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Bureau of Land Management**

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**Environmental Assessment
DOI-BLM-CO-S050-2014-0037 EA**

North Delta Grazing Permit Renewals

Location: BLM Public Lands North of Delta, Colorado

**U.S. Department of the Interior
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ENVIRONMENTAL ASSESSMENT

NUMBER: DOI-BLM-CO-S050-2014-0037 EA

PROJECT NAME: North Delta Grazing Permit Renewals

PLANNING UNIT: North Delta, Escalante, and Gunnison Gorge Land Health Units

LEGAL DESCRIPTION FOR DETAILED ANALYSIS AREA:

T4S, R3E, Ute Meridian, several sections.

T15S, R97W; T15S, R96W; T15S, R95W; T14S, R97W; T14S, R98W; T14S, R96W; T14S, R95W; T13S, R95W; T13S, R96W all in the 6th Principal Meridian, many sections.

APPLICANT(s): Grazing Term Permit Holders

BACKGROUND/INTRODUCTION

The Uncompahgre Field Office will be completing an Environmental Assessment for term grazing permit renewals in an area north of Delta, Colorado between Highway 50 and Highway 65. This area is primarily composed of salt desert shrub communities at the lower elevation trending to pinyon/juniper at the higher elevations. Vegetation in the area is comprised of salt tolerant shrubs and grasses such as, winter fat, shadscale, low mat saltbush, Salina wildrye, Indian ricegrass, and needle and thread to name a few. Precipitation for the area ranges from 6” in the lower elevations to 12-18” in the higher elevation. Due to low precipitation, and salt laden soils, rehabilitation of range sites in these lower areas are slow to improve under good management or complete protection.

This Environmental Assessment will analyze the impacts of issuing permits for livestock grazing on public land managed by the BLM. Permits will include terms and conditions that improve or maintain public land health. The public will benefit from lands which are maintained in a healthy condition and that provide sustainable resources for a variety of uses.

This action would be in accordance with CFR 4180 Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration. The analysis includes an evaluation of whether or not an allotment, or a portion thereof, is meeting, or not meeting the five standards for landscape health identified in the Uncompahgre Basin Resource Management Plan and Record of Decision; amended March 1997 to include, the Colorado Standards for Public Land Health and Guidelines for Livestock Grazing Management. If an allotment, or a portion thereof, is

determined to not be meeting standards, then causal factors are evaluated; i.e. current grazing management, drought, wildfire, vegetation manipulation, wildlife use, or other.

The North Delta Land Health Unit Grazing Permits were applied for by the permittees, are being considered for renewal, with the exception of a portion of the Alkali Flats and Wells Gulch allotments which are now part of the Dominguez Escalante National Conservation Area (D-E NCA). These allotments consisted of approximately 12,433 and 16,879 acres, respectively. Upon completion of the Dominguez Escalante National Conservation Area (D-E NCA) Proposed Resource Management Plan, 3,464 acres have been removed from the Alkali Flats allotment to create the Huff Allotment #04294, and 6,536 acres have been removed from the Wells Gulch allotment to create the Dominguez Rims allotment #04293. The allotments are divided along the highway, and the D-E NCA boundary. Huff and Dominguez Rims allotments are within the D-E NCA and will be analyzed under a separate permit renewal process in the future. The remaining allotments and the portion of Alkali Flats and Wells Gulch allotments will be analyzed in this permit renewal process. All allotments are located in Delta County on the western slope of Colorado. The project area is located north of Delta, Colorado within the North Delta LHA Unit (Figure 1).

The BLM currently administers 10 grazing permits authorizing livestock grazing on 9 allotments in the North Delta Land Health Assessment Unit (see Table 1 below).

A livestock producer (permittee/lessee) must hold a grazing permit/lease to graze livestock on public land. Grazing Permits specify all authorized use including; allotment to be grazed, number of livestock, class of livestock, season of use, percent public land, active Animal Unit Months (AUMs), suspended AUMs, temporary suspended AUMs, and grazing preference (CFR §1400.0-5).

Table 1 North Delta Allotments

Allotment Name	Allotment Number	Class of Livestock	Authorization Number
Alkali Flats	14017	Sheep	0504841
Deer Basin/Midway	14019	Sheep	0505456
Delta Pipeline	03277	Sheep	0504841
Dirty George	14023	Cattle	0503129
Petrie Mesa	14022	Sheep	0505456
Point Creek	14021	Sheep	0503155

Allotment Name	Allotment Number	Class of Livestock	Authorization Number
South Branch	14004	Cattle	0501994
Ward Creek/Dough Spoon	14025	Cattle	0501994
			0503001
			0503130
			0503131
			0503133
Wells Gulch	14016	Sheep	0505449

The initial Land Health Assessment (LHA) was completed for the North Delta Land Health Unit during the 2002 field season. In 2012, the second North Delta LHA was completed and included utilization and long term vegetation monitoring data collected during the past 10 years¹. This monitoring allows BLM to evaluate the allotments during the permit renewal process to determine if current grazing management and Terms and Conditions are meeting rangeland health standards, evaluate carrying capacities and stocking rates, and recommend changes to the permits, if necessary. See Tables 2 and 3 for information regarding acres meeting or not meeting land health standards.

Table 2. Land Health Assessment Summary by Allotment

<i>Allotment Name and Number (Class of Livestock)</i>	<i>Land Health Assessment</i>										
	<i>TE Plants^b</i>	<i>Bighorn</i>	<i>ON ACEC</i>	<i>Standard 1 Soils^c</i>		<i>Standard 3 Healthy Communities^c</i>		<i>Standard 4 Special Status Species^c</i>		<i>LHA Issues</i>	<i>Weeds^d</i>
				<i>Meet</i>	<i>Not Meet</i>	<i>Meet</i>	<i>Not Meet</i>	<i>Meet</i>	<i>Not Meet</i>		
Alkali Flats 14017 (sheep)	X	X	N/A	7,923	901	3,151	5,673	3,151	5,673	Overall the allotment saw a decline in cover for forbs, shrubs ^f , and increases in exotics ^f .	IA, NW
Deer Basin/ Midway 14019 (sheep)	X	X	X	8,290	3,035	8,089	3,035	8,089	3,035	Overall exotics increased, decrease in shrubs ^f , decrease in natives.	IA, NW
Delta Pipeline 03277 (sheep)	X	X	X	5,898	0	3,095	2,803	3,095	2,803	Problems with shrub cover, forbs, and increases in exotics	IA, NW
Dirty George 14023 (cattle)	N/A	N/A	N/A	1257	0	1,257	0	1,390	0	This is a P/J site and the pooled transects did not show noteworthy concerns.	IA, NW

<i>Allotment Name and Number (Class of Livestock)</i>	<i>Land Health Assessment</i>										
	<i>TE Plants^b</i>	<i>Bighorn</i>	<i>ON ACEC</i>	<i>Standard 1 Soils^c</i>		<i>Standard 3 Healthy Communities^c</i>		<i>Standard 4 Special Status Species^c</i>		<i>LHA Issues</i>	<i>Weeds^d</i>
				<i>Meet</i>	<i>Not Meet</i>	<i>Meet</i>	<i>Not Meet</i>	<i>Meet</i>	<i>Not Meet</i>		
Petrie Mesa 14022 (sheep)	X	X	X	2,006	0	2,006	767	2,006	767	Significantly low shrub cover, forb, and cool season grass cover. Sites dominated by exotic plants.	IA, NW
Point Creek 14021 (sheep)	X	X	N/A	1,601	0	608	993	1,601	0	High amounts of exotic plants on sites, low shrub and cool season grass cover.	IA, NW
South Branch 14004 (cattle)	N/A	N/A	N/A	774	0	774	0	774	0	Trees and shrubs appropriate for P/J site	IA, NW
Ward Creek/ Dough Spoon 14025 (cattle)	X	N/A	X	16,356	0	16,356	0	16,356	0	Overall the there is a lack of cool season grasses on the allotment, low forbs. Noxious and exotic plants are a problem.	IA, NW

<i>Allotment Name and Number (Class of Livestock)</i>	<i>Land Health Assessment</i>										
	<i>TE Plants^b</i>	<i>Bighorn</i>	<i>ON ACEC</i>	<i>Standard 1 Soils^c</i>		<i>Standard 3 Healthy Communities^c</i>		<i>Standard 4 Special Status Species^c</i>		<i>LHA Issues</i>	<i>Weeds^d</i>
				<i>Meet</i>	<i>Not Meet</i>	<i>Meet</i>	<i>Not Meet</i>	<i>Meet</i>	<i>Not Meet</i>		
Wells Gulch 14016 (sheep)	X	X	N/A	10,271	0	10,271	0	10,275	0	Exotic weeds, drought, major ROW, and some isolated soil issues due to large storm event.	IA, NW

^b TE Plants—Allotments considered to be within the potential habitat or has occurrences of Colorado hookless cactus.

^c Number of acres within each category for the Allotment; Meet—Meets Land Health Standard; NM—Does not meet Land Health Standard.

^d IA – Invasive Annuals; NW – Noxious Weeds

^f Statistically significant

Table 3 Land Health Acreage by Allotment for Standard 3 Healthy Vegetation Communities

Allotment	Public Land Acres	Not Meeting (NM) for Land Health Standard 3 (Acres/[%])		Meeting for Land Health Standard 3		Problem Acres and Percent of Allotment	
		Total Acres NM	Acres NM with Livestock Mgt. Contributing	Total Acres Meeting	Total Acres Meeting Trend Down with Livestock Mgt. Contributing	Total Acres with Livestock Mgt. Contributing	Allotment % of Acres Livestock Mgt. Contributing
Alkali Flats, #14017	8,900	5,675	4,773	3,151	2,260	7,033	78%
Deer Basin/Midway, #14019	11,701	3,047	3,047	8,089	1,573	4,620	40%
Delta Pipeline # 03277	6,029	2,803	2,803	3,095	N/A	2,803	47%
Petrie Mesa #14022	2,841	767	767	2,006	N/A	767	27%
Point Creek #14021	1,586	993	993	608	N/A	993	63%
Wells Gulch # 14016	10,412	0	0	10,271	N/A	0	0

PURPOSE AND NEED FOR THE ACTION

The BLM's need for the action is to respond to applications to authorize livestock grazing on 9 allotments in the North Delta Land Health Unit and the purpose would be to re-issue permits in accordance with the following: 1) livestock grazing is in conformance with the BLM Uncompahgre Resource Management Plan goals and objectives and Record of Decision (1989), 2) achieves or makes significant progress towards achieving the Standards for Public Land Health in Colorado and complies with the fundamentals of rangeland health (43 CFR 4180.1) and Standards and Guidelines (43 CFR 4180.2), and 3) attempts to comply with BLM Policy 1730 - Management of Domestic Sheep and Goats to Sustain Wild Sheep (released on 3/2/2016).

Decision to be made:

The BLM will decide whether or not to issue grazing permits and determine if modifications from the current permits are necessary.

PLAN CONFORMANCE REVIEW

The Proposed Action is subject to and has been reviewed for conformance with the following plan (43 CFR 1610.5-3, BLM 1617.3):

Name of Plan: Uncompahgre Resource Management Plan and Record of Decision

Date Approved: 1989

Decision Number/Page: 11

Decision Language: Suitable public lands will be available for livestock grazing use.

Name of Plan: Gunnison Gorge National Conservation Area Resource Management Plan and Record of Decision

Date Approved: 2004

Decision Number/Page: 2-52

Decision Language: Livestock grazing permits will be evaluated to ensure that compatible livestock management objectives, practices, and mitigating measures are incorporated before being implemented.

Other Authorities:

Taylor Grazing Act (43 U.S.C. §§ 315-316o, June 28, 1934, as amended 1936, 1938, 1939, 1942, 1947, 1948, 1954 and 1976) was the first federal effort to regulate grazing on federal public lands. It establishes grazing districts and uses a permitting system to manage livestock grazing in the districts.

§ 315b. Grazing Permits. The Secretary is authorized to issue permits to graze livestock in grazing districts to settlers, residents and other stock owners upon the annual payment of reasonable fees. Permits must be for a period of not more than ten years, with renewal subject to the discretion of the Secretary, who shall specify numbers of stock and seasons of use. During periods of range depletion due to severe drought or other natural causes, or during epidemics, the Secretary may remit, reduce, refund in whole or part, or postpone payment of grazing fees for the time the emergency exists.

Grazing privileges must be safeguarded adequately but must not create any right, title, interest or estate in or to the lands.

Federal Land Policy and Management Act (43 U.S.C.1752) states that Public lands will be managed on the basis of multiple use and sustained yield.

§ 402. Grazing leases and permits. Permits and leases for domestic livestock grazing on public lands issued by the Secretary... shall be for a term of ten years subject to such Terms and Conditions the Secretary concerned deems appropriate.

§4110.3 Changes in grazing preference.

(a) The authorized officer will periodically review the grazing preference specified in a grazing permit or lease and make changes in the grazing preference as needed to:

- (1) Manage, maintain, or improve rangeland productivity;
- (2) Assist in making progress toward restoring ecosystems to properly functioning condition;
- (3) Conform with land use plans or activity plans; or
- (4) Comply with the provisions of subpart 4180 of this part.

(b) The authorized officer will support these changes by monitoring, documented field observations, ecological site inventory, or other data acceptable to the authorized officer.

(c) Before changing grazing preference, the authorized officer will undertake the appropriate analysis as required by the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.).

Under NEPA, the authorized officer will analyze and, if appropriate, document the relevant social, economic, and cultural effects of the proposed action.

§4110. 3-2 Decreasing active use.

(b) When monitoring or documented field observations show grazing use or patterns of use are not consistent with the provisions of subpart 4180 of this part, or grazing use is otherwise causing an unacceptable level or pattern of utilization, or when use exceeds the livestock carrying capacity as determined through monitoring, ecological site inventory, or other acceptable methods, the authorized officer will reduce active use, otherwise modify management practices, or both. To implement reductions under this paragraph, BLM will suspend active use.

§4130.3 Terms and conditions.

(a) Livestock grazing permits and leases shall contain terms and conditions determined by the authorized officer to be appropriate to achieve management and resource condition objectives for the public lands and other lands administered by the Bureau of Land Management, and to ensure conformance with the provisions of subpart 4180 of this part.

§4130.3-1 Mandatory terms and conditions.

(a) The authorized officer shall specify the kind and number of livestock, the period(s) of use, the allotment(s) to be used, and the amount of use, in animal unit months, for every grazing permit or lease. The authorized livestock grazing use shall not exceed the livestock carrying capacity of the allotment.

(b) All permits and leases shall be made subject to cancellation, suspension, or modification for any violation of these regulations or of any term or condition of the permit or lease.

(c) Permits and leases shall incorporate terms and conditions that ensure conformance with subpart 4180 of this part.

§4130.3-2 Other terms and conditions.

The authorized officer may specify in grazing permits or leases other terms and conditions which will assist in achieving management objectives, provide for proper range management or assist in the orderly administration of the public rangelands.

§4160.1 Proposed Decisions:

(a) Proposed decisions shall be served on any affected applicant, permittee or lessee and any agent and lien holder of record, who is affected by the proposed actions, terms or conditions, or modifications relating to applications, permits and agreements (including range improvement permits) or leases, by certified mail or personal delivery. Copies of the proposed decisions shall also be sent to the interested public.

§4180.2 Standards and guidelines for grazing administration.

(c)(1) If a standards assessment indicates to the authorized officer that the rangeland is failing to achieve standards or that management practices do not conform to the guidelines, then the authorized officer will use monitoring data to identify the significant factors that contribute to failing to achieve the standards or to conform with the guidelines. If the authorized officer determines through standards assessment and monitoring that existing grazing management practices or levels of grazing use on public lands are significant factors in failing to achieve the standards and conform with the guidelines that are made effective under this section, the authorized officer will, in compliance with applicable laws and with the consultation requirements of this part, formulate, propose, and analyze appropriate action to address the failure to meet standards or to conform to the guidelines.

(c)(2) Upon executing the agreement and/or in the absence of a stay of the final decision, the authorized officer will implement the appropriate action as soon as practicable, but not later than the start of the next grazing year.

(c)(3) The authorized officer will take appropriate action as defined in this paragraph by the deadlines established in paragraphs (c)(1) and (c)(2) of this section. Appropriate action means implementing actions pursuant to subparts 4110, 4120, 4130, and 4160 of this part that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines. Practices and activities subject to standards and guidelines include the development of grazing-related portions of activity plans, establishment of terms and conditions of permits, leases, and other grazing authorizations, and range improvement activities such as vegetation manipulation, fence construction, and development of water.

Standards for Public Land Health: In January 1997, Colorado Bureau of Land Management (BLM) approved the Standards for Public Land Health. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. A finding for each standard will be made in the environmental analysis.

Standard	Definition/Statement
#1 Upland Soils	Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

#2 Riparian Systems	Riparian systems associated with both running and standing water, function properly and have the ability to recover from major surface disturbances such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat and bio-diversity. Water quality is improved or maintained. Stable soils store and release water slowly.
#3 Plant and Animal Communities	Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes.
#4 Threatened and Endangered Species	Special status, threatened and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.
#5 Water Quality	The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.

BLM Regulation and policy direct lands to be classified in terms of Land Health (BLM Manual Section 4180). The UFO has basic classifications of “Meeting Land Health Standard(s)” and “Not Meeting Land Health Standard(s)” into the following subcategories:

- Meeting Land Health Standard(s): Lands for which health indicators are currently in acceptable condition such that basic levels of ecological processes and functions are in place. This rating includes the following subcategories:
 - Fully Meeting Standard(s): Lands for which there are no substantive concerns with health indicators
 - Exceeding Standard(s): Lands for which health indicators are in substantially better conditions than acceptable levels.
- Not Meeting Land Health Standard(s): Lands for which one or more health indicators are in unacceptable conditions such that basic levels of ecological processes and functions are no longer in place.

Land health trend is a pattern or gradual change in a condition of a series of data points to move in a certain direction over time, and is used to support land health findings and describe this landscape further. It includes these categories: upward, static, and downward.

- Upward Trend: lands which have shown improving indicator conditions over time.
- Static Trend: lands which have shown no clear improvement or decline in indicator conditions over time.
- Downward Trend: lands which have shown declining indicator conditions over time.

SCOPING, (INTERNAL AND EXTERNAL) AND ISSUES:

The term permit renewal proposals were initially scoped internally by the Uncompahgre Field Office Interdisciplinary (ID) Team/Resource Specialists in February 2011 to begin identifying any issues and/or resource concerns and prepare the land health assessment. The Land Health Assessment scoping consisted of sending informational letters out to the permittees, local counties, and interested publics on May 9, 2011. Additionally, a letter was sent on November 11, 2014 requesting information from the public on the proposal regarding concerns for the environmental analysis. The notifications were posted on the UFO NEPA Register website. Four Scoping comment letters were received from three non-governmental organizations and one permittee. During this time frame there were numerous individual meetings in the field with each permittee. The BLM also conducted a separate meeting with a permittee and consultant in the field on July 1, 2014. In August 2015 the BLM provided a letter providing a 30 day public comment period on the preliminary Environmental Assessment for “North Delta Grazing Permit Renewal”.

Below are issues raised during internal and external scoping:

Areas of Critical Environmental Concern (ACEC)

There is an ACEC within the Adobe Badlands WSA are the permits consistent with the objectives of the ACEC?

Lands with Wilderness Characteristics

How would livestock grazing and related management activities affect wilderness characteristics within the Adobe Badlands WSA adjacent to wilderness characteristics unit?

Wild and Scenic Rivers

How would livestock grazing and related management activities affect the water quality, free-flowing nature, outstandingly remarkable values of the Wild and Scenic River eligible segment?

Cultural Resources

How would livestock grazing effect cultural resources in the area?

Native American Religious Concerns

Are there cultural resources in the area that could be impacted by livestock grazing?

Soils

Is livestock grazing reducing vegetative cover and biologic soil crust which could potentially cause erosion and mobilization of selenium and salts?

Vegetation

How would livestock grazing affect native species' composition, cover and vigor?
Would the proposed action affect standard 3 of the public land health standards?

Invasive, Non-native Species

Would the proposed action influence the spread, dominance and establishment of noxious and invasive species?

Threatened and Endangered Species

How has current grazing practices impacted populations and distribution of Colorado hookless cactus? How would livestock grazing affect fish populations?

Migratory Birds

How does grazing influence migratory bird species of conservation concern?

Wildlife, Terrestrial

How does grazing management influence forage condition and availability of forage for wild ungulates, as well as pronghorn recruitment? How does domestic sheep grazing management influence risk of contact between domestic and wild sheep?

Wildlife, Aquatic

How might grazing management affect cutthroat in Alkali creek and in other streams? How do changes in selenium delivery to the Gunnison River affect the endangered big river fishes and critical habitat?

Wetlands & Riparian Zones

How would grazing management affect perennial stream bank stability and riparian cover and composition?

Water (Surface)

How would grazing practices affect runoff volume and concentrations of salt and selenium in the Gunnison River?

Socio-Economics

How would the proposed action and alternatives affect the livestock permittee and Delta County?

Rangeland Management

How would the proposed action and alternatives affect the findings for rangeland health standards?

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Below are the descriptions of the Proposed Action and Alternatives. The range of alternatives includes the proposed action (current) management (which is the same as the No Action Alternative), a Modified Grazing Alternative (BLM’s Preferred Alternative), and the No Grazing Alternative. Each is described in detail below.

Proposed Action (Current Livestock Grazing Management) (also the No Action Alternative)

The BLM proposes to issue and fully process new term grazing permits for 10 permittees on 9 allotments within the North Delta LHA (see Figure 1. North Delta LHA Unit). The renewal of these grazing permits would be for period of up to ten years.

The Proposed Action Alternative would re-issue all the livestock grazing permits with the same authorizations (Table 4), and terms and conditions that are on the existing permit. The applications for the existing permits are the same as the expiring permits (no changes to the terms and conditions) therefore the Proposed Action is the same as the No Action Alternative. For analysis purposes this alternative will be referred to as the Proposed Action (Current Management).

This alternative does not take into account “making significant progress toward or maintaining watersheds” as required by 43 CFR §4180.1 Fundamentals of Rangeland Health. See Table 2. Land Health Assessment Summary by Allotment.

Table 4 Proposed Action (Current Livestock Grazing Management) Grazing Allotments and Authorization

Allotment Name and Number	Public Land Acres	Class of Livestock	Livestock Numbers	Season of Use	Active AUM’s	% Public Land ¹	Existing Allotment Category ²
Alkali Flats #14017	12,433	Sheep	1920	12/01-2/28	1,387	100	I
			1912	03/01-03/20			
Deer Basin/Midway #14019	11,701	Sheep	1567	12/20-3/20	900	96	I
Delta Pipeline #03277	6,029	Sheep	784	12/01-02/28	563	100	I
			750	03/01-03/20			
Dirty George #14023	1,389	Cattle	205	06/02-06/15	133	100	M
			200	10/15-10/20			
Petrie Mesa #14022	2,841	Sheep	155	12/09-03/20	104	100	M
Point Creek #14021	1,586	Sheep	400	04/16-05/31	102	24	C
			400	11/16-3/10			
South Branch #14004	825	Cattle	112	06/04-06/30	101	65	M
			111	10/15-10/29			
Ward Creek/Doughs poon	17,190	Cattle	25	10/16-11/01	445	63-100	I
			142	05/17-06/15			
			90	10/16-11/02			

Allotment Name and Number	Public Land Acres	Class of Livestock	Livestock Numbers	Season of Use	Active AUM's	% Public Land ¹	Existing Allotment Category ²
#14025			79	05/02-06/16			
			37	10/16-10/27			
			226	5/27-06/15			
			226	10/16-10/18			
Wells Gulch #14016	16,879	Sheep	3230	03/01-03/21	2,366	100	I
		3245	12-01-02/28				

¹ Dependent on the permittee's private land acres unfenced in an allotment.

² C—Custodial, least intensive management; M—Maintain, less intensive management with an objective of maintaining resource condition; I— Improve, most intensive management with objective of improving resource condition

MODIFIED GRAZING ALTERNATIVE (BLM'S PREFERRED ALTERNATIVE)

The BLM would re-issue livestock grazing permits with allotment specific Terms and Conditions within the North Delta LHA Unit (Figure 1). Under this alternative, where necessary, grazing permit authorization(s)/ allocation(s) and Terms and Conditions may be modified so progress can be made towards meeting the Fundamentals of Rangeland Health and Standard and Guidelines for Grazing Administration, CFR §4180.1 and §4180.2. Modifications may include: reductions in AUMs, adjustments in season of use, more intensive livestock management, changes in percent public land, utilization, carrying capacity, stocking rate, class of livestock, timing and intensity of grazing use, duration of grazing, or the use of other grazing seasons not stated on the current permit.

Additionally, modifications to the permit may be made in response to environmental events such as drought, heavy snow fall, and flooding. During times of drought, modifications will include advance planning and communication, field-level data collection and use of a variety of standard range management practices. The practices, hereafter referred to as Drought Response Tools or DRTs, will be applied during drought situations where and when necessary in grazing allotments.

standards, or meeting with downward trend, carrying capacities (AUMs) were adjusted from the 10 year average actual use. The amount of the reduction was the difference in a 50% utilization rate to a 35% utilization rate which is equal to a 30% reduction in AUMs from the 10 year average annual AUM use Table 5.

Table 5 Summary of 10 Year Actual Use

Allotment Name	Allotment Number	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average 10 Year Actual Use	
Alkali Flats	14017	763	871	794	841	811	572	815	984	191	401	704	
Deer Basin/ Midway	14019	138	138	177	435	604	417	580	381	278	404	355	
Delta Pipeline	03277	201	283	318	336	469	496	379	557	210	348	360	
Dirty George	14023	55	39	39	39	39	39	84	39	39	39	45	
Petrie Mesa	14022	104	151	99	113	65	36	39	65	0	59	73	
Point Creek	14021	77	24	28	28	33	101	101	32	96	44	56	
South Branch	14004	101	101	101	101	101	101	101	101	101	101	101	
Ward Creek/ Dough Spoon	14025	9	9	9	9	9	9	9	9	9	9	9	
		106	106	10	10	106	0	0	0	37	0	38	
		205	205	205	205	205	205	205	205	205	205	205	205
		37	37	37	37	37	37	37	37	37	37	37	37
		100	100	100	100	100	100	100	100	100	100	100	100
Wells Gulch	14016	641	819	863	945	449	677	672	677	303	811	686	

To maintain a healthy and productive rangeland grazing system the stocking rate should not exceed the carrying capacity of the land. In order to monitor reduction in carrying capacity and utilization rates, science-based grazing season utilization guidelines, utilization mapping, long term trend studies, and actual use data will be used. These tools will aid in determining if appropriate permit allocation levels (AUMs/carrying capacity) are achieved. Specific grazing season utilization guidelines are for key forage species pertinent to each individual allotment and grazing species.

Design features, and Terms and Conditions for grazing permits are described below, and for each individual allotment in Table 6. Allotment Descriptions, Evaluations, and Modifications are located in the Range analysis section of this EA. All allotment authorizations will be analyzed with a two week variable window on each side of the on/off date (not to exceed AUMs) to account for seasonal variations in range condition and to promote cooperation and management of grazing permits

administered by the United States Forest Service. Modifications to permits and/or Terms and Conditions are subject to change as determined by the authorized officer (AO) and in consultation with the permittee.

Table 6. Modified Grazing Alternative AUM Adjustments

<i>Allotment Name and Number</i>	<i>Livestock Number/ Kind</i>	<i>Grazing Period (MM/DD)</i>		<i>%PL</i>	<i>Current Active AUMs¹</i>	<i>Average 10 Year Actual Use</i>	<i>Proposed Active AUMs²</i>	<i>Suspended AUMs³</i>	<i>Retired AUMs³</i>	<i>Terms and Conditions⁵</i>	<i>Appropriate AUMs based on 18 to 25 ac/AUM.⁶ Literature Reference capacity suggested for Salt Desert Shrub</i>
		<i>Begin</i>	<i>End</i>								
Alkali Flats #14017	1000/ Sheep	1-Dec	28-Feb	100	1,001	704	493	35	473	All Std's, BH-S, BH-M, All PTE, R1	528
Deer Basin/Midway #14019	1567/ Sheep	1-Dec	28-Feb	96	900	355	249	331	320	All Std's, BH-S, BH-M, All PTE,	580
Delta Pipeline #03277	1000/ Sheep	1-Dec	1-Mar	100	563	360	252	98	213	All Std's, BH-S, BH-M, All PTE,	350
Dirty George #14023	200/ Cattle	15-Oct	20-Oct	100	39	25	39	0	0	All Std's, R1	39
	205/ Cattle	2-Jun	15-Jun	100	94	20	94	0	0	All Std's, R1	94
Petrie Mesa #14022	1000/ Sheep	9-Dec	1-Mar	100	104	73	73	0	31	All Std's, BH-S, BH-M, All PTE,	104
Point Creek #14021	1000/ Sheep	16-Apr or 16-Nov	31-May or 1-Mar	24	102	56	39	29	34	All Std's, BH-S, BH-M, All PTE,	68
South Branch #14004	111/ Cattle	15-Oct	29-Oct	78	36	36	36	0	0	All Std's, R1	36
	112/ Cattle	4-Jun	30-Jun	78	65	65	65	0	0	All Std's, R1	65

Allotment Name and Number	Livestock Number/ Kind	Grazing Period (MM/DD)		%PL	Current Active AUMs ¹	Average 10 Year Actual Use	Proposed Active AUMs ²	Suspended AUMs ³	Retired AUMs ³	Terms and Conditions ⁵	Appropriate AUMs based on 18 to 25 ac/AUM. ⁶ Literature Reference capacity suggested for Salt Desert Shrub
		Begin	End								
Ward Creek/Dough Spoon #14025	25/ Cattle	16-Oct	1-Nov	63	9	9	9	0	0	All Std's, All PTE,	9
	226/ Cattle	27-May	15-Jun	64	95	19	95	0	0	All Std's, All PTE,	95
	226/ Cattle	16-Oct	18-Oct	64	14	19	14	0	0	All Std's, All PTE,	14
	26/ Cattle	16-Oct	27-Oct	100	10	10	10	0	0	All Std's, All PTE,	10
	58/ Cattle	2-May	16-Jun	100	88	88	88	0	0	All Std's, All PTE,	88
	21/ Cattle	2-May	16-Jun	100	32	32	32	0	0	All Std's, All PTE,	32
	11/ Cattle	16-Oct	27-Oct	100	4	4	4	0	0	All Std's, All PTE,	4
	90/ Cattle	16-Oct	2-Nov	100	53	53	53	0	0	All Std's, All PTE,	53
	142/ Cattle	17-May	15-Jun	100	140	140	140	0	0	All Std's, All PTE,	140
Wells Gulch #14016	3245/ Sheep	1-Dec	10-Mar	100	1,433	686	1,172	0	261	All Std's, BH-S, BH-M, All PTE,	1,433

¹Current Active AUMs: Currently what is authorized for use on the grazing permit. ²Proposed Active AUMs: What is proposed for authorized use on the permit, and was adjusted using an average of 10 year actual use AUMs. ³Suspended AUMs: AUMs put in suspension for future use when the allotment shows improvement. ⁴Retired AUMs: AUMs that are proposed to be removed from the permit.

⁵Terms and Conditions descriptions are listed below under Terms and Conditions. ⁶Managing Intermountain Rangelands-Salt-Desert Shrub Ranges J. Blaisdell & R. Homgren 1984

Terms and Conditions

Standard Terms and Conditions Common to All Permits (Standard).

- Grazing will be limited to 18 days or less in each pasture or use area during the growing season to prevent grazing of plant re-growth. This limitation does not apply to dormant season grazing periods.
- Grazing will be deferred on new vegetation treatments and rehabilitated burned areas to the extent necessary to comply with BLM Colorado Standards for Public Land Health and Guidelines for Livestock Grazing Management.
- Periodic authorization of grazing outside the time period (15 days pre and post grazing dates) specified in the grazing permit may be allowed with prior approval from the authorized officer, for range readiness management and cooperation with USFS.
- Spring and fall grazing of BLM pastures or use areas occurring in the same year will usually not be authorized. Exceptions may be made to accommodate grazing deferments associated with fire stabilization and rehabilitation or vegetation treatments with prior written approval from the BLM.
- The BLM must be contacted prior to any range project maintenance activity, e.g. cleaning of ponds or reservoirs with heavy equipment, which would involve soil surface disturbance. All heavy equipment would be washed and free of debris before entering BLM lands.
- The grazing permit authorizes motorized access off existing public routes for administrative and maintenance purposes of range improvement projects only. In areas where there is a concern for threatened and endangered plants see Terms and Conditions PTE3.
- Grazing will be managed in a way that does not conflict with efforts to treat noxious weeds and invasive plants.
- Salt, protein, energy, and mineral supplement sites must be at least ¼ mile (or as far as practical) from permanent water sources. The exception to this is placing salt in the bottom of reservoirs for sealing purposes. All supplements will be placed at least 200 meters (656 feet) from occupied Threatened and Endangered Plant habitat. Energy supplements, such as corn, will be fed on a hardened surface such as a road and may be fed at a rate of 1 pounds/head/day and can only occur within the last 45 days of gestation (see definition in glossary).
- The operator is responsible for informing all persons who are associated with the allotment operations that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during any allotment activities and grazing activities, the operator is to immediately stop activities in the immediate area of the find that might further disturb such materials, and immediately contact the BLM. Within five working days, the BLM will inform the operator as to whether the materials appear eligible for the National Register of Historic Places and whether there are mitigation measures the operator will likely have to undertake before the identified area can be used for grazing activities again.
- Pursuant to 43 CFR 10.4(g), the holder of this authorization must notify the BLM, by telephone, or with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4(c) and (d), anyone must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer.

- If paleontological materials (fossils) are uncovered during Allotment activities, the operator is to immediately stop activities that might further disturb such materials, and contact the authorized officer. The operator and the authorized officer will consult and determine the best option for avoiding or mitigating paleontological site damage. The authorized officer may approve higher level utilization when plant health will not be compromised and rapid plant re-growth is anticipated.
- Require submission of Actual Use Report at the end of grazing season, to include: livestock movement by pasture and by date, dead report in note section, sightings of BH, and recreation conflicts.
- In salt desert shrub communities utilization will be limited to 35% or less of the current year growth.
- Higher elevation, greater than 7,000 ft with less fragile soils and vegetative communities, will maintain a 50% or less utilization rate on current year growth.
- In areas where sheep grazing and high recreation use overlap, guard dog warning signs will be placed by the permittee.

Riparian Terms and Conditions

R1. In riparian areas, dormant and growing season utilization will be 35% or below for native woody riparian species.

Bighorn Sheep Terms and Conditions

Terms and Conditions are additive from “Some” through “High” probability of interaction.

Some Probability of Interaction (BH-S)

- BH1. All ewes must be bred before turn out onto BLM.
- BH2. Mandatory use of at least 2 guard dogs per band to deter co-mingling.
- BH3. Only healthy domestic sheep shall be turned out onto BLM.
- BH4. No scheduled lambing of domestic sheep shall occur on BLM.
- BH5. Sweep allotments within 24 hours of moving off to capture any strays.
- BH6. Use of marker sheep within bands; at least 1/100head.
- BH7. Remove sick, physically disabled or dead domestic sheep from the band and BLM lands as soon as possible after discovery.
- BH8. Use only highly gregarious breeds of domestic sheep.
- BH9. Maintain a band of no greater than 3000 head.
- BH10. Report any documented BHS in proximity of allotment or domestic sheep to CPW and BLM immediately.

Moderate Probability of Interaction (BH-M)

- BH 11. Mandatory use of at least 3 guard dogs per band to deter co-mingling in Moderate Probability allotments
- BH 12. During spring use, limit band size for ewes with lambs. Numbers would be determined on a permit-by-permit basis based on site specific information.
- BH 13. Require a submission of dead report to be turned in at the end of the grazing season.

BH 14. No yearling ewes will be turned out during the desert bighorn sheep breeding season (August 1- September 30).

BH 15. Decrease probability of interaction between bighorn and domestic sheep by creating barriers to movement (fences, herding, hazing, etc.) utilizing available topographic and natural barriers where feasible.

High Probability of Interaction (BH-H)

BH 16. Shorten the time period domestic sheep spend close to known bighorn use areas.

Mandatory use of at least 4 guard dogs per band to deter co-mingling

Plant Threatened or Endangered Terms and Conditions (PTE)

(Biological Opinion: ES/GJ-6-CO-12-F-006, TAILS 06E24100-2012-F-0020)

PTE 1. No concentrations of livestock activities including but not limited trailing, bedding (except dispersed), salt or supplement, portable watering and new range improvements will be allowed within 200 meters (656 feet) of plant populations.

PTE 2. To minimize sheep grazing impacts in allotments containing Colorado hookless cactus, limit sheep grazing within 200 meters (656 feet) of occupied habitat to 5 nights per use area or to the extent needed to avoid regrazing.

PTE 3. Within 200 meters (656 feet) of listed plants, motorized access for livestock grazing operations will be limited to existing roads and routes.

PTE 4. As a standard permit term and condition within occupied habitat of threaten and endangered plant species, grazing season utilization levels of palatable perennial forage will be limited to approximately 35% except around congregation areas for example ponds, watering areas, fences, bedgrounds, and cattle guards.

PTE 5. The permittee will be required to notify the BLM authorized officer at least 48 hours in advance of trailing activities when they are outside of the permitted grazing dates.

Design Features (DF)

In addition to terms and conditions of the grazing permit, the following are design features for this alternative.

Standard Design Features

Drought Design Features

- After collaboration with the permittee, modifications to the permit may be made in response to abnormal environmental events such as drought, heavy snow fall, and flooding etc. Modification may include timing, intensity, or duration of grazing, or the use of other grazing seasons not stated on the permit.
- During times of drought, trigger points (Table 7) and drought monitoring processes are described in the Drought Detection and Monitoring Plan (Appendix A) may be implemented.

Table 7 Drought Trigger Points

<i>Trigger Point*</i>	<i>Drought Management Guidance</i>
Moderate Drought	Assess conditions January 15 th prior to spring turnout, and June 15 th prior to fall or winter turnout. Send a drought notification letter informing permittees of the moderate drought conditions, reduced forage production, and the concern that if moisture doesn't come in the next few months to expect changes in management.
Severe Drought	<p>If drought conditions are severe at March 15th for spring turnout or August 15th for fall or winter turnout, schedule drought monitoring field visits to be conducted 2-4 weeks prior to turn out to assess field conditions. Permittees will be invited to assist in monitoring. If field verified severe drought:</p> <ul style="list-style-type: none"> • defer grazing past active growth; or • limit utilization to no less than 2-2.5 inch stubble height on rhizomatous species (not sod bound), 2.5 inches on short-mid stature grasses and 4 inches on mid height bunchgrasses (depending upon key species), and shrub utilization to <15% of the leaders browsed^{2, 3,4}
Extreme Drought	<p>If field verified extreme drought, manage for minimal use i.e.:</p> <ul style="list-style-type: none"> • trailing only (active movement of livestock), • permit use of pastures meeting land health standards that have been rested prior years: limit utilization to no less than 2.5 inch stubble height on rhizomatous species (not sod bound), 2.5-4 inches on bunchgrasses (depending upon key species), and shrub utilization to <15% of the leaders browsed^{2, 4} • During multiyear severe or extreme drought implement complete rest
Post Drought Recovery (1-2 years following a severe or extreme drought episode)	<p>Based on site specific field verification</p> <ul style="list-style-type: none"> • Complete rest; or • defer grazing past active growth; and • limit utilization to no less than 2.5 inch stubble height on rhizomatous species (not sod bound), 2.5-4 inches on bunchgrasses (depending upon species), and shrub utilization to <15% of the leaders browsed^{2, 4} • Or resume permitted grazing without restrictions

The Trigger Points used to initiate DRTs are Moderate, Severe, and Extreme Drought severity categories.

These categories are established by the United States Drought Monitor (<http://droughtmonitor.unl.edu/>). They describe different levels of drought in terms of regional impacts to water availability and crops as follows:

- Moderate Drought: Some damage to crops, pastures; streams, reservoirs, or wells, some water shortages developing or imminent; voluntary water-use restrictions requested
- Severe Drought: soil moisture and weekly stream flows estimated in the 6-10th percentile of normal, and impacts of crop or pasture losses likely; water shortages common; water restrictions imposed
- Extreme Drought: soil moisture and weekly stream flows estimated in the 3-5th percentile of normal, and impacts of major crop/pasture losses; widespread water shortages or restrictions

Bighorn Sheep Design Features

- Prohibit the changing of cattle to sheep in allotments with high probability levels of interaction with bighorn sheep unless analyzed with risk mitigated or until current science mitigates risk.
- Where possible shorten the time period spent close to known bighorn use areas.
- When opportunities arise, consider changing class of livestock in sheep allotments to cattle, to reduce the probability of interaction between domestic and wild sheep. These allotments would be evaluated on basis of site specific domestic/bighorn sheep information and probability levels.

NO GRAZING ALTERNATIVE (ALTERNATIVE 2)

Livestock grazing permits would not be renewed. The no grazing alternative would deny all applications for grazing permit renewal. Permits would be expired at the end of their current ten-year authorization, and no further grazing would take place on any allotment within the project area. Concurrently, all range improvements would be abandoned, become dilapidated and unusable for other public uses. In addition, the permittee(s) or lessee(s) shall receive from the United States reasonable compensation for the adjusted value of their interest in authorized permanent improvements placed or constructed by the permittee or lessee on public lands covered by cancelled permit or lease according to 43 CFR §4120.3-6 (c)(d).

Table 8 Summary of Alternatives

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM¹ Literature Reference capacity suggested for Salt Desert Shrub
Alkali Flats # 14017	Active AUMs	1001	493	N/A	528
	10 Year Actual Use AUMs	704	N/A		
	Suspended AUMs	0	35		
	Retired AUMs	0	473		
	Upland Utilization	50% except where basal ground cover is < 10% then 35% utilization is expected	35%		
	Grazing Strategy	none	Changes would include use-area delineations, planned grazing strategies, and periodic rest. Specific plans for each allotment would be made on an individual basis during implementation.		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, BH-M, All PTE, R1, R2		
	Acres	12,433	8,900		
	Allotment Category	I	Same as No Action		
Deer Basin/Midway #14019	Active AUMs	900	249	N/A	580
	10 Year Actual Use	355	N/A		

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM ¹ Literature Reference capacity suggested for Salt Desert Shrub
	AUMs				
	Suspended	0	331		
	Retired	0	320		
	Upland Utilization	50%	35%		
	Grazing Strategy	none	Changes would include use-area delineations, planned grazing strategies, and periodic rest. Specific plans for each allotment would be made on an individual basis during implementation.		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, BH-M, All PTE,		
	Acres	11,701	Same as No Action		
	Allotment Category	I	Same as No Action		
Delta Pipeline #03277	Active AUMs	563	252	N/A	350
	10 Year Actual Use AUMs	360	N/A		
	Suspended	0	98		
	Retired	0	213		
	Upland Utilization	50% except where basal ground cover is < 10% then 35% utilization is expected	35%		
	Grazing Strategy	none	Changes would include use-area delineations,		

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM ¹ Literature Reference capacity suggested for Salt Desert Shrub
			planned grazing strategies, and periodic rest. Specific plans for each allotment would be made on an individual basis during implementation.		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, BH-M, All PTE,		
	Acres	6,029	Same as No Action		
	Allotment Category	I	Same as No Action		
Dirty George #14023	Active AUMs	133	Same as No Action	N/A	133
	10 Year Actual Use AUMs	45	N/A		
	Suspended	0	0		
	Retired	0	0		
	Upland Utilization	50%	50%		
	Grazing Strategy	none	None		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's		
	Acres	1,389	Same as No Action		
	Allotment Category	M	Same as No Action		
Petrie Mesa #14022	Active AUMs	104	73	N/A	104
	10 Year Actual Use AUMs	73	N/A		

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM¹ Literature Reference capacity suggested for Salt Desert Shrub
	Suspended	0	0		
	Retired	0	31		
	Utilization	50%	35%		
	Grazing Strategy	none	Changes would include use-area delineations, planned grazing strategies, and periodic rest. Specific plans for each allotment would be made on an individual basis during implementation.		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, BH-M, All PTE,		
	Acres	2,841	Same as No Action		
	Allotment Category	M	I		

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM ¹ Literature Reference capacity suggested for Salt Desert Shrub
Point Creek #14021	Active AUMs	102	39	N/A	68
	10 Year Actual Use AUMs	56	N/A		
	Suspended	0	29		
	Retired	0	34		
	Upland Utilization	N/A	35%		
	Grazing Strategy	none	Changes would include use-area delineations, planned grazing strategies, and periodic rest. Specific plans for each allotment would be made on an individual basis during implementation.		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, BH-M, All PTE,		
	Acres	1,586	Same as No Action		
	Allotment Category	M	I		
South Branch #14004	Active AUMs	101	Same as No Action	N/A	101
	10 Year Actual Use AUMs	101	N/A		
	Suspended	0	0		
	Retired	0	0		
	Upland Utilization	50%	50%		
	Grazing Strategy	none	None		
	Terms &	See Appendix	Std's		

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM¹ Literature Reference capacity suggested for Salt Desert Shrub
	Conditions, Design Features	"C" for individual permit T&C			
	Acres	825	Same as No Action		
	Allotment Category	M	Same as No Action		
Ward Creek/ Dough Spoon #14025	Active AUMs	445	Same as No Action	N/A	445
	10 Year Actual Use AUMs	374	N/A		
	Suspended	0	0		
	Retired	0	0		
	Upland Utilization	50%	35%		
	Grazing Strategy	none	None		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, PTE, R2		
	Acres	17,190	Same as No Action		
	Allotment Category	I	Same as No Action		
Wells Gulch #14016	Active AUMs	1,433	1,172	N/A	1,172 AUMs calculated on ecological site type production data
	10 Year Actual Use AUMs (high)	686	N/A		
	Suspended	0	0		
	Retired	0	261		
	Upland Utilization	50%	35%		

Allotments	Changes	Proposed Action (Current Management), Also the No Action	Modified Grazing Alternative (BLM's Preferred)	Alternative 2 (No Grazing)	AUMs based on 17 to 25 ac/AUM¹ Literature Reference capacity suggested for Salt Desert Shrub
	Grazing Strategy	Has delineated use areas and manages deferred grazing rotation system	Same as No Action		
	Terms & Conditions, Design Features	See Appendix "C" for individual permit T&C	Std's, BH-M, All PTE,		
	Acres	16,879	10,343		
	Allotment Category	I	Same as No Action		

¹ Managing Intermountain Rangelands-Salt-Desert Shrub Ranges J. Blaisdell & R. Homgren 1984.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Reduced-Grazing Strategy for LHA Findings - Considered but Not Carried Forward

This alternative developed a reduced-grazing strategy, proportionate to the percent of the allotment meeting with downward trends or not meeting Land Health Standard 3 Vegetation, and with livestock management as one of the significant causal factors, see Table 9 Reduced grazing strategy based on LHA findings. All other allotments remain the same as the Modified Grazing Alternative. All Terms and Conditions remain the same as under the Modified Grazing Alternative (See Terms and Conditions section for Modified Grazing Alternative. This alternative was not considered, because it is substantially similar in design to an alternative (BLM’s preferred Alternative) that is analyzed for most allotments in this alternative. In addition, it did not address stock rate and carrying capacity of allotments, in comparison to the ecological site capabilities, or utilization adjustments on other allotments within the North Delta permit renewal area.

Table 9 Reduced grazing strategy based on LHA findings

Allotment Name & Number	Livestock Number/ Kind	Public Land Allotment Acres	Grazing Period (MM/DD)		%PL	Type Use	Current AUMs (Percent Reduction)	Proposed Active AUMs	Suspended AUMs	Retired AUMs
			Begin	End						
Alkali Flats #14017	1920 Sheep	8,900	12/1	3/1	100	Active	1387(78%)	305	223	859
Deer Basin/ Midway #14019	1567 Sheep	11,701	12/1	3/1	100	Active	900(40%)	540	192	168
Delta Pipeline # 03277	1200 Sheep	6,029	12/1	3/1	100	Active	563(47%)	298	52	213
Petrie Mesa #14022	1000 Sheep	2,841	12/1	3/1	100	Active	104(27%)	76	28	0
Point Creek #14021	1000 Sheep	1,586	4/16 or 11/16	5/31 or 3/1	24	Active	102(62%)	39	63	0

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter provides a description of the human and environmental resources that could be affected by the Proposed Action and presents comparative analyses of the direct, indirect and cumulative effects on the affected environment stemming from the implementation of the Proposed Action and alternatives.

Cumulative impacts of the proposed action and alternatives and past, present and reasonably foreseeable actions known to the BLM, which may occur within the affected area, are shown at the end of this section.

Potential effects to the resources/concerns (Table 10) were evaluated to determine if detailed analysis is necessary. Consideration of some elements is to ensure compliance with laws, statutes, regulation or Executive Orders that impose certain requirements upon all Federal actions. Other items are relevant to the management of public lands in general or to the BLM Uncompahgre Field Office (UFO) in particular. Any element not affected by the proposed action will not be analyzed.

Table 10. Issue Statement

Elements	¹ Not Present	² Present / No Analysis Needed	³ Present / Requires Further Analysis	Rationale if not Analyzed or Issue Statement
Air Quality		X		Concentrations of fugitive dust and/or gaseous emissions that could result from livestock are expected to quickly dissipate by wind and topographic features and is not expected to exceed air quality standards.
Climate Change		X		While livestock emit methane, a greenhouse gas, the volume is extremely small compared to the CEQ threshold established at 25,000 metric tons annually to consider for analysis ⁵ . Carbon sequestration is also affected by grazing but less than can be measured for analysis. The impact to threatened and endangered species and terrestrial wildlife are discussed within those sections.
ACEC			X	There is an ACEC within the Adobe Badlands WSA.
Wilderness	X			

Elements	¹ Not Present	² Present / No Analysis Needed	³ Present / Requires Further Analysis	Rationale if not Analyzed or Issue Statement
Wilderness Study Areas (BLM Manual Section 6330)			X	Grazing would be allowed to continue as a “grandfathered use.” Manual 6330 limits those activities and developments to the same manner and degree as existed on October 21, 1976. Any new proposals would have to meet the non-impairment standard, and therefore would not have an effect on the WSA’s wilderness characteristics, and would not constrain Congress’s ability to designate the area as wilderness.
Lands with Wilderness Characteristics			X	How would livestock grazing and related management activities affect wilderness characteristics within the Adobe Badlands WSA Adjacent wilderness characteristics unit?
Wild and Scenic Rivers			X	How would livestock grazing and related management activities affect the water quality, free-flowing nature, outstandingly remarkable value, and/or tentative classification of WSR Eligible river segment, Gunnison River Segment 2?
Cultural			X	Cultural Resource Inventory of the proposed routes is required under section 106 of the NHPA
Native American Religious Concerns			X	Analysis of specific areas within the project area is required under AIRFA. Depending on the results of the cultural resource inventory, consultation may be required.
Farmlands, Prime/Unique	X			Soils on BLM lands are not considered prime and unique because they are not irrigated.
Soils			X	Is grazing reducing vegetative cover and biologic soil crust, causing erosion and mobilization of selenium and salts?
Vegetation			X	How will action affect native species composition and cover and vigor? How will proposed action change acreages meeting standard 3?

Elements	¹ Not Present	² Present / No Analysis Needed	³ Present / Requires Further Analysis	Rationale if not Analyzed or Issue Statement
Invasive, Non-native Species			X	Will changes in grazing practices affect the spread, dominance and establishment of noxious and invasive species?
Threatened and Endangered Species			X	How has current and historic grazing practices impacted populations and distribution of Colorado hookless cactus? What proposed changes will affect hookless cactus populations? How do changes in selenium delivery to the Gunnison River affect the endangered big river fishes and critical habitat?
Migratory Birds			X	How does grazing influence migratory species of conservation concern?
Wildlife, Terrestrial (including Terrestrial TES)			X	How does grazing management influence forage condition and availability of forage for wild ungulates? Pronghorn recruitment? How does domestic sheep grazing management influence risk of contact between domestic and wild sheep?
Wildlife, Aquatic			X	How might grazing management affect cutthroat in Alkali creek other streams? How do changes in selenium delivery to the Gunnison River affect the endangered big river fishes and critical habitat?
Wetlands & Riparian Zones			X	How will grazing management affect perennial stream bank stability and riparian cover and composition?
Floodplains		X		No proposed development in the floodplain.
Water -- Surface			X	How will grazing practices affect runoff volume and concentrations of salt and selenium in the Gunnison River?
Water -- Ground		X		No impacts to groundwater.
Wastes, Hazardous or Solid	X			The action would not create or impact wastes to the degree it needs to be analyzed.

