APPENDIX G

Prospectus: Over The River
Bighorn Sheep Mitigation & Assessment

Prospectus: *Over The River* Bighorn Sheep Mitigation & Assessment

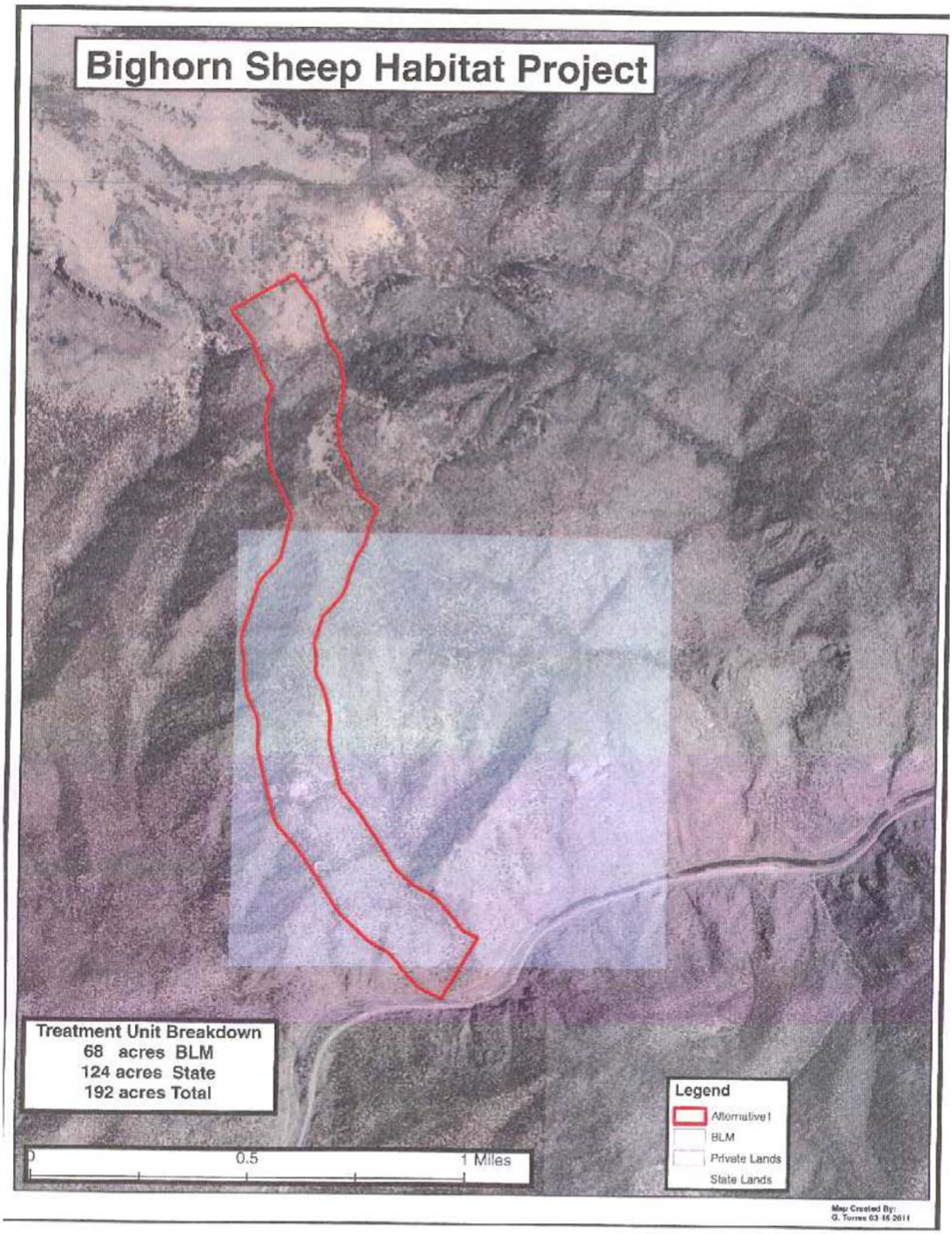
Colorado Division of Wildlife

Habitat Treatments

The original prospectus submitted to the Bureau of Land Management on December 16, 2010, outlined a habitat treatment in the vicinity of Parkdale on the north side of the Arkansas River. This area is currently heavily timbered with stands of pinyon-juniper trees. The habitat treatments involved clearing a "Y" shaped area to a width of 300 yards providing additional usable sheep habitat and a corridor for access to areas of available, but unused, sheep habitat along Table Mountain and Summerville Mesa. It was estimated that this would require clearing approximately 326 acres. At the time of the prospectus development, a variety of clearing techniques were considered. Since that time, we have reevaluated the area and determined that because of the treatment and terrain, hand thinning would be the only available treatment technique. Hand thinning will be much more labor intensive, take longer to complete, and cost more than methods originally evaluated; consequently we have reevaluated the original "Y" shaped treatment area and approach. By eliminating the east portion of the "Y" shaped treatment area and maintaining the west portion as originally proposed (see attached map), the goals and objectives of the treatment can be met while clearing fewer acres. In addition to maintaining the west prong of the "Y" shaped polygon, on-site evaluations of tree density and presence of rock out-cropping will be made so that habitat treatments are targeted in such a way to maximize sheep utilization of the treatment area.

In addition, the treatment areas will be designed to blend into the surrounding habitat to reduce the visual impact. Much of the lower slopes of the treatment area consist of sparse tree cover, brush, and rocks. Removing vegetation along the lower slopes near the highway is not anticipated as tree cover is not extensive enough to be a visual obtrusion to sheep. Throughout the treatment area boundary edges may be feathered. Much of the treatment area will not be visible from the Highway 50 corridor and impacts to the viewscape will be minimal.

The treatments are designed to provide alternative habitat to bighorn sheep and allow animals a place to move in the event that stress from the project forces them to move.


Bighorn Sheep Habitat Project
Treatment Unit Breakdown
68 acres BLM
124 acres State
192 acres Total
0
0.5
1 Miles
Legend
Alternative 1
BLM
Private Lands
State Lands
Map Created By:
G. Torres 03 16 2011

PROSPECTUS: *Over The River*™ Bighorn Sheep Mitigation & Assessment

Colorado Division of Wildlife

Introduction

