is expected primarily during daylight hours, when increased noise is generally more tolerable. (There may be some nighttime traffic if there is a full moon. Also, some of the semi-trucks may schedule nighttime trips through the canyon to avoid the daytime traffic.) Increased traffic noise during the two-week viewing period could be limited through the use of traffic mitigation measures and through encouraged use of transit and carpooling for sight-seeing activities (see Section 5.7.1, Transportation and Access, and Appendix J2.1.3, Transportation Alternatives, for further information on the potential use of transit).

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would have no impacts on area noise levels.

5.6.2.3 Recommendations for Further Study

Noise Mitigation during Anchor Installation

It is recommended that further study of the means by which noise could be reduced during drilling operations be performed. This might include providing more specifications on methods that would be used to reduce noise, or performance of noise-level measurements when such methods are in place.

Texas Creek Training and Staging Area

Activities to be performed at the Texas Creek training and staging area should be more fully examined so that a more thorough analysis of possible noise effects can be conducted.

Night Work and Viewing

Depending on the timing of the viewing period (possible full-moon conditions), night traffic and other disruptions could cause additional noise in the OTR corridor. Possible nighttime viewing should be further considered. Installation and removal activities could also take place during the night (see Chapter 4, Section 4.3.5, Alternative D: Alternate Timing of Installation Activities). If such activities

were to occur during the night, evaluation of such activities and impacts on area residents and wildlife would be necessary.

5.6.3 Visual Resources

This section addresses the BLM Visual Resource Management (VRM) program.

5.6.3.1 BLM VRM Classifications

BLM uses VRM classifications to describe the different degrees of modification allowed to the basic elements of the landscape. These classifications are derived from overlaying maps of scenic quality, visual sensitivity levels, and distance zones.

- **Scenic quality** can be described as the overall impression retained after passing through the area (driving, rafting, or walking through). Scenic quality is based on a point system, with the highest number of points for areas with the most outstanding characteristics and fewer points for features that are fairly common to the physiographic landscape. Criteria include landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.
- **Visual sensitivity levels** are determined based on volume of travel through the area and public reaction (a subjective dimension). These are ranked as high, medium, and low for each of the levels.
- **Distance zones** play a key role in visual quality management based on the visibility from major viewing routes and key observation points. Three basic zones are foreground/middle ground, background, and seldom seen.

Each VRM class describes a different degree of acceptable modification in basic elements (form, line, color, and texture) of the landscape. These classes are the basis for determining whether or not a modification would result in a visual impact and, if so, what appropriate mitigation measures would be required. There are four classes:

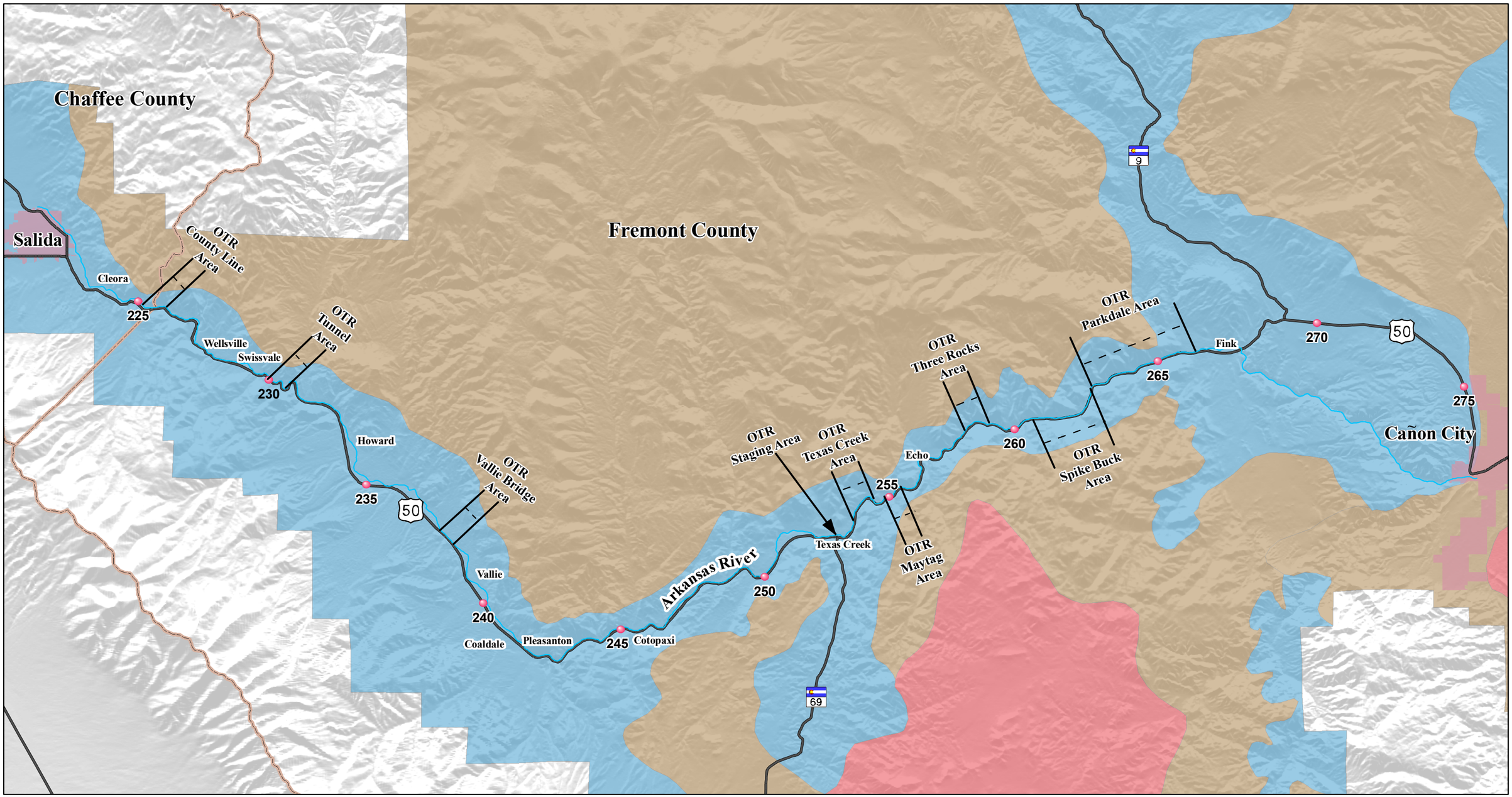
- **Class I.** Natural ecological changes and very limited management activity are allowed. This classification is applied to wilderness areas, wild and scenic rivers, and other similar situations.
- **Class II.** Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape. Contrasts are seen, but must not attract attention.
- **Class III.** Contrasts to the basic elements caused by a management activity are evident, but should remain subordinate to the existing landscape.
- **Class IV.** Any contrast attracts attention and is a dominant feature of the landscape in terms of scale, but it should repeat the form, line, color, and texture of the characteristic landscape.

Proposed Action

Most of the OTR areas have a VRM Class II inventory rating, as seen in Map 5.6-4, BLM Visual Resource Management (VRM) Classifications. Class II zones require that any changes in the basic elements not be evident in the landscape. Contrasts may be seen but must not attract attention. Some of the areas that will be impacted by OTR are located on lands not under BLM management and have not been inventoried. These areas may or may not be Class II.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not have any long term impacts to visual resources. If the No Action alternative is selected, temporary negative impacts, such as unsightly installation activities, will not take place. However, a public work of art is a visual resource and the No Action alternative would mean that the temporary, beneficial impacts of having OTR installed in the community would not be realized.



LEGEND

- Cities
- Counties
- US Highway 50 Mile Posts
- Highways

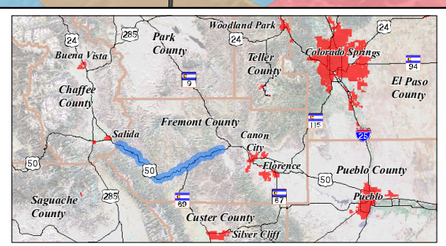
BLM Visual Classificaiton

- Class II
- Class III
- Class IV

N W E S

0 2.68 Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. Visual classification data provided by BLM. Jurisdiction information provided by CDOT.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.6-4. BLM Visual Resource Management (VRM) Classification

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5.6.3.2 Recommendations for Further Study

It is acknowledged that the intent of the OTR project is a temporary display of artwork. The visual resource analysis for the Draft EIS should focus on the temporary visual implications that installation, display, and removal of the artwork would have on the landscape. If the BLM deems it necessary, a full visual inventory of the project area based on the OTR Operations Plans would be needed. This inventory should consider existing visual characteristics of each area contrasted with the Proposed Action and alternate actions. However, the temporary nature of the impacts might not deem necessary such an inventory.

5.7 Social Resources

5.7.1 Transportation and Access

Transportation issues, including access to private property and emergency response times, are perhaps the greatest concern expressed by stakeholders. OTR is expected to draw considerable numbers of viewers during a two-week period, taxing the capacity of US 50 and other area roadways. The following section examines existing travel patterns along US 50. Next, the magnitude of potential impacts on traffic movement is described, and some potential mitigation measures are summarized.

5.7.1.1 Affected Environment

This description of existing traffic conditions within the project area includes traffic counts, accident rates, and roadway users. Data provided by CDOT—average daily traffic (ADT) counts and accident rate information—were reviewed and evaluated to determine the level of service and the level of safety currently provided by the area's roadways.

Existing Roadway Characteristics

US 50 would be the principal travelway for access and viewing the proposed temporary work of art. US 50 is a two-lane, nondivided, transcontinental highway. The highway is considered a principal arterial roadway by CDOT, the agency with jurisdiction over federally funded and state-funded roadway construction and maintenance projects within Colorado, and it is included in the National Highway System (NHS). It is an asphalt paved road. Lane widths are typically 12 feet in the OTR corridor, while shoulder widths vary from 3 to 8 feet, with wider shoulders more common in Chaffee County.

In the OTR area, the highway is adjacent to the Arkansas River and is situated within a canyon. Passing lanes—in four westbound sections and one eastbound section—are provided in selected locations where the mountainous terrain does not provide sufficient sight distance for passing in the opposing traffic lane. Auxiliary or turning lanes are provided at selected access points to minimize conflicts between turning and through traffic.

The principal access roadways to the OTR artwork corridor are three basic road types as defined by CDOT (Map 5.7-1, Highways near the OTR Artwork Corridor).

1. Four-lane interstate (I-25).
2. Two-lane roads with centerline stripes and shoulders delineated by edge stripes (principal arterials US 285 and US 50).
3. Two-lane roads with centerline stripes but often with narrow or no shoulders (minor arterials SH 115, 9, 69, and 291).

Roadway Users in the Project Area

Highway users of US 50 include truckers, local residents, recreationists, and interstate travelers. In addition, school bus and rafting operations use US 50 within the project area.

US 50 serves as a general traffic and truck route from I-25 to Cañon City and farther west to Salida, as well as across the length of Colorado. To the west of the project area, US 50 serves several recreational

Map 5.7-1. Highways near the OTR Artwork Corridor

destinations, including Monarch Pass, Crested Butte, and the Black Canyon of the Gunnison. The highway also provides a connection to US 285 at Poncha Springs, which provides access to the San Luis Valley and New Mexico to the south and to Buena Vista and several Colorado ski resorts to the north.

Many of the residents of towns and settlements in the area use US 50 to commute to Salida, Buena Vista, or Cañon City. In addition, local drivers use the highway to gain access to I-25 and US 285. The nearest major cities are Pueblo via US 50 and Colorado Springs via US 50 to SH 115.

Commercial rafting companies use US 50 as the route to drop off and retrieve rafts and passengers who float various segments of the Arkansas River during the summer. These companies generally use school buses for this purpose. July is the busiest month for commercial rafting in the project area. The busiest section of the river within the project area (Texas Creek–Parkdale) carried 185 commercial boats with 1,212 people in those boats on an average weekend day in July 1999. Assuming 50 people per bus and 4 bus trips per 50 people, there were approximately 100 rafting bus trips per day on the average weekend day in July 1999.

There are many recreation and fishing access points along the Arkansas River within the project area. Private motor vehicles use designated parking areas.

School buses use US 50 to pick up and drop off schoolchildren during the school year (September through June). Three school districts exist along US 50 within the project area: Salida School District R-32-J (which also serves western Fremont County), Cañon City Schools (Freemont RE-1 School District), and Fremont RE-3 School District at Cotopaxi. A total of 27 school bus routes use US 50 within the study area in the early morning (before 9:00 AM) and in the mid- to late afternoon hours (2:00 to 5:00 PM). There are 37 school bus stops between Salida and Cañon City on US 50. During their routes, school buses must cross the highway at specific locations to pick up children, because Colorado state law prohibits children from crossing the highway to meet the school bus (Cañon City Pierce School District,

pers. com. 2000; Fremont RE3 Ward School District, pers. com. 2000; Chaffee County McGinnis School District, pers. com. 2000).

Traffic Counts

Traffic data for 2005 were acquired from the CDOT website and agency contacts. Data provided included Annual Average Daily Traffic (AADT) counts, daily truck percentages for roadways within the project area, and accident data for US 50. Other traffic data are taken from the Traffic Operations Analysis report, which is included in Appendix J2.1.4. Data for the Traffic Operations Analysis report were collected by All Traffic Data (2002 and 2005) and Countermeasures (2002).

CDOT collects data on US 50 using road tube counters placed at various locations along the roadway. In general, CDOT does an actual count at each location once every three years. The data used in this evaluation were taken from both the CDOT traffic database and actual 24-hour road tube counts provided by CDOT. The 24-hour counts list data by day of week and hour of day. Another method used by CDOT to gather data is the installation of an automatic traffic recording (ATR) station. These stations gather data about the roadway volumes 24 hours per day, 7 days per week, and can be used to determine seasonal variations and daily variations in traffic over a long period of time. There is one ATR station along US 50 near the project area, west of Coaldale.

Table 5.7-1 presents AADT data and the annual percentage of trucks on roadways in and near the OTR area.

Table 5.7-1. 2005 AADT and Annual Percentage of Trucks on Roads in and near OTR Area

Highway	Section	AADT Range	Truck Percentage Range
US 50	SH 9 to SH 291	3,000 to 4,400	7.7 to 15.6
US 285	SH 291 to US 24	4,300 to 6,900	7.6 to 11.9
SH 291	US 50 To US 285	3,100 to 5,100	3.5 to 7.3
SH 9	US 50 to US 24	670 to 1,600	3.7 to 5.5

Source: 2005 CDOT traffic data.

Within the corridor, traffic volumes are greatest in the Parkdale area west of the intersection with SH 9, as shown in Table 5.7-2. A smaller increase in traffic volume occurs near Cotopaxi, at the intersection with Fremont County Road (FCR) 1A. Higher volumes occur on US 50 east of the OTR corridor, within Cañon City and west of the Penrose interchange with SH 115.

Table 5.7-2. US 50 Peak Summer Weekend Traffic Volumes (2005)

Segment	Peak Summer Weekend Daily Traffic Volume
West of Coaldale	5,150
West of FCR 1A	6,350
East of FCR 1A	6,400
West of SH 69	5,250
East of SH 69	5,200
East of FCR 3	5,350
West of SH 9	7,550

Source: DEA (2006), from data collected by All Traffic Data Services (2005), CDOT (2005), and CounterMeasures (2002).

Detailed data on heavy vehicle traffic were acquired from CDOT for US 50 in the project area. Table 5.7-3 summarizes the truck traffic percentages in the project area by segment. In this table, other large vehicles such as recreational vehicles (RVs) and buses are included in the category of "trucks."

Table 5.7-3. Annual Percentage of Truck Traffic on SH 50 in the Project Area

Segment	Truck %
SH 9 to FCR 3 (Parkdale)	12.3
FCR 3 (Parkdale) to SH 69 (Texas Creek)	15.6
SH 69 (Texas Creek) to FCR 1A (Cotopaxi)	13.5
FCR 1A (Cotopaxi) to FCR 4 (Howard)	7.7
FCR 4 (Howard) to SH 291 (Salida)	11.4

Source: 2005 CDOT Traffic Data.

Vehicle classification data taken in August 2002 by the permanent ATR west of Coaldale were used to calculate the vehicle mix shown in Table 5.7-4. Note that in Table 5.7-4 buses and recreational vehicles (RVs) are broken out separately from trucks. Further, four-tire trucks—for instance, some delivery vans—are shown with cars in Table 5.7-4.

Table 5.7-4. US 50 Vehicle Classification Data (August 2002), West of Coaldale

Vehicle Type or Class	Percent
Cars (a)	93.7
Motorcycles	0.9
Recreational vehicles (b)	1.1
Buses	0.3
Trucks	4.0
Total	**100.0**

Source: 2002 CDOT Traffic Data compiled by DEA (2006).
Notes: (a) Estimate includes four-tire trucks.
(b) Estimate based on single-unit truck data.

Travel Demand Overview

Traffic operations analyses for existing conditions were performed for US 50 in the project area. This area was defined as US 50 from SH 291 to SH 9. Traffic data provided by CDOT were used in these analyses. In addition to AADT, CDOT provided average daily traffic (ADT) data for specific locations within the area. The difference between AADT and ADT is important for the analysis of US 50 in this area. AADT represents the average volume on a roadway segment throughout the year. Because US 50 is a recreational corridor, traffic amounts vary substantially between months of the year and between days of the week. ADT reflects seasonal and day-of-week factors to provide more accurate information on possible traffic conditions during a specific period of interest. ADT volume information is the appropriate basis for an analysis of this area. ADT volume information for US 50 was developed using information from the ATR station west of Coaldale. Monthly ADT information is presented in Table 5.7-5.

Table 5.7-5. Monthly ADTs on US 50 from ATR West of Coaldale

Month	ADT	% of Yearly Traffic	Monthly Factor
January	2,140	5.91	0.71
February	2,296	6.34	0.76
March	2,620	7.23	0.87
April	2,452	6.77	0.81
May	3,233	8.93	1.07
June	3,886	10.73	1.29
July	4,618	12.75	1.53
August	3,934	10.86	1.30
September	3,376	9.32	1.12
October	2,793	7.71	0.93
November	2,436	6.73	0.81
December	2,438	6.73	0.81
Average	**3,019**	**8.33**	**1.00**
Total	**36,222**	**100.00**	**12.00**

Source: 2005 CDOT traffic data.

Based on these data it was determined that the busiest time of the year for ADT on US 50 in the project area is summer and the busiest summer month is July, followed by August and June. The period from July 14 through August 31, 2005, was used in the assessment of existing conditions because this part of the year is the most likely window when the temporary work of art would be viewed, and because it avoids considering the exceptionally high volumes associated with the Independence Day holiday.

Daily data were then analyzed to determine which days of the week in July and August are, on average, the busiest. The data are shown in Table 5.7-6.

Table 5.7-6. Daily ADTs on US 50 in Late July and August, West of Coaldale

Day	ADT	% of Weekly	Daily Factor
Monday	3,694	12.65	0.89
Tuesday	3,531	12.09	0.85
Wednesday	3,624	12.41	0.87
Thursday	3,999	13.69	0.96
Friday	4,829	16.53	1.16
Saturday	4,723	16.17	1.13
Sunday	4,813	16.47	1.15
Average	**4,173**	**14.29**	**1.00**
Total	**29,214**	**100.00**	**7.00**

Source: 2005 CDOT traffic data.

Based on these data it was determined that weekend days (including Fridays) are generally busier than weekdays in July and August for US 50 in the project area and the busiest day of the week, on average, is Friday. Friday volumes can exceed weekday ADTs by as much as 40 percent. Average traffic numbers for Friday were used in the existing conditions operational assessment.

Existing Traffic Operational Assessment

The existing operations of US 50 in the project area were determined by using the August weekend ADT data and the methodology outlined in the Highway Capacity Manual (TRB 2000). The quality of traffic operation is measured in terms of Level of Service (LOS). This concept stems from the presumption that delay is undesirable, and that delay on highway segments can be estimated for a given set of roadway environmental, traffic volume, and traffic control conditions. LOS designations range from A (ideal conditions, virtually no delay) to F (congested conditions, extremely high delay).

The HCM uses different methodologies for two-lane and multi-lane (that is, four or more lanes) highways. On two-lane roadways, passing a slower vehicle requires entering the oncoming traffic lane where it is safe and legal to do so. Therefore, the methodology for two-lane highways focuses on the percent of time spent following a slower vehicle as a key determinant of LOS. On a multi-lane highway, passing is possible in another traffic lane of the same direction. LOS for multi-lane facilities is determined by density, which is the number of vehicles per lane-mile.

CDOT considers LOS C or better, acceptable for rural highways. Peak hour information estimates for August weekends on US 50 in the project area were analyzed to determine the average travel speed, the percentage of time spent following, and density, which are the determinants of LOS. Table 5.7-7 shows the existing operations of US 50 in the project area during the peak hour on a weekend in August 2005.

Table 5.7-7. Speed, Percent Time Spent Following, and Density Estimates for US 50

August 2005 Weekend Midday Peak Hour			
Roadway Segment	**Average Travel Speed (mph)**	**Percent Time Spent Following**	**LOS**
West of Coaldale	51.5	52.5	C
West of FCR 1A	50.4	59.0	C
East of FCR 1A	50.5	58.5	C
West of SH 69	50.9	56.4	C
East of SH 69	50.8	57.4	C
East of FCR 3	50.8	57.0	C
West of SH 9	50.1	60.7	C
East of SH 9	48.7	67.1	D
West of FCR 3A	49.3	64.6	C
East of FCR 3A	46.6	74.3	D
		Density (pc/mi/ln)	
West of SH 115	59.5	6.9	A
East of SH 115	59.5	4.1	A

Source: DEA (2006)

All roadway segments operate at LOS D or better during the peak hour on an average weekend in August. The quality of traffic operations on all but two roadway segments is within the threshold (C) for rural roads acceptable to CDOT.

Traffic Accidents

In addition to traffic operations, safety statistics on US 50 in the project vicinity were reviewed for the last three years available, 2001 to 2003. The CDOT data are shown in Table 5.7-8. On US 50 between Salida and SH 115, there is a total accident rate of 1.87 accidents per million vehicle-miles traveled (acc/MVM), an injury accident rate of 0.64 acc/MVM, and a fatal accident rate of 2.58 acc/100 MVM. The statewide averages for a rural primary arterial are a total accident rate of 1.34 acc/MVM, an injury accident rate of 0.39 acc/MVM, and a fatal accident rate of 2.02 acc/100 MVM (CDOT 2003a). Within the project area, the accident rate on US 50 is generally greater than that of other similar rural routes in Colorado. More accidents of all severity levels occur west of SH 69, which is more developed and has fairly dense access spacing.

Table 5.7-8. Accident Rates along Segments of US 50 from I-25 to Salida (2001–2003)

Milepost	Highway Segment	PDO Accidents Acc/MVM	Injury Accidents Acc/MVM	Fatal Accidents Acc/100 MVM	Total Accidents Acc/MVM
222.2–253.0	Salida City Limits to SH 69	1.14	0.70	3.75	1.89
253.0–269.13	SH 69 to SH 9	0.71	0.52	1.69	1.25
269.13–276.74	SH 9 to Cañon City	0.72	0.25	5.69	1.02
276.74–290.5	Cañon City to SH 115	1.51	0.74	1.44	2.26
222.2–290.5	**Full US 50 Corridor**	**1.20**	**0.64**	**2.58**	**1.87**
	Statewide Average (Rural)	**0.93**	**0.39**	**2.02**	**1.34**

Source: CDOT 2003 compiled by DEA (2006).

Summary of Project Area Traffic Conditions

The following is a summary of the existing transportation conditions on US 50 in the project area:

- The corridor is used for local, regional, and interstate traffic, and accommodates a substantial amount of recreational traffic in the peak summer periods.
- Trucks account for approximately 10 to 15 percent of all traffic on US 50.
- Weekend days in the summer are the busiest times of year for traffic volumes on US 50.
- US 50 is experiencing accidents of all severity levels at greater rates than comparable rural highways statewide.

5.7.1.2 Impact and Mitigation Issues

Proposed Action

Installation

Impacts during most of the installation period would be limited to eight locations where lane closures are anticipated, as described in the Installation, Removal and Restoration Plan in Appendix J1. During periods of lane closure, traffic would use the remaining lane in alternating directions, controlled by flaggers in radio contact. Single-lane delays during installation activities are expected to last between 5 and 10 minutes.

Minimal viewing is anticipated during anchor installation when lane closures would be necessary. Likewise, cable installation is not anticipated to attract a significant number of viewers.

The final week or so before viewing, when fabric panels are installed and stretched over the Arkansas River, is likely to attract noticeable visitation. Assumptions about installation visitors include the following:

- Only people living within driving distance of OTR will consider viewing during installation (or removal). Those who fly to the area to view will time their journey to coincide with the formal viewing period.
- Installation (or removal) visitation will occur only when at least some fabric panels are visible and will be proportional to the number of panels completed.
- Installation (or removal) visitation will occur during daylight hours only (further analysis would need to address nighttime visitation which might occur especially if a full moon occurs during the viewing period).
- Viewers will see the panels only once during installation or removal, and only once during formal viewing, which creates a cap on the number of possible installation or removal viewers.
- Installation is completed on a Thursday so that the formal viewing period begins on Friday for weekend viewers.

Given these assumptions, about 90,000 viewers are expected during the last week of installation. Of these, about 19,000 would be expected on the final Thursday, or an average of about 1,600 per hour during 12 daylight hours. Assuming two visitors per vehicle, 600 vehicles would be associated with installation viewing. This amount of increased traffic can easily be accommodated by US 50 with little need for mitigation.

Impacts During Viewing

As described in the Event Management Plan in Appendix J2, the temporary work of art is expected to attract approximately 380,000 visitors during the 14-day viewing period, nationally and internationally. Under free-market conditions, transit is expected to attract about 10 percent of viewers. The remaining person-trips, however, at 2.5 persons per vehicle, will be sufficient to exceed the capacity of US 50 for about seven continuous hours of the day. Assuming that visitation is spread throughout the day in the same proportion as existing traffic during daylight hours of 8:00 AM to 7:59 PM, the peak hour (11:00 AM to noon) demand would be 1,600 vehicles westbound, which is well above the capacity of the westbound lane.

At this point, queuing would begin to occur and the travel time between Cañon City and Salida would approach 2 hours, creating incentives for drivers to travel at other times of the day, to cancel or combine trips, to travel with more occupants, or to switch to transit. For example, if the 16,300 weekend westbound vehicle trips were evenly spread throughout all 24 hours of the day, the hourly volume would be 680 vehicles, which would be within the capacity of the roadway. More realistically, the resulting distribution of vehicle trips would be at capacity for several hours during the day, with marginally increased volumes during inconvenient overnight hours. Note that unserved demand from one hour would be combined with the demand for the following hour, so that queues forming during periods when demand exceeds capacity would take some time to dissipate beyond when demand returns to below capacity.

Details of traffic operations during the formal viewing period are given in the Traffic Operations Analysis in Appendix J2.1.4, assuming a lower level of total visitation (250,000 visitors) but making other conservative assumptions (for example, that all westbound viewers will return along US 50 eastbound).