Elements	¹ Not Present	² Present / No Analysis Needed	³ Present / Requires Further Analysis	Rationale if not Analyzed or Issue Statement
Environmental Justice		X		The project will not disproportionately impact minority or low income populations.
Socio-Economics			X	How will changes to grazing management affect the livestock permittee and livestock ranching in Delta County? How will constraints to grazing management impact permittee's ranching operation?
Access		X		Livestock grazing will not impact or cause changes to access
Transportation		X		Livestock grazing will not impact or cause changes to the transportation system
Cadastral Survey		X		Livestock grazing will not impact property boundaries or survey monuments.
Realty Authorizations		X		Livestock grazing will not harm or disrupt use of realty authorizations.
Range Management			X	How will the proposed changes in grazing management move range conditions towards meeting land health standards and stabilize the grazing base for current and future ranchers?
Forest Management		X		Livestock grazing will not affect forest resources in the area because there are none present.
Fire			X	Will livestock grazing reduce fine fuel loading?
Noise	X			Livestock grazing will not affect noise to the degree that it needs analyzed.
Recreation		X		Proposed action does not affect recreation.
Visual Resources		X		Proposed action does not affect visual resource management class.
Geology and Minerals		X		Proposed action does not affect salable, leasable, locatable minerals.
Paleontology		X		Due to the location of paleontology resources, livestock grazing in this area is expected to have minimal impact to paleontological resources.
Law Enforcement		X		The proposed action would not increase the potential for criminal activity, and would not impact law enforcement.

¹Not present: the element is not present in the area impacted by the proposed or alternative actions.

²Present but no analysis needed: the element may be present, but not affected to a degree that detailed analysis is required.

³Present and requires further analysis: the element is present and requires further analysis because:

- 1) analysis of the issue is necessary to make a reasoned choice between alternatives, or
- 2) analysis of the issue is necessary to determine the significance of impacts.

GENERAL SETTING

The majority of the project area is located in Montrose and Delta Counties on the western slope of Colorado. The general area is comprised of three Land Health Assessment (LHA) units; Escalante, North Delta, and Gunnison Gorge. Total acres are approximately 547,000 and are composed of 291,709 acres of BLM, 27,000 acres of Black Canyon National Park, 1,982 acres of state land, and 201,521 acres of private land.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

Percent Land Health Standard 3 (vegetation) acres meeting, and not meeting will be used as an indicator for analysis. It is assumed that only allotments that intersect with the ACEC will be analyzed under the proposed action. The three allotments that intersect with the ACEC are Delta Pipeline, Deer Basin-Midway, and Petrie Mesa.

Affected Environment:

The project area is located north of Delta, Colorado within the North Delta LHA Unit (Table 1) which includes the Adobe Badlands Outstanding Natural Area/Area of Critical Environmental Concern (ACEC). The outstanding values for the ACEC include unique scenic qualities and Threatened and Endangered (T&E) species.

The adobe badlands ONA/ACEC located in the North Delta LHA unit is comprised of approximately 6,380 acres (Table 11). The status of vegetation in the Adobe Badlands ONA/ACEC is of particular concern, since vegetation reflects habitat conditions important for maintaining the ACEC's key values including unique scenic qualities, and T&E species habitat. The indicators of greatest concern, within the LHA unit include; exotic invasive plants, low perennial cool season grass cover, low perennial forb cover, low native plant diversity, areas of low perennial warm season grass cover, low shrub vigor and cover, and heavy shrub hedging. The area has 74% acres meeting land health standards, and 26% not meeting standards. These determinations are due to several factors including historic and current grazing management, historic and current recreation, and exotic invasive species. For additional vegetation information see the vegetation section.

Table 11 Adobe Badlands ACEC

Adobe Badlands ACEC/ONA			
Allotments	Deer Basin Midway Allotment	Delta Pipeline Allotment	Petrie Mesa Allotment
ACEC Acres	3,041	1,560	1,779
Allotment Acres	8,106	6,021	3,195
Percent of ACEC within allotment boundary	38%	26%	56%
Acres within ACEC Meeting LHS	2,198	974	1,519
Acres within ACEC Meeting with downward trends.	2,085	13	0
Acres within ACEC Not Meeting	842	581	260
Unknown	0	5	0

Environmental Consequences:

Modified Grazing Alternative– The proposed management actions are targeted to stop continued degradation through adjustments in carrying capacities (AUMs) to match forage availability, limiting early spring use unless a grazing strategy is in place, and adjustments in utilization from 50% to 35%. Changes are expected to improve vegetative vigor, improve low cool season perennial basal cover, promote seedling recruitment, and overall perennial plant basal cover, which would be beneficial to soils and Colorado hookless cactus habitat. The allotments are anticipated to make slow incremental steps over the next 25-100 years towards static to upward trends which will move the allotment(s) towards meeting Land Health Standards without total removal of livestock grazing and by association address the relevant and important values within the ACEC.

The Modified Grazing Alternative addresses indirect and direct impacts concerning livestock grazing management within the ACEC and in the associated allotments. For additional effects analysis concerning the relevant and important values of the ACEC, see the T&E plants section, recreation section for unique scenic qualities and soil section for erosion.

Alternative 2 (no grazing): Removing grazing from the North Delta land health area would eliminate the direct effects and reduce the indirect impacts to Colorado hookless cactus from grazing. The vegetation community problems that most likely threaten Colorado hookless cactus populations or contribute to the suppression of populations such as exotic plant competition, low native vegetation diversity, low shrub cover, low shrub vigor, and the presence of noxious weeds would slowly improve with the reduction in reduction in forage use. With limited precipitation and 120 years of grazing disturbance, improvement in Colorado hookless cactus habitat would take place over the next 120⁹⁰ ±years. Other disturbances from rights-of-ways, OHV and wildlife would continue to impact Colorado hookless cactus and its habitat.

Proposed Action Alternative (current management) –T&E species in the Adobe Badlands ONA/ACEC is one of the major constituents for the creation of this ACEC, and Colorado hookless cactus is the main species of concern. Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Allotments with acres meeting land health standards would continue to do so under this action, Allotments with acres meeting with a downward trend, would continue to degrade, and acres not meeting standards would remain static and/or increase. This action would not promote the relevant and important values of the ACEC. In addition, this action is not in accordance with CFR §4180.1 Fundamentals of Rangeland Health. Direct and indirect impacts would be expected to continue at similar levels depicted in the current LHA.

WILD AND SCENIC RIVERS

Affected Environment:

A segment of the Gunnison River adjacent to the North Delta grazing unit has been determined to be “eligible” for inclusion in the National Wild and Scenic River System (NWSRS). The full Eligibility Report with detailed information on the inventory and determination process can be found on the BLM Uncompahgre Field Office website here:

www.blm.gov/style/medialib/blm/co/field_offices/uncompahgre_field/rmp/rmp_docs.Par.16348.File.dat/Final%20WSR%20Eligibility%20Report%20Final%20Web%20071210.pdf

The name of the relevant eligible river segment is Gunnison River, Segment 2. The segment has a tentative classification of “recreational.” This means that there are few constraints on the level of development and modification of the lands adjacent to the segment within a quarter mile of either side of the segment.

The outstandingly remarkable value (ORV) is “fish”, and specifically, the Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*). Both species are classified as endangered under the Endangered Species Act and are known to inhabit this segment. In addition, this section of water supports predominantly native fish species, including exemplary populations of three BLM and Colorado sensitive species: flannelmouth suckers (*Catostomus latipinnis*), bluehead suckers (*Catostomus discobolus*), and roundtail chubs (*Gila robusta*). The river in the segment is free-flowing and the water quality is sufficient to support the fish ORV. BLM Manual 6400 details the policy guidance for managing eligible river segments. It requires BLM to manage the segment to protect the free-flowing nature of the river, its tentative classification (recreational), and the ORV (fish) until a determination is made to carry the segment forward for study as a “suitable” segment or it is released from further study.

Environmental Consequences:

Impacts Common to all Alternatives

It is likely that under all alternatives rain, snowmelt, and irrigation return flows originating on the Mancos shale uplands, would continue to carry salts and selenium derived from those soils

into the river segment. This would continue to negatively impact the water quality of the segment, however, the contribution from the lands in the North Delta grazing unit is a very small fraction of the total contribution from the entire watershed. (Refer to the Water Quality and Aquatic Wildlife sections of this document for more detailed analyses.)

Modified Grazing Alternative– There would likely be no discernable impacts to water quality or the ORV. There would be no impacts to either the tentative classification of this segment or its free-flowing nature. (Refer to the Water Quality and Aquatic Wildlife sections of this document for more detailed analyses.)

Alternative 2 (No Grazing) –There would likely be no discernable change to impacts to water quality or the ORV. There would be no impacts to either the tentative classification of this segment or its free-flowing nature. (Refer to the Water Quality and Aquatic Wildlife sections of this document for more detailed analyses.)

Proposed Action Alternative – There would likely be no discernable change to impacts to water quality or the ORV. There would be no impacts to either the tentative classification of this segment or its free-flowing nature. (Refer to the Water Quality and Aquatic Wildlife sections of this document for more detailed analyses.)

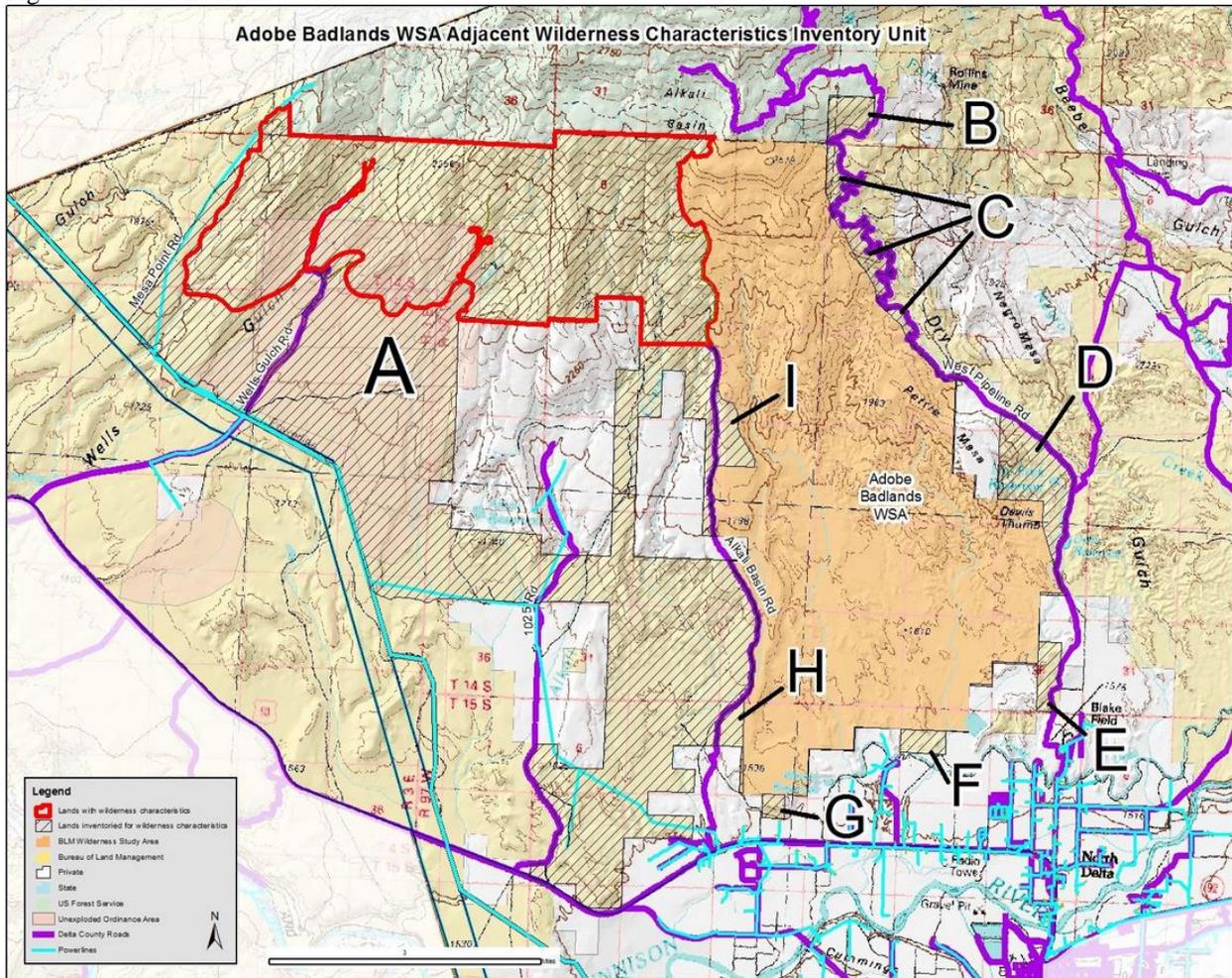
LANDS WITH WILDERNESS CHARACTERISTICS

Affected Environment:

BLM completed an updated inventory of lands with wilderness characteristics within the Uncompahgre Field Office in 2015. The webpage with all the details can be found here: http://www.blm.gov/co/st/en/fo/ufo/uncompahgre_rmp/lwc_inventory.html.

One unit within the North Delta project area was found to possess wilderness characteristics – Adobe Badlands WSA Adjacent Wilderness Characteristics Inventory Unit, Figure 2. The wilderness characteristics assessment can be found here: http://www.blm.gov/style/medialib/blm/co/field_offices/uncompahgre_field/documents/lwwc_docs.Par.18241.File.dat/2015-04 UA Adobe Badlands WSA Adjacent.pdf.

Figure 2. Adobe Badlands WSA



The unit (outlined in red above) has been determined to possess wilderness characteristics, including adequate size, naturalness, outstanding opportunities for solitude and primitive and unconfined recreation, and supplemental values. The inventory process was conducted consistent with BLM policy guidance in BLM Manual Section 6310.

The existing RMP does not address management of lands with wilderness characteristics, so any project proposals relative to livestock grazing in the area would be considered regardless of their potential affects to wilderness characteristics. BLM would apply BMPs to any proposal (including those that would moderate impacts to wilderness characteristics), but no proposal would be off the table solely on the basis of impacts to wilderness characteristics.

Environmental Consequences:

Impacts Common to all Alternatives There are no impacts common to all alternatives. The Modified Grazing Alternative could potentially lead to impacts to wilderness characteristics. Alternative 2, would likely result in gradual, small scale increases in acreage of lands possessing wilderness characteristics. Since wilderness characteristics exist, and are relatively stable under

current grazing practices (proposed action alternative), there would be no impact from the Proposed Action alternative.

Modified Grazing Alternative – The Adobe Badlands WSA Adjacent wilderness characteristics unit was found to possess characteristics while under current grazing management. Although under the Modified Grazing Alternative there would likely be slight, incremental improvements land health, there would likely be no discernable effect on wilderness characteristics.

Alternative 2 (No Grazing) - Under this alternative there would be no grazing. It is likely that in the long run there would be gradual, small scale increases in acreage of lands possessing wilderness characteristics.

Proposed Action Alternative - The Proposed Action alternative would continue with current grazing management. Under current management the area possesses wilderness characteristics as currently inventoried. Continuation of current grazing management would have no impact on size or quality of characteristics in the inventory unit.

CULTURAL RESOURCES

Affected Environment:

The 1998 BLM/Colorado SHPO Protocol agreement requires the BLM to identify all historic properties and sacred sites on all lands within Colorado that are within the Area of Potential Effect (APE) of a BLM undertaking (1998 Protocol VII (A) p. 4), which is defined as the geographic area(s) within which an undertaking may cause changes in the character or use of historic properties (36 CFR 800.2). During Section 106 review, a cultural resource assessment was completed for this allotment in November and December 2014, following the procedures outlined in IM-WO-99-039, IM-CO-99-007 and IM-CO-99-019. Copies of the cultural resource assessment are available in the Uncompahgre Field Office archaeology files and the summary report is attached to the range allotment permit file.

The North Delta area encompasses a limited range of cultural resources ranging from the recent historic to the earliest Paleo-Indian periods. The topography and landscape contributes to the “low potential” of this zone, being composed mainly of Mancos Shale lowlands with few water resources. Archaeological sites in the area are comprised mostly of isolated finds, limited lithic scatter/resource procurement sites and evidence of historic ranching and development. There are few known National Register eligible sites within the North Delta LHA unit. In general, archaeological sites in the vicinity are in stable condition, and vandalism is low – mainly due to the area’s lack of accessibility. Casual surface collection remains a problem. In the more remote backcountry, site disturbance is usually limited to erosional factors, some damage from cattle grazing (nearly all of which is from the past) and inevitable aging factors.

Environmental Consequences/Mitigation:

Impacts Common to all Alternatives-Direct impacts that may occur, where livestock concentrate and include trampling, chiseling and churning of site soils, cultural features and artifacts, artifact breakage and impacts from standing, leaning, and rubbing against above ground features and rock art. Indirect impacts may include, soil erosion, gulying and increased potential for unlawful collection and vandalism. In areas where cultural site presence coincides with areas of livestock concentration, continued grazing may contribute to substantial ground disturbance and cause cumulative, long term, irreversible adverse effects to historic properties.

Modified Grazing Alternative – Effects from Grazing - The North Delta grazing permit renewals contain nine individual allotments which have been analyzed for the presence of cultural resources which may be impacted by cattle grazing. All of the allotments have been examined and the appropriate reports are on file in the cultural files, BLM, Uncompahgre Field Office.

Allotment 14004 - South Branch. Cultural Resources Information for Range Allotments form on file (02UN – 004). Class II work required for the initial evaluation was completed in 2001, and it is recommended that the permit be renewed with no further work required.

Allotment 14016 – Wells Gulch. Cultural Resources Information for Range Allotments form on file (01UB – 113). Evaluations were completed and it is recommended that the permit be renewed with no further work required.

Allotment 14017 – Alkali Flats. Cultural Resources Information for Range Allotments form on file (00UN – 154). The permit was renewed in 2000 with further work required. Inventories were completed in 2003 (Frank Stipe, 2003 – report on file) and renewal is recommended with no further work required.

Allotment 03277 – Pipeline. This allotment was evaluated as the “Pipeline Pasture” of the Alkali Flats allotment, and a report is on file (00UN – 153). The permit was renewed in 2000 with further work required. Inventories were completed with negative results in the fall of 2000 (Fike 2000, report on file) and renewal is recommended with no further work required.

Allotment 14019 –Deer Basin/Midway. Cultural Resources Information for Range Allotments form on file (01UB – 111). Renewal is recommended with no further work required.

Allotment 14021 – Point Creek. Cultural Resources Information for Range Allotments form on file (01UB – 112). Renewal is recommended with no further work required.

Allotment 14022 – Petrie Mesa. Cultural Resources Information for Range Allotments form on file (02UN – 003), with further action required. Class II work required for the initial evaluation was completed in 2001 (Botsford 2001 report on file), and it is recommended that the permit be renewed with no further work required.

Allotment 14023 – Dirty George. Cultural Resources Information for Range Allotments form on file (02UN – 002). Renewal is recommended with no further work required.

Allotment 14025 – Ward Creek / Doughspoon. Cultural Resources Information for Range Allotments form on file (99UB – 087). Renewal is recommended with no further work required. These allotment reports were completed between 1999 and 2002 with no further work recommendations, or with some recommendations which were subsequently fulfilled and reports issued. Currently, there are no potentially ‘at risk’ historic properties located in areas of potential livestock concentration. Previously identified properties have been monitored and will continue to be field visited to assess livestock grazing impacts. As currently constituted, there will be no impacts to any known or anticipated historic property from the issuance of these grazing permits.

Mitigation Measures - Appropriate mitigation measures may be identified in consultation with Colorado SHPO upon discovery and within the ten year period of this permit. It is recommended a renewal be issued for these grazing allotments subject to the allotment specific stipulations contained in the information forms.

Alternative 2 (No Grazing) -Effects from Grazing, there would be no effects to any cultural resources if the no grazing alternative were adopted.

Proposed Action Alternative – Effects from Grazing, existing impacts would continue as they are, and no change would be expected. Since all the allotments analyzed above, exhibit no change and have been recommended as “Renewal with No Further Work”, no additional impacts would be expected aside from those effects noted within each allotment specific form.

NATIVE AMERICAN RELIGIOUS CONCERNS

Affected Environment:

The North Delta LHA area is not known to include any locality of special interest to the Northern Ute, Southern Ute or Ute Mountain Ute Indian Tribes. Consultation may be initiated concerning any potential use conflicts or impacts. Management, planning and project specific assessments for these areas should be assumed to require Native American Consultation with the appropriate tribal entities.

The locality addressed in this EA was historically home to large numbers of Ute people of the Uncompahgre band, and some areas may be considered both religiously significant, and traditionally important to modern day Ute people. There are no known Traditional Cultural Properties or significant cultural value localities within the LHA. The BLM has consulted with representatives from the Uintah and Ouray (Northern) Ute tribe, Southern Ute Tribe and the Tribal Historic Preservation Office of the Ute Mountain Ute Tribe.

Environmental Consequences/Mitigation:

Modified Grazing Alternative - Previous consultations have revealed limited localities which could be impacted by grazing activities. On-site visits have been conducted and there are no observed impacts to Native American Religious Concerns. Should monitoring of these localities result in the identification of impacts to religious or cultural values, the appropriate mitigation steps will be undertaken in consultation with representatives from the interested tribes.

Alternative 2 (No Grazing) - Effects from Grazing, under the no grazing alternative there would be no effects to any Native American Religious concerns

Proposed Action Alternative – Effects from Grazing, if the permits are renewed without further changes, there would be no changes to existing practices, and no impacts are anticipated.

SOILS (includes a finding on Standard 1)

Affected Environment:

The analysis area for impacts to soils includes the North Delta LHA area where direct effects occur. However, some of the indirect and cumulative effects occur downstream as soils are eroded from the site and carried downstream. The scope of the analysis for indirect and cumulative effects includes the reaches of the Gunnison River where each of the three LHA areas and their drainages meet the river.

Soils on public lands in the North Delta LHA vary in parent material from the marine evaporate sediments of the Mancos Shale to the sedimentary sandstone and shale units of the Dakota, Morrison and Mesa Verde formations. Most of the soils are dominated by sandy and silty clay loams and are covered by a thin veneer of gravels, cobbles and boulders left behind from glacial outwash. Some parts of the area are also covered with boulders and cobbles comprised of volcanic basalt mobilized by glacial action off the top of Grand Mesa. More precise descriptions of the soils in the area are in the table below from the Paonia and Ridgway Soil Surveys (USDA, Natural Resources Conservation Service). Only those soil units 1000 acres or larger, are included in the Table 12.

Table 12. Soil Descriptions and Associated Ecological Sites

Soil Unit Name	Geomorphic Description	Texture	Ecological Site Type	Soil Erodibility (Kw) Higher=More Erodable (0.2-.69)	Runoff Potential	Acres
Badland	flood plains, gullies, hillsides, uplands, valleys	unweathered bedrock		0	Very high	17354
Utaline-Torriorthents complex	benches, mesas, pediments	stony loam	Stony Saltdesert	0.2	High	10327
Saraton-Agua Fria complex, 20 to 50 percent slopes	benches, mesas, terraces	gravelly loam		0.28	High	7958
Meeteetse stony loam, 3 to 20 percent slopes	alluvial fans, terraces, uplands	stony loam	Stony Saltdesert	0.2	Very high	7118
Utaline sandy loam, 3 to 12 percent slopes	fans, mesas, terraces	sandy loam	Stony Saltdesert	0.28	Medium	5207
Rock outcrop	benches, canyons, escarpments, mesas, uplands	unweathered bedrock		0	Very high	3805
Shavano-Lazear complex, 3 to 12 percent slopes	uplands	fine sandy loam	Loamy Saltdesert	0.28	High	3462
Torriorthents-Rock outcrop, sandstone, complex	mountains	very stony loam		0.15	High	2221
Gullied land	drainageways, flood plains	variable		0	Medium	1844
Persayo silty clay loam, 12 to	uplands	silty clay loam	Silty Saltdesert	0.32	Very high	1782

Soil Unit Name	Geomorphic Description	Texture	Ecological Site Type	Soil Erodibility (Kw) Higher=More Erodable (0.2-.69)	Runoff Potential	Acres
35 percent slopes						
Billings silty clay loam, 0 to 3 percent slopes	fans, flood plains	silty clay loam	Salt Flats	0.32	Medium	1611
Utaline stony loam, 3 to 30 percent slopes	fans, mesas, terraces	stony loam	Stony Saltdesert	0.2	Medium	1566
Billings silty clay loam, gullied, 0 to 6 percent slopes	fans, flood plains	silty clay loam	Salt Flats	0.32	Medium	1496
Lazear-Rock outcrop complex, 3 to 30 percent slopes	uplands	gravelly loam	Saltdesert Breaks	0.2	Very high	1104
Chipeta silty clay, 3 to 30 percent slopes	uplands	silty clay	Clayey Saltdesert	0.24	Very high	1046
Delson very stony loam, 20 to 60 percent slopes	mountain slopes	very stony loam	Deep Clay Loam	0.1	Very high	1046
Glenton fine sandy loam, 0 to 3 percent slopes	fans, stream terraces	fine sandy loam	Sandy Saltdesert	0.28	Very low	1008

Natural erodibility is rated by the NRCS and quantified by the soil erodibility factor (Kw). The Kw factor indicates the susceptibility of a soil to sheet and rill erosion by water. The estimates are based primarily on percentage of silt, sand, clay, organic matter and soil structure. No vegetative or slope component is factored into the erodibility factor. In the table above, the higher the erodibility factor, the more susceptible the soil is to sheet and rill erosion by water. There are 5,863 acres with a Kw factor of 0.32 or greater. These soils have textures with very little rock content and higher percentages of silt and clay and can easily be eroded by water. There are 55,324 acres with a Kw factor less than 0.32. These soils have characteristics such as stony loam, gravelly loam, and unweathered bedrock and are less likely to be eroded by water. Much of the area is covered by glacial and volcanic basalt rock. This material provides protection for soil surfaces on many of the mesas and terraces. Those soils that don't have the rock veneer, are approximately 11% of the soils in the area, and are at greater susceptibility to erosion due to the natural physical properties of the soil.

The North Delta Land Health Assessment (2013) evaluated soils to determine if they were meeting or not meeting land health standards. Assessment of soil health is conducted using the following indicators: evidence of excessive rills and pedestals, active gullies, appropriate groundcover and plant canopy cover (including biological soil crust), adequate plant litter accumulation, minimal litter movement, appropriate soil organic material, and plant species diversity and presence of vigorous, desirable plants. These are the factors in combination with slope and rainfall that largely control the erosion processes. There were 56,575 acres found to be meeting land health standards while 3,965 acres were not meeting. The remaining acres in the unit were not evaluated in part because they consisted of land features that were difficult to assess such as rock outcrops and cliff bands. Approximately 91% of the soils in the unit are meeting and 6% not meeting.

In drier portions of the unit, biological soil crust (BSC) is an important component of the plant community needed for stabilizing soils more susceptible to erosion. Biological soil crust is most prevalent in portions of the field office that receive less than 14 inches of annual precipitation,

and on terrain with less than a 25-percent slope. In areas receiving more than 14 inches of annual precipitation, competition from vascular plants reduces the occurrence of biological soil crust.

Livestock can impact biological soil crusts by direct trampling. BSCs help stabilize the soil and inhibit wind and water erosion by forming a blanket or mat covering and binding the soil surface. BSC is a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria. The crusts also serve a critical role in nutrient cycling, water infiltration, and seedling germination⁶. The lack of biological soil crust was identified as a problem in the land health assessment (LHA) on 8,973 acres or approximately 15% of the acres assessed.

If soils become severely impacted from disturbance or during dry periods and native perennial vegetation and soil crust is degraded, annual weeds such as cheat grass can become dominate. Annual vegetation provides soil stabilization for a short period of time compared to perennials and prevents soil crust establishment by forming a dense monoculture of tightly spaced plants^{7, 8}. The LHA identified 44,952 acres with invasive or noxious species identified as a problem or 73% of the acres assessed.

Causal factors are collected at the upland study sites during the field sampling portion of the LHA and were identified by comparing evidence of human-related or notable natural influences between sites meeting health standards versus those with land health problems. Some of the causes cited are historic grazing, current grazing, drought, nearby agriculture and residential. There were 11,234 acres or 41% of soils meeting with a downward trend where current grazing was cited as a causal factor. The causes for land health conditions are often not exclusive and are usually complicated by multiple causal factors such as drought, historic grazing, past treatments, proximity to BLM routes and trailing routes.

The 2012 Land Health Assessment analyzed trends from the previous assessment in 2002 to determine if conditions are improving or declining with current management. Using paired t-tests, trends were upward on 17% of the acres assessed, static on 65% and downward on 6%. The majority of the acreage was found to be in the static category due in part to the Mancos Shale soil types. With approximately 8" of precipitation annually, disturbance from all of the causal factors at these sites is difficult to recover from before invasive species become dominant.

Environmental Consequences:

Impacts Common to all Alternatives- Soil rarely benefits from disturbance and grazing represents a routine disturbance of direct impact by hoof action. Direct impacts can be readily seen in the contours left on hillsides where livestock use the same trails around terrain features. Once contours are established, they are used more frequently and where contours merge, runoff is concentrated and soils are mobilized downslope. It has been found that sediment production on Mancos Shale is increased 10 times once it has been disturbed⁹.

Indirect impacts include mobilization of soils during rainfall-runoff events. Once soils are dissolved and suspended in water they can contribute to existing concentrations of salinity, selenium, sediment and bacteria. See the Surface Water section for further description. Grazing

can also cause indirect effects to soils by reducing plant basal cover as well as promoting the conversion of plant species to invasive short lived annuals that provide little cover.

Despite these direct and indirect impacts, grazing can be managed at appropriate levels to maintain land health conditions at a level of “meeting.” For example, the Wells Gulch allotment was assessed in 2012 and found to be meeting on 96% of the allotment. The trend since the last assessment in 2002, is static on 94% of the allotment and down on 4%. The Delta Pipeline, Point Creek and Wells Gulch allotments are all meeting with static trends and are assumed to continue to meet even under the Proposed Action alternative with continuation of existing management. Therefore, only the allotments not meeting or meeting with a downward trend will be analyzed. Acres impacted and the design features of each alternative will be used to determine how the existing problems would be impacted.

In the Modified Grazing Alternative and the Proposed Action alternatives, reduction in impact is expected due to changes in the permit or removal of grazing from the landscape. However, the projected recovery period for any type of reduction in impact to biological soil crust could be as little as 25 years or as much as 50 years depending on site stability, effective precipitation and continued disturbance regimes¹¹⁵.

Modified Grazing Alternative – The Alkali Flats allotment does not meet land health standards on 10% of the allotment. The Modified Grazing Alternative reduces the average 10 year actual use AUMs by 30% as well as utilization levels and implements delineated use areas with periodic rest. This will result in direct reductions in hoof impact compared to the Proposed Action alternative on 4,772 acres of soils with high levels of bare soil and low cryptogam cover.

The Deer Basin-Midway allotment meets standards on 74% of the allotment and does not meet land health standards on 26%. The Modified Grazing Alternative reduces the average 10 year actual use AUMs by 30% and reduces utilization levels from 50% to 35%. This will result in direct reductions in hoof impact compared to the Proposed Action alternative on 3,044 acres of soils with high levels of exotic plants, low cryptogam cover and low plant basal cover.

The Dirty George allotment meets on half and meets with a static trend on half of the allotment. The Modified Grazing Alternative does not change the Active AUMs or utilization levels. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative to resolve the exotic plants and bare soils found as problems in this allotment. The indicated causes of the problems were from wildlife use and historic grazing.

The Petrie Mesa allotment meets on 71% of the allotment. The Modified Grazing Alternative will reduce AUMs to 73 AUMs, the average 10 year average actual use, as well as reducing utilization levels from 50% to 35% and implement delineated use areas and a new grazing strategy. This will result in direct reductions in hoof impact compared to the Proposed Action alternative on 766 acres of soils with high levels of bare soil, exotics and low cryptogam cover.

The South Branch allotment meets on 97% of the allotment. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative to resolve the exotic

plants and bare soils found as problems in this allotment. The indicated causes of the problems were from wildlife use, BLM roads and use as a stock driveway.

The Ward Creek-Doughspon allotment meets on 98% of the allotment. The Modified Grazing Alternative does not adjust the Active AUMs but does reduce the utilization levels from 50% to 35% in salt desert shrub communities. This will result in some direct reductions in hoof impact compared to the Proposed Action alternative by preventing livestock from staying in any one area very long. The existing problems include runoff drainages, bare soils and exotics. The causes are from an open OHV area, rights-of-ways, old contour furrow treatments, and historic grazing. The Modified Grazing Alternative is unlikely to impact the existing problems.

Alternative 2 (No grazing) Removing grazing from the North Delta land health area would reduce the direct and indirect impacts from grazing. The problems such as low cryptogram cover, bare soils, and low plant basal cover would slowly improve with the reduction in hoof action and reduction in forage use. With limited precipitation and 120 years of grazing disturbance, improvement in soil health would take place over 25-50 years. Other disturbances from rights-of-ways, OHV and wildlife would continue to impact soils.

Proposed Action Alternative – Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Direct and indirect impacts would be expected to continue at similar levels.

Finding on the Public Land Health Standard for upland soils:

Current land health conditions rate soils in the North Delta land health unit as meeting on 56,575 acres, and not meeting on 3,965 acres. The Modified Grazing Alternative would reduce direct and indirect impacts to soils and result in an upward trend in soil health conditions.

VEGETATION (includes a finding on Standard 3)

Assumptions: The ecological site(s) with the greatest acres, within the allotment, will drive the majority of adjustments in livestock grazing management on allotments. Percent acres impacted and the design features of each alternative will be used to determine how existing vegetation issues will be addressed.

Indicators: Percent Land Health Standard 3 (vegetation) acres meeting, meeting with downward trends and not meeting.

Land health determinations and statistical methods

In the North Delta Land Health Unit, 43 daubenmire cover upland vegetation monitoring transects were conducted to represent a sample of the entire land health unit. Once field data was collected and entered into MS Excel, summary statistics for the data was computed for each vegetation polygon. Then, where there were enough studies within a polygon (≥ 3), student t-tests were used to evaluate whether indicators were significantly different from ecological site means (developed for the UFO during the 10 years of original Land Health Assessments.) A confidence level of 80% was used to make this determination. This information was used to help in making land health determinations for soils and vegetation within each of the polygons. Paired t-tests were also performed to evaluate whether measured trends for land health indicators within allotments, vegetation types, or special management areas were significant (confidence level 80% or $p < 0.2$ was used.)

The BLM assumed the level of significance at $p < 0.2$ with a confidence interval of 80% to ensure significant differences were adequately detected. In the analysis of data, higher confidence levels, higher precision and greater variability all dictate large sample sizes. Based on the importance of the data obtained, and the resources available to do the necessary sampling, a small sample size may be used. However, a significant difference (range deterioration) may exist but may not be detected with the more widely used $p < .05$ and 95% confidence interval. The lower confidence interval was applied in the analysis to lower the chances of not detecting a change, due to the small sample size, and the need to detect range deterioration or improvement.

A post hoc power analysis was conducted on several example t-tests to determine if our statistical tests may have failed to detect a true change. In one test, on warm season grasses in the stony salt desert site compared to the ecological site average, the result indicated our sample size should increase from 4 samples to 7 samples. While the probability of detecting a change would be improved, the time and ultimately the cost to increase the number of sample sites was prohibitive. We acknowledge this may have resulted in a failure to detect a change in some cases. However, this weakness was considered as determinations were made for each of the polygons to ensure there was sufficient data present particularly in cases where the determination for a polygon did not change from the previous land health evaluation.

Once data analysis was complete, the ID team met and reviewed the field data, the statistical analysis results, and previous land health determinations for each polygon. A new determination for a polygon was made if there was sufficient evidence that the previous determination was no

longer accurate. Determinations from 2002 were carried forward where there was insufficient new data, and past problems were reviewed for each polygon, current status of each problem was documented, and new concerns were added if they were supported by data. The results of the trend analysis were discussed, and the ID team made trend determinations for each polygon for each standard where there was adequate data, or where it was appropriate to extrapolate data from adjacent polygons. When making trend determinations, special consideration was given to trends of indicators which had been identified as concerns in the 2002 LHA

Affected Environment:

The analysis area for impacts to vegetation includes the North Delta LHA area where direct effects occur. However, some of the indirect and cumulative effects occur in 2 adjacent LHA units as the same type of grazing use occurs within those areas. The scope of the analysis for indirect and cumulative effects includes three Land Health Units, North Delta, Dominguez Escalante, and Gunnison Gorge (Table 13).

Vegetation on public land varies from one vegetation community to another depending on soil characteristics that give each community its own ecological characteristics known as the ecological site description or range site description. The largest common vegetation communities across the three land health units include: Pinyon Juniper types with 174,325 acres (36%), salt-desert shrub types with approximately 166,010 acres (34%), Mountain Shrub with 62,109 acres (13%), and Sagebrush with 60,314 acres (12%). Within the North Delta Land Health unit Pinyon Juniper comprises 8,927 (14%) acres and the salt-desert shrub community totals 49,209 (76%) acres. Other vegetation communities are present, but either comprise too small of a percent public land to drive management changes, are private, or are being analyzed under another standard like riparian.

A majority of this landscape unit has concerns and issues with Standard 3. These concerns are most pronounced in the salt-desert shrub communities. The vegetation of salt-desert shrub communities are characteristically sparse, with optimal ground cover 30%, and should largely be dominated by cool and warm season grasses, shrubs, in addition to annual and perennial forbs. The most concerning indicators within the LHA unit include exotic invasive plants, low perennial cool season grass cover, low perennial forb cover, low native plant diversity, limited areas of low perennial warm season grass cover, low shrub vigor and cover, and heavy shrub hedging.

Based on historical information, both of these vegetation types (Pinyon -Juniper and Salt-Desert Shrub) have altered herbaceous vegetative communities. This has been partly attributed to the amount of livestock introduced into the west during settlement. The original grazing capacity of salt desert shrub communities were approximately 5 acres/AUM but has changed to a minimum requirement of about 18 acres/AUM¹⁰. Will C. Barnes (Forest Service's Chief of Grazing) in 1926 put it this way "this is a clear case of first come first served and the devil take the hind-most." To attempt to address this early uncontrolled grazing use the Taylor Grazing Act, as passed in 1934 and which sought to "stop injury to the public grazing lands by preventing overgrazing and soil deterioration; provide for their orderly use, improvement, and development; and to stabilize the livestock industry dependent upon the public range". This was the start of

grazing management on public rangelands, which continued through the years with various changes most notably the passing of Federal Land Policy and Management Act of 1976 (FLPMA), and the Rangeland Grazing Reform Act of 1993.

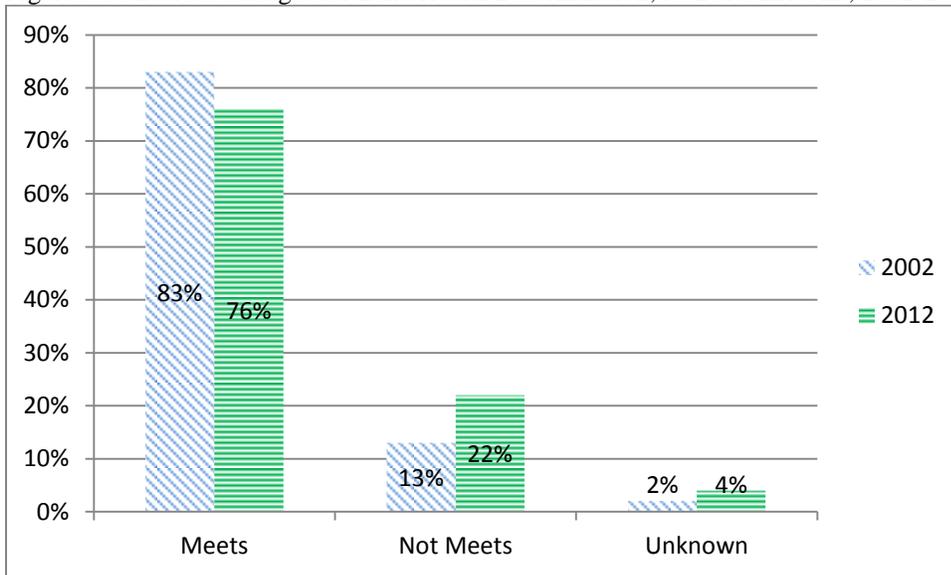
Many of the land health problems in the three land health units are due to the legacy of heavy use and degradation caused many years ago. The semiarid climate, relatively fragile vegetation, and soils which are slow to recover from disturbance, combined with historical heavy use (not just grazing), changes in the stability of ecological sites, and changes in vegetative composition, has hampered BLM’s ability to bring about change in these fragile environments. Nevertheless, due to past and some current unintentional mismanagement of grazing, there continues to be concerns with the salt desert shrub community associated with the stony salt desert ecological site and other ecological sites that support the salt desert shrub vegetative community. The health status of vegetation and long term trends within the salt-desert shrub community are a direct reflection of habitat conditions needed for TES species, soil health, AUM availability, esthetics, and the support of all facets of BLM’s multi-use mission. The pinyon juniper communities are largely meeting across all three land health units. Table 13 and Figure 4 below depict current and prior land health status across the three land health units.

Table 13. Land Health Units

Land Health Unit Comparison ¹		
LHA Units	Standard 3 Vegetation	
	Meets	Not Meeting
North Delta	76% (83%)	22% (13%)
Escalante	81% (71%)	8% (24%)
Gunnison Gorge	82% (90%)	11% (5%)

¹Parentheses note 2002 LHA unit results.

Figure 3 Standard 3 Changes for Land Health Determination, N. Delta LH Unit, 2002-2012



Between 2002 and 2012, there has been a decline in acres meeting and an increase in acres not meeting land health standards (Figure 3). Although there was a small loss in acres meeting land health standards (7%) there was a larger jump in acres not meeting (9%). More importantly, trends across the unit are not improving. Downward trends over time, across areas meeting land health standards, have slightly increased (5%), while trends across areas not meeting standards have moved substantially downward (20%) (Figure 3). More than half the unit acres are showing downward trend (55%) from 2002 to 2012; 34% of the area is meeting but in downward trend and 21% of the area is not meeting and in downward trend.

Figure 4. Standard 3 Land Health Trends for N. Delta LH Unit

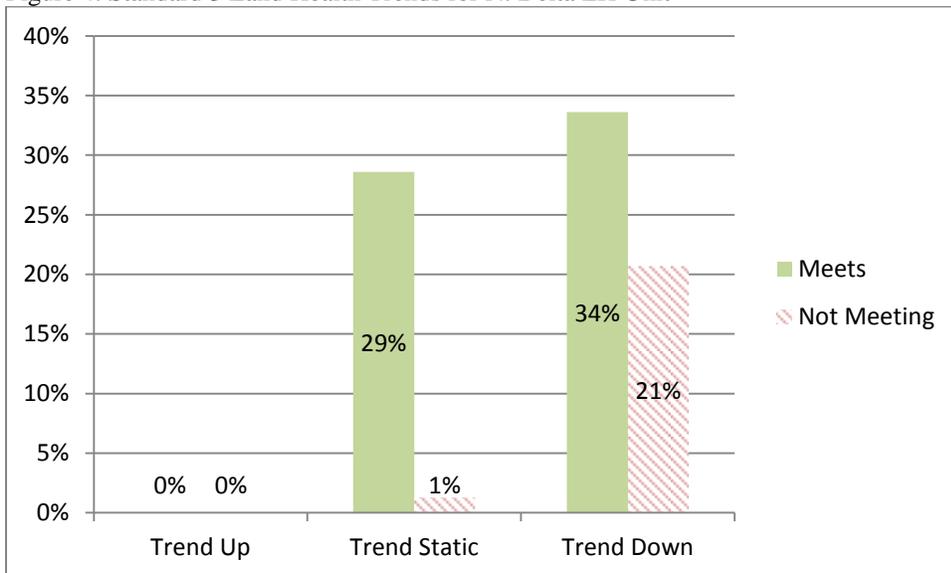


Table 14 shows there are no upward trends within the land health unit. Static trend within acres meeting land health standards is 46% as compared to the unit trend of 29%. Downward trends within acres meeting land health standards is 54% as compared to 34% across the unit. Overall, in areas meeting or not meeting land health standards, long term trends are trending downward.

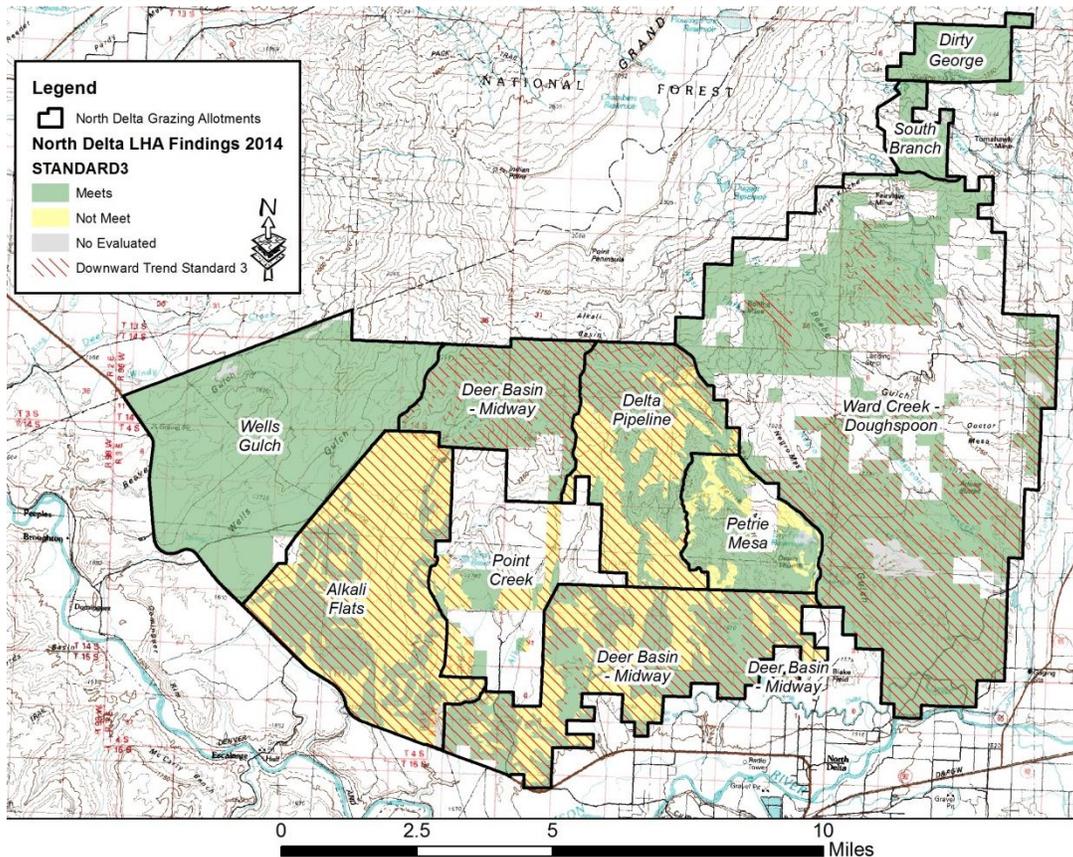
Table 14. Trend by Land Health Category

North Delta Land Health Unit Trends by Land Health Category			
	Standard 3 Vegetation		
Current Assessment	Total Acres within Meets Category (% Total North Delta)	Total Acres within Not Meeting Category (% Total North Delta)	*Trend across all N. Delta LH Unit Acres
Trend Up	0% (0%)	0% (0%)	0%
Trend Static	46% (29%)	6% (1%)	30%
Trend Down	54% (34%)	94% (21%)	55%

Trends are based on percent of acres for each category. *Approx. 15% of the total acres within N. Delta LH Unit are unknown for trend.

In addition, to the larger landscape unit being evaluated for land health standards, determination and trends were evaluated and analyzed for each allotment within the North Delta land health unit and results are presented below.

Figure 5. Land Health Standard 3 determinations and trend for N. Delta area



Alkali Flats # 14017

The Land Health Assessment done in 2013 for this allotment indicates, it is not meeting (64%) and meeting with a downward trend (35%), for approximately 99% of the allotment. Of this, current livestock management was found to be one of the significant causal factors, on 78% of the allotment (Delta LHA, 2014). Concerns noted from the latest LHA were a low occurrence of perennial shrubs, perennial cool season grasses, and perennial forbs, in relation to the Ecological Site Descriptions, and the last LHA (2002) completed. The largest ecological site in the allotment is stony salt desert, with 4,799 acres, other ecological sites include clayey foothill (60 ac), clayey salt desert (204 ac), salt flats (952 ac), and silty salt desert (668 ac), and when combined with a lands that do not have an ecological site attributed, adobe badland, (2,269 ac) total the remaining evaluated acres in the allotment.

The stony salt desert ecological site should have an optimum ground cover of about 30%, with perennial grasses contributing about 60% of the species composition and 18% of the vegetative cover split evenly between cool and warm season, shrubs should contribute about 30% species composition and 9% vegetative cover, with forbs comprising about 10% of the species composition and 3 % vegetative cover. The current LHA suggests the allotment has deviated from what is suggested in the stoney salt desert rangesite description, with forbs, shrubs, and cool season grasses, considerably lower than the ecological site suggestions. The warm season grass, galleta, is the most dominant grass, and has a higher vegetative cover in most areas than the ecological site description suggests (Table 15).

Table 15. Stoney Salt Desert Site, Site Means and Long Term Trends

Range Site Description (Characteristics)			Allotment LHA Ecological Site Means from 2002/2012		Allotment Long Term Trend	
Stoney Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological site description	Trend Change from 2002 to 2012 LHA	
Grass	60%	18%	13.7%	↓	No significant change (→)	
	Cool	30%	9%	1.2%	↓	No significant change (→)
	Warm	30%	9%	12.5%	→	No significant change (→)
Shrub	30%	9%	2.4%	↓	Significant change (↓)	
Forb	10%	3%	1.1%	↓	No significant change (→)	

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from statistical test on long term trend transects within the allotment ↑ increase, ↓ decrease, →static.

Trend data comparing the current LHA to the 2002 LHA indicates, across the allotment, perennial forb cover has not changed, perennial shrub cover decreased significantly (2% p=0.184), while warm and cool season grass cover has remained static. In addition, exotic species were noted as having significantly increased in cover (19%), on average (Table 15).

The Land Health Assessment done in 2013 for this allotment indicates it is not meeting (26%) and meeting with a downward trend (73%), for approximately 99% of the allotment. Of this, current livestock management was found to be one of the significant causal factors, on 40% of the allotment acreage assessed (North Delta LHA, BLM 2012). Concerns recorded were an overall increase in exotics, decrease in shrub cover, and an overall decrease in natives, in relation to the ecological site descriptions, current LHA (2012) suggestions, and the last LHA (2002) completed. The largest ecological site in the allotment is stoney salt desert, with 4,694 acres, other ecological sites include, clayey foothill (2 ac), clayey salt desert (506 ac), salt flats (989 ac), shallow clay loam pinyon juniper (2,419 ac), and silty salt desert (166 ac), and when combined with a lands that do not have an ecological site attributed, Adobe Badland (3,199 ac), total the remaining evaluated acres in the allotment.

Deer Basin Midway #14019 (The allotment has two spatially distinct parcels)

The first parcel is towards the toe of the Grand Mesa, is higher in elevation, and is primarily comprised of the stoney salt desert and shallow clay loam pinyon juniper (NRCS, draft 1996) ecological sites (Table 16 and Table 17). The stoney salt desert range site is suggested to have an optimum ground cover of about 30 %, with perennial grasses contributing about 60% of the species composition and 18% of the vegetative cover. Shrubs contribute about 30% species

composition and 9% vegetative cover, with forbs comprising about 10% of the species composition and 3 % vegetative cover.

The current LHA suggests the allotment has deviated from what is suggested in the stoney salt desert ecological site description for forb, cool/warm season grass, and exotic plant cover with forbs and shrubs considerably lower, and warm season grasses notably higher, than the ecological site suggestions. Cool season grasses seem to be in the natural range of variability.

Trend data collected before and concurrently with the LHA processes (2002-2012) indicates, this portion of the allotment has remained static, although perennial shrub cover significantly decreased, (5%, p=0.1055). There were no significant changes, in the percent dead, decadent, or low vigor browse. Causal factors listed include: Rights of Way (not roads), wildlife use current, drought, BLM roads, seral stage issues, and current and historic livestock grazing (Table 16).

Table 16. Stoney Salt Desert Site, Site Mean, and Long Term Trend Upper Section Deer Basin Midway.

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means		Allotment Long Term Trend	
Stoney Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological site description	Trend Change from 2002 to 2012 LHA	
Grass	60%	18%	29.8%	↑	No Significant difference (→)	
	Cool	30%	9%	11.5%	→	No Significant difference (→)
	Warm	30%	9%	18.3%	↑	No Significant difference (→)
Shrub	30%	9%	3.7%	↓	Significant difference (↓)	
Forb	10%	3%	0.66%	↓	No significant difference (→)	

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from long term trend transects within the allotment ↑ increase, ↓ decrease, →static.