The Colorado Division of Wildlife (CDOW) identified potential impacts of the proposed *Over The River*™ (OTR) project on wildlife along the Arkansas River in the course of reviewing the draft environmental impact statement (EIS). Bighorn sheep (*Ovis canadensis*) in the river canyon may be impacted by human-related disturbance associated with the construction, viewing, and deconstruction phases of OTR. In the event OTR is approved, CDOW recommends that project proponents provide funding sufficient to potentially mitigate adverse affects on resident bighorn herds and to evaluate both the impacts of the project and the mitigation measures.

Based on present knowledge, suitable habitat for bighorn sheep in the canyon is restricted to a relatively narrow band of habitat along the river. Much of the upland habitat in the canyon is potentially suitable for sheep based on slope and other terrain features, but it is densely-vegetated with pinyon pine and juniper trees. Sheep typically avoid dense tree cover because of visual obstruction that increases predation risk. Thus, while much of the canyon affords potentially suitable habitat for sheep, actual habitat use is concentrated along the river. Additionally, sheep depend on the river for water. The disturbance associated with OTR could influence sheep habitat use along the river corridor (Fig. 1A–C). Consequently, the CDOW is concerned that bighorns may be negatively impacted, in terms of reduced lamb and ewe survival, if OTR-associated disturbances displace them into upland habitats that are of lower quality and lack water. Thus, CDOW proposes actions to avoid and minimize disturbance to bighorn sheep in the river canyon and also implementation and evaluation of habitat treatments and water developments in a portion of the Arkansas River canyon where OTR will occur.

Approach

The proposed approach first attempts to avoid and minimize impacts of the OTR construction activities on bighorn sheep by placing timing restrictions on construction/deconstruction on the railroad (North) side of the Arkansas River during the lambing period and critical winter periods. For the lambing, a seasonal closure from April 15 – June 30 annually should be implemented for panel sections being placed at County Line, Three Rocks, Spike Buck, and Parkdale (excluding 0.6 miles upstream from miles marker 262.5 and 1.4 miles downstream from mile marker 264.5 as they are > 1 km from lambing habitat). For the critical winter period (December – March annually), regular assessments of snow fall should be made using measuring poles placed at 1 km intervals along the Union Pacific rail lines along the curtain sections at County Line, Three Rocks, Spike Buck, and Parkdale (only panel sections for which critical winter timing restrictions would be invoked). Construction activities should cease within a particular panel section when snow fall exceeds 25 cm for the majority of measuring poles in that particular panel section. Operations can continue when snow recedes below the 25 cm level for the majority of measuring poles within a particular panel section that was closed. These conditions are expected in one winter out of ten.