To achieve the manageable level of service described in the Traffic Operations Analysis Report, one or more of the following must occur:

- A greater transit share than the market-driven 10 percent is realized.
- Private vehicle occupancies greater than the assumed 2.5 persons per auto are realized.
- Visitation trips are spread over a longer time period than 12 hours per day.
- Local trips are rescheduled from peak visitation times.
- Visitation of less than 330,000 is realized since potential viewers choose not to travel because they do not wish to deal with expected congestion levels.

Impacts During Removal and Restoration

Traffic impacts during removal and restoration would be similar to those encountered during installation. Lane closures may be required as trucks carry away material used for the work of art to be recycled. Similar mitigation techniques as were applied during installation would be used when removal and restoration necessitate lane closures. Small amounts of curious viewers may add to traffic volumes, but would not noticeably affect traffic operations.

Mitigation

The number of expected OTR viewers indicates that some—if not several—forms of travel mitigation would be necessary. However, because of uncertainties in the visitation estimate, and limited ability to coordinate with agencies regarding what techniques may or may not meet policy guidelines, mitigation techniques are discussed in this Report from a "toolbox" approach. That is, many mitigation techniques are described, and selection of the appropriate combination of techniques is needed. Just as a toolbox might contain a set of wrenches, only one would be suitably sized to turn a particular bolt, so the mitigation toolbox described here contains a number of techniques that must be selected in response to the identified situations.

Individual mitigation "tools" were chosen based on recommendations found in FHWA's *Managing Travel for Planned Special Events* (2003) and CDOT's *Guidelines for Developing Traffic Incident Management Plans for Work Zones* (2003b). Mitigation measures were packaged into transportation-related alternatives for use in this Report. Presentation of transportation alternatives in this Report is not meant to limit or restrict what packages of transportation actions may be applied together.

Potential mitigation measures can be classified into two larger groups, indicating whether the measure primarily involves traffic operations (supply-side) or travel demand modification. Traffic operations tools can further be classified as those affecting the physical roadway or those having purely operational aspects.

Traffic Operations Measures

Examples of traffic operation mitigation measures that affect the physical roadway are signing and striping, closure of turnouts and pullouts, installation of median rumble strips (for safety, to alert a driver that he or she has veered out of the driving lane), and installation of temporary traffic lights. Converting US 50 to one-way westbound flow for better viewing of OTR is one option that would require considerable signing and restriping to indicate the new traffic flow pattern.

Examples of purely operational mitigation measures include manual intersection control by traffic or law enforcement officers, use of flaggers to control traffic at lane closures, use of pilot cars, and restrictions against making certain turning movements—such as left or U-turns—during the viewing period. (However, the restrictions would need to be indicated with appropriate signage.)

In general, traffic should be kept moving smoothly. For those points where views of OTR are especially clear or panoramic, the tendency of the curious (especially photographers) would be to stop. If there is no safe place to stop, a potential hazard exists and traffic should be kept moving. Sheriffs' deputies, hired for the Proposed Action, would guide traffic while uniformed monitors paid by OTR Corporation would guard private property using two-way communication for assistance. The number of persons controlling traffic and protecting private property would be determined on the basis of need. Need would vary with time: (1) weekday vs. weekend day and (2) day vs. night. If private parking is provided by individual landowners (separate from any part of the applicant's proposal), guidance should be received in advance by the landowner from public authorities in order not to create more traffic problems because of ingress and egress conflict on roads. If traffic becomes too congested for stopping for viewing and photographing, stopping could be prohibited, except for emergencies; even whole roads could be closed to visitors. Potential traffic mitigation measures are discussed in more detail in the Traffic Operations Analysis in Appendix J2.1.4, the Installation, Removal, and Restoration Operations Plans (Appendix J1.2), and the Event Management Plan (Appendix J2.2).

Travel Demand Measures

Travel demand tools might be classified as those aimed at getting travelers to reduce the number of vehicle trips made, to change trip timing, to use alternate routes, and to take alternate modes. Incentives to change each type of travel decision are described in more detail below.

Vehicle trip reduction incentives may be aimed at OTR viewers or canyon residents. Some incentives for viewers to reduce travel might include news stories describing the congestion on US 50 and encouraging viewers to carpool, or perhaps restricting access to the corridor to viewers with hangtags that were distributed by lottery. Vouchers for residents to stay in hotels near out-of-corridor activities—for example, work or kidney dialysis—also would have the effect of eliminating within-corridor trips.

News releases with details of congestion during peak times may be the most effective measure for changing trip timing. Because the artists intend that viewing OTR is free, differential pricing should not be used to modify traveler behavior. Other methods of encouraging people to change their trip timing include having periods of time set aside for residents only on US 50, encouraging area employers to implement flexible hours, and restructuring contract incentives for USPS delivery carriers. If USPS contracts cannot be restructured during visitation, OTR Corporation can examine the feasibility of reimbursing carriers for delays caused by OTR.

Congestion on US 50 would be a natural incentive for travelers to use any alternate routes available. Greater diversion may also be achieved using VMS, HAR, and news releases to make travelers aware of the high demands on US 50 and aware of available alternate routes. Such alternate routes for residents and for through traffic are described in the Alternate Route Report, included as Appendix J2.1.5. Commercial trucks would be made aware of possible traffic congestion and alternate roads would be proposed by means of radio announcements, CB radio, VMS, HAR, and the media. VMS notices may be given as far away from the OTR corridor as Rocky Ford or Grand Junction to give travelers the opportunity to divert to a less-congested route.

Alternate modes—ranging from carpools and bicycles to buses and trains—would be essential in handling the large number of visitors expected while limiting the number of vehicle trips on US 50. A variety of techniques may be used to encourage viewers to use alternate modes. As with other travel decisions, information and media releases about OTR can strongly suggest alternate modes. However, techniques that create a unique, pleasant experience on an alternate mode are more likely to be effective than simply asking viewers to use other modes.

One example of creating a priority experience is restricting access to walking paths at turnouts to bus passengers. Bus passengers would then be able to look for that perfect picture, while auto passengers would have to take photos through their car windows. Any organized train tour would have the natural advantage of using a different right-of-way (that is, the tracks) than other viewers. Train trip organizers might also arrange for picture-taking stops at suitable places along the corridor. Union Pacific Railroad maintains ownership of this track and will determine if passenger use is appropriate.

The artists Christo and Jeanne-Claude have always envisioned OTR being viewed by rafters, who have a unique vantage point from the river itself. Rafting operators are anticipated to offer as many trips as possible and permitted during the viewing period to accommodate the resulting demand. Note that rafting operators currently use another alternate mode, bus, to transport their clients to the put-in and from the take-out locations.

Another example of priority treatment for alternate modes is to offer travel time incentives such as queue-jumping. Autos arriving to view the artwork might have to line up behind pilot cars, while buses might be able to skip such a line. An extreme example of one mode getting priority would be an organized bicycle tour, in which one lane or the whole highway is closed to all vehicles except bicycles. Ride The Rockies is a popular annual bike event in which portions of US 50 (depending on the route, which varies from year to year) are closed to motorized traffic.

Another priority concept is for vehicles of residents of the area and the trucks for their supplies to have identification placards on their vehicle windshields and therefore receive preferential passage on US 50 and adjoining roads.

One type of incentive that frequently affects mode choice habits is a financial one. While OTR Corporation would prefer to let the free market function, subsidies to bus operators are a possibility should they be necessary to maintain orderly traffic flow on US 50. Art institutions such as the Colorado Springs Fine Art Center and the Sangre de Cristo Art Center in Pueblo are planning to bring visitors by Art Tours bus. Subsidies would allow bus operators to offer trip packages at reduced prices—or even free—and thus attract more passengers. Viewer sensitivity to such subsidies would of course also depend on the cost to view OTR by auto—primarily for the gasoline that would be consumed while traversing the corridor under visitation conditions.

For the possible emergency transportation of local residents, rafters, and visitors to a hospital, OTR Corporation may elect to have a helicopter on 24-hour stand-by, with designated landing pads along the valley. The helicopter could also be at the disposal of rescue personal for rafters in distress.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would create no changes to the existing transportation conditions on US 50 in the OTR area. However, if the No Action alternative is selected, area traffic operations would not gain the experience of participating in a large scale and complex traffic management plan. OTR provides a unique opportunity for collaboration among CDOT, the public safety community, and local public agencies to develop traffic plans that will benefit the Arkansas Valley before, during, and after OTR. Representatives from the agencies will be brought together to discuss specific concerns and objectives and to consider a variety of strategies and tactics that might be implemented as part of the project's traffic management program. These plans will support current protocols and identify technological and operational applications to enhance communications, cooperation, and coordination. The OTR team will facilitate the planning effort not only to support the project but to provide long-term response capabilities that support the local agencies. Infrastructure required to meet the traffic management needs of the project through the collaborative planning effort will remain after OTR and provide enhanced capabilities for the future.

OTR has an agreement with Union Pacific Railroad to use the railroad for installation and removal activities. OTR will provide for the inspection, upgrade and re-certification of the rail line, as directed by Union Pacific Railroad. If a No Action alternative is selected, then these improvements to the railroad would not occur.

5.7.1.3 Recommendations for Further Study

The following are recommendations for further study regarding visitation levels, traffic impacts, and transportation management:

- Impacts of the Proposed Action should be calculated with the final visitation estimate and statistics similar to those in the Traffic Operations Analysis of Appendix J2.1.4.
- Traffic operations of the four transportation alternatives and other alternatives as appropriate should be calculated and reviewed.
- Other mitigation options should be packaged with transportation alternatives as appropriate to optimize the traffic operations of each alternative.

5.7.2 Recreation

5.7.2.1 Affected Environment

The Arkansas River provides diverse recreational opportunities on BLM-managed lands, which are important recreation destination areas for Colorado and the nation.

The Arkansas River is the most heavily used whitewater recreation resource within Colorado and is also recognized for its outstanding brown trout fishery. More than 785,000 people visited the Arkansas Headwaters Recreation Area (AHRA) in 2005 (AHRA 2006). One of several key features contributing to the Arkansas River as a major recreation destination is its world-class rafting conditions and its proximity to Colorado's Front Range communities. Information regarding recreational opportunities and uses within the project area was obtained from the BLM and Colorado State Parks. This information was used to identify the range of recreational activities as well as the extent of visitation throughout the project area. Recreation use data were gathered from the BLM, the Royal Gorge Resource Area Resource Management Plan and Environmental Impact Statement (EIS), and the Final Arkansas River Recreation Management Plan of 2001.

Jurisdiction and Management

The AHRA estimates that recreation within and visitations to the Arkansas River Valley generate revenue in excess of $64 million annually. The BLM and the Colorado Division of Parks and Outdoor Recreation (DPOR) jointly manage the Arkansas River corridor under a cooperative management agreement (CMA). As illustrated in Table 5.7-9, the Colorado Division of Wildlife (CDOW) and Chaffee and Fremont counties also influence the recreational character of the Arkansas River.

Table 5.7-9. Arkansas River Corridor Management Authorities

Agency	Management Responsibility
DPOR	Under the Recreation and Public Purpose Act, the DPOR leases and manages public lands administered by the BLM. The DPOR provides recreation management services on these lands, including: • Administering closure provisions of the boating safety regulations (jointly with Chaffee and Fremont counties) • Managing the licensing of commercial river outfitters and guides and providing for on-river boating safety. • Regulating the manner, type, time, location, and amount of recreational use on the Arkansas River from its confluence with the Lake Fork to Pueblo Reservoir. • Collecting state-authorized user fees on leased lands.
BLM	The BLM has jurisdiction and administers many public lands within the study corridor and manages other use resources.
Bureau of Reclamation	The Bureau of Reclamation controls periodic upstream water releases from the Fryingpan-Arkansas water storage project.
CDOW	CDOW manages wildlife and fishery actions.
Chaffee and Fremont counties	The counties provide for river search and rescue operations and, jointly with the DPOR, administer closure provisions of the boating safety regulations.

Existing Recreational Uses within the Study Corridor

The most common recreation use within the study corridor includes boating, scenic driving/sightseeing/ wildlife viewing, hiking, fishing, picnicking, camping, and swimming/sunbathing. Other recreational activities that occur in this area include backpacking, big game hunting, rock collecting, rock climbing, mountain biking, gold panning, horseback riding, and outdoor recreational vehicle (ORV) use.

Map 5.7-2, Recreation displays the recreational opportunities and river access locations within the study area.

Fifteen public river access location sites and two additional fishing access locations have been identified between Salida and Parkdale. Comparatively few private boater “put-in” sites are used on a regular basis between Salida and Parkdale. Private boater put-in sites used on a regular basis by commercial outfitters and private boaters include Swissvale Manor, Rocky Mountain Outdoor Center (within Howard), a point downstream from the KOA campground (East of Cotopaxi), and the Texas Creek Store. Three public campsites are located within the corridor at locations called Cottonwoods, Five Points, and Point Bar.

Recreational Uses by BLM River Segment

The BLM categorizes the Arkansas River into segments based on river and visitor use characteristics. Two of the six river segments addressed in the Final Arkansas River Recreation Management Plan are located in the OTR area: (1) Salida to Vallie Bridge and (2) Vallie Bridge to Parkdale. The segment located upstream of the project area, the Buena Vista to Salida segment, is the most heavily used portion of the river for commercial rafting trips, and includes Class III and IV rapids, the more desirable levels for white water rafting and kayaking experiences.

Salida to Vallie Bridge Segment

This segment of the river offers predominantly calm waters, with a vertical drop of 24 feet per mile. For boating in this segment, the put-in sites are the Salida Boat Ramp, Rincon, and Vallie Bridge. Fishing is a popular recreation use in this segment.

Every June, the City of Salida hosts "First in Boating on the Arkansas" (FIBArk), a nationally renowned whitewater event that takes place in this segment. This event includes boat races from Salida to Cotopaxi.

Two recreation sites that provide access to picnic areas, fishing, and hiking are present within this segment (Rincon and Vallie Bridge).

Vallie Bridge to Parkdale Segment

This segment of the river between Vallie Bridge and Parkdale is heavily used for commercial boating, offering rapids up to Class IV and a vertical drop of 30 feet per mile. White water rapids present in this segment include Maytag, Lose-Your-Lunch, Three Rocks, and Shark's Tooth.

Seven recreation sites within this segment provide access to picnic areas, sightseeing, fishing, and hiking: Trading Post, Lone Pine, Texas Creek, Pinnacle Rock, Five Points, Spike Buck, and Parkdale. The Parkdale site—one of the most heavily used in this segment—provides access to the river and is the last boating access point before the river enters the Royal Gorge.

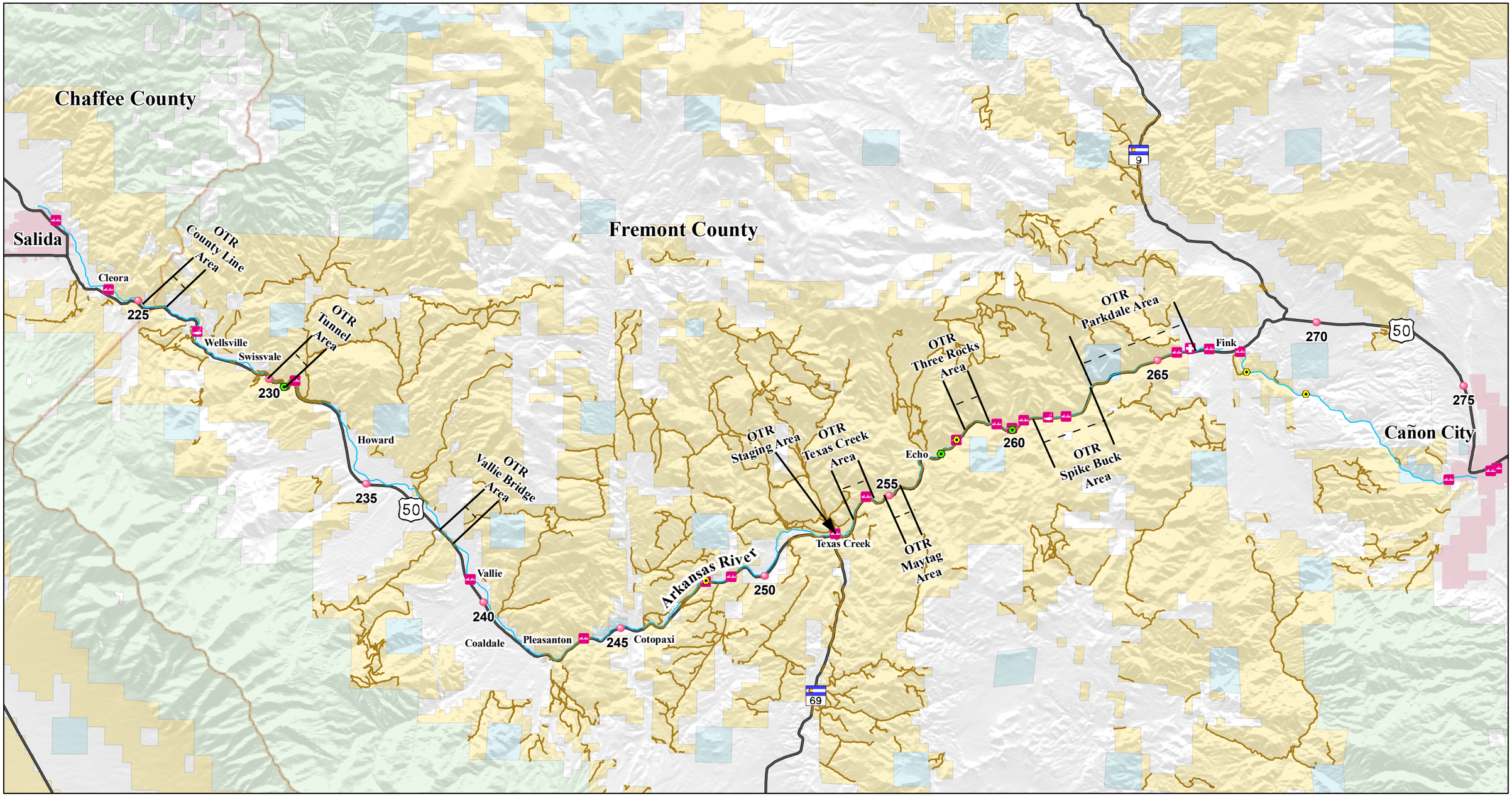
Boating

The Arkansas River is the most commercially floated river in the nation, with more than 300,000 rafters during the 2005 season, of which over 30,000 were private boaters (AHRA 2006). Water flows of the Arkansas River peak in early June (see Section 5.4, Water Resources). The boating season extends into July and August.

Commercial rafters must launch by 3:30 PM because rafting outfitters are required to be off the river by 5:00 PM This is to accommodate angling use in the evenings between Salida and Parkdale.

Angling

Most of the Arkansas River between Salida and Cañon City is accessible for fishing. The surface of the water is public and thus open to public use. Angling is a popular recreation activity throughout the Arkansas River Valley. Certain segments of the river are used more than other segments for angling (see Map 5.7-3, Angler Utilization). Public fishing access is available on public lands and on fishing easements crossing private lands. All public access areas along the river are designated as such with signs. Typically, the more heavily fished areas are those providing public access (primarily BLM-administered areas) and those areas where US 50 approaches the river.



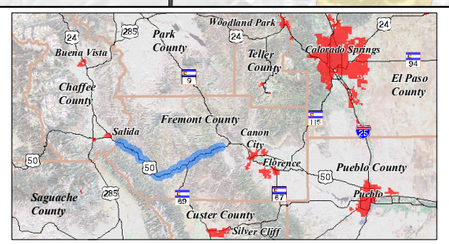
LEGEND

- Cities
- Counties
- US Highway 50 Mile Posts
- Highways
- Bureau of Land Management Lands
- US Forest Service Lands
- State Lands
- Picnic Areas
- Campsites
- Ambulance Access
- Fishing Access Locations
- River Access Locations
- USFS Trails

N W E S

0 2.68 Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. Recreation data provided by BLM and USFS. Land ownership data provided by BLM. Jurisdiction information provided by CDOT.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.7-2. Recreation

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\Recreation_11x17_061113.mxd)
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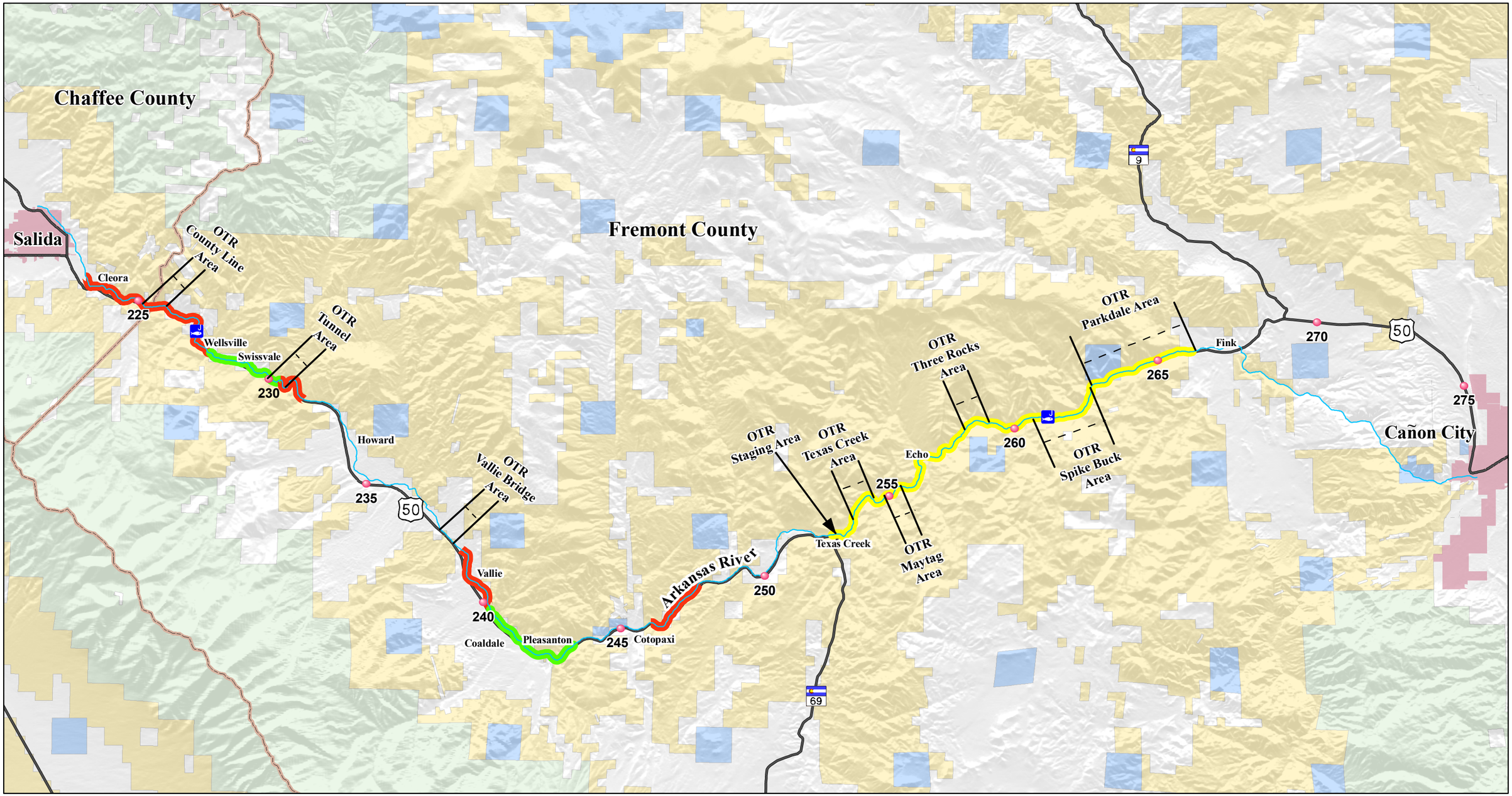


LEGEND

- Cities
- Counties
- US Highway 50 Mile Posts
- Highways
- Bureau of Land Management Lands
- US Forest Service Lands
- State Lands

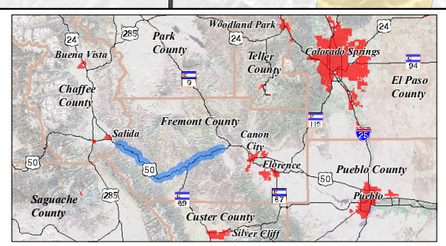
Angler Utilization Along Arkansas River

- High
- Moderate- High
- Moderate
- Fishing Access Locations

N W E S

0 2.68 Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. Fishing access locations and land ownership data provided by BLM. Angler utilization data believed to be provided by BLM but not verified. Jurisdiction information provided by CDOT.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.7-3. Angler Utilization

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\AnglerUtilization_11x17_061031.mxd)
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CDOW regulates the game fish populations within the Arkansas River. CDOW conducted a creel census of the Arkansas River in 1995 to estimate angling use of the river. The results of the census are conservative because it was conducted during a relatively high water year when angling use was probably lower than that of a normal water year (Greg Policky, CDOW, pers. comm.).

The peak angling months, which generally coincide with large quantities of hatching caddisflies, occur primarily in the spring. In the spring and fall the brown trout fishing is exceptional.

According to the creel census results, the greatest overall (public and private access) angling pressure within the project area occurs between Texas Creek confluence and the upper Howard Bridge (840 anglers per river mile per year). Within this segment, some areas are used more than others. The public access areas (7.9 miles) receive 1,550 anglers per river mile while the private access areas (12.4 miles) receive only 388 anglers per river mile. Heaviest use in this segment occurs within a 2-mile reach downstream from Cotopaxi near the Lone Pine River Recreation Site and immediately upstream and downstream from the Vallie Bridge River Recreation Site.

The Arkansas River from the Texas Creek confluence downstream to Parkdale is almost entirely public land managed by the BLM. However, the 1995 creel census results indicate that this segment receives only moderate usage (786 anglers per mile).

The river segment upstream from the upper Howard Bridge to the Stockyard Bridge (downstream from Salida) receives the lowest overall fishing pressure (469 anglers per river mile). This segment includes 5.2 miles of public land (792 anglers per mile) and 6.2 miles of private land (198 anglers per mile). Although overall fishing pressure in this segment is low, certain reaches within this segment receive heavy fishing pressure. The areas receiving the heaviest fishing pressure are from the Rincon Recreation Site downstream to Badger Creek and a 5-mile reach (on public land) immediately upstream from Wellsville.

A designated Gold Medal waters (flies and lures/artificial bait only) area is located downstream of Rincon (milepost 231). See Section 5.3.2, Aquatic Wildlife, for further information about fisheries of the Arkansas.

Wildlife Viewing

The slopes between Wellsville and Parkdale are prime Rocky Mountain bighorn sheep viewing areas in the mid-morning and late afternoon (see Section 5.3.3, Terrestrial Wildlife).

Bird Watching

Most bird watching occurs during the spring and fall migration when the largest number of neotropical migrants, waterfowl, and shorebirds are present along the river corridor (see Section 5.3.4, Migratory Birds, and Appendix E2, Migratory Bird Species List).