The shallow clay loam pinyon juniper sites (Table 17) should have an optimum basil ground cover that ranges from 14% when the tree canopy is at its lowest 0-15%, to a basil ground cover of 8% when tree canopy is at its highest > 30%. When tree canopy is lowest, 0-15%, grasses and grasslike species should contribute about 31-71% of species composition and 4-10 % of the vegetative cover, forbs should comprise about 0-3% of the composition and 0-0.30% vegetative cover, and shrubs should contribute about 16-43% composition and 2-6% vegetative cover. When tree canopy is the highest, ≥30%, grasses and grasslike species should contribute about 6-15% of the species composition and 0.48-1.2% of the vegetative cover, forbs should comprise about 0-3% composition and 0-0.24% vegetative cover, and shrubs should contribute about 0-7% compositions and 0-0.56% vegetative cover.

The current LHA suggests this portion of the allotment has deviated from what is suggested in the shallow clay loam pinyon juniper ecological site description for, forbs and grasses (Table 17). Warm season grasses are within the suggested vegetative cover percent while cool season grasses are considerably lower than the ecological site suggestions. The average canopy cover of

trees on the site is 14.65%, which is on the cusp of splitting categories for tree canopy cover therefore; the site could be compared to a 15-30% tree canopy cover site. In that case, grasses are still below what is suggested for the cover class, and are more closely depicting grass cover on a $\geq 30\%$ tree cover class. The shrubs would be higher than suggested, and forbs would be just below the range associated with this higher tree cover class. With this said the ecological sites descriptions are suggestions, and shifts in one type of vegetative species, may be influenced from other dynamics of the site, i.e. aspect, and location of transect on the site side slope verses flatter areas etc. Overall this part of the allotment is probably within the range of variability for this type of ecological site.

Trend data collected before and concurrently with the LHA processes (2002-2012) across this portion of the allotment perennial forb, grass, shrubs and exotic vegetation cover has not changed (Table 17). However, vegetation composition saw a significant increase (5%, $p=0.1900$) in the percent dead browse species and a significant increase (18%, $p=0.0934$) in heavily hedged browse. When looking at the causal factors, drought and current/historic wildlife use were noted, while current livestock management use was not identified as a causal factor in this portion of the allotment.

Table 17. Shallow-Clay Loam P/J, Site Mean, and Long Term Trend Upper Section Deer Basin Midway.

Ecological Site Description (Characteristics)		Allotment LHA Ecological Site Means			Allotment Long Term Trend	
Shallow Clay Loam PJ#110 (draft, NRCS)	Species Comp. % by weight	Vegetative Cover %	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA	
0-15% Tree Canopy ²						
Grass		31-71%	4-10%	0.4%	↓	No Significant Difference (→)
	Cool	31-61%	4-8.5%	0.1%	↓	No Significant Difference (→)
	Warm	0-10%	0-1.4%	0.3%	→	No Significant Difference (→)
Shrub		16-43%	2-6%	5.4%	→	No Significant Difference (→)
Forb		0-3%	2-6%	0.1%	↓	No Significant Difference (→)

Ecological Site² Vegetative Cover % = Optimal Ground Cover (14%) * Species Comp. %

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from long term trend transects within the allotment ↑ increase, ↓ decrease, → static.

The second parcel, is near the Devils Thumb golf course, and is lower in elevation, precipitation, and is primarily composed of the stoney salt desert ecological site, and adobe badland cool slope, which does not have an ecological site associated with this soil type (Table 18 and Table 19). Adobe badland cool slope will be compared to site means across the landscape for this soil type.

The current LHA suggests, the allotment has deviated from what is suggested in the stoney salt desert ecological site description, with forbs, shrubs and cool/warm season grasses, noticeably lower than the ecological site suggestions.

Trend data collected before and concurrently with the LHA processes (2002-2012) indicates across the allotment perennial forb, and cool/warm grass cover have not changed however, perennial shrub cover has significantly decreased (5%, $p=0.1055$) in both ecological sites (Table 18 and Table 19). When looking at the causal factors, drought, noxious weeds, seral stage and current livestock management were noted as significant causal factors associated with the stony salt desert, while drought, dumping, noxious weeds, historic grazing, and new OHV use was associated with the adobe badland areas.

Table 18 Stoney Salt Desert Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means		Allotment Long Term Trend
Stony Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological site description	Trend Change from 2002 to 2012 LHA
Grass		60%	18%	2.3	↓
	Cool	30%	9%	0.0	↓
	Warm	30%	9%	2.3	↓
Shrub		30%	9%	0.7	↓
Forb		10%	3%	0.2	↓
					No significant change (→)
					No significant change (→)
					Significant (↓)
					No significant change (→)

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from long term trend transects within the allotment ↑ increase, ↓ decrease, → static.

Table 19. Adobe Badland Cool Slope Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means		Allotment Long Term Trend
Adobe Badland Cool Slope unattributed (closely resembles Clayey Salt Desert)	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA
Grass		N/A	N/A	0	N/A
	Cool				No significant change (→)
	Warm				No significant change (→)
Shrub		N/A	N/A	11.8	N/A
Forb		N/A	N/A	0.3	N/A
					No significant change (→)

Adobe Badland Ecological Site will be compared to site means across the landscape for this soil type and aspect.

Trend data is derived from long term trend transects within the allotment ↑ increase, ↓ decrease, → static.

Delta Pipeline # 03277

The Land Health Assessment done in 2012 for this allotment indicates, it is not meeting (47%), and meeting with a downward trend (51%), for approximately 98% of the allotment. Of this, current livestock management was found to be one of the significant causal factors on 47% of the allotment (N. Delta LHA, BLM 2012). Concerns recorded, were an increase in exotics, a decrease in perennial shrub cover, low community diversity, and a decrease in perennial forbs, in relation to the Ecological Site Descriptions and the last LHA completed. The largest ecological site in the allotment, is stony salt desert ,with 2,718 acres, other ecological site include, salt flats (5ac), sandy salt desert (86 ac) and shallow and sandy loam pinyon juniper (1,430ac) and when combined with a lands that do have an ecological site attributed adobe badland (1,668 ac), total the remaining evaluated acres in the allotment.

The current LHA suggests, the allotment has deviated from what is suggested in the stoney salt desert ecological site description with perennial forbs and shrubs noticeably lower than suggested. Overall, grass cover is in the range of variability however, the ratio of cool to warm season grass is highly out of the suggested cover percentages. Cool season grasses are considerably lower and warm season grasses are markedly higher than suggested in the ecological site description. With the warm season grass cover notably high, and the increase in exotics, it is plausible perennial forb and cool season grass establishment could be suppressed (Table 20).

Trend data collected before and concurrently with the LHA processes (2002-2012) indicates, across the allotment perennial forbs and shrubs have significantly decreased (6%, $p=0.0098$) and (9%, $p=0.1959$) respectively, while cool and warm season grass cover has not changed (Table 20). The percent dead browse saw no changes, while the percentage decadent browse increased significantly (2%, $p=0.1668$). In addition, exotic vegetation increased significantly (6%, $p=0.1844$) across the allotment within this ecological site. When looking at the causal factors, drought, noxious weeds, seral stage, and current livestock management were identified as significant causal factors associated with the stony salt desert ecological site.

Table 20. Stony Salt Desert Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means		Allotment Long Term Trend
Stony Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA
Grass	60%	18%	20.6%	→	No significant change (→)
	Cool	30%	1.3%	↓	No significant change (→)
	Warm	30%	19.3%	↑	No significant change (→)
Shrub	30%	9%	0.5%	↓	Significant (↓)
Forb	10%	3%	0.1%	↓	Significant (↓)

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation from Ecological site: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from long term trend transects within the allotment ↑ increased, ↓ decreased, →static.

The shallow and sandy loam pinyon juniper #112 site (NRCS, draft 1996) site should have an optimum basal ground cover that ranges from 12%, when the tree canopy is at its lowest 0-15%, to a basal ground cover of 8%, when tree canopy is at its highest, ≥ 35%. When tree canopy is lowest, grasses and grasslike species should contribute about 12-58% of species composition and 1.4-6.9 % of the vegetative cover, forbs should comprise about 0-10% of the composition and 0-1.2% vegetative cover, as shrubs should contribute about 18-57% composition and 2.16-6.84% vegetative cover. When tree canopy is the highest, grasses and grasslike species should contribute about 0-9% of the species composition and 0-0.76% of the vegetative cover, forbs should comprise about 0-10% composition and 0-0.8% vegetative cover, and shrubs should contribute about 0-1% compositions and 0-0.08% vegetative cover (Table 21). The current LHA mean for the site could not be compared to the NRCS ecological site data, as there were not enough transects in the LHA data to create a mean across the LHA area for comparison. However, there is the percent cover, for the one transect, and it could be compared in general, and with caution as there are not enough samples to make a statistical comparison. With that stated, the average canopy cover for trees on this site is 11.8%, which is within the lowest category for tree canopy cover. Warm season grasses, are within the suggested vegetative cover percent, while cool season grasses are somewhat lower than the ecological site suggestions. Shrub cover is higher than suggested, however shrub composition is within the range of variability. Forb cover is within the range suggested in the ecological site description. Overall, it is suggested this site has not deviated from the NRCS ecological site described for this area.

Table 21. Shallow Sandy Loam PJ Site #112, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)		Allotment LHA Ecological Site Means			Allotment Long Term Trend	
Shallow Sandy Loam PJ#112 (draft, NRCS)	Species Comp. % by weight	Vegetative Cover %	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA	
0-15% Tree Canopy ² Ground Cover 12%						
Grass		12-58%	1.44-6.9	2.4	→	No significant change (→)
	Cool	12-45	1.44-5.4	1.2	↓	No significant change (→)
	Warm	0-13	0-1.56	1.2	→	No significant change (→)
Shrub		18-57	2.16-6.8	14.0	↑	No significant change (→)
Forb		0-10	0-1.2	0.2	→	No significant change (→)

Deviation from Ecological site description **caution** not enough in sample size to give solid comparison.

Deviation from Ecological site: ↑ increase; ↓ decrease; → within range of variability

Trend data collected before and concurrently with the LHA processes (2002-2012) indicates across the allotment, perennial forbs, shrubs, and both cool and warm season grasses have remained static. The percent dead browse, and heavily hedged browse increased significantly (5%, $p=0.1900$) and (18%, $p=0.0934$) respectively, while the percentage of decadent browse remained static. In addition, exotic vegetation remained static and did not increase (Table 21). When looking at the causal factors, drought, seral stage, current wildlife use, and fire suppression were identified as significant causal factors.

Dirty George # 14023

The Land Health Assessment done in 2012 for this allotment indicates, it is meeting LHS for Standard 3 Vegetation. The largest ecological site in the allotment is deep clay loam with 779 acres, the other ecological site is a mountain pinyon ecological site (NRCS draft, 1995), with 580 acres, these combined acres were evaluated in the allotment.

Current, grazing management was not noted as a concern on the allotment. Current estimates of forage produced on the allotment, with average precipitation, does support the active 133 AUMs. Currently, the carrying capacity on the allotment is 11ac/AUM. This allocation is considered sufficient for this allotment and the higher location on the landscape.

The mountain pinyon #114 site (NRCS, draft 1996) site, should have an optimum basal ground cover that ranges from 15%, when the tree canopy is at its lowest, to a basal ground cover of 8%, when tree canopy is at its highest, > 30%. When tree canopy is lowest, grasses and grasslike species should contribute about 68-130% of species composition and 10.2-19.5 % of the vegetative cover, forbs should comprise about 15-45% of the composition and 2.25-6.75% vegetative cover, while shrubs should contribute about 19-46% composition and 2.85-6.9%

vegetative cover. When tree canopy is the highest, grasses and grasslike species should contribute about 09-48% of the species composition and 0.72-3.84% of the vegetative cover, forbs should comprise about 0-15% composition and 0-1.2% vegetative cover, and shrubs should contribute about 7-31% compositions and 0.56-2.48% vegetative cover (Table 22). The current LHA mean for the site could not be compared to the NRCS ecological site data, as there was not enough transect data in the LHA to create a mean across the LHA area for a comparison. However, there is the percent cover for the **one** transect, and it could be compared, in general, and with caution, as there are not enough samples to make a solid comparison. With that state, the average canopy cover for trees on this site is 19.7%, which is within the middle category for tree canopy cover (15-30%). The current LHA suggests the allotment has not deviated from what is suggested in the mountain pinyon #114 (NRCS, draft 1995) ecological site description, with perennial forbs and shrubs within the natural range of variability. Overall, grass cover and type of grass is within the range of variability (Table 22).

Table 22. Mountain Pinyon Site #114, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)		Allotment LHA Ecological Site Means			Allotment Long Term Trend	
Mountain Pinyon #114 (NRCS, draft 1995)	Species Comp. % by weight	Vegetative Cover %	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA	
15-30% Tree Canopy ² Ground Cover 10%						
Grass		26-74	2.6-7.4	15.7	→	No significant change (→)
	Cool	24-66	2.4-6.6	15.7	→	No significant change (→)
	Warm	2-8	0.2-0.8	0	→	No significant change (→)
Shrub		1-61	0.1-6.1	36.3	↑	No significant change (→)
Forb		0-30	0-3	1.3	→	No significant change (→)

Deviation from Ecological site description **caution** not enough in sample size to give solid comparison.

Deviation from Ecological site: ↑ increase; ↓ decrease; → within range of variability

Trend data collected before and concurrently with the LHA processes (2002-2012) indicates cover of perennial forbs, grasses, and shrubs have not change significantly. The percent composition of dead browse saw a significant increase of 5% ($p=0.1900$), while the percent composition of heavily hedged browse saw a significant increase of 18% ($p=0.0934$). In addition, exotic vegetation did not see a significant increase across the allotment (Table 22). When looking at causal factors, exotic plants, historic livestock management (in relation of proximity to homesteads), and wildlife use current/ historic were noted as causal factors.

Petrie Mesa # 14022

The Land Health Assessment done in 2012, for this allotment indicates it is not meeting vegetative standards for 27% of the allotment and meeting with a static trend for the other 71% of the allotment. Of this current livestock management was found to be one of the significant causal factors on 27% of the allotment. The largest land mass on the allotment does not have an official ecological site attributed by NRCS, adobe badlands, 2006 acres. The other ecological site is stony salt desert, with 767 acres, these combined acres are what were evaluated in the allotment.

The current LHA suggests, the adobe badland site has not deviated from the natural range of variability, for this soil type (Table 23). Potential concerns noted for this soil type include bare soil, low plant basal area, low perennial grass and forb cover, and low shrub cover. Current causes include drought, erosion from uplands (adobe hills), and OHV use through transect area.

The stony salt desert ecological site should have an optimum ground cover of about 30 %, with perennial grasses contributing about 60% of the species composition and 18% of the vegetative cover, as shrubs should contribute about 30% species composition and 9% vegetative cover, and

forbs comprising about 10% of the species composition and 3 % vegetative cover. The current LHA suggests the allotment has deviated from what is suggested in the stony salt desert ecological site description, with forbs, shrubs, and cool season grasses considerably lower than the ecological site suggestions (Table 24). The warm season grass, mainly galleta, is the most dominant grass and is within the natural range of variability.

Table 23 Adobe Badlands Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)		Allotment LHA Ecological Site Means			Allotment Long Term Trend
Adobe Badland unattributed (closely resembles Clayey Salt Desert)	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological site description	Trend Change from 2002 to 2012 LHA
Grass	N/A	N/A	9.1	N/A	
	Cool				No significant change (→)
	Warm				No significant change (→)
Shrub	N/A	N/A	8.9	N/A	No significant change (→)
Forb	N/A	N/A	0.7	N/A	No significant change (→)

Adobe Badland Ecological Site will be compared to site means across the landscape for this soil type and aspect. Trend data is derived from long term trend transects within the allotment ↑ increase, ↓ decrease, → static.

Trend data collected before and concurrently with the LHA processes (2002-2012) indicate across the ecological site, perennial forbs, grasses, and shrubs have not change significantly (Table 23). Concerns noted include, high level of bare soil, exotic plants, low cool and warm season grass cover, low forb cover, low shrub vigor, seral stage issues, historic and current livestock management, and historic and current wildlife use.

Table 24 Stony Salt Desert Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means from 2002/2012		Allotment Long Term Trend
Stony Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological Site Description	Trend Change from 2002 to 2012 LHA
Grass	60%	18%	7.6%	↓	
	Cool	30%	0.0%	↓	No significant change (→)
	Warm	30%	7.6%	→	No significant change (→)
Shrub	30%	9%	0.6%	↓	No significant change (→)
Forb	10%	3%	0.0%	↓	No significant change (→)

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from statistical test on long term trend transects within the allotment (↑) increase, (↓) decrease, (→) static.

Trend data collected before and concurrently with the LHA processes (2002-2012) indicate, across the ecological site, perennial forbs, grasses, and shrubs have not change significantly (Table 234). Concerns noted include, sites dominated by exotic plants, low cool and warm season grass cover, low perennial forb cover, heavy shrub hedging, low shrub vigor, and low cryptogam cover. When looking at causal factors, drought, historic and current livestock management, along with wildlife use historic and current, were noted as significant factors contributing to the not meeting rating for the stony salt desert ecological site.

Overall, trend data on the allotment across both ecological sites, has not changed from 2002 - 2012 LHA. The adobe badland site within the allotment, is meeting with static trends for Standard 3 Vegetation, while the stony salt desert is not meeting Standard 3 Vegetation (Table 23 and Table 24).

Point Creek #14021

The Land Health Assessment done in 2012, for this allotment indicates, it is not meeting for approximately 63% of the public land within the allotment, with livestock management noted as one of the significant causal factors. Concerns recorded, were an overall increase in exotics, decrease in shrubs, and an overall decrease in natives, in relation to the ecological site descriptions and the last LHA completed. The largest ecological site on the allotment, is the stony salt desert with 994 acres. The second largest site adobe badland, 610 acres, does not have an official ecological site designated. Other ecological sites on the allotment include: clayey salt desert, salt flats, and sandy salt desert.

The stony salt desert ecological site should have an optimum ground cover of about 30 %, with perennial grasses contributing about 60% of the species composition and 18% of the vegetative cover, as shrubs should contribute about 30% species composition and 9% vegetative cover, with forbs comprising about 10% of the species composition and 3 % vegetative cover. The current LHA suggests the allotment has deviated from what is suggested in the stony salt desert ecological site description with, cool season grasses and forbs considerably lower than suggested, warm season grasses notably higher, and shrubs within the range of variability (Table 25).

Table 25 Stony Salt Desert Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means from 2002/2012		Allotment Long Term Trend (Cover)
Stony Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA
Grass	60%	18%	20.2%	→	
	Cool	30%	0.0%	↓	No Significant Change (→)
	Warm	30%	20.2%	↑	Significant (↑)
Shrub	30%	9%	7.1%	→	No Significant Change (→)
Forb	10%	3%	0.1%	↓	No Significant Change (→)

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from statistical test on long term trend transects within the allotment (↑) increase, (↓) decrease, (→) static.

There is not a trend comparison for the adobe badland site type for this allotment. However, since it is directly adjacent to the stony salt desert ecological sites on the allotment with similar disturbances and grazing management, trend across the allotment was ascertained from the stony salt desert ecological sites. With that stated, trend on the allotment is considered downward, due to the significant increase in warm season grasses (16%, p=0.1478), at the expense of cool season grasses (0%), which is a considerable deviation from the ecological site description. In addition, there was a significant increase in the composition of heavily hedged shrubs (37%, p=0.0443), and dead shrubs (10%, p=0.1007), Table 25.

South Branch #14004

The Land Health Assessment done in 2012 for this allotment indicates, it is meeting land health standards for the entire allotment. The largest ecological site on the allotment is mountain pinyon (draft NRCS1995), 403 acres, while the second largest site is Deep Clay Loam with 374 acres.

Table 26 Mountain Pinyon #114 Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means		Allotment Long Term Cover Trend	
Mountain Pinyon #114 (NRCS, draft 1995)	Species Comp. % by weight	Vegetative Cover %	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA	
30%+ Tree Canopy ² Ground Cover 10%						
Grass	9-48	0.72-3.84	1.3	→	No significant change (→)	
	Cool	8-42	0.64-3.36	1.3	→	No significant change (→)
	Warm	1-6	0.08-0.48	0	→	No significant change (→)
Shrub	7-31	0.56-2.48	22	↑	No significant change (→)	
Forb	0-15	0-1.2	n/a	→	No significant change (→)	

Deviation from Ecological site description **caution** not enough in sample size to give solid comparison.

Deviation from Ecological site: ↑ increase; ↓ decrease; → within range of variability

The current LHA mean for the site could not be compared to the NRCS ecological site data, as there was not enough transect data in the LHA to create a mean across the LHA area for a comparison. However, there is the percent cover for the **one** transect, and it could be compared, in general, and with caution, as there are not enough samples to make a solid comparison. With this stated the current LHA suggests the allotment has not deviated from what is suggested in the mountain pinyon ecological site description.

Trend on the allotment has remained stable from the previous 2002 LHA to the current 2012 LHA, with no significant changes in cover across the varying attributes measured, i.e. perennial grasses and forbs, shrubs, or trees. There were some significant changes in composition, with an increase in percent dead browse (5%), and heavily hedged browse (18%). These changes were attributed to current and historic wildlife use, mainly elk, Table 26.

Ward Creek/Dough Spoon # 14025

The Land Health Assessment done in 2012, for this allotment, indicates it is meeting land health standards in 98% of the allotment, but has downward trends for 79% of the allotment. The current LHA suggests the allotment has deviated from what is suggested in the clayey salt desert ecological site description, with cool and warm season grasses and forbs and shrubs lower than suggested. Concerns sited, were a low occurrence of cool and warm season grass cover, low litter cover, exotic plants, mainly halogeton, and low plant diversity in relation to the Ecological Site Descriptions, and the last LHA (2002) completed, Table 27. Causal factors included: drought erosion, historic grazing, noxious weeds, contour furrows, Rights of Way, OHV use (open area), and new BLM roads. Current livestock management was not identified as causal factor within the ecological site.

The clayey salt desert ecological site should have an optimum ground cover of about 15-20%, with perennial grasses contributing about 50% of the species composition and 10% of the vegetative cover, shrubs should contribute about 90% species composition and 18% vegetative cover, with forbs comprising about 10% of the species composition and 2 % vegetative cover, Table 27.

Long term cover trend, on this portion of the allotment, suggests no significant changes in forbs, warm season grasses, or shrubs across LHA years 2002-2012. However, cool season grasses have seen a significant decrease in cover (1%, p=0.1816). There were also no significant changes in cover for exotics, percent dead, decadent browse or low vigor browse. Bare ground showed a significant decrease in cover (4.9%, p=0.0481), while basal and cryptogams significantly increased in cover by 2% (p=0.0692) and 7% (p=0.0692), respectively. Overall, this portion of the allotment is considered in a downward trend for Standard 3 Vegetation, due to the absence of cool and warm season grasses and forbs, Table 27.

Table 27 Clayey Salt Desert Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)		Allotment LHA Ecological Site Means			Allotment Long Term Cover Trend
Clayey Saltdesert	Species Comp. % by weight	Vegetative Cover %	Vegetative Cover %	Allotment Deviation from Ecological description	Trend Change from 2002 to 2012 LHA
Ground Cover rarely exceeds 20%					
Grass		50	10	0	↓
	Cool	30	6	0	↓
	Warm	20	4	0	↓
Shrub		90	18	9.0	↓
Forb		10	2	0	↓
					No significant change (→)

Ecological Site¹ Vegetative Cover % = Optimal Ground Cover (20%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from statistical test on long term trend transects within the allotment (↑) increase, (↓) decrease, (→) static.

The shallow and sandy loam pinyon juniper #112 site (NRCS, draft 1996) should have an optimum basal ground cover that ranges from 12%, when the tree canopy is at its lowest 0-15%, to a basal ground cover of 8%, when tree canopy is at its highest, > 35%. When tree canopy is lowest, grasses and grass-like species should contribute about 12-58% of species composition and 1.4-6.9 % of the vegetative cover, as forbs should comprise about 0-10% of the composition and 0-1.2% vegetative cover, and shrubs should contribute about 18-57% composition and 2.16-6.84% vegetative cover. When tree canopy is the highest, grasses and grass-like species should contribute about 0-9% of the species composition and 0-0.76% of the vegetative cover, forbs should comprise about 0-10% composition and 0-0.8% vegetative cover, and shrubs should contribute about 0-1% compositions and 0-0.08% vegetative cover, Table 28. Shrubs and forbs show higher numbers than the ecological site suggests, however percent cover of these species

vary widely across this site type. Cool and warm season grasses are within the suggested cover classes suggested by the ecological site description. The current LHA indicates it is within the range of variability for this ecological site type.

Table 28 Shallow Sandy Loam PJ #112 Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)		Allotment LHA Ecological Site Means			Allotment Long Term Trend	
Shallow Sandy Loam PJ#112 (draft, NRCS)	Species Comp. % by weight	Vegetative Cover %	Vegetative Cover %	Allotment Deviation from Ecological site description	Trend Change from 2002 to 2012 LHA	
0-15% Tree Canopy ² Ground Cover 12%						
Grass		12-58%	1.44-6.9			
	Cool	12-45	1.44-5.4	1.7	→	No Significant Change(→)
	Warm	0-13	0-1.56	1.1	→	No Significant Change(→)
Shrub		18-57	2.16-6.8	21.1	↑	No Significant Change(→)
Forb		0-10	0-1.2	3.8	↑	Significant Increase(↑)

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (15%) * Species Comp. %

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from statistical test on long term trend transects within the allotment (↑) increase, (↓) decrease, (→) static.

Long term cover trend on this site has remained static across LHA years 2002-2012. There have been no significant changes in the amount of forb, shrub, or cool/warm season grass cover, Table 28. Concerns on the allotment include: a small amount of noxious weeds, mainly whitetop, low perennial shrub vigor, and heavy hedging. Factors tied to concerns include drought, roads (BLM), wildlife use current and historic, recreation impacts, lots of hunter camps, and ROW(not roads).

Wells Gulch #14016

The Land Health Assessment done in 2012 for this allotment indicates, it is meeting land health standards in 100% of the allotment. There were no acres within the allotment not meeting standards.

The largest ecological site in the allotment is stony salt desert, with 7,038 acres. The other ecological sites include mountain pinyon, with 506 ac, loamy salt desert, with 109 ac, clayey salt desert, with 2,329 ac, and sandy salt desert, with 381 ac.

The stony salt desert ecological site should have an optimum ground cover of about 30 %, with perennial grasses contributing about 60% of the species composition and 18% of the vegetative cover, shrubs should contribute about 30% species composition and 9% vegetative cover, with forbs comprising about 10% of the species composition and 3 % vegetative cover, Table 29. The

current LHA suggests, the allotment has deviated from what is suggested in the stoney salt desert ecological site description, with cool season grasses considerably lower than the ecological site suggestion, shrubs are within the natural range of variability, and warm season grasses are higher than the suggested percent cover. In addition, forbs are showing a decrease in cover from what is suggested in the ecological site description. However, forbs especially annual and early perennials can be highly variable across this ecological site type, and precipitation and timing in reading transects play a major role in whether forbs are depicted accurately.

Table 29 Stony Salt Desert Site, Site Mean, and Long Term Trend Lower Section

Ecological Site Description (Characteristics)			Allotment LHA Ecological Site Means from 2002/2012		Allotment Long Term Trend	
Stony Salt Desert 30% Optimal Ground Cover	Species Comp. % by weight	Vegetative Cover % ¹	Vegetative Cover %	Allotment Deviation from Ecological site description	Trend Change from 2002 to 2012 LHA	
Grass	60%	18%	19.6%	→		
	Cool	30%	9%	0.5%	↓	No Significant Change (→)
	Warm	30%	9%	19.1%	↑	No Significant Change (→)
Shrub	30%	9%	8.5%	→	No Significant Change (→)	
Forb	10%	3%	0.8%	↓	No Significant Change (→)	

Ecological Site ¹Vegetative Cover % = Optimal Ground Cover (30%) * Species Comp.%

Deviation: ↑ increase; ↓ decrease; → within range of variability

Trend data is derived from statistical test on long term trend transects within the allotment ↑increase, ↓ decrease, →static.

Trend data collected before and concurrently with the LHA processes (2002-2012) indicates, across the allotment vegetative species cover has not changed. Basal cover significantly increased 4.3%, (p=0.1725), and canopy cover increased significantly, by 18.6% (p=0.0444). Heavily hedged shrubs significantly decreased in composition across the landscape by 31%, (p=0.1898). Overall, this allotment is static for trend across years 2002-2012, Table 29. Concerns noted, were exotic vegetation, low perennial grass cover, and low shrub vigor on 2 sites. Factors tied to concerns include: drought, historic grazing, invasive weeds, ROW, fire and on one site out of 4 current livestock management was identified.

Environmental Consequences:

One of the most significant human caused changes affecting the ecosystems of the Colorado Plateau and surrounding areas was the widespread introduction of domestic livestock. Livestock were brought into the area by the Spanish in the 1500s however cattle and sheep only began to have a significant impact on the region's ecosystems when the railroads made it possible to transport large numbers of livestock into the area. By 1890, hundreds of thousands of cattle and

large numbers of sheep were grazing on the Colorado Plateau and surrounding areas. By the time federal forest reserves were proclaimed in the 1890s, ranchers on the Colorado Plateau and surrounding area, had become accustomed to unregulated and unrestricted use of public lands as range for livestock. As a result of this unrestricted use, once rich grasslands were seriously degraded even before the turn of the century.

The unrestricted grazing set the path for rangelands to move from a stable community with varying stable states across thresholds toward other often degraded vegetative states. Thresholds are transitions between multi-stable states where states, are recognizable and relatively stable associations of species occupying an ecological site¹¹. Friedel¹² pointed out, once a threshold is crossed to a more degraded state, improvement cannot be attained on a practical time scale without greater intervention or management effort than simple grazing control or removal of livestock. In addition, Kitchen and Hall (1995) noted, on **spring** grazed pastures, it could take at least 120 years after the elimination of grazing to fully restore species and the process could take longer due to the loss of seed sources and increased dominance of introduced exotic annuals. They also state dormant season grazing with sheep at moderate levels appears to pose little threat to the stability of these communities and spring grazing risks could be minimized with a conservative deferred grazing system.

Historically, these rangelands in the North Delta LHA unit, have crossed a threshold from the original vegetation communities (ecological sites), where salt-desert shrub ranges were estimated to have a carrying capacity of 5 acres/AUM, and have transitioned to at least 18 acres/AUM¹⁰. The ecological sites in the North Delta LHA unit have transitioned across thresholds and have moved towards new degraded stable states with altered vegetation characteristics, as compared to associated ecological sites. With the semiarid climate, relatively fragile vegetation, soils that are slow to recover from disturbance, combined with historical heavy use and some current mismanagement, land health has been impacted which has affected the stability of ecological sites, modified vegetative composition and distribution, and has hampered BLM's ability in the past to bring about change in these fragile environments. Laycock¹¹ suggests that if a vegetation type is in a stable lower stable state (successionally), it will not respond to simple changes in grazing management or even the removal of grazing. He further states managers must recognize this situation when it occurs, so that false expectations of improvement are not fostered.

Terrestrial landscape intactness models from the Colorado Plateau Rapid Ecoregional Assessment¹³ for the near-term (2025) predicted changes that are not dramatic. Near-term terrestrial intactness results showed habitat quality declines in all vegetation communities with the greatest declines observed for Colorado Plateau Pinyon-Juniper Woodland and Inter-Mountain Basins Big sagebrush Shrubland.¹⁴ This assessment also predicts changes in average precipitation by season.¹⁵ For near-term predictions, precipitation is predicted to decline for most months, except for October (+8.0mm) and December (+5.2mm).

Alkali Flats - The entire Alkali Flats allotment, either meets with downward trends or does not meet land health standards. With this acknowledged, and the majority of the allotment struggling to meet land health standards in combination with downward trends, the Modified Grazing Alternative adjusts carrying capacity from 9 acres an AUM to 18 acres an AUM which will change the active AUM preference on the permit from 1,001 to 493. Additionally, the

Modified Grazing Alternative reduces seasonal utilization from 50% to 35%, sets up a path for development of grazing strategies with periodic rest, and adjusts grazing dates to occur during dormant seasons. With these adjustments in grazing management, it is anticipated the allotment will make small incremental steps toward changing trend, and over time, 25-100 years land health status.

Deer Basin-Midway – This allotment, most notably the lower elevation portion would be considered in poor condition when compared to the ecological sites within the allotment, and the current LHA finding, 99% of the allotment, not meeting or meeting with downward trends . Currently, the carrying capacity on the allotment is 14acre an AUM. The current estimate of forage produced on the allotment with average precipitation does not support the active 900 AUMs. With this acknowledged, and livestock management contributing to more than a third (40%) of the allotment struggling to meet land health standards and exhibiting downward trends, the carrying capacity will go from 14acres an AUM to 47 acres an AUM, which will change the active AUM preference from 990 to 249. In addition, seasonal utilization levels will be adjusted from 50% to 35%.

Delta Pipeline -- The Land Health Assessment done in 2012 for this allotment indicates, it is not meeting land health standards (47%), and meeting land health standards with downward trends (51%), for approximately 98% of the allotment. Of this, current livestock management was found to be one of the significant causal factors on 47% of the allotment (N. Delta LHA, BLM 2013). Concerns identified, were an increase in exotics, a decrease in shrub cover, low community diversity, and a decrease in perennial forbs, in relation to the Ecological Site Descriptions, and the last LHA completed. With this acknowledged, and livestock management contributing to almost half (47%) of the allotment struggling to meet land health standards the carrying capacity will go from 11 acres an AUM to 24 acres an AUM, which will change the active AUM preference from 563 to 252. In addition, seasonal utilization levels will be adjusted from 50% to 35%.

Dirty George – The Land Health Assessment done in 2012 for this allotment indicates, it is meeting LHS for Standard 3 Vegetation. The Modified Grazing Alternative does not change the Active AUMs or utilization levels. There are no anticipated reductions in direct or indirect impacts, compared to the Proposed Action alternative, to resolve the exotic plants, and bare soils found as problems in this allotment. The identified causal factors were wildlife use and historic grazing.

Petrie Mesa- The Land Health Assessment done in 2012 for this allotment indicates, it is not meeting land health standards for standard three vegetation (27%), and meeting standard three with static trends on 71% of the allotment. Of this, current livestock management was found to be one of the significant causal factors on 27% of the allotment. With this acknowledged and actual use across a 10 yr period at 73 AUMs, management on the allotment will be adjusted to move the allotment towards meeting LHS. Active AUMs will go from 104 to the 10 year average actual use of 73 AUM's to maintain static trends, and seasonal utilization will be adjusted from 50% to 35% to improve trends incrementally across time.

Point Creek- The Land Health Assessment done in 2012 for this allotment indicates, it is not meeting for approximately 63% of the public land within the allotment, with livestock management noted as one of the significant causal factors. Concerns recorded, were an overall increase in exotic vegetation, decrease in shrubs, and an overall decrease in natives, in relation to the Ecological Site Descriptions, and the last LHA completed. With, 62% of the allotment not meeting Standard 3 Vegetation, and displaying a downward trend, with livestock management contributing, management on the allotment will be adjusted to move the allotment towards meeting LHS. Changes in management will reduce the AUM allocation from 101 AUMs to 68 , and change the carrying capacity to 24 ac/AUM. in addition to modifying utilization on the allotment from 50% to 35%.

South Branch- This allotment meets land health standards on 97% of the allotment. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative. Livestock management was not noted as a causal factor for issues on the allotment. Issues noted were from current and historic wildlife use, BLM roads, and use of a historic stock driveway.

Ward Creek-Dough Spoon- Overall, current grazing management was not considered a significant causal factor in the health of the allotment for Standard 3 Vegetation, and Standard 4 T&E species. Current estimates of forage produced on the allotment, with average precipitation, should support the active 445 AUMs. Carrying capacity on the allotment is 63acres/AUM. This AUM allocation is sufficient for the location on the landscape, elevation, and vegetation communities present on the allotment. Causal factors for the area include: an open OHV area, rights-of-ways, old contour furrow treatments, and historic grazing. The Modified Grazing Alternative is unlikely to impact the existing problems.

Wells Gulch- The Land Health Assessment done in 2012 for this allotment indicates, it is meeting land health standards in 100% of the allotment, . There were no acres within the allotment not meeting standards. Concerns noted, were low occurrences of perennial shrubs, fire, rights-of -ways, low perennial cool season grasses, increases in exotics mainly halogeton, and forbs in some areas, in relation to the Ecological Site Descriptions, and the prior LHA completed. The 1,433 current active AUMs are higher than suggested in the ecological site descriptions by 261 AUMs. With this acknowledged, and current estimates of forage produced on the allotment, with average precipitation, the allotment will go to 1,172 active AUMs. This equates to a carrying capacity of 9acres/AUM. This carrying capacity would be considered low for salt desert shrub communities however, since the allotment is meeting LHS, and has no downward trends, the allotment will not have active AUMs adjusted below the ecological site suggestions. The permittee has been progressively managing, using identified areas, periodic rest, and proper utilization rates (~35%). This has allowed the allotment to maintain land health standards and not declined in vegetative standards, from the last LHA (2002) reading. Utilization will stay at approximately 35%.

Modified Grazing Alternative - The Modified Grazing Alternative would be in accordance with CFR §4180.1 Fundamentals of Rangeland Health by addressing direct and indirect impacts.

The Modified Grazing Alternative analyzed carrying capacity, in relation to the ecological site description's lowest production potential on all allotments across the North Delta LH unit. Results identified, where allotments were either meeting with downward trend or not meeting, with livestock management one of the significant causal factors. This suggested allotments were in excess of the ecological site suggested carrying capacities. Blaisdell and Holmgren¹⁰ stated, salt-desert shrub communities were historically estimated to have a carrying capacity 5acres/AUM, but due to unregulated historic use have transitioned to at least an 18 acre/AUM carrying capacity. This supports the findings, that most salt-desert shrub communities, within the LH unit have crossed a threshold sometime in the past, and entered into another stable, but degraded state. In addition, actual use AUM's were examined to determine, if the permittee came close to using what was determined in the carrying capacity evaluation. It was found, most permittee's used less than what was suggested by the ecological site descriptions lowest production potential, which suggests carrying capacities were still not in balance with the forage available. This supports LH results, which showed salt desert shrub communities continued degradation from 2002 to 2012. These evaluations and findings prompted additional adjustments to the 10 year actual use AUMs (30%) within the proposed action.

Seasonal utilization levels, in the past permit renewal, allowed for 50% use for many areas within the salt-desert shrub community. However, in many citations the suggested utilization rate is 30- 35% in areas with 8"-12" of precipitation. Holechek, Gomez, Molinar and Galt¹⁶ suggest, 30-35% use is needed for the improvement in rangeland vegetation, which is one of many citations that support the reduction in utilization from 50% to 35% in brittle, low precipitation salt desert shrub communities.

With the adjustment in carrying capacities (AUMs) and utilization rates, in the Alkali Flats, Deer Basin/Midway, Delta Pipeline, Petrie Mesa and Point Creek Allotments, allotments are anticipated to see minor incremental improvements, in cover and composition of native species within 25-100 years. Increases in perennial grass and shrub cover are slow to occur in salt desert shrub communities, and monitoring of trend data will be necessary to determine, if minor changes are occurring. Trends anticipated over time (10-25 years) include, moving downward trends to static, and static trends to upward, which should slowly cease any new degradation on the allotments, while incrementally moving them towards meeting land health standards. Acres meeting with static or downward trends will tend to respond to changes in management more readily, because the vegetation is still comprised of desirable perennial vegetation which under proper management, and moderate additional input, recovers more quickly than areas lacking any semblance to the native community. Acres not meeting standards, will not recover by simply removing grazing or modifying grazing management. Typically, areas dominated by invasive annuals, where desirable perennial vegetation has been compromised, have reached a point of not being able to respond to management changes, of any kind, without additional inputs such as seeding and/or herbicide treatments.

The suggested adjustments in utilization, on these allotments, is expected to improve vigor on perennial grasses and shrubs already established, which should in turn, allow for incremental increases in seed production, propagation, and seedling establishment over the next 25-100 years. These vegetative improvements however, are dependent upon weather patterns, and other outside disturbances, such as fire and drought etc.

In all these allotments, there are areas where simple adjustments to grazing management may not be enough to move acres, across a degraded threshold, towards meeting land health standards. This is partially due to, the dominance of annual invasive species, increased warm season grasses at the expense of the more desirable cool season grasses, and the continued presence of existing disturbance and uses. In these cases, additional inputs such as, herbicide treatment, and seeding etc. will be necessary to move acres towards meeting land health standards.

Additional changes in grazing management, as supported by Kitchen and Hall¹⁷ included, adjusting grazing dates, to end within the dormant vegetative period, which will continue to move allotments, in small incremental steps towards meeting land health standards. Spring grazing will be considered if a permittee has a strategic grazing system in place, which would allow for periodic spring deferment, on a majority of the allotment.

The Wells Gulch allotment was meeting land health standards.. There were no areas on the allotment that had downward trends. However, in support of good management, carrying capacities were modified to meet ecological site recommendation, and utilization on the allotment was adjusted to 35%. With these adjustments, it is expected current grazing management will maintain and promote the allotment continuing to meet land health standards with no downward trends.

The South Branch and Dirty George allotments were both meeting land health standards and both were within appropriate carrying capacities. Livestock management was not noted as an issue within either allotment.

The Ward Creek/Dough Spoon allotment is well within the appropriate carrying capacity. Livestock management was not considered a significant causal factor in the health of the allotment.

Alternative 2 (no grazing) –Removal of grazing from the North Delta land health area would reduce direct and indirect impacts from grazing, and slowly move allotments towards meeting land health standards. The problems, such as low cool season grass cover, low plant basal cover, and low shrub cover may slowly improve. Kitchen and Hall¹⁷ noted, on spring-grazed pastures, it would take at least 120 years after the elimination of grazing to fully restore certain species, and this process could be further hindered by increased dominance of introduced annuals, and other disturbances. In addition, Kitchen and Hall¹⁷ state, continued winter (dormant season) grazing with sheep, at moderate levels, appears to pose little threat to the stability of shrub communities, within the Desert Experimental Range. They further state, spring grazing increases the risks, but common sense suggests, the effects of spring grazing could be minimized under a conservative deferred grazing system. Other disturbances from rights-of-ways, OHV, and wildlife would continue to have vegetation impacts.

This alternative would also be in accordance with CFR §4180.1 Fundamentals of Rangeland Health, by reducing direct and indirect impacts, which will start to slowly, and incrementally move allotments towards meeting Public Land Health Standard 3, Vegetation. However, due to the long recovery periods, for the salt desert shrub community it is not anticipated this alternative

would see improvements in land health status before the 25-100 year time frame, which is the same time frame as moderately to lightly grazed rangelands. Additionally, it would not be in accordance with the Taylor Grazing Act of 1934 as amended 1936, 1938, 1939, 1942, 1947, 1948, 1954 and 1976, Federal Land Policy and Management Act of 1976 (FLPMA), or BLM's multiple use mission.

Proposed Action Alternative (current management) – Continuation of grazing under current management, would result in similar impacts as found in the 2012 land health assessment. Allotments with acres meeting land health standards would continue to do so under this action, while allotments with acres meeting land health standards, but coupled with static trends, would remain stable, and allotments with acres meeting land health standards coupled with downward trends, would continue to degrade, and acres not meeting standards would remain static and/or increase. This action is not in accordance with CFR §4180.1 Fundamentals of Rangeland Health. Direct and indirect impacts would be expected to continue at similar levels. This alternative would not meet Public Land Health Standard for Standard 3 Vegetation.

Finding on the Public Land Health Standard for plant and animal communities (partial, see also Wildlife, Aquatic; Wildlife, Terrestrial; and Vegetation):

Current land health conditions rate native plant and animal communities (Standard 3) in the North Delta land health unit as (16%) meeting, (60%) meeting with downward trends, and (22%) not meeting. The proposed action, properly implemented, is expected to stop the current rate of habitat degradation for the salt desert shrub and other habitats in the North Delta LHA unit. In addition, minor incremental improvements in native species cover and composition is anticipated over the next 25-120 years. Such improvements may be most pronounced in those sites meeting with meeting with downward trends. For those lands that are not meeting, such anticipated improvements may be undetectable, and may in fact require active restoration to have measurable improvements in native species cover and composition.

INVASIVE, NON-NATIVE SPECIES (includes a finding on Standard 3)

Affected Environment:

Exotic invasive annuals dominate 40,166 acres, for 65% of the vegetation community, in many of the lower-elevation areas in the North Delta landscape. Halogeton (*Halogeton glomeratus*) is by far the most abundant weed, although cheatgrass (*Bromus tectorum*), annual wheatgrass (*Eremopyrum triticeum*), purple mustard (*Chorispora tenella*), filaree (*Erodium cicutarium*), and European madwort (*Alyssum simplex*) are also common throughout the unit. Noxious weeds are present on 4,786 acres, for 8% of the North Delta landscape. Russian knapweed (*Acroptilon repens*), whitetop (*Cardaria draba*), and tamarisk (*Tamarix* spp.) are often present, in disturbed drainages, erosion pits, contour furrows, or gullies. The annual weeds are dominant in areas, where the mature perennial vegetation has been compromised. In salt desert shrub areas, where the native perennial vegetation is present, exotics are typically present, but in far less amounts, suggesting a tie between health of the native community, and the ability of the annuals and noxious weeds to take over.

Environmental Consequences:

Impacts Common to all Alternatives- Weeds in rangeland cause an estimated loss of \$2 billion annually in the United States, which is more than all other pests combined. They impact the livestock industry, by lowering carrying capacities, quality and quantity of forage, they interfere with grazing management, poison animals, increase cost of management, increase the cost of livestock production, and reduce land value. They also impact, wildlife habitat and forage, deplete soil and water resources, and reduce plant and animal diversity. Noxious and invasive weeds can out compete native plant communities even under good management. Weeds prefer highly disturbed sites, such as pipelines, roads, recreation trails and staging areas, grazing projects for either livestock or wildlife, livestock or wildlife bed grounds, overgrazed areas, and tend to form monocultures in highly disturbed areas. Once weeds are established they can spread by many vectors including, vehicles, wind, livestock, wildlife, recreation, waterways, and the suppression of native species etc. The suppression of native species is achieved through many avenues, from exploiting resources before native seedlings have the opportunity to use them, suppression of native vegetation through allelopathic effects, which is associated with secondary compounds produced by the weed to inhibit seedling establishment, and through compounds like alkaloids, which make them resistant to herbivory due to negative feedbacks (sick feeling) to the grazer.

Proper grazing management is crucial in the control of noxious and invasive weeds. It is essential for maintaining competitive perennial species, seedling establishment of desired species, and proper functioning soil dynamics, which support native plant species and, bind native ecosystems together.

Modified Grazing Alternative – The Modified Grazing Alternative evaluated carrying capacities in relation to the ecological site description, and found most of this rangeland had greatly deviated from the amount and type of vegetation suggested. In addition, the evaluation found most allotments were over suggested carrying capacities, especially for salt desert shrub communities in poor condition. Degraded rangelands have a higher susceptibility to invasion from exotic and noxious weed species than intact native systems, which show resilience to the establishment of weedy species, especially exotic annuals.

The Alkali Flats, Deer Basin Midway, Delta Pipeline, and Point Creek Allotments, all show over 60% of the acreage in each allotment in a downward trend, and not meeting land health standards, with livestock management, and exotic species as a contributing factor. Petrie Mesa, Dirty George, South Branch, and Wells Gulch, were found to be in static trend, with Dirty George, Wells Gulch, and South Branch meeting land health standards. Ward Creek Dough Spoon was meeting but exhibiting 56% downward trends, but livestock management was not a contributing factor in the determination. Exotic invasive species and noxious weeds were considered ubiquitous across the land health unit, and one of the major causal factors on most of the allotments. The Modified Grazing Alternative suggests; reductions to carrying capacities (AUMs) to reflect available perennial forage on allotments, adjustments to utilization from 50% to 35%, limitations on spring grazing use, and the incorporation of a grazing strategy that incorporates periodic rest.

Adjusting carrying capacities will reduce overgrazing of perennial vegetation by balancing grazing with the amount of available perennial forage on each allotment. Implementing a conservative utilization level of 35%, as supported by Holechek, Gomez, Molinar, and Galt¹⁶, will ensure there is adequate plant material left, for the plant to initiate photosynthesis, store carbohydrates, replace root material, and complete reproductive activities. While implementing a grazing strategy, which allows for period rest of pastures and/or use areas within allotments, will support the establishment of seedlings, increase vigor of perennial species, and support a system that will be more resilient to exotic species establishment. It is anticipated, the combined changes to grazing management, will decrease the opportunity for exotic species establishment on additional acres, halting any new downward trends on the allotment(s) due to exotic and noxious weed establishment. In addition, these changes will allow for slow incremental steps towards reducing exotic weeds in allotment(s), and increase the potential movement of more acres into static and upwards trends, and over time in 25-100 years, meeting land health standards. Although, grazing management changes are necessary to reduce continued degradation, note on some acres that have crossed a threshold where a new stable, although degraded state has been established, additional inputs such as, herbicide treatment, seeding, and minimizing of new disturbances may be necessary to move allotments from downward trends, to static, and eventually upward trends. In addition, Kitchen and Hall¹⁷ suggest, it may not be prudent to attempt restoration of annualized land due to the cost and high probability of failure. They go on to say, such communities may be highly unstable due to the presence of introduced annuals, even if restoration is achieved. In addition, continued disturbances outside managed grazing would still continue exposing the area to the reintroduction of exotic species. Additionally, it is cautioned by Laycock¹¹ once a vegetation community is in a lower stable successional state it may not respond to changes in grazing and managers must recognize this situation when it occurs so that false expectations of improvement are not fostered.

Alternative 2 (no grazing)-Most invasive species were introduced from Eurasia with the settlement of the west, and are highly aggressive, lack their native pathogens and predators, and contain chemical compounds that make them unpalatable compared to native species. During the establishment phase, species like cheat grass, halogeton, and medusahead flourish at the expense of native species, and now dominate millions of acres. The simple removal of grazing from the North Delta LH unit, and the associated 9 allotments, will not reduce or eradicate established noxious and invasive exotic species from the landscape, due to continued points of disturbance, introduction, and establishment of new infestations through new and existing disturbances such as, pipelines, powerlines, roads, recreation trails and staging areas, open OHV areas, and wildlife use etc.

Even though this alternative would reduce one disturbance grazing on the landscape, it does not address indirect and cumulative impacts from other disturbances. These disturbances are expected to continue, and by association the continued establishment of invasive exotic and noxious species. Therefore, it would not meet Public Land Health Standards for Standard 3 Vegetation.

Proposed Action Alternative –Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Allotments with acres meeting land health standards would continue to do so under this action, while allotments with acres meeting

with static trends, would remain stable or degrade, as allotments with acres meeting with with downward trends, would continue to degrade, while acres not meeting standards would remain static and/or increase. This action is not in accordance with CFR §4180.1 Fundamentals of Rangeland Health. Direct and indirect impacts would be expected to continue at similar levels.

This alternative would not meet Public Land Health Standard for Standard 3 Vegetation.

Finding on the Public Land Health Standard for plant and animal communities (partial, see also Wildlife, Aquatic; Wildlife, Terrestrial; and Vegetation): The Modified Grazing Alternative modified several areas of grazing management that needed to be addressed. With these changes in grazing management, it is predicted livestock grazing should not contribute to additional degradation due to increases in exotic species.

TERRESTRIAL WILDLIFE; including Migratory and Special Status Birds, Special Status Terrestrial Wildlife

Within the planning area, there are several special status species. Species were selected for analysis based on, inventory data maintained by the UFO, Colorado Parks and Wildlife Natural Diversity Information Source (NDIS), and inventory data available from the Colorado Natural Heritage Program (CNHP). The UFO also utilizes, the U.S. Fish and Wildlife Service Information, Planning, and Conservation System (IPaC) to generate the most current species list, and to analyze the effects of a Modified Grazing Alternative on threatened, endangered, candidate species, and critical habitat for these species.¹⁸ Those species that are not known to occur or have the potential to occur will have no further discussion in this document. More detailed documentation is found in the project record for those species that were removed from further consideration. In accordance, with BLM Manual 6840, the goal of management is to prevent a trend toward federal listing, or loss of viability for sensitive species.

Affected Environment

General Discussion

Issues & Measures for Analysis

Resource Issue Area/Potential Effects:

- How would domestic grazing practices of the proposed action and alternatives affect vegetative cover and habitat suitability for terrestrial wildlife species?

Analysis Area:

- North Delta LHA area

Cumulative Impacts Analysis Area (CIAA):

- N Delta, Escalante and Gunn Gorge LHA areas

Impact Indicators:

- Acres meeting, meeting with a downward trend, not meeting Standard 3.
- Acres meeting, meeting with a downward trend, not meeting Standard 2 (riparian).