In addition to avoidance and minimization of impacts through timing restrictions, sheep should be monitored in the River Canyon to assess impacts and initial habitat treatments be used to minimize the effects of the project. This approach will require splitting the canyon where OTR will occur into three monitoring sites and implementing initial habitat treatments in one of the sites. The initial habitat treatment is intended to both mitigate and minimize the disturbance affects by increasing available habitat away from the river corridor, thereby providing additional habitat for utilization following disturbance. The monitoring site receiving habitat treatments will occur in the eastern portion of the canyon, immediately west of Parkdale, where a near-continuous stretch of curtains is proposed (Fig. 1A). A second monitoring site will encompass the area east of Texas Creek where a second set of curtains is proposed (Fig. 1A). These two sites will allow monitoring of sheep responses in impacted areas with and without initial habitat mitigation. The third monitoring site will encompass a portion of the canyon where no development activity will occur, which will serve as a control area throughout (Coaldale-Cotopaxi, Fig. 1B). Proposed habitat treatments should be implemented prior to the OTR construction phase so that the targeted herbaceous response will become available during the construction phase. Sheep will be monitored at each monitoring site (developed with habitat treatment/developed without habitat treatment/control) for a 6-month period before any construction activities and for the duration of the project, including construction, viewing and deconstruction phases. This will allow for the documentation of sheep presence along the river prior to any development activity or habitat mitigation and to document sheep responses once construction activities begin. Monitoring will allow for the evaluation of both the OTR impact and habitat mitigation on sheep utilization of the canyon.

Habitat Treatments

All habitat treatments will be implemented in cooperation with BLM. Habitat treatments will occur on the north side of the Arkansas River immediately west of Parkdale (Fig. 1A), which encompasses the north/south running ridges east of Spike Buck Creek leading up to Table Mountain. This site was identified for its potential to open up available sheep habitat currently heavily timbered with pinyon-juniper, and to provide access to available sheep habitat that is currently unused along Table Mountain. Approximately 326 acres will be treated (the amount necessary to clear a corridor from the river up to Table Mountain at a width acceptable to sheep – on the order of about 300 yards) by one or any of the following techniques: roller-chopping, hydro-ax, hand-thinning and prescribed burning. The techniques chosen will be dictated by on-site considerations (e.g., slope and soils) and weather conditions (Figure 1D). In the event that mechanical treatment is used, all reasonable efforts (e.g., rubber tires) will be taken to minimize surface disturbance. Reseeding, weed spraying, and/or fertilization will be used as warranted based on site-specific conditions to enhance and accelerate forage response and suppress weed proliferation within treatment areas. In addition, 2-3 water developments should be implemented within the uplands of the treatment site by installing new water guzzler(s) and restoring an existing guzzler. In the event that it is not possible to treat this area south of Table Mountain (Figure 1D) prior to the OTR construction, other areas should be identified in cooperation with BLM and include an assessment of planned OTR activities, tree cover, slope, expected sheep use, and the potential to move sheep off the river corridor.

Monitoring

Bighorn sheep monitoring will quantify changes in sheep use and occupancy, if any, of habitats in the Arkansas River Canyon in all three monitoring sites. By comparing sheep responses in the developed monitoring sites to responses in the undeveloped site, a determination can be made if sheep movements and distributional changes observed in affected areas are greater or comparable to those of sheep in unaffected areas. This will provide the information necessary to determine the extent, if any, of impacts of OTR on sheep habitat use. Secondly, large-scale demographic impacts will be monitored as they relate to OTR activities. Comparisons of annual population size and production estimates will be made on an annual basis for the duration of the project between the developed and undeveloped monitoring sites to quantify any major impacts on sheep demographics associated with the proposed project. The major requirements for the monitoring component include a part-time technician to monitor sheep occupancy for the 6 month period leading up to the initiation of the project and for the duration of OTR activities (total time approximately 3.5 years) and a sample of 15 GPS-collared sheep and 15 VHF-collared sheep to allow estimation of population size and detection probability for estimating sheep occupancy along the river. Because of the duration of the OTR project and limited battery life of the GPS collars, the 15 GPS collared sheep will have to be re-captured and re-collared approximately 2 years into the project. The second component, evaluating sheep responses to initial habitat mitigation activities, will be quantified by measuring sheep utilization, or lack thereof, of habitat treatments. To achieve this monitoring component, deployment of GPS collars on ewes is necessary to accurately measure sheep locations throughout the year, particularly in difficult terrain where human observation is problematic, in all monitoring sites. This location data can be used to derive utilization surfaces that will provide information on whether the habitat improvements resulted in increased utilization of the treatment/mitigation areas. The 15 GPS collars described previously can be used to simultaneously provide the needed information for this monitoring component. The proposed monitoring activities as described provide a scientifically rigorous means of quantifying the impacts, or lack thereof, of OTR on bighorn sheep inhabiting the Arkansas River Canyon.