Camping

Three AHRA-established campgrounds exist along the Arkansas River between the Salida area and Cañon City. All three generally are near or at capacity during weekends and throughout the week during the peak time of the year, mid-July to mid-August. A reservation through the AHRA office is recommended for campers to ensure that they obtain campsites during the peak season. Campsites are considered primitive, with no running water, pit toilets, tent pads, or firepits, and “pack-in/pack-out” policies for personal trash. Camping is restricted to a 14-day limit for a single party within a given area. Early season users, May to early June, are typically day-use, experienced boaters from the Front Range seeking the high river flows associated with the spring runoff that occurs earlier here than in northern parts of the state. Later season visitors are generally families rafting the river during the tamer low-water period. The three established campgrounds are located at the Hecla Junction, Rincon, and Five Points pullouts along US 50 as it parallels the Arkansas River.

Hecla Junction. Hecla Junction is approximately 14 miles northwest of Salida. This campground has 22 established sites with a capacity of 6 people per site for a maximum capacity of 132 people per night. This area is predominantly used by rafters and anglers, although the road receives a considerable amount of RV and bus traffic, usually commercial rafting companies, with some "drive-through" camping (people stopping to camp while on their way to another destination).

Rincon. The Rincon campground is located southeast of Salida between Swissvale and Howard along US 50. The campground has five established sites with a capacity of 6 people per site for a maximum capacity of 30 people per night. Most users are anglers and rafters, with some drive-through camping.

Five Points. The Five Points campground is also located along US 50, northwest of the town of Cotopaxi. The campground has the same capacity as the Hecla Junction campground, 132 people per night. Most users at this campground are river rafters and drive-through campers.

The total one-night camping capacity of the three established AHRA campgrounds is 296 people. There are no provisions for overflow camping on AHRA-administered lands. Most of the overflow camping is accommodated by private camping facilities (for example, the KOA in Cotopaxi and in Buena Vista). Some backcountry camping occurs in the nearby McIntyre Hills Wilderness Study Area (WSA) on the south side of US 50 and the Area of Critical Environmental Concern (ACEC) north of Parkdale.

The US Forest Service has 14 established campgrounds within the San Isabel National Forest in the Salida Ranger District, most of which are a short drive to the south of the project area. These campgrounds collectively have 267 units with a capacity of 10 people, two vehicles, and two tents per campsite for a total capacity of 2,670 people. There also is one large group site that has a maximum capacity of 100 people for a total of 2,770 people. Many of the established campgrounds are full during the peak of the visitor season (June–July). Visitors who plan to camp during the peak season should make reservations through the Salida Forest Service office. Many of the campgrounds offer running water, picnic tables, established fire rings, vault toilets, and other amenities while others offer a minimum of services. Overflow primitive camping is available throughout the national forest; however, no amenities are available and all users are responsible for the proper disposal of their trash.

Hiking and Mountain Biking

Because of the limited access, little hiking and mountain biking occur throughout the project area. The north side of the project area is inaccessible to such activities, except at the few river crossings located at Howard and Texas Creek. There are some hiking and biking opportunities within the Badger Creek area as well as north of Texas Creek and on the south side of US 50 near Vallie Bridge that connects to the Rainbow Trail system (see Map 5.7-2, Recreation, for display of all hiking trails in the project area).

Rock Climbing

Some climbing opportunities exist on the rock face east of Coaldale below Cottonwood rapid on the south side of US 50 (approximately milepost 243). There are also some climbing opportunities within the Badger Creek area as well as north of Texas Creek.

Sports

Recreational sports available to visitors in the Salida area consist of city-sponsored sports teams and golfing. Sports teams within the area include Babe Ruth baseball, youth soccer, softball, volleyball leagues, basketball, bowling, and swimming. Softball and volleyball teams are available for various levels of interest and skill. Salida's 9-hole public golf course is a popular recreational spot for residents and visitors.

Special Local Events

Chaffee County Fair. The Chaffee County Fairgrounds are located in Poncha Springs. The fair is usually held the last week of July.

Fremont County Fair. The Fremont County Fairgrounds are located in Cañon City and the fair is usually held at the end of July and the beginning of August.

Colorado State Fair. The annual Colorado State Fair is held in Pueblo and begins in late August and usually ends Labor Day weekend.

FIBArk. Every June the FIBArk event is held, a nationally renowned whitewater event. It offers activities over 4 days, held in Salida, that include boat races from Salida to Cotopaxi.

Peak Rafting Season. June through August are the heaviest times for rafting.

Other Local Attractions

Royal Gorge Bridge Park. Located 8 miles west of Cañon City and south of US 50, the Royal Gorge Bridge is a one-lane toll bridge built in 1929 that spans Royal Gorge 1,053 feet above the Arkansas River. The park offers an incline railway to the bottom of the gorge and an aerial tram across the canyon. The Royal Gorge Bridge receives approximately 500,000 visitors annually.

Royal Gorge Route Tourist Train. The Royal Gorge Route runs year-round, operating at 9:00 AM, noon, and 3:00 PM during the summer season (May 20–October 8) and at noon on the weekends in the winter (October–May). This train travels from Cañon City to Parkdale, a 24-mile round trip. The Royal Gorge Route follows a portion of the old Denver & Rio Grande Western rail line.

5.7.2.2 Impact and Mitigation Issues

Proposed Action

Viewing art is a type of recreational activity, and the experience of viewing the OTR temporary work of art will be the largest impact to recreation, with several hundred thousand visitors expected. Because an art experience is a new type of activity to be experienced in this way in this corridor, it is discussed in a separate section (see Section 5.7.3, Public Art). The rest of this section focuses on potential impacts on traditional recreational activities.

Potential OTR impacts on traditional recreational activities include the following, discussed by OTR phase:

- Installation of OTR may have impacts on recreationists through the presence of working crews and noise from installation operations (for example, drilling).
- The viewing period of OTR would have large impacts on recreationists. The typical recreationist during the period might want to avoid the hundreds of thousands of new recreationists brought to the area to see OTR.
- Removal of OTR would have impacts similar to installation.

Installation and Removal

Although some recreationists would enjoy seeing the progression of OTR throughout its installation and removal stages, some would prefer its absence in the canyon. During the rafting season, the river is heavily rafted, so the presence of the installation and removal crews would not add a large percentage increase of human presence in the canyon and impacts on recreationists at this time would be low. During the other months of the year, however, the installation and removal crews would entail a human presence that would otherwise be absent. This presence may diminish the experience of anglers, wildlife viewers, boaters, and other recreationists if they are seeking solitude, but would enhance the experience for those who are intrigued by OTR.

OTR Viewing Period

The typical recreation experience in the canyon would be a very different experience during the OTR viewing period. This period is expected to bring in many thousands of people who are interested in viewing the temporary work of art. These people would anticipate a highly positive experience since they would have chosen to travel to the area for the event. There would be a large amount of new users of public lands, who might for the first time be enjoying an activity on public lands. The recreationists that typically come to the region to experience peace and tranquility, however, would want to avoid these heavy crowds during the viewing period. Wildlife are likely be scared off from being near US 50 and thus tourists hoping to see wildlife most likely would avoid this area during this time. Avid anglers are not likely to fish this stretch of the Arkansas during this period.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not change the existing recreational activities occurring along the corridor. However, selection of the No Action alternative would prevent rafters and other recreationists from experiencing viewing OTR.

5.7.2.3 Mitigation Measures Already Implemented

Some panels from the original 10.4-mile design of OTR were removed based on coordination with BLM, other agencies, and public comments to address rafting community concerns. Some panels were located in areas that are used for water rescue and were removed to address these concerns. The current design of OTR includes 5.9 miles of panels (see 4.3.6 Other Alternatives Considered but Not Selected for Detailed Study, for further information).

5.7.2.4 Recommendations for Further Study

Full impacts from the installation, viewing, and removal of OTR need to be identified for all recreational activities and mitigation measures designed. It needs to be determined how the BLM would address commercial and private rafting permits during OTR, if any exemptions or alterations from the current permitting system would occur. This would include determining if increased water flows would be permitted to allow for a rafting experience should a drought occur during the viewing period.

5.7.3 Public Art

5.7.3.1 Affected Environment

The Arkansas River Corridor where OTR is proposed to be located is managed by the BLM and enjoyed for many recreational uses, but the area has never hosted an activity of this type and scale.

The State of Colorado has shown support for public art. In 1977 the Colorado General Assembly passed the Art in Public Places Act, requiring allocation of 1 percent of capital construction funds for new or renovated state buildings for the acquisition of works of art for the project site. These art acquisitions form the state art collection, developed and administered by the Colorado Council on the Arts. The works selected through this program represent great diversity in style, imagery, materials, and techniques.

By uniting artists, architecture, and host community, the Colorado Art in Public Places Program (AIPP) integrates the art experience into public space. The AIPP program has successfully commissioned or purchased more than 350 works of art for the enhancement of state buildings and the enjoyment of Colorado citizens. Public art is an amenity accessible to all. In addition to the appreciating value of artwork, other benefits have accrued to the state and its citizens. Agencies report that art work has a positive impact on morale, encourages employee creative problem solving, helps create a sense of respect and pride, assists recruitment efforts on collage campuses, and contributes to student learning.

5.7.3.2 Impact and Mitigation Issues

OTR is expected to bring in many thousands of viewers because these people believe their lives will be touched in some positive way by experiencing this temporary work of art. This impact is expected to be the largest impact of OTR. Because the BLM has not traditionally been host to this type of recreational activity, this section discusses in detail some of the impacts of art on people and on society, and of Christo and Jeanne-Claude's art in particular.

Although this section discusses the positive impacts the art experience brings to the viewer, it is important to note that some people do not value the art experience and thus would not want to view the work of art. Several residents have commented that they would not value the OTR art experience. Some public comments have expressed that OTR would temporarily decrease the natural beauty of the Arkansas River. The rest of this section discusses the benefits that come to the several hundred thousand willing visitors, and to the society that hosts the OTR, whether or not they elect to experience the work of art themselves.

Value of Public Art

Since prehistoric times, man has created works of art—expressions of themselves for the purpose of self-expression alone or the shared enjoyment of its creation. Art refers to the creative activity or its result, whether images or objects, sights or sounds, drawings or carvings that convey the beauty of the world or realize the imagination of the artist (Wikipedia 2006).

Art has an "amenity value," which is defined as a "value derived from satisfaction" (Encarta 2006). People enjoy art for many reasons: Art may cause people to pause and reflect, experience joy, and undergo a calming effect. Art attracts and appeals. Art may also stir emotions and provoke controversial thought.

Today, cultures around the globe value public art—art that is available to the public free of charge. Works of public art are found at public plazas, malls, parks, schools, government and office buildings, industrial plants, community centers, and outside private residences. Public art ranges from small crafts and paintings to large sculptures and massive works of art such as many of the works created by Christo and Jeanne-Claude.

Viewing public art may be thought of as a type of recreational experience, similar to sightseeing or wildlife viewing.

Value of Christo and Jeanne-Claude's Art

Christo and Jeanne-Claude's works of art are available to the viewing public at no cost to those who choose to enjoy these temporary works. People have long demonstrated that they value Christo and Jeanne-Claude's works of art, many coming from around the world to participate in the exhibitions, partly because of the temporary nature of the work of art. Christo and Jeanne-Claude's original aspiration is to create gifts of art that are brief but extraordinary.

Although the OTR work of art is large in scale, it is not the first of its size. Christo and Jeanne-Claude have successfully realized many works of art in grand scale (see Figure 1-1, Selected Projects by Christo and Jeanne-Claude). In addition, many other artists have created large works of art in outdoor spaces (see "Public Art's Cultural Evolution" in Appendix F for discussion of other artists' creations).

Christo and Jeanne-Claude's art brings joy, beauty, and peace.

People come to experience Christo and Jeanne-Claude's works of art because the experience brings them joy and beauty. The experience also offers them the opportunity to participate in a rare cultural event, a transitory piece of living history. People know they will experience something unique that they will be able to discuss and share the rest of their lives.

Despite surrounding controversies, Christo and Jeanne-Claude's works of art bring extraordinary peace to the people who come to view them. In California, during the *Umbrellas*, observers commented that the experience of visiting the work of art was unlike anything they had ever known. Visitors were thoughtful and considerate to each other in the aura of the massive art surrounding them, as opposed to the usual rush and hurriedness of tourists in a new place. The California Highway Patrol remarked that typical problems that develop in highly trafficked areas were handled with a minimum of conflict, particularly because of the calmness of the visitors. People were much more respectful of one another and treated each other courteously and with camaraderie.

Dennis Doberneck, then-District Superintendent for California Department of Parks and Recreation, stated that "no law enforcement or visitor safety problems occurred during the project that affected State Park lands." This was partially due to excellent planning by the project team, but it can also be attributed to the overall cooperative and pleasant attitude of the visitors.

Even in New York City, known for its hurried residents, Mayor Michael Bloomberg commented on the utter joy and delight on the faces of those visiting *The Gates, Central Park, New York City.*

Many people who might not usually care to view art come to see Christo and Jeanne-Claude's works of art. Their lives are slightly changed by the knowledge that they have experienced and shared a unique and fleeting event with friends and strangers alike from all walks of life. The non-art enthusiasts are often the people who derive special pleasure from experiencing a work of art by Christo and Jeanne-Claude. For further discussion, see the letter from Diane Vanderlip in Appendix F, Public Art Documents, excerpted here:

> *There are few events in the world that bring people from all walks of life together in such a positive way as does the art of Christo and Jeanne-Claude. Their determination to make their artworks stupendously huge, visually stunning, important public events is legendary and historic and given the opportunity, people want to see one of their projects in person. Such is the power of their temporary public art projects.*
>
> *The absolute joy shared by the millions of people experiencing each of those projects set all the woes of the world aside… for just those few days that we were all able to instead consider the immense gift these artists had given us. They gave the gift of a totally new experience that cost us nothing, but gave us a shared sense of humanity and respect for the achievements of the individual. Those projects made a difference in the life of all who experienced them.* (Vanderlip 2006; see Appendix F).

As an example of the peace and beauty that Christo and Jeanne-Claude's works of art can bring, *The Gates* contributed significantly to the spiritual and economic recovery of New York after 9/11. And the joyful memory of their *Wrapped Reichstag* in Berlin, Germany, has replaced many of the horrific images of the Reichstag burning during World War II.

Some communities have commemorated the temporary experiences brought about by hosting Christo and Jeanne-Claude's works of art. The State of Colorado created a permanent rest area and commemorative park at the Rifle location of *Valley Curtain*, which was realized in 1972 (and a documentary film about it was nominated for an Academy Award). The County of Sonoma in northern California built Running Fence Park and installed a historical landmark at the project site on Highway 1 in Valley Ford to commemorate *Running Fence, 1976.*

> ***Christo and Jeanne-Claude's art stirs public debate and requires scrutiny, which in turn leads to improvements in society.***

Mayor Michael Bloomberg said that one of the most noted benefits of *The Gates* by Christo and Jeanne-Claude was that local New Yorkers and visitors alike, whether friends or strangers, were talking and

discussing public art. Not everyone agreed, of course, but the art of communication was very much present.

Promoting free expression in the arts and educating people to think deeply about them is part of fostering a broader ability in the citizenry to think and to express their insights. These are basic values on which democratic institutions rely: believing that a better world will emerge from the free expression of ideas and a public coming together out of this free congress of perspectives (see the letter from Dr. Jonathan Fineberg in Appendix F for further explanation). Therefore, it benefits society to support the use of public space as a forum for this kind of debate. The concept of temporarily borrowing public space is a foundation of Christo and Jeanne-Claude's works of art.

No artist in American history has more effectively brought about this kind of constructive debate through art than Christo and Jeanne-Claude. OTR has and will continue to cause a healthy controversy and debate about its merit as a work of art and acceptable use of public land. The passion engendered by this discussion will, as in all previous projects by Christo and Jeanne-Claude, create a critical atmosphere that causes citizens to examine many aspects of public process with fresh eyes. Precisely because the project is so "out of the ordinary," people will depart from their routine habits of thinking. This in turn will cause them to notice how a wide range of society functions: traffic control, judicial review of the permitting process, issues of access and financing on public lands, and so on. This degree of public scrutiny will, as it has in all past projects by these artists, lead to significant enhancements of the public domain. Also, bringing together communities on a regional level to work on solving the challenges that would be brought about by OTR will foster improvements. For example, bringing together emergency response personnel to coordinate efforts and identify needs may bring lasting improvements to the region.

In another example, the economic rebirth of South Beach in Miami and the development of an environmental council for South Florida (an effective coalition of the major environmental conservation agencies in the region) were both stimulated by the 1983 *Surrounded Islands* project of Christo and Jeanne-Claude. Approximately one-third of the site of *Wrapped Coast*, completed in 1969 in Little Bay, Sydney, Australia, was an illegal garbage dump at the start of the project. After *Wrapped Coast* was removed, the site was renovated with a beautiful golf course.

OTR has been and will continue to be passionately debated on all sides. Based on the historical performance of all previous projects by these artists, it will just as certainly follow with the same public success as their earlier projects. There have been—without exception—substantial, quantifiable gains on many levels to societies that have hosted previous projects by these artists and no evidence of damage. Christo and Jeanne-Claude's contribution to cultural value is a long-term benefit. The realized works of art and surrounding social atmospheres become part of the history of the place where they existed and part of art history. All of their major works are published in art and history books worldwide, and have left lasting impressions on those that experienced them and the communities that hosted them.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would have significant impacts to this "Public Art" category. A selection of the No Action alternative would deny many thousands of people the unique experience of viewing the OTR temporary work of art. Christo and Jeanne-Claude's realized works of art become part of the history of the place they existed and part of art history. Selection of the No Action alternative would preclude this once-in-a-lifetime event along the Arkansas River corridor from having a place in art history. In addition, a selection of the No Action alternative may discourage future proposals for artistic use on public lands.

5.7.4 Socioeconomics

5.7.4.1 Affected Environment

This section summarizes the major socioeconomic characteristics identified for the project area. Major socioeconomic variables include:

- Employment, income, and the economy
- Population
- Housing
- Community services
- Fiscal summaries for affected government jurisdictions
- Social attitudes

Area of Influence

Economic effects would be felt statewide because many visitors would come from outside Colorado and would purchase goods and services as they travel through other areas of the state. The primary area expected to be the most heavily affected is along US 50 and the Arkansas River from the incorporated City of Cañon City to the incorporated City of Salida.

This area also includes the unincorporated communities of:

- Parkdale
- Texas Creek
- Cotopaxi
- Pleasanton
- Coaldale
- Howard
- Swissvale
- Wellsville

Much of the socioeconomic data presented in this section are available only on the county level. The primary study area is within two counties, Fremont County and Chaffee County. Cañon City is the county seat of Fremont County, and Salida is the county seat of Chaffee County.

Although this area currently has a strong summer tourist season, infrastructure, and services, these would be strained with the projected influx of several hundred thousand visitors over a two-week period to view the temporary work of art. The cities of Colorado Springs (approximately 60 to 80 miles from the OTR area with a metropolitan area population of about 590,000) and Pueblo (about 45 miles from the project area with about 150,000 people in its metro area) lie to the east of the proposed project site. The Denver metropolitan area is located approximately 120 miles to the northeast, and has a population of more than 2 million. These larger cities are expected to provide both a source of visitors (existing residents of these cities) and lodging for out-of-town visitors. These cities are discussed, but the focus of analysis is on the primary study area.

Employment and the Economy

Table 5.7-10 shows 2000 employment and wage data for Fremont County, Chaffee County, and the State of Colorado. As measured by employment, government is the largest economic sector in the two-county area; government employment is especially high because of the state and federal correctional facilities in both counties. These facilities are the Colorado State Penitentiary in Cañon City and the Buena Vista Correctional Facility in Buena Vista (a city of about 2,200 northwest of Salida in Chaffee County).

Table 5.7-10. Employment and Wages for Fremont and Chaffee Counties and State of Colorado – 2000 Census (by place of residence)

	Fremont County		Chaffee County		Colorado	
	Employment	**Average Wage**	**Employment**	**Average Wage**	**Employment**	**Average Wage**
Agriculture, Forestry and Fishing	111	$16,064	88	$12,004	32,963	$22,646
Mining	187	$29,950	15	$25,038	12,880	$64,716
Construction	1,256	$28,428	567	$27,904	162,604	$36,965
Manufacturing	1,048	$29,370	262	$19,752	205,640	$47,446
Transportation, Communication, and Public Utilities	320	$33,541	152	$31,460	140,674	$54,698
Wholesale Trade	151	$25,044	189	$21,778	110,408	$51,980
Retail Trade	2,411	$14,524	1,731	$14,584	414,558	$19,073
Financial, Insurance and Real Estate	395	$23,984	316	$27,633	137,598	$52,321
Services	2,734	$18,156	1,466	$16,828	650,169	$37,281
Government	4,996	$36,358	1,577	$29,723	319,140	$34,910
Total and Average Wage*	**13,609**	**$26,759***	**6,363**	**$21,508***	**2,186,765**	**$37,166***

Source: CDLE 2006a.

The private sector economy in the area is driven by the retail trade and services economic sectors. This situation reflects the importance of tourism to the regional economy. Although jobs in these sectors are relatively plentiful, they are also relatively low paying. Income has not increased as rapidly in Fremont and Chaffee counties as in the state as a whole. The highest paying jobs in the area are in government, transportation, communication, public utilities, and mining. Both counties reflect overall economic trends in Colorado, with increasing importance of retail trade and services employment to serve the tourism industry, especially in the rural portions of the state.

As with many areas of Colorado, the labor market is relatively tight in Fremont and Chaffee counties. Average annual unemployment in 2005 was 6.2 and 5.4 percent for Fremont and Chaffee counties, respectively, compared to 5.0 percent for the state as a whole (CDLE 2006b).

In addition to general sightseeing, camping, fishing, and picnicking in the project area, major tourist activities specific to the area include the Royal Gorge Bridge and rafting/water activities in the Arkansas Headwater Recreation Area (AHRA). The project area is located within the AHRA. Tourism to the area is highest in summer months, with peak visitation in July and the first two weeks of August. The Royal Gorge Bridge is one of Colorado's major tourist attractions. Annual visitation to the bridge has been at about 500,000 or more for 10 years. It has been estimated that the economic impact of commercial rafting on the Arkansas River in 2004 was estimated at more than $52.7 million (CROA 2005). Fishing is also a major recreational and economic contributor to the study area economy and lifestyle. The length of the Arkansas River between Salida and Cañon City is amenable to fishing (see Section 5.7.2, Recreation, for more details on fishing and rafting on the Arkansas River).

Business and commercial activities from Parkdale to Wellsville are limited. They consist primarily of commercial outfitters/rafting companies, a KOA campground, restaurants, small commercial stores, a small motel, and ranching activities.

Because the area is connected to other parts of Colorado through an efficient road system, visitors to the Arkansas River area between Salida and Cañon City often are on their way to or from other areas of the state. The project area is south of the Interstate 70 corridor, which supports extensive year-round tourism activities and visitation.

Population

Fremont and Chaffee counties have grown steadily over the last 60 years, but not as rapidly as other parts of Colorado and as the state as a whole, based on data from 1980 to 2004 (see Table 5.7-11). As shown in Table 5.7-12, growth trends for the two counties and the state are expected to continue through at least 2030.

Table 5.7-11. Population Estimates for the Incorporated Municipalities and Counties in the Project Area

	1980	1990	2000	2004
Cañon City	13,037	12,687	15,431	15,683
Salida	4,870	4,737	5,504	5,358
Chaffee County	13,227	12,684	16,242	16,833
Fremont County	28,676	32,273	46,145	47,449
State of Colorado	2,889,735	3,294,473	4,301261	4,653,023

Source: Colorado DOLA 2006a.

Table 5.7-12. Population Projections for Fremont and Chaffee Counties and State of Colorado

	2010	2020	2030
Fremont County	51,772	62,084	72,280
Chaffee County	18,887	23,143	27,182
State of Colorado	5,209,892	6,257,281	7,298,094

Table 5.7-13 shows some general characteristics of the residents of Fremont and Chaffee counties compared to the state in 2000. Generally, residents of the two counties were slightly older, fewer had advanced degrees, made less money, and were at a higher percentage of poverty level compared to the state average. These study area characteristics are reflective of rural areas where residents may have given up certain opportunities such as income to live in an area that they perceive to have a high quality of life.

Table 5.7-13. Characteristics of 2000 Population in Chaffee and Fremont Counties and State of Colorado

	Fremont County	Chaffee County	State of Colorado
Median age	38.8	41.8	34.3
High school graduation or better	80.5%	88.5%	86.9%
% Bachelors degree or better	13.5	24.3	32.7
Median household Income	$34,150	$34,368	$47,203
% Persons below poverty level	11.7	11.7	9.3

Source: Colorado DOLA 2006b.

Short-Term Housing

Because OTR is expected to have a short-term effect from installation and removal crews and visitation to the OTR sites, emphasis in this section is on the availability of short-term housing such as hotels and motels for OTR employees and visitors. The supply of short-term housing is often measured in "beds," which is the number of rooms in the short-term housing supply. Beds are usually estimated to support two persons, so the number of beds times two is the estimated number of people these beds can support for overnight stays.

The closest sources of beds in the primary study area are Cañon City and Salida, in addition to a few scattered motels between Salida and Cañon City. As noted above, it is assumed that Pueblo, Colorado Springs, and Denver (among other surrounding cities and towns) would also serve as sources of beds to visitors needing overnight accommodations. Estimated numbers of beds and persons supported by the beds in Salida, Cañon City, Pueblo, and Colorado Springs are:

- Salida – about 1,500 beds × 2 people = 3,000 people
- Cañon City – about 1,100 beds × 2 people = 2,200 people
- Pueblo – about 3,400 beds × 2 people = 6,800 people
- Colorado Springs – about 20,000 beds × 2 people = 40,000 people

This totals about 26,000 beds supporting about 52,000 people per night.

In addition to this short-term housing, there are also about 2,500 camping sites, both public and private, in the Arkansas River Valley area.

However, most of these beds and campsites are normally occupied during July and August. Therefore, OTR visitors may be competing for beds with other visitors who normally visit the area during this period for other recreational purposes. However, many of the typical visitors to the area would be replaced by OTR visitors during this period (see Section 5.7.2, Recreation, for further discussion).

If beds are not available within the primary study area, visitors would need to travel to surrounding towns capable of providing services to visitors, such as Breckenridge, Aspen, Snowmass, Vail, and Denver, all of which are less than 150 miles from the project area.

Further, a portion of OTR visitors would live within a day's drive of the artwork site, and these persons would not require short-term housing.

Fiscal Summaries for Affected Government Jurisdictions

Provision of public services such as those identified above to OTR artwork visitors (such as police assistance) could be a burdensome cost to the affected government jurisdictions. This section summarizes the current revenue and expenditure situation for likely affected government agencies. The focus of this information is on the general fund for each jurisdiction. The general fund is used for day-to-day operations of each government unit. Information is for the year 2000 budget unless noted otherwise.

Fremont County

Fremont County has general fund revenue of about $7.5 million. The largest sources of revenue are a 1.5 percent sales tax, property taxes, and charges for services, which comprise 42, 22, and 18 percent of total general fund revenues, respectively. General fund expenditures are budgeted at $7.9 million. Major sources of general fund expenditures are general government (47 percent of total general fund expenditures) and public safety (45 percent). In addition to the general fund, major budget items for Fremont County include social services and road and bridge funds.