While there is no direct overlap, portions of the project area are located in proximity to occupied Desert and Rocky Mountain bighorn sheep core herd home ranges (CHHR). Proximity to CHHR may be cause for concern for interaction between bighorn sheep on foray outside of their CHHR and domestic sheep. Both desert and Rocky Mountain bighorn sheep are BLM sensitive species in

Colorado. If a proposed action is expected to impact a sensitive species, it is required that analysis from the action (and alternatives) be disclosed in the NEPA analysis (BLM Manual 6840).

The analysis area for impacts to terrestrial wildlife, including migratory birds, and special status terrestrial wildlife, includes the North Delta LHA area totaling 61,449 acres of BLM administered public lands, where both direct and indirect effects occur. However, some of the indirect and cumulative effects also occur, for the same species analyzed, within the Escalante, and Gunnison Gorge land health units. These three adjacent areas have similar habitats, wildlife species and potential direct and indirect effects as described below. In the case of bighorn sheep, a 22-mile buffer around the 3-LHA area (Figure 10), based on potential foray distances, was used to incorporate additional area that could be used by bighorn on foray. In the case of pronghorn antelope, the two neighboring pronghorn populations are discussed.

Both the North Delta and the 3-LHA areas support a large variety of upland and riparian wildlife species. Some species are year-long residents, while others are migrants. A variety of small mammal, bird, and reptile species are scattered throughout the area, where their specific habitats are present. Habitat variety is great, and is created by diversity in topography, slope, aspect, vegetation, soils, and climate. The description of existing vegetation in the vegetation section provides a more detailed description of most wildlife habitats that occur, and the current state of Land Health. The greater 3-LHA area is predominated by pinyon juniper (36%), and salt desert shrub (34%), with a smaller portion of mountain shrub (13%), and sagebrush (12%), vegetation types. The North Delta area is predominately composed of salt desert shrub (76%), with a small component (14%), of pinyon juniper vegetation types. Included in the general discussion of wildlife species are predators and big game species.

From the Colorado Plateau Rapid Ecoregional Assessment, all mammal species examined are expected to experience some declines due to climate change in the near-term future (2025). All of the mammal species that inhabit low elevation, open landscapes showed further declines in amounts of terrestrial intactness [habitat]. Prairie dog and pronghorn antelope currently show limited amounts of intact habitat, with their habitats predominantly having low intactness. Future trends for both prairie dog and pronghorn are decreases in intact habitat and increases in low intactness habitats. Desert bighorn sheep showed the least amount of impact in the near-term, with only slight changes within the high intactness categories.

Predators

Large predators, such as coyotes, cougars, and black bears use the area regularly as parts of their larger overall ranges. Of the predators, coyotes are the most numerous and widespread. Black bear primarily use the major drainages with well-developed riparian vegetation, and the higher elevation oak/serviceberry areas, especially during spring, late summer, and fall for feeding. Summer concentrations for black bear are at higher elevations along the Grand Mesa, West Elks and Uncompahgre Plateau for this area. Fall Concentrations overlap with summer concentration areas and extend to lower elevations on the slopes of Grand Mesa and Uncompahgre Plateau. Mountain lion probably use nearly all of the area at some time or another while hunting, or raising young. At present, CPW does not have an accurate estimate of mountain lion populations, and they are generally considered to be in the area. The number of mountain lion

present is probably very low, limited mostly to the ones who have established their territories, or parts of their territories in this area.

Historically, large predators were either eliminated (grizzly bear and wolves) or greatly reduced (mountain lions and black bears), which allowed smaller predators such as coyote, fox and bobcat to expand and flourish. Predator control programs were effective, and widely employed in the 1800s to the later 1980s. Limited predator control activities continue in the area by Animal Damage Control (APHIS), at the request of livestock producers, if there are problem animals.

Allotments within this planning area occur, within B-17 for black bear and L-9 for mountain lion. The larger cumulative effects analysis area also, includes B-5 for black bear and L-22 for mountain lion.

Overall, bear mortality has increased over the last 10 years in DAU B-17, and conflicts between bears and humans are not uncommon.¹⁹ The most significant issue regarding bear management, in the Grand Mesa (B-17) area relates to balancing the demands of hunters, livestock producers, local residents, and non-consumptive users of wildlife. The highest mortality years for black bear in DAU B-5 occurred in the late 1990's through the early 2000's, and were probably related to severe drought conditions and catastrophic mast crop failures. This caused bears to be mobile, and in search of non-traditional food sources, making them more susceptible to hunter harvest and control kills. Trends in mortality, as well as age and gender data collected from harvest bears lead CPW to believe the population is increasing²⁰.

Smaller predators like coyote, red fox, skunk, and raccoon are thought to be increasing, because they adjust very well to human-disturbed environments, and now thrive in close proximity to people.

Deer and Elk

Mule deer and elk are probably the most noted wildlife species that occur due to their historic prominence in the ecosystem, and their high social and economic value to the area and region. Both species use the area year long, but primarily they use it as winter range, coming from higher elevation summer ranges on Grand Mesa, West Elks and Uncompahgre Plateau. The intensity of use by each species varies widely from year to year, and is controlled primarily by population size, and the variation in timing, and amount of snowfall. During most winters there is a high degree of overlap in mule deer and elk use on winter ranges however, the extent of competition is unknown. Winter range is located at lower elevations, primarily in the sagebrush and pinyon-juniper vegetation. CPW classifies various portions of the larger analysis area as mule deer and elk severe winter and winter concentration areas. The severe winter range and winter concentration areas constitute BLM's crucial winter range. Critical winter habitat makes up approximately half of the entire area, with overlapping mule deer and elk habitats composed of 35% of the area as mule deer severe winter, 23% of the area as mule deer winter concentration, 28% of the area as elk severe winter, and 17% of the area as elk winter concentration (Table 30). Comparatively, the North Delta area supports only a small portion of all big game winter critical habitat (16%), with overlapping mule deer and elk habitats composed

of 4% mule deer severe winter, 11% mule deer winter concentration, 12% elk severe winter, and 34% elk winter concentration.

Table 30. Big game winter seasonal habitat for the analysis areas.

<i>Habitat</i>	<i>North Delta</i> <i>(147,797 acres)</i>	<i>Escalante</i> <i>(121,062 acres)</i>	<i>Gunnison Gorge</i> <i>(320,356 acres)</i>	<i>Total</i> <i>(589,215 acres)</i>
Mule Deer Severe Winter	8,025.1 (4%)	11,286.9 (54%)	86,796.4 (42%)	207,687.5 (35%)
Mule Deer Winter Concentration	15,062.9 (11%)	38,089.6 (28%)	80,827.5 (60%)	133,979.9 (23%)
Elk Severe Winter	18,935.2 (12%)	66,175.2 (40%)	78,492.7 (48%)	163,603.2 (28%)
Elk Winter Concentration	33,498.2 (34%)	20,607.1 (21%)	44,866.3 (45%)	98,971.6 (17%)
Total Winter Big Game Habitat	47,915.4 (16%)	116,465.4 (38%)	143,087.7 (47%)	307,468.6 (52%)

()—percent of seasonal habitat within LHA area; (*Italics*)—percent of the total area composed of this seasonal habitat

Federally Listed Species

Of the Federally listed species evaluated, only the threatened Colorado hookless cactus occurs within the North Delta LHA unit. There are adverse effects from the Modified Grazing Alternative for the Colorado hookless cactus, and the species is brought forward for detailed analysis (See Threatened, Endangered, and Sensitive Species Plants section). There are no other Federally Listed terrestrial species known, or are likely to occur, within the North Delta analysis area. There will be no effect to any of the other terrestrial species listed for the UFO, and there will be no further discussion of these species.

BLM Sensitive Species

Of the Terrestrial BLM Sensitive Species evaluated, and within the analysis area, terrestrial wildlife species that are known, or are likely to occur within the project area are brought forth for analysis below. There will be no effect to any of the other sensitive species listed for the UFO, and there will be no further discussion of these species.

Of the BLM sensitive bat species expected to occur in the project area, only foraging habitat is expected. Effects to these species are expected to be immeasurable and discountable, and could generally be included in the description of effects to general wildlife species. There will be no further discussion of these species.

The remaining special species to be discussed below include: white-tailed prairie dog, kit fox and burrowing owl (Badlands/Salt Desert Ecological Site Species), migratory birds, and bighorn (desert and Rocky Mountain). Assumptions:

- Lands meeting land health standards for Standard 3 (Native Plant and Animal Communities) and 2 (Riparian), would be suitable habitat for wildlife species and would provide for viable populations.

Land Health Findings

Land Health Standard 3, determinations have changed since the proceeding Land Health Assessment of 2000-2001 (Figure 3). While there was a slight decline (7%), in areas meeting standards, and an increase in areas not meeting land health standards (9%). Of concern for the

North Delta area, is there is more than half of the area showing a downward trend (54.3%) from 2002 to 2012 (Figure 4).

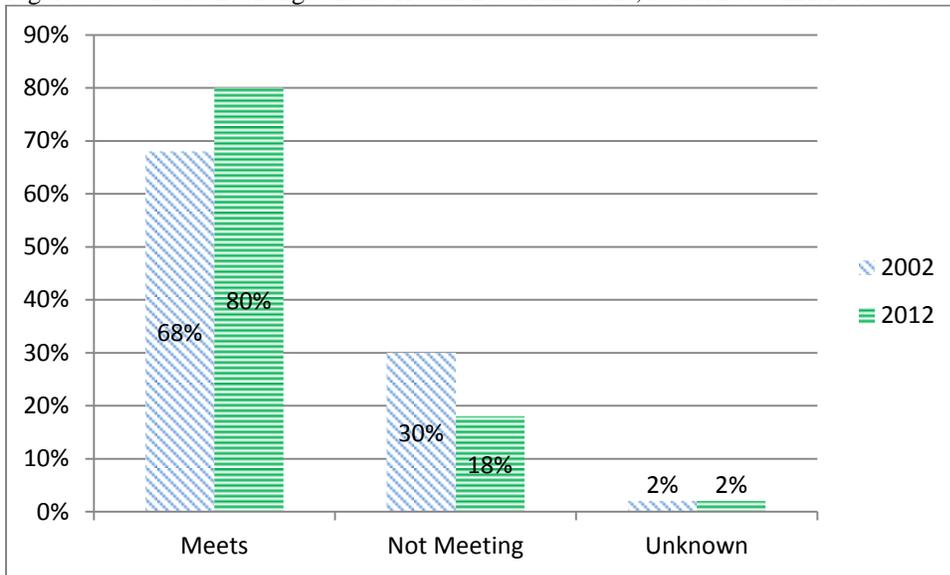
Identified indicator issues and concerns for upland vegetation communities included exotic plants competing and/or degrading habitat, low perennial cool season grass cover, low perennial forb cover, low native vegetation diversity, low shrub vigor, low shrub cover, and the presence of noxious and exotic weeds. The LHA identified 73% of the acres assessed having invasive exotic or noxious weed species as a problem. See TES Plants section for additional discussion specific to the salt desert shrub community. Based on the allotment by allotment vegetation analysis general concerns include, much of the area not achieving ecological site suggestions due to, less than expected cover of perennial shrubs, cool season grasses and perennial forbs; higher than expected cover for warm season grasses (in stoney salt desert). Of concern for wildlife habitat, is the general decline in perennial shrubs, increases in dead and heavily hedged shrubs between the 2001 and 2012 assessments.

Causal factors are collected at the upland study sites during the field sampling portion of the LHA, and were identified by comparing evidence of human-related or notable natural influences between sites meeting health standards versus those with land health problems. Some of the causes cited, are historic grazing, current grazing, drought, nearby agriculture and residential occupation. See vegetation section for more details.

Riparian vegetation is also habitat for various wildlife species. Land Health Standard 2 determinations, have also changed for this standard since the proceeding Land Health Assessment (Figure 6). There is a decrease in areas not meeting, from 30% to 18%, and an increase from 68% to 80% in areas that meet. Trend information is not available for this standard.

Identified indicator issues and concerns, for riparian vegetation communities, that result in lands not meeting standards included, issues related to channel morphology, floodplain infrequently flooded, water and sediment not in balance with channel dynamics, and riparian vegetation issues. Some of the causes cited are historic livestock grazing, channelization, drought, and various causal factors related to regulated water levels and uses. See riparian section for more details.

Figure 6. Standard 2 Changes Land Health Determinations, North Delta LHA area.



Of all the various terrestrial wildlife species, several species need more detailed discussion due to potential issues

American Pronghorn –

Issues & Measures for Analysis

Resource Issue Area/Potential Effects:

- How would domestic grazing practices of the proposed action and alternatives affect vegetative cover for pronghorn fawn hiding cover?
- How would domestic grazing practices affect vegetation composition relative to forage nutrition (summer forbs/winter browse) for pronghorn does and fawns?

Analysis Areas and Rationale:

- Allotments that overlap with the CPW overall range for N. Delta pronghorn herd (Alkali Flats, Deer Basin/Midway, Delta Pipeline, Petrie Mesa, Point Creek, Ward Creek/Doughspoon, Wells Gulch);

Cumulative effect:

- CPW overall range for three herds in SW CO (Grand Junction, UFO, Tres Rios)

Impact Indicators:

- Acres meeting, not meeting for Standard 3.
- Acres meeting ecological site descriptions
- Number of days of grazing permit dates overlapping with fawning (15-May to 1-July²¹)
- Number of allotments with overlap with fawning dates;
- Percent of pronghorn herd with BT and/or EHD.

Discussion

Portions of the project area contain habitat for pronghorn antelope which are an important game animal on most salt desert shrub ranges. There are several factors that promote healthy pronghorn herds including: adequate water during the summer, desirable shrubs in the winter, and forbs in the spring and summer. With large tracts in the project area meeting vegetative

standards with downward trends, or not meeting Standard 3 Healthy Vegetative Communities, the rangeland may not be providing adequate browse, forbs, and hiding cover for the sustainability of pronghorn herds. CPW also has concerns for this herd for fawn hiding cover and competition for forage with domestic livestock²².

While not a BLM sensitive species, pronghorn are an important game species for the area. Pronghorn use flat or rolling expansive areas, and are adapted to hot deserts, or alpine plateaus, for protection from predators. Newborn fawns are more drab in color than their parents, and spend the greater portion of their first few weeks of life hidden, rising only to nurse.²³ Pronghorn are present on the salt desert shrub, grassland, and grass/forb sites in the analysis area, predominantly in the North Delta area, with some use in the Escalante area (Table 31).

Table 31. Portions of the three LHA areas that contain Pronghorn habitat.

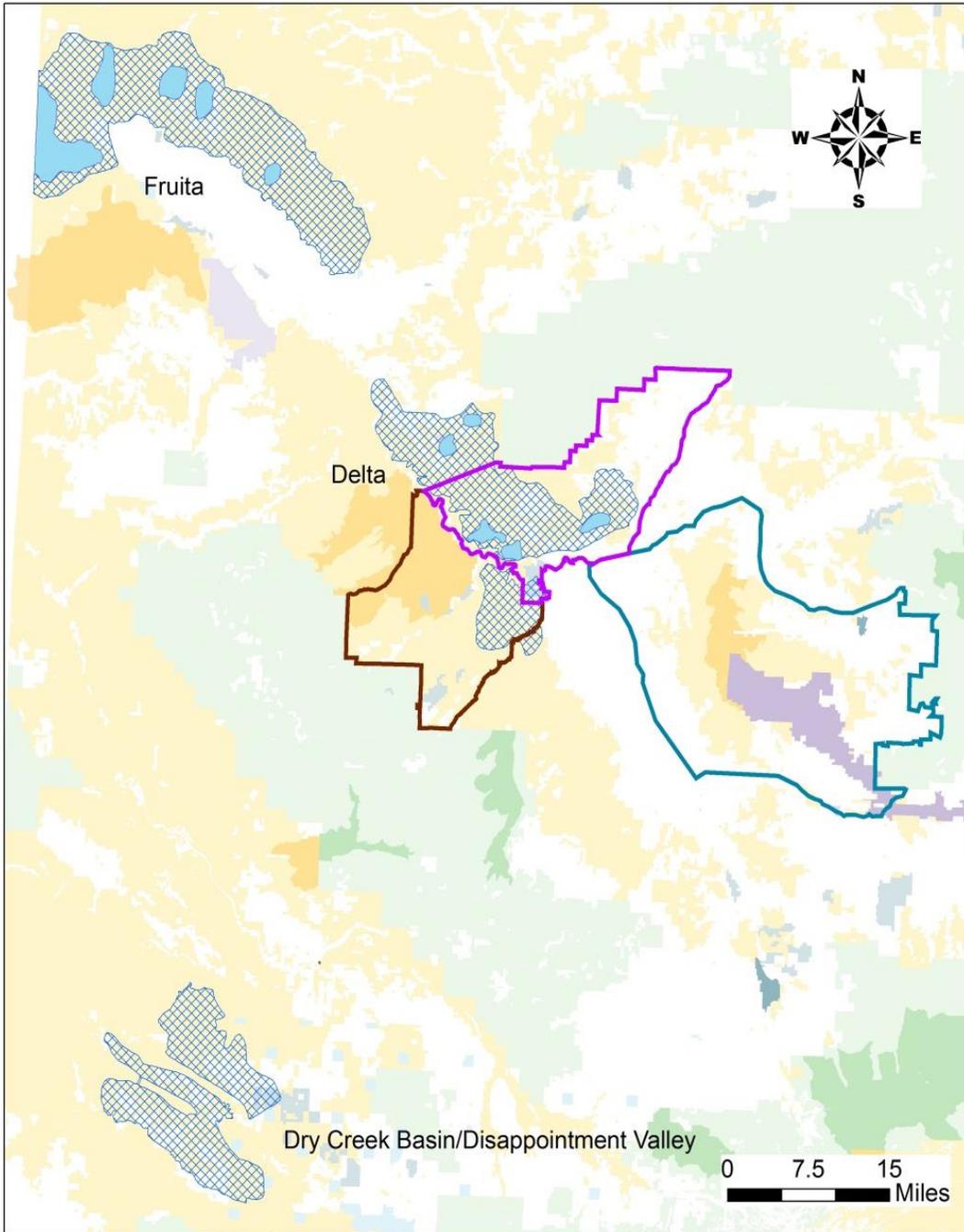
<i>Habitat</i>	<i>North Delta</i>	<i>Escalante</i>	<i>Gunnison Gorge</i>	<i>Total</i>
Overall Range	62,671.5 (77%)	18,736.1 (23%)	0	81,407.7
Winter Concentration	5,636.8 (100%)	0	0	5,636.8

Within western Colorado, there are two other populations: A-22 (near Fruita) and A-99 (Dry Creek Basin/Disappointment Valley) (Figure 7).

The population near Fruita (GMU 30, DAU A-22) fluctuates from year to year, based on moisture and productivity of the adjacent herd in Utah²⁴. When the Utah herd is performing well, pronghorn expand into Colorado, but during drought the population does not perform as well in Colorado based on the lack of water. CPW estimates very few pronghorn are currently residing in Colorado for this population, and that water is the limiting factor.

The Dry Creek Basin/Disappointment Valley herd (GMU 70, A-99), has been somewhat steady between 30-50 pronghorn over the last 5 years. This population does not appear to be performing well, primarily following the extreme drought conditions in the early 2000's. The majority of the herd resides in Dry Creek Basin, where there are more reliable natural water sources. The herds in Gypsum Valley and Disappointment Valley have rarely been observed in recent years. This population has received numerous transplants, between the late 1960's and mid 1990's, yet the population has never performed really well, and has never been hunted. CPW estimates that drought conditions are probably limiting this population based on lack of water sources, but probably more importantly available forbs and grasses.

Figure 7 Pronghorn populations in southwestern Colorado, relative to the N. Delta Project Area.



Current pronghorn antelope populations in the project area (Delta, A-27), are estimate at 80-100 animals. Pronghorn had become locally extirpated, and were reintroduced in the 1970s. Forty-four animals were trapped, from Chico Basin in SE Colorado, and released in the Wells Gulch area; 59 animals were trapped from the Maybell area, in NW Colorado, and released in the Roubideau Creek area. Information from CPW biologist²⁵ describes the reintroduction of this pronghorn population as a classic species reintroduction bell curve, of growing very well for a number of years in the late 70's and early 80's, when CPW estimated over 300 pronghorn in the area, and issued quite a few licenses. However, by the late 80's the population began a slight reduction, and drastically reduced during the drought years of the early 2000's, probably associated with forage quality, and possibly hemorrhagic disease die-offs. A research project was initiated by CPW in 2012, with the capture of 19 local pronghorn²⁶. All but one of these animals (95%) tested positive for exposure to Blue tongue (BT) and Epizootic hemorrhagic disease (EHD). Additionally, in March 2012, 24 pronghorn were trapped and relocated from SE Colorado to the Delta-Mesa County line. Seventeen of the 24 transplanted pronghorn (71%) tested positive for exposure to BT/EHD. Radio tracked pronghorn use much of the North Delta project area and beyond (Figure 8).

Cattle are the primary reservoir of BT virus, and probably EHD virus (although infrequent)²⁷. BT is primarily a disease of domestic sheep, with mule deer, pronghorn, and bighorn sheep being susceptible. Cattle are reservoirs for BT because they often do not develop symptoms, but are chronic carriers. Soft muddy margins of ponds or slow-moving streams contaminated with cattle feces produce large numbers of no-see-um gnats, which are carriers of BT. Although, losses to hemorrhagic disease can be significant, animal populations generally recover quickly, and there is little wildlife management agencies can do to prevent the occurrence²⁸.

As of February 2012, CPW reported 2 known mortalities of neck banded does that were hit by cars on Hwy 50, 1 local capture and 1 transplanted. Of the radio-collared animals, 7 of the 10 local captures have died, while only 1 of 9 radio-collared pronghorn transplanted from the southeast have died²⁹. Causes of death, of radio collared pronghorn, were reported as coyotes (4), fence (1), and unknown (3). In July 2012, a coordinated ground survey was conducted to classify pronghorn in this population. A total of 52 pronghorn were classified with an observed fawn:doe ratio of 4.8 fawns/100 does, and 19.1 bucks/100 does. Both of these ratios are very low compared to other pronghorn populations. Low fawn production could be due to malnutrition and/or lack of hiding cover. Malnutrition that extends into late gestation causes birth of small weak young with reduced chances of survival. Pregnant females protect developing fetuses by catabolizing much of their own fat and protein, and if severe enough will eventually abort or resorb fetuses due to malnutrition³⁰. Additionally, it is suggested plant communities averaging $\geq 15''$ in height appear necessary to decrease fawn mortality by predators.³¹

After several years of decline, the Delta pronghorn population may have stabilized, with indication of a possible slight increase the last 2 years based on improved fawn:doe ratios, and the limited mortality seen from the remaining collared pronghorn²⁵.

As far as CPW priority for these populations, all three western pronghorn populations are probably lower priority, based on quality of habitat, population potential, and lack of hunting

opportunity²⁴. For the most part, these populations are probably now being managed for watchable wildlife opportunities, at least until habitat condition improves for these landscapes providing for larger herds, with hunting opportunities.

CPW mapped overall range for pronghorn overlap, with most of the allotments, in the North Delta area and include, Alkali Flats, Deer Basin/Midway, Delta Pipeline, Petrie Mesa, Point Creek, Ward Creek/Dough Spoon, and Wells Gulch (Table 38 and Table 41). Two allotments within pronghorn habitat overlap with fawning season:

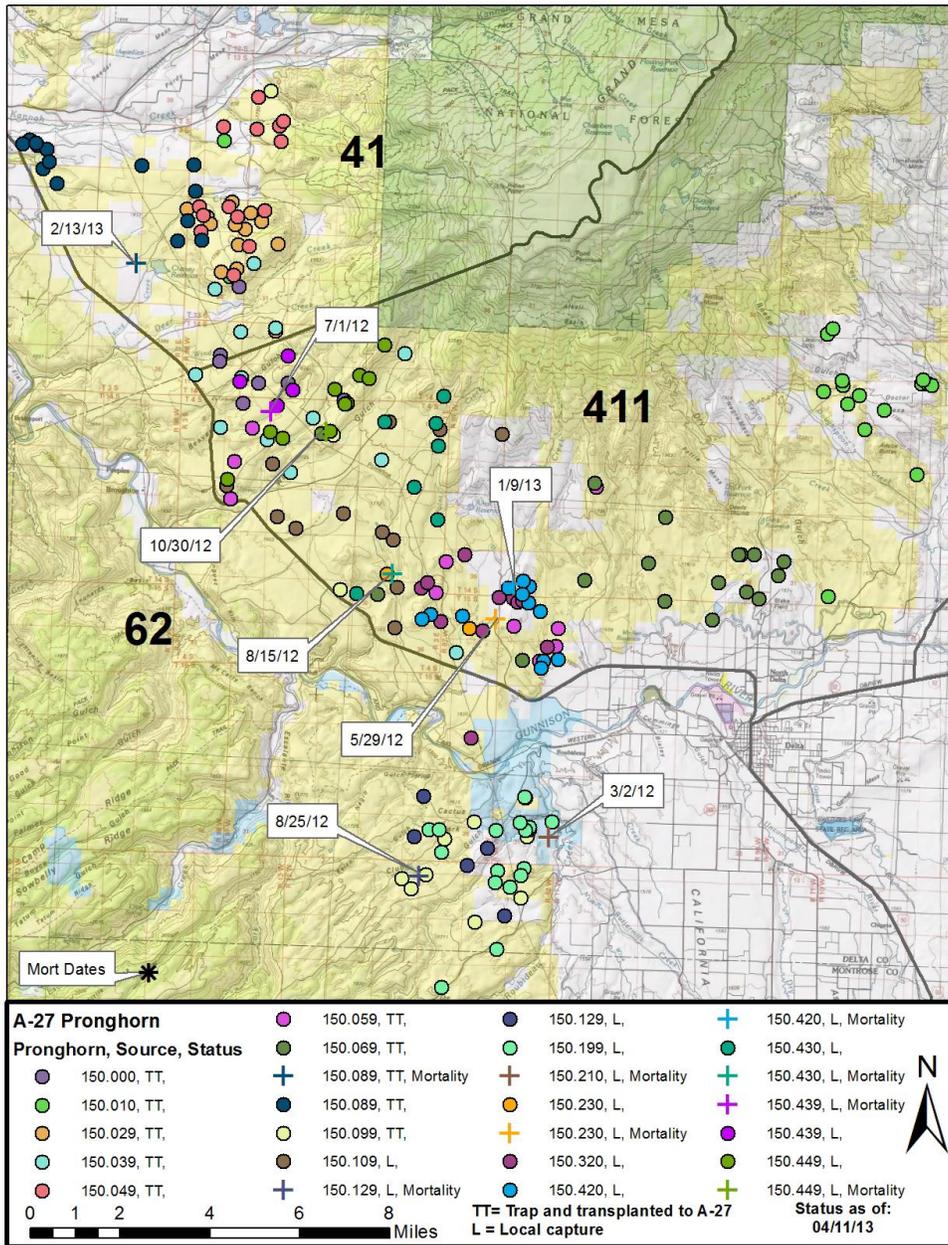
- **Point Creek**—LHA indicates, it is not meeting for approx. 63% of the public land within the allotment with livestock management noted as one of the significant causal factors.
- **Ward Creek/Dough Spoon**—Overall, current grazing management was not considered a significant causal factor in the health of the allotment for Standard 3 (vegetation).

There are several factors that promote healthy pronghorn herds including, adequate water during the summer, desirable shrubs in the winter, and forbs in the spring and summer. Water availability is recognized by both CPW and BLM as limiting for this population. With large tracts in the project area, showing downward trends, or not meeting Standard 3 Healthy Vegetative Communities, the rangeland may not be providing adequate, shrubs, forbs, and hiding cover, for the sustainability of pronghorn herds.

Assumptions:

- Pronghorn condition, fawn survival, and population growth were limited by winter severity, and intraspecific competition for summer forbs, and winter browse³².
- Fawn production and survival is dependent on doe nutrition (summer forbs/winter shrubs [browse]), vegetative cover (cool season grass cover), and fawn nutrition (forbs).
- Competition and dietary overlap between domestic sheep, and pronghorn for forage (forbs and shrubs)³³.
- Areas meeting ecological site descriptions would provide adequate habitat to produce fawns and have them survive to adulthood. This includes adequate forage and hiding cover.

Figure 8. Pronghorn locations of locally captured and transplanted individuals since capture and release (from CPW 2013).



Badlands/Salt Desert Ecological Site Species (White-tailed Prairie Dog, Kit Fox and Burrowing Owl [BLM Sensitive])

Issues & Measures for Analysis

Resource Issue Area/Potential Effects:

- How would domestic grazing practices, of the proposed action and alternatives, affect vegetative cover, and habitat suitability for kit fox, white-tailed prairie dog and burrowing owl (salt desert shrub habitat species)?

Analysis Areas:

- Salt desert ecosystem in N. Delta area
- These three species are depend on the salt desert ecosystem for a majority of important life functions; kit fox and burrowing owl are associated with prairie dog towns.

CIAA Analysis Area:

- N. Delta/Escalante/Gunn Gorge LHA areas for Cumulative Effects.

Impact Indicators:

- Acres (%) of salt desert shrub meeting standards, or not meeting standards, for Standard 3.

Discussion

White-tailed prairie dog, kit fox, and burrowing owl are all BLM sensitive species, and for the North Delta area are closely tied with the badlands/salt desert vegetation community (See TES Plants section for more discussion on this vegetation type). Kit fox are considered endangered by CPW. They were known to be in the North Delta and Gunnison Gorge area in the early 1990s.³⁴ Recent studies by CPW in the Grand Valley area (Montrose to Grand Junction), resulted in only one probably kit fox detection³⁵. CPW concluded that kit fox populations in Colorado are close to extirpation. They attributed this to, 1) interspecific competition with other predators (i.e. red fox, coyote, domestic dog, and domestic cat); 2) prey availability; 3) environmental conditions (drought); and 4) increased human disturbance, such as OHV use. The number of domestic predators that were detected during surveys, and their potential adverse impacts on kit fox, were stated as a valid concern. They also stated that human-facilitated changes in the western landscape during the last century have caused alterations in plant species composition, and disruption of ecosystem function and structure. These rangeland condition changes may have resulted in kit fox populations being more susceptible to environmental conditions. OHV use in Peach Valley (Gunnison Gorge LHA area) is extensive, with roads, and motorcycle trails bisecting the entire study area. One of the strongholds for kit fox in the 1990s was the Peach Valley area. Kit fox can tolerate some level of human disturbance but Link³⁶ noted that kit foxes in Colorado, spent more time in their dens during weekends when peak periods of noise and disturbance occurred. The human population in both Delta and Montrose counties is increasing, resulting in more people recreating in the area. This increase in recreational activities may disturb kit foxes, and cause additional stress to already small populations, making it difficult for maintenance and re-colonization to occur.

White-tailed prairie dogs are known to be in the North Delta area, and may occur anywhere there is open grass/salt desert shrub vegetation. Prairie dogs prefer forbs, and the proportion of grasses and forbs in their diet changes seasonally. Prairie dogs, depend on burrows to, (1) protect them from inclement weather and predators; (2) provide refuge for bearing and rearing young; and (3) as hibernacula. Lack of precipitation, extreme daily temperatures, and/or lack of forage and water appear to be the ultimate factors driving aestivation and hibernation. They can hibernate from up to 5 months during the winter, and will aestivate during mid- to late summer.

BLM mapped some of the prairie dog colonies in the 1980s, but there has been very little follow-up mapping. The last survey was completed in 2007, during which 59 known prairie dog colonies northwest of Montrose were visited, and compared with distribution data collected from the mid-1990s³⁷. Approximately, 17% of the colonies showed signs of current prairie dog activity, while the remaining colonies were abandoned or extirpated. The active sites were all

located north of the Gunnison River in Delta County. Plague-caused fluctuations in prairie dog populations and has resulted in some of the previously mapped sites being abandoned. Prairie dog populations appear to fluctuate greatly from year to year, and have been reported to fluctuate by more than 50% between consecutive years³⁸. Variation in density between years is likely driven by local factors such as, disease cycles, climate, and vegetation quantity and quality.

Burrowing owls are known to be in the area, and are dependent on prairie dog towns for nesting and burrow sites. Long term population trends (1968-2010), show burrowing owl population trends as declining, for the Southern Rockies Region (-0.1) and Colorado (-0.4). In the last decade (2000-2010), populations appear to be increasing for the Southern Rockies Region (+3.2), but remain declining for Colorado (-0.3)³⁹. Little is known about their population status within the UFO or North Delta area. This species is also discussed in the Migratory Bird section.

Assumptions:

- Salt desert habitat that meets Standard 3 would provide suitable habitat for these species.
- Salt desert habitat has not crossed some threshold where it is no longer able to improve with changes in management.

Migratory Birds

Issues & Measures for Analysis

Resource Issue Area/Potential Effects:

- How would domestic grazing practices of the proposed action and alternatives affect vegetative cover and habitat suitability for migratory bird species?

Analysis Area:

- North Delta LHA area

CIAA Area:

- N Delta, Escalante, and Gunn Gorge LHA areas.

Impact Indicators:

- Acres meeting, not meeting Standard.

Discussion

The plant communities, in the North Delta area and larger CIAA area, provide a variety of nesting habitats for a large number of different migratory bird species. Breeding bird surveys were conducted in the North Delta area in 2012.⁴⁰ This survey found 50 bird species present, with horned lark, common raven, and lark sparrow being the most detected species; western meadowlark, mourning dove, and rock dove were also detected frequently. Two nest sites were confirmed: prairie falcon and burrowing owl. Two non-native species were detected: European starling (1), and chukar (3).

For the purposes of this analysis, the U.S. Fish and Wildlife Service list of Birds of Conservation Concern was used as a tool to complete the analysis for this EA.⁴¹ These species represent the remaining migratory birds with similar habitat types. Table 32 below contains the bird species used for this analysis, their general habitat within the area, and their general nesting and foraging habitat. Analysis will be conducted based on two groups: tree/cliff nesting species and ground/shrub nesting or ground foraging species. Two species, bald eagle, and ferruginous

hawk, are found in the area primarily in the winter months. In recent years, a few bald eagle nests have been found along the Gunnison River after many years of absence.

Table 32. Nesting and foraging habits of Birds of Conservation Concern for planning area⁴²

	<i>Species</i>	<i>Nesting Vegetation</i>	<i>Nesting</i>	<i>Foraging</i>
Tree/Cliff Nesting Species	Golden eagle+	Cliff	Cliff	Soaring
	Peregrine falcon*	Cliff	Cliff	Aerial dive
	Prairie falcon+^	Cliff	Cliff	Aerial forager
	Bald eagle*	Forest/Woodland	Tree	Soaring
	Ferruginous hawk*	Grassland	Tree	Soaring
	Juniper titmouse+	Forest/Woodland	Tree Cavity	Foliage gleaner
Ground/Shrub nesting or foraging species	Lewis' woodpecker	Forest/Woodland	Tree Cavity	Aerial forager
	Burrowing owl*+^	Grassland	Burrow	Aerial dive
	Chestnut-collared longspur	Grassland	Ground	Ground
	Gray vireo+	Forest/Woodland	Shrub	Foliage gleaner
	Pinyon jay+	Forest/Woodland	Tree	Ground

* BLM Sensitive Species; Predominantly wintering only species; + Detected in the North Delta area during bird surveys; ^ Nesting confirmed during bird surveys.

Assumptions:

- Migratory bird species that rely on surface vegetation (grass, shrub) for nesting and/or foraging habitat may be impacted by grazing animals;
- Vegetation communities that meet Standard 3 would provide suitable habitat for these species;
- Birds of Conservation Concern represent other migratory bird species that also rely on similar vegetation/habitats for nesting and/or foraging habitat.

Desert and Rocky Mountain Bighorn Sheep

Issues & Measures for Analysis

Resource Issue Area/Potential Effects:

- How would domestic sheep grazing practices of the proposed action and alternatives affect the potential for disease transmission and disease outbreak interval?

Analysis Area:

- Allotments within North Delta area;

CIAA Area:

- 22 mile buffer of North Delta, Escalante and Gunnison Gorge LHA areas
- Based on the average distance a bighorn (Idaho, Rocky Mountain) will travel on foray outside of their Core Herd Home Range

Impact Indicators:

- Acres of sheep allotment that have predicted disease outbreaks <25 years;
- Number of days of overlap of domestic sheep grazing and breeding/rut season.

Discussion

Bighorn sheep (*Ovis canadensis*) is a species of sheep native to North America. Bighorn sheep are gregarious and live in herds. There are two subspecies found in this area: Rocky Mountain bighorn (*O. c. canadensis*) and desert bighorn (*O. c. nelsoni*). Both are considered sensitive species for Colorado BLM. Domestic sheep (*Ovis aries*) are most likely descended from wild

mouflon of Europe and Asia. Domestic sheep are also flock animals and strongly gregarious. Domestic sheep have a tendency to congregate close to other members of a flock, although this behavior varies with breed. Because bighorn and domestic sheep are gregarious, when located in proximity, they may be attracted to each other. Attraction between bighorn and domestic sheep may increase during bighorn sheep breeding season and during domestic sheep breeding season.

Historically, the CIAA area saw unrestricted and unregulated domestic grazing, including sheep and goat grazing (see Vegetation and Range Management sections). Disease has often been implicated in periodic “all-age” die-offs, and sustained bouts of poor lamb survival in Colorado bighorns. In the late 1800s, die-offs were reported in bighorn sheep in the Tarryall Mountains, and elsewhere, and in 1933 a die-off extirpated bighorns in what is now Dinosaur National Monument. In 1953, the state’s largest bighorn population residing in the Tarryall and Kenosha Mountains experienced a die-off, caused by pneumonia, that reduced the population from an estimated 1,000 animals (some observers have said 2,000) to 30 within two years; the Tarryall-Kenosha epidemic likely extended from a 1952 outbreak on Pikes Peak. The causes of these early die-offs are hard to verify retrospectively, but contact with domestic livestock, that led to the introduction of exotic diseases and parasites, seems the most logical explanation. Agents of disease suspected to be responsible for historical epidemics have included; “scabies” (also called “scab” or “mange”, and caused by mite infestations), “nasal bots” (parasitic fly larvae), “hemorrhagic septicemia” (later termed “pasteurellosis”, a bacterial infection), and lungworms (a natural parasite of bighorns).

Exotic sheep species such as mouflon (*Ovis musimon*), and aoudads (or Barbary sheep; *Ammotragus lervia*) can potentially compete with bighorn, and introduce infectious disease. Escapes of exotic sheep and goats have occurred in the past, in the Battlement Mesa and Black Canyon of the Gunnison River³⁰ areas. Additionally, there is currently a feral domestic goat herd in Dominguez canyon.

Other problems, such as unregulated harvest, overgrazing, competition with other livestock, plant community succession, forestation of native ranges, and increasing human development of winter ranges have been identified as contributing to bighorn sheep declines either historically or presently.

CPW manage bighorn populations as either; Primary (Tier 1) or Secondary (Tier 2) populations⁴⁵. Tier 1 herds are “regarded as those large (i.e., ≥ 100 animals for $\geq 90\%$ of the years since 1986) native populations comprised of one or more interconnected herds, (in, or to be designated into, GMUs) that have received few (i.e., ≤ 50 animals total) if any supplemental releases of Rocky Mountain bighorn sheep in the past”. Tier 2 herds “may represent indigenous or introduced bighorn sheep populations (and combinations thereof), that have less genetic diversity and more limited ranges, that may or may not be able to persist in sizable numbers in the face of various adversities”.

Desert bighorn

There is debate whether desert bighorn sheep were native to Colorado⁴³. Prior to CPW translocations that began in 1983, there are not records of bighorn sheep occurring in the Uncompahgre (S-62; D-E NCA area) herd since settlement in the 1880’s. Evidence that desert

bighorns might have been indigenous to the area comes entirely from archaeological sites in southwest Colorado that suggest Native Americans hunted bighorns in low elevations areas that would be more suitable for desert bighorns than Rocky Mountain bighorns.

Three herds make up Colorado's desert bighorn population: Black Ridge, Dominguez (Uncompahgre), and Dolores River. These bighorn herds are a high priority (Tier 1) for CPW, based on CPW's desert bighorn addendum⁴⁴.

Desert bighorn sheep, were released into the Big Dominguez Creek drainage in early to mid-1980s (20 bighorn from Arizona, 21 bighorn from Nevada), with additional releases occurring in the Roubideau Creek drainage in 1991 (38 bighorn from Nevada)⁴³. Population estimates increased to approximately, 175 in 2001. In 2001, there was a suspected disease outbreak, with subsequent all-age die-off. The population declined to 100 in 2004, but has increased to 150 in 2007⁴⁶, and 160 in 2012⁴⁴.

Rocky Mountain bighorn

It is difficult to estimate how many Rocky Mountain bighorn were present in Colorado in pre-settlement times. Explorers indicated, in their journals, great numbers of bighorn in both the mountainous areas, and along the Front Range⁴⁵. Since the late 1800s the general trend of bighorn populations, in Colorado and throughout the west, has been downward. Historical, statewide estimates of bighorn were 7,230 in 1915, 3,200 in 1958, and 2,200 in 1970. There were an estimated 6,045 bighorn in Colorado in 1988, and an estimated 7,040 in 2007 statewide. The reason for increases in Colorado Rocky Mountain bighorn populations is CPW's longstanding effort to trap and translocate bighorn to establish new populations, or supplement existing populations. From 1945–2007, there were 147 releases of bighorn sheep in Colorado resulting in the translocation of 2,424 animals. Black Canyon of the Gunnison is a transplanted population. For the Black Canyon population, estimates in the late 1980s were approximately 50 bighorn, with an increase to 90 in the early 1990s. The population has been in decline since, with a current estimate of 30 bighorn⁴⁶. The Black Canyon population was considered by CPW to be a Tier 2 population⁴⁵, however, because population numbers are low, they are no longer managed as a core population (Tier 2) for management⁷⁵.

Bighorn sheep (either species), are not known to use the North Delta area, and no CPW mapped habitat overlaps with the allotments. However, CPW does predict both desert and Rocky Mountain bighorn sheep suitable habitat within the North Delta area. Highway 50, may present some level of deterrent for movement from the Uncompahgre (Dominguez) population to the North Delta area. Additionally, Highway 92, as well as private lands, may present some level of deterrent for movement from the Black Canyon population to the North Delta area. Both desert and Rocky Mountain bighorn sheep have CPW mapped overall range within the 3-LHA areas (Table 33). Portions of the project area are located in proximity to occupied desert and Rocky Mountain bighorn sheep habitat, which may have conflicts with domestic sheep grazing. Only desert bighorn are considered to be BLM sensitive species, but both species have issues with disease transmission from domestic sheep. For ease of analysis, both species will be discussed here.

Table 33. Acres of bighorn sheep habitat within 3-LHA area, by species.

<i>LHA Unit</i>	<i>Acres Overall Range</i>	<i>Bighorn Species</i>
North Delta	5,100*	Desert
Escalante	60,186	Desert
Gunnison Gorge	43,280	Rocky Mountain

*Within the LHA unit, but not the North Delta Permit Renewal area.

The potential effect (probability of die-off and population viability) of intermingling of bighorn sheep with domestic sheep is well documented and recognized. Current science indicates that the bacteria that cause pneumonia in bighorn sheep populations, *Mycoplasma ovipneumoniae* and *Mannheimia haemolytica*, appear only to be transmitted between domestic and bighorn sheep when they come in direct contact (<30-foot separation)^{47,48,49}. Besser et al.⁵⁰ and others, identified that epizootic pneumonia of bighorn sheep is a devastating disease, and etiology regarding the bacterial respiratory pathogens is unclear. This is also the case in Colorado⁵¹. Transmission of *Mannheimia haemolytica* from domestic sheep to bighorn sheep was irrefutable, as demonstrated by Lawrence⁴⁸ and others, and provides justification sufficient for preventing range overlap, and potential association of domestic sheep and goats with bighorn sheep⁵².

No one form of evidence can conclusively demonstrate that contact with domestic sheep frequently leads to die-offs of bighorn sheep populations in the wild. Taken together however, the experiments, and observations from the lab, and the field do indicate that contact of wild bighorn populations with domestic sheep does pose a risk of disease transmission, and die-offs in free-ranging bighorn populations. Lab experiments demonstrate the particular sensitivity of bighorn sheep to some pneumonia-causing bacteria. The controlled conditions, available in inoculation and pen experiments, show that healthy domestic sheep often carry bacteria that are fatal to bighorn sheep, and that they can transmit those bacteria through close contact. Finally, nearly a century of observations, in the field, supports the view that proximity to domestic sheep is a risk factor for bighorn sheep, due to disease transmission from domestic sheep to bighorn sheep.

Garde et al.⁵³ offers the following conclusions summarizing the risk to bighorn sheep from *Pasteurella spp.* and *Mannheimia spp.*

- These bacteria can cause pneumonia in bighorn sheep, but there are benign commensal strains in the upper respiratory tract, which have no harmful effects.
- Pathogens that are benign in domestic sheep can be lethal in bighorn sheep.
- The transference of pathogens from domestic to bighorn sheep has been documented in laboratory settings, with resulting mortality in bighorn sheep.
- Domestic sheep, goats, and llamas have been reported with these bacteria species.
- Wild sheep and mountain goats have been reported with these bacteria species.
- Transmission is by direct contact and aerosolization (e.g., fine mist from breathing).
- These bacteria species do not persist in the environment.
- Acute-to-chronic die-offs in bighorn sheep populations can result in low-to-100 percent mortality, although these bacteria can be present in healthy sheep.
- These bacteria are considered opportunistic, and can result in pneumonia outbreaks.
- These bacteria can cause clinical disease in domestic sheep and goats, but are rarely primary pathogens.

In summary, field observations suggest, bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep, which has led to numerous independent experiments. These experiments provide strong corroboration that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep.

Given the substantial concern raised in the published literature over the past 30 years, management guidance has focused on the separation of these species to prevent disease transmission from domestic sheep to bighorn sheep^{54,52,55,56,57,58}. Given these concern, the BLM UFO utilized the Risk of Contact (RoC) Model to generally assess the risks, within the North Delta area and beyond (Appendix B). The RoC model estimates the probability that foraging bighorn sheep will reach a domestic sheep allotment. However, within an allotment it is not possible to determine where and when bighorn sheep would consistently occur or for how long. Use of some areas within an allotment may present less chance of contact with bighorn sheep than others, while some areas may have higher probability of occurrence (e.g., source habitats as defined by RoC User Guide). Consequently, because of this uncertainty, the RoC Model predicts potential interspecies contact by using the assumption that contact with an allotment results in interspecies contact. Of key importance to the model, the Core Herd Home Range (CHHR) defines the most important portion of a herd's use area, characterized by most (95%) of the use. By definition, where a CHHR overlaps an allotment, there is contact with the allotment, and the assumption is that one or more contacts per year may occur. It is recognized that stray domestic sheep could have implications for bighorn sheep herds, and in many rangeland settings may pose a risk of disease transmission as large as or greater than from foraging bighorn sheep. However, the bighorn sheep risk of contact tool⁵⁹ does not model the risk of stray domestic sheep, and the subsequent potential for contact with bighorn sheep.

With assistance from CPW biologists, the RoC model was run using the best available local bighorn population information to provide the parameters in the RoC model (See Appendix B for more details). However, much of the needed data was not available for individual bighorn populations, and assumptions were made given the available data. This may have resulted in spurious results for this area. Additional features in the landscape such as major highways, urban development and fragmented ownership between CHHR and the North Delta area may reduce the likelihood of bighorn foray into the area⁶⁰, but are not accounted for in the RoC model. More details on the methods can be found in the draft bighorn sheep appendix in the project record⁶¹. Results of the modeling effort are found below in Table 35 and Table 36.

The BLM-UFO recognizes the uncertainty regarding the relationship between the number of bighorn sheep contacts with a domestic sheep allotments, and predictions for disease transmission and outbreaks. Because of the uncertainty regarding the probability that contact of a bighorn sheep within an allotment will lead to disease outbreak within a population, modelers ran the disease model with assumptions for a range of values from 0.05 (1 in 20 contacts would result in a disease outbreak), to 1.00 (every contact would result in a disease outbreak). The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00. Results for this calculation are found in Table 36.

In a review of other RoC model efforts, general trends appear to develop. The Payette National

Forest Analysis⁵⁸ stated that total foray contact rates >0.04 annually (less than a 25 year interval) were deemed unacceptable, due to estimated disease return intervals, and subsequent impacts to long term viability to bighorn herds. Additionally, they assumed that 1 in 4 contacts (0.25) would result in disease transmission based on local information. The Rio Grande National Forest⁶², stated that a disease event occurring within a bighorn herd every 25 years or less would result in High Risk to bighorn long term viability, and a low probability of population persistence. This would result in a bighorn sheep population that is constantly being exposed to ongoing disease transmission and resultant outbreaks. CPW state veterinarian suggested that “perhaps once every 100 years would be more appropriate as a mark for ‘moderate’ risk ”⁶⁵ for disease outbreak levels.

During the bighorn breeding season, there may be an increase in attraction between wild and domestic sheep. Breeding season dates were provided by CPW bighorn sheep biologist during modeling efforts⁶⁶. Dates of domestic sheep grazing with existing permits in the North Delta area have no overlap with the desert bighorn breeding season (Table 34). However, all of the domestic sheep grazing allotments have anywhere from 12- 46 days of overlap with Rocky Mountain bighorn breeding season.

Bighorn sheep, particularly rams, make occasional long-distance movements beyond their CHHR. Forays are defined as any short-term movement of an animal away from and back to its CHHR⁶³. This life-history trait can put bighorn sheep at risk of contact with domestic sheep, particularly when suitable habitats are well connected and overlap with domestic sheep use areas⁶⁴, or even when domestic sheep use is outside of CHHR areas. CPW provided local professional opinion on foray behavior for this area⁶⁵ but felt that the current state of their local telemetry data was not sufficient to develop local foray parameters.

For Rocky Mountain bighorns, young rams tend to wander during the summer months, probably as ewes are lambing and raising new lambs the young rams disperse. Those young rams are leaving the family groups and may be trying to find other rams or bighorn groups. There is also some movement of rams pre-rut and during the rut, when rams are trying to find ewe groups for breeding.

Based on CPW collar data and professional opinion, desert bighorns generally appear to move more than Rocky Mountain bighorns, and move year round. Their seasonal habitats are not restricted by snow conditions, as much as Rocky Mountain bighorn. Also, since desert bighorns tend to lamb across a longer period of time in the spring, and even year round, the family structure seems more fluid through the year. Due to this, young rams probably disperse from the family groups during lambing and lamb rearing, especially in March through June. Rams probably start looking for ewes again for breeding in July, August, and September. During the winter in Escalante Canyon, it seems like the bigger ewe groups spend a lot of time with young rams, up to 5 and 6 year old rams, but you don't generally see real old rams with ewe groups outside of breeding season.

Because of this information, defining a bighorn foray season is problematic. So no analysis of domestic sheep grazing permit seasonal overlap with local bighorn foray season will be conducted.

Table 34.Overlap of domestic sheep allotment permit dates with bighorn breeding season dates in domestic sheep allotments in North Delta.

<i>Allotment Name</i>	Domestic Grazing Period		Breeding Season Overlap (Days)^a	
	<i>Start</i>	<i>End</i>	<i>Desert</i>	<i>Rocky Mountain</i>
Alkali Flats	1-Dec	28-Feb	No	Yes (31)
	1-Mar	20-Mar	No	No
Deer Basin/Midway	20-Dec	20-Mar	No	Yes (12)
Delta Pipeline	1-Dec	28-Feb	No	Yes (31)
	1-Mar	20-Mar	No	No
Petrie Mesa	9-Dec	20-Mar	No	Yes (23)
Point Creek	16-Apr	31-May	No	No
	16-Nov	10-Mar	No	Yes (46)
Wells Gulch	1-Mar	21-Mar	No	No
	1-Dec	28-Feb	No	Yes (31)

^a Breeding seasons: Desert—August 1 to September 30; Rocky Mountain—November 1 to December 31⁶⁶

Assumptions:

- Utilize RoC model results to inform relative risks for bighorn sheep;
- Allotments overlapping with Core Herd Home Range result in annual contact.
- 1 in 4 potential contacts results in disease outbreak;
- Potential disease events <25 years results in populations that never recover from initial disease outbreak and impact long term population viability.
- Given the assumption of 1 in 4 contacts results in a disease event, we generated relative risk rates using the following scheme.

0-25 years High
 25-50 years Moderate
 50-75 years Some
 75-100 years Low
 >100 years Very Low

Within the larger CIAA analysis area (22-mile buffer around the 3-LHAs), there are currently 489,937 acres of domestic sheep grazing: 58% BLM, 36% USFS and 6% other lands (Table 37, Figure 10). Given the RoC model assumptions above, within CIAA domestic sheep areas, 195,827 acres (40%) is predicted that disease outbreaks will occur less than a 25 year interval (i.e. high risk). USFS lands were not included in the RoC model, so are not included in this assessment. Within these high risk areas, 179,070 acres (91%) is within BLM lands.