Adaptive Management

The proposed approach includes both timing stipulations to avoid and minimize impacts to sheep at critical (lambing and winter) periods, and initial habitat treatments to be completed prior to construction in the most affected portion of the river canyon so that displaced sheep have a place to go with adequate forage and water. In addition to this pre-emptive habitat work, the CDOW recommends an adaptive management approach be used as it relates to additional mitigation for the OTR project.

An adaptive management fund of $200,000 should be established, which could be drawn from with the authorization of the CDOW and BLM for further mitigation work to prevent or offset impacts to sheep both during and after the project. For instance, water placements and/or enhance forage could be placed in areas sheep move into because of disturbance caused by the project if those areas are deficient in food or water resources. These efforts will be used to offset potential impacts and are not expected to exceed 10% of the adaptive management fund, unless agreed upon by the BLM and the CDOW after consultation

with the project proponent. If attempts to avoid and minimize impacts to sheep during the project are not successful, or not needed, this fund would be used to enhance habitat post de-construction to reverse any project-related declines observed in sheep demographic rates in the future, or replace sheep in the unlikely event of large scale die-offs. Mitigation during, or after the project conclusion will not exceed the amount established in the adaptive management fund.

To determine the amount of additional habitat mitigation, if any, demographic parameters (population estimates, survival, and lamb production) will first be determined prior to construction activities in the 6 month pre-construction monitoring period for each of the three monitoring sites (Coaldale-Cotopaxi, Texas Creek and Parkdale). This information will establish the baseline demographic values for the various monitoring sites. Assuming a start date of March 2012, point estimates of population size and sheep production will be collected each December from 2011-2014 and compared to the baseline values to assess if there is any change. These comparisons will be made relative to the demographic changes observed in the Coaldale-Cotopaxi site, where no OTR activities are planned. Mitigation commitment by OTR will be based on the maximum decrease from baseline values across the years of observation adjusted for changes in demographic parameters observed in the Coaldale-Cotopaxi site. If no change in demographic parameters is detected, no additional habitat mitigation will be required. However, if a decrease is detected in either the number of adults, or the number of lambs, additional mitigation will be calculated using the following table (Table 1):

Table 1. Additional mitigation[1] beyond 326-acre treatment if sheep are impacted

	Change in adult sheep population				
Change in lamb:ewe ratio	Increase to -0% decline	1-10% decline	11-25% decline	25-50% decline	>50% decline
Increase to -0% decline	No mitigation	50 acres	75 acres	100 acres	Replace sheep
0-10% decline	50 acres	75 acres	100 acres	150 acres	Replace sheep
11-25% decline	75 acres	100 acres	150 acres	200 acres	Replace sheep
26-50% decline	100 acres	150 acres	200 acres	250 acres	Replace sheep
>50% decline	150 acres	200 acres	250 acres	300 acres	Replace sheep

[1] It is assumed the original 326 acre treatment will benefit sheep and ultimately contribute to mitigating impacts as well as acreage described in mitigation table.

The following example demonstrates this process. Suppose the baseline values are 30 lambs per 100 ewes in both the Coaldale-Cotopaxi and Parkdale sites prior to OTR activities. In subsequent monitoring, the

largest decrease from these baseline values is 25 lambs per 100 ewes for the Coaldale-Cotopaxi site (i.e., a decrease of 5 lambs per 100 ewes) and 15 lambs per 100 ewes for the Parkdale site (i.e., a decrease of 15 lambs per 100 ewes). Because of the 5 lamb per 100 ewe decrease demonstrated at the unaffected Coaldale-Cotopaxi site, this example would suggest that OTR activities created a decline of 10 lambs per 100 ewes, or 33% when compared to the baseline values for the Parkdale site. Because this was the largest decline documented for the life of the project and suppose no decline in the adult sheep population was documented, then per Table 1, this would require 100 acres of additional habitat mitigation.