Chaffee County

Total general fund revenues for Chaffee County are budgeted at $4.7 million. Major general fund revenue sources include property taxes and a 2 percent sales tax (combining for 65 percent of total general fund

revenues) and charges for services (18 percent of total revenues). Major general fund expenditures include the Sheriff's Department (17 percent of total general fund expenditures), administration (14 percent), county jail (8 percent), and the Assessor's Office (7 percent). Other funds besides the general fund include social services, road and bridge, and a lodging tax fund. The lodging tax is a 1.9 percent tax charged for hotel/motel stays. The lodging tax fund is budgeted at $162,000 with expenditures going to advertising, production of a visitor's guide, and administration.

Cañon City

Cañon City has a general fund budget of $9.3 million, with major revenue sources of taxes (including a 2 percent sales tax) and intergovernmental transfers, which are 48 and 19 percent of total general fund revenues, respectively. General fund expenditures are budgeted at $7.6 million, with major amounts going to public safety (33 percent of total general fund expenditures), general government (27 percent), and public works (18 percent). Other major budget funds include the water fund and community revitalization funds.

Salida

Salida's general fund is budgeted at $4.8 million, with revenues coming from taxes (including a 2 percent sales tax) and intergovernmental transfers, which are 70 and 20 percent of total general fund revenues, respectively. General fund expenditures are budgeted at $5.3 million, with major expenditure categories of public works (27 percent of total general fund expenditures), the police department (19 percent), and the Hot Springs pool (11 percent). Other major budget funds include the water and sewer funds.

Social Attitudes

Based on the public comment record and interviews conducted by the BLM for its Arkansas River Recreation Management Plan, residents within and adjacent to the project area have a variety of concerns and attitudes. Some do not want any change in the area, while others look forward to change and growth. Some see a positive effect on the local economy if management of the river changes, and it appears that most people in the area support and want economic growth for the area. Some residents feel there are too many people using the river and there is too much trespassing and crowding. Some want to return the river to the way it used to be: quiet, and without noisy rafters. Some feel that the development of lands by the State Parks Board would hurt the quality of their life; others feel just the opposite.

There are many different users of the river and its environs: boaters (commercial and private), fishermen, picnickers, hunters, hikers, ORV users, campers, rock collectors, wildlife watchers, nature viewers, and people who may not use the area but are nonetheless concerned about the river environment. Each group has concerns about how the river should be used for each activity. Some see rafting as being too large a part of the river's use, while others think more rafting should be allowed. There are some who think that better management of conflicts would lead to more use opportunities for all.

Conflicts exist between and among the different river users. For example, some anglers feel that the growth of rafting has caused a reduction in fishing opportunities on the river, which vary by type of fishing (fly, bait, and tackle fishing). Boats sometimes get entangled in fishing lines, and the noise of the rafters and their boats can be disruptive to the fish and to anglers. Anglers, on the other hand, may detract from the natural scenic experience sought by rafters.

Similar conflicting attitudes also exist in regard to OTR. Some rafters are excited about the possibility of rafting under the fabric panels, while some think the temporary work of art would detract from the natural beauty of the area.

5.7.4.2 Impact and Mitigation Issues

Proposed Action

Both beneficial and adverse impacts are likely to occur to socioeconomic components of the project area from OTR. Social impacts include additional requirements for community services and governmental

agencies for visitors and employees of OTR and contractors (see Section 5.7.5, Community Resources and Public Safety), and a temporary disruption to a routine way of life for residents.

All efforts will be made by OTR Corporation and its employees to keep to a minimum the project effects on residents. The traffic plan (Section 5.7.1) will identify measures to be taken to keep delays in traffic movements through the project area, including Cañon City and Salida, within a reasonable amount of additional minutes in travel time, and identify alternate routes (Appendix J2.1.5, Alternate Route Report). Measures need to be designed to ensure that community services can provide extended services to handle the influx of visitors and that community infrastructure and groups can handle all local emergencies along the valley (see Section 5.7.5, Community Resources and Public Safety).

Economic impacts include employment opportunities for local people during all phases of OTR, and the additional revenues that would be brought into the area by employees of OTR and the large number of visitors that travel to the area to see the temporary work of art. During the viewing period, many thousands of visitors will need local services, including the purchase of gas, food, and lodging. However, there may be negative economic impacts experienced by some particular sectors that rely on certain types of customers who might come to the region for a less crowded experience (for example, there may be some negative impacts experienced by local fishing guides). This Proposed Action will bring worldwide attention to the area, however, and this will have a positive impact on tourism that may have long-lasting effects. The overall net economic impact on the area is expected to be quite large.

OTR Wages and Workers' Expenditures

OTR will involve hiring many workers to install the work of art, provide operations support during the viewing period, remove the work of art, and restore the lands to their original conditions. The artists hire local labor whenever possible. If the need for certain specialized skills exceeds the capacity of the local labor market, workers will need to be brought in from farther away.

During the installation, removal, and restoration phases, professional local contractors will be hired to provide skilled, insured, and bonded workers (See Appendix J1.2, Installation, Removal, and Restoration Operations Plan). Employment opportunities will be available for people who would assist in attaching the fabric panels to the cables and pulling the fabric panels across the river.

During the viewing period, OTR paid monitors will work during daylight hours only, while professional security will be provided during the night. OTR Corporation will employ both skilled and nonskilled workers for a variety of tasks, including public information, site maintenance, engineering and safety, traffic access control, traffic flow, and incident reporting (see Appendix J2.2, Event Management Plan).

Estimates of the number of OTR workers and wages earned are not available as of April 2007, but based on previous works of art by Christo and Jeanne-Claude, these figures are expected to provide a large positive economic impact on the local area. In addition, these workers will purchase goods and services, which will bring additional economic benefits.

Visitor Expenditures

During the viewing period, visitors will need local services, including gas, food, and lodging. The Colorado River Outfitters Association found that direct expenditures by rafters on the Arkansas River in 2004 were approximately $100 per person per day in direct expenditures, which resulted in a total economic impact of about $250 in indirect expenditures (accounting for additional impacts on the suppliers of good and services, using a multiplier of 2.56 from the Colorado Tourism Board). Approximately $60 of the $100 expenditure accounts for the rafting fees. Therefore, the remaining $40 is spent for provisions such as gas, food, lodging, and souvenirs in the local area by one river rafting customer in one day.

OTR is expected to bring in 380,000 visitors during the viewing period, and possibly up to an additional 90,000 during the installation period and 90,000 during the removal period. Applying the $40 in

expenditures to these viewers would result in a direct economic impact of $22.4 million and a total economic impact of $57.3 million (using a multiplier of 2.56). This does not include the expenditures for all of the other days that the visitors will be in the area or the expenditures visitors will incur in other areas such as Denver or other tourist attractions around the state.

The total economic impact of *The Gates, Central Park, New York City* was estimated at $254 million, but *The Gates* had 4 million viewers. Nonetheless, the estimate of the economic impact of *The Gates* demonstrates that Christo and Jeanne-Claude projects have had significantly large positive economic impacts on surrounding areas. New York City Mayor Bloomberg stated that the city received approximately $8 million in tax revenue "at virtually no cost" to the city.

A recent article in the *Denver Post* stated that Metro Denver's cultural institutions in 2005 attracted 14.1 million people who spent $785 million, and generated a total economic impact of $1.4 billion on the local economy. In 1992 the impact was $461 million, so Colorado has seen an ongoing incremental increase in cultural activity. The Colorado Business Committee for the Arts expects significant increases in the future.

Loss in Some Regular Customers

There may be negative economic impacts experienced by a few sectors that rely on customers who come to the region for a less crowded experience than will be available during OTR. For example, a few local fishing guides have commented that they will lose some of their regular customers. These losses are expected to be offset by the gains from OTR bringing worldwide attention to the area and the overall net economic impact on local communities is expected to positive.

Personal Benefits of Experiencing OTR: Consumer Surplus

Personal benefits of OTR include the pleasure received from experiencing the art, including feelings of peace and joy. The enjoyment of visiting OTR may be measured through what economists refer to as "Willingness to Pay" or "Consumers Surplus." Willingness to Pay (WTP) is the maximum amount that a buyer is willing to pay for a good and it measures how much a buyer values a good. Consumers surplus is the value that people are willing to pay for something over its actual cost. Costs in this case are limited to travel costs since Christo and Jeanne-Claude do not charge viewing fees for their works of art.

Many studies have estimated WTP and consumer surplus for various recreational activities. Randall Rosenberger and John Loomis from Colorado State University performed a meta-analysis and revealed average consumer surplus values of outdoor recreation activities. They found that the average value of a one day picnicking experience is $23; sightseeing, $13; rafting, $78; fishing, $41; wildlife viewing, $36; and general recreation, $42 (Rosenberger and Loomis 2001).

If the sightseeing value estimate of $13 is applied to the 380,000 expected visitors during the viewing period, plus up to an additional 90,000 during the installation period and 90,000 during the removal period, the resulting consumers surplus benefit is $7.3 million. If the general recreation value of $42 is applied, this results in a consumers surplus benefit of $23.5 million. Averaging these two estimates results in an expected OTR consumers surplus benefit of approximately $15.4 million.

Increase in Tourism

There is the potential for OTR to provide some lasting impacts to the region. The publicity generated by this temporary work of art will certainly bring a long-lasting and heightened awareness of the Arkansas River canyon and the surrounding areas. It is very common for visitors to come to the site of a Christo and Jeanne-Claude temporary work of art long after the exhibition has been removed. Even though OTR will be installed in a rural environment, it is expected that significant tourist interest in this region will be raised over the long term.

Benefits of OTR Studies

As stated in Section 5.2, the studies that have been accomplished for planning and examining the impacts of OTR have been conducted at no cost to the public or government agencies. These studies will continue to be performed throughout the OTR permitting and operating processes and will provide significant benefits to local communities. Through these studies, OTR has provided and will continue to provide an increase in knowledge about the dynamics of the Arkansas River corridor, including baseline conditions and trends of various environmental and human aspects. OTR funded research will provide long-term benefits to the canyon communities.

Summary of the Potential Value of OTR

A summary of the expected impacts of Christo and Jeanne-Claude's proposed OTR are included in Table 5.7-14. Some of these benefits may be quantified, while others are described qualitatively. The total economic impact of OTR is expected to be more than $72.7 million, with many additional societal benefits.

Table 5.7-14. Potential Economic and Societal Impacts of OTR

Impact	Estimate of Economic and Societal Impact
Hiring workers for installation of OTR	+
Hiring workers during the viewing period	+
Hiring workers for removal of OTR and restoring the lands	+
OTR workers' expenditures on goods and services	+
OTR visitors' expenditures on goods and services	$57.3 million
Potential economic loss to businesses (e.g., some fishing guides) that might lose their regular customers that come to the area for solitude	-
Personal benefit of art experience to individuals: measured through consumer surplus[a]	$15.4 million
Benefits of public art such as morale improvement, encouragement of creative problem solving, respect, pride, camaraderie	+
Societal improvements through community discussions stimulated by OTR	+
Societal improvements through OTR studies (e.g., environmental studies, traffic studies, emergency response planning)	+
Long-term increase in tourism to the area	+
Tax revenues	+

[a] Consumer surplus is the value that a person is willing to pay for something over its actual cost. Costs in this case are limited to travel costs since Christo and Jeanne-Claude do not charge viewing fees for their works of art.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. A selection of the No Action alternative would not entail any changes to the existing socioeconomic structure of the study area. However, if the No Action alternative is selected, the local population will be denied the opportunity to experience potential economic gains. OTR is expected to have an economic impact of more than $72.7 million, with more than $57 million coming from visitor expenditures, and this economic boost would not occur if OTR was not permitted.

5.7.4.3 Recommendations for Further Study

Further research could be conducted to identify which sectors might experience a negative economic impact from the temporary work of art and to determine what mitigation measures would be possible to reduce impacts on these sectors.

5.7.5 Community Resources and Public Safety

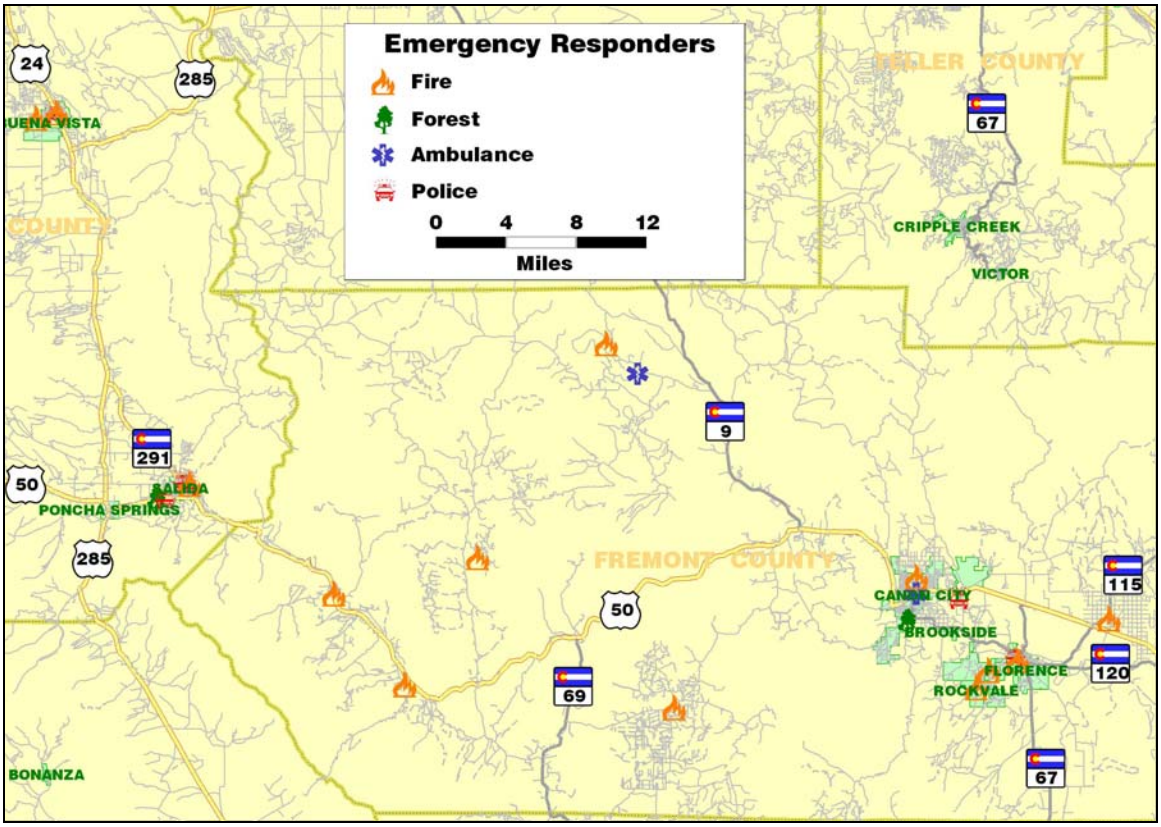
5.7.5.1 Affected Environment

About 30 emergency response entities were identified in the general OTR area. This number includes law enforcement, ambulance, fire districts, and the Colorado State Forest Service. Many responders are concentrated in cities, including Cañon City (five), Salida (five), and Buena Vista (three). These responders are listed by type in Table 5.7-15, Emergency Responders By Type. Locations are plotted on Map 5.7-4, Locations of Local Emergency Responders. Additional discussion is found in the Event Management Plan in Appendix J2.2.

Table 5.7-15. Emergency Responders By Type

Ambulance
American Medical Response – Cañon City
American Medical Response – Fremont County
Arkansas Valley Ambulance
Chaffee County EMS
Northwest Fremont EMS, Inc.
Fire
Buena Vista Fire Department
Cañon City Area Fire Protection District
Chaffee County Fire Protection District
Coaldale Fire Department (Deer Mountain Fire Protection District)
Cotopaxi Fire Rescue (Deer Mountain Fire Protection District)
Deer Mountain Fire Protection District (headquarters)
Florence Fire Protection District #1
Howard Fire Department
Indian Springs Volunteer Fire Department
Penrose Volunteer Fire Department (Florence Fire Protection District)
Rockvale Volunteer Fire Department (Florence Fire Protection District)
Salida Fire Department (South Arkansas Fire Protection District)
Tallahassee Rural Fire Protection Association
Williamsburg Volunteer Fire Department (Florence Fire Protection District)
Forest
Colorado State Forest Service – Cañon City District
Colorado State Forest Service – Salida District
Law Enforcement
Buena Vista Police Department
Cañon City Police Department
Chaffee County Sheriff's Office
Colorado State Patrol – Troop 2A Post 2 (Cañon City)
Colorado State Patrol – Troop 2A Post 3 (Salida)
Florence Police Department
Fremont County Sheriff's Office
Salida Police Department

Map 5.7-4. Locations of Local Emergency Responders



Emergency Management

The Colorado Division of Emergency Management (CDEM) is responsible for the state's comprehensive emergency management program, which supports local and state agencies. Activities and services cover the four phases of emergency management—preparedness, prevention, response, and recovery—for disasters like flooding, tornadoes, wildfire, hazardous materials incidents, and acts of terrorism. During an actual emergency or disaster, CDEM coordinates the state response and recovery program in support of local governments (see http://www.dola.state.co.us/oem/aboutus.htm). The Chaffee County Office of Emergency Services (Salida) and the Freemont County Emergency Management Agency (Cañon City) are the local agencies that coordinate with CDEM.

The AHRA is comanaged by the BLM and Colorado State Parks. Both Colorado State Parks and BLM provide personnel, including summer interns, for this 150-mile length of the Arkansas River.

The Ranger Section patrols all portions of the AHRA, both land and river, throughout the year. The three full-time staff members typically hire up to 12 seasonal staff members to assist them with their patrol responsibilities. BLM staff members in 2005 were the river manager, seasonal recreation technician, and the addition of a winter seasonal administrative position. The BLM river manager is responsible for the overall operations and the maintenance of this unique multi-agency partnership. He works closely with the park manager (AHRA 2006).

The AHRA officers are capable of enforcing state laws and the rules and regulations of the Colorado State Parks and they are trained in swift water rescue. The rangers/officers patrol the area daily by land and water. River rangers are responsible for conducting commercial boating inspections, rescues, and informing the public about river safety. Land rangers are responsible for parks pass compliance, rules and

regulation compliance, and land based emergencies. The rangers/officers are dispatched out of the Chaffee and Fremont County dispatch centers and are coordinated with county sheriff operations. The AHRA takes the lead over other agencies with river-related emergencies. River crime scenes are handled by the county sheriff departments. The AHRA staff is based in Salida at AHRA headquarters. The AHRA also has a mutual aid agreement with the county sheriff departments and with the CSP.

Hospitals and Emergency Medical Service

Fremont County

The 51-bed St. Thomas Moore Hospital in Cañon City is the major medical facility in Fremont County. Emergency response providers include Arkansas Valley Ambulance (Coaldale) and two services in Cañon City: Northwest Fremont EMS (two ambulances) and American Medical Response (a national service with providers in Cañon City with 15 ambulances).

Chaffee County

The Heart of the Rockies Regional Medical Center in Salida is undergoing expansion and currently has 25 beds. Chaffee County EMS has six ambulances (three in Salida and three in Buena Vista) and is serviced by Flight for Life Air Service through a mutual aid agreement with Summit County when needed.

Fire Protection

The BLM has its own wildfire management team, made up of one full-time firefighter and seasonal staff. The wildfire management team has three trucks. Equipment and personnel are based out of the Cañon City BLM office, and dispatched out of the Pueblo Interagency Dispatch Center in Pueblo. The BLM fire management team has a mutual aid agreement with Fremont County and will respond to fires outside of its jurisdiction. The BLM team is trained to work only on the suppression of wildfires. The official BLM response to fires is complete suppression as quickly as possible. Most fires that have occurred in the proposed project area have burned in June and July.

Fire protection is offered at various locations in Fremont and Chaffee counties. Most services are volunteer.

Fremont County

The Cañon City Fire Protection District, mostly volunteers, has two stations in Cañon City. The Tallahassee Volunteer Fire Department has five fire stations located within their 200 square mile service area, which overlaps Parkdale within the project area. The Florence Fire Protection District is outside the project area. The Deer Mountain Fire District includes the Cotopaxi Fire Rescue, Coaldale Fire Department, and a station at Texas Creek and covers 236 square miles of western Freemont County. The Indian Springs Volunteer Fire Department (Cotopaxi) and the Howard Fire Department (Howard) are also located in Fremont County in the project area. Availability of water can be an issue for fire protection in Fremont County. Fremont County residents outside of Cañon City have wells for their water supply. There is no public water supply within the unincorporated parts of the project area. There is no tanker service available for trucking water to holding tanks.

Chaffee County

Chaffee County Fire Protection District and Buena Vista Fire Department are outside the project area. The South Arkansas Fire Protection District includes the Salida Fire Department. No other fire protection services for Chaffee County overlap the project area. The service area extends from Salida downstream to Swissvale. The fire house for this area is located in Salida. Available resources include 11 firefighters plus volunteers, and 7 trucks/vehicles including a ladder truck, pumpers, tankers and rescue truck.

There is no public water available in the west end of the proposed project area. Public water is available only within the city limits of Salida. There is no tanker service available for trucking water to holding tanks.

Law Enforcement

State

The Colorado State Patrol (CSP) has offices in both Cañon City (Troop 2A Post 2) and Salida (Troop 2A Post 3). The CSP provides highway traffic enforcement, public safety, hazardous materials issues, and truck inspection services in the study area. The Cañon City office is staffed with five troopers and one sergeant with four cars to patrol between Cañon City and Cotopaxi. There are typically one or two patrols of this area each day. The Salida CSP office is staffed with two troopers, one corporal, and one sergeant. These officers patrol the area between Salida and Cotopaxi about one or two times per day. In addition to their regular patrols, CSP officers in the project area are dispatched out of the Pueblo Dispatch Center to respond to emergencies, accidents, and so on. The CSP has a mutual aid agreement with all other law enforcement agencies in the area to deal with major accidents and other emergencies. The Colorado State Forest Service has district offices in both Cañon City and Salida.

County

Fremont County Law Enforcement. The Fremont County Sheriff's Office is headquartered in Cañon City. The main sheriff's office has 18 deputies. There is a field office serviced by four deputies in Cotopaxi, within the project area. The sheriff's office has a total staff of more than 80 people, including the deputies noted above, administrative personnel, and correctional officers. The sheriff's office has patrol cars for all deputies.

Chaffee County Law Enforcement. The Chaffee County Sheriff's Office is headquartered in Salida. The county jail is also housed at this location. There is a field office in Buena Vista. The sheriff's department has 15 officers, including the sheriff and under-sheriff. Deputies are directed to respond to calls in conjunction with the Chaffee County EMS and fire department. The sheriff's office has 23 vehicles, including 19 patrol cruisers.

City Police Departments

Salida, Buena Vista (outside the study area), Cañon City and Florence (outside the study area) have their own police departments.

5.7.5.2 Impact and Mitigation Issues

Proposed Action

OTR public safety issues include:

- Staffing and equipment needs for event, traffic, and emergency response management:
  - Emergency management–CDEM
  - AHRA
  - County and local EMS
  - Fire protection
  - Law enforcement–state, county
  - Additional needs
- Safety issues related to the temporary work of art:
  - Public endangerment as installed or if engineering failures occur (also see Section 5.7.6)
  - River access for user safety and rescue

Direct impacts on community resources and public safety are associated with OTR during the installation, viewing, removal, and restoration phases.

The OTR Operations Plans (Appendix J) provide the specific details for meeting community services and public safety needs during the installation, viewing, and removal.

OTR could provide many benefits to community resources. OTR provides a unique opportunity to work collaboratively with BLM, CDOT, emergency response agencies, the public safety community, local public works agencies, the public and other agencies and entities to develop emergency and incident response plans that will benefit the Arkansas Valley before, during, and after OTR. Representatives from the public and various agencies will be brought together to discuss specific concerns and objectives and to consider a variety of strategies and tactics that might be implemented as part of the OTR traffic and emergency management program. These plans will support current protocols and identify technological and operational applications to enhance communications, cooperation, and coordination. The OTR team will facilitate the planning effort to support the project, which will enhance the ability of long-term response capabilities that support the local agencies. Infrastructure required to meet the emergency response needs of OTR through the collaborative planning effort will remain after the exhibit and provide enhanced capabilities for the future.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not entail direct impacts to public safety. However, if the No Action alternative were selected, local emergency response personnel would not gain the experience of participating in a large-scale and complex public safety plan. OTR provides a unique opportunity to work collaboratively with CDOT, emergency response agencies, the public safety community, and local public works agencies to develop emergency and incident response plans that will benefit the Arkansas Valley before, during, and after OTR. Representatives from the agencies would be brought together to discuss specific concerns and objectives and to consider a variety of strategies and tactics that might be implemented as part of the project's traffic and emergency management program. These plans would support current protocols and identify technological and operational applications to enhance communications, cooperation, and coordination. The OTR team will facilitate the planning effort to support the project, which will enhance the ability of long-term response capabilities that support the local agencies. Infrastructure required to meet the emergency response needs of the project through the collaborative planning effort would remain after OTR and provide enhanced capabilities for the future.

5.7.5.3 Mitigation Measures Already Implemented

Some fabric panels from the original 10.4-mile design of OTR were removed based on coordination with BLM, other agencies, and public comments to address public safety concerns. Some panels were located in areas that are used for water rescue/emergency response and were removed to address these concerns. The current design of OTR includes 5.9 miles of fabric panels (for further information, see Section 4.3.6, Other Alternatives Considered but Not Selected for Detailed Study).

5.7.5.4 Recommendations for Further Study

All information in this section should be updated in detail for the Draft EIS. Since much of the information about services, equipment, stations, and personnel is time-sensitive, it will need to be updated. Some of the details on services date to 1999–2000. The Draft EIS should also include a map of the various service areas for the agencies.

To assess impacts for these resources, the number of projected visitors will need to be compared to the No Action projected visitors. Then additional staffing needs for both viewing time and during installation,

removal, and restoration will need to be calculated. Staffing and equipment estimates will be needed for each resource from state to local level. Likelihood of river-related public safety issues based on number of visitors compared with current safety issues could be calculated.

5.7.6 Engineering Safety for Extreme Weather Events

5.7.6.1 Affected Environment

Wind

On-site wind data were collected at eight sites from July 21 to October 2, 1998, and from June 17 to September 22, 1999, for an aerodynamic study of the temporary work of art. The full study is provided in Appendix J1.1.3, Wind Engineering Services Report. As part of the study, maximum daily wind speeds from Salida were extracted from National Weather Service data set for the three-month period for all the years of record (1973 to 1992). The data were scaled to a height of 15 feet above ground, which corresponds to the height above ground of most of the on-site wind measurements. The analyses of the long-term wind statistics obtained from the climatic data set at the Salida station and the wind information gathered at the eight anemometer sites along the project corridor indicate that 1 minute mean wind speeds of 35 mph can be expected to occur from July through September for most of the project area locations. As a result, the once in 10 years wind speed of 42 mph obtained from the Salida data set appears to be representative of the general conditions in the project corridor. For the Red Rocks and Three Rocks areas, however, the wind measurements indicate that higher wind speeds would be expected. At these locations, 1 minute mean speeds of 53 and 50 mph could occur during a 10-year period. In addition, the data evaluation indicated that wind directions tend to align with the river valley, although there were measurements of occurrences of strong winds at 45 to 90 degrees to the river valley.