For the North Delta area, there are currently 47,140 acres of domestic sheep grazing: 88% BLM,

12% other lands (Table 37, Figure 9). Given the RoC model assumptions, within the North Delta domestic sheep areas, 25,690 acres (54%) is predicted that disease outbreaks will occur less than a 25 year interval (i.e. high risk). Within these high risk areas, 20,868 acres (81%) is within BLM lands. Within this permit renewal, 4 domestic sheep allotments result in high risk, 3 allotment pieces (2 portions of Deer Basin) in moderate risk, and 1 allotment and 1 allotment piece (1 portion of Deer Basin) in very low risk of contact (Table 36).

Table 35. RoC Model Results for Bighorn Risk of Contact with North Delta Allotments (Probability that a bighorn sheep will intersect an allotment) from the UFO-wide analysis (See Appendix B).

<i>Allotment</i>	<i>Probability of Contact</i>		<i>Rate of Contact</i>		
	Ram	Ewe	Ram	Ewe	Herd
Alkali Flats*	0.0093 ^a	0.0028	0.1161	0.0066 ^b	0.1228 ^c
Deer Basin/Midway*	0.0081	0.0018	0.0967	0.0042	0.1009
Deer Basin/Midway*	0.0001	0.00002	0.00060	0.00003	0.0007
Deer Basin/Midway*	0.0110	0.0026	0.1356	0.0058	0.1414
Delta Pipeline*	0.0331	0.0073	0.2747	0.0127	0.2875
Dirty George	0.0019	0.0008	0.0051	0.0006	0.0057
Petrie Mesa*	0.0368	0.0096	0.3397	0.0171	0.3568
Point Cr*	0.0276	0.0061	0.3273	0.0142	0.3415
South Branch	0.0022	0.0009	0.0134	0.0010	0.0145
Ward Cr/Doughspon	0.0512	0.0142	0.2571	0.0158	0.2728
Wells Gulch*	0.0145	0.0076	0.1797	0.0177	0.1974

* Current domestic sheep allotments

^a Given that a ram is on foray, there is a 0.9% probability that it will contact this allotment.

^b Given the probability of ram on foray, predicts a rate of 0.7 ram contacts with allotment in 10 years.

^c Given the probability of foray of bighorn in the population, predicts a rate of 12.3 contacts with allotment in 10 years.

Table 36. Predicted years between potential disease events for North Delta allotments, based on RoC Model Results from the UFO-wide analysis (See Appendix B).

<i>Allotment</i>	<i>Herd Rate of Contact</i>	<i>Years Between Contact</i>	<i>Years Between Potential Disease Events</i>							<i>Risk of Disease Outbreak</i>
			<i>1:1 (1.0)</i>	<i>1:1.1111 (0.9)</i>	<i>1:1.3333 (0.75)</i>	<i>1:2 (0.50)</i>	<i>1:4 (0.25)</i>	<i>1:10 (0.10)</i>	<i>1:20 (0.05)</i>	
Alkali Flats*	0.1228	8	8	9	11	16	33	81	163	Moderate
Deer Basin/Midway*	0.1009	10	10	11	13	20	40	99	198	Moderate
Deer Basin/Midway*	0.0007	1536	1536	1707	2048	3073	6145	15363	30726	Very Low
Deer Basin/Midway*	0.1414	7	7	8	9	14	28	71	141	Moderate
Delta Pipeline*	0.2875	3	3	4	5	7	14	35	70	High
Dirty George	0.0057	176	176	196	235	353	706	1765	3529	Very Low
Petrie Mesa*	0.3568	3	3	3	4	6	11	28	56	High
Point Cr*	0.3415	3	3	3	4	6	12	29	59	High
South Branch	0.0145	69	69	77	92	138	277	692	1384	Very Low
Ward Cr/Doughspoon	0.2728	4	4	4	5	7	15	37	73	High
Wells Gulch*	0.1974	5	5	6	7	10	20	51	101	High

* Current domestic sheep allotments

^a From Table 35, last column; ^b 1/Herd Rate of Contact

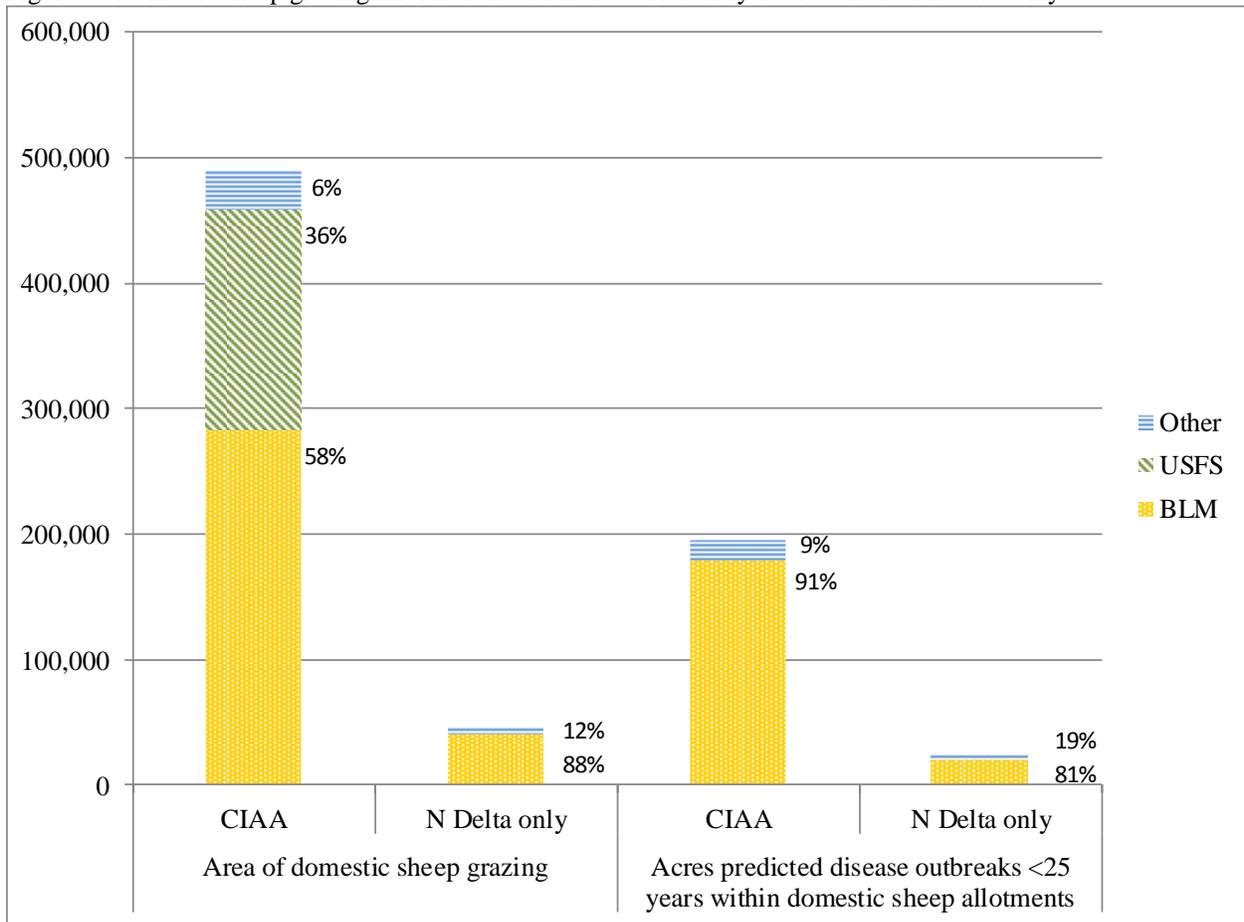
^c Grey shaded cells for allotments show potential disease event rates more frequently than 25 years.

^d Given the assumption of 1 in 4 contacts results in a disease event, relative risk rates are set at High—<25 years; Moderate—25-50 years; Some—50-75 years; Low—75-100 years; Very Low—>100 years

Table 37. Domestic sheep grazing information within the CIAA analysis area.

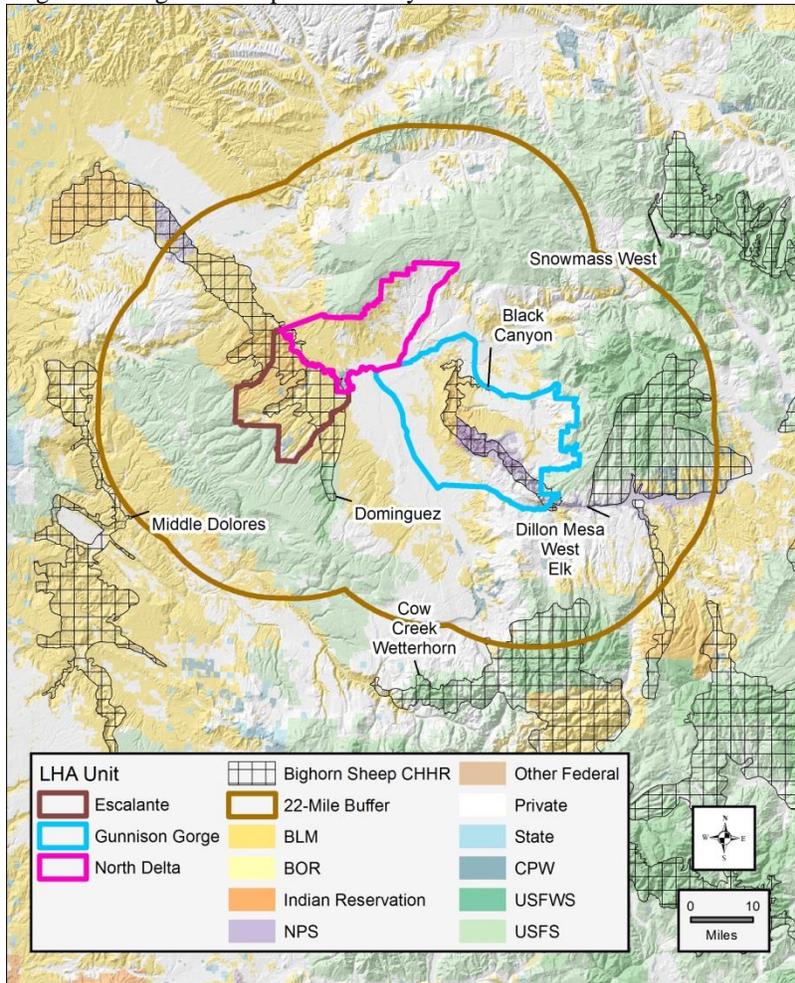
<i>Land Ownership</i>	<i>Area of domestic sheep grazing (Acres [% of CIAA])</i>		<i>Acres predicted disease outbreaks less than 25 years within domestic sheep allotments</i>	
	<i>CIAA</i>	<i>N Delta only</i>	<i>CIAA</i>	<i>N Delta only</i>
BLM	284,348	41,473 [15%]	179,070	20,868 [12%]
USFS	174,342	0	Unavailable	0
Other	31,247	5,667 [18%]	16,757	4,822 [29%]
Total	489,937	47,140 [33%]	195,827	25,691 [13%]

Figure 9. Domestic sheep grazing information within the CIAA analysis area and North Delta only.



*RoC model was not run for USFS allotments to predicted risk of contact

Figure 10. Bighorn sheep CIAA analysis area



Environmental Consequences

Because effects are difficult to measure for the numerous wildlife species that may be in the area, for most wildlife species, effects are discussed in a general manner in this section. For a few species, additional effects are discussed below.

General Wildlife

Impacts Common to all Grazing Alternatives

Grazing has been called the most widespread influence on native ecosystems of western North America and represents a routine disturbance to vegetation which may result in alteration of species composition of vegetation communities, disruption of ecosystem functioning and alteration of ecosystem structure.⁶⁷ As described in the Vegetation section, historically these rangelands in the North Delta LHA unit have transitioned across thresholds and have moved towards other often degraded vegetative states, as compared to associated ecological sites Salt-desert shrub ranges were estimated to have a carrying capacity of 5 acres/AUM, and have transitioned to at least 18 acres/AUM. With the semiarid climate, relatively fragile vegetation, soils that are slow to recover from disturbance combined with historical heavy use and some current mismanagement, land health has been impacted which has affected the stability of

ecological sites, modified vegetative composition, and has hampered BLM's ability in the past to bring about change in these fragile environments. As described in the Vegetation section, if a vegetation type is in a lower stable state, it will not respond to simple changes in grazing management or even the removal of grazing.

Grazing activities from livestock presence or human activities, associated with livestock management, may have direct impacts to wildlife species through competition of food and habitat. Direct effects would be difficult to quantify. We assume that healthy native vegetation (Meeting Standard 3 for Land Health) equates to healthy terrestrial wildlife habitat and will provide for healthy terrestrial wildlife populations. The response of native wildlife to grazing varies by habitat and species. These activities may cause individual wildlife to be displaced from areas, and depending on the level and timing of the activity, could have impacts to survival and/or reproductive efforts, i.e. disrupt breeding through trampling of nest/burrows or cause adults to leave nests/burrows and young.

Indirect impacts include modification of habitat for terrestrial wildlife species. Grazing may affect the composition of plant communities, and thus wildlife habitat, in essentially two ways: (1) active selection by herbivores for or against a specific plant group, and (2) differential vulnerability of plant group to grazing⁶⁷. Grazing can also exert an impact on animal populations, usually due to indirect effects on habitat structure and prey availability.^{68,69,70,71,72} Grazing can destabilize plant communities by aiding the spread and establishment of exotic species. Livestock help spread exotic plant species by dispersing seeds in fur and dung; opening up habitat for weedy species; and reduce competition from native species by eating them. As shown in the Land Health Assessments (2002 and 2012) for this area, the vegetation, and by extension the wildlife habitat, in the area, is in decline with causal factors at least partially attributed to historic and current grazing. With continued grazing, in this already compromised vegetative community, terrestrial wildlife habitat quality will continue to be limited at some level. Depending on the level of grazing, some improvements may be seen over the long term. Until improvement is seen, in the vegetation community, wildlife populations are not expected to have quality habitat, or have the resources for a stable or increasing population. Under all alternatives, recovery of the native vegetation is a long term prospect.

The presence of livestock can also be a vector for diseases, which impact native wildlife species, especially, wild ungulates. Under the grazing alternatives, domestic livestock will remain in the North Delta area, and disease trends for wild ungulates would continue. These will be discussed in more detail below under the pronghorn section, and in the TES species section relative to bighorn sheep. These issues may also be present at some level for other wild ungulate species in the area (mule deer, elk).

Modified Grazing Alternative

When compared to the Proposed Action (Continued Management) alternative, direct impacts to wildlife species will continue at some level as described in Impacts Common to all Grazing Alternatives. Removing or reducing livestock across large areas could alleviate a widely recognized and long term stressor, making these lands less susceptible to the effects of climate change.⁷³ By reducing AUMs, the level of direct disturbance would be reduced (e.g. fewer animal unit months equals decrease in disturbance). By reducing utilization targets and AUMs to more closely match carrying capacities, impacts to vegetation communities, and thus

terrestrial wildlife habitat, would be reduced. With the modification to the carrying capacities (AUMs) and utilization rates the Alkali Flats, Deer Basin/Midway, Delta Pipeline, Petrie Mesa and Point Creek allotments, the allotments should start to make marginal, but minor undetectable changes within 10-50 years, towards meeting land health standards (See Vegetation Section for more details). The remaining allotments (Wells Gulch, South Branch, Dirty Gorge, Ward Creek/Dough Spoon) did not have land health issues associated with current livestock management for Standard 3, Vegetation. These allotments should continue with current trends. As predicted by the COREA, if climate change results in drier years into the near future, the addition of the drought plan in the Modified Grazing Alternative may result in more years with management directed by the drought plan. With additional modifications to management during times of drought, impacts to wildlife habitat (vegetation) should be reduced, making these lands less susceptible to the effects of climate change.

American Pronghorn

General effects to pronghorn have already been described under General Wildlife, and above under Proposed Action. Specific for pronghorn, when compared to the Proposed Action alternative, by reducing utilization from 50% (No Action) to 35% (Proposed Action), these allotments are expected to improve vigor on perennial grasses, forbs and shrubs already established, which should in turn allow for incremental increases in seed production, propagation, and seedling establishment over the next 25-100 years, depending upon weather patterns and other outside disturbances (see Vegetation section). With reduced AUMs, impacts from grazing to habitat suitability should be reduced from the Proposed Action alternative. Grazing activities continue to occur during the fawning season (15-May through 1-July⁷⁴) (Table 38). With reductions in domestic grazing utilization on native vegetation and as the vegetation improves, it is expected that pronghorn food (desirable shrubs in the winter, and forbs in the spring and summer) and fawn hiding cover will improve over time. This should provide for both more residual cover in those allotments that graze outside of fawning season, as well as maintaining cover during the fawning season for those two allotments that graze during that critical period. With continued domestic livestock presence in the area, current trends for BT and EHD in the pronghorn population would continue. Better nutrition and hiding cover may improve fawn:doe ratios and fawn survival rates. Current population trends will likely continue or see slight improvement.

Table 38. CPW mapped pronghorn habitat within the project area relative to the Proposed Action.

Allotment Name	Public Land Allotment Acres	% Allotment in Downward Trend ^d	Pronghorn Habitat		Days of Overlap with Fawning season
			Overall Range Acres (% of Allotment)	Winter Concentration Acres (% of Allotment)	
Alkali Flats*	8,900	99	8,900 (100%)	1,484 (17%)	0
Deer Basin/Midway*	11,701	87	9136 (78%)	631 (13%)	0
Delta Pipeline*	6,029	70	1595 (26%)	0	0
Petrie Mesa*	2841	0	1014 (36%)	78(52%)	0
Point Creek*	1586	62	1586 (100%)	0	17
Ward	17272	56	7833 (45%)	922 (9%)	Max 33 days

Creek/Dough Spoon+ Wells Gulch*	10362	0	9679 (93%)	0	0
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*Domestic Sheep Allotments; + Cattle Allotments

^a Pg 19 in BLM. 2015. North Delta Land Health Assessment 2013-2014.

Migratory Birds

General effects to migratory birds have already been described under General Wildlife. Specific to migratory birds, when compared to the Proposed Action alternative, by reducing utilization from 50% (No Action) to 35% (Proposed Action), these allotments are expected to improve vigor on native vegetation already established, which should in turn allow for incremental increases in seed production, propagation, and seedling establishment over the next 25-100 years, depending upon weather patterns and other outside disturbances (see Vegetation section). With reduced AUMs, impacts from grazing to habitat suitability should be reduced from the Proposed Action alternative. Grazing activity continues in one allotment during the breeding season, but no changes in dates are proposed from the Proposed Action alternative (Table 39). Direct effects, due to take of migratory bird reproduction, would be the same as the Proposed Action alternative.

Table 39. Days of overlap between proposed grazing season dates and migratory bird breeding season (15-May through 15-July).

<i>Allotment Name</i>	<i>No Action</i>			<i>Proposed Action</i>		
	<i>Domestic Grazing Period Start</i>	<i>Domestic Grazing Period End</i>	<i>Days Overlap</i>	<i>Domestic Grazing Period Begin</i>	<i>Domestic Grazing Period End</i>	<i>Days Overlap</i>
Alkali Flats*	1-Dec	28-Feb	0	1-Dec	1-Mar	0
	1-Mar	20-Mar	0			
Deer Basin/Midway	20-Dec	20-Mar	0	1-Dec	1-Mar	0
Delta Pipeline	1-Dec	28-Feb	0	1-Dec	1-Mar	0
	1-Mar	20-Mar	0			
Petrie Mesa	9-Dec	20-Mar	0	1-Dec	1-Mar	0
Point Creek	16-Apr	31-May	17	16-Apr	31-May	17
	16-Nov	10-Mar	0	16-Nov	1-Mar	0
Wells Gulch +	1-Mar	21-Mar	0	1-Dec	10-Mar	0
	1-Dec	28-Feb	0			

Desert and Rocky Mountain Bighorn

General effects to bighorn have already been described under General Wildlife. Similar to the Proposed Action alternative, since there is no bighorn CHHR within the North Delta area, there are no effects to core habitat areas. As stated earlier, the use of the RoC model was run using the best available local bighorn population information to provide the parameters in the model, however much of the needed data was not available. This may result in spurious model results. Specific for bighorn, when compared to the Proposed Action alternative, by continuing domestic sheep presence in the area, there will continue to be 25,691 acres predicted from the RoC model

to have disease outbreaks in local bighorn populations on an interval less than every 25 years. If this model result is accurate, this results in those local populations of bighorn sheep never recovering from those disease outbreaks. Additional features in the landscape such as major highways, urban development and fragmented ownership between CHHR and the North Delta area may reduce the likelihood of bighorn foray into the area, but are not accounted for in the RoC model. Depending on the actual foray rates for this area (given the potential habitat fragmentation factors of the landscape), disease interval rates may be longer, providing some time for population recovery.

Overlap of domestic sheep grazing permit grazing dates and Rocky Mountain bighorn sheep breeding season dates would continue (Table 40), with potential for attracting foraging bighorn during that time period. This alternative increases the number of days of overlap, for Rocky Mountain on two allotments (Deer Basin/Midway, Petrie Mesa). Proposed timing of the domestic sheep grazing coincides with periods of lower foray potential for both species of bighorn⁷⁵ (Banulis pers. comm. 12/10/2015). Permit terms and conditions for domestic sheep (BH-S, BH-M and BH-H) will

- decrease attraction of domestic herds to foraging bighorn;
- decrease the likelihood of disease exposure by domestic sheep;
- increase herder/permittee reporting.

These terms and conditions should reduce the likelihood that domestic sheep and bighorn will come into contact, therefore reducing the likelihood that disease transmission takes place. Additionally, bighorn sheep design features will encourage additional changes through time to reduce the risk of contact between domestic sheep and bighorn.

Bighorn populations have persisted in this area, despite domestic sheep grazing through the Uncompahgre valley since the late 1800s. CPW considers both of these populations to be stable, although Black Canyon is very small and no longer considered to be a core population for management. Under this alternative, population trends for bighorn would be expected to continue. Currently, the Uncompahgre (Dominguez; desert bighorn) herd is increasing, but still relatively small (160). The Black Canyon (Rocky Mountain bighorn) herd appears to be stable, but at very low numbers (30). Without additional augmentation, the Black Canyon population may eventually, no longer be present.

Table 40. Overlap of domestic sheep allotment permit dates with bighorn breeding season dates.

<i>Allotment Name</i>	No Action				Proposed Action			
	Domestic Grazing Period		Breeding Season Overlap (Days)^a		Domestic Grazing Period		Breeding Season Overlap (Days)	
	<i>Start</i>	<i>End</i>	<i>Desert</i>	<i>Rocky Mountain</i>	<i>Begin</i>	<i>End</i>	<i>Desert</i>	<i>Rocky Mountain</i>
Alkali Flats*	1-Dec	28-Feb	No	Yes (31)	1-Dec	1-Mar	No	Yes (31)
	1-Mar	20-Mar	No	No				
Deer Basin/Midway	20-Dec	20-Mar	No	Yes (12)	1-Dec	1-Mar	No	Yes (31) +19
Delta Pipeline	1-Dec	28-Feb	No	Yes (31)	1-Dec	1-Mar	No	Yes (31)

	1-Mar	20-Mar	No	No				
Petrie Mesa	9-Dec	20-Mar	No	Yes (23)	1-Dec	1-Mar	No	Yes (31) +8
Point Creek	16-Apr	31-May	No	No	16-Apr	31-May	No	No
	16-Nov	10-Mar	No	Yes (46)	16-Nov	1-Mar	No	Yes (46)
Wells Gulch +	1-Mar	21-Mar	No	No	1-Dec	10-Mar	No	Yes (31)
	1-Dec	28-Feb	No	Yes (31)				

* Includes Huff allotment in the Proposed Action Alternative; + Includes Dominguez Rims allotment in the Proposed Action Alternative

^a Breeding seasons: Desert—August 1 to September 30; Rocky Mountain—November 1 to December 31⁶⁶

Summary

In summary, the Modified Grazing Alternative would result in undetectable changes in the short-term. Success would be to stop the ongoing degradation of habitat, and see improvements in shrub vigor and recruitment. In the long-term, the area should start to make marginal, but minor undetectable changes within 10-50 years toward meeting land health standards for vegetation and improvements in wildlife habitat.

Alternative 2 (No Grazing)—

When compared to the Proposed Action alternative, removal of grazing from the North Delta area would reduce the direct and indirect impacts from grazing (see General Wildlife above), and slowly move allotments toward meeting land health standards (See Vegetation Section). With the removal of grazing from the area, disruptive activities from livestock presence or human activities associated with livestock management would no longer occur, and those direct impacts to wildlife species through competition of food and habitat would be reduced. The livestock vector for diseases would also be reduced in the area for native wildlife species, especially wild ungulates (mule deer, elk, pronghorn, bighorn). These will be discussed in more detail below under pronghorn, and bighorn sheep.

Indirect impacts, of habitat modification, for terrestrial wildlife species through domestic grazing animals, would be removed. However, the vegetation community problems that most likely impact wildlife populations or contribute to the suppression of populations such as exotic plant competition with native vegetation, low native vegetation diversity, low shrub cover, low shrub vigor, and the presence of noxious weeds, would slowly improve with the reduction in forage use. The recovery of the plant communities, and thus terrestrial wildlife habitat, may take 120 years or more. Until improvement is seen in the vegetation community, wildlife populations are not expected to have quality habitat or have the resources for stable to increasing populations. Other disturbances from right-of-ways, and OHV would continue to impact terrestrial habitat.

With the removal of livestock from the North Delta area, a vector for diseases which impact native wildlife species would be removed locally. Wild ungulates that migrate outside of the North Delta area may still be exposed in adjacent areas. Since the pronghorn population seems to be highly infected with BT and EHD, it may take a number of years for this disease to subside

within the population. With many wild ungulate species that may be vectors, trends may not change.

American Pronghorn

When compared with the Proposed Action alternative, with removal of domestic grazing on native vegetation and as the vegetation improves, it is expected that pronghorn food (desirable shrubs in the winter, and forbs in the spring and summer) and fawn hiding cover will improve over time. Additionally, with the removal of domestic livestock from the area, infection rates of BT and EHD in the pronghorn population should decline over time. Effects to pronghorn populations are expected to be similar to the Proposed Action, but should occur sooner, but will be at least partially tied to vegetation recovery.

Desert and Rocky Mountain Bighorn

Similar to the Proposed Action alternative, since there is no bighorn CHHR within the North Delta area, there are no effects to core habitat areas. When compared with the Proposed Action alternative, with removal of domestic sheep presence in the area, 25,691 acres would no longer be predicted to have disease outbreaks in local bighorn populations on an interval less than every 25 years. Given that these bighorn populations are located outside of the North Delta area, and will continue to have exposure from other sources, it is uncertain what affect this would have on the populations.

Summary

Removing grazing from the North Delta land health area would eliminate the direct effects and reduce the indirect impacts from grazing to wildlife and wildlife habitat. The vegetation community problems that most likely contribute to the suppression of wildlife populations such as exotic plant competition, low native vegetation diversity, low shrub cover, low shrub vigor, and the presence of noxious weeds would slowly improve with the reduction in forage use. With past effects of limited precipitation and 120 years of grazing disturbance, improvement in wildlife habitat would take place over the next 100+ years. Other disturbances from right-of-ways, OHV, and wildlife on vegetation would continue to impact wildlife habitat. Additionally, the livestock vector for diseases would also be reduced in the area for native wildlife species, especially wild ungulates (mule deer, elk, pronghorn, bighorn).

Proposed Action Alternative

Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Direct and indirect impacts would be expected to continue at similar levels. Over time, a greater percentage of wildlife terrestrial habitats would be expected to degrade to a not meeting rating, which could begin to have population level impacts to wildlife species, especially special status species. As predicted by the COREA, if climate change results in drier years into the near future, without the addition of the drought plan in the Proposed Action alternative, impacts to wildlife habitat (vegetation) may increase during drought years, making these lands susceptible to the effects of climate change.

Pronghorn

General effects to pronghorn have already been described under General Wildlife. Specific for pronghorn under the Proposed Action alternative, by continuing domestic grazing utilization levels at 50%, allotments are expected to continue the existing trend for vegetation and disease. Generally, the North Delta area has low cover of native vegetation. Areas with problems with

perennial grasses, forbs and shrubs would continue to decline (see Vegetation section). Indirect effects from grazing activities may include reduced habitat suitability through the year-round reduction in hiding cover for fawns as well as reduced nutrition for does. Of importance to pronghorn reproduction is shrubs in the winter and forbs in the spring and summer. This has impacts to a doe's ability to produce fawns and for a fawn's ability to hide and survival from predators. Additionally, grazing activities during the fawning season (15-May through 1-July⁷⁴) would reduce cover during this critical time period (Table 41). With no changes in domestic grazing utilization on native vegetation, it is expected that pronghorn food (desirable shrubs in the winter, and forbs in the spring and summer) as fawn hiding cover will continue to decline. This would result in both reduced residual cover in those allotments that graze outside of fawning season, as well as reduced cover during the fawning season for those two allotments that graze during that critical period. With continued domestic livestock presence in the area, current trends for BT and EHD in the pronghorn population would continue. Fawn:doe ratios will continue to be low. Fawn survival rates are not expected to improve. Current population trends will likely continue or see declines. Without additional augmentation, this population may eventually no longer be present in the North Delta area.

Table 41. CPW mapped pronghorn habitat within the project area relative to the Proposed Action alternative.

<i>Allotment Name</i>	<i>Public Land Allotment Acres</i>	<i>% Allotment in Downward Trend^a</i>	<i>Pronghorn Habitat</i>		<i>Days of Overlap</i>
			<i>Overall Range Acres (% of Allotment)</i>	<i>Winter Concentration Acres (% of Allotment)</i>	
Alkali Flats*	12,433	99	11,373 (91%)	2,771 (22%)	0
Deer Basin/Midway*	11,701	87	9,136 (78%)	631 (13%)	0
Delta Pipeline*	6,029	70	1,595 (26%)	0	0
Petrie Mesa*	2,841	0	1,014 (36%)	78 (52%)	
Point Creek*	1,586	62	1,586 (100%)	0	17
Ward Creek/Dough Spoon+ Wells Gulch*	17,272	56	7,833 (45%)	922 (9%)	Max 32 days
	16,879	0	13,739 (81%)	0	0

* Domestic Sheep Allotments; + Cattle Allotments

^a Pg 19 in BLM. 2015. North Delta Land Health Assessment 2013-2014.

Migratory Birds

General effects to migratory birds have already been described under General Wildlife.

Tree/Cliff Nesting Species

Effects to tree/cliff nesting species (Table 32), from the Proposed Action alternative, would be generally limited to indirect impacts to habitat for prey species through modification of habitat (habitat). Depending on the location and height of nesting substrate, disruptive effects may also occur.

Ground/Shrub Nesting or Ground Foraging Species

Effects to ground/shrub species (Table 32), from Proposed Action alternative, would be both direct and indirect in nature. Direct impacts may include trampling and disruptive activities. Modification of vegetation through grazing during the breeding season may cause breeding efforts to be reduced. Only one allotment proposes grazing during the breeding season (Table 39). Direct effects, due to take of migratory bird reproduction, may occur in the Point Creek allotment during those years when grazing takes place during the breeding season.

Indirect effects from the grazing alternatives may include modification of habitat (vegetation) for nesting, foraging and/or prey species. Both grazing alternatives will remove vegetation at some level. Given that the current health of the vegetation is poor, current habitat suitability is assumed to be limited for both grazing alternatives.

Desert and Rocky Mountain Bighorn

General effects to bighorn have already been described under General Wildlife. Specific for bighorn under the Proposed Action alternative, indirect effects are anticipated from bighorn sheep on foray, outside the CHHR, that reach the North Delta area domestic sheep allotments and return to their CHHR. By continuing domestic sheep presence in the area, there will continue to be 25,691 acres predicted to have disease outbreaks in local bighorn populations on an interval less than every 25 years. Given model issues described above, under this alternative, current trends in bighorn sheep disease outbreaks would continue, but we do not have a good estimate with available data. Overlap of domestic sheep grazing permit windows and Rocky Mountain bighorn sheep breeding season dates would continue, with potential for attracting foraging bighorn during that time period. Population trends for bighorn would be expected to continue to decline. Without additional augmentation, these populations may eventually no longer be present in the North Delta area.

Summary

In summary, the Proposed Action alternative would result in undetectable changes in the short-term. However, current land health trends for vegetation would continue:

- areas meeting land health standards may continue to do so under this action;
- areas meeting with static trends may remain stable;
- areas meeting that have downward trends would continue to degrade; eventually joining the not meeting category;
- areas not meeting that have downward trend would continue to degrade further and remain in the not meeting category;
- areas not meeting standards would remain, with number of acres static or increasing.

This alternative would not meet Public Land Health Standard, for Standard 3 Vegetation, and would not provide for suitable wildlife habitat for many species of wildlife.

Finding on the Public Land Health Standard for plant and animal communities (partial, see also Vegetation; Invasive, Non-native Species; and Wildlife, Aquatic) and for Threatened & Endangered species (partial, see also Threatened, Endangered, and Sensitive Plant Species):

Current land health conditions rate native plant and animal communities (Standard 3) in the North Delta land health unit as 76% meeting, and 22% not meeting. Current land health conditions rate special status species (Standard 4) in the North Delta land health unit as 75% meeting, and 20% not meeting. The proposed action, if properly implemented, is expected to

stop the current rate of habitat degradation caused by domestic sheep grazing for the salt desert shrub habitat in the North Delta LHA unit. In addition, minor incremental improvements in native species cover and composition is anticipated over the next 25-120+ years. Such improvements may be most pronounced in those sites meeting with downward trends, which may result in more suitable wildlife habitat. For those lands that are not meeting, such anticipated improvements may be undetectable, and may in fact require active restoration to have measurable improvements in native species cover and composition.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES PLANTS (includes a finding on Standard 4)

Affected Environment:

The analysis area for impacts to threatened, endangered, and sensitive plant species includes the North Delta LHA area totaling 61,449 acres of BLM administered public lands, where both direct and indirect effects occur. However, some of the indirect and cumulative effects also occur for the same species analyzed within the Escalante, Gunnison Gorge, and a small portion of the Roubideau land health units. The scope of the analysis, for indirect and cumulative effects include: the section 7 range of the Colorado hookless cactus (*Sclerocactus glaucus*, Threatened), and four LHA areas, totaling 278,300 acres of BLM administered lands. These areas are Escalante, North Delta, and Gunnison Gorge LHA areas, and 7,872 acres of the Canal allotment in the Roubideau LHA unit totaling 286,172 acres. Further, the Colorado hookless cactus is known to occur or has suitable habitat for occupation.

The Endangered Species Act (ESA), as amended (16 U.S.C. 1531-1534) mandates the protection of species listed as threatened or endangered of extinction, and the habitats which they depend. Section 7 of the ESA clarifies the responsibility of federal agencies to utilize their authorities, to carry out programs for the conservation of listed species. In addition, federal agencies must consult with the U.S. Fish and Wildlife Service (Service) to ensure that any action authorized, funded, or carried out by the agency is "...not likely to jeopardize the continued existence of any endangered species, or threatened species, or result in the destruction, or adverse modification of habitat of such species...". The Uncompahgre Field Office (UFO) utilizes the U.S. Fish and Wildlife Service Information, Planning, and Conservation System (IPaC), to generate the most current species list, to analyze the effects of a Modified Grazing Alternative on threatened, endangered, and candidate species, and designated critical habitat for these species.⁷⁶ Additionally, the BLM has a state-wide list of Sensitive Species for management consideration. In accordance, with BLM Manual 6840, the goal of management of these species is to prevent a trend toward federal listing or loss of viability.

A spatial analysis was conducted to assess which allotments within the North Delta LHA unit have potential to intersect with special status plant species.⁷⁷ After review of both BLM special status plant species occurrences, and Colorado Natural Heritage Program records, the only threatened, endangered, or BLM sensitive plant species known to occur within the North Delta LHA unit is the Colorado hookless cactus. Based on these results, the Colorado hookless cactus is the only species that will be considered for impact analysis.

Colorado hookless cactus is a small ball or barrel-shaped cactus, endemic to Montrose, Delta, Mesa, and Garfield Counties in western Colorado. The occurrences are spread over

approximately 1,700 square miles, with an estimated 618,000 acres of potential habitat.⁷⁸ This species has two population centers, one associated with the Gunnison River and its tributaries near the City of Delta, and the other with the Colorado River and its tributaries near Debeque, Colorado. Colorado hookless cactus was originally listed as threatened on October 11, 1979 (44 FR 58868), with revised listing due to taxonomic changes published on September 15, 2009 (74 FR 47112). Critical habitat has not been proposed for this species. The Recovery Outline released by the Service in 2010⁷⁸ presents an updated and thorough review of the species' status.

Habitat

Colorado hookless cactus grows primarily in the salt desert shrub community, found on alluvial terraces, associated with the Gunnison and Colorado Rivers. Soils are commonly derived from Mancos shale, often overlain with a thin layer of alluvium, and range from fine silty clay to coarse gravel, often with volcanic cobbles and boulders scattered on the surface. Typical elevations for the species range from 4,593 to 6,562 feet above mean sea level (Heil and Porter 2004).⁷⁹ Within the North Delta LHA unit two small populations were identified, in 2014 that occur between 6900 and 7200 feet. The dominant co-occurring plant species include shadscale (*Atriplex confertifolia*), black sage (*Artemisia nova*), cactus (*Opuntia* spp.), strawberry hedgehog cactus (*Echinocereus triglochidiatus*), galleta (*Pleuraphis jamesii*), and Indian ricegrass (*Acnatherum hymenoides*). Populations also occur in sagebrush, and the transition zone between sagebrush and pinyon-juniper woodland. Within these communities, Colorado hookless cactus is often found under small nurse shrubs, especially shadscale (*Atriplex confertifolia*). In many populations Colorado hookless cactus co-occurs with exotics, especially cheat grass (*Bromus tectorum*), and/or Halogeton (*Halogeton glomeratus*), and along some drainages dominated with Russian knapweed (*Acroptilon repens*). While the cactus has been observed, in these degraded sites with competitive annual species, often only large mature individuals are present and recruitment appears to be inhibited by the competition. This suggests, perhaps recruitment in the most degraded sites only occurs in the most abundant moisture years. Observations, made at three historic occurrences in 2014, suggest that in sites where Colorado hookless cactus once occupied, that are now dominated by invasive annuals that the cactus population can either be extirpated or greatly suppressed. According to the 2002 North Delta LHA report, the Mancos shale communities that the cactus occurs in to have little resilience to disturbance due to soil chemistry and structure and the small amount of available moisture.⁸⁰

Threats

The primary threats identified for this species in the Recovery Outline are, destruction, modification, fragmentation, or curtailment of habitat and range; collection; livestock grazing and trampling; predation; herbicides and pesticides; hybridization; and climate change. The factors contributing to habitat destruction and modification include: (1) mineral and energy development; (2) utility corridors; (3) invasive species; (4) off-road vehicle (ORV) recreation; (5) water developments; (6) livestock grazing and trampling; and (7) herbicides and pesticides.⁷⁸ Specific to the North Delta LHA area, current and historic livestock grazing, coupled with the secondary effect of invasive species dominance over substantial portions of suitable habitat within the unit represent the greatest threat to the species. Utility corridors have resulted in past impacts to the species, and those impacts continue today as new infrastructure is added, and existing infrastructure is maintained. Future impacts from utilities development is anticipated, as the Westwide Energy Corridor EIS⁸¹ designated approximately 8,000 acres of the unit as a major energy development corridor. OHV impacts have greatly impacted the cactus, and its habitat in

the North Delta Open OHV area, and some new impacts from OHV activity has been observed around Star Nelson Rd., and within the Devils Thumb WSA, and immediately south of the Devils thumb feature outside the WSA.

From the Colorado Plateau Rapid Ecoregional Assessment, all plant communities examined are expected to experience some declines in habitat quality due to climate change in the near-term (2025). The least change was observed in the more sparsely vegetated community types such as the Inter-Mountains Basins Mixed Salt Desert Scrub habitat that the Colorado Hookless cactus occurs within. Changes in the present salt desert shrub character could be expressed as shifts in vegetation composition, diversity and growth, declines in net primary production, intensification of the hydrologic cycle (more intense runoff), increases in soil erosion, increases in nonnative species populations, and increased frequency and intensity of fire.⁸² Specifically to the Colorado Hookless cactus the FWS concluded in its 2010 recovery outline “Effects related to climate change (e.g., persistent or prolonged drought conditions, changes in community assemblages and the ability of nonnative species to succeed) may affect long-term persistence of Colorado hookless cactus. While the potential impacts of climate change could be significant, improved localized projections are needed to better understand this potential threat.”⁷⁸

Abundance, Viability, and Demography

The North Delta LHA unit has some of the highest concentrations of Colorado hookless cactus in the Uncompahgre field office. The 2014 North Delta LHA report, found there were 1,246 separate occurrences of the species. Approximately 3,000 new individual cacti have been documented within the unit, and 89 previously unknown occurrences since 2011. The most significant and abundant populations occur in the Wells Gulch allotment, and in the Deer Basin portion of the Deer Basin/Midway allotment.

Monitoring by the BLM UFO prior to 2009 is summarized, in *Sclerocactus glaucus Monitoring Projects and Trends in the BLM Uncompahgre Field Office, 1978 – 2009*⁸³, between 1983 and 1986. The UFO inventoried Colorado hookless cactus at 31 sites in Montrose, Delta, and Mesa Counties, finding a total of 4,979 plants. In 1993, they resurveyed 26 of these sites, with data recovered for only 21 sites. The estimates of individuals at any given site were not entirely comparable between years, due to divergent monitoring methods and the lack of permanent plots, however 12 of the sites showed a stable or upward trend, and 9 showed a downward trend. Declines were greater than 50 percent at several sites.

In 1986, the UFO collaborated with CNAP to establish seven 1 m² monitoring plots in the Escalante Canyon ACEC, with a total of 36 individuals across all plots. When the plots were revisited in 1993, an 11 percent reduction in plant number and a shift towards the seedling and mature size classes was found. In 2010, the UFO was unable to relocate these plots.

Field observations by agency and private consultants indicate, Colorado hookless cactus population size can change rapidly (England 2008, pers. comm., cited in BIO-Logic 2008; Conner 2011, pers. comm.) The North Delta LHA report from UFO noted that: “Population fluctuations for the Uinta Basin hookless cactus, now Colorado hookless cactus, are much more rapid than originally expected, and in some cases significant recruitment events, such as the one in the early nineties near Escalante Creek, result in substantial increases in the number of

individuals in the population. Cactus borers, and other mortality factors seem to keep this species' populations in a constant state of change".⁸⁰ Monitoring of the federally listed congener *Sclerocactus wrightiae* has also shown extreme fluctuations in mortality rates between years, often correlated with changes in precipitation.⁸⁴

In general, monitoring has not yet been conducted long enough to provide substantial documented information on population trends. For those purposes, BLM UFO established four long term demographic monitoring plots for the Colorado hookless cactus. Two sites were established in the North Delta LHA, one west of Star Nelson road, in an area based on observation that is relatively lightly used by domestic sheep, and another near Devils Thumb Golf Course, where moderate to heavy sheep use had been observed. The desired monitoring objective is to attempt to tease out cactus population trends with varying levels of domestic livestock use, relative to other environmental stressors such as, climactic variation, herbivory, insects, and disease. The other two locations were established in the Escalante LHA unit, in cattle allotments, to answer similar questions associated with cattle use.

Figure 11 Colorado hookless cactus population trend North Delta LHA unit 2011-2014

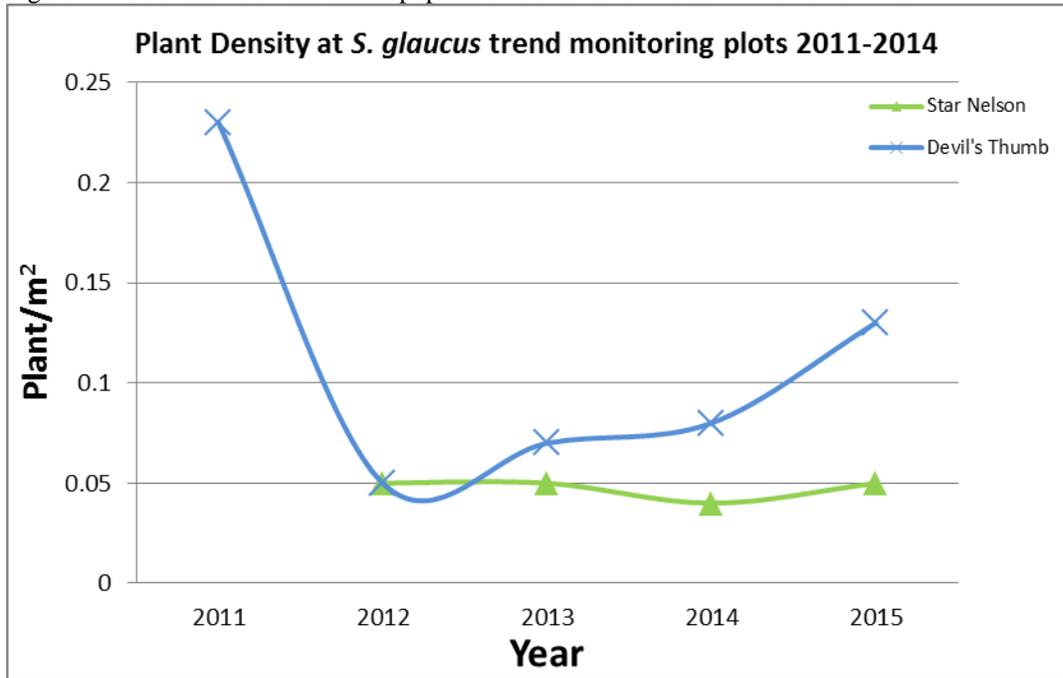


Figure 11 depicts North Delta Colorado hookless cactus trend for both Star Nelson and Devils Thumb monitoring plots, since their respective establishment. The Devils Thumb plot experienced a significant decline ($t=3.21$, $p<0.05$) in plant density, from 2011 to 2012, due to the substantial drought that occurred from late 2011 through the spring of 2012. Much of the mortality experienced, at this site, was attributed to rodent herbivory and drought related mortality. This site has seen slight, yet not statistically significant increases in plant density from '12-'13 ($t=0.45$, $p=0.66$), and significant increases in mean plant density between '13-'14' ($t=2.48$, $p=0.028$) and '14-'15' ($t=2.95$, $p=0.012$) as the population continues to show recovery from drought affects. Meanwhile, the Star Nelson plot has largely remained static with no change in plant density following the drought in 2012. Then in 2014 there was a minor ($t=2.08$, $p=0.06$) decrease in plant density followed by a minor ($t=2.01$, $p=0.07$) increase in plant density between '14-'15. At this point, it is difficult to see any clear trend relative to livestock grazing impacts, versus other environmental stressors such as, precipitation levels and herbivory. Both sites are similar, in that they are not overly dominated by invasive annuals, and yet the Devils Thumb site which does see more relative use by sheep saw a significant increase in mean plant density between '13-'15, while the Star Nelson site which sees lower relative use by sheep saw a minor, yet not significant, decline in mean plant density between '13-'14. A similar site needs to be established, with grazing excluded, to serve as a control coupled with a longer term data set, before we can effectively tease out the effects of sheep grazing in the North Delta LHA.

Land Health Findings

Land Health Standard 4 determinations have changed since the preceding Land Health Assessment of 2000-2001, where all lands were found to be meeting. The acreage of lands not meeting, Standard 4, has increased greatly. This is largely a result of a new, more intensive approach for documenting this standard, than was used in the past. Now, Standard 4

determinations are more closely tied with Standard 3 determinations, which can indicate habitat concerns, where there are TES species, especially when detailed population information is not known. In past assessments, lands were typically judged as meeting Standard 4 when specific information on TES species was lacking. Approximately, 75% of the area allotted for grazing is now found to be meeting for Standard 4, while the remaining area is not meeting (20%). Areas with known occurrences of Colorado hookless cactus were determined to not meet Standard 4 (30.7%), based on increasingly degraded habitat from exotic annuals, and/or decreasing native species cover and composition. 65.6% of occurrences were found to be on lands meeting land health standards as shown in the Table 42 and Figure 12.

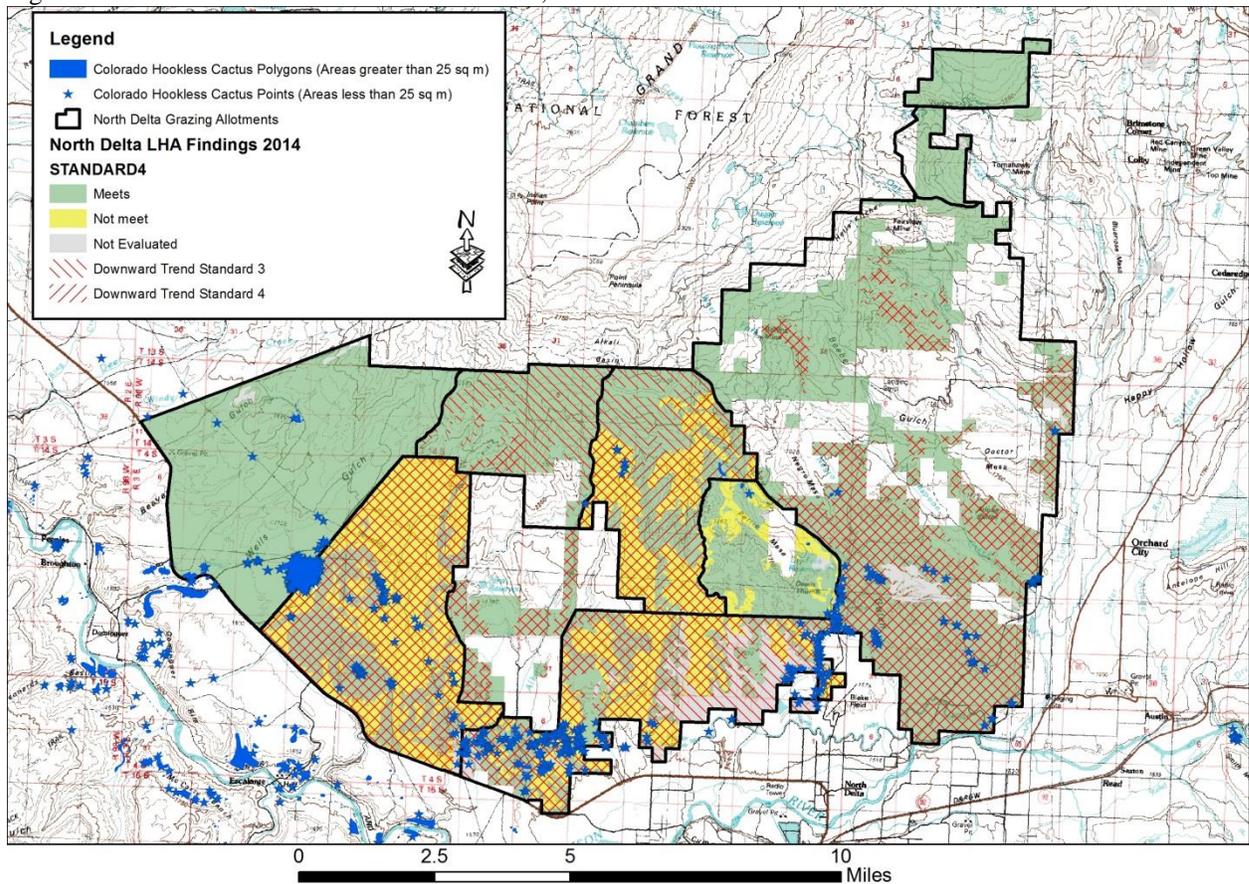
Table 42 Colorado Hookless cactus Land Health Findings

Land Health Status	# of Colorado Hookless Cactus Occurrences	%
Meets	818	65.6
Not Meet	382	30.7
Unknown/Not Evaluated	46	3.7

Identified specific habitat indicator issues and concerns, for upland vegetation communities, that resulted in lands not meeting, for Colorado hookless cactus included: exotic plants competing and /or degrading habitat, low perennial cool season grass cover, low perennial forb cover, low native vegetation diversity, low shrub vigor, low shrub cover, and the presence of noxious weeds. The factors that most likely threaten Colorado hookless cactus populations or contribute to the suppression of populations are: exotic plants competition, which was observed over 38, 211 acres (62% of the LHA unit), low native vegetation diversity observed on 31,696 acres (41% of the unit), low shrub cover observed on 11,560 acres (19% of the unit), low shrub vigor observed on 15,435 acres (25% of the unit), and the presence of noxious weeds observed on 4,786 acres (8% of the unit). As discussed before, the presence of invasive annuals and noxious species, at high plant community composition and cover levels, coupled with low native plant community diversity, not only results in direct competition for resources with the Colorado hookless cactus and other native species, but also likely suppresses annual cactus recruitment, in all but the most abundant precipitation years. Conditions for plant establishment, in arid rangelands, occur infrequently and irregularly.⁸⁵ Non-native plant species, often have faster growth rates, higher fecundity, more efficient dispersal of seeds, higher fitness, and higher resource use efficiency, than native species. Due to these life history characteristics, non-native plant species may be able to more rapidly colonize new ground, and become established at disturbed sites more readily than native species, potentially preventing subsequent colonization by certain native species.⁸⁶ As stated, in the habitat discussion, the cactus is often associated with nurse shrubs. These nurse shrubs are thought to facilitate the growth and development of other plant species beneath their canopy. This is attributed to the benign microhabitats, that are more favorable for seed germination, seedling recruitment, adjusting light, temperature, soil humidity and nutrients,⁸⁷ and the protection from grazing animals, when compared to their surrounding environment,. Thus plant communities, which constitute occupied and suitable habitat, with low shrub cover and/or vigor, likely contribute to the suppression of cactus populations in the North Delta LHA unit. Plant communities occupied by the Colorado hookless cactus in the North Delta LHA unit, with low shrub cover and vigor, represent not only less

opportunities for cactus establishment, but also offer less protection from mortality induced stochastic events, such as drought or excessive herbivory from rodents and cactus borers.