In the event that sheep must be re-stocked as a result of the OTR project, costs would be borne out of the adaptive management fund and any funds remaining after sheep had been transplanted be used to enhance habitat. In situations where translocations are not necessary, any remaining money in the adaptive management fund after the required habitat treatment is completed will be refunded to the project proponent.

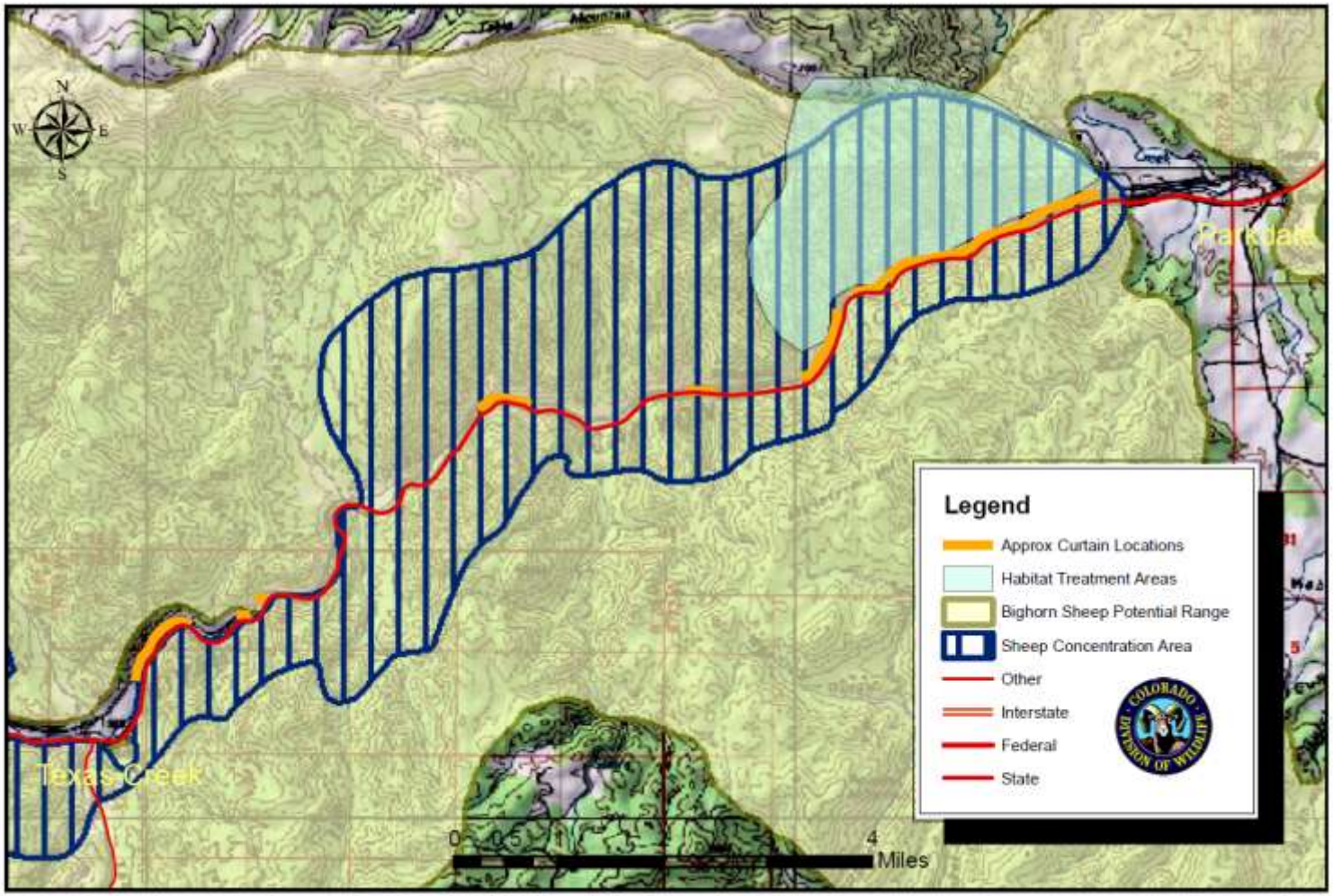


Figure 1A. Bighorn sheep potential range and concentration areas, proposed habitat treatment areas, and proposed curtain locations along the Arkansas River Canyon for the eastern portion of the proposed project area located between Salida and Canyon City, Colorado. Based on present knowledge, most sheep occupy habitat immediately adjacent to the river throughout the year.