Temperature and Precipitation

The project area is within the middle Arkansas River Valley, where the climate is arid with low humidity, low annual precipitation, and hot summer temperatures. Prevailing weather patterns place this area in the rain shadow of the Sangre de Cristo and Mosquito mountain ranges. The Western Regional Climate Center has monthly climate data summaries for both Cañon City and Salida. In typical years, July and August are the wettest months of the year, averaging approximately 1.5 to 2 inches of precipitation from afternoon thundershowers. Cañon City averages slightly higher temperatures and precipitation than Salida. A typical summer day is sunny in the high 70s to low 80s (degrees in Fahrenheit) in Salida with evening temperatures in the high 40s. Cañon City summer highs are in the mid to high 80s with lows in the high 50s.

Temperatures recorded at Salida (from 1971 to 2000) ranged from a high of 96° F in July 1996 to a low of –33°F in February 1989. Average monthly temperatures are in the 60s from June through August, in the 50s during May and September, in the 40s in April and October, in the 30s in February, March, and November, and in the 20s in January and December. Temperatures recorded at Cañon City (from 1971 to 2000) ranged from a high of 107° F in July 1954 to a low of –25° F in December 1990. Average monthly temperatures are in the 70s in July and August, in the 60s during June and September, in the 50s in May and October, in the 40s in March, April, and November, and in the 30s in January, February, and December.

Precipitation data for the project area are discussed in Section 5.4.2, Hydrology and Water Rights. Area precipitation consists of heavy rains up to 3 to 5 inches in a day during the spring and summer. Maximum snowfall can reach 36 to 53 inches from fall into spring. Snowfall has not been recorded in the OTR corridor from June through August.

Hailstorms may also occur in the project area, with recorded storms with hailstones of 1.5 inches in diameter documented during an August 1993 thunderstorm in Chaffee County. Hailstorms are much more frequent in Fremont County, and data on recorded hailstorms are shown in Table 5.7-16. These storms were recorded from June through August in various parts of the county, including the Arkansas River Valley. Very limited property damage was reported, approximately $6,000 total.

Table 5.7-16. Hail Storms in Fremont County

Location	Date	Diameter
1 Fremont	7/11/1958	2.00 in.
2 Fremont	7/11/1958	2.00 in.
3 Fremont	9/8/1960	1.00 in.
4 Fremont	6/16/1965	2.00 in.
5 Fremont	8/21/1965	1.00 in.
6 Fremont	8/22/1969	2.00 in.
7 Fremont	8/26/1981	1.75 in.
8 Fremont	6/13/1984	1.00 in.
12 Fremont	6/23/1987	1.75 in.
14 Fremont	7/3/1989	1.75 in.
16 Fremont	8/12/1991	1.00 in.
18 Cañon City	8/1/1993	1.75 in.
19 Florence	8/1/1993	1.75 in.
20 Florence	8/1/1993	1.75 in.
21 Florence	8/1/1993	2.00 in.
22 Cañon City	8/1/1993	1.75 in.
27 Penrose	10/1/1994	0.88 in.
28 Hillside	6/28/1995	0.88 in.
29 Florence	7/1/1995	1.75 in.
36 Cañon City	8/1/1996	3.00 in.
39 Cañon City	8/8/1996	0.75 in.
40 Cañon City	8/8/1996	0.75 in.
41 Cañon City	8/16/1996	0.88 in.
46 Texas Creek	9/4/1997	0.75 in.
47 Cotopaxi	8/3/1998	0.88 in.
49 Hillside	7/13/2000	0.75 in.
52 Cañon City	8/21/2000	0.75 in.
55 Cañon City	5/28/2001	1.00 in.
56 Cañon City	5/30/2001	0.75 in.
58 Cañon City	5/30/2001	0.75 in.

Location	Date	Diameter
59 Penrose	6/20/2001	0.88 in.
61 Florence	7/13/2001	0.75 in.
62 Penrose	7/14/2001	0.75 in.
63 Penrose	8/5/2001	0.88 in.
68 Florence	5/24/2003	1.75 in.
69 Penrose	6/10/2003	0.75 in.
70 Penrose	7/15/2003	1.00 in.
73 Cañon City	6/21/2004	1.75 in.
74 Cañon City	8/9/2004	0.88 in.

Floods

Flooding and floodplains in the project corridor are discussed in Section 5.4.4, Floodplains.

Fire

Fire is discussed in Section 5.5.8, Fire Management. Wildfires have occurred in the project area near Texas Creek and Cañon City in May and June 2002. The fire near Texas Creek reportedly caused $5 million of property damage. Fires can start when lightning strikes dry vegetation or trees, or can be started by human activities. The year 2002 was one of the worst drought years on record in Colorado. Wildfires in the project area are limited by lack of fuel (trees and ground vegetation). Natural fire barriers include the railroad tracks north of the river and US 50 south of the river.

Earthquakes

Potential earthquake hazard is discussed in Section 5.5.2, Geology and Mineral Rights. The project corridor contains evidence of fault activity within the last 23.7 million years.

5.7.6.2 Impact and Mitigation Issues

Proposed Action

General Structure

The OTR team conducted four life-size prototype tests on private property near Mack, northwest of Grand Junction, Colorado, over a period of three years. In June and September 1997, June 1998, and August 1999, the team installed 18 different fabric panels so that Christo and Jeanne-Claude could make appropriate aesthetic decisions.

Each test fabric panel was different, including fabric type, weave, thickness, color, fabric panel dimension, size and spacing of grommets, the amount of additional fabric in each panel, and the placement of folds.

The team tested different methods of installation and removal using a variety of anchors, cables, cable clamps, hooks, grommets, and other hardware. The fabric panels were installed over a dry river bed, representative of the topography that occurs at the proposed project site along the Arkansas River, between Cañon City and Salida.

Photographs were taken during the life-size tests in 1999, and are displayed in Section 3.2 of this Report.

Wind

RWDI (2000) conducted a study of the aerodynamic stability of the proposed panels and the wind loads for the design of the cables and anchors. Two wind test studies were performed. A 1:16 scale aeroeleastic model of the typical panels was constructed and subjected to wind tunnel testing. Wind loads were also measured on a full-scale mock-up of panels/anchors/cables.

The results of the wind tests indicate that the fabric panel configurations are aerodynamically stable for the 42 mph 1-minute wind load event (statistically signifying a 10-year wind episode). The wind tests also indicated that the wind loads on the cables are affected by the position of the panels above the river. Reducing the height of the panels above the river from 25 to 10 feet reduced the wind loads for the tested configuration by approximately 30 percent.

Golder (2000; Appendix J1.1.1) noted that the 42 mph 1 minute wind speed is based on a probability of exceedance within a period of 3 months. However, the duration of service for OTR (two weeks or less) would indicate an actual return period much higher than 10 years for the 42 mph wind speed (approximately 4 times higher, representing a 40-year wind episode). In addition, Golder (2000) noted that the maximum wind load on cross-river cables occurs when the wind direction is at 45 degrees to the river valley. Although it is important to consider these winds, they occur only about 10 percent of the time, and the probability of maximum winds occurring at the least desirable wind direction is unlikely. These two factors indicate that a much higher level of conservatism has been built into the loads corresponding to 42 mph winds. Thus, although the Red Rocks and Three Rocks areas encounter higher wind speeds than other areas, a 42 mph design wind speed is adequate for design of the cross-river cables in all areas (Golder 2000).

Precipitation

Precipitation hazards associated with OTR include rainfall, snow, or hail collecting on the fabric and potentially causing structural failure. The fabric is permeable and allows precipitation in the form of water to pass through the fabric. A test was performed on an installed fabric panel (see the photograph in Appendix J1.1.4, Fabric Rainfall Test) in 1998. During the test, a 2-inch hose was used to spray 10,000 gallons of water on the fabric. The water was sprayed over an area of approximately 4 square feet and the fabric porosity allowed water to immediately pass through with no ponding. According to subsequent assumptions and calculations, the fabric can easily allow passage of water during a 9-inch per hour storm event (a 100-year storm for the OTR corridor).

Snow generally occurs from October to April in the OTR area and rarely occurs during the time when the fabric panels would be up. If snow were to fall during the time the fabric panels were displayed, area conditions would still provide a degree of warmth that would cause probable rapid melting.

Hailstorms commonly occur at least once during the summer months in Fremont County, and seven occurrences in the county were recording during 2001. Hailstorms could affect the fabric panels through direct damage to the panels from falling hail or by collection on the panels and potentially causing overall structural failure. However, a hailstorm would most likely be accompanied by high enough winds to induce billowing of the fabric panels, which would most likely prevent the collection of hailstones (Golder 2000).

Floods

The potential for 100-year flood conditions to affect OTR is discussed in Section 5.4.4, Floodplains. According to preliminary field studies, the panels would remain from 15 to 20 feet above the Arkansas River flood stage if the river flooded during the viewing period. However, a more thorough analysis of clearance both during normal flow conditions and during flood stage is recommended in Section 5.4.4.

Fire

There is the potential that storm conditions could produce lightning in the project corridor that could strike the temporary work of art. The panel fabric is not fireproof but is fire-resistant polypropylene. This means that if the fabric were to catch fire, the fabric would not burn unsustained. A lightning strike might burn a hole in the fabric but would not continue to burn or spread to other areas of the fabric. Possible effects from fire are further discussed in Section 5.5.8, Fire Management.

Earthquakes

The potential for earthquakes to affect OTR is discussed in Section 5.5.2,Geology and Mineral Rights. Although a few minor earthquake epicenters have been recorded in the project area during the last 20 years, it is highly unlikely that an earthquake of sufficient magnitude to affect the structural integrity of the temporary work of art would occur during the short period of project viewing.

Mitigation

Wind

Diagonal cables in the Red Rocks and Three Rocks areas are designed for a higher wind speed than 42 mph because of their diminished sensitivity to the wind direction. Because these members are essential components in the cable system, they are treated with an extra measure of conservatism (Golder 2000).

Precipitation, Floods, Fire, and Earthquakes

Natural hazards associated with heavy rain, snow, floods, and earthquakes are very unlikely to affect the OTR components during the viewing period; thus mitigation beyond the measures discussed above are not considered necessary.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not constitute any changes that might exacerbate natural hazard conditions that already exist.

5.7.6.3 Recommendations for Further Study

Hail

Although the billowing effect of wind during potential hailstorms would most likely prevent collection of hail on the fabric panels, this condition should be considered during the final design of the temporary work of art to ensure that such hazards are minimized as recommended by Golder (2000).

Evacuation and Contingency Plan

Natural hazards are by their nature unpredictable and relatively rare events in relation to the viewing period. In general, OTR has been designed to withstand such events to an acceptable degree of risk, as discussed above. Natural hazards are possible, however, and such events that are very extreme could adversely impact the structural integrity and cause hazards to persons and property. Therefore, an evacuation and contingency plan should be created to ensure procedures are in place to allow timely evacuation during the viewing period, and to provide measures to ensure minimal damage to the surrounding environment and communities from OTR.

Fabric

Additional specifications for the panel fabric will be provided in relation to fire resistance, potential static electricity, and strength characteristics.

5.7.7 Nonhazardous Waste

5.7.7.1 Affected Environment

This nonhazardous waste section includes discussion on wastewater treatment, solid waste transfer stations, and landfills along the project area. Where applicable, restroom availability in the project area is also discussed.

Chaffee County does not have a solid waste management district. Homes and businesses contract trash pickup services from private companies. Chaffee County Landfill has several recycling sites in Salida. The landfill is located off of US 285.The Salida municipal wastewater plant services the community and discharges into the Arkansas River.

Cañon City and Howard have solid waste transfer facilities; there are none in Chaffee County.

Fremont County does not have a solid waste management district. Homes and businesses contract for trash pickup services from private companies. Fremont County Phantom Landfill is located in Penrose. A number of private recycle and trash collection companies were identified in Cañon City. Wastewater treatment appears to be under a private contractor for Cañon City.

The Upper Arkansas Area Council of Governments (2001) supports a recycling program within its four-county area, which includes Chaffee and Fremont counties.

Within the project study area are 11 site facilities that generally provide boating and fishing access and some campsites. All 11 sites have limited restroom facilities intended to serve the existing uses of the recreation site. These locations from west to east are Salida East, Point Barr, Rincon, Vallie Bridge, Canyon Trading Post, Lone Pine, Texas Creek, Pinnacle Rock, Five Points, Spike Buck, and Parkdale. Royal Gorge Park, which is located east of Parkdale but west of Cañon City, has restrooms for its existing users.

Except as associated with the recreation area sites, restroom facility availability between Salida and Cañon City is limited.

5.7.7.2 Impact and Mitigation Issues

Proposed Action

Proposed Action installation, viewing, removal, and restoration activities will all require availability of sanitation and trash/recycling services. The extent to which services are required will depend on the details identified in the plans for numbers of employees and schedules. Visitation numbers, distribution of visitors over time, and location during OTR viewing will also drive the needs for sanitation and trash/recycling services. Support staff will also need these services.

Based on the lack of existing facilities in this rural corridor today, the Proposed Action will need to provide sanitation and trash/recycling services for the duration of the project period. The Operations Plans will include details for these services (see Appendix J).

There is a possibility of indirect and cumulative impacts related to the capacity of county landfills and sanitation services. There is also the possibility for an indirect effect related to increased pressure on existing AHRA facilities and the general AHRA, should OTR Corporation not provide adequately for visitor sanitation and trash disposal needs. Additional monitoring, restrictions, or service may be needed at AHRA restroom facilities to prevent misuse or overuse.

The Arkansas River Recreation Management Plan (January 2001) identified the following:

> *Although not treated as a hazardous material, human waste is transported and is a concern for health reasons. Some human waste is chemically treated to reduce bacteria counts. Human waste not deposited in a portable toilet or other facility for disposal is not treated and is often deposited directly on the land along the Arkansas River. Concentrations of human waste vary from site to site depending on the number of people present and facilities provided.*

After provision of required services, no mitigation should be needed.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. No impacts would occur related to nonhazardous waste (sanitation and trash) under the No Action alternative other than that which is already occurring.

5.7.7.3 Recommendations for Further Study

The information presented in this section needs detailed verification. Existence of services between Salida and Cañon City needs verification.

Calculations of the needs for portable toilets will require:

- Identification of use locations
- Calculation of need types (overnight users, day visitors, proximity to alcohol/concessions)
- Calculations of numbers of visitors/users per hour, per day
- Calculations on frequency of service (time of service and number of times)
- Possible visitor intercept locations in Salida or Cañon City to allow for setup of temporary sanitation systems that tap into municipal water and sewer lines
- Identification of services (preferably local from Salida or Cañon City) to provide facilities

Trash/recycling service need calculations will require:

- Calculation of use locations
- Calculation of numbers of visitors/users/hour per day
- Calculations of frequency of pickup
- Identification of proximity to overnight facilities, day users, concessions
- Identification of services (preferably local, from Salida or Cañon City)
- Signage and information associated with recycling

5.7.8 Regulated and Hazardous Materials

5.7.8.1 Affected Environment

A reconnaissance of the project area and a database search were performed to identify regulated and hazardous materials, including hazardous or solid wastes potentially occurring within the project area. The reconnaissance included a visit by a professional geologist from Dames & Moore, Inc. on December 10, 1999, to the seven areas of the Arkansas River Canyon where the proposed fabric panels would be installed. The database search involved a review of information gathered from several environmental databases through Entrac Site Assessment (Entrac 1997). ASTM Standard Designation E-1527-97 for Phase I Environmental Site Assessments (published May 1997) due diligence search radius distances ranged from adjacent to the site and adjoining properties to a distance of 1 mile from the site.

These distances varied among the databases. The site reconnaissance conducted on December 10, 1999, did not identify any facilities of environmental concern located within immediate OTR areas. To update the database search information, a search of several key environmental databases was performed in January 2006.

Site Reconnaissance

The site reconnaissance (followup conducted in January 2006) identified two black 55-gallon drums located adjacent to the railroad. One drum was located at milepost 265 near Parkdale and one drum was located at milepost 261 (near the Narrowleaf Cottonwood Campground–Five Points). The drums appeared in good condition and the placement of the drums indicated likely association with routine railroad operations. The contents of the drums are unknown, although their association with railroad activities might indicate they are used to store equipment or parts.

Environmental Database Search and Review

Databases compiled by the Entrac Site Assessment (Entrac 1997) were reviewed to identify information pertinent to OTR. Table 5.7-17 lists the databases searched, the type of database, the radius around the project area considered, and the number of pertinent sites identified within that radius.

Table 5.7-17. Site Assessment Report Summary

Type of Database	Description of Database/Effective Date	ASTM Radius*	Number of Sites Identified (within the search area)
NPL**	The National Priorities List identifies uncontrolled or abandoned hazardous waste sites. To appear on the NPL, sites must have met or surpassed a predetermined hazard ranking system score, have been chosen as a state's top priority site, pose a significant health or environmental threat, or be a site where the EPA has determined that remedial action is more cost-effective than removal action. Effective date: 01/06	1 mile	0
SPL**	The Colorado Department of Public Health and the Environment maintains the database of sites scheduled for voluntary cleanup, and maintains the database of State Voluntary Cleanup Sites. Effective date: 01/06	1 mile	0
RCRA TSDs	The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of RCRA TSD facilities that report storage, transportation, treatment or disposal of hazardous waste. Effective date: 07/99	0.5 miles	0
CORRACTS	The EPA maintains a list of Corrective Action Reports (CORRACTS) identifying hazardous waste handlers with RCRA corrective action activity. Effective date: 08/99	1 mile	0
CERCLIS**	The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database (EPA 2006a) identifies hazardous waste sites that require investigation and possible remedial action to mitigate potential negative impacts on human health or the environment. Effective date: 01/06	0.5 miles	0
SWLF	The Colorado inventory of solid waste facilities and landfill sites (SWLF) contains a listing of both active and inactive solid waste disposal facilities. Effective date: 01/99	0.5 miles	0
LUST**	The LUST database is a list of information pertaining to all reported leaking underground storage tanks. Effective date: 01/06	0.5 miles	0

Type of Database	Description of Database/Effective Date	ASTM Radius*	Number of Sites Identified (within the search area)
RCRA Generators	RCRA Large Quantity Generators are facilities that generate at least 1000 kg/month of non-acutely hazardous waste, or one kg/month of acutely hazardous waste. Small and Very Small generators are facilities that generate less than 1000 kg/month of non-acutely hazardous waste. Both Large and Small Quantity Generators are included in this list. Effective date: 08/99	Site and adjoining properties	0
UST and AST **	The UST and AST lists contain the state underground and aboveground registered storage tank sites listings. Effective date: 01/06	0.25 miles	24
TRIS	Toxic Release Inventory System facilities are facilities that release toxic chemicals above threshold quantities and are required to submit a Toxic Chemical Release Form (Form R) for specified chemicals.	0.5 miles	0
FINDS	The Facility Index System is a compilation of any property or site that the EPA has investigated, reviewed, or been made aware of in connection with its various regulatory programs.	Site and adjoining properties	2
RCRA-VIOLS/ENF	RCRA violators are facilities that have been cited for RCRA violations at least once since 1980. RCRA enforcements are enforcement actions taken against RCRA violators.	Site and Adjoining properties	0
SPILL	Colorado Spill Events	Site and adjoining properties	0
ERNS**	EPA's Emergency Response Notification System (ERNS) list contains reported spill records of oil and hazardous substances. Effective date: 08/99 (These are currently housed at the National Response Center database)	Site and adjoining properties	7

*The radius area is defined per ASTM Standard Designation E-1527-97 requirements.
**January 2006 database search updates.

An online search was performed of the National Response Center spills database for all spills of record in Chaffee and Fremont counties (NRC 2006). The search yielded eight spills as summarized in Table 5.7-18. Most of these spills were caused by traffic accidents on US 50 and resulted in releases to the Arkansas River. Two spills were caused by railroad accidents. More recently, a semi-trailer carrying uranium ore rolled on its side near Swissvale in February 2006 (*The Mountain Mail* 2006). The spilled ore did not reach the Arkansas River and was contained and cleaned up immediately. However, US 50 was closed in both directions for approximately 5 hours during the cleanup process.

Table 5.7-18. NRC Database Search Results

Site Location	Date	Incident	Substance
8 miles east of Salida	11/23/94	Tanker truck accident/rupture, released to Arkansas River	8,196 gallons of gasoline
11 miles E. of Salida	8/28/03	Tractor trailer truck accident, released to Arkansas River	2,000 gallons of liquid asphalt
Swissvale 1 mile east	7/6/94	Semi-tractor trailer turned over off a bridge released to Arkansas River	55,000 pounds of dry cement
Swissvale	8/21/03	Oil tank truck overturned, released to Arkansas River	Asphalt oil

Site Location	Date	Incident	Substance
Near Vallie	3/11/98	Freight train fuel tank rupture due to rocks on track (spill contained with booms and absorbent pads)	2,800 gallons diesel
Texas Creek 3 miles west	3/20/94	55-gal drum in Arkansas River; concrete curing agent in barrel lodged against rock shelf on river	Unknown
Royal Gorge	6/20/97	Motor vehicle left in Royal Gorge – releasing materials to Arkansas River	Oil, etc.
Agile Stone System near Cañon City	1/29/03	Materials released from a locomotive due to an unknown cause	Oil/fuel No. 2-D
near Swissvale* (MP 231)	2/15/06	Semi-trailer truck rolled on side in accident – spilling ore (it did not reach the river)	25 tons of uranium ore

*Based on *The Mountain Mail* (2006) newspaper article (not NRC database).

The Colorado Storage Tank Information System (COSTIS) database (CDLE 2006c) was searched for underground and above-ground storage tank (UST/AST) and leaking underground storage tank (LUST) sites in the project area in January 2006. UST/AST sites found in the project corridor are listed in Table 5.7-19. All of these sites are documented as "closed," indicating that there are no "event" investigation or cleanup activities in progress. Table 5.7-20 shows former LUST sites in the project area where cleanup activities have been completed. There are a total of 18 active tanks in the project corridor. Most of these are located in the area of Cotopaxi.

Table 5.7-19. Underground and Above-Ground Storage Tank Sites

Site Name	Location	# Inactive Tanks	# Active Tanks	Substance
Copper Gulch Midway Store	Texas Creek	2	0	Diesel, unleaded USTs
Wild Willies LLC	Cotopaxi	0	2	Unknown
Barry's Den	Cotopaxi	0	2	Gasoline USTs
Arkansas River KOA	Cotopaxi	0	2	Unknown
Cotopaxi Store Inc.	Cotopaxi	0	4	2 gasoline and 1 diesel USTs; 1 LPG
Cotopaxi Texaco	Cotopaxi	3	0	2 gasoline, 1 diesel USTs
Verda M. Young	Cotopaxi	2	0	1 gasoline, 1 diesel USTs
Cañon Trading Post	Cotopaxi	3	0	Unknown
Lazy J Resort	Coaldale	2	0	Unknown
Former Service Station	Cotopaxi	0	0	Unknown
Jim Foster Property	Howard	1	0	Unknown
CDOT Cotopaxi	Cotopaxi	2	0	1 gasoline, 1 diesel USTs
Cotopaxi Section HQ (Railroad)	Cotopaxi	1	0	Unknown
Cotopaxi County Shop	Cotopaxi	5	0	Unknown
Cotopaxi Trading Post	Cotopaxi	0	0	Unknown
Domtar Gypsum Quarry	Coaldale	2	0	Unknown

Site Name	Location	# Inactive Tanks	# Active Tanks	Substance
Fremont County Shop	Cotopaxi	0	2	1 diesel, 1 unknown ASTs
Louis Perniciaro	Howard	1	0	Gasoline UST
Frontier Cafe	Howard	0	3	1 diesel, 2 gasoline USTs
Broken Arrow Resort	Howard	2	1	2 gasoline USTs, 1 LPG
Chuck Knutzen Property	Howard	0	0	Unknown
Fremont School District RE-3	Cotopaxi	0	1	1 gasoline UST, 1 LPG
Fremont County Road and Bridge	Cotopaxi	0	0	Unknown
Sterling Homes	Cotopaxi	0	1	1 LPG

Table 5.7-20. Former Leaking Underground Storage Tank Sites

Site Name	Location	Date of Site Closure
CDOT Cotopaxi	Cotopaxi	3/28/95
Cañon Trading Post	Cotopaxi	7/26/95
Perniciaro Property	Howard	5/12/98
Chuck Knutzen Property	Howard	4/30/96
Fremont County Road & Bridge	Cotopaxi	7/22/97
Cotopaxi Texaco	Cotopaxi	2/9/98
Young Property	Cotopaxi	11/19/97
Lazy J Resort	Coaldale	6/22/00
Jim Foster Property	Howard	5/12/98

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS; EPA 2006a) and RCRA Information System (RCRIS; EPA 2006c) databases were searched in January 2006. No CERCLIS sites were identified in the project area. Two RCRIS sites were found in the project corridor: Rocky Mountain Photograph (160 Bremer) in Howard and CDOT Cotopaxi (this is also a UST site). These two sites were also identified during a search of EPA's Enforcement & Compliance History Online (ECHO) database (EPA 2006b). No sites in the vicinity of the Proposed Action were listed on CDPHE's list of State Voluntary Cleanup Sites or on the latest Colorado list of active solid waste facilities (2005a).

Transport of Hazardous Materials

Specific counts of vehicles transporting hazardous materials are not available for the project corridor. However, general counts and projections for truck traffic along the project corridor are shown in Table 5.7-21. Truck traffic increases eastward across the corridor from 7.7 percent of total traffic from mileposts 233 to 245 to 15.6 percent from mileposts 253 to 267. According to the Colorado State Patrol (2006), US 50 from the north junction of Colorado 141 near Grand Junction to the Kansas border is a designated east-west route for the transport of hazardous materials, but is not a designated route for the transport of nuclear materials.

Table 5.7-21. US 50 Truck Traffic Data (CDOT 2006)

Milepost Interval	AADT Single-Unit Trucks		AADT Combination-Unit Trucks		Percent Trucks
Year	2005	2010 Forecast	2005	2010 Forecast	2005
233-245	60	65	170	185	7.7
245-253	90	96	270	289	13.5
253-267	130	139	360	384	15.6

AADT: average annual daily traffic (2-way).
Single-Unit Trucks: delivery vans, UPS trucks, etc.
Combination-Unit Trucks: semi-tractor trailers.

Source: CDOT 2006c.

5.7.8.2 Impact and Mitigation Issues

Proposed Action

Numerous active underground storage tank sites are located within the project corridor area, but the database search and site reconnaissance did not identify any facilities of environmental concern located within the immediate project area. Spill records, however, indicate that past releases within the project corridor have affected the Arkansas River as a result of highway and railroad accidents. OTR installation and removal activities could increase chances for the accidental release of fuel or other materials from construction equipment. During the viewing period, increased visitor traffic might increase the risk of highway accidents that could lead to hazardous materials spills.

Accidental spills will be addressed through the OTR Operations Plans (see Appendix J). The OTR Operations Plans will identify all appropriate responders for hazardous and contaminated spills, and specify procedures that will be followed by the contractor for such incidents. All identified responders will be involved in developing the incident response plan. In general, all spills will be contained and cleaned up as soon as possible. All spills will be reported to the CDPHE Environmental Emergency Spill Reporting Line (1-303-239-4501). For spills involving hazardous materials, the local emergency response team will be contacted via 911. The telephone numbers for medical and emergency services will be maintained onsite. If any unplanned occurrence requires assistance, the site supervisor or designated person will contact the appropriate response team.