Figure 12. Colorado Hookless Cactus Distribution, N. Delta LHA Unit



Trends

It is difficult to assess trend from the previous assessment in 2002 for standard 4, to determine if conditions are improving or declining, with current management because of the changes in how this standard is now assessed. Therefore, with the plant community/ habitat issues discussed above, using standard 3 (upland plant communities), as a surrogate, one can infer habitat trends for the Colorado hookless cactus. For a detailed discussion, of general vegetation and habitat trends for the salt desert shrub communities, in the North Delta LHA, refer to the Vegetation and Terrestrial Wildlife sections of this document. A majority of this landscape unit has concerns and issues with Standard 3. These concerns are most pronounced in salt desert shrub vegetation, and in the Alkali Flats, Deer Basin-Midway, Delta Pipe-line, Petrie Mesa, and Point Creek allotments. The status of vegetation in the salt desert shrub ecosystem within the unit, is of particular concern, since vegetation reflects habitat conditions important for maintaining populations of the Colorado hookless cactus.

Within the North Delta landscape 18% of the acreage assessed was identified as not meeting Standard 3 in the original LHA from 2001. Measured trend data since that time indicates

conditions have been static to downward on these lands, over the past 12 years. Overall, acres of lands not meeting Standard 3, in the salt desert shrub communities, increased by 12% from 2001-2014, now comprising 30% of the North Delta LHA unit, and 94% of the lands identified as not meeting in 2001, exhibit downward trend from '01-'14 much of those acres are salt desert shrub communities occupied by Colorado hookless cactus. Of the lands identified, as meeting in 2014, 34% exhibit downward trends from '01-'14, suggesting a greater percentage of occupied Colorado hookless cactus habitat is at risk of further degradation, and being classified, as not meeting land health standards.

Environmental Consequences:

Impacts Common to the Modified Grazing Alternative and Proposed Action Alternatives-- Physical damage to Colorado hookless cactus individuals, from sheep bedding, and moderate to heavy trampling, by livestock trailing have been observed.^{80,83,88, 78} Even when direct mortality does not occur, trampling damage may make individual plants more susceptible to desiccation, or herbivory from insects, or small mammals. No evidence of browsing by livestock on this species has been reported, nor observed.

The UFO has been revisiting historic (>20 years old) occurrences for the Colorado hookless cactus, since 2013, and found in most cases that populations that are not within close proximity to livestock concentration areas remain on the landscape, and appear to be viable. Between, 2013-2015 six population density estimates were conducted, on known historic occurrences, with no data in 20 plus years. The results of those sampling efforts are summarized in table 41.

Table 43 Colorado hookless cactus population density estimates (point-in-time monitoring)

Site	Estimated SCGL/m ² in plot +/- 30%	Total # SCGL Plot Estimate +/- 30%
EOR* 10382	0.15	120
EOR 16984	0.10	103
Gravel Pit*	0.26	190
Guzzler*	0.1	123
Picnic*	0.19	460
McCarty Bench*	0.38	248

*indicates monitoring locations within the Escalante LHA Unit.

During this effort, two historic occurrences were found to have been extirpated, and one occurrence had been reduced from more than 300 individual cacti in 1993 to one remaining individual in 2014. Observed causes for these observations were sheep bed grounds and the subsequent dominance of the sites by invasive annuals, including cheatgrass, annual wheatgrass, and halogeton.

Direct measurable effects to plants from livestock have been observed, primarily during concentrated uses such as salting/supplement, watering, trailing, and bedding. Although

trampling of Colorado hookless cactus by grazing livestock has been observed, there are no data to indicate, it occurs commonly, or has been responsible for detectable landscape-scale changes, in abundance or distribution of the species. Not all trampled plants will die. Based on field observations, plants can survive some damage and partial uprooting, and non-lethal damage may be compensated for through budding. However, if damaged plants direct scarce resources towards tissue repair and away from reproduction, and if damage makes them vulnerable to desiccation, herbivory, and/or disease, they may have reduced reproductive output for some length of time as well as increased mortality compared to undamaged plants. Physical impacts to cacti from activities secondary to grazing, such as vehicle use for herding, supplying camps, or maintenance of range improvements, may also kill or impair plants. The terms and conditions established for threatened or endangered plants (PTE1-5) are expected to mitigate and minimize the observed effects associated with livestock concentrations.

Indirect effects to Colorado hookless cactus from grazing program-related changes in habitat have occurred, and are well documented in the North Delta LHA. Observations indicate, in the Mancos shale soils, the species commonly occurs, and are vulnerable to surface disturbance. Once disturbed, the vegetation community is slow to recover and often becomes dominated by annual weeds.⁸⁹ Kitchen and Hall noted, that assuming the rates of change, in salt desert shrub community composition were somewhat constant, it would take at least 120 years after elimination of spring grazing to fully restore the salt desert shrub community to levels found in areas excluded from grazing.⁹⁰ As noted above in the Affected Environment section, BLM has inferred these kinds of community level changes were caused by the intensive grazing practiced historically. Based on the declines in land health from 2001- to 2014, current management of livestock grazing is continuing to cause such disturbance and these affects are likely compounded by drought, rights of way development, and recreational activities. Within the North Della LHA area, these impacts are most pronounced in the Alkali Flats, Delta Pipeline, Deer Basin/Midway, and Petrie Mesa allotments. Mature Colorado hookless cactus do exist in areas with a high percent cover of weedy species such as, cheatgrass and halogeton. Monitoring of Colorado hookless cactus in the Colorado River Valley have found no recruitment of cacti documented, in areas where cheatgrass infestations are dense, possibly because seedlings are unable to compete with weeds for water and nutrients.⁹¹

Affects from climate change

Removing or reducing livestock across large areas could alleviate a widely recognized and long term stressor, making these lands less susceptible to the effects of climate change.⁷³ With additional modifications to management during times of drought, impacts to Colorado Hookless cactus habitat should be reduced, making these lands less susceptible to the effects of climate change.

Modified Grazing Alternative – For all allotments analyzed the application of the design features PTE 1-4 will minimize and mitigate direct impacts to cactus populations from permitted livestock grazing by avoiding livestock concentrations that have documented population level affects to Colorado Hookless cactus. Managing for improved land health is assumed will further secure existing populations possibly resulting in increased cactus densities which is an identified FWS goal for delisting the species from Endangered Species Act protections.

The entire *Alkali Flats* allotment is considered suitable habitat for Colorado hookless cactus, and the majority of the allotment does not meet land health standards. The Modified Grazing Alternative reduces the Active AUMs by 30%, from the previous ten year average actual use, as well as reduces utilization levels from 50% to 35% and implements delineated use areas with periodic rest. These changes are expected to result in reductions in Colorado hookless cactus habitat degradation compared to the Proposed Action alternative. Over the entire allotment, improvement in shrub health, vigor, and cover can be anticipated with reduced annual use coupled with periodic annual rest. Habitat improvements are expected to be most pronounced on 2,260 acres, of lands meeting while exhibiting downward trends attributed to current livestock management over the next 25-50 years, given the slow recovery of these plant communities. These areas still have all functional groups (grass, forb, shrub) represented, and are not as dominated by invasive annual and noxious weeds. The Modified Grazing Alternative is also expected to result in minor incremental increases in native grass and forb cover and composition, coupled with shrub recruitment on 5,675 acres of lands not meeting LHA standards, due to current livestock management. However, the level of dominance by invasive annuals and warm season galleta grass will greatly inhibit or slow native species recruitment, and detectable change may not be realized for well beyond 120 years. These proposed changes, if the grazing program is effective at addressing the plant community issues, and institutionalized into the future, should result in 5,675 acres of improving cactus habitat conditions, which in turn, may lead to population expansion over time.

The entire low elevation portion of *Deer/Basin-Midway Allotment*, and the open salt desert shrub slopes of the upper elevation portion of the *Deer Basin-Midway Allotment* is considered suitable habitat for Colorado hookless cactus. The Modified Grazing Alternative reduces the Active AUMs by 30%, from the previous ten year average actual use, as well as reduces utilization levels from 50% to 35%, and implements delineated use areas with periodic rest. These changes are expected to result in reductions in Colorado hookless cactus habitat degradation compared to the Proposed Action alternative. Over the entire allotment improvement in shrub health, vigor and cover can be anticipated with reduced annual use coupled with periodic annual rest. Habitat improvements are expected to be most pronounced on approximately 6,200 acres of lands, meeting with downward trends, which were attributed to current livestock management over the next 25-50 years given the slow recovery of these plant communities. These areas still have most functional groups (grass, forb, shrub) represented, and are not as dominated by invasive annual and noxious weeds. The Modified Grazing Alternative is also expected to result in minor incremental increases in native grass and forb cover and composition coupled with shrub recruitment on approximately 3,000 acres of lands not meeting LHA standards due to current livestock management. However, the level of dominance by invasive annuals and warm season galleta grass will greatly inhibit or slow native species recruitment and detectable change may not be realized for well beyond 120 years. The lowest elevations of this allotment may never

recover due to complete domination by invasive species and the absence of native species. In these cases, active restoration may be necessary to move these areas towards a higher ecological standard. These proposed changes if the grazing program is effective at addressing the plant community issues and institutionalized into the future, should result in 3,000 acres of improving cactus habitat conditions which in turn may lead to population expansion over time within the allotment.

The entire portion of the *Delta Pipeline* allotment below 7,000 feet is considered suitable habitat for Colorado hookless cactus including substantial populations inside the Adobe Badlands WSA. The Modified Grazing Alternative reduces the Active AUMs by 30%, from the previous ten year average actual use, seasonal utilization levels for cactus habitat remain unchanged from the previous permit of 35% and implements delineated use areas with periodic rest. These changes are expected to result in reductions in Colorado hookless cactus habitat degradation compared to the Proposed Action alternative. Over the entire allotment improvement in shrub health, vigor, and cover can be anticipated with the incorporation of periodic annual rest. Since seasonal utilization is unchanged from the previous permit improvements in shrub vigor and cover may not be as pronounced as is anticipated in the other salt-desert shrub allotments analyzed. Habitat improvements are expected to be most pronounced on approximately 1,670 acres of lands meeting with downward trends attributed to current livestock management over the next 25-50 years given the slow recovery of these plant communities. These areas still have most functional groups (grass, forb, shrub) represented and are not as dominated by invasive annual and noxious weeds. The Modified Grazing Alternative is also expected to result in minor incremental increases in native grass and forb cover and composition coupled with shrub recruitment on approximately 2,800 acres of lands not meeting LHA standards due to current livestock management. However, the level of dominance by invasive annuals and warm season galleta grass will greatly inhibit or slow native species recruitment and detectable change may not be realized for well beyond 120 years. These proposed changes if the grazing program is effective at addressing the plant community issues and institutionalized into the future should result in 2,800 acres of improving cactus habitat conditions which in turn may lead to population expansion over time within the allotment.

The entire *Petrie Mesa* allotment is considered suitable habitat for Colorado hookless cactus, including substantial populations inside the Adobe Badlands WSA. The Modified Grazing Alternative reduces the Active AUMs by 30%, as well as reduces utilization levels from 50% to 35%, and implements delineated use areas with periodic rest. These changes are expected to result in reductions in Colorado hookless cactus habitat degradation compared to the Proposed Action alternative. Over the entire allotment improvement in shrub health, vigor, and cover can be anticipated with reduced annual use coupled with periodic annual rest. Habitat improvements are expected to be most pronounced on approximately 2,000 acres of lands meeting with downward trends attributed to current livestock management over the next 25-50 years given the slow recovery of these plant communities. These areas still have most functional groups (grass, forb, shrub) represented and are not as dominated by invasive annual and noxious weeds. The Modified Grazing Alternative is also expected to result in minor incremental increases in native grass and forb cover and composition coupled with shrub recruitment on approximately 770 acres of lands not meeting LHA standards due to current livestock management. However, the level of dominance by invasive annuals and warm season galleta grass will greatly inhibit or

slow native species recruitment and detectable change may not be realized for well beyond 120 years. The lowest elevations of this allotment may never recover due to complete domination by invasive species and the absence of native species. In these cases active restoration may be necessary to move these areas towards a higher ecological standard. These proposed changes if the grazing program is effective at addressing the plant community issues and institutionalized into the future should result in 770 acres of improving cactus habitat conditions which in turn may lead to population expansion over time within the allotment.

The entire *Point Creek* allotment is considered suitable habitat for Colorado hookless cactus however, there are no occurrences of the species documented on BLM administered public lands. Records search does not indicate any formal survey has been conducted within the allotment. There are substantial occurrences all around the allotment and on private lands within the allotment therefore, BLM assumes that the allotment is occupied by Colorado hookless cactus for management purposes. The Modified Grazing Alternative reduces the Active AUMs by 38%, as well as establishes a seasonal utilization limit of 35% where there was previously none. These changes are expected to result in reductions in Colorado hookless cactus habitat degradation compared to the Proposed Action alternative. Over the entire allotment improvement in shrub health, vigor, and cover may occur with reduced annual use however, no season long rest is proposed for the allotment. Habitat improvements are expected to be most pronounced on approximately 993 acres of lands meeting with downward trends which were attributed to current livestock management over the next 25-50 years, given the slow recovery of these plant communities. These areas still have most functional groups (grass, forb, shrub) represented and are not as dominated by invasive annual and noxious weeds. The Modified Grazing Alternative is also expected to result in minor incremental increases in native grass and forb cover and composition as well over the same time frames.

The entire portion of *Ward Creek-Doughspoon* allotment below 7,000 feet is considered suitable habitat for Colorado hookless cactus. The allotment meets Land Health Standards on 16,356 of the allotment. The Modified Grazing Alternative does not adjust the Active AUMs but does reduce the utilization levels from 50% to 35% on salt desert shrub communities. This will result in some nominal increases in native grass and forb cover and composition across the allotment. However, the level of dominance by invasive annuals and warm season galleta grass will greatly inhibit or slow native species recruitment and detectable change may not be realized for well beyond 120 years. Because the land health issues are associated with the open OHV area, rights-of-ways, old contour furrow treatments, and historic grazing, the Modified Grazing Alternative is unlikely to ameliorate the existing habitat conditions for Colorado hookless cactus.

The entire portion of the *Wells Gulch* allotment below 7,000 feet is considered suitable habitat for Colorado hookless cactus and supports the largest populations of Colorado hookless cactus found in the North Delta unit. The Modified Grazing Alternative reduces utilization levels from 50% to 35%, and continues to maintain delineated use areas with periodic rest. These changes are expected to continue to result in improving Colorado hookless cactus habitat conditions which have been recognized with the Proposed Action alternative. Over the entire allotment, continued improvement in shrub health, vigor, and cover can be anticipated with reduced annual use coupled with periodic annual rest. Further, habitat improvements are expected to be most pronounced on approximately 6,900 acres of lands meeting with static trends over the next 25-50

years given the slow recovery of these plant communities. Similar incremental increases in native grass and forb cover and composition increases can be expected to those observations made between 2002-2014. However, the level of dominance by invasive annuals and warm season galleta grass will greatly inhibit or slow native species recruitment and detectable change may not be realized for well beyond 120 years. Continuing current livestock manage coupled with a reduction in seasonal utilization from 50%-35 should result in continued improving cactus habitat conditions and maintenance of the existing large populations present on this allotment.

Even with the implementation of the design features (PTE1-5) and the proposed changes in grazing management, damage to and loss of cacti from trampling and range management activities may occur in localized areas in the North Delta Unit, especially where livestock use is concentrated. Surface disturbance to the clay soils may also continue to alter habitat characteristics and function in areas of concentrated use. These effects are likely to be measurable and detectable in some locations and therefore, cannot be considered insignificant and discountable. Because of the direct, indirect, and secondary effects of livestock grazing described the BLM Uncompahgre Field Office has determined that livestock grazing and management authorized by the Modified Grazing Alternative or Proposed Action Alternative “may affect, and is likely to adversely affect” the Colorado hookless cactus.

The UFO consulted with the USFWS on the programmatic nature of BLM authorized grazing for the Colorado hookless cactus, Clay-loving wild buckwheat (*Eriogonum pelinophilum*), and the DeBeque Phacelia (*Phacelia submutica*) as required by Section 7 of the ESA, and prepared a Biological Assessment⁹² to evaluate likely impacts to federally listed or proposed threatened or endangered species.

The USFWS issued a Biological Opinion on November 15, 2012 regarding BLM Authorized Grazing and its impacts on federally protected plants, including the proposed conservation measures.⁹³ The USFWS Biological Opinion is that the Modified Grazing Alternative is not likely to jeopardize the continued existence of the Colorado hookless cactus.

Alternative 2(No Grazing)-Removing grazing from the North Delta land health area would eliminate the direct effects and reduce the indirect impacts to Colorado hookless cactus from grazing. The vegetation community problems that most likely threaten Colorado hookless cactus populations or contribute to the suppression of populations such as exotic plant competition, low native vegetation diversity, low shrub cover, low shrub vigor, and the presence of noxious weeds would slowly improve with the reduction in forage use. With limited precipitation and 120 years of grazing disturbance, improvement in Colorado hookless cactus habitat would take place gradually over the next 120 ±years. Other disturbances from rights-of-ways, OHV and wildlife would continue to impact and degrade Colorado hookless cactus and its habitat.

Proposed Action Alternative – Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Direct and indirect impacts would be expected to continue at similar levels. A greater percentage of occupied Colorado hookless cactus habitat would be expected to be degraded to a not meeting rating which could begin to have population level impacts to the cactus in the North delta LHA unit. Should this alternative be selected the term grazing permits would need to have Plant T&E Terms and

Conditions (PTE1-6) applied to all allotments occupied by the cactus to conform to the Programmatic Biological Opinion for the Effects Colorado hookless cactus from the Bureau of Land Management Livestock Grazing Program or reinitiate consultation with FWS for the Proposed Action alternative.

Finding on the Public Land Health Standard for Threatened & Endangered species: Current land health conditions rate special status species in the North Delta land health unit as 46,642 meeting 34% of which also exhibits downward vegetation community trends, and 12,324 not meeting of which 21% exhibited downward trends between 2001 and 2014. The proposed action, if properly implemented, is expected to decrease the current rate of habitat degradation caused by domestic sheep grazing for the Colorado hookless cactus in the North Delta LHA unit. In addition, minor incremental improvements in native species cover and composition is anticipated over the next 25-120+ years. Such improvements may be most pronounced in those sites meeting with downward trends which may result in more suitable habitat that is conducive to Colorado hookless cactus occupation and persistence. For those lands that are not meeting such anticipated improvements may be undetectable and may in fact require active restoration to have measurable improvements in native species cover and composition.

WILDLIFE, AQUATIC INCLUDING THREATENED, ENDANGERED, AND SENSITIVE SPECIES (includes a finding on Standard 3 & 4)

Affected Environment:

The scope of the analysis for direct and indirect effects to aquatic species including TE&S species includes the watersheds in the North Delta LHA area extending from the top of Grand Mesa to their termination at the Gunnison River. These 9 HUC 6 watersheds total approximately 181,272 acres.

Threatened, Endangered, and Sensitive Species

The Gunnison River is designated as critical habitat for Colorado pikeminnow (*Ptychocheilus lucius*) and Razorback sucker (*Xyrauchen texanus*) from the confluence with the Uncompahgre River down to the confluence with the Colorado River. Colorado pikeminnow also have been found in the Gunnison River upstream from the confluence with the Uncompahgre River as far as the Hartland Diversion Dam (approximately 4 miles from the confluence). Few wild razorback suckers are known to occur in the Gunnison River; however, the population is being augmented by stocking both in the Colorado and Gunnison Rivers. Colorado Parks and Wildlife and USFWS have both suggested that numbers of these two species appear to be low in the immediate reach below Hartland dam in part due to the Gunnison River above Hartland dam being too cold (cold water fishery) for these warm water fish to inhabit.

The Humpback chub (*Gila cypha*) and Bonytail (*Gila elegans*) are not known to occur in the UFO. However, one individual was captured in 2007 in the Gunnison River in a canyon bound reach at river mile 22, approximately 5 miles north of the UFO planning area boundary. Based on this information, there is a possibility the species occurs within the Gunnison River, or may spend part of its life cycle in the river well below the project site. The Proposed Acton would not occur within designated critical habitat. The Gunnison River is also known to contain

populations of the BLM sensitive flannelmouth sucker(*Catostomus latipinnis*), bluehead sucker(*Catostomus discobolus*), and roundtail chub (*Gila robusta*).

The primary threats to the four Colorado River endangered fish and the three BLM sensitive fish are stream flow regulation and habitat modification; competition with and predation by nonnative fishes; and pesticides and pollutants.⁹⁴

General Aquatic Wildlife & Sensitive Amphibians

According to both BLM and Colorado Parks and Wildlife sampling efforts the only perennial stream within the North Delta LHA unit known to support fish is Alkali Creek which forms the boundary between the Delta Pipeline and Deer Basin/Midway allotments. Alkali Creek is tributary to the Gunnison River. The stream was found to be inhabited by cutthroat trout in 2013. The stream was then sampled to collect fin clips from resident cutthroat trout for genetic analysis and lineage identification, as well as determine upper and lower fish distribution limits.

Fish densities are low but well distributed throughout the sampled reach of Alkali Creek which extended from the forest boundary down to about one mile above the Lone Starr Ditch diversion. A population estimate has not been completed at this time. The riparian area is narrow, but vegetation along the stream is lush and dense, and is comprised of horsetail, red osier dogwood, wolf current, sedges/rushes, water leaf, hemlock, and wood rose. The stream substrate is a mix of gravels, cobbles, and small boulders. Substrates are slightly embedded. The stream is a steep Rosgen A/B channel type with step pools, and a mix of riffles and swift runs. Large, deep pools are limited. Fish were concentrated primarily in the pools sampled. Water quality for this stream is presented in that section of this document.

Based on genetic testing, the fish in Alkali Creek are Yellowstone cutthroat trout. Suggesting that they are in fact a non-native species introduced to the creek at some point in the past.

Little is known about amphibian population trends in the North Delta LHA. Amphibian observations made in the North Delta LHA unit include northern leopard frogs, wood house toad, and tiger salamanders. Aquatic invertebrates observed during various aquatic sampling efforts include mayflies, stoneflies, dragon fly larvae, and caddisflies. These species all depend upon depend on aquatic habitats for all life process.

Land Health Findings

For the purposes of assessing habitat quality for aquatic species Standard 2 Riparian and Standard 5 Water Quality is utilized as a surrogate to assess Standard 3 since all aquatic wildlife occurring within the unit are dependent upon the quantity and quality of the water and associated riparian habitat for all life process. Refer to the North Delta LHA, the Riparian, and Surface Water affected environments of this document. In general the findings for the limited aquatic habitats within the LHA unit are that riparian habitats are not being impacted by domestic livestock use, and that water quality does not exceed standards for aquatic life use.

Environmental Consequences:

Impacts Common to all Alternatives Threatened, Endangered, and Sensitive Species: The Modified Grazing Alternative and alternatives will have no connection to stream flow regulation and habitat modification or competition with and predation by nonnative fishes. Within the North Delta LHA unit domestic livestock grazing occurs on the marine sediments of the Mancos Shale formation that contain high levels of selenium. Research has shown that high selenium levels may adversely affect reproduction and recruitment.^{95,96,97,98,99,100} In 2009 the Fish and Wildlife Service issued a Programmatic Biological Opinion (PBO) under the Endangered Species Act to address the recovery of endangered fish species. The PBO addresses the Bureau of Reclamation's Aspinall Unit operations as well as all other public and private uses in the Gunnison Basin. The primary requirements of the PBO are the reoperation of the Aspinall Unit and the implementation of a Selenium Management Program. The BLM is a signatory to a Memorandum of Understanding with the Bureau of Reclamation, State of Colorado, and local irrigation companies, to assist in the development and implementation of a long-range plan. In the MOU, the BLM agreed to, "Evaluate options to conform to a goal of no net new selenium loading from land exchanges, sales, and other actions involving public lands."

The impacts to water quality from the Modified Grazing Alternative and alternatives and how they relate to selenium loads in the Gunnison River and how those selenium loads might impact the four Colorado River endangered fish are analyzed in detail in the Surface Water Quality section of this document. The analysis in the Surface Water section of this document concluded that:

- The Mancos shale rangelands found in the North Delta LHA area contribute very little selenium to the Gunnison River (0.1 pounds/year)¹⁰¹ compared to the irrigated agricultural lands contribution
- Selenium loads in the Gunnison River have dropped 28.6 percent since 1986 due primarily to improved irrigation practices and lining canals and ditches in the contributing areas of the Gunnison and Uncompahgre basins
- During the period of declining trends for selenium loads in the Gunnison River, rangeland health conditions haven't changed as shown in the two recent land health surveys for North Delta
- The long term recovery of watershed health, from grazing related impacts, compared to the 10 year scope of this grazing permit, is expected to have very little direct reductions in salinity or selenium contributions to the Gunnison River
- The conclusion that all alternatives considered including no grazing and continuation of current management is expected to have similar levels of selenium contribution to the Gunnison River.
- In accordance with the PBO for the reoperation of the Aspinall Unit, and in conformance with the MOU signed by BLM no net new selenium loading is anticipated from the proposed action

The livestock grazing management contemplated under the Modified Grazing Alternative and alternatives will not result in increased selenium loading delivered to the Gunnison River from the North Delta LHA unit which has been documented to have affects to the four endangered fish. Based on these conclusions the BLM Uncompahgre Field Office has determined that livestock grazing authorized by the Modified Grazing Alternative will have no “**effect**” on the Colorado pikeminnow, Razorback sucker, Humpback chub, and Bonytail or the three BLM sensitive species flannelmouth sucker, bluehead sucker, and roundtail chub.

General Aquatic Wildlife & Sensitive Amphibians

Aquatic organisms including fish, amphibians, and aquatic invertebrates are dependent upon water quality, quantity, and associated riparian communities to fulfil all life processes. Impacts from livestock grazing management contemplated under the Modified Grazing Alternative and alternatives will be similar to those analyzed in the Riparian and Surface Water sections of this document.

Modified Grazing Alternative – General Aquatic Wildlife & Sensitive Amphibians--Current livestock management was not listed as a concern or a causal factor in the degradation of aquatic wildlife habitat within the North Delta LHA unit. This may be in part due to the inaccessibility of the streams to livestock grazing, in addition to the temporal separation of grazing activities and the growth and development time of associated riparian plant communities. The Modified Grazing Alternative presents modifications to carrying capacity (AUMs), and seasonal utilization levels, coupled with the implementation of grazing strategies which are expected to continue to maintain and may marginally improve current aquatic habitat conditions through better management in the associated uplands.

Alternative 2 (No Grazing) - General Aquatic Wildlife & Sensitive Amphibians--Livestock grazing was not considered to be a causal factor for riparian health observations or water quality impacts. Therefore, the removal of livestock is not expected to result in demonstrable improvements in aquatic habitat conditions.

Proposed Action Alternative – General Aquatic Wildlife & Sensitive Amphibians,

Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment.

Finding on the Public Land Health Standard for plant and animal communities (partial, see also Vegetation; Wildlife, Terrestrial; and Invasive, Non-native Species): Current land health conditions rate aquatic species habitat in the North Delta land health unit as Standard 2 Riparian Habitat: 11.5 miles (80%) meeting, and 2.6 miles (18%) not meeting of which 0 miles were attributed to livestock use. Water Quality: 14.0 miles (99%) meeting and 0 miles not meeting of which 0 miles were attributed to livestock use. The Modified Grazing Alternative is expected to maintain current conditions for aquatic species.

WETLANDS & RIPARIAN ZONES (includes a finding on Standard 2)

Affected Environment:

Within the Colorado Plateau Ecoregion, six primary natural drivers for riparian and wetland systems have been identified: groundwater, channel geomorphology and soils, precipitation, temperature, stream hydrology, and animal herbivory¹⁰². Together these shape the composition, structure, and function of riparian ecosystems. Heavy animal herbivory in the form of livestock and native wildlife grazing can result in alteration of streamside morphology, increased sedimentation, degraded riparian vegetation through trampling and consumption, and nutrient loading. Livestock grazing practices which leave abundant stubble and groundcover on the range promote watershed cover, while practices which remove too much upland or riparian vegetation or trample and compact sensitive areas can lead to channel down cutting¹⁰³.

Impacts to stream and riparian condition will be contrasted between the different alternatives based on analysis of management activities which affect stream hydrology, stream bank soils, and riparian vegetation. Activities which degrade these features include livestock grazing practices which allow animals to congregate in riparian areas to the extent that they trample and damage stream banks and remove the riparian vegetation¹⁰³. Intensive grazing management or development of range infrastructure can distribute livestock away from streams and wetlands, allowing the riparian area or wetland to recover¹⁰⁴. Riparian conditions within the North Delta LHA can be described by the most recent determinations for Land Health Standard 2. These determinations are made from riparian Proper Functioning Condition data collected in the field, and rely on a number of hydrologic, erosion, and vegetation indicators. The indicators affected most by livestock grazing over the short and long-term will be referred to as livestock -related indicators and include riparian vegetation cover (especially for providing stream bank protection), vigor of riparian plants, and adequacy of plant roots to withstand flooding. Riparian health is determined to be meeting Standard 2 (also referred to as Proper Functioning Condition), meeting with a downward trend (Functioning at Risk), or not meeting (Nonfunctional.) Table 1 shows, mileages across the grazing allotments for Standard 2 by determination status, with mileage broken out to reflect where there are known existing problems with the drought-related indicators.

Of six perennial streams in the North Delta LHA unit, two were meeting Land Health Standard 2 in 2012. Camp Creek met the standard in 2001 and 2012, while Alkali Creek was not evaluated in 2001. Two streams, Dirty George Creek and E. Fork Doughspoon met the standard in 2001 but were rated Meeting with a downward trend in 2012. Kiser and Ward creeks were not rated in either year.

The circumstances leading to “meeting with a downward trend” in the East Fork of Doughspoon Creek are:

- 1) channel morphology is not in balance with landscape setting;
- 2) riparian area not at maximum extent; and
- 3) the stream is not in balance with water and sediment.

The cause for the problems listed are related to water being diverted into the creek channel from other creeks and conveyed downstream to canals and farms. Livestock grazing is not considered

an issue in this situation.

A similar situation exists in Dirty George Creek, with flow augmentation from diversions feeding into Dirty George, and upstream reservoirs supplying regular flows all summer, causing changes in channel morphology in an otherwise more ephemeral stream.

Two ephemeral streams were rated as not meeting Land Health Standard 2 in 2001. Oak Creek received the same rating in 2012, while Negro Creek was not evaluated in 2012. Irrigation water conveyance is identified as one cause for some of the problems in each stream, but other problems indicate watershed condition as a cause. These problems include:

- 1) riparian plants showing poor vigor;
- 2) lack of vegetation diversity in composition and structure;
- 3) upland watershed causing degradation, and
- 4) inadequate vegetation cover to protect streambanks.

Table 44. Standard 2 Determinations by allotment within N. Delta Land Health Unit.

Allotments				
	Total Miles	% Meeting	% Meeting with a downward trend	% Not Meeting
Deer Basin-Midway	2.1	100	0	0
Delta Pipeline	0.8	100	0	0
Dirty George	2.2	0	100	0
South Branch	0.7	100	0	0
Ward Creek-Doughspoon	8.2	52	16	32

Table 45. Standard 2 Indicators

Land Health Issues Standard 2 Riparian		
Riparian Indicator Issue	Miles	% of Stream Miles
Channel sinuosity, width:depth ratio	5.4	38
Floodplain infrequently flooded	4.1	29
Riparian zone not widening or at maximum width	3.5	24
Water and sediment not in balance with channel	3.2	22
Vegetation cover inadequate to protect streambanks	1.9	13
Riparian plants in low vigor	1.9	13
Riparian vegetation not diverse	1.9	13
Riparian species don't indicate maintenance of soil moisture	1.9	13
Channel laterally and/or vertically unstable	1.9	13

Environmental Consequences:

Impacts Common to all Alternatives This LHA unit contains very few streams in contrast to other units. Part of this is due to water rights holders manipulating stream headwaters and upper reaches on Grand Mesa to divert flow to natural channels which are then used to move the irrigation water downstream. This has resulted in some streams now being ephemeral, while others carry far more water than they would have historically. Some streams have been dry for so long they no longer support much riparian vegetation and have been removed from consideration for Standard 2. The streams which convey irrigation water largely meet Standard 2 where those flows are moderated and consistent. Where flows are extreme or subject to large and irregular fluctuations, streams are not meeting Standard 2.

The augmented flows have resulted in recurring problems for some of the Standard 2 indicators that relate to the stream channel. Channel morphology is typically altered on such streams, with imbalances in water and sediment being supplied to the channel. As a result, floodplains and flood processes are not functioning as they would have historically. Only along Oak Creek have these channel problems led to riparian vegetation concerns and a not meeting Standard 2 rating.

Modified Grazing Alternative –Since current livestock management was not considered a causal factor in the degradation of any riparian areas within the Land Health unit current livestock management is considered to be in balance with the riparian and stream systems present within the Land Health unit.

Livestock grazing can be a compatible use in riparian areas when managed to support the function, capability, and potential of the riparian site. Current livestock management was not listed as a concern or a causal factor in the degradation of riparian areas on any of the streams

within the grazing allotments. This may be in part due to the inaccessibility of the streams to livestock grazing, in addition to the time and duration of livestock use.

The Modified Grazing Alternative modifications to carrying capacity (AUMs), and seasonal utilization levels, coupled with the implementation of grazing strategies will continue to maintain and may marginally improve current riparian conditions through better management in the associated uplands.

Alternative 2 (No grazing) -Removal of livestock from the landscape would not improve or maintain the riparian areas more than what is currently being achieved due to contributing causal factors outside the control of BLM management.

Proposed Action Alternative – Current livestock management on the Land Health unit was not a considered a causal factor in the degradation of riparian systems across the unit. This may be in part being due to the inaccessibility of the streams to livestock grazing, in addition to the time and duration of use. It is anticipated with no changes to livestock management streams would continue to either meet standards or meet with problems with the same causal factors as the last two land health determinations.

Summary of Alternatives- Because there are so many variables that contribute to riparian health and channel function related to upstream activities (irrigation) and livestock grazing was not found to be contributing to riparian degradation it is difficult to direct or expect improvement of this standard from modifications to grazing management. As a whole, these alternatives have very little influence on the standard because of other activities within the watershed/riparian system that are influencing conditions (irrigation, and private land development) which are outside BLM control. There are no anticipated reductions in direct or indirect impacts across any of the alternatives.

Figure 13. Inaccessible portion of upper Alkali Creek



Finding on the Public Land Health Standard for riparian systems: Current land health conditions determine riparian vegetation in the North Delta land health unit is meeting 100% on 5 streams out of 8 streams, meeting with a downward trend on 2 streams, and not meeting on one stream. Current livestock management was not noted as contributing to the meeting with a downward trend on 2 streams or not meeting status of one stream. The Modified Grazing Alternative will not have any direct or indirect impacts on riparian vegetation for Standard 2.

WATER -- SURFACE (includes a finding on Standard 5)

Affected Environment:

The scope of the analysis for direct and indirect effects includes the watersheds in the North Delta LHA area extending from the top of Grand Mesa to their termination at the Gunnison River. These 9 HUC 6 watersheds total about 181,272 acres.

Selenium and salinity are naturally occurring elements found in the marine sediments of the Mancos Shale. They can be easily mobilized by surface disturbing activities and delivered to nearby waterways by overland flow and erosional processes during storm events. Existing selenium levels in the Uncompahgre and Gunnison Rivers exceed the State of Colorado water quality standards.

Selenium

Selenium is a naturally occurring soluble trace metal found in the marine sediments of the Mancos Shale. Selenium can be easily mobilized by applying irrigation water to soils derived from Mancos Shale or from surface disturbing activities on Mancos Shale, and delivered to nearby waterways by irrigation return flow, groundwater, or overland flow. Once in the waterways, selenium can move through the aquatic environment, bio-accumulate in organisms and potentially reach toxic levels¹⁰⁵.

In 1997, the Colorado State Water Control Commission revised the chronic aquatic-life criterion for dissolved selenium from 17 µg/L to 4.6 µg/L. The Selenium Task Force was created soon after to address selenium issues. The group is comprised of private, local, state, and federal agencies including the BLM.

As required by the Clean Water Act and the 303(d) listing, the Colorado Water Quality Control Division released the TMDL in 2009 for the Gunnison River and tributaries and the Uncompahgre River and tributaries. This project is within the contributing area covered by the TMDL. Remediation strategies are implemented in part by the Selenium Task Force as well as the Selenium Management Program administered by the Bureau of Reclamation.

In 2009 the Fish and Wildlife Service issued a Programmatic Biological Opinion (PBO) under the Endangered Species Act to address the recovery of endangered fish species. The PBO addresses the Bureau of Reclamation’s Aspinall Unit operations as well as all other public and private uses in the Gunnison Basin. The primary requirements of the PBO are the reoperation of the Aspinall Unit and the implementation of a Selenium Management Program. The BLM is a signatory to a Memorandum of Understanding with the Bureau of Reclamation, State of Colorado, and local irrigation companies, to assist in the development and implementation of a long-range plan. In the MOU, the BLM agreed to, “Evaluate options to conform to a goal of no net new selenium loading from land exchanges, sales, and other actions involving public lands.”

Salinity

Salts are another naturally occurring component of the sedimentary formations in the three Land Health Areas and are easily mobilized. The soluble mineral content of the Mancos Shale can be as high as 20% but is typically more like 6%, and the major mineral is typically gypsum. Salts are mobilized by both surface water and groundwater. Mean annual salinity load at the Colorado/Utah state line in the Colorado River is 2.89 million tons. In a study reviewing the salinity trends in the Colorado from 1986-2003, the contribution from the Gunnison basin was found to be 38% or a little over 1 million tons annually¹⁰⁶. The Colorado River Basin Salinity Control Act passed in 1974 and amended in 1984, directs the BLM to minimize salt contributions to the Colorado River system from BLM administered lands.

Standards and Classifications

The impaired surface waters table below shows the surface waters in the area that are on Colorado’s impaired waters, 303(d) or Monitoring and Evaluation list (CDPHE, Water Quality Control Commission, 5 CCR 1002-93).

Table 46 Impaired Surface Waters

Segment Description	Portion	Colorado’s Monitoring & Evaluation Parameter(s)	Clean Water Act Section 303(d) Impairment	303(d) Priority
COGULG02 Gunnison River, Uncompahgre River to Colorado River	all	Sediment	<i>E. coli</i>	H
COGULG07 Surface, Ward, Tongue, Youngs, and Kiser Creeks not on USFS land	Tongue Creek		Se, Fe(Trec)	M
COGULG07	Ward Creek	Se		

Surface, Ward, Tongue, Youngs, and Kiser Creeks not on USFS land				
COGULG07 Surface, Ward, Tongue, Youngs, and Kiser Creeks not on USFS land	Surface Creek	Pb		
COGULG04b All lakes and reservoirs tributary to the Gunnison River and not on national forest lands from the outlet of Crystal Reservoir to the Colorado River	Jatz Bottomlands	Se		
COGULG04a Tributaries to Gunnison River, Crystal Reservoir to Colorado River	Wells Gulch	pH		

The non-point source pollutants from various land uses on public and private property likely contribute to the E. coli, sediment, and selenium listings. E. coli sources include human, wildlife, and livestock waste. Once E.coli enter the aquatic environment they can persist for long periods of time. Sediment in streams may present a favorable environment for bacteria attachment to soil particles. Very little is known about the extent and mechanisms of this attachment¹⁰⁷.

Results of 2012 Water quality and Macroinvertebrate sampling

The only water quality parameter of concern on several of the creeks was fecal coliform. The State actually uses E. coli as the water quality standard but fecal coliform can be used as an indicator of bacterial levels in the stream. In both BeeBee Gulch and Oak Creek fecal coliform levels were near the water quality standard.

All three sites met attainment for aquatic life use using the Colorado Department of Public Health and Environment Multimetric Index (MMI), but Oak Creek was rated in poor condition, indicating impairment of some kind. The total lack of entire functional groups of macroinvertebrates and a lack of water quality exceedances indicate a lack of flows may be impairing the macroinvertebrate community rather than a pollutant.

Alkali creek had the best overall macroinvertebrate community using the HBI and EPT metrics. Beebee Gulch was also in good condition while Oak Creek scored low in both HBI and EPT with a poor overall macroinvertebrate community. Since there were no concerns with water quality at any of the sites the macroinvertebrates in these streams seem to be most impacted by the existence of stream flows.

This sampling resulted in 11.1 miles of streams or 78% meeting land health standards. The low number of streams sampled is primarily due to the manipulated nature of water in the land health unit. Water is plentiful on top of Grand Mesa where winter storms drop a significant amount of snow. Water is intercepted and stored in numerous lakes across the top of the mesa and is

distributed out through a network of irrigation ditches and natural drainages to private property on the flanks and toe of the mesa. Several ephemeral channels that might naturally only see flows several times a year have been channelized and used for transmitting irrigation water. This augmented flow can make an otherwise dry channel flow for 4-5 months during the irrigation season. These flows can produce increased riparian vegetation as well as a macroinvertebrate community. However, when irrigation flows run out, the stream slowly dries out as the water that was stored in the floodplain and banks is wrung out like a sponge.

Environmental Consequences:

Impacts Common to all Alternatives--Unirrigated rangeland underlain by Mancos Shale in the North Delta LHA contributes to several indirect effects including; increased salinity and selenium concentrations in the water column, sedimentation, and E coli contamination. These indirect effects are naturally occurring through erosional processes. However, existing disturbance from roads, rights-of-ways, and grazing increases soil mobilization during rain events delivering more contaminants to the stream channel. Recent studies in the area analyzed the contributions of salinity and selenium from the rangeland sites like those found in the North Delta LHA and are summarized below. The direct impacts of sediment and E. coli are also discussed.

Increased salinity in the Gunnison River impacts downstream water uses such as drinking water use and the irrigation of crops. In a study conducted by the USGS estimating the contributions to the annual salinity load in the Gunnison River, they determined the low elevation unirrigated rangeland sites underlain by Mancos Shale contribute 13-26 percent of the salinity load¹⁰⁸. The remaining portion of salinity load is contributed by irrigation return flows, municipal inputs and return flows from deep percolating groundwater.

Selenium is present in highly soluble sodium salts and gypsum on unirrigated Mancos Shale rangelands in the North Delta LHA area. Laboratory experiments with soils collected in the area indicate selenium is released most rapidly when water is applied to previously non-irrigated soils¹⁰⁹. Since rangelands are not irrigated, the selenium present in soils is only mobilized during large rain events when overland flow mobilizes soils. These events deliver large volumes of water, but for short periods of time. The total load of selenium contributed to the Gunnison River during these events is actually small compared to the ongoing contributions from other sources. A recent study conducted in the Smith Fork Creek region south of the LHA area with similar soils and underlying geology found three natural sub-basins with grazing had little to no selenium loads¹¹⁰.

Further evidence that selenium from rangelands is a minimal source contributing to the Gunnison River is the trend of selenium loads in Gunnison River. Long term selenium trends in the Gunnison River have dropped 28.6 percent since 1986¹¹¹. Much work has been done to improve irrigation practices and lining canals and ditches in the contributing areas of the Gunnison and Uncompahgre basins. Whether the decline in trend is due to the agricultural improvements or due to the reduction of selenium available to be flushed from irrigated fields over time is unknown. During the period of declining trend, rangeland health conditions haven't changed as shown in the two recent land health surveys for North Delta. This likely indicates that the selenium load contributed from rangeland has little influence on the selenium loads in the

Gunnison River.

Sediment is on the State of Colorado's Monitoring and Evaluation list for the reach of the Gunnison River where the LHA area drains. Increased sediment can affect downstream water uses like drinking water as well as fish habitat. Fish habitat affected by sediment for endangered fishes in rivers like the Gunnison includes both gravelbed reaches (spawning-habitat and food-source locations), backwater areas, and overbank habitat (juvenile habitat) formed along the banks of sand-bed reaches¹¹². Recent sediment sampling conducted by the USGS found multiple cross sections within two reaches of the Gunnison River downstream from the Aspinall Storage Unit with ineffectual mobilization of bed material. The Gunnison River also has no evidence of reaching equilibrium conditions in suspended sediment concentrations. This indicates that larger time scales may be needed since completion of the Aspinall Unit to reach stable conditions within this system or that the observed trends are in response to more continuous anthropogenic changes or climatic effects within the basin¹¹³.

E. coli is on the State of Colorado's 303(d) list for the Gunnison River from the Uncompahgre River to the confluence with the Colorado River. *E. coli* is used by the State as an indicator of the presence of pathogenic organisms that can cause illness through recreational contact or drinking contaminated waters. Some of the manure-borne pathogens of concern in addition to *E. coli* include: *Campylobacter*, *Listeria monocytogenes*, *Salmonella*, *Yersinia enterocolitica*, protozoa *Cryptosporidium parvum*, and *Giardia*. The infectious doses of bacterial pathogens can vary widely. The infectious dose for enterohemorrhagic *E. coli* is 10 cells, 500 cells for *Campylobacter*, 105 for *Salmonella*, and as high as 108 for some strains of pathogenic *E. coli*. The infectious doses are smaller for protozoa: less than 10 organisms for the *C. parvum* and 10–25 for *Giardia*¹¹⁴.

Modified Grazing Alternative – The Alkali Flats allotment contains two major drainages. Point creek is an ephemeral drainage 3.2 miles in length, but is not rated for land health due to the lack of water present. The allotment contains short reaches of Alkali Creek in the southeast corner that was also not rated for land health standards due to the short length. The Alkali watershed contains high levels of bare soil and low cryptogam cover which is estimated to recover in the range of 14-50 years. This is due to the low precipitation, fine grained soils and routine disturbance to the soils¹¹⁵. In a study conducted by the USGS, the estimated annual salinity load contributed to the Gunnison River by the Alkali Creek watershed is 54 tons/year¹⁰⁸. Selenium loads measured in Red Canyon (at Poison Spring Gulch), a nearby tributary to the Gunnison River with similar geology and uplands dominated by rangeland, was less than 0.1 pounds/year¹¹⁶. The Modified Grazing Alternative reduces the 10 year actual use AUMs by 30%, as well as utilization levels, and implements delineated use areas with periodic rest. Because of the long term recovery of watershed health compared to the 10 year scope of this grazing permit, very little direct reductions in salinity and selenium contributions to the Gunnison River would be expected. Direct salinity loading impacts would continue at approximately 54 tons/year, with the proposed action, which is similar to the Proposed Action alternative. The direct selenium load impacts would continue to be approximately 0.1 pound/year in both the Modified Grazing Alternative and the Proposed Action alternative.

The Delta Pipeline and Deer Basin-Midway allotments share a border formed by 2.9 miles of Alkali Creek. The entire 2.9 miles are in the upper reaches of the Alkali Creek watershed and were found to be meeting land health standards. While lower portions of the allotment have low levels of cryptogam cover and low plant basal cover, the upper reaches of the allotments have better cover. Channel incision and a lack of vegetation and roots to withstand flooding were noted as problems. The reduction of the average 10 year actual use AUMs by 30% and utilization reductions of 15% will result in direct reductions to streamside vegetation. However, due to the large contributing area of the lower portions of the allotments, contributions of salinity and selenium would continue at existing rates as described in the Alkali Flats allotment in both the Modified Grazing Alternative and the Proposed Action alternative.

The Dirty George allotment contains 1.5 miles of Dirty George Creek. Dirty George Creek is heavily augmented by irrigation flows from storage reservoirs on Grand Mesa. The resulting riparian vegetation has reached its maximum extent while stabilizing the banks. The Modified Grazing Alternative does not change the Active AUMs or utilization levels. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative.

The Petrie Mesa allotment contains numerous ephemeral drainages but no perennial drainages. Upland soil conditions are mostly meeting. Vegetation is has some areas of not meeting. The Modified Grazing Alternative reduces the average 10 year actual use AUMs by 30%, as well as utilization levels from 50% to 35%, and implements delineated use areas and a new grazing strategy. Due to the recovery time of both biological soil crust and perennial plant species, no direct reductions in contributions of salinity and selenium would be expected in both the Modified Grazing Alternative and the Proposed Action alternative.

The Point Creek allotment contains 1.2 miles of Alkali Creek, but this reach no longer carries water. The entire flow is diverted into an irrigation ditch and carried to adjacent private property. Soil land health standards are meeting with static trends, however standard 3 is mostly not meeting due to low plant basal cover, exotic invasive species and noxious weeds. Reductions in the average 10 year actual use AUMs by 30% and utilization reductions, will not result in direct and indirect reductions in salinity and selenium contributions to the Gunnison River, due to the limited extent of BLM land in the allotment. Existing irrigation on nearby private lands and existing roads and rights-of-way will continue to contribute salinity, selenium, sediment and E. coli to alkali creek at similar rates in both the Modified Grazing Alternative and the no action.

The South Branch allotment contains 0.8 miles of Camp Creek, a perennial stream augmented with irrigation flows from the top of Grand Mesa. With the higher elevation of this allotment, more annual precipitation results in a variety of upland and riparian vegetation. The Modified Grazing Alternative does not change the active AUMs or utilization levels. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative.

The Ward Creek-Doughspoon allotment contains 2.8 miles of BeeBee Creek, 2.4 miles of Doughspoon Creek and 1.9 miles of Oak Creek. All of these drainages are augmented with irrigation water coming from the top of the mesa. Doughspoon and BeeBeek Creek both meet land health standard 5, while Oak Creek meets with problems. Problems with Oak Creek were

deep incision, vertical instability, lack of riparian diversity, and irrigation tail water. The Modified Grazing Alternative does not adjust the Active AUMs but does reduce the utilization levels from 50% to 35%. These actions are not expected to result in direct reductions to the indicators or the problems cited, since the cause is likely due to using the channel to convey irrigation water for over a century. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative.

The Wells Gulch Allotment contains several ephemeral drainages, the largest being Wells Gulch. Unlike some of the other large drainages in the LHA area, Wells Gulch is not used to convey irrigation water, and therefore is largely in a natural condition. Upland conditions for soils and vegetation are mostly meeting land health standards. The Modified Grazing Alternative does change the active AUMs to reflect what is suggested in the ecological site description(s) in addition to reducing utilization levels from 50% to 35%. There are no anticipated reductions in direct or indirect impacts compared to the Proposed Action alternative.

Alternative 2 (no grazing)-Removing grazing from the North Delta land health area is unlikely to reduce the direct and indirect impacts from grazing in the lifespan of the 10 year grazing permit. Recent studies indicate the contribution of salinity and selenium to the Gunnison River from rangelands is small compared to other land uses in the region. Reductions in E coli and sediment would be expected as fecal matter breaks down over time and new contributions from livestock are removed. Sediment would be reduced as upland biological soil crust and perennial vegetation increases. Recovery would be expected to take 25-50 years, and full recovery is unlikely, due to the presence of invasive species. Other disturbances from rights-of-ways, OHV and wildlife, would continue to impact water quality.

Proposed Action Alternative - Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Direct and indirect impacts would be expected to continue at similar levels.

Finding on the Public Land Health Standard for water quality--Current land health conditions rate water quality in the North Delta land health unit as 11.1 miles meeting, 3.0 miles meeting with a downward trend, and 0 miles not meeting. The Modified Grazing Alternative is unlikely to reduce direct and indirect impacts to water quality over the life of the 10 year permit renewal.