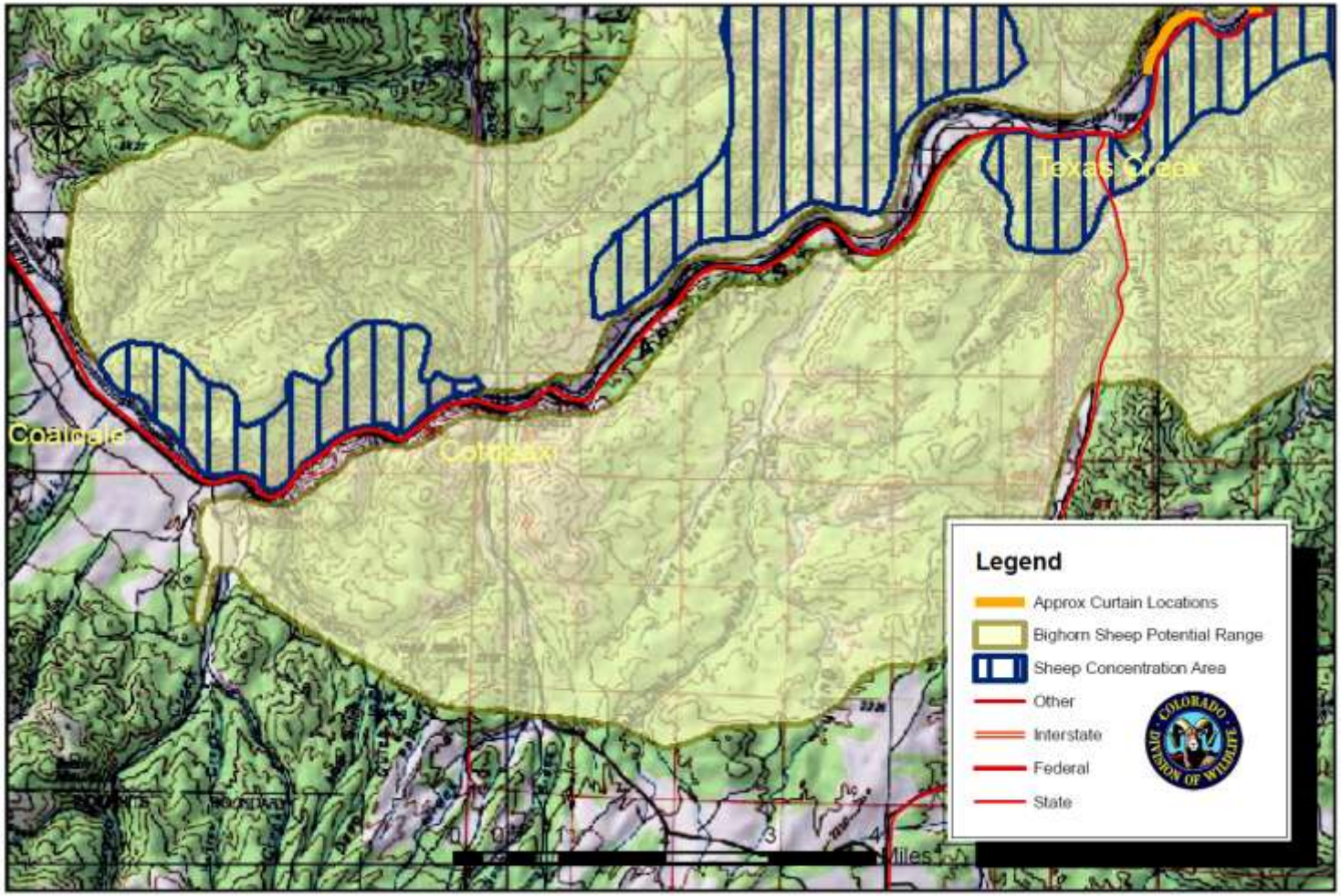


Figure 1B. Bighorn sheep potential range and concentration areas, proposed habitat treatment areas, and proposed curtain locations along the Arkansas River Canyon for the central portion of the proposed project area located between Salida and Canyon City, Colorado. Based on present knowledge, most sheep occupy habitat immediately adjacent to the river throughout the year.