If suspected hazardous or petroleum products were encountered during installation, samples of the material would be collected and analyzed for metals, hydrocarbons, organic chemicals (volatile or semivolatile organic compounds), and other toxicity and characteristic parameters to determine what special handling and disposal requirements would be appropriate.

The Texas Creek staging area (for materials storage and installation staging) could be a major source of risk due to the possible mishandling of materials and accidental spills. All petroleum products and other hazardous materials (for example, fuel or solvents) used for installation purposes would be handled and stored to prevent accidental spillage or cause other harm to the project area. Stockpile management measures, including perimeter barriers, covers, and location considerations, would be used to minimize effects on local waterways from possible spills. The handling of materials would involve implementing appropriate training of personnel, specific storage techniques for different materials, proper labeling, containment techniques, cleanup specifications/equipment, and regular maintenance and inspection protocols.

Dewatering operations will be performed as consistent with applicable state and local permits. These practices remove and discharge excess water generated by storms or groundwater dewatering. Should

dewatering be required, permit acquisition (from CDPHE) for discharge of groundwater into nearby surface water may require water analyses, removal of specific contaminants to CDPHE- and EPA-approved levels, and lowering of total suspended solids (TSS) to acceptable levels.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. The No Action alternative would not result in any effects on the corridor area from hazardous materials spills or releases beyond what is typically occurring. In addition, there would be no intrusive activities associated with this alternative that might affect areas of soil or groundwater contamination.

5.7.8.3 Recommendations for Further Study

The original hazardous materials database search was performed in 1997. Although this information was updated based on available online databases in January 2006, a full database search should be performed as part of the EIS process to update and augment the information provided to date. The database search should be conducted near the completion of the Draft EIS to present the most up-to-date information possible.

5.7.9 Land Use

5.7.9.1 Affected Environment

The area of the Proposed Action along US 50 and the Arkansas River is predominately rural. The Arkansas River meanders through land managed by the BLM interspersed with parcels of privately owned land. The majority of the OTR area occurs in Fremont County along US 50 between mileposts 225 and 267, touching the edge of Chaffee County near milepost 225. The largest communities in the project vicinity are Salida to the west and Cañon City to the east. Small communities or developed areas located along US 50 and the Arkansas River from west to east are Wellsville, Swissvale, Howard, Coaldale, Cotopaxi, Texas Creek, and Parkdale. Area names and rural development are often associated with historic railroad sidings.

Map 5.8-1 shows the land ownership and county jurisdictions along the project area. The information regarding land ownership and jurisdiction in the project area was obtained from the BLM and Chaffee and Fremont counties. The Chaffee County Comprehensive Plan (Consensus Planning, Inc. March 2000) includes goals and objectives for Salida, which is located in the extreme southeastern corner of the county. There are no specific land use plans for this area except to note that Salida is identified as a focus area for growth and development. Fremont County does not have a Comprehensive Plan. Cañon City is a sufficient distance from the project area such that its land use and zoning plans are not within the project area.

Land Uses

The entire project area between mileposts 225 and 267 is rural. Land uses within the project area include residential, small commercial, and recreational, interspersed with small-scale ranch-based agricultural activities. Other uses include mining and mineral resource extraction, dispersed grazing, and transportation.

Commercial and retail development within the vicinity is located primarily in Salida and Cañon City, as are schools, libraries, and local government buildings. Two airports exist within the vicinity, one in Cañon City and one in Salida. Salida schools (District R-32-J) also serve western Fremont County. A Fremont District RE-3, K-12 school system is located in Cotopaxi, serving Howard, Coaldale, and Cotopaxi. Cañon City schools (Fremont District RE-1) serve the eastern portion of the project area. Commercial land uses from Wellsville to Parkdale are limited primarily to commercial river outfitters, a KOA campground, restaurants, small commercial stores, and a motel.

Arkansas Headwater Recreation Area

The AHRA is a landmark cooperative effort of the BLM and Colorado State Parks. Through this partnership, the agencies provide visitors with outstanding recreation opportunities and care for the nationally significant natural resources of the Arkansas Valley. The AHRA Arkansas River Recreation Management Plan (January 2001) covers the entire OTR project area (see Section 5.7.2 on Recreation for additional discussion). The AHRA planning process has as much if not more relevancy to OTR than county-level land use planning.

Public land access to the Arkansas River is complicated by four major impediments, according to the AHRA Management Plan: private land, the river, topography, and the railroad tracks.

5.7.9.2 Impact and Mitigation Issues

Proposed Action

No long-term direct impacts on land use will occur under the Proposed Action. The public lands will be returned to their original condition. However, there may be some short-term impacts on land use such as agricultural endeavors, fishing, and camping.

Residual positive economic impacts on the area could result in changes in land uses related to retail business or lodging. (See Section 5.7.4, Socioeconomics, for additional discussion.)

No mitigation is required for this resource based on information available at this time.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing would be installed. No impacts on land use would occur under the No Action alternative.

5.7.9.3 Recommendations for Further Study

Impacts and actions related to the Proposed Action and specific accesses to BLM and adjacent private lands need to be identified.

5.8 Other Critical Elements of the Human Environment

5.8.1 Cultural Resources (Historical and Archeological)

Cultural resources can be either prehistoric or historic and may also be archaeological. Prehistoric resources include the remains of artifacts or features representing one or more events. Artifacts include ceramics, bone, chipped stone, chipped volcanic glass, metal, perishable fiber, and wood. Features include stone, wood, earth, and mortar.

Cultural resources are nonrenewable and are protected under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (Section 106); 16 USC 470 et seq; revised Advisory Council on Historic Preservation 36 CFR 800 as well as under Section 4(f) of the US Department of Transportation Act of 1966.

Authorized under the NHPA, the National Register of Historic Places (NRHP) is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archaeological resources. Properties listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history.

Chaffee County

Fremont County

Salida

Cleora

OTR County Line Area

225

Wellsville

Swissvale

OTR Tunnel Area

230

Howard

235

50

OTR Vallie Bridge Area

Vallie

240

Coaldale

Pleasanton

245

Cotopaxi

Arkansas River

250

Texas Creek

OTR Staging Area

OTR Texas Creek Area

255

OTR Maytag Area

Echo

OTR Three Rocks Area

260

OTR Spike Buck Area

OTR Parkdale Area

265

Fink

270

50

275

Cañon City

9

69

LEGEND

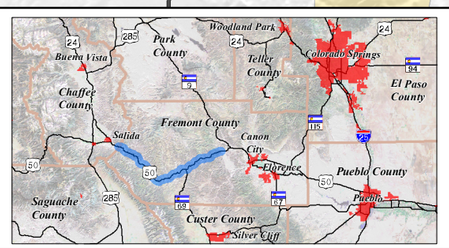
Cities
Counties
US Highway 50 Mile Posts
Highways
Railroads

Land Ownership

Bureau of Land Management Lands
US Forest Service Lands
State Lands
Private Lands

N
W
E
S
0
2.68
Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. Land ownership data provided by BLM. Jurisdiction information provided by CDOT.

Map produced February 2007 by J.F. Sato & Associates

OVER THE RIVER

Map 5.8-1. Land Ownership

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\Landstatus_11x17_061031.mxd)
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5.8.1.1 Affected Environment

Cultural Resource Setting along the Arkansas River Canyon

Prehistoric sites in the canyon include open lithic scatters, rock shelters, and quarry sites. Projectile point typologies indicate occupation during the Late Archaic and Late Prehistoric periods, from about 1000 BC on. Historically, the Ute Tribes used the canyon. Historic Euro-American sites in the canyon are primarily from mining and railroading, with some homesteading.

The most prominent site within the area of potential effect (APE), physically and historically, is the Denver & Rio Grande Western Railroad (D&RGW RR) (5FN779) created in 1870 by General William J. Palmer to serve the Front Range corridor and mining areas to the west. The railroad reached Pueblo in 1871 and Cañon City in 1874.

Competition for the right to construct a railroad through the Arkansas River canyon escalated into the "Royal Gorge War" of 1878–1880, a conflict between the Denver & Rio Grande and the Atchison, Topeka, and Santa Fe railroad for the rights to lay tracks to reach Leadville (Little 1957, Beebe and Clegg 1958). Several historic sites along the canyon are associated with the Royal Gorge War. At least 11 sites consist of dry-stacked stone wall structures positioned high on the canyon walls, providing gunmen with strategic overlooks to the river and canyon below. These structures are referred to as the DeRemer Forts, named after James R. DeRemer, chief engineer of the Denver and Rio Grande Railway, who directed their construction. A number of these structures are now located on land managed by BLM.

The D&RGW RR gained legal control of the canyon in February 1880. The railroad, owned by Southern Pacific at the time of the 1997 survey, described below, is now owned by the Union Pacific Railroad Company. The Arkansas River Canyon corridor portion of the railroad has been documented recently as a district, a rural historic landscape that is eligible to the NRHP and significant at the state level.

Eligibility for Listing on the National Register of Historic Places

To be eligible for the NRHP, a historic property, typically, must be 50 years old or older and meet the following integrity and significance requirements per 36 CFR 60.04:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and:
(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
(b) that are associated with the lives of persons significant in our past; or
(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
(d) that have yielded, or may be likely to yield, information important in prehistory or history.

A complete cultural resources inventory of the project area was to have been completed by Native American Cultural Services (Peter Gleichman, Principal Investigator). An initial inventory (Appendix G) was completed on December 18, 1997, in coordination with and with the verbal approval of the BLM Royal Gorge Field Office, Cañon City. Mr. Gleichman was subsequently approved by email by BLM (Weimer, April 20, 2006) to complete the updates needed. The text that follows explains what was done for the 1997 inventory and what changes are needed to update the inventory due to changes in alternative definitions.

File and literature searches (Class I survey) and the Class III survey[1] were conducted for the 1997 OTR APE (see below). Subsequent to changes in the alternative definitions, a 2006 OTR APE has been defined. The 2006 OTR APE has not been reviewed by or received approval from BLM or Colorado Office of Archaeology and Historic Preservation (OAHP).

Area of Potential Effect (APE)

A flexible APE has been feet from the river's banks, on both the north and south sides of the river. At that time it was understood identified for the project.

The 1997 OTR APE was defined as including seven segments of the Arkansas River Canyon, covering a total of 10.1 miles between Parkdale Siding and extending west 0.4 miles into Chaffee County. The inventoried area extended 100 that all direct effects would occur within 50 feet of the river banks. An additional 50-foot buffer zone was included.

The seven segments previously inventoried are within current areas called County Line, Tunnel, Texas Creek, Maytag, Three Rocks, Spike Buck, and Parkdale. Because of changes in alternative definition, additional Class III survey work is required: Vallie Bridge, additional parts of all the areas except Maytag, additional polygons throughout between the railroad access and the river, and a project staging area in the Texas Creek area. Additional areas requiring a Class III survey are identified on Map 5.8-2, which shows the 1997 OTR APE and the proposed 2006 OTR APE.

1997 Inventory Results

Table 5.8-1 summarizes inventory results based on the 1997 OTR APE only. Both previously recorded and newly recorded sites are identified. Note: Locations of historic resources on BLM lands are not subject to the Freedom of Information Act and are therefore not revealed in the data provided in this report.

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[1]Cultural Resource Survey Classes Defined:

Class I. A Class I survey or literature search involves the thorough review and synthesis of the existing literature concerning a survey area.

Class II. Any type of sample survey that involves less than a 100 percent survey of a project area is considered a Class II survey. This type of survey is often done to locate obvious features such as historic districts, buildings, structures, and objects.

Class III. A Class III survey involves 100 percent pedestrian coverage of a project area. Generally this involves walking transects at a set interval or coverage of the area along contour lines. This type of survey provides detailed information of historic and archaeological sites.

Colorado Cultural Resource Survey Manual, Volume I: The Steps published by the Colorado Historical Society's Office of Archaeology and Historic Preservation Office (page 16) revised in 2005

BLM Cultural Information Redaction Notes
Christo and Jeanne-Claude *Over the River* Design and Planning Report

BLM is required to protect cultural resources and information on public lands under the National Historic Preservation Act (Section 304). On 12/19/2007, BLM-RGFO redacted the following cultural sections from the OTR report for delivery to EIS cooperating agencies:

Table 5.8-1; page 5-183

5.8.1.2 Impact and Mitigation Issues

Proposed Action

Based on the 1997 Class III survey, except for the D&RGW RR, no historic properties will be affected by the Proposed Action. All other NRHP-eligible resources are located north of the railroad, and thereby outside the actual area of direct impacts. The D&RGW tracks will be used to stage the installation and removal of the proposed temporary work of art.

OTR viewing is expected to attract 380,000 visitors to the Arkansas River Canyon. Because of the level of traffic and crowd management controls anticipated for OTR, no indirect effects on the identified NRHP Eligible Historic Properties are anticipated. All visual and noise effects on NRHP eligible historic properties will be temporary. Based on the 1997 survey data available, no mitigation measures will be required.

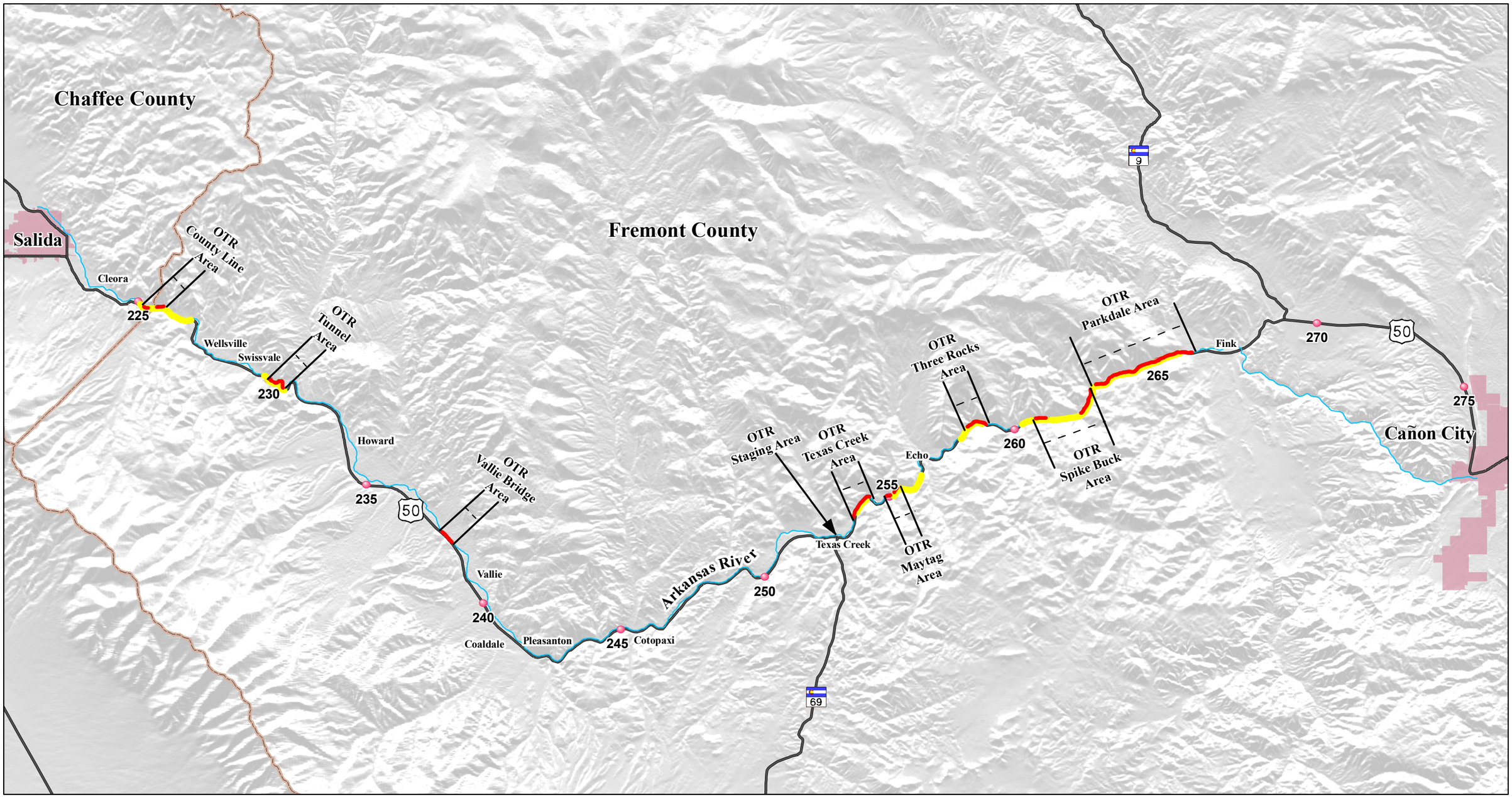
No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing will be installed. No historic properties will be affected by the No Action alternative.

5.8.1.3 Recommendations for Further Study

Per Section 106 of the National Historic Preservation Act (as amended) and revised Advisory Council on Historic Preservation 36 CFR 800 -- PROTECTION OF HISTORIC PROPERTIES, determinations of the area of potential effects (APE) require lead agency (in this case BLM) consultation with the State Historic Preservation Officer (SHPO) and consulting parties. Typically, all areas where the undertaking may cause changes to land or structures, or to their uses, whether the changes would be direct or indirect, beneficial or adverse, are part of the APE. Once the APE has been identified, the focus shifts to the search for historic properties. The National Register of Historic Places (NRHP) is the nation's official list of cultural resources worthy of preservation. Again, consultation occurs with the SHPO and consulting parties on the identification of historic properties and their determinations of eligibility to the NRHP. Assessment of effects and mitigation also include the SHPO and consulting parties.

The 2006 OTR APE definition must be reviewed and approved by BLM, Colorado SHPO, and other consulting parties. A methodology update will be required upon completion of expanded Class I and III surveys. 2006 The OTR APE Class III Survey must be completed for expanded APE. See Appendix G for detailed maps of 2006 OTR APE and original 1997 APE.



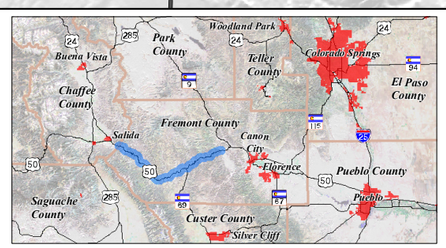
LEGEND

- Cities
- Counties
- US Highway 50 Mile Posts
- Highways
- 1997 Cultural Resource Inventory Area
- 2006 Expanded Area of Potential Effects (APE)

N
W E
S

0 2.68 Miles

SCALE - 1:170,000 or 1" = 2.68 miles



SOURCE - Hillshade created by J.F. Sato and Associates. Panel locations provided by Golder and Associates. 1997 cultural study area provided by BLM. 2006 expanded APE provided by J.F. Sato and associates. Jurisdiction information provided by CDOT.

Map produced February 2007 by J.F. Sato & Associates.

OVER THE RIVER

Map 5.8-2. Cultural Resource Inventory Area

Map Document: (V:\Projects\OTR\Maps\OTR_Proposal_Maps_Dec06\APECorridorMap_11x17_061031.mxd)
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5.8.2 Native American Religious Concerns

5.8.2.1 Affected Environment

As mandated by Section 106 of the National Historic Preservation Act (as amended) and revised Advisory Council on Historic Preservation regulations (36 CFR 800), the lead agency (BLM) must contact all the federally recognized Indian tribes with established interest in Fremont and Chaffee counties. These tribes would be invited to become consulting parties for the project, thus acknowledging the government-to-government relationship between the United States and sovereign tribal groups. Federal agencies must be sensitive to the fact that historic properties of religious and cultural significance to one or more tribes may be located on ancestral, aboriginal, or ceded lands outside modern reservation boundaries.

This proposed temporary work of art must comply with the requirements under the American Indian Religious Freedom Act (AIRFA) and the National Historic Preservation Act (NHPA) that mandate public input from American Indian Tribes when BLM projects may affect Indian religious practices or sacred areas.

Potentially affected tribes were contacted by BLM for this project. The tribes were notified of the area of potential effect (as defined under Section 106 of the National Historic Preservation Act) and asked for input. However, per a BLM email, the OTR project records of Native American Consultation (pre-2001) were inadvertently destroyed (Weimer email, April 20, 2001). Native American Consultation for the OTR project must again be initiated.

5.8.2.2 Impact and Mitigation Issues

Proposed Action

The Native American Consultation process needs to be redone.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing will be installed. The No Action alternative will not have any impacts to Native American religious concerns.

5.8.2.3 Recommendations for Further Study

Native American Consultation for the OTR project must start over and be completed, and impacts and mitigation measures determined.

5.8.3 Environmental Justice

5.8.3.1 Affected Environment

Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority and Low-Income Populations,” was signed on February 11, 1994, and published in the Federal Register on February 16, 1994. The purpose of the EO is to determine whether the construction and operation of projects with federal involvement would result in disproportionate effects on minority and low-income populations.

The purpose of the environmental justice regulations is to ensure that minority and low-income populations and minority-owned businesses do not receive “disproportionately high and adverse effects” as a result of federal actions.

Adverse effects are defined as all significant individual or cumulative health or environmental effects, including interrelated social and economic effects. If such effects are predominately borne by minority or

low-income populations, or if those populations would suffer greater or more severe effects than others, then the effects are considered disproportionate and adverse.

Two questions form the basis for analysis of environmental justice issues:

- Does the potentially affected area include minority and/or low-income populations?
- If there are minority and/or low-income populations who would be affected, are the adverse environmental impacts likely to fall disproportionately on either population?

Review of 2000 US Census data for counties indicated that minority populations represented 13 percent of Chaffee County and 19 percent of Fremont County. Analysis of block group statistics for Census Tracts in proximity to US 50 and the Arkansas River in the project area shows minority populations at 9 percent in Chaffee County and 7 percent in Fremont County, well below the county averages (US Census Bureau 2000).

As a simple indicator of the potential for low-income populations in the project area, US Census data on numbers of households below the poverty level were checked for these same block groups. While 12 percent of households in each county was shown as below the poverty level in 1999, 16 percent of the population in the block group near the project corridor in Chaffee County and 10 percent of the population in the block groups near the project corridor in Fremont County were identified as below the poverty level in 1999. This information is summarized in Table 5.8-2 and Table 5.8-3.

Table 5.8-2. Fremont County Minority Population and Households with Incomes below Poverty Level Summary

Census Block Group	9790.1	9790.2	9790.3	9790.4	Total	County
Hispanic or Latino	22	36	39	38	135	4776
White alone	399	811	825	885	2920	37408
Other races	13	12	26	39	90	3961
Total minorities	35	48	65	77	225	8737
Total	469	907	955	10394	3145	46145
% minorities	7	5	7	7	7	19
Total households	161	379	396	375	1311	15254
Households below poverty	4	35	35	53	127	1829
% below poverty	2	9	9	14	10	12

Source: US Census American Factfinder, Census 2000 Summary File 1 - P8 and Census 2000 Summary File 3 – P92.

Table 5.8-3. Chaffee County Minority Population and Households with Incomes below Poverty Level Summary

Census Block Group	2.3	3.1	Total	County
Hispanic or Latino	129	21	150	1393
White alone	1473	566	2039	14174
Other races	43	9	52	675
Total minorities	172	30	202	2068
Total	1602	596	2198	16242
% minorities	11	5	9	13
Total households	653	236	889	6612
Households below poverty	118	28	146	794
% below poverty	18	12	16	12

Source: US Census American Factfinder, Census 2000 Summary File 1 - P8 and Census 2000 Summary File 3 – P92.

5.8.3.2 Impact and Mitigation Issues

Proposed Action

Minority populations larger than the county averages have not been identified for census block groups along the project area for either Chaffee or Fremont counties. Although one block group in Fremont County had a population living below the poverty level that exceeded the county average, the excess was not large and the overall project area percentage below the poverty level for Fremont County does not exceed the county average. Chaffee County census block groups along the western edge of the project area do exceed or equal the county average for populations below the poverty level. Should there be direct impacts on residents in this area, it would be necessary to examine the likelihood that impacts would fall disproportionately on the low-income populations.

If it is confirmed that no direct impacts or disproportionate impacts will occur to minority or low-income populations from the Proposed Action, no mitigation will be required for this resource. However, if direct or disproportionate impacts are identified, then mitigation measures will be needed.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing will be installed. No impacts will occur under the No Action alternative to minority or low-income populations.

5.8.3.3 Recommendations for Further Study

Should there be direct impacts on residents in the low-income areas, it will be necessary to examine the likelihood that impacts would fall disproportionately on the low-income populations.

5.8.4 Wilderness, Areas of Critical Environmental Concern, Wild and Scenic Rivers

5.8.4.1 Affected Environment

Special Management Areas

Two special management areas exist within the project area, the McIntyre Hills Wilderness Study Area (WSA) and the nominated Arkansas Canyonlands Area of Critical Environmental Concern (ACEC). Information regarding special management areas within the project area was obtained from the BLM, the

Royal Gorge Resource Area Resource Management Plan and EIS (BLM 1995), and the BLM Management Situation Analysis.

Wilderness Study Areas

The McIntyre Hills WSA is located on the south side of the Arkansas River between Texas Creek and Parkdale. Under the BLM's interim management guidelines, proposed activities in WSAs must (1) be temporary, (2) not cause any substantially noticeable impact following reclamation, and (3) not impair the suitability of the WSA for wilderness designation (BLM 1993).

Recreation Management Areas

About 109,000 acres of the Arkansas River corridor is currently managed as the Arkansas River Special Recreation Management Area by BLM. A portion of the Arkansas River corridor, about 5,000 acres, is currently managed for recreation as the AHRA. Day-to-day management is conducted by the Colorado Division of Parks and Outdoor Recreation in partnership with BLM. Management involves shoreline activities and boating. The two affected water conservancy districts and the Bureau of Reclamation are the largest water cooperators on the Arkansas River. The AHRA has many small turnout sites as well as several larger pulloffs available for day use activities. These are commonly used by tourists and residents for picnics, wildlife viewing, gold panning, and numerous other activities.

Areas of Critical Environmental Concern (ACECs)

No designated ACECs occur within the project area. The Arkansas Canyonlands area, however, is located within the project area and has been nominated for ACEC designation. This area was recommended primarily for scenic and recreation values as well as for its resident bighorn sheep herd and botanical resources. The Arkansas Canyonlands ACEC area spans US 50, and extends from west to east along US 50 from approximately Texas Creek to Cottonwood Creek.

Wild and Scenic Rivers

The 1968 National Wild and Scenic Rivers Act (Public Law 90-542; 16 U.S.C. 1271-1287) is the nation's primary river conservation law. The act was specifically intended to balance the existing policy of building dams on rivers for water supply, power, and other benefits with a new policy of protecting the free-flowing character and outstanding values of other rivers. The act provides a mechanism for the preservation of selected rivers and streams in a free-flowing condition for the benefit and enjoyment of present and future generations. To accomplish this goal, Congress established the National Wild and Scenic Rivers System (NWSRS) as well as a process to add rivers to the system in 1968. Today there are 156 rivers totaling nearly 11,000 miles in the national system. The act:

- Bans all new dams and other potentially harmful water development projects
- Restricts activities that would impair a designated river's "outstandingly remarkable values"
- Ensures that water quality at the time of designation is maintained and enhanced
- Creates a federal reserved water right for the amount of unappropriated water that is necessary to protect a designated river's special values
- Requires the development of a cooperative river management plan to govern future management of a designated river.