SOCIO-ECONOMICS

Affected Environment

There are economic and social ties associated with livestock grazing of federal public lands, on both BLM and USFS. Ferriday¹¹⁷ determined that over 16% of private land in the six counties (Delta, Gunnison, Mesa, Montrose, Ouray, and San Miguel) surrounding the Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forest may be economically tied to permitted livestock grazing on USFS lands, and approximately 24% of the private land is associated with permitted livestock grazing on both BLM and USFS managed lands. With this stated, the size of the ranch operations and corresponding fixed costs are often established based on availability of federal AUMs, and reduction in these AUMs, implies, that in the short term, fixed costs and debt must still be covered as animal units decrease. Net farm income and equity therefore decreases, and there is incentive for owners to consider selling and/or subdividing land for development, particularly given land prices in many

areas surrounding national forests¹¹⁸. Additionally, agriculture continues to be an important source of employment comprising 10% and 7% of all jobs in Delta and Montrose counties respectively, and 4% in the six county area¹¹⁹. With these agricultural jobs, almost \$30 million was being spent on hired farm and contract labor, and \$172 million dollars of agricultural product was sold across the six counties surrounding the GMUG, and by association the surrounding BLM lands.¹²⁰

The majority of the project area is located in Montrose and Delta Counties on the western slope of Colorado. In 2013, Delta County had a population of 30,483 and Montrose County a population of 40,713. The per capita income is \$34,681 in Delta County and \$32,750 in Montrose County. Farm and ranch employment accounts for 9% or 1,387 of the 14,971 jobs in Delta County. In Montrose County farm employment accounts for 5% or 1,190 of the 22,045 jobs¹²¹.

Livestock grazing is a substantial part of Colorado's \$40 billion agricultural industry as the market value of the sale of cattle and calves accounted for approximately \$4.4 billion in 2012. Nationally, Colorado ranked fifth in sales of the cattle commodity group, eleventh for cattle inventory, and third for sheep and lamb inventory¹²².

As previously noted, in this Environmental Assessment, studies have found that approximately 24% of the private land in Delta, Gunnison, Mesa, Montrose, Ouray, and San Miguel counties is associated with permitted livestock grazing on both BLM and USFS managed lands. This characteristic of regional private land-use and the economics of ranching highlight the critical role that federal AUMs have on an individual rancher's decisions on herd size, and management operations. As a change in federal AUMs will alter the decision of a rancher in respect to herd size, grazing rotation, and scheduling, these decisions may impact land-use up to or more than 24% of private land associated with grazing on federal lands in the six-county region.

Delta and Montrose Counties had cattle and calf inventories of 33,208 and 56,083 and sheep and lamb inventories of 13,611 and 15,433 respectively, in 2012¹²³. Current grazing fees on public land are \$1.69 per AUM, compared to \$10.57/AUM on Colorado State Trust Lands in the Southwestern Colorado, and \$17.50/AUM on private land^{124,125}. (BLM 2015, Colorado 2014, and USDA 2014). Within the project area that BLM administers, there are 10 grazing permits authorizing livestock grazing on 9 allotments.

Fees from permits (Section 3 of the Taylor Grazing Act) issued for grazing, within a grazing district, on public lands are distributed as follows:

- 50% - Range Improvement Fund
- 12.5% - State of Colorado (distributed according to state law)
- 37.5% - U.S. Treasury

Environmental Consequences

Impacts Common to all Alternatives -There are socioeconomic consequences due to competing habitat and land-use conflicts within the planning area. Specifically, portions of the planning area containing Gunnison Sage-grouse and Desert and Rocky Mountain bighorn sheep habitat, as competition between livestock and wildlife grazing may contribute to vegetation damage on

adjacent and nearby private lands. These impacts can be attributed to the scarcity of suitable land for both grazing by livestock and wildlife, and of limited habitat for sensitive species that are compounded by drought and land health issues.

Environmental Justice - Executive Order 12,898 requires federal agencies to assess projects to “identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” There are no environmental justice communities within the study area. The areas involved in the project are rural in nature, small communities; with sparsely populated subdivisions exist within existing distances of the proposed activity.

Modified Grazing Alternative - Socioeconomic consequences of the Modified Grazing Alternative include possible changes in the timing, scale, and revenue generated through ranching operations, due to the changes regarding permits and AUMs. An input-output analysis model (IO model), of the regional economy, was constructed to examine the impact of a loss of \$1000.00 of economic activity in the cattle/sheep ranching and farming sector. This IO model, with a \$1000.00 reduction of economic activity in cattle/sheep ranching and farming, assesses the impacts of a reduction of AUMs on the regional economy. The \$1000.00 reduction represents how a change would impact the regional economy, and was selected as the uncertainty of the costs of ranching operations. Further, the fluctuation of cattle/sheep market prices, make it impractical to accurately estimate the costs of a reduction of AUMs. Accordingly, the \$1000.00 impact provides the reader a benchmark to measure the total economic consequences of every \$1000.00 reduction of direct economic activity within the cattle/sheep ranching and farming sector. The results of the IO model find a \$405.00 reduction of indirect economic activity and \$67.00 reduction in economic activity. Overall, a \$1000.00 reduction of economic activity resulting from a reduction of AUMs across the study area results in a \$1472.00 reduction of total economic activity within the regional economy. The sectors most affected include cattle/sheep ranching and farming, support activities for agriculture, real estate, financial services, healthcare, and retail and wholesale trade. Further, using a similar benchmark to measure job losses, the regional economy loses 1.7 jobs for every \$100,000.00 reduction of cattle/sheep ranching and farming direct economic activity¹²⁶.

Mitigation: The action of reducing 10 year average actual use AUMs in the Modified Grazing Alternative will have economic impacts to individual permittees. To reduce this impact, the proposed AUM reductions will be carried out over a 3 year period. The proposed reductions will be calculated on the proposed AUM reduction for each individual permittee and will be reduced an overall 30%, with 25% the first year, an additional 25% the second year, and the remaining 50% the third year.

The residual impact after applying the mitigation will result in giving the permittee time to plan and implement business ranching decisions based on their specific operational need. This will lessen the initial impact to individual permittees, while stabilizing rangeland health and productivity for future grazing use.

Alternative 2 (No Grazing) – Social consequences include changes in the ranching lifestyle resulting from the loss of agricultural revenue and jobs due to permits not being renewed.

Economic consequences would include increased ranch operation costs or declines in regional cattle/sheep production both of which could result in the sale of private ranch lands.

Proposed Action Alternative (current management) – Continuation of grazing under current management would result in no short-run changes to the socioeconomics of the study area. However, long-run consequences could result in the decline of economic activity or feasibility of certain allotments due to continued declining rangeland health and productivity.

RANGE MANAGEMENT

Affected Environment

The North Delta Land Health Unit saw unrestricted and unregulated domestic grazing from the time of settlement until the passing of the Taylor Grazing Act in 1934 as amended 1936, 1938, 1939, 1942, 1947, 1948, 1954 and 1976. The Taylor Grazing Act of 1934, sought to “stop injury to the public grazing lands by preventing overgrazing and soil deterioration; to provide for their orderly use, improvement, and development; and to stabilize the livestock industry dependent upon the public range” through lease of the public domain to stock raisers. This orderly use of the range continued until the onset of World War II when livestock trespasses increased and harvesting of vegetation went above allowable levels. In 1946 the Bureau of Land Management was created and there were many initiatives dealing with grazing, from the development of 10 year grazing leases, to AUM adjudication. However, the monumental change came in the 1960 with the Bureaus multiple use mandates. The BLM range program developed Allotment Management Plans (AMPs) which set forage goals for wildlife, livestock, soil stability, and recreation. In addition the passing of Federal Land Management Policy Act (FLMPA) in 1976 continued Congress’s support of the planning process by establishing policy to retain public lands, inventory and identify land resources, and provide multiple use and sustained yield management of public land and resources through planning (also see the vegetation section for additional historical information).

The latest land health determinations (2012), across the project landscape for upland standard 1 Soil, 3 Vegetation, and 4 Wildlife/TES are: 45% are meeting standards, 34% are meeting with a downward trend, and 14% are not meeting standards. In addition, stream standard 2 Riparian and 5 Water Quality, within the project landscape, is 78% meeting standards, 19% meeting with a downward trend, and 3% not meeting standards.

Assumptions:

In each allotment the majority of adjustments to livestock management will be driven by deficiencies analyzed within the largest ecological site.

Environmental Consequences

Alkali Flats # 14017

In the prior permit renewal, this allotment consisted of approximately 12,433 acres, of which 100% was public land with an active grazing preference of 1,387 AUMs. During this permit renewal process, 3,464 acres and 386 AUMs were removed from the allotment to create the Huff Allotment #04294 located within the Dominguez Escalante National Conservation Area. The change in acres brought the allotment to 8,969 acres with an active grazing preference of 1,001 AUMs with no change in the percent public land. The active grazing preference will be discussed in the following paragraphs. In the 1987 RMP, the allotment was classified an “I” category allotment which calls for most intensive management, with the objective of improving existing resource conditions. This category will not change during this permit renewal process.

The stony salt desert ecological site has the greatest acres within the allotment, and the majority of adjustments in management, will be driven by deficiencies in this ecological site. Current grazing management was noted as contributing to Standard 1 Soil, Standard 3 Vegetation, and Standard 4 T&E species, concerns on the allotment. Current estimates of forage produced on the allotment, with average precipitation, does not support the active 1,001 AUMs. Currently the carrying capacity on the allotment is 9 acres/AUM. This acre/AUM allocation is considered low for salt desert shrub communities in poor condition. This allotment would be considered in poor condition when compared to the associated ecological sites comprised within the allotment, the recent LHA results, and current livestock management, contributing to 78% of the allotment, not meeting or meeting with a downward trend. With this acknowledged and the majority of the allotment struggling to meet land health standards, the carrying capacity will go from 9 ac/AUM to 18 ac/AUM, which will change the active AUM preference on the permit from 1,001 to 493. In addition, utilization will go from 50% to 35%, except in areas of high concentration (fencelines, cattleguards, water developments, sheep bedgrounds, and roadsides where utilization is expected to be higher)¹²⁷. AUMs will be decreased according to CFR § 4110.3-3 (a) which states, “After consultation, cooperation and coordination with the affected permittee or lessee, and the state having lands or responsibility for managing resources within the area, the authorized officer will implement changes in active use through a documented agreement or by a decision.” The authorized officer will implement changes in AUMs over a 3 year period. In addition, the BLM will work with the permittee to set up use areas within the allotment which will allow for more intense grazing management and periodic rest to be implemented within areas of the allotment.

Table 47 Proposed Permit Alkali Flats

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Alkali Flats #14017	1000/Sheep	12/1	2/28	100	Active	493	35

Dates are opened up on the permit to allow for rotations between allotments, however AUMs associated with the permit will not be increased.

Deer Basin/Midway #14019

The allotment consists of approximately 12,438 acres of which 96 % is public land with an active grazing preference of 900 AUMs. In the 1987 RMP, the allotment was classified an “I” category allotment which calls for most intensive management, with the objective of improving existing resource conditions. This category will not change during this permit renewal process.

Current grazing management was noted as contributing to, Standard 1 Soil, Standard 3 Vegetation, and Standard 4 T&E species, concerns on a large portion of the allotment, especially the lower elevation Midway pasture. Trend data on the allotment suggests the allotment is in static trend, for the Deer Basin pasture, and downward for the Midway pasture. This allotment, most notably the lower elevation portion, would be considered in poor condition, when compared to the associated ecological sites comprised within the allotment, and the current LHA finding of 99% of the allotment not meeting or meeting with a downward trend. Currently the carrying capacity on the allotment is 14ac/AUM, and the current estimate of forage produced on the allotment with average precipitation, does not support the active 900 AUMs. With this acknowledged, and livestock management contributing to more than a third (40%) of the allotment struggling to meet land health standards, the carrying capacity will go from 14ac/AUM to 47 ac/AUM, which will change the active AUM preference from 990 to 249. In addition, utilization will go from 50% to 35%, except in areas of high concentration (i.e. fencelines, cattleguards, water developments, sheep bedgrounds, and roadsides) where utilization is expected to be higher. Most adjustments in AUMs will be in the lower parcel of the allotment, since it is not meeting LHS and is in a downward trend. AUMs will be decreased according to CFR § 4110.3-3 (a) which states “After consultation, cooperation and coordination with the affected permittee or lessee, and the state having lands or responsibility for managing resources within the area, the authorized officer will implement changes in active use through a documented agreement or by a decision.” The authorized officer will implement changes in AUMs over a 3 year period. A portion of the AUMs reduced will be permanently removed from the allotment, and a portion will be placed into “suspended non-use” and could be reallocated depending upon allotment condition in the future. In addition, the BLM will work with the permittee to set up use areas within the allotment, which will allow for more intense grazing management and periodic rest to be implemented within use areas in the allotment.

Table 48 Proposed Permit Deer Basin/Midway

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Deer Basin/Midway #14019	1576/Sheep	12/1	02/28	96	Active	249	331

Dates are opened up on the permit to allow for rotations between allotments, however AUMs associated with the permit will not be increased.

Delta Pipeline # 03277

This allotment consists of approximately 6,029 acres of which 100 percent is public land with an active grazing preference of 563 AUMs. In the 1987 RMP, this allotment was a pasture within the Alkali Flats allotment which was classified an “I” category allotment which calls for the most intensive management, with the objective of maintaining existing resource conditions. This category will be carried through to this allotment and will not change during this permit renewal process.

Currently, the carrying capacity on the allotment is 11ac/AUM, and the current estimate of forage produced on the allotment with average precipitation, does not support the active 563 AUMs. With this acknowledged and livestock management contributing to almost half (47%) of the allotment struggling to meet land health standards, the carrying capacity will go from 11ac/AUM to 24 ac/AUM, which will change the active AUM preference from 563 to 252. In addition, utilization will go from 50% to 35%, except in areas of high concentration (i.e. fencelines, cattleguards, water developments, sheep bedgrounds, and roadsides) where utilization is expected to be higher.

Table 49 Proposed Permit Delta Pipeline

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Delta Pipeline #03277	1000/Sheep	12/1	02/28	100	Active	252	98

Dates are opened up on the permit to allow for rotations between allotments, however AUMs associated with the permit will not be increased.

Dirty George #14023

The allotment consists of approximately 1,389 acres of which 100 percent is public land with an active grazing preference of 133 AUMs. In the 1987 RMP, the allotment was classified an “M” category allotment, which calls for less intensive management, with the objective of maintaining existing resource conditions. This category will not change during this permit renewal process.

The Land Health Assessment done in 2012 for this allotment indicates it is meeting LHS for Standard 3 Vegetation. The largest ecological site in the allotment is Deep Clay Loam with 779 acres, as the other ecological site is Mountain Pinyon (NRCS draft, 1995) with 580 acres. These combined acres are what was evaluated in the allotment.

Current grazing management was not noted as a concern on the allotment. Current estimates of forage produced on the allotment with average precipitation does support the active 133 AUMs. Currently, the carrying capacity on the allotment is 11ac/AUM. This allocation is considered sufficient for this allotment and the higher location on the landscape.

Table 50 Proposed Permit Dirty George

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Dirty George #14023	200/Cattle	10/15	10/20	100	Active	39	0
	205/Cattle	06/02	06/15	100	Active	94	0

* Dates are opened up on the permit to allow for rotations between allotments however, AUMs associated with the permit will not be increased.

Petrie Mesa #14022

The allotment consists of approximately 2,825 acres of which 100 percent is public land with an active grazing preference of 104 AUMs. In the 1987 RMP the allotment was classified an “M” category allotment which calls for less intensive management , with the objective of maintaining existing resource conditions. This category will change during this permit renewal process to an “I” category which is most intensive management, with the objective of improving existing resource conditions. This change is in response to threatened and endangered species, and associated habitat.

The Land Health Assessment done in 2012 for this allotment indicates it is not meeting standard three vegetation on 27% of the allotment and meeting with static trends on 71%, for approximately 98% of the allotment. Of this, current livestock management was found to be one of the significant causal factors on 27% of the allotment. The largest land mass on the allotment is 2006 acres of adobe badlands. The other ecological site is stony salt desert with 767 acres, and these combined acres are what were evaluated in the allotment.

Current grazing management was noted as contributing to, Standard 3 Vegetation, and Standard 4 T&E species, concerns on the allotment. Current estimates of forage produced on the allotment with average precipitation should support the active 104 AUMs when proper livestock distribution is achieved. Currently, the carrying capacity on the allotment is 27ac/AUM. This allocation should be sufficient for the type vegetation communities on the allotment when compared to the ecological sites comprised within the allotment. However, with this

acknowledged, 27% of the allotment not meeting Standard 3 Vegetation, with livestock management contributing, and actual use across a 10 yr period at 73 AUMs management will need to be adjusted, to move the allotment towards meeting LHS. Active AUMs will go from 104 to 51 and utilization will go from 50% to 35%, except in areas of high concentration (i.e. fencelines, cattleguards, water developments, sheep bedgrounds, and roadsides) where utilization is expected to be higher. In addition, the BLM will work with the permittee to set up use areas within the allotment that will allow for more intense grazing management and periodic rest to be implemented within identified use areas.

Table 51 Proposed Permit Petrie Mesa

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Petrie Mesa #14022	1000/sheep	12/1	2/28	100	Active	73	0

Dates are opened up on the permit to allow for rotations between allotments however, AUMs associated with the permit will not be increased.

Point Creek# 14021

The allotment consists of approximately 4,750 acres of which 1,614 acres are public land that equates to 24% public land allotment with an active grazing preference of 101 AUMs. In the 1987 RMP, the allotment was classified a “C” category allotment which calls for less intensive management with the objective of maintaining existing resource conditions. This category will change during this permit renewal process to an “I” category that calls for the most intensive management, with the objective of improving existing resource conditions. This change is in response to threatened and endangered species and associated habitat.

The Land Health Assessment done in 2012 for this allotment indicates it is not meeting for approximately 63% of the public land within the allotment, with livestock management noted as one of the significant causal factors. Concerns recorded were an overall increase in exotics, decrease in shrubs, and an overall decrease in natives in relation to the Ecological Site Descriptions and the last LHA completed. The largest ecological site on the allotment is the stony salt desert, 994 acres, and is the second largest site is in the adobe badlands, with 610 acres. Other ecological sites on the allotment include: clayey salt desert, salt flats, and sandy salt desert.

Current grazing management was noted as contributing to Standard 3 Vegetation and Standard 4 T&E species, concerns on the allotment. The current estimate of forage produced on the allotment with average precipitation does not support the active 102 AUMs. Currently, the carrying capacity on the allotment is 16ac/AUM which is not sufficient for the compromised vegetation communities on the allotment. With this acknowledged and 62% of the allotment not meeting Standard 3 Vegetation, the allotment displaying a downward trend with livestock management contributing, management on the allotment will need to be adjusted to move the allotment towards meeting LHS. Change in management will include, reducing AUM allocation on the allotment to 68 AUMs, that will allow for 24 ac/AUM, and modifying utilization guidelines on the allotment from 50% to 35%, except in areas of high concentration (i.e. fence

lines, cattle guards, water developments, sheep bedgrounds, and roadsides) where utilization is expected to be higher. In addition, the BLM will work with the permittee to set up use areas within the allotment, which will allow for more intense grazing management and periodic rest, to be implemented within identified use areas. Even with the proposed changes in livestock management, the allotment may need invasive species treated to reduce the competition between natives and weedy species, improve vigor on existing shrubs, and allow for cool season grasses to reestablish.

Table 52 Proposed Permit Point Creek

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Point Creek #14021	1000/sheep	5/1	5/31	24	Active	20	29
	1000/sheep	11/16	2/28	24	Active	48	
	Or 1000/sheep	11/16	2/28	24	Active	68	

Dates are opened up on the permit to allow for rotations between allotments however, AUMs associated with the permit will not be increased.

South Branch # 14004

The Land Health Assessment done in 2012 for this allotment indicates it is meeting for the entire allotment. The allotment consists of approximately 1,049 acres of which 825 acres are public land. This equates to 78% public land allotment with an active grazing preference of 101 AUMs. This is a change from the last LHA when the public land percentage was 65%. The change in public land is due to GIS mapping of correct allotment boundaries. In the 1987 RMP the allotment was classified an “M” category allotment that calls for less intensive management, with the objective of maintaining existing resource conditions. This category will not change. The largest ecological site on the allotment is Mountain Pinyon (draft NRCS1995), 403 acres, the second largest site is Deep Clay Loam with 374 acres.

Current grazing management was not noted as contributing to Standard 3 Vegetation, and Standard 4 T&E species, concerns on the allotment. Current estimates of forage produced on the allotment with average precipitation should support the active 101 AUMs. Currently, the carrying capacity on the allotment is 10ac/AUM. This AUM allocation has proven to be sufficient, through past studies and LHA, for the location on the landscape, elevation, and vegetation communities on this allotment.

Table 53 Proposed Permit South Branch

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
South Branch #14004	111/cattle	06/04	06/30	78%	Active	65	0
	111/cattle	10/15	10/29	78%	Active	36	

*the grazing period is opened up to allow for flexibility, the AUMs available for use will remain unchanged.

Ward Creek/Dough Spoon # 14025

This allotment is a common allotment which consists of approximately 27,943 acres of which 17,190 acres are public land. This equates to 63-100% public land allotment, depending upon permittee preference, with a total active grazing preference of 443AUMs. In the 1987 RMP, the allotment was classified an “I” category allotment that calls for most intensive management, with the objective of improving existing resource conditions. This category will not change. The largest ecological site on the allotment is clayey salt desert with 9,622 acres, other ecological sites on the allotment include: shallow and sandy loam pinyon juniper (3,507 ac), stony salt desert (2,746 ac) and Deep Clay Loam (470 ac).

Overall, current grazing management was not considered a significant causal factor in the health of the allotment for Standard 3 Vegetation and Standard 4 T&E species. Current estimates of forage produced on the allotment with average precipitation supports the active 445 AUMs. The carrying capacity on the allotment is 69.3ac/AUM, and this AUM allocation is sufficient for the location on the landscape, elevation, and vegetation communities on this allotment.

Table 54 Proposed Permit Ward Creek/Dough Spoon

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Ward Creek/Dough Spoon #14025	25/cattle	10/16	11/01	63	Active	9	0
	226/cattle	5/27	6/15	64	Active	95	0
	226/cattle	10/16	10/18	64	Active	14	0
	26/cattle	10/16	10/27	100	Active	10	0
	58/cattle	05/02	06/16	100	Active	88	0
	21/cattle	05/02	06/16	100	Active	32	0
	11/cattle	10/16	10/27	100	Active	4	0
	90/cattle	10/16	11/2	100	Active	53	0
	142/cattle	5/17	6/15	100	Active	140	0

*the grazing period is opened up to allow for flexibility, the AUMs available for use will remain unchanged.

Wells Gulch #14016

In the subsequent permit renewal, this allotment consisted of approximately 16,879 acres, of which 100% was public land with an active grazing preference of 2,366 AUMs. During this permit renewal process, 6,536 acres and 933 AUMs were removed from the allotment to create the Dominguez Rims allotment #04293, located within the Dominguez Escalante National Conservation Area. The change in acres brought the allotment to 10,343 acres with an active grazing preference of 1,433 AUMs and no change in the percent public land. The active grazing preference (AUMs) will be discussed in the following paragraphs. In the 1987 RMP the allotment was classified an “I” category allotment that calls for the most intensive management, with the objective of improving existing resource conditions. This category will not change.

The Land Health Assessment done in 2012 for this allotment indicates it is meeting land health standards in 29% of the allotment, and meeting with a downward trend for 71% of the allotment. There were no acres within the allotment not meeting standards. Of the 71% meeting with a

downward trend, current livestock management was only one of the causal factors and not found to be the significant causal factor for any one area meeting with a downward trend. Concerns noted were low occurrences of perennial shrubs, fire, rights of ways, and low numbers of perennial cool season grasses and forbs in some areas. In addition, an increase in noxious and invasive weeds, mainly halogeton, were noted as having increased on the allotment and were contributing greatly to areas meeting with a downward trend.

Current grazing management was not noted as being a significant causal factor for acres meeting with a downward trend for Standard 3 Vegetation and Standard 4 T&E species concern on the allotment. The 1,433 current active AUMs are higher than suggested in the ecological site descriptions by 261 AUMs. With this acknowledged and current estimates of forage produced on the allotment with average precipitation, the allotment will go to 1,172 active AUMs. This equates to a carrying capacity of 9ac/AUM. This carrying capacity would be considered low for salt desert shrub communities, however since the allotment is meeting LHS, the allotment will not have active AUMs adjusted below the ecological site suggestions. The permittee has been progressively managing use areas, with periodic rest, and proper utilization rates (~35%) for most of the area, which has allowed the allotment to maintained land health standards. Utilization will stay at approximately 35%, except in areas of high concentration (i.e. fencelines, cattleguards, water developments, sheep bedgrounds, and roadsides) where utilization is expected to be higher¹²⁷.

Table 55 Proposed Permit Wells Gulch

Allotment # and Name	Livestock Number/Kind	Grazing Period (MM/DD)		%PL	Type Use	Active AUMs	Suspended AUMs
		Begin	End				
Wells Gulch #14016	2179/sheep	12/01	3/10	100	Active	1,172	0

*the grazing period is opened up to allow for flexibility, the AUMs available for use will remain unchanged.

Modified Grazing Alternative - The Modified Grazing Alternative addresses the problem of current carrying capacity (AUM's) as compared to ecological site potential, Actual Use Reports, and current and prior LHA results. In addition, it also addresses seasonal utilization targets which have been above what is suggested for improvement and maintenance of semi-desert grass lands with 8-12" of annual precipitation. It also attempts to address historical overuse by acknowledging potential multiple stable states within the State and Transition Models, which suggest once a threshold is crossed, vegetation communities may move to a new degraded stable state that are harder to recover. Laycock¹¹ looked at 10 years of livestock exclusion and found that it had little effect on shrub communities dominated by big sagebrush, shadscale, and Nuttall saltbush in western Colorado. This is because the vegetation could have been in a stable state, even though degraded, and some force or energy might be necessary to move the vegetation past the threshold which is preventing change. In addition, Kitchen and Hall (1996) state continued winter (dormant season) grazing with sheep at moderate levels appears to pose little threat to the stability of shrub communities within the Desert Experimental Range, and further mention spring grazing increases the risks, but common sense suggests the effects of spring grazing might be minimized under a conservative deferred grazing system.

With these adjustments in grazing management, it is anticipated no new acres will enter into a downward trend due to current livestock management. Areas where trend is static on the allotment(s), and where perennial cool season grasses, forbs, and shrubs are still a major component of the vegetation, recovery to upward trends and moving towards meeting LHS, will occur more quickly than areas lacking desired vegetation components and dominated by exotic invasive annuals. Areas dominated by exotic invasive annual may need additional inputs (herbicide treatment, seeding) to move the vegetation community from one trend category to another. Expectations in desired perennial basal cover (additional desired perennial vegetation) on the allotment will be in slow incremental steps over 25-100 years, and may only be marginally detectable in the first 10-25 years; however, trend should start to move with increased plant vigor, soil stability, treatment of exotic invasive weeds, and seeding where necessary, in addition to modifications in current grazing management.

Other disturbances from rights-of-ways, OHV and wildlife would continue to impact vegetation communities and introduce invasive annual and perennial plant species.

Alternative 2 (no grazing) - Introduction and unrestricted domestic grazing during the settlement of arid western rangelands set the path for these rangelands to cross vegetative community thresholds. A stable vegetative state is considered resilient, when that state returns to the original state after being disturbed by either natural events (fire, insects) or by management action (grazing, introduction of invasive species, developments)¹¹. If the stable state does not return to the original level after disturbance it is considered to have crossed a threshold. Historically, these rangelands in the North Delta LHA unit have crossed a threshold from the original vegetation communities where salt-desert shrub ranges were estimated to have a carrying capacity of 5 acres/AUM and have transitioned to at least 18 acres/AUM¹⁰. These new thresholds move towards new stable states with altered vegetation characteristics as compared to associated ecological sites. Friedel¹², states once a threshold is crossed to a more degraded state, improvement won't occur on a practical time frame without much greater intervention or management effort than simply removing grazing. Kitchen and Hall¹⁷ noted, on spring-grazed pastures it would take at least 120 years after the elimination of grazing to fully restore certain species and this process could be further hindered by increased dominance of introduced annuals. In addition, Kitchen and Hall¹⁷ mention, continued winter (dormant season) grazing with sheep at moderate levels appears to pose little threat to the stability of shrub communities within the Desert Experimental Range and further state spring grazing increases the risks, but common sense suggests the effects of spring grazing might be minimized under a conservative deferred grazing system. With the proposed management actions targeted to stop continued degradation, improve vegetative vigor, and low cool season perennial basal cover, the allotments would slowly improve moving towards meeting Land Health Standards without total removal of livestock grazing.

Other disturbances from rights-of-ways, OHV and wildlife would continue to impact vegetation communities and introduce invasive annual and perennial plant species.

Proposed Action Alternative (current management)- Continuation of grazing under current management would result in similar impacts as found in the 2012 land health assessment. Allotments with acres meeting land health standards would continue to do so under this action,

and allotments with acres meeting that have downward trends would continue to degrade, as acres not meeting standards would remain static and/or increase. This action is not in accordance with CFR §4180.1 Fundamentals of Rangeland Health. Direct and indirect impacts would be expected to continue at similar levels.

FIRE

Affected Environment

Over the past thirty years, there have been six large (>100 acres) wildfires within the North Delta LHA boundary. These fires have typically burned and carried in grasses, occasionally consuming mixed salt desert shrub, sagebrush, and a very few pinyon and juniper.

Environmental Consequences

Impacts Common to all Alternatives-The greatest impacts to changes in fire size and intensity during any given season will be attributed to seasonal weather patterns affecting the growth, continuity, and moisture of fine fuels.

Modified Grazing Alternative – Grazing livestock decreases fine fuel loading and changes spatial distribution of fuels. This is likely to decrease the intensity and frequency of fires from that of a system with no grazing. Because grazing has already been established in the area, fire intensity and size under this Modified Grazing Alternative will remain very similar to previous years. However, some reductions in AUMs in some allotments may allow for an increase in fine fuel loading and availability.

Alternative 2 (No Grazing) – With no grazing, fine fuel loading will increase and likely result in an increase in wildland fire intensity and size, as the fires will have a more continuous fuel source.

Proposed Action Alternative – Grazing livestock have already been decreasing fine fuel loading under the current permit condition. By renewing permits as is, no immediate changes to fire intensity or size can be anticipated.

CUMULATIVE IMPACTS

Cumulative impacts are the environmental impacts that could result from the implementation of the Proposed Action, when added to the impacts from all other past, present, and reasonably foreseeable activities, regardless of who is conducting such activities. The cumulative effects analysis considers the geographic scope of the cumulative effects and past, present, and reasonably foreseeable actions.

Analysis Area

For cumulative analysis purposes, the majority of the general analysis area is located in Montrose and Delta Counties. The general area is comprised of three Land Health Assessment (LHA) units, Escalante, North Delta, and Gunnison Gorge (Figure 14) because data collection and analysis has been done recently for these units.

Total acres of the cumulative effects analysis area are approximately 547,000 and are composed of 291,709 acres of BLM, 27,000 acres of Black Canyon National Park, 1,982 acres of state land, and 201,521 acres of private land. The Uncompahgre Field Office cumulatively analyzed impacts on the broader 3 Land Health units while focused a detailed direct and indirect analysis on the North Delta LHA unit where applications for grazing permit renewals were received.

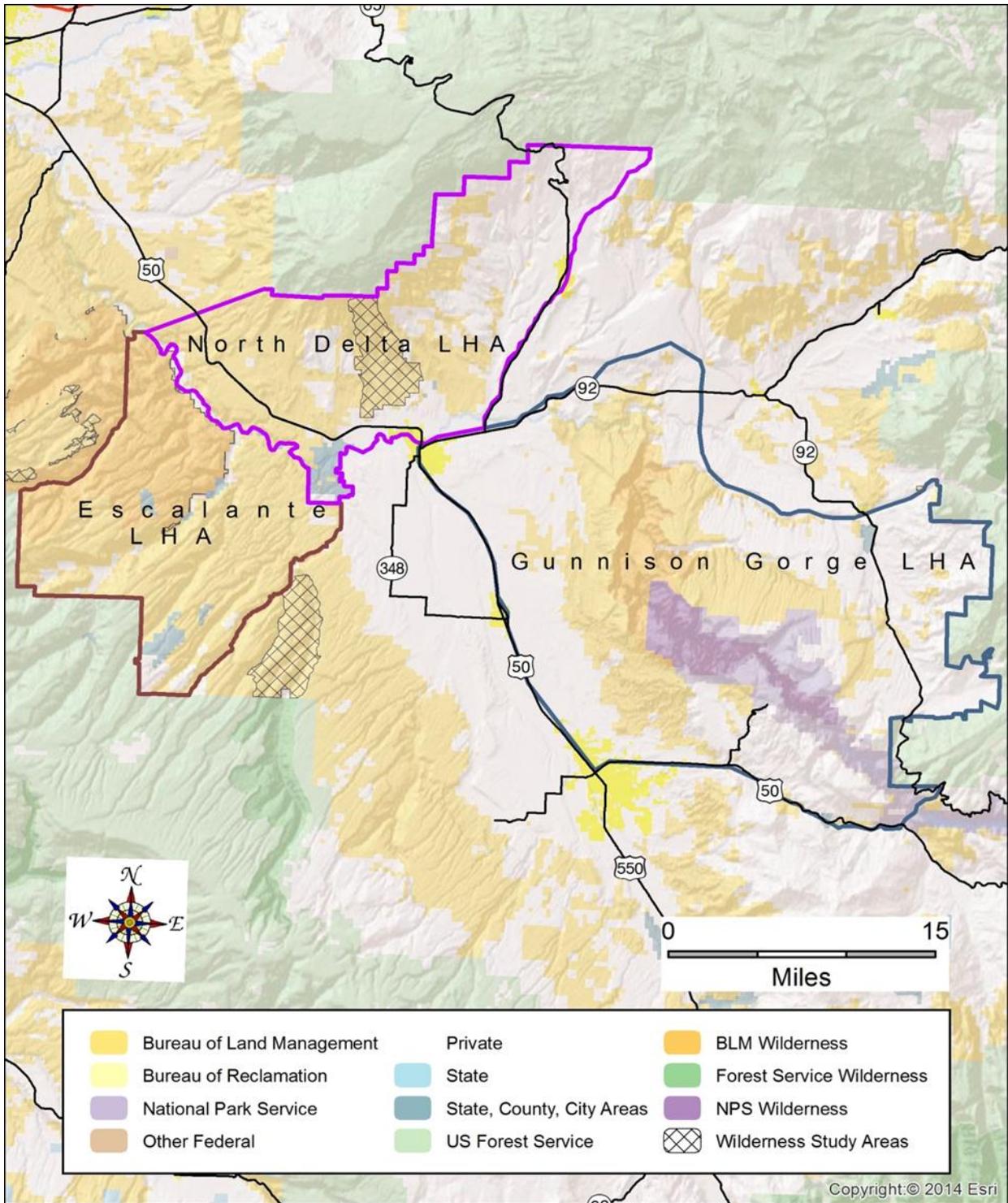


Figure 14 Escalante, North Delta, and Gunnison Gorge LHA Unit

The analysis area for each resource depends on the type of impact. The timeframes also vary due to scope of the impact and recovery times. The table below shows each resource and the impact areas.

Table 56 Cumulative Impact Resource and Impact

Resource	Cumulative Impact Analysis Area	Indicator (i.e. acres, AUMs, miles, # of sites)	Timeframe
ACEC	4 ACEC's Adobe Badlands ONA, Escalante Canyon ACEC, Native Plant Community ONA, Gunnison Gorge IBA	6,380	For native Vegetation 25-100 years for the detectable increases in basil cover of desirable species.
Lands with Wilderness Characteristics	4 wilderness characteristics units (Adobe Badlands WSA Adjacent, Cottonwood Canyon, Dry Fork of Escalante, Dominguez Addition) and part of Camel Back WSA Adjacent	25,322 acres	The temporal scope is 10 years -- the term of the grazing permits.
Wild and Scenic Rivers	The geographic extent is the LHA unit watershed above the lower end of the eligible segment. Also included is the Hartland Dam fish passage (just downriver from the segment) and Crystal Dam, which controls river flows on the Gunnison River.	17,190 acres	The temporal scope is 10 years -- the term of the grazing permits.
Cultural Resources	All cultural resource analyses for grazing allotments are initially made as cumulative effects analyses. The nature of the analysis of grazing allotments must be done as an historical study of the allotment and the resources, meaning that the analysis itself is of the		The temporal scope is the same as the historic and prehistoric occupation of the allotment.

Resource	Cumulative Impact Analysis Area	Indicator (i.e. acres, AUMs, miles, # of sites)	Timeframe
	cumulative effects of grazing. Therefore the affected environment section of the cultural resources is the cumulative analysis of those effects.		
Native American Religious Concerns	As above for Cultural Resources.		
Soils	North Delta Land Health Unit and the confluence of drainages from the Gunnison Gorge and Escalante LHA at the Gunnison River	181,272	25-50 years for biological soil crust recovery and perennial plant recovery.
Upland Vegetation	North Delta, Escalante, Gunnison Gorge Land Health Units	278,300	25-100 years for the detectable increases in basal cover of desirable species.
Invasive, Non-native Species	North Delta, Escalante, Gunnison Gorge Land Health Units	278,300	10-25 years depending upon inputs.
Threatened, Endangered, Sensitive Species	Salt Desert ecosystem in the North Delta, Escalante, and Gunnison Gorge LHA Units		25-50 years, 120 years on more degraded sites
Migratory Birds	North Delta, Escalante, Gunnison Gorge Land Health Units	278,300	25-50 years, 120 years on more degraded sites
Wildlife, Terrestrial	22 mile buffer of N Delta/Escalante/Gunn Gorge LHA. 22 miles is the average distance a bighorn (Idaho, Rocky Mountain) will travel on foray outside of their Core Herd Home Range. Pronghorn: Allotments that overlap with the CPW overall range for N Delta pronghorn herd (Alkali Flats, Deer Basin/Midway, Delta		25-50 years, 120 years on more degraded sites

Resource	Cumulative Impact Analysis Area	Indicator (i.e. acres, AUMs, miles, # of sites)	Timeframe
	Pipeline, Petrie Mesa, Point Creek, Ward Creek/Doughspoon, Wells Gulch)		
Riparian zones and Wetlands	Perennial and intermittent streams within the three LHA units.	Miles of Stream	5-25 years for riparian area recovery depending upon stream morphology.
Surface Water	Nine HUC 6 subwatersheds from the top of Grand Mesa to the outlet at the Gunnison River	181,272	25-50 years for biological soil crust recovery and perennial plant recovery.
Socio-Economics	Montrose and Delta Counties	AUMs	On going
Range Management	North Delta, Escalante, Gunnison Gorge Land Health Units	Number of Permits	On going

Past, Present, and Reasonably Foreseeable Future Actions (RFFA)

- Escalante permit renewal
- GGNCA permit renewal
- Continued lining of existing irrigation ditches conveying water from Federal Bureau of Reclamation irrigation water projects.
- FRAM –oil and gas development
- Pronghorn waters

The table below summarizes all the known past, present and reasonably foreseeable future actions. The actions are listed by activity and grouped by the cumulative impact analysis area depending on the resource.

Table 57 Past, Present, and Reasonably Foreseeable Future Actions

Activities	Past Development	Present	RFFA
<i>North Delta, Escalante, and Gunnison Gorge Land Health Areas</i>			
BLM roads	675 miles		
County Roads (Dirt)	430 miles		
Paved County Roads and State Highways	345 miles		
Rights of Way (Power and Pipelines)	374 miles		
Rights of Way: Trans-CO pipeline, N. Delta Tri-State temporary work areas.	2,521 acres		
Area available for grazing (acres)	BLM LH Units = 278,300 acres NPS=6,739 acres State=4,141 acres Private=48,515	BLM LH Unit = 278,300 acres NPS=6,739 acres State=4,141 acres Private=48,515	BLM LH Unit = 270,885 acres* NPS=6,739 acres State=4,141 acres Private=48,515 *Proposed changes in Dominguez-Escalante RMP
Livestock Grazing	AUMs	AUMs	AUMs
Livestock Crossing Routes	132 miles	132 miles	132 miles
Irrigated Agriculture	51,719 acres	51,719 acres	51,719 acres
Irrigation Ditches	BLM=50 miles Other=350 miles		
Treatments (Contour Furrows)	1,084 acres	1,084 acres	1,084 acres
Check Dams	1,217 dams	1,217 dams	1,217 dams
Recreation Developments	13.2 acres	13.2 acres	2 OHV staging areas may be constructed; approximately 6 acres combined

Activities	Past Development	Present	RFFA
Open OHV area	1,072 acres	1,072 acres	1,072 acres
<i>22 mile buffer around North Delta, Escalante and Gunnison Gorge Land Health Areas</i>			
Sheep Allotments with Predicted Disease outbreaks less than 25 years	BLM=179,070 acres FS=174,342 acres Other=16,757 acres	BLM=179,070 acres FS=174,342 acres Other=16,757 acres	Same as present, but may have changes based on Dominguez-Escalante NCA RMP when finalized
<i>Mesa, Delta, Montrose Counties</i>			
2000 Census Population	220,963	221,012	Projected 2030: 305,441

ACEC

The cumulative impact analysis area for the ACEC is considerably smaller than the 3 land health units and contains 4 ACEC(s)/special designated units. For Cumulative Impacts, see associated Cumulative Impact Analysis sections attributed to Designation Attributes.

Table 58. ACEC Designation Attributes

LHA Unit	ACEC/ Special Designation Area ¹	Designation Attributes
N. Delta	Adobe Badlands ONA	Unique Scenic Qualities ² , Threatened and Endangered Plant Habitat (salt desert shrub), and for Sensitive Soils.
Dominguez Escalante	Escalante Canyon ACEC	Wildlife, Fish, Cultural, Geological, Natural Hazard, and Rare Plants.
Gunnison Gorge	Native Plant Community ONA	Native Plant Communities
Gunnison Gorge	Gunnison Gorge IBA	Gunnison Sage Grouse

¹ACEC-Area of Critical Environmental Concern, ONA-Outstanding Natural Area, IBA- Important Bird Area

²Unique Scenic Qualities attribute were not brought forward for analysis in the EA.

Lands with Wilderness Characteristics

Recent updates to the BLM inventory of lands with wilderness characteristics show that there are four units, and part of a fifth unit, with wilderness characteristics within the three LHA units in the CIAA. All of the wilderness characteristics units were inventoried between 2010 and 2014. These units were found to possess wilderness characteristics with current grazing with grazing management in place. Continuation of grazing, and maintenance of currently existing range developments, will have no effect on the wilderness characteristics of these units.

Wild and Scenic Rivers

Existing soil disturbance from roads, rights-of-ways, treatments, recreation, and grazing continue to contribute to elevated levels of salt and selenium entering the Wild and Scenic Eligible Gunnison River Segment 2 from soil erosion during runoff events. The resulting reduction of water quality in the river negatively affects the fish ORV. As noted in the “soils” section below, the most effective means to slow erosion is perennial vegetation, and biological soil crust. But with disturbed areas within the CIAA being dominated by annual weeds, it could take over a century to reestablish perennial grasses and shrubs.

A fish passage was completed on the Hartland Dam in 2012. Prior to that, the endangered fish (ORV) could not navigate the dam structure. It is likely that this improvement to the dam is having a positive effect on the fish in relation to increased access to habitat.

The flows in this segment of the Gunnison River are largely controlled by releases from Crystal Dam, part of the larger Aspinall Unit, operated by the Bureau of Reclamation (BOR), upriver from this segment. Past operation of the unit did not favor the habitat requirements of the endangered fish, particularly spring flow requirements for spawning. In 2012 the BOR issued a Record of Decision which included provisions for operating the unit to support habitat

requirements of the endangered fish.

Changes to terms and conditions in the Modified Grazing Alternative would result in some incremental improvements in water quality due to small improvements in soil conditions and less soil erosion. However, with the long recovery period for biological soil crusts and reestablishment of perennial grasses and shrubs, the incremental improvements are not likely to be seen in the scope of 1 ten year permit renewal period.

The reasonably foreseeable future actions include the permit renewals for two additional land health areas. Those additional areas include more eligible segments and suitable segments.

Eligible segments include:

- Rose Creek; tentative classification is wild; ORV is scenic;
 - Cottonwood Creek; tentative classification is scenic; ORV is vegetation;
 - Dry Fork Escalante Creek, Segment 2; tentative classification is recreational; ORV is vegetation;
 - Escalante Creek, Segment 1; tentative classification is scenic; ORVs are scenic, recreational, wildlife, geologic and vegetation;
 - Escalante Creek, Segment 2; tentative classification is recreational; ORVs are fish, wildlife and vegetation;
 - Gunnison River, Segment 3; tentative classification is recreational; ORVs are recreational, fish, cultural and vegetation; and
 - Monitor Creek; tentative classification is wild; ORV is vegetation.
- More information on these segments can be found in the Eligibility Report here:
http://www.blm.gov/co/st/en/fo/ufo/wild_and_scenic_river.html

Suitable segments include:

- Gunnison River within Gunnison Gorge NCA (entire river in Gunnison Gorge Wilderness to the powerline south of the confluence with the North Fork); tentative classification is wild; ORVs are cultural and historical, ecological, scenic, geological, recreational, and wildlife;
 - Gunnison River within Gunnison Gorge NCA (from powerline south of the confluence with the North Fork to the Relief Ditch diversion); tentative classification is recreational; ORVs are scenic and recreational;
 - Red Canyon; tentative classification is scenic; ORVs are scenic and recreational; and
 - Smith Fork Creek; tentative classification is scenic; ORVs are scenic and recreational.
- More information on these segments can be found in Appendix I of the Gunnison Gorge Resource Management Plan here:
http://www.blm.gov/style/medialib/blm/co/field_offices/gunnison_gorge_national.Par.70287.File.dat/GGNCA-RODRMP-Nov2004.pdf

Effects on these Wild and Scenic segments (both eligible and suitable) from the Modified Grazing Alternative would provide slight incremental improvements to vegetation and ecological ORVs, but the effects would likely not be detectible within the ten year term of the grazing permits. Within the draft Dominguez-Escalante NCA RMP, one alternative (Alternative B) is to remove domestic sheep grazing from the NCA. This would remove 21,041 acres of domestic sheep allotments that are currently overlapping with CHHR and would be expected to have disease outbreaks on an annual basis, thus supporting the improvement of the wildlife ORV in Escalante Creek, Segment 2. There would be no effect on the other ORVs or tentative

classifications of these segments.

All eligibility/suitability determinations were made with current grazing management in place. The Proposed Action alternative would have no effect on eligibility, suitability, tentative classification or ORVs of these segments.

Soils

Existing soil disturbance from roads, rights-of-ways, treatments, recreation, and grazing continue to contribute to degradation of soil health. Bare ground associated with all of these disturbances leads to transport of soil particles through erosive processes. Once mobilized, soil is dissolved in solution and mobilized downslope dependent on the volume of water present. Rainfall-runoff events in the CIAA are typically caused by monsoonal events that are high volume but short duration. These events may erode soils, delivering them to downstream water bodies, but the impact is short duration, limiting the impact.

The most effective means to slow erosion is perennial vegetation, and biological soil crust. Large portions of the cumulative impact area consist of salt desert shrub vegetation communities. Once these sites are disturbed, exotic annual weeds dominate the site before native annual species can get reestablished. Annuals don't provide the same level of protection to prevent soil erosion. A site dominated by annuals could take 120 years, under spring grazing conditions, or longer to reestablish native perennial grasses and shrubs, and attempted mechanical restoration is not cost effective, due to the failure rates¹⁷.

The reasonably foreseeable future actions, in addition to the proposed action, include the permit renewals for two additional land health areas. These combined actions would result in approximately 270,885 acres continuing to be grazed. Changes to terms and conditions, in each of the permits would result in some incremental improvements in soil health conditions. With a 25-50 year recovery period for biological soil crust, and 25-100 year or longer recovery period for perennial grasses and shrubs, and with the cumulative impact of nearly 2000 miles of roads and rights-of-ways, incremental improvements are not likely to be seen in the scope of 1 ten year permit renewal period.

Impacts from the Modified Grazing Alternative would have minimal effect on either improving or degrading soil health when combined with the past, present and RFFA actions in the cumulative impact analysis area. Similarly, alternative 2 (no grazing) would have little impact on the contributions of soils eroded and delivered to the Gunnison River due to the long recovery times of soil crust and perennial plants. The Proposed Action alternative (current management) would continue to contribute soils eroded from the landscape in levels similar to those found in the existing land health assessment.

Vegetation

Large portions of the cumulative impact area consist of salt desert shrub vegetation communities. The largest common vegetation communities across the three land health units include: Pinyon Juniper with 174,325 acres (36%), salt desert shrub with approximately 166,010 acres (34%), mountain shrub with 62,109 acres (13%), and sagebrush with 60,314 acres (12%). Within the

North Delta Land Health unit pinyon/juniper communities comprises 8,927 (14%) acres, and the salt desert shrub community totals 49,209 acres (76%).

A majority of this landscape unit has concerns with Standard 3 and are most pronounced in the salt desert shrub communities. The vegetation of salt desert shrub communities are characteristically sparse, with optimal ground cover 30%, and should largely be dominated by cool and warm season grasses, shrubs, in addition to annual and perennial forbs. The most concerning indicators within the 3 LHA unit include exotic invasive plants, low perennial cool season grass cover, low perennial forb cover, low native plant diversity, limited areas of low perennial warm season grass cover, low shrub vigor and cover, and heavy shrub hedging.

Based on historical information, both of these vegetation types (pinyon juniper and salt desert shrub) have altered herbaceous vegetative communities which has partly been attributed to the amount of livestock introduced into the west during settlement. During this era of unregulated heavy use period, many of these communities crossed an ecological threshold, which are difficult to recover once in a stable but degraded state¹¹. In addition, Laycock¹¹ points out, that enclosures protected from grazing (sheep and jackrabbits) for 6-15 years did not move degraded vegetation communities to a differed vegetation condition or stage. Part of the conclusion for his observation was the amount of exotic annual vegetation present during the trials. Laycock¹¹ and Friedel¹² suggests, if a vegetation type is in a stable lower stable state (successional), it will not respond to simply to changes in grazing management or even the removal of grazing. They further state managers must recognize this situation when it occurs so that false expectations of improvement are not fostered.

The reasonably foreseeable future actions in addition to the Modified Grazing Alternative include the permit renewals for two additional land health areas, and potential changes in type of livestock within the Dominguez-Escalante (D-E) NCA. These combined grazing permit renewals would result in approximately 330,280 (270,885 BLM only) acres continuing to be grazed, but would result in a slight reduction of 7,415 acres of grazing related disturbance. Changes to terms and conditions in each of the permits would result in some incremental improvements in vegetation health conditions. With a 25-100 year or longer recovery period for perennial grasses and shrubs, and the incremental improvements are not likely to be seen in the scope of 1 ten-year permit renewal period.

Impacts from the Modified Grazing Alternative would have small incremental effect on improving degraded vegetation/ecological sites by halting any additional net degradation and improving trend over 10-25 years (downward to stable) which would move the landscape towards meeting land health standards in 25-100+ years when combined with the past, present and RFFA actions for the cumulative impact analysis area. Similarly, alternative 2 (no grazing) would have minor undetectable changes within 25-100+ years towards meeting land health standards. The Proposed Action alternative (current management) would continue to decline in levels similar to those found in the existing land health assessments.

Invasive, non-native species

Existing disturbance from roads, rights-of-ways, vegetation treatments, recreation, adjacent private land, wildlife use, and grazing continue to contribute to degradation of vegetation and

establishment of exotic invasive plants and noxious weeds. Impacts from noxious and invasive weeds in past and present actions within the CIAA include: 337,695 acres of public lands (BLM, NPS, State, County, City and private combined); 51,719 acres of irrigated agriculture, 1,084 acres of treatments, 1,071 acres of open OHV; 2,356 miles of linear disturbance (roads, ROW [powerline/pipelines], ditches, livestock trailing routes) and 13.2 acres of recreation developments. All of these areas would correspond to vector points, establishment and persistence of invasive and noxious weeds.

The reasonably foreseeable future actions, in addition to the Modified Grazing Alternative include the permit renewals for two additional land health areas, and potential changes in type of livestock within the Dominguez-Escalante (D-E) NCA. These combined grazing permit renewals would result in approximately 330,280 (270,885 BLM only) acres continuing to be grazed, but would result in a slight reduction of 7,415 acres of domestic grazing related disturbance. Changes to terms and conditions in each of the permits would result in some incremental improvements in desired perennial vegetation health conditions, and thus a more resilient native vegetation community. With 25-100 year or longer recovery period for perennial grasses and shrubs in areas where thresholds have been crossed, and the cumulative impact of nearly 2000 miles of roads and rights-of-ways, the incremental improvements are not likely to be seen in the scope of 1 ten-year permit renewal period.

Impacts from the Modified Grazing Alternative would have minor incremental effect on improving desired vegetation, and by association, a vegetation community more resilient to the establishment and spread of noxious and invasive weeds, even when combined with the past, present and RFFA actions in the cumulative impact analysis area. Similarly, alternative 2 (no grazing) would have minor undetectable changes within 10-25 years towards changing trend cycles and 25-100+ years meeting land health standards. The Proposed Action alternative (current management) would continue to decline in levels similar to those found in the existing land health assessments.