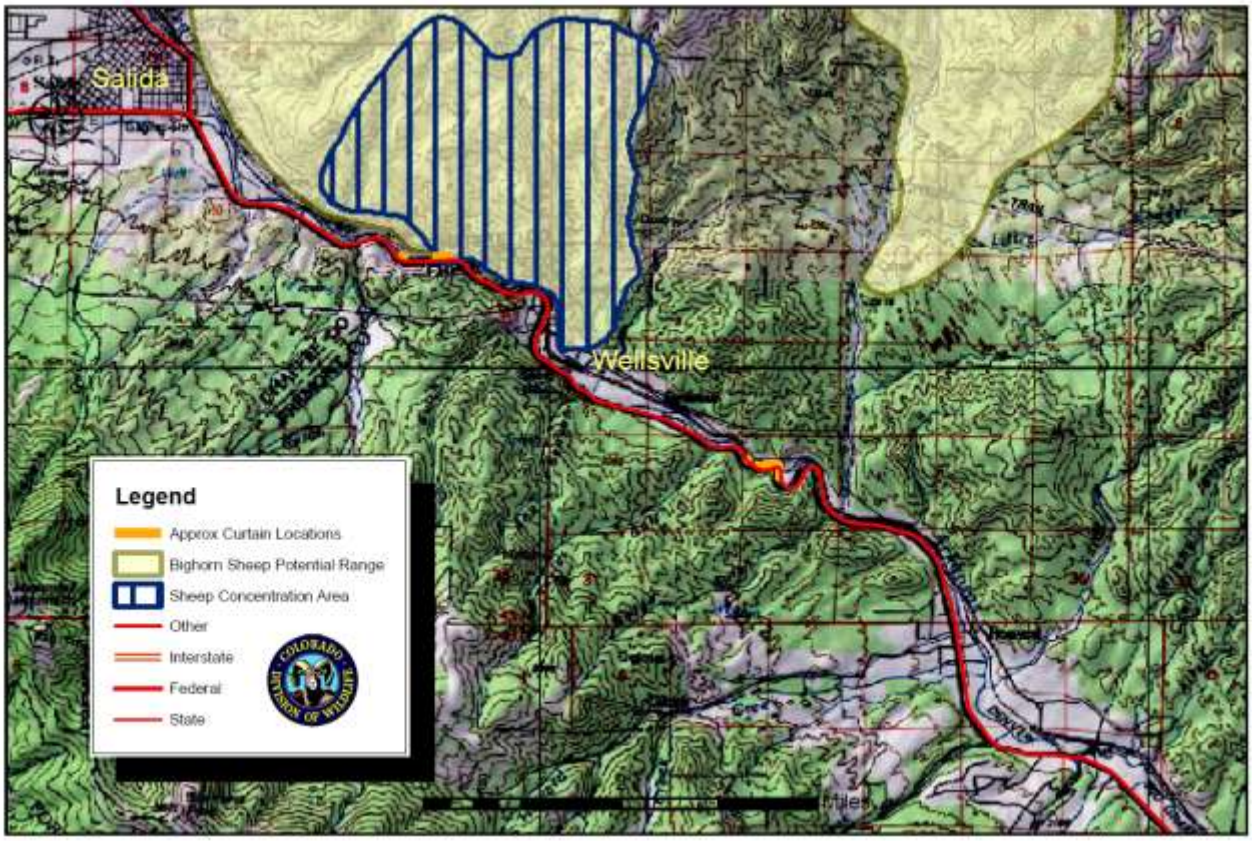


Figure 1C. Bighorn sheep potential range and concentration areas, proposed habitat treatment areas, and proposed curtain locations along the Arkansas River Canyon for the western portion of the proposed project area located between Salida and Canyon City, Colorado. Based on present knowledge, most sheep occupy habitat immediately adjacent to the river throughout the year.

Figure 1D. Proposed initial habitat treatment area in the Arkansas Canyon totaling 326 acres and two additional water guzzlers.