Eligibility and Classification

The act requires a river or river segment to be free-flowing and, within its immediate environment, have one or more outstandingly remarkable values. The boundaries of any river proposed for potential addition to the NWSRS, as specified in section 4(d) of the act, are usually limited to that area measured within 0.25 miles of the ordinary high watermark on each side of the river. After determining eligibility of a river for inclusion in the NWSRS, it must be tentatively classified according to the category (wild, scenic, or recreational) most appropriate for each eligible segment.

Classification is based on the degree of naturalness and the extent of development of the river and adjacent lands as they exist at the time of the study. Classifying a study river as wild, scenic, or recreational does not segregate or withdraw the subject lands but rather recommends a level of interim management for federal lands in the river area until a decision on designation is made by Congress. Specific management strategies may vary according to classification, but would be designed to protect and enhance the outstandingly remarkable values of the river area.

Arkansas River

The significance of the Arkansas River is related to the historical development of and access to many communities along the corridor. The river has nationally recognized recreation values that are very vulnerable to future development. The nationally significant recreational values of the Arkansas River exist to some degree because of transmountain diversion water, since native flows on the Arkansas River are probably insufficient to support a commercial whitewater industry through July and August (BLM 1993).

The Arkansas River has been modified in the last 150 years through development of the two transportation corridors, US 50 and the Denver-Rio Grande Western Railroad, which has changed the character of the river shoreline. The river study corridor is still, however, in an essentially natural state. The river is managed as a water conduit for downstream water rights owners and is manipulated daily to provide water storage and flow for downstream need.

Royal Gorge Resource Area

Before the Royal Gorge Resource Management Plan (RMP) (BLM 1993), no stream within the resource area had been analyzed for inclusion in the NWSRS. During the RMP approval process, all potentially eligible stream segments were studied for eligibility for wild and scenic designation. A detailed description of the process is included in Appendix L of the Draft RMP and EIS (BLM 1993). All streams and rivers in the Royal Gorge Planning Area were analyzed for eligibility under the specific provisions included within the act. Only the Arkansas River, Segments 1 through 4, and Beaver Creek were determined to be eligible. This determination was made according to specific criteria included within the act and Department of Interior guidance. Further consideration by a team of resource specialists also determined the Arkansas River and Beaver Creek to be “suitable” for designation. Appendix L of the Draft RMP and EIS is the public record of the study for potential designation of two additions to the NWSRS. The study was conducted between December 1989 and March 1991. As part of the RMP, two streams were analyzed for potential addition to the NWSRS. These streams included a l26-mile stretch of the Arkansas River from Leadville downriver to the Royal Gorge Park, and a 20-mile stretch on the main branch and east branch of Beaver Creek from below Skagway Dam downstream to the southern boundary of the Beaver Creek State Wildlife Area.

Two segments of the Arkansas River in the OTR corridor area were evaluated for WSRS designation during the 1993 through 1995 BLM planning process (BLM 1993; BLM 1995). Segment 3 of the Arkansas River begins at Salida and continues downstream to Vallie Bridge, and Segment 4 begins at Vallie Bridge and continues downstream to the western boundary of the Royal Gorge Park. Segments 3 and 4 met all suitability criteria as defined in the act and were considered eligible for designation because of the outstanding recreational values of the segments. Although channelization and development (including US 50 and the railroad corridor) have affected the natural state of these segments, these segments are still considered to be in a predominantly natural state and are nationally valued for their recreational amenities.

Approved Resource Management Plan and Record of Decision

According to the Final EIS and ROD (BLM 1995; BLM 1996), neither the Arkansas River nor Beaver Creek was recommended for WSRS designation because BLM believed it was not a realistic option for

providing protection to the streams. Beaver Creek is protected currently by the existing wilderness study area boundary and the existing management agreement between BLM and the Colorado Division of Wildlife. In addition, the Arkansas River is not a "wild" river as defined by the act and is among the most intensively managed in the nation.

The Final EIS (BLM 1995) documented comments received on the Draft RMP and EIS. Many commenters expressed strong concern about BLM not recommending the Arkansas River Corridor for wild and scenic river designation, stating that the national recreation area (NRA) designation would not adequately protect the outstanding remarkable values within the river corridor. In response, BLM stated the following:

> *…wild and scenic river designation is a battle that cannot be won. The Federal Reserved Water Right (FRWR) required as part of a W&S river is such a controversial issue that it prevents or delays interminably meaningful progress in terms of river protection. The issue that separated factions in the long discussion over additional Colorado wilderness areas completed this past winter was the FRWR. A bill was passed in 1993, but the issue was not resolved. The new wilderness bill simply does not discuss the FRWR because, unlike the Wild and Scenic Rivers Act, it is not a requirement of the original Wilderness Act. In the case of the Arkansas River, the application of an FRWR is unrealistic because the river is currently fully appropriated under Colorado water law, leaving no water available for application of the FRWR. What current adjudicated water right should be taken to provide for a FRWR? Should it simply be confiscated through condemnation or purchase? How much water is needed to "protect" the river and how many rights holders will be affected? How is that water purchased? What is a realistic value? Imported water (water not native to the Arkansas River drainage) is in addition exempt from the FRWR. Depending on whom you ask, imported water constitutes half to three-quarters of the river flow after the annual high runoff period. That water will never be affected by a FRWR. The problems with adequate flows for whatever purpose you favor are during the low flow period during the summer, fall, and winter, when imported water makes up such a considerable percentage of available flow. The central issue on the Arkansas River is resource protection, not wild and scenic rivers. Currently, all affected parties are working cooperatively to manage the river; i.e., provide for delivery of water to downstream rights holders, maintain recreational values for float boating and fishing, and strive to provide for the needs of aquatic life in the river. The Wild and Scenic River Study Report documented the 'outstandingly remarkable" recreational value of the Arkansas River. It is worthy of strong protection because of the value to individual recreationists as well as the economy of the upper Arkansas Valley. The recreational value of the river, however, is just one significant value. The river is of significance to one-fourth of 'the residents of the state for domestic water and supports a significant percentage of Colorado agricultural industry. Initiating a Federal reserve water right, is of doubtful value, will only destroy the cooperative efforts to manage the Arkansas River, probably the most intensively managed river in the entire nation.*
>
> *The proposed national recreation area (NRA) can promote river protection by encouraging the cooperative management of the river. An NRA proposal would have to be written specifically for the Arkansas River. There is no "umbrella' Congressional act such as the National Wild and Scenic Rivers Act that would be used to provide protection. This is actually an advantage in terms of providing protection to the river because it is not encumbered by the unresolvable baggage of a Federal reserve water right.*

Additional discussion of the NRA and the Arkansas River corridor as a recreation area is included in Section 5.7.2, Recreation.

5.8.4.2 Impact and Mitigation Issues

Proposed Action

Since there are no designated wild and scenic rivers (or river segments) in the project corridor, the Proposed Action would not affect wild and scenic rivers. The Arkansas River is a recognized NRA and is protected through BLM management activities as well as other federal and state water resources and water quality regulations (see related discussions in Section 5.4.2, Hydrology and Water Rights; Section 5.4.3, Water Resources, Surface and Ground; and Section 5.7.2, Recreation). The proposed work of art is a temporary installation and supports the recreational and aesthetic values of the river corridor. Effects on recreational resources are further discussed in Section 5.7.2.

Mitigation

Mitigation activities to protect recreation resources and special uses of the river corridor are discussed in the OTR Operations Plans (Appendix J), and in Section 5.7.2, Recreation. Mitigation activities will also protect the natural amenities of the river corridor, including water quality, vegetation, and wetlands. Foot traffic along the corridor might be limited during installation and removal periods as well as during viewing through access control measures if directed by the BLM (see Section 5.7.1, Transportation and Access). Commercial rafting is an important aspect of project viewing and will be managed accordingly. Fishing, hiking, and other recreational activities in the immediate project vicinity will be managed as discussed in the Event Management Plan, in Appendix J2.2.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing will be installed. The No Action alternative will not have any effects on wilderness, Areas of Critical Environmental Concern, or Wild and Scenic Rivers.

5.8.4.3 Recommendations for Further Study

Further investigation as to the status and appropriate documentation of ACECs in the vicinity of OTR should be performed during followup studies. Such investigation should include consultation with the BLM.

5.8.5 Farmlands, Prime and Unique

5.8.5.1 Affected Environment

Farming within the project area includes both irrigated and nonirrigated lands. Crops raised include hay, alfalfa, and pasture grasses. No prime or unique farmlands, as categorized by the Natural Resource Conservation Service (NRCS 1995), exist within the project area because of the short growing season and unsuitable soils. The nearest area of prime farmlands is east of Cañon City. The majority of the Arkansas River corridor is made up of forest and wooded land. Privately owned irrigated cropland occurs near Howard, Cotopaxi, Texas Creek, and Parkdale, primarily on the south side of US 50.

5.8.5.2 Impact and Mitigation Issues

Proposed Action

Since no areas of prime farmland were identified in the area of OTR, the Proposed Action will not affect prime farmland. Mitigation is not necessary since no impacts are indicated.

No Action Alternative

Under the No Action alternative, no temporary work of art for public viewing will be installed. There will be no effects on prime farmland from the No Action alternative.

5.9 Unavoidable Adverse Impacts

This disclosure is required under NEPA and the CEQ regulations regarding OTR's implementation. This preliminary analysis to date has identified several unavoidable, adverse, environmental impacts of OTR:

- Wildlife (Section 5.3.3): There is the likelihood of short-term disturbance and possible displacement of species of high public interest, most notably bighorn sheep.
- Threatened and Endangered Species (Section 5.3.1) and Migratory Birds (Section 5.3.4): The bare cables create the potential for collisions by birds that would result in injury or death. The consultation process with the USFWS may result in mitigation for this potential effect, but the cables may still result in unavoidable adverse impacts. Populations of sensitive plants (i.e., Arkansas Canyon stickleaf) may be affected by construction activities and possibly by the viewing public (trampling).
- Transportation and Access (Section 5.7.1) and Socioeconomics (Section 5.7.4): There would be short-term disruptions to routine for local residents and commercial traffic, mainly because of an increase in travel and commuting times due to lane closures during installation and removal activities and due to congestion from the large number of visitors during the viewing period. Traffic management and emergency response management would occur to ensure public safety, but there would still be inconveniences experienced by those who live and work in the project area.
- Recreation (Section 5.7.2): Potential negative impacts might occur to the fishing community, which has expressed concern for negative effects on the fishing experience in the project area. These impacts could result in negative impacts on fishing-related businesses and to owners and employees of these businesses, such as fishing guides.

5.10 Short-Term Uses Versus Long-Term Productivity

This disclosure, required under NEPA, identifies the costs, in terms of natural resource productivity in the long term (that is, over decades or centuries), that are projected to result from the short-term use by the Proposed Action. In this case, authorization of OTR Corporation's proposed use of public lands in the permit area will involve no such impacts identified to date. All impacts on air, water, soil, vegetation, and wildlife identified in this analysis will be temporary or able to be mitigated, and thus will have no effect on the long-term productivity of the natural resource base.

5.11 Irreversible or Irretrievable Commitment of Resources

This required disclosure identifies commitments of resources that, in practical terms, cannot be regained. Irreversible commitment of a resource means that, once committed, the resource is lost to other uses and the effects on it are not reversible. This type of commitment generally applies to nonrenewable resources (for example, minerals, geologic features, or cultural resources) or to resources that are renewable only over a very long period of time (for example, soil productivity or perhaps old-growth forest). The impacts identified through this analysis to date do not fall in this category. If BLM authorization of OTR Corporation's use was issued and subsequently revoked, the site could be reclaimed and returned to its previous ecological function, the socioeconomic and way of life for local residents would return to pre-project conditions, and traffic patterns would again be similar to those without the project.

Irretrievable commitments of resources involve lost use or productivity of resources. Any such loss resulting from authorization of OTR Corporation's proposed use of the permit area would be considered irretrievable. Based on this definition, OTR might entail some irretrievable commitments of economic

resources from lost wages by residents due to traffic impacts during installation and removal periods and especially during the viewing period. The Draft EIS should discuss in general terms the Proposed Action's irreversible and irretrievable commitment of resources. This general discussion might recognize that the alternatives would require a similar commitment of resources.

An example of such discussion would be as follows:

> Implementation of the Proposed Action and all alternatives involves a potential irretrievable commitment of economic resources. Any lost wages due to impacts from OTR are considered an irretrievable commitment during the time period that the land is used for the project. The commitment of resources in this case may be offset by beneficial effects of income brought to the area by the OTR project, and other project benefits such as a potential improvement in emergency services and other resources that receive research funds (such as studies on sensitive plant species in the project area) unavailable otherwise, and benefits to Public Art. This balance needs to be defined in order to determine the extent and acceptability that losses of wages to some people are offset by increased opportunities for others.

5.12 Mitigation Summary

Table 5.12-1 summarizes the mitigation issues and recommended mitigation measures for OTR.

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Table 5.12-1. Summary of Resource Mitigation Based on Preliminary Analysis*

Resource Topic	Issues	Mitigation
5.3.1 Threatened, Endangered, and Sensitive Species	Effects on: • Federally listed threatened or endangered species • Colorado Division of Wildlife listed species as threatened, endangered, or species of concern • Species on sensitive species lists developed by BLM • Species identified by the CNHP as rare or endangered	• Avoiding known habitats where possible would minimize habitat loss for TES species. Nest sites, roost sites, and element occurrence sites of T&E plants have been documented and would be avoided, to the extent possible. • To minimize the potential for bird-cable collisions, cable-marking techniques (known as bird flight diverters [BFD]) will be evaluated for installation on the supporting cables. Certain BFDs have proven effective in reducing bird mortality and have been acceptable as mitigation. The US Fish and Wildlife Service will be consulted. • Prohibiting construction around known nest sites during the nesting season of April to mid-July to avoid loss of nests, hatchlings, or disruption of nesting activities. • Prohibiting construction activities within 0.50 miles of golden eagle nests during the nesting period of March through August. • Manipulating anchor locations to “finetune” them to avoid unnecessary disturbance in wetland, riparian, and shrub communities. • To minimize the potential destruction of sensitive plant species, the sensitive plant survey conducted by CNHP in summer 2006 will be used to identify sensitive plant locations ahead of the anchor installation crews as installations proceed along the corridor. Sensitive plant locations would be flagged so the work crews can avoid the plants, to the extent possible. • Some T&E plants are quite numerous in certain areas and some disturbance of plants may be necessary. To address this possibility, OTR Corporation will consult with the BLM to identify and quantify potentially disturbed species. • During the viewing period, strict management would be enforced for locations where parking and hiking can be allowed. Such locations would need to be on stable terrain and have clearance surveys conducted to ensure no sensitive plants are present. Restricted areas for foot traffic would be well marked and identified with high visibility tape and flagging.
5.3.2 Aquatic Wildlife	• Interference with wildlife movement, mortality, and reproduction from activities on the site for mammals, reptiles and amphibians, and aquatic wildlife • Direct habitat loss	Best management practices to minimize erosion are the best means of minimizing sedimentation effects on aquatic organisms. • Sediment fences would be installed below each anchor location (if warranted by site conditions). • Newly exposed soil and rock will be covered with erosion control fabric as needed to control erosion. • Working on slopes during high-intensity rain storms would be prohibited. • Grout used to place some of the anchors would be nontoxic. Any spills of grout would be immediately cleaned up and removed from the site for proper disposal. • Sites where vegetation damage occurs would be revegetated following removal of all facilities. • Erosion control measures such as erosion control fabric would be installed where needed, such as steep slopes and erosive soils. • Spills of fuel or other liquids during construction would be cleaned up and removed from the site. • Foot traffic would be controlled during the viewing period, to the extent possible, especially in areas with erosive soils or steep slopes.

5.3.3 Terrestrial Wildlife	• Interference with wildlife movement, mortality, and reproduction from activities on the site for mammals, reptiles and amphibians, and aquatic wildlife
	• Direct habitat loss
		• To eliminate or minimize potential effects on bighorn sheep, measures will include:
		  • Prohibiting project activities in areas designated as sensitive, lambing, wintering, or drinking areas by BLM or CDOW during the time of year when these areas are most likely to be used.
		  • Scheduling the viewing during August, which is late enough in the year to avoid disturbing ewes and their newborns. The Proposed Action uses gaps between panels to avoid lambing areas and other areas of critical sheep habitat.
		  • Providing an adequate buffer zone around BLM/CDOW designated sheep areas to minimize effects of human activities. CDOW has suggested a buffer of 0.25 miles.
		  • Ensuring that human presence on the north side of the river is kept at an absolute minimum. Monitors would be located only at points of access to the north side.
		  • Providing supplemental water, food, and mineral sources for the north side sheep herd in an effort to reduce their dependency on the river. Guzzlers have already been placed north of the river in 2000. Selected areas could be overseeded or fertilized to improve native grassland species forage. Supplemental feed could be dropped by air. Mineral licks could be established. Piñon-juniper areas could be thinned by burning or selected cutting to improve grazing and the visibility distance for the sheep to enhance habitat usability.
		  • Conducting pre- and post-work of art monitoring of sheep populations or activity levels and reproduction. Monitoring could be jointly funded by OTR Corporation, CDOW, and BLM. If post-work of art monitoring determines that fecundity decreased or mortality increased as a result of the work of art, develop a plan to import bighorn sheep from other Colorado herds to re-establish a self-sustaining herd. OTR Corporation would fund the transplant effort.
		• To minimize potential human-bear conflicts, as part of the transportation plan and crowd control, OTR Corporation would provide many trash receptacles throughout the corridor. Small trash containers would be emptied on a daily basis. The larger collection containers would be bear-proof. Monitors would direct the public to where trash containers are located to minimize littering.
		• To minimize potential effects on small mammals, access would be prohibited to the upland piñon-juniper habitats where many small mammals den and forage. Monitors would request that pedestrians not climb up into the piñon-juniper habitat. This effort would be part of the larger effort to minimize viewer access into the upland areas to avoid impacts on native vegetation and the spread of invasive and non-native species.
		To minimize potential effects on reptiles and amphibians, to avoid displacing reptiles and amphibians from riparian habitats along the river, foot traffic by work crews and by the viewing public would be kept to an absolute minimum in all moist substrates. All equipment traffic would be prohibited in moist substrates, to the extent possible.

Resource Topic	Issues	Mitigation
5.3.4 Migratory Birds	• Disturbance from project activities may stress individual birds, interfere with their foraging, cause them to be displaced to other habitat areas, or interfere with breeding and nesting. • Bird collisions with cables may occur, primarily after the cables are strung and before the fabric is placed, and again after the fabric has been removed.	CDOW has established recommendations on buffer zones for raptor species that include seasonal restrictions for human activity. The size of the buffer areas and restriction periods vary with the species' sensitivity to human intrusion and length of time for nesting and fledging. Those that apply to species in the project area are as follows: • Bald eagle winter roost restriction is a 0.25-mile radius between November 15 and March 15. A larger buffer of 0.5-mile radius is recommended if there is a direct line of sight from the roost to the activities. Approximately 40 roost trees have been identified that are regularly used by bald eagles in the winter. These trees are located from Texas Creek to Wellsville, but most are concentrated between Texas Creek and Cotopaxi. • Golden eagle nest site restrictions are recommended within 0.50-mile radius of a nest site between February 1 to July 15. Such restrictions would affect work in the Vallie Bridge Area, and possibly in the staging area and the Three Rocks Area. More precise nest site locations are necessary to determine if the staging area and Three Rocks Area are within the buffer area. • Peregrine falcon buffer area restrictions are similar to the golden eagle at 0.50-mile radius, but the seasonal restrictions are March 15 to July 31. No nest sites are close enough to any project areas where buffers for this species would be required. • Passerine species such as Lewis woodpecker and American dipper are also sensitive to human intrusion, but no buffer area suggestions were designated by CDOW. Reducing human intrusion near active nest sites of these species will be evaluated with the BLM and Audubon Society prior to construction activities and the viewing phase of the project. In all cases, it will need to be determined if the roost sites and nest sites are active or not to decide if buffer areas are warranted. Increasing the visibility of cables while they are strung without fabric is the best means of mitigating potential bird collisions. The following actions will be taken to address potential effects on bird species from the project structural components: • Consult with the US Fish and Wildlife Service. • Determine in conjunction with BLM biologists best measures to protect birds from collisions with bare cables during project construction and dismantling. • Avoid construction activities within buffer areas for raptor species (e.g., 0.50 mile of golden eagle nests at Vallie Bridge Area) during the nesting period of March through August.
5.4.1 Wetlands and Riparian Areas	• Loss of wetlands or other waters of the US, and riparian areas. • Reduced function of wetlands or other waters of the US, and riparian areas.	Wetlands and other water resources would have the potential to be affected during construction by erosion-sedimentation material and by runoff from disturbed areas. Wetlands and riparian areas would derive benefits from mitigation measures described for soils and vegetation. Specific mitigation measures will include the following: • Minimizing impacts on wetlands is an integral feature of the design of alternatives. The work of art is designed to be elevated above the river. To achieve that elevation, the anchor locations must be located at some distance up the banks and away from the river. Such locations largely keep the anchors and construction activities away from wetlands and riparian areas. Project design will be reviewed in areas where it appears that wetlands may be affected by anchor placement to evaluate ways to avoid these areas. BMPs will be used during construction operations, including: • Erecting exclusion fencing to protect wetlands from intrusions of equipment. • Erecting silt fencing and other erosion control materials to protect wetlands and stream systems from erosion run-in. • Locating equipment servicing and staging areas at least 100 feet from wetland and drainage systems to protect these areas from contaminants, and have absorbent materials on hand (pillows and barriers) for emergency spill control. • Revegetating construction areas as soon as possible to curtail erosion and rapid runoff that may affect wetlands and aquatic habitats. • Prohibiting construction activities during high intensity storm. • Maintaining existing vegetated buffers or establishing new buffers to protect wetlands and streams. • Restricting rafting rest and lunch stops in riparian areas of special value such as narrowleaf cottonwood and river birch galleries. Such galleries would be cordoned off to prohibit foot traffic. • Restricting public access to certain riparian areas along the banks and floodplains during the viewing period. Areas restricted to the public will be fully described in the Event Management Plan.
5.4.2 Hydrology and Water Rights	• Potential effects on Arkansas River flows and associated water rights. • Potential effects on rafters and other recreation users due to water rights issues and/or drought conditions during project viewing.	The Proposed Action would not affect the quantity of water available for various uses, including public supplies and agricultural uses. Flow in the Arkansas River is directly affected by water management activities. Based on the historical records, these activities have not dramatically altered flows, and the project viewing window occurs during a period in which river flow is generally enhanced through imported water. For aesthetic reasons (for viewers from the highway, viewing areas, and from boaters [rafting, kayaking]), it is important that river flows be maintained at levels typically suitable for rafting conditions. If there is a drought in the Arkansas River Basin during the project viewing, flow in the river might be compromised below levels deemed necessary for rafting and/or aesthetic preferences. In such a case, OTR Corporation would consider taking steps (in coordination with BLM and the rafting industry) to augment river flow during the viewing period using existing BLM water rights.
5.4.3 Water Resource, Surface and Ground	• Possible water quality effects on the Arkansas River from project installation and removal • Disturbance of vegetation from foot traffic during project viewing causing possible effects on stormwater sediment loads and subsequent impacts on the Arkansas River	There are currently no water quality impaired stream segments in the project corridor. BMPs to prevent and minimize erosion and protect area water quality would be employed during all phases of the Proposed Action. The following measures will be taken to project water quality and water resources: • River bank disturbance would be minimized during all phases of the project. • Excavated material resulting from anchor placement would be contained at the excavation site to reduce the potential for sediment to enter the river. • Methods of erosion control include covering newly exposed soil and rock with fabric and not working on slopes during high-intensity rainstorms. • Grout that is used to place some anchors would be nontoxic and contained at the site of application. • Any spills generated during project installation and removal would be cleaned up and immediately removed from the site for proper disposal. • Sites where vegetation cover is damaged would be revegetated with a BLM-approved seed mix of native species (in compliance with North American Weed-Free Forage Program certification standards), and erosion-control measures (such as erosion control fabric) would be installed where needed (for example, on steep slopes and erosive soils). • Erosion control measures are discussed in Section 5.5.4, Vegetation, and mitigation of disturbed vegetation is further described in Section 5.5.4.2 and in Appendix J1.1, OTR Installation, Removal, and Restoration Engineering Plan • Access to the riverbanks and floodplain would be controlled to the extent possible by the monitors, who would be spaced approximately 300 feet apart on the highway side of the river during the viewing phase. • Access to the railroad side of the river would be restricted. • Security personnel would be onsite during project construction and removal.

Resource Topic	Issues	Mitigation
5.4.4 Floodplains	• Potential flooding of the Arkansas River and tributaries could affect visitors in the corridor during the project viewing period, recreational users, project structural components, and area communities.	Flooding conditions (9-foot river levels) in the project corridor are very infrequent and existing water diversions and withdrawals during the summer months can affect river levels significantly (either decreasing or increasing flows). The presence of the cable anchors along the river banks and cables across the river are not expected to constitute an impediment to flood waters and these components are expected to be well above normal river flow elevations. Mitigation during a potential flood would include procedures for evacuation of Arkansas River Valley communities, residents, and visitors (during project viewing), and measures for minimizing potential damage from project structure components. These procedures could be detailed in a contingency plan.
5.5.1 Paleontological Resources	• Potential effects on area paleontological resources due to project installation, viewing, and removal activities.	No effects on paleontological resources are anticipated as a part of OTR at this time; therefore, no mitigation measures are necessary.
5.5.2 Geology and Mineral Rights	• Disturbance of rocks and geological features from project activities (including during anchor drilling activities) • Potential earthquake hazard during project viewing • Potential effects on area mining operations	Engineering studies have been conducted to ensure that all project materials and structures (anchors, steel wire cables, and fabric panels) will meet structural requirements to prevent damage to area geological features and prevent any geologic hazard issues. A Colorado engineering firm will test and provide certification for all components. The following measures will be taken to mitigate disturbance of rocks: • Every effort would be made to minimize disturbance of rocks during the anchor installation phase. • All fabric panels have been specifically positioned to avoid contact with rocks. • All installation work would be completed by professional contractors. • All project anchors would be removed following the viewing period. Where caissons are present, anchors would be removed and caissons would remain in place at least 12 inches below ground level. • All holes left in bedrock by rock anchors would be filled with matching color mortar. Although the chances of an earthquake occurring during the project viewing period are extremely low, it is recommended that an evacuation and contingency plan be included in the Final EIS that will include appropriate procedures for evacuation in the case of an earthquake or significant earthquake or other geologic hazard warning signs. Such planning should also include plans for protection of the corridor environment and residents in the case of failure of project structural components. The project does not directly affect any identified mining operations. The project viewing period is likely to encompass the greatest impacts on commercial traffic on US 50, including area mining operations. Traffic access and mobility impacts and mitigation plans are further addressed in Section 5.7.1, which may entail potential economic impacts on quarry operations.
5.5.3 Soils	• Disturbance areas include those experiencing foot traffic associated with anchor, cable, and panel installation and removal, vehicle/equipment traffic associated with installation and removal activities, vehicle/equipment traffic associated with access to anchor points, and the Texas Creek training and staging areas.	Soils along the project corridor are predominantly shallow over underlying bedrock and derived from granite and related rocks with an abundance of rock outcrops. Good vegetative cover is essential to hold these soils in place. Disturbance areas have been minimized by taking advantage of previously disturbed US 50 shoulders and by using the railroad corridor for equipment/vehicle transport. BMPs would be implemented during drilling of anchor points and placing anchors. Such practices include controlling rock and soil debris that is generated during drilling, and minimizing to the extent possible the amount of foot traffic that occurs on these areas. Any topsoil that is excavated during drilling would be preserved for use during reclamation upon removal of the project. Drilling and placement of anchors typically takes 3 to 4 hours at any one anchor point. Immediate and ongoing measures would be taken during and after anchor placement to minimize and avoid erosion and disturbance of soil and associated vegetation: • Placement of mats in work areas • Use of special treads for drill rigs and associated equipment • Covering of any disturbed areas or soil during work cessation • Minimize disturbance of sensitive soils and vegetation by placing anchors along previously disturbed areas • Use of horizontal drilling techniques to avoid disturbance of slopes • Use of the railroad to drill anchors and transport equipment and crews • Reclamation of areas of disturbance In addition to the measures above that would be performed during project installation and removal, measures would be taken during project viewing to ensure that soil disturbance from foot traffic and vehicle traffic is minimized. These measures are further described in Appendix J1.2 and Appendix J2.2.

Resource Topic	Issues	Mitigation
5.5.4 Vegetation	• Loss of vegetative cover	Mitigation measures for biological resources focus on reducing habitat losses as much as possible in areas that can be reclaimed. Mitigation measures that normally apply to construction projects to reduce impacts are listed below. Vegetation impacts would be minimized by constructing anchor locations on previously disturbed areas of the railroad right-of-way and US 50 right-of-way, whenever possible. Other measures to reduce the magnitude of construction impacts would focus on protecting the vegetation and re-establishing vegetation as soon as feasible. Specific mitigation measures to protect vegetation during construction will include: Salvaging topsoil for use in reclamation. When the anchor sites are constructed, any soil that is excavated would be placed in a large canvas bag. Each anchor site would have an identification number and that same identification number would be placed on the canvas bag of soil. The bags of soil would be stored in an off-site leased warehouse during the viewing. During anchor removal, the bags would be brought back to the site and placed near the appropriate anchor. After the anchor is removed, the bagged soil would be used to restore the ground to original contour and would be tamped to stabilize the site. Replacing soils to their original site should speed vegetation recovery because the soils contain inoculum (seeds and microbes) from the original site, although the viability of some species will be reduced by storage. Using BMPs and erosion control measures to reduce vegetation losses and sedimentation in areas adjacent to the anchor construction area. These would include: • Using mats to protect vegetation and surface soils from equipment tracks and tires when moving from the highway or railroad to access drill points. • Servicing of equipment on the railroad or highway ROW. Any spills of fuel, lubricants, hydraulic fluids, or solvents would be cleaned up with absorbent materials and properly disposed. • Containing spoil from drilling operations and using erosion control measures to curtail overland flow from drill sites. • Collecting water and drilling fluids used during drilling for proper disposal. • Restricting access to areas that are sensitive to trampling during the viewing to limit foot traffic from viewers and rafters. • Revegetating construction areas as soon as possible, using salvaged topsoil and BLM-approved, weed-free seed mixtures of native species adapted to area conditions. • Restoring areas that have been compacted by scarifying with hand tools, spreading by hand the appropriate seed mixture, and lightly raking the soil. The soil would be tamped with hand tools to complete the site reclamation.
5.5.5 Invasive, Non-Native Species	• Potential of project activities to contribute to the spread of noxious weeds	New weed infestations are most likely to occur where the soil has been disturbed by motorized vehicles, road maintenance, and recreation activity. Noxious weeds can be transported into and out of the project area by wind, water, tires, people, and animals both domestic and wildlife. The BLM and other cooperating agencies in the Upper Arkansas Headwaters will continue to use an integrated weed management approach to address the noxious weeds of concern. The increased number of visitors to the corridor would increase the possibility for soil disturbance and transport of weed seeds not only within the corridor but also to other areas in and outside of the county from vehicle tires, personnel clothing, and equipment. Installation and removal of OTR would take place when dispersal of noxious weed seed is the highest. The noxious weeds of greatest concern emerge early in the spring, flower in early summer, and set seed in mid- to late summer. The best control for weed management is to prevent noxious weeds from being spread into areas of disturbance. The following mitigation measures are recommended: • Minimize the area of disturbance. • Re-establish native vegetation on disturbed areas as soon after disturbance as practicable. • Use only certified weed-free seed and mulch materials. • Limit the number of vehicles and traffic pattern in the construction areas to the smallest practical size. • Wash construction equipment before use within the construction areas. • Monitor areas of disturbance for invasion of weed species, especially noxious weeds. Monitoring period should occur over several growing periods. Weed species can lay dormant in the soil for a long period of time until environmental conditions are suitable for plant growth. Diffuse knapweed and musk thistle are biennial plants. They form a rosette the first year and flowering plants the next growing season. Early detection and eradication is the best strategy to prevent the spread of noxious weeds. Educational materials on weed prevention, noxious weed species, and non-native invasive plants should be distributed with other information material regarding viewing of the temporary work of art.
5.5.6 Forest and Woodland Management	• Possible effects on managed forest and woodland areas from project installation. Installation of the cables and placement of the anchor points could result in the removal or trimming of individual trees.	The piñon-juniper vegetation along the river is not considered an operable stand for woodland management. No maintenance activities are planned within these areas, and they are not open for firewood cutting. Management of other activities such as recreation and fire suppression would continue as described in the resource management plan. If tree limbs are accidentally broken during project installation, they would be properly trimmed to prevent insect and further damage to the trees.
5.5.7 Range Management	• Potential effects from project activities on grazing allotments managed in the project corridor.	The proposed temporary work of art would not preclude access to the grazing allotments from US 50. Increased traffic and possible delays on the highway could, however, be a nuisance for livestock operators during the installation, viewing, and removal periods. This would primarily occur at the staging and crew training area at Texas Creek and at Vallie Bridge. The grazing allotment at Kerr Gulch ends at the end of September and dismantling of the fabric panels at Vallie Bridge could present traffic congestion if cattle are being trucked out of the allotment at the same time. Mitigation measures should include coordination to minimize disruption to range management activities.
5.5.8 Fire Management	• Potential effects of a wildfire on OTR. Such effects could damage structural components of the project or cause a safety hazard to visitors and area communities.	The full fire suppression strategy identified in the 2004 Fire Management Plan would remain in effect in the corridor along the Arkansas River. No further mitigation is required.

Resource Topic	Issues	Mitigation
5.6.1 Air Quality	• Motor vehicle emissions resulting from increased traffic during project viewing. • Vehicle emissions from equipment and dust generated during project installation and removal activities.	Because the Proposed Action is not anticipated to cause or result in violations of any NAAQS, mitigation measures for air quality would center on controlling fugitive dust during installation and removal. Mitigation measures for air quality will be developed and refined for the final project design. However, mitigation measures that normally apply to construction projects to reduce impacts are listed below. Construction impacts will primarily be mitigated through implementation of appropriate BMPs. Conceptual techniques for mitigation of impacts could include the following: • Require OTR workers to minimize trampling vegetation and all other ground habitat during all project phases • Artist provision of a bond to ensure proper restoration of all vegetation • Control fugitive dust through a fugitive dust control plan, including wetting of any disturbed areas during installation and removal phases • Minimize off-site tracking of mud and debris during installation and removal phases by washing construction equipment and providing temporary ground stabilization • Reduce emissions (related traffic congestion) by routing and scheduling construction trucks so as to reduce delays to traffic during peak travel times • Require appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel in order to reduce CO and NO_2 emissions in vehicular exhaust • Use the cleanest fuels available for construction equipment and other project vehicles to reduce exhaust emissions Traffic management measures would be implemented to minimize delays and concentrated air quality impacts (see Appendix J1.2 and Appendix J2.2).
5.6.2 Noise	• Increases in corridor noise levels from project alternatives due to: • Increased traffic volumes during project viewing • Equipment noise during project installation and removal • Increased localized traffic and activity during project installation and removal—especially near the project staging and training area. • Since the train track would be used for project installation activities, there would be some noise from the small train engine that would be used to transport project materials and equipment.	All three phases of project activity would have localized and temporary impacts on noise in the project area: installation, viewing, and removal. According to Colorado statutory authority (25-12-103), construction projects are limited to a maximum noise level of 80 dBA between 7 AM and 7 PM. Noise is limited to 90 dBA for 15 minutes during a 1-hour period between these times. Since drill noise measurements indicated maximum levels in the range of 80 to 90 dBA, mitigation measures would be used to lower audible noise from the drilling operations and other construction equipment. These measures would significantly reduce audible noise to persons using the river for recreation, persons at nearby residences or commercial operations, and area wildlife. Project installation and removal activities would be performed during daylight hours only when occasional loud noises are more tolerable. No one receptor would be expected to be exposed to construction noise of long duration; therefore, extended disruption of normal activities is not anticipated. Provisions would be included in the plans and specifications requiring the contractor to make every reasonable effort to minimize construction noise through abatement measures including: • Work-hour controls • Maintenance of muffler systems • Use of acoustical shrouds around the drill or entire drilling operation • Use of mufflers, and quieter backup alarms. Train track noise (during project installation activities) is expected to be intermittent and would not affect any specific area for a prolonged period. The training and staging areas near Texas Creek would be the hub of activity during all project phases. As such, this area would be a general noise source (additional traffic and persons involved in the project) for the surrounding area that is not currently present. However, these activities are not expected to generate noise levels that would be especially noticeable to area residents or recreational users. Increased sightseeing traffic is primarily expected during daylight hours when increased noise is generally more tolerable. Increased traffic noise during the two-week project viewing period would be limited through the use of traffic mitigation measures as described in Section 5.6.2 and through encouraged use of transit and carpooling for sightseeing activities.
5.6.3 Visual Resources	• Change to landscape setting and scenery. • Compliance with BLM visual resource management prescriptions. • Preliminary impact analysis for the Proposed Action includes two factors related to BLM VRM classifications: the visual impact of OTR during its two-week period of showing, and the impacts associated with the installation, removal, and restoration phases.	The defined purpose of the proposed work of art is to provide a contrast with the landscape setting of color, line, form, and texture. Details of the installation, viewing, removal, and restoration plans would allow determination of levels of visual impacts associated with installation crew and equipment presence, anchor and cable presence, and the gradual installation of fabric panels throughout the project area. The scenic quality, or overall impression retained after passing through the area, would be affected for area residents and recreation users, regardless of those who come expressly to view the work of art. Visual sensitivity would be high. Public reaction, a subjective dimension of the VRM criteria, would be high. The intention of the work of art includes eliciting public reactions, both negative and positive. During its two-week period of showing, changes in all of the basic elements (form, line, color, texture) associated with OTR would be evident in the characteristic landscape. Contrasts would be seen and attract attention. This is considered an impact based on VRM Class II criteria. If the BLM deems it necessary, a full visual inventory of the project area based on the OTR Operations Plans would be needed. This inventory should consider existing visual characteristics of each area contrasted with the Proposed Action and alternate actions. However, the temporary nature of the impacts might not deem necessary such an inventory. All panels, cables, and visual evidence of the anchors would be removed following the viewing period. No visual impacts are expected to remain after project area restoration (see Appendix J1, Installation, Removal, and Restoration Planning Documents). This is consistent with a VRM Class II area. Restoration of the area fulfills the requirement for mitigating any long-term visual impacts.
5.7.1 Transportation and Access	• Transportation issues, including access to private property and emergency response times, are perhaps the greatest concern expressed by stakeholders. OTR is expected to draw considerable numbers of viewers during a two-week period, taxing the capacity of US 50 and other area roadways. • Highway users of US 50 include truckers, local residents, recreationists, and interstate travelers. In addition, school bus and rafting operations use US 50 within the project area.	The number of expected OTR viewers indicates that some—if not several—forms of travel mitigation would be necessary. However, because of limited ability to coordinate with agencies regarding what techniques may or may not meet policy guidelines, mitigation techniques are discussed in this Report from a “toolbox” approach. That is, many mitigation techniques are described, and selection of the appropriate combination of techniques is needed. The mitigation toolbox contains a number of techniques that must be selected in response to the identified situations. Individual mitigation “tools” were chosen based on recommendations found in FHWA’s *Managing Travel for Planned Special Events* and CDOT’s *Guidelines for Developing Traffic Incident Management Plans for Work Zones*. Potential mitigation measures can be classified into two larger groups, indicating whether the measure primarily involves traffic operations (supply-side) or travel demand modification. Traffic operations tools can further be classified as those affecting the physical roadway or those having purely operational aspects. Examples of traffic operation mitigation measures that affect the physical roadway are signing and striping, closure of turnouts and pullouts, installation of median rumble strips (for safety, to alert a driver that he or she has veered out of the driving lane), and installation of temporary traffic lights. Converting US 50 to one-way westbound flow for better viewing of OTR is one option that would require considerable signing and restriping to indicate the new traffic flow pattern. Travel demand tools might be classified as those aimed at getting travelers to reduce the number of vehicle trips made, to change trip timing, to use alternate routes, and to take alternate modes. For the possible emergency transportation of local residents, rafters, and visitors to a hospital, OTR Corporation may elect to have a helicopter on 24-hour stand-by, with designated landing pads along the valley. The helicopter could also be at the disposal of rescue personal for rafters in distress. The full discussion of potential mitigation techniques is contained in Section 5.7.1.2

Resource Topic	Issues	Mitigation
5.7.2 Recreation	• The Arkansas River is the most heavily used whitewater recreation resource within Colorado and is also recognized for its outstanding brown trout fishery. More than 785,000 people visited the AHRA in 2005 (AHRA 2006). • Installation and removal of OTR may have impacts on recreationists through the presence of working crews and noise from installation operations (for example, drilling). • The viewing period of OTR would have large impacts on recreationists. The typical recreationist during the period might want to avoid the hundreds of thousands of new recreationists brought to the area to see OTR.	Viewing art is a recreational activity, and this will by far be the largest impact to recreation, with several hundred thousand visitors expected. Because an art experience is a new type of activity in this corridor, it is discussed in a separate section (see Section 5.7.3, Public Art). Although some recreationists would enjoy seeing the progression of OTR throughout its installation and removal stages, some would prefer the absence of this presence in the canyon. During the rafting season, the river is heavily rafted, so the presence of the installation and removal crews would not add a large percentage increase of human presence in the canyon. During the other months of the year, however, the installation and removal crews would entail a human presence otherwise absent. This presence may decrease the angler's, wildlife viewer's, boater's, and other recreationists' experience seeking solitude, but would increase the experience for those who are intrigued by OTR. The typical recreation experience in the canyon would be a very different experience during the OTR viewing period. This period is expected to bring in many thousands of people who are interested in viewing the temporary work of art. These people anticipate a highly positive experience since they would choose to travel to the area. There would be a large amount of new users of public lands, who might for the first time be enjoying an activity on public lands. The recreationists that typically come to the region to experience peace and tranquility, however, would want to avoid these heavy crowds during the viewing period. Wildlife are likely be scared off from being near US 50 and thus tourists hoping to see wildlife most likely would avoid this area during this time. Avid anglers are not likely to fish this stretch of the Arkansas during this period Efforts to avoid direct impacts on recreation resources are included in the design of the proposed work of art. Some fabric panels from the original 10.4-mile design of OTR were removed based on coordination with BLM, other agencies, and public comments to address the rafting community concerns. Some fabric panels were located in areas that are used for water rescue and were removed to address these concerns. The current design of OTR includes 5.9 miles of fabric panels (see Section 4.3.6, Other Alternatives Considered but Not Selected for Detailed Study, for further information).
5.7.3 Public Art	• The Arkansas River Corridor where OTR proposes to be located in managed by the BLM and enjoyed for many recreational uses, but the area has never hosted an activity of this type and scale.	Mitigation measures are not needed for this issue.
5.7.4 Socioeconomics	• Both beneficial and adverse impacts may occur on socioeconomic components of the project area from OTR. • Social impacts include additional requirements for community services and governmental agencies for visitors and employees of OTR and contractors, and a temporary disruption to a routine way of life for local residents.	All efforts would be made by OTR Corporation and its employees to keep to a minimum the project effects on residents. The traffic plan (Section 5.7.1) will identify measures to keep delays in traffic movements through the project area, including Cañon City and Salida, within a reasonable amount of additional minutes in travel time, and identify alternate routes (Appendix J2.1.5). Measures will be designed to ensure that community services can provide extended services to handle the influx of visitors and that community infrastructure and groups can handle all local emergencies along the valley (see Section 5.7.5, Community Resources and Public Safety). Economic impacts include employment opportunities for local people during all phases of OTR, and the additional revenues that would be brought into the area by employees of OTR and the large number of visitors that travel to the area to see the temporary work of art. During the viewing period, many thousands of visitors will need local services and purchase gas, food, and lodging. However, there may be negative economic impacts experienced by some particular sectors that rely on certain types of customers who might come to the region for a more peaceful experience or for a different reason than viewing OTR (for example, there may be some negative impacts experienced by local fishing guides). This Proposed Action would bring worldwide attention to the area, however, and this would have a positive impact on tourism that may have long-lasting effects. OTR is expected to have an economic impact of more than $72.7 million, with over $57 million coming from visitor expenditures. Mitigation for economic impacts is not considered necessary due to the overall positive economic impact.
5.7.5 Community Resources and Public Safety	• Potential effects associated with the ability of emergency responders to access (and respond without delay to emergencies) the project corridor (including river recreation users) during project viewing.	The Operations Plans (Appendix J) provide the specific details for meeting community services and public safety needs during the installation, viewing, and removal. These plans are expected to fully mitigate any identified needs for personnel, equipment, and logistics. OTR provides a unique opportunity to work collaboratively with BLM, CDOT, emergency response agencies, the public safety community, local public works agencies, the public and other agencies and entities to develop emergency and incident response plans that would benefit the Arkansas Valley before, during, and after OTR. Representatives from the public and various agencies would be brought together to discuss specific concerns and objectives and to consider a variety of strategies and tactics that might be implemented as part of the project's traffic and emergency management program. These plans would support current protocols and identify technological and operational applications to enhance communications, cooperation, and coordination. The OTR team would facilitate the planning effort not only to support the temporary work of art but also to provide long-term response capabilities that support the local agencies. Infrastructure required to meet the emergency response needs of OTR through the collaborative planning effort would remain after the exhibit and provide enhanced capabilities for the future.
5.7.6 Engineering Safety for Extreme Weather Events	• Potential effects from high winds could include damage to the panels and other structural components of the project and pose safety risks to area visitors and residents. • Precipitation hazards associated with the work of art include rainfall, snow, or hail collecting on the fabric and potentially causing structural failure. • Potential storm conditions could produce lightening that could strike the work of art and start a fire.	The results of the wind tests indicate that the fabric panel configurations are aerodynamically stable for the 42 mph one minute wind load event (statistically signifying a 10-year wind episode). The 42 mph one minute wind speed is based on a probability of exceedance within a period of 3 months. However, the duration of service for the work of art (three weeks or less) would indicates an actual return period much higher than 10 years for the 42 mph wind speed (approximately 4 times higher, representing a 40-year wind episode). No further mitigation is required since the proposed design is engineered to withstand a 40-year wind episode. Diagonal cables in the Red Rocks and Three Rocks areas would be designed for a higher wind speed (than 42 mph) because of their diminished sensitivity to the wind direction. Because these members are essential components in the cable system, they would be treated with an extra measure of conservatism. The panel fabric is permeable and can easily allow passage of water during a 9-inch per hour storm (a 100-year storm for the project corridor). Snow generally occurs from October to April in the project area and rarely occurs during the time when the panels would be up for this Proposed Action. If snow were to fall during the time the panels are displayed, area conditions would still provide a degree of warmth that would cause probable rapid melting. Hailstorms commonly occur at least once during the summer months in Fremont County and could affect the fabric panels through direct damage to the panels from falling hail or by collection on the panels and potentially causing overall structural failure. However, a hailstorm would most likely be accompanied by high enough winds to induce billowing of the fabric panels, and thus preventing the collection of hailstones. The panel fabric is not fire proof but is fire-resistant polypropylene. If the fabric were to catch fire, the fabric would not burn unsustained. A lightning strike might burn a hole in the fabric but would not continue to burn or spread to other areas of the fabric.

Resource Topic	Issues	Mitigation
5.7.7 Nonhazardous Waste	• Possible effects from project visitors/workers/support staff on the availability or capacity of sanitation and trash/recycling services • Possible impacts on the Arkansas River from human waste.	Based on the lack of existing facilities in this rural corridor today, the Proposed Action would need to provide sanitation and trash/recycling services for the duration of the project period. The Operations Plans will include details for these services (see Appendix J). The extent to which services are required would depend on the details identified in plans for numbers of employees and schedules. Visitation numbers, distribution of visitors over time, and location during OTR viewing would also drive the needs for sanitation and trash/recycling services. Support staff would also need these services. Additional monitoring, restrictions, or service may be needed at AHRA restroom facilities to prevent misuse or overuse.
5.7.8 Regulated and Hazardous Materials	• Properties contaminated by hazardous waste or petroleum products. • Containing hazardous materials during project installation and removal. • Highway accidents potentially releasing environmental contaminants into adjacent land and streams. • Project installation and removal activities could increase chances for the accidental release of fuel or other materials from construction equipment. • During the viewing period, increased visitor traffic might act to increase the risk of highway accidents that could lead to hazardous materials spills.	If suspected hazardous or petroleum products were encountered during construction, samples of the material would be collected and analyzed for metals, hydrocarbons, organic chemicals (volatile or semivolatile organic compounds), and other toxicity and characteristic parameters to determine what special handling and disposal requirements are appropriate. Accidental spills would be addressed through the incident response plans included in Appendix J1.2 and Appendix J2.2. The incident response plan (developed during the preconstruction stage) would identify all appropriate responders for hazardous and contaminated spills as well as specify procedures that would be followed by the contractor for such incidents. All identified responders would be involved in the development of the incident response plan. In general, all spills would be contained and cleaned up as soon as possible. All spills would be reported to the CDPHE Environmental Emergency Spill Reporting Line (1-303-239-4501). For spills involving hazardous materials, the local emergency response team would be contacted by dialing 911. The telephone numbers for medical and emergency services would be maintained on site. If any unplanned occurrence requires assistance, the site supervisor or designated person would contact the appropriate response team. Material storage and construction staging areas are a major source of risk due to the possible mishandling of materials and accidental spills. All petroleum products and other hazardous materials (for example, fuel, solvents) used for construction purposes would be handled and stored to prevent accidental spillage or other harm to the project area. Stockpile management measures, including perimeter barriers, covers, and location considerations, would be used to minimize effects on local waterways from possible spills. The handling of materials would involve implementation of appropriate training of personnel, specific storage techniques for different materials, proper labeling, containment techniques, cleanup specifications/equipment, and regular maintenance and inspection protocols. Dewatering operations (if required) would be performed as consistent with applicable state and local permits. These practices remove and discharge excess water generated by storms or groundwater dewatering.
5.7.9 Land Use	• Potential effects on public and private lands and land uses in the project corridor.	The project area along US 50 and the Arkansas River is predominately rural. The Arkansas River meanders through land managed by the BLM interspersed with parcels of privately owned land. One corner of a State Land section is included. No long-term direct impacts on land use would occur under the Proposed Action and public lands would be returned to their original condition. Residual positive economic impacts on the area could result in changes in land uses related to retail business or lodging. (See Section 5.7.4, Socioeconomics, for additional discussion.) No mitigation is required for this resource based on information available at this time.
5.8.1 Cultural Resources (Historical and Archeological)	• Potential effects from project components or activities on area cultural resources.	Based on the 1997 Class III survey, except for the D&RGW RR, no historic properties would be affected by the proposed project. All other NRHP-eligible resources are located north of the railroad, and thereby outside the actual area of direct impacts. The D&RGW tracks would be used to stage the installation and removal of the proposed temporary work of art and no physical changes to the railroad line woud occur that would contravene the historical nature of this resource. Because of the level of traffic and crowd management controls anticipated for OTR, no indirect effects on the identified NRHP Eligible Historic Properties are anticipated. All visual and noise effects on NRHP eligible historic properties would be temporary. Since identified impacts are temporary, no mitigation measures would be required.
5.8.2 Native American Religious Concerns	• Possible effects on Native American religious practices or sacred areas from the project activities.	This proposed temporary work of art would comply with the requirements under the American Indian Religious Freedom Act (AIRFA) and the National Historic Preservation Act (NHPA) that mandate public input from American Indian Tribes when BLM projects may affect Indian religious practices or sacred areas. Specific impacts and mitigation measures will be identified as necessary once the Native American Consultation process is reinitiated and completed.
5.8.3 Environmental Justice	• Potential effects on minority and/or low-income populations from project activities. • Potential disproportionate effects on minority and/or low-income populations.	Minority populations larger than the county averages have not been identified for Census block groups along the project area for either Chaffee or Fremont counties. Chaffee County Census block groups along the western edge of the project area do exceed or equal the county average for populations below the poverty level. Should there be direct impacts on residents in this area, it would be necessary to examine the likelihood that impacts would fall disproportionately on the low-income populations. If it is confirmed that no direct impacts or disproportionate impacts would occur to minority or low-income populations from the Proposed Action, no mitigation would be required for this resource. However, if direct or disproportionate impacts are identified, then mitigation measures would be needed.
5.8.4 Wilderness, Areas of Critical Environmental Concern, Wild and Scenic Rivers	• Wilderness areas within the project corridor are important for Colorado and the nation. • Potential effects on wilderness areas of critical concern and wild and scenic rivers from project activities	The Arkansas River is a recognized National Recreation Area and is protected through BLM management activities, as well as other federal and state water resources and water quality regulations. The proposed work of art is a temporary installation and supports the recreational and aesthetic values of the river corridor. Mitigation activities to protect wilderness resources and special uses of the river corridor are discussed in the Transportation and Event management plans, and in Section 5.7.2, Recreation. Mitigation activities would also project the natural amenities of the river corridor, including water quality, vegetation, and wetlands. Foot traffic along the corridor would be limited both during project installation/removal periods as well as during project viewing through access control measures. Commercial rafting is an important aspect of project viewing and would be managed accordingly. Fishing, hiking, and other recreational activities in the immediate project vicinity would be managed as discussed in the Event Management Plan (Appendix J2.2). There are no designated Wild and Scenic Rivers (or river segments) in the project corridor.
5.8.5 Farmlands, Prime and Unique	• Effects on prime or unique farmlands from project activities	No prime or unique farmlands were identified within the project corridor and no mitigation measures are necessary with the proposed project.

*Note that mitigation measures and discussions of impacts contained in this table are based on preliminary analysis of resources, and further consideration of mitigation measures and impacts is required during subsequent EIS studies.

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