Terrestrial Wildlife, including Migratory and Special Status Birds, Special Status Terrestrial Wildlife

Existing disturbance from roads, rights-of-ways, treatments, and grazing continue to contribute to degradation of vegetation and wildlife habitat health by decreasing foraging habitat and prey availability. Impacts to wildlife from past and present actions within the CIAA include 337,695 acres of domestic grazing lands (BLM, NPS, State, County, City and private combined); 51,719 acres of irrigated agriculture, 1,084 acres of treatments, 1,071 acres of open OHV, 2,356 miles of linear disturbance (roads, ROW [powerline/pipelines], ditches, livestock trailing routes) and 13.2 acres of recreation developments. All of these areas would correspond to removal or alteration of wildlife habitat and temporary (or in the case of some roads, permanent) disruption and disturbance to wildlife species, or direct impacts to individuals from vehicular collisions. These disturbances are at least partially overlapping, but grazing alone characterizes 57 % of the 589,215 acre CIAA.

Large portions of the cumulative impact area consist of salt desert shrub vegetation communities. Once these sites are disturbed, exotic annual weeds dominate the site before native annual species can get reestablished. A site dominated by annuals could take 120 years or longer to

reestablish native perennial grasses and shrubs, and attempted mechanical restoration is not cost effective due to the failure rates¹⁷.

The reasonably foreseeable future actions, in addition to the proposed action, include the permit renewals for two additional land health areas, and potential changes in type of livestock within the Dominguez-Escalante NCA. These combined grazing permit renewals would result in approximately 330,280 (270,885 BLM only) acres continuing to be grazed, but would result in a slight reduction of 7,415 acres of grazing related disturbance. Changes to terms and conditions in each of the permits would result in some incremental improvements in vegetation health conditions and thus wildlife habitat condition. With 120 year or longer recovery period for perennial grasses and shrubs, and the cumulative impact of nearly 2000 miles of roads and rights-of-ways, the incremental improvements are not likely to be seen in the scope of 1 ten-year permit renewal period. Additionally, within the draft Dominguez-Escalante NCA RMP, one alternative (Alternative B) is to remove domestic sheep grazing from the NCA. This would remove 21,041 acres of domestic sheep allotments that are currently overlapping with CHHR and would be expected to have disease outbreaks on an annual basis.

Impacts from the Modified Grazing Alternative would have minimal effect on either improving or degrading vegetation and terrestrial wildlife habitat health when combined with the past, present and RFFA actions in the cumulative impact analysis area. Similarly, alternative 2 (no grazing) would have minor undetectable changes within 10-50 years towards meeting land health standards. The Proposed Action alternative (current management) would continue to decline in levels similar to those found in the existing land health assessments.

Threatened, Endangered, and sensitive species Plants

Past and present actions on BLM-managed land within the CIAA area include: major utility line rights-of-way (ROW), water developments, especially check dams and irrigation projects, military training, road construction and highway expansion, livestock grazing, OHV use and other recreational activities, and illegal collection. Past and current human uses of other lands in the CIAA area include primarily agriculture, both cropland and rangeland, and industrial or residential development. Natural factors contributing to the status of the species include herbivory and trampling by wildlife. These anthropogenic and natural factors have undoubtedly contributed to changes in the distribution and abundance of the Colorado hookless cactus and altered important habitat characteristics.

The reasonably foreseeable future actions, in addition to the proposed action, include the permit renewals for two additional land health areas Escalante and Gunnison Gorge NCA. These combined actions would result in approximately 286,172 acres continuing to be grazed. Changes to terms and conditions in each of the permits could result in some incremental improvements in habitat conditions. With 25-50 year recovery period for those associated habitat that have most functional groups represented with moderate levels of invasive annual plant dominance and 120 year or longer recovery period for habitats that are more degraded. The cumulative impact of nearly 1500 miles of roads, and 2,500 acres of long term disturbed rights-of-ways, and nearly 10,800 acres of open OHV area, the incremental improvements are not likely to be realized in the scope of 1 ten year permit renewal period.

Impacts from the Modified Grazing Alternative would have a minimal positive impact on improving Colorado hookless cactus habitat, when combined with the past, present and RFFA actions in the cumulative impact analysis area. Alternative 2 (no grazing) would have a similar positive impact on improving Colorado hookless cactus habitat due to the long recovery times of degraded salt desert shrub communities, that the cactus is closely tied to within the CIAA. The Proposed Action alternative (current management) would have minimal negative impacts by continuing to degrade habitat for the Colorado hookless cactus at rates similar to those found in the existing land health assessment.

Wetlands and riparian zones

The cumulative impact analysis area (CIAA) for wetlands and riparian zones include perennial and intermittent streams within the 3 LHA unit, North Delta, Dominguez Escalante, and Gunnison Gorge. There are 46 total miles of stream meeting standard 2 in the CIAA area, 13 miles meeting with a downward trend, and 4 miles that are unknown within the area. Past and present actions were noticeably similar on BLM-managed riparian and wetland within the CIAA area and include: irrigation diversions to ditches for irrigation, irrigation return flows, water developments, isolated grazing issues, ROWs which contribute sediment and other pollutants into water, and invasive and noxious weed species.

Reasonably foreseeable future action will continue to include irrigation diversions for private land irrigation. Future lining of ditches could dry up some artificial riparian areas which are due to current ditch leakage. Continued grazing, with proper management, should not create riparian issues. Continued ROWs, such as the railroad in Escalante Canyon, can initiate fires from the tracks into the riparian zone of the Gunnison River that may introduce invasive/noxious weeds.

Impacts from the Modified Grazing Alternative would continue to have minimal effects on either improving or degrading riparian areas, within the North Delta land health unit, when combined with past, present, and reasonably foreseeable future actions in the cumulative impact analysis area. Current livestock management was not found to be a contributing factor in the degradation of riparian areas for this land health unit, and factors contributing were outside the impact of BLM management. In addition, alternative 2 (no grazing) would have little to no impact on the improvement of riparian area within this land health unit for the same reason as the proposed alternative. The current action alternative (current grazing management) impacts would be similar to the Modified Grazing Alternative and to the findings in the existing land health assessment.

Water-Surface

The cumulative impact analysis area for surface water is slightly smaller than the three land health areas, because the actions occurring are limited to the impacts above BLM and below BLM in the upper and lower reaches of the watershed. There are 181,272 acres affected in the CIAA. The largest impact to surface water is the storage and diversion of water for irrigation on private land. Most of the natural streams above the BLM land are used to convey water to private property inholdings within BLM or at lower elevation. There are nearly 50 miles of additional irrigation ditches located on BLM land in low elevation areas to convey water to adjacent private agricultural fields. There is 51,719 acres of irrigated private land in close proximity to the CIAA.

Reasonably foreseeable future actions include the lining of existing irrigation ditches conveying water from Federal Bureau of Reclamation irrigation water projects. As described in the surface water environmental consequences section, approximately 74-87% of the salinity, and most of the selenium concentrations in the Gunnison River, are attributed to irrigation return flows, deep groundwater percolation and municipal sources. The lining of existing irrigation ditches will contribute to reduced salinity and selenium contributions by reducing the deep percolation of groundwater. Sediment and E. coli are unlikely to be impacted by lining of ditches.

Impacts from the Modified Grazing Alternative would have minimal effect on either improving or degrading surface water quality when combined with the past, present and RFFA actions in the cumulative impact analysis area. Similarly, alternative 2 (no grazing) would have little impact on the contributions of selenium, salinity, sediment and E. coli eroded from uplands and delivered to the Gunnison River due to the long recovery times of soil crust and perennial plants. The Proposed Action alternative (current management) would continue to contribute similar levels of contaminants eroded from the landscape in levels similar to those found in the existing land health assessment.

Socio-Economics

Proposed Alternative – Cumulative social and economic effects experienced from reduction on any allotment would be compounded on a regional basis. As long as grazing on allotments within the planning area remains economically feasible, the cattle, sheep, and farming sector will continue to provide economic activity, including jobs and income, within the study area. However, if reductions of AUMs result in the grazing on allotments in the planning area to becoming economically not feasible, then the cattle, sheep, and farming sector will provide less economic activity within the study area.

The impact of the Modified Grazing Alternative has been analyzed and considered, separately and cumulatively in the document. The specific action of reducing 10 year average actual use AUMs in the Modified Grazing Alternative will have economic impacts to individual permittees. However, cumulatively the grazing operations in the regional area, while impacted in the short term in Delta County, will in the long term remain sustainable, and rangeland health and productivity will be protected and enhanced for future use.

No Grazing Alternative – Cumulative social and economic effects experienced by not renewing permits would be compounded on a regional basis. The cattle and farming sector of the regional economy would experience a decline in economic activity that exceeds the proportion of cattle and sheep inventories grazed, on public lands due to the multiplier effect.

Proposed Action Alternative (current management) – Cumulative social and economic effects experienced with continuation of grazing under current management would result in a decline of economic activity consistent with management actions implemented to remedy continued declines rangeland health and productivity. These actions could range from a reduction in AUMs to elimination of grazing and may include land health restoration activities.

Range Management

The cumulative impact analysis area for livestock grazing management includes the three land health units North Delta, Dominguez Escalante, and Gunnison Gorge, because subsequent permit renewals may have similar effects on livestock grazing management. Livestock grazing is a dominant land use activity in these areas and includes a total of 70 allotments and 43 grazing permits.

Past actions include the renewal of grazing permits with some modifications to Term and Conditions of the permit. However, some of these changes were never implemented due to the way the term or condition was drafted, which made it difficult to put into grazing management practices. In addition, a variety of range improvements not limited to such improvements as cattle guards, water developments, fences, and trailing routes have been implemented across the landscape to aid in livestock management including distribution, delineation of use areas, and the management of other activities effecting livestock management.

Present actions include the renewal of grazing permit renewals with modifications to Terms and Conditions of the permit, including but not limited to, carrying capacity (AUMs), number and kind of livestock, percent public land, utilization, grazing strategies, stocking rates, and timing. In addition, a variety of range improvements such as cattle guards, water developments, fences, and trailing routes are being maintained to aid in livestock management, including but not limited to, distribution, proper utilization management, and delineation of use areas.

Reasonably foreseeable activities within the cumulative impact analysis area include livestock grazing permit renewals with modification to Terms and Conditions of the permit as listed in the above paragraphs. Grazing permit renewals are expected to maintain or improve vegetation conditions within the analysis area. There are no estimates or figures for active AUMs in other allotments at this time, but it is reasonable and foreseeable that acres/AUM would be comparable in allotments with similar ecological sites that are meeting with downward trends or not meeting land health standards.

Impacts from the Modified Grazing Alternative would have small incremental positive impacts on improving the amount of forage available on the range and in animal performance, when combined with the past, present and RFFA actions in the cumulative impact analysis area. Alternative 2 (no grazing) would have similar impacts on improving forage availability due to the long recovery times of degraded salt desert shrub communities within the CIAA. The Proposed Action alternative (current management) would continue to see degradation in rangeland condition similar to current conditions explained in the past and current land health assessments.

CONSULTATION AND COORDINATION

Information on the Land Health Assessment was posted to the UFO BLM website, and letters with information about the permit renewals were sent to permittees and posted online for a thirty day public scoping period starting on 5/9/2011. In all, 37 scoping letters were sent. In addition, the preliminary EA was made available for public review and comment for 30 days beginning August 17, 2012 until September 17, 2012. In addition, tribal consultation was initiated and partner agencies were notified early on in the process to participate. During the public comment period 14 comment letters were received from 2 government agencies, 6 individuals and 6 organizations. After review of the comment letters, substantive comments were received on the following summary topics (see Attachment C for summary of comments and responses):

- The Risk of Contact (RoC) model should be used as the best scientific tool for determining risk associated on N. Delta Allotments and completed for all alternatives.
- RoC model literature, methods used, assumptions, inputs and outputs, or disease transmission studies are flawed, particularly how Payette data was used.
- RoC model is not compliant with Data Quality Act, ESA, or presidential orders on scientific integrity and transparency.
- It is requested no new domestic sheep grazing allotments be created or conversions in class of domestic sheep occur, and favor no reauthorization of domestic sheep grazing in areas with elevated risk to big horn sheep.
- BLM needs an emergency response plan or action plan in the event contact or close contact between big horn sheep and domestic occurs.
- BLM needs a monitoring plan developed to monitor effectiveness of separation between big horn and domestic sheep.
- How do bighorn sheep recommendations relate to 9 mile effective buffers for separation, on what research is the BLM relying on to come to this conclusion?
- BLM is violating the sheep MOU or the MOU provides adequate guidelines and the BLM is favoring single species management.
- BLM is not using all available research on big horn sheep and domestic sheep interaction (Agricultural Research Station) and is using outdated or no longer valid data.
- The analysis states that populations would not recover from a disease outbreak, which violates BLM Manual 6840 pg 105.
- BLM should stop using flawed local model (POI) for bighorn sheep risk of contact.
- BLM should analyze risk of disease transmission rather than risk of contact.
- Land Health Assessment is being evaluated to make incorrect analysis to reduce carrying capacity (AUM's) and the results are flawed and subjective.
- Trend data conclusions are flawed because BLM used different methods.
- Ecological Site Descriptions should not be relied upon to determine what a landscape should look like.
- There is no explanation of how Adobe Badlands ACEC can continue in static or downward trend (as stated in the Proposed Action analysis) and still meet ACEC goals.
- Adobe Badlands should not qualify for WSA because it is already trammled.
- Why does BLM use a nebulous category "meeting with problems" when there is a list of problems that should make the area not meeting.
- How can areas with 65% of the community dominated by invasive annuals meet LHS.
- LHA was done during a drought.

- AUM reductions without other changes in management (use areas, rest, rotation) will not improve land health.
- Increase in weeds being correlated with livestock is unsubstantiated; other environmental factors influence weed spread
- The criteria the BLM used in calculating AUMs is unclear.
- Reductions on Wells Gulch allotment are arbitrary because failure to meet land health is not attributed to current livestock grazing.
- BLM asserts exaggerated claim on historic grazing magnitude.
- 50% utilization rates can be an effective management tool. Does not favor 35% utilization because there is no scientific basis.
- The utilization rate of 35% is not supported in literature or by ESD.
- The EA does not address forage allocation for wildlife and livestock to correct problems with over browsing.
- The EA does not strike a balance between grazing and environmental pressures.
- The EA does not analyze the level of grazing impacts optimal to protect biological soil crust and their role in maintaining healthy vegetation.
- BO/BA for cactus is outdated and BLM should re-consult on the issue for this EA.
- There is no evidence to support grazing threatens cactus; other environmental factors are influencing. Not all populations are known, so permittees can't stay away from every population. Grazing may be beneficial to cactus.
- The BLM is not following its multiple use mandate, the NEPA process, and did not or should include permittees in the LHA and EA process.
- The public lands provide economic stability and the proposed action will harm the economy.
- Drought monitoring tool is inappropriate for this area or is inefficient and utilization levels are actually higher than the 35% non-drought standard.
- Impacts of climate change are not addressed, especially for actions with long term impacts, and for plant communities and ungulates.
- North Delta herd of antelope contracted BT/EHD from cattle in the area is a faulty assumption; bighorn and antelope have BT/EHD issues. Shouldn't be blamed on domestic livestock and the BLM and CPW are saying two different things to the public regarding influence of sheep and disease transmission on antelope.

After the end of the public comment period, the BLM analyzed the comments and made changes as necessary to the EA. A summary of public comments and responses is included as Attachment C.

INTERDISCIPLINARY REVIEW:

The following BLM personnel have contributed to and have reviewed this environmental assessment.

<u>Name</u>	<u>Title</u>	<u>Area of Responsibility</u>
Jedd Sondergard	Hydrologist	Soils, Surface Water, NEPA Coordination
Melissa Siders	Wildlife Biologist	Terrestrial Wildlife, Terrestrial TES Species, Migratory Birds
Lynae Rogers	Rangeland Management Specialist	Rangeland Management, Riparian, ACEC, Vegetation, Invasive Species,
Ken Holsinger	Biologist	Threatened and Endangered Species, ACEC, Vegetation
Kelly Homstad	Fuels Specialist	Air Quality, Fire
Edd Franz	Recreation Planner	WSA, Lands w/ Wilderness Characteristics, WSR
Glade Hadden	Archaeologist	Cultural Resources, Native American Religious Concerns

GLOSSARY

Actual Use Report – means a report of the actual livestock grazing use submitted by the permittee or lessee. (§43 CFR 4100.0-5)

Authorized Officer – means any person authorized by the Secretary to administer regulations in this part, (§43 CFR 4100.0-5)

Animal Unit Month (AUM) – means the amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month. (§43 CFR 4100.0-5)

Emergency Feeding – Emergency feeding may be required as a result of an unforeseen event which limits the forage available for livestock. Feeding of hay as a result of fire, flood, or snow is an example. Emergency feeding is accepted on the public lands for short periods while the emergency exists or until the livestock can be removed. (§43 CFR 4110.3-2 (a) and 4310.3-3 (c)).

Maintenance Feeding – Maintenance feeding is providing feed to supplement the forage in meeting the dry matter requirement for adequate livestock nutrition beyond the period of emergency feeding. An example is feeding hay during periods of drought when available forage is not adequate. Maintenance feeding is not accepted on the public lands. (§43 CFR 4110.3-2).

Proper Grazing – Proper Grazing is related to proper stocking rate and can be defined as the level of grazing that does not impair the ability of plants to recover from grazing and provides sufficient residue for soil maintenance.

Supplemental Feed – Supplemental feed means a feed which supplements the forage available from the public lands and is provided to improve livestock nutrition or rangeland management. (43 CFR 4100.0.5) Permittees or lessees may place supplemental feed on the public lands unless they are prohibited from doing so by terms and conditions in the grazing permit or lease. The authorized officer may include terms and conditions in permits or leases to direct placement of supplemental feed on the public lands by permittee or lessee. (§43 CFR 4130.6-2).

Utilization – means the portion of forage that has been consumed by livestock, wild horses and burros, wildlife and insects during a specified period. (§43 CFR 4100.0-5)

APPENDIX A: DROUGHT MONITORING PLAN

Uncompahgre Field Office Drought Detection and Monitoring Plan

I. Introduction

Drought, which is a normal part of the climate for virtually all regions of the United States, is of particular concern in the West where an interruption of the region's already limited water supplies for extended periods of time can produce devastating impacts¹. The Uncompahgre Field Office is located primarily within the Colorado Plateau ecoregion defined by the Western Ecology Division of the United States Environmental Protection Agency. Drought is considered to be a recurring event within this ecoregion. The early detection and prompt response to drought is needed to prevent further degradation to affected resources within the UFO. The purpose of this monitoring plan is to describe the drought indicators and response triggers that will be used to facilitate the early detection and monitoring of drought conditions, and determine if management actions are needed. This document also provides a description of the monitoring methods that will be used to determine if the drought response triggers have been met.

II. Goals

The early detection of drought is necessary for effective management during drought. The following list outlines the goals of the Uncompahgre Field Office Drought Detection and Monitoring Plan:

Goal 1: Early detection of drought conditions.

Goal 2: Verify whether regional drought conditions are reflected at the local level.

Goal 3: Strategically monitor the condition of vegetation and water resources at the local level.

Goal 4: Monitor to determine when drought conditions have ceased.

III. Drought Indicators

Drought indicators are observations signaling the start or continuation of a drought. The UFO will use the following drought indicators (A, B, C below) to determine the onset and/or continuation of a drought:

A. Regional Drought Severity Class

The UFO will use the Drought Monitor's drought severity classification and its components to indicate drought at the regional level. The National Oceanic and Atmospheric Administration and other government agencies monitor drought at national and regional levels and make this information

¹ Wilhite, D.A. 1997. Responding to drought: Common threads from the Past, Visions for the Future. Drought Mitigation Center Facility Publications. Paper 29. Available: <http://digitalcommons.unl.edu/droughtfacpub/29>

available to the public on the U.S. Drought Monitor (<http://droughtmonitor.unl.edu/>). The drought severity classification breaks drought conditions into 5 stages: abnormally dry, moderate drought, severe drought, extreme drought, and exceptional drought. The US Drought Monitor is designed to provide a general summary of current drought conditions nationwide. Drought intensity categories are based on five key indicators: Palmer Drought Index, CPC Soil Moisture Model Percentiles, USGS Weekly Streamflow Percentiles, Standardized Precipitation Index, and Objective Short and Long-term Drought Indicator Blends, together with numerous supplementary indicators. A summary of the Drought Monitor categories is as follows:

- **Abnormally Dry:** Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.
- **Moderate Drought:** Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested.
- **Severe Drought:** soil moisture and weekly streamflows estimated in the 6-10th percentile of normal, and impacts of crop or pasture losses likely; water shortages common; water restrictions imposed.
- **Extreme Drought:** soil moisture and weekly streamflows estimated in the 3-5th percentile of normal, and impacts of major crop/pasture losses; widespread water shortages or restrictions.
- **Exceptional Drought:**, soil moisture and weekly streamflows estimated in the 0-2nd percentile of normal, and impacts of exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies.

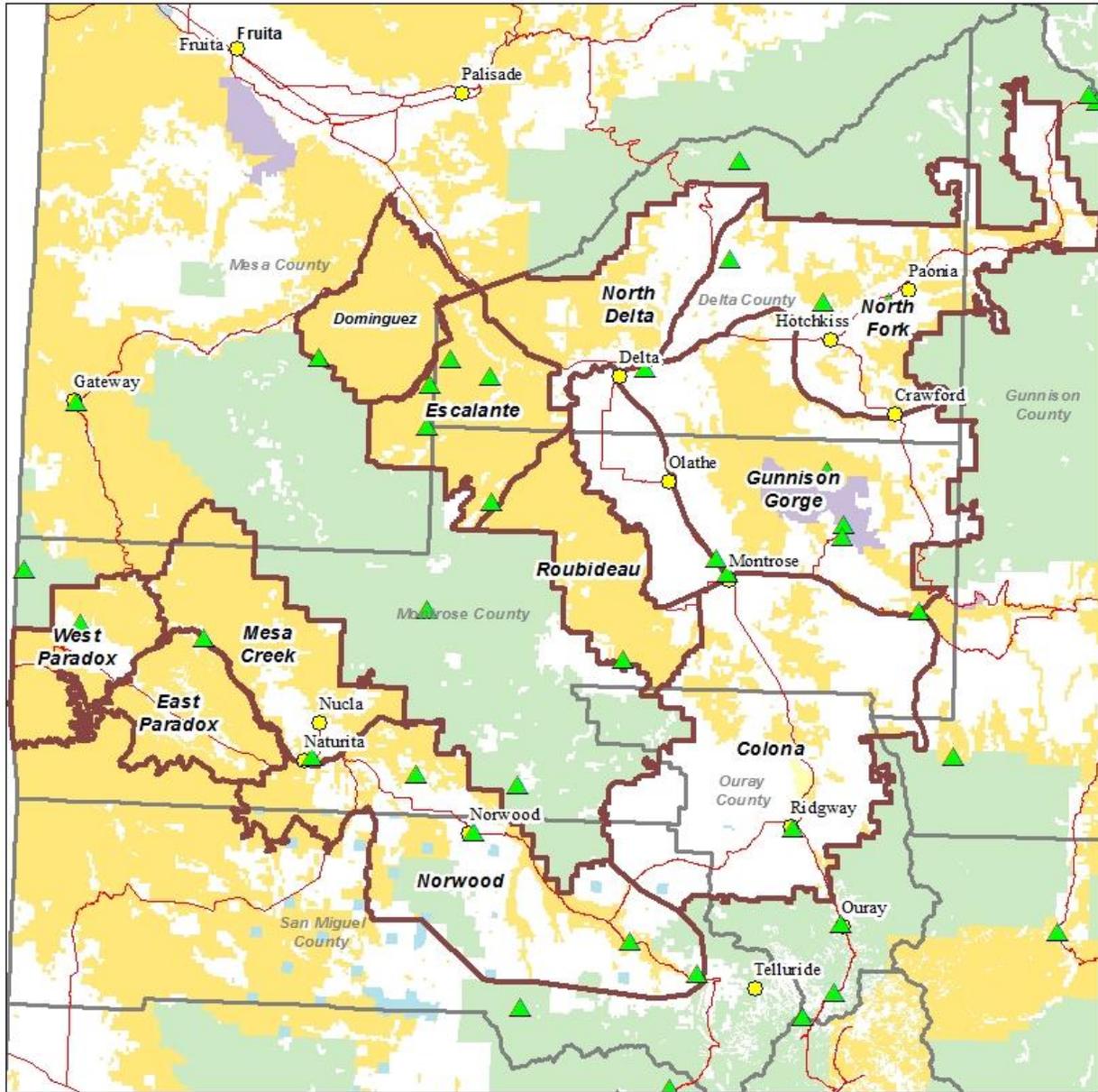
Drought Monitor information will be evaluated monthly by UFO staff.

B. Local Weather Data (temperature, precipitation, and soil moisture)

Each month, UFO staff will review monthly temperature, precipitation and soil moisture statistics from local weather sites to evaluate and classify drought status within each of the 10 landscape units, and determine whether triggers have been reached. Local weather sites include both BLM and non-BLM administered weather stations. Below are the existing weather monitoring sites within each of the 10 Landscape Health Units. (Map A1.) Additional resources that may be used to determine classification could include: Keetch-Byram Drought Index, NOAA/NESDIS satellite Vegetation Health Indices, basin snow water equivalent averages, groundwater levels, and the Surface Water Supply Index.

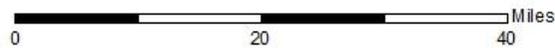
Where local temperature and precipitation conditions diverge from the regional-level drought severity classification, the UFO staff will reclassify the drought severity at the appropriate level for specific areas. The 10 Landscape Health Units will be used as a basis for drought severity categorization.

Map A1. Landscape Health Units across the project area.



Legend

-  Climate Monitoring Locations
-  LHA_Landscape_Units
-  Bureau of Land Management
-  Bureau of Reclamation
-  National Park Service
-  Private
-  State
-  US Forest Service



Map produced by Bureau of Land Management,
 Uncompahgre Field Office, GIS Program
 Projection: UTM, Zone 13; Datum: NAD 1983
 No warranty is made on the accuracy, reliability and completeness
 of these data for individual use or aggregate use with other data.
 Spatial data may not meet National Map Accuracy Standards. This
 information may be updated without notification.



C. Site-Level Indicators

UFO staff will make site visits to verify whether local vegetation and water availability conditions are consistent with drought categories determined from regional and local weather data. At a minimum, site visits will be conducted at a range of elevations within each Landscape Health Unit that are verified in a severe drought condition based on local weather monitoring conditions. Key forage species will be monitored based on the dominant palatable species as described in the associated Ecological Site Descriptions (ESDs) for the area. In instances where key species referenced in the ESD are absent, key species would be identified using site-specific and/or past monitoring data. The following plant production and/or drought stress indicators will be used to determine whether site-level conditions accurately reflect the Drought Severity classifications:

- Plant production: Are interruptions in plant life cycle stages (emergence, vegetative growth, flowering, seed set and dispersal, senescence) consistent with the drought severity class? Is sufficient forage available to meet Drought Management Objectives without damaging the vegetation resource?
- Drought stress: May also be monitored using VegDRI with site visits occurring to ground truth VegDRI reports. VegDRI is a hybrid drought monitoring and mapping tool that integrates satellite observations of vegetation status and climate data with information on land cover, soil characteristics, and other environmental factors. VegDRI reveals vegetation conditions as plants respond to solar energy, soil moisture, and other limiting factors (USGS 2010).
- Soil Moisture: Is sufficient soil moisture available for plant growth?
- Water availability: For those allotments which do not typically rely on water hauling for normal year use, are water sources (natural and/or developed) limited as described by the drought severity class? Are waters sufficient to provide for the management and/or distribution of wildlife and livestock while maintaining riparian area functionality and the health of adjacent upland areas?

IV. Data Management

Field worksheets, maps and drought monitoring summaries will be stored in the short/ long term monitoring files for the respective allotment. GPS points of monitoring locations will be uploaded into GIS. All GIS information will be kept to Uncompahgre Field Office and Colorado State Office standards and will be incorporated into the UFO's GIS data base.

Delayed emergence			
Lack of flowering			
Unsuccessful seed set			
Induced senescence			
Dead			
Average Total			
Drought Rating (1-4)			

Vegetation in occupied sage grouse habitat

Evaluate 25 individuals of each key perennial plant species (grasses and forbs). Use key species whenever possible on un-grazed sites. Use dot count to tally which indicators best describe the height of each individual.

	Grass height at leaf droop	Forb height at leaf droop	Sagebrush height (vegetative stems)
Key Species			
<1 inch			
1-2 inches			
2-4 inches			
4-6 inches			
6-8 inches			
8-10 inches			
10-12 inches			
12-14 inches			
14-16+ inches			
Average Total			
Drought Rating (1-4)			

Summary - Based on the data collected, answer the following questions:

Does plant production of key species show substantial proportions of the population are experiencing life cycle impairments due to drought (e.g., drought induced senescence, reduced seed head development, etc.)?

Yes No Rational:

Has substantial death of key species occurred? Yes No

Are riparian water sources reduced to the point where livestock water needs will concentrate animals and damage riparian vegetation and impact channel stability? Yes / No / NA

Final Conclusions:

Field Verified drought severity class: Near Normal Moderate Severe
Extreme

General recommendations to protect resources for Moderate, Severe and Extreme conditions:

APPENDIX B: BIGHORN /DOMESTIC SHEEP RISK OF ASSOCIATION MODELING

This appendix was developed for the UFO RMP Amendment and was finalized September 2015. Note that this is an analysis for the UFO RMP Amendment area, which includes the North Delta Permit Renewal project area. Table and Figure references have been changed to reflect the Appendix label (B). Reference to Schommer and Woolever 2008 has been changed to Wehausen et. al. 2011.

Disease Summary

The potential effect that association (intermingling) with domestic sheep has on bighorn sheep populations (probability of die-off and population viability) is well documented and recognized. Current science indicates that the bacteria that cause pneumonia in bighorn sheep populations, *Mycoplasma ovipneumoniae* and *Mannheimia haemolytica*, appear only to be transmitted between domestic and bighorn sheep when they come in direct contact (<30-foot separation) (Besser et al. 2012a; Lawrence et al. 2010; Wehausen et. al. 2011). Besser et al. and others (2012b) identified that epizootic pneumonia of bighorn sheep is a devastating disease and etiology regarding the bacterial respiratory pathogens is unclear. This is also the case in Colorado (Miller and Wolf 2011). Transmission of *Mannheimia haemolytica* from domestic sheep to bighorn sheep was irrefutable, as demonstrated by Lawrence and others (2010), and provides justification sufficient for preventing range overlap and potential association of domestic sheep and goats with bighorn sheep (WAFWA 2012).

No one form of evidence can conclusively demonstrate that contact with domestic sheep frequently leads to die-offs of bighorn sheep populations in the wild. Taken together, however, the experiments and observations from the lab and the field do indicate that contact of wild bighorn populations with domestic sheep does pose a risk of disease transmission and die-offs in free-ranging bighorn populations. Lab experiments demonstrate the particular sensitivity of bighorn sheep to some pneumonia-causing bacteria. The controlled conditions available in inoculation and pen experiments show that healthy domestic sheep often carry bacteria that are fatal to bighorn sheep, and that they can transmit those bacteria through close contact. Finally, nearly a century of observations in the field supports the view that proximity to domestic sheep is a risk factor for bighorn sheep due to disease transmission from domestic sheep to bighorn sheep.

Garde et al. (2005) offers the following conclusions summarizing the risk to wild bighorn sheep from *Pasteurella* spp. and *Mannheimia* spp.

- These bacteria can cause pneumonia in bighorn sheep, but there are benign commensal strains in the upper respiratory tract which have no harmful effects.
- Pathogens that are benign in domestic sheep can be lethal in bighorn sheep.
- The transference of pathogens from domestic to bighorn sheep has been documented in laboratory settings with resulting mortality in bighorn sheep.
- Domestic sheep, goats, and llamas have been reported with these bacteria species.
- Wild sheep and mountain goats have been reported with these bacteria species.
- Transmission is by direct contact and aerosolization (e.g., fine mist from breathing).

- These bacteria species do not persist in the environment.
- Acute-to-chronic die-offs in bighorn sheep populations can result in low-to-100 percent mortality, although these bacteria can be present in healthy sheep.
- These bacteria are considered opportunistic and can result in pneumonia outbreaks.
- These bacteria can cause clinical disease in domestic sheep and goats but are rarely primary pathogens.

In summary, field observations suggest that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep, which has led to numerous independent experiments. These experiments provide strong corroboration that bighorn sheep have a high probability of contracting fatal pneumonia following contact with domestic sheep.

The impact of disease on bighorn sheep conservation is likely to increase as habitat loss and fragmentation restrict their movement and concentrate them into smaller areas, increasing contact rates and the spread of disease (Cahn et al. 2011, Scott 1988; Levins et al. 1994). Given the substantial concern raised in the published literature over the past 30 years, management guidance has focused on the separation of these species to prevent disease transmission from domestic sheep to bighorn sheep (The Wildlife Society 2014; WAFWA 2012; Cahn et al. 2011; Foreyt 1989; O'Brien et al. 2014; USFS 2009).

The Western Association of Fish and Wildlife Agencies (WAFWA) Wild Sheep Working Group recommends that land management agencies and state wildlife agencies cooperate to complete comprehensive risk assessments of domestic sheep grazing allotments to inform the land use planning process (WAFWA 2012). WAFWA provides recommendations for land management agencies, state wildlife agencies, and domestic sheep permittees to consider implementing in order to minimize risk of association between bighorn sheep and domestic sheep commensurate with level of risk. The BLM-UFO used GIS modeling to quantify the relative risk of association between domestic and bighorn sheep populations. Two modeling efforts were conducted: Probability of Interaction (PoIM) developed by the BLM-UFO in 2011 and Risk of Contact (RoC) developed by the U.S. Forest Service and BLM in Idaho (see additional discussion below). The BLM-UFO used the results from the models described below to inform the management actions in each alternative, to minimize risk of association between domestic and wild sheep. The parameters used in this model were based on existing science, where information could be obtained (see references), but they were also based on professional judgment.

Probability of Interaction Model (PoIM)

Assumptions for PoIM

The BLM-UFO assumed that CPW's mapping of bighorn sheep range was equivalent to suitable, occupied habitat and used that data as the basis for the highest priority habitat for bighorn sheep. Additionally, the PoIM model is concerned with bighorn sheep herds or populations and not with individual wandering bighorns (most often sub-adult rams) (WAFWA 2012). The PoIM attempts to quantify the probability of intermingling between domestic and bighorn sheep populations

given that either is free to move across the land naturally (i.e., without herders, for domestic sheep).

Explanation of PoIM assumptions

In order to use the model at a landscape level and to maintain parsimony², the BLM-UFO made the following assumptions:

1. CPW bighorn sheep overall range maps (CPW 2013a) are equivalent to occupied bighorn sheep habitat, for the purposes of the PoIM. Suitable habitat maps for desert bighorn sheep were not available.
2. When bighorn and domestic sheep occur in the same space, risk of interaction is high; as distance increases away from bighorn sheep mapped range (occupied habitat), the risk of interaction decreases. Risk of interaction is also affected by a great number of other variables (e.g., sex of animal, proximity of escape terrain, source habitats, and unsuitable habitat) that the BLM-UFO was unable to factor for in this model because of limited data availability.
3. Allotments have particular natural barriers to movement for both bighorn and domestic sheep that may prove to naturally mitigate some risk:
 - a. Domestic sheep barriers to movement (Holecheck, Pieper, and Herbel 1989, McDaniel and Tiedeman 1981) are as follows:
 - i. Continuous cliffs (>70% slope) = barrier to movement.
 - ii. Major rivers = barrier to movement.
 - iii. Continuous steep slopes (40–70%) = partial (50%) barrier to movement.
 - b. Bighorn sheep barriers to movement are determined as follows:
 - i. As distance from occupied habitat increases, the barrier to movement outward increases.
 - ii. At greater than 9 miles from mapped bighorn sheep range, the probability of the presence of a bighorn sheep is extremely low, and interaction is unlikely (WAFWA 2012).
 - iii. At greater than 2 miles from bighorn sheep range, extensive flat terrain (0–10% slope; interconnected areas >0.5 mile in diameter) would increase the barriers to movement outward from the bighorn sheep range.
4. Seasonal overlap of domestic sheep during breeding seasons would increase the likelihood of interaction between domestic and bighorn sheep because of the following:
 - a. Attraction between bighorn sheep and domestic sheep would increase during bighorn sheep breeding season and during domestic sheep breeding season.
 - b. Risk of interaction is higher when both bighorn and domestic sheep are present during either breeding season.

² The ability of a model to keep the number of variables small and still retain enough predictive power to be useful.

5. Additional assumptions used in the assessment of seasonal overlap include the following:
- a. Female domestic sheep are not turned out on BLM lands until after breeding.
 - b. Male domestic sheep are not permitted on BLM lands.
 - c. Desert bighorn sheep breeding season for the Middle Dolores (S-63) and Uncompahgre (S-62) bighorn sheep populations is Aug 1–Sept 30 (Banulis, personal communication, 2011).
 - d. Rocky Mountain bighorn sheep breeding season for the Black Canyon (S-80), Cow Creek/Wetterhorn (S-21), Dillon Mesa (S-80) and Snowmass West (S-25) bighorn sheep population is November 1 to December 31 (B. Banulis, personal communication, 2011).
 - e. Domestic sheep grazing season is defined by the dates of permitted use on an allotment.
 - f. Seasonal overlap = number of days of domestic sheep grazing season that overlap with bighorn sheep breeding season.

PoIM Methods

The following is a description of the methodology used to quantify the probability of mingling between domestic sheep (DS), and bighorn sheep (BHS) to determine risk posed by domestic sheep grazing within BLM-UFO allotments (Figure B 1).

1. In an initial risk assessment, allotment risk was characterized by the percentage of the allotment that fell within the BHS occupied habitat, as follows:
 - a. >75% = automatic rating of high risk
 - b. <75% = determined through remainder of process below
2. The rest of the process consisted of evaluating the undetermined areas for physiographic barriers to movement and the compounding temporal effects that allotment usage incurs for increasing the risk, as follows (see also Figure B 1 below) :
 - a. Phase 1: Proximity to Bighorn Sheep Range
 - b. Phase 2: Natural Barriers to Movement
 - c. Phase 3: Season of Use
3. Using ArcGIS, natural breaks in the data were determined using the ‘Natural Breaks (Jenks)’ option for displaying graduated color groups (Jenks 1967; Esri 2012) with four categories for those allotments falling within 9 miles of BHS habitat *in the UFO and in all of the D-E NCA RMP planning area only*. Using the results of the statistical analysis combined with the analysis of proximity to BHS range, the classifications in Table B. 1 were developed.
These risk categories were applied to all of the allotments in both the UFO and D-E NCA on the basis of their respective PA2 values.

Table B. 1. Bighorn Sheep Probability of Interaction Allotment Risk Category Ranges*

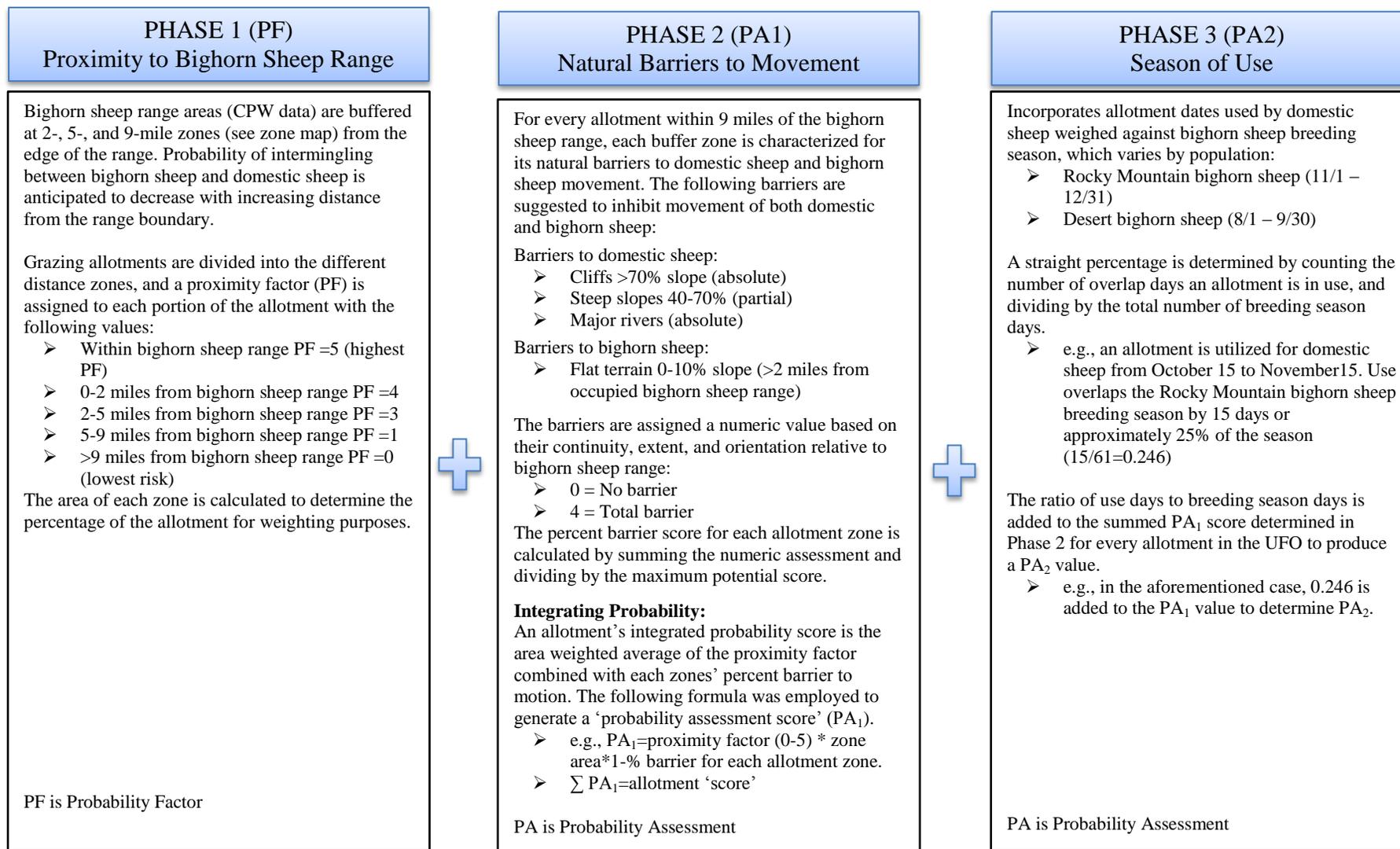
Allotment Risk Category	PA2 low	PA2 high
Low (>9 miles from BHS range)	0.00	0.00
Some	0.000001	1.5
Moderate	1.500001	3.22
High	3.22001	5+

*PA2 is the final probability assessment score from the process. See Figure B 1.

PoIM Results

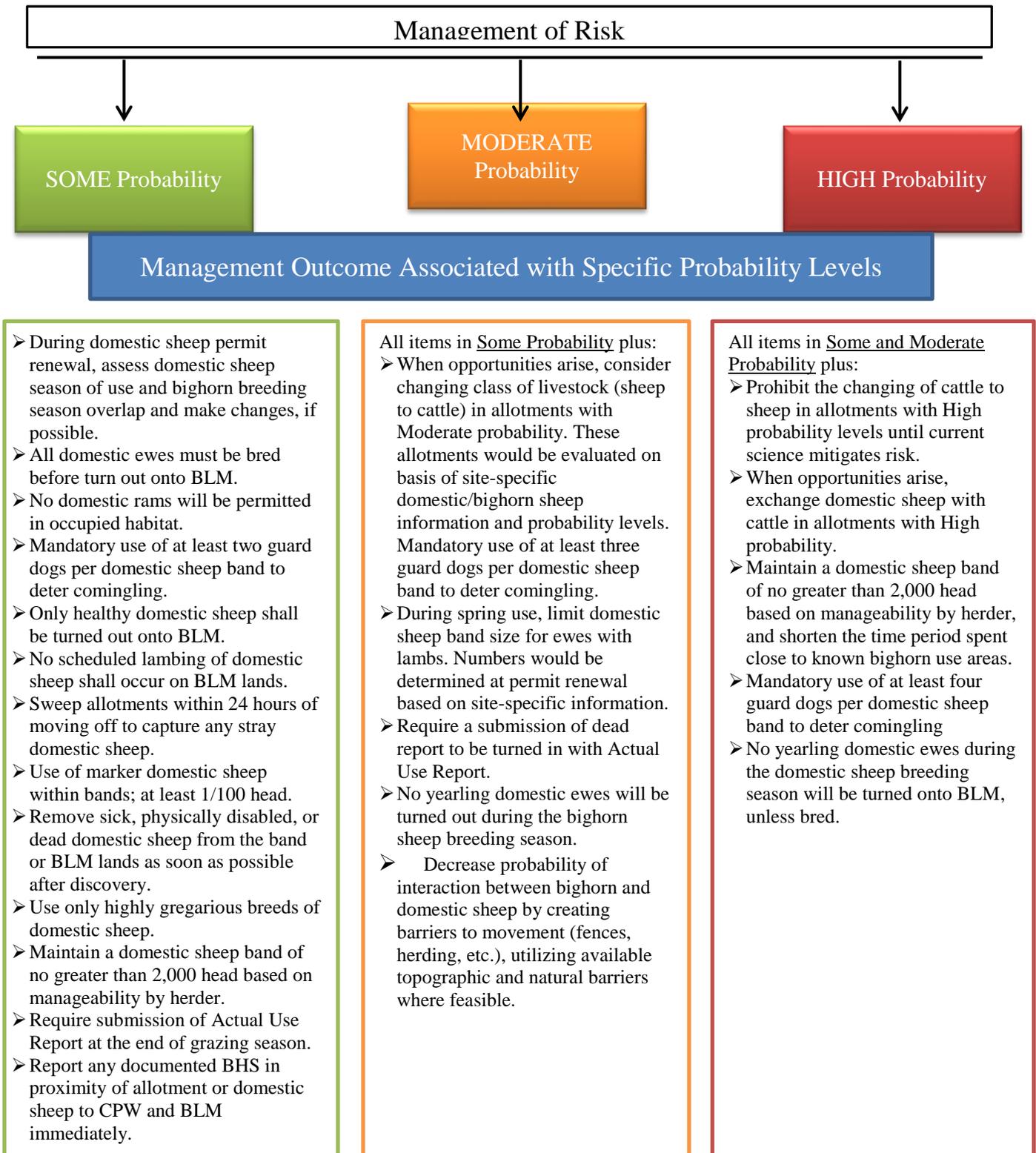
The PoIM analyzed 231 allotments or allotment pieces (Table B. 5). Most of the assessed areas are allotted to cattle or horses (87.4%). A smaller portion of the UFO RMP area is allotted to sheep (11.7%) or cattle or sheep (0.9%). A majority of assessed areas was considered to be Low (33.3%) or Some (32.9%) in the Allotment Risk Category. Only 12.6% of assessed areas were considered High and 21.2% were considered Moderate. Domestic sheep would be managed according to the probability of risk (Figure B. 1).

Figure B 1. Criteria for the Domestic/Bighorn Sheep Probability of Interaction Assessment



Statistical Analysis: The PA₂ values are calculated for each allotment within the 9-mile buffer zone. The values are then statistically analyzed to determine the natural breaks in the data set using the Jenks 'Natural Breaks' method. The final PA map for the UFO, Dominguez-Escalante National Conservation Area, and Gunnison Gorge sheep includes the weighted average PA₁ risk combined with the breeding season analysis.

Figure B. 1. Management of Risk³



³ Management Outcome was developed through a series of meetings with CPW and sheep permittees in 2011-12 as part of the UFO RMP Amendment process.

Risk of Contact Model (RoC)

In response to bighorn sheep population viability concerns, the Payette National Forest developed a methodology for calculating the probability and rates of contact between bighorn sheep and active domestic sheep allotments. Subsequently, in 2011, the U.S. Forest Service initiated a process to develop a geospatial platform based on the concepts used in the Payette analyses for application on other national forests. This was subsequently expanded to include the BLM (January 2013) and became an ArcGIS extension available to BLM in early 2014. Information for this model can be found in the extension tool user's guide (USFS 2013).

The RoC model was developed in an area that was rich in bighorn sheep movement and habitat data. For analysis of the risk of contact for this area, the BLM-UFO modified the use of the RoC model based on the best available data for our local bighorn populations. In order to utilize the best available data for model inputs, a series of webinars were conducted between BLM-UFO and Colorado Parks and Wildlife Biologists to agree upon data usage and assumptions⁴.

The RoC model estimates the probability that foraging bighorn sheep will reach a domestic sheep allotment. However, within an allotment it is not possible to determine where and when domestic sheep would consistently occur or for how long. Use of some areas within an allotment may present less chance of contact with bighorn sheep than others, while some areas may have higher probability of occurrence (e.g., source habitats as defined by RoC User Guide). Consequently, because of this uncertainty the RoC Model predicts potential interspecies contact by using the assumption that contact with an allotment results in interspecies contact. Of key importance to the model, the Core Herd Home Range (CHHR) defines the most important portion of a herd's use area, characterized by most (95%) of the use. By definition, where a CHHR overlaps an allotment, there is contact with the allotment and the assumption is that one or more contacts per year may occur. It is recognized that stray domestic sheep could have implications for bighorn sheep herds, and in many rangeland settings may pose a risk of disease transmission as large as or greater than from foraging bighorn sheep. However, the bighorn sheep risk of contact tool (USFS 2013) does not model the risk of stray domestic sheep and the subsequent potential for contact with bighorn sheep.

The following is a description of the methodology used to quantify the probability of bighorn sheep (BHS) to have contact with a grazing allotment, and ultimately contact with domestic sheep (DS) to determine risk posed by domestic sheep grazing within BLM-UFO allotments. BHS populations within approx. 35km (21.7 miles) of the UFO RMP boundary were selected for the RoC analysis because the RoC model calculates foray probabilities for BHS to approx. that distance (T. Rinkes per comm). The model was developed according to procedures outlined in the RoC ArcGIS extension tool user's guide (USFS 2013).

1. Inputs to the model include the following:
 - a. Bighorn suitable habitat
 - b. Bighorn Core Herd Home Range
 - c. Relative preference for habitat
 - d. Bighorn ram distance/ewe distance files
 - e. Bighorn adult herd size and sex ratios

⁴ December 12, 2014, January 15, 2015 and February 20, 2015.

f. Foray probability values (ram and ewe)⁵

Suitable Habitat Model

Bighorn sheep occupy rugged canyons, foothills, and mountainous terrain at elevations ranging from 1,450 to 10,500 feet. Key habitat features include steep, rugged escape terrain, grasses and forbs for forage, and a limited amount of tall vegetation. Bighorn sheep have habitat preferences and select habitat based on factors such as proximity of steep-sloped escape terrain, forage availability, and horizontal visibility (USFS 2013; O'Brien et al. 2014).

CPW developed a Rocky Mountain bighorn sheep suitable habitat model for the state of Colorado in 2012 (CPW 2012; Figures Figure B. 2 [CPW Rocky Mountain BHS Suitable Habitat Model for RoC Analysis Area]), but a desert bighorn sheep model was not available until late in 2014 (Figure B. 3) [CPW Desert BHS Suitable Habitat Model for RoC Analysis Area]). The desert BHS habitat model was made available by CPW for this modeling effort during the webinars. This model is similar to the Rocky Mountain suitable habitat model, but uses a less rugged terrain feature and only shows habitat to within 35km of the Dolores and Dominguez desert bighorn herds. As prescribed in the User's Guide, based on the source habitat model, all areas in the Rocky Mountain and desert suitable habitat models were assigned to one of three habitat classes—source habitat, connectivity area, and non-habitat. Source habitat for bighorn sheep occurs within BLM-UFO domestic sheep allotments and adjacent landscape.

Telemetry Data/Core Herd Home Range Modeling

Usually, CHHR analysis uses bighorn sheep telemetry location points to identify and enclose an area that contains 95 percent of all telemetry points from radio-collared bighorn sheep. CPW did not feel that they had enough telemetry locations to conduct this portion of the model. As stated in the User's Guide (USFS 2013), "If point location data are not available, a polygon layer containing the CHHR boundaries must be supplied." CPW biologists reviewed their existing spatial data for bighorn sheep home range polygons for overall, summer and winter ranges and provided their best professional judgment for boundaries for the populations involved (Figure B. 4 [Analysis area and bighorn sheep populations used in the RoC model]). It was acknowledged that these areas were over estimations of the CHHR concept and will overestimate foray distances.

Because we are interested in landscape (UFO RMP area) results, the RoC Model was run for each of the 12 BHS populations that are within approx. 35 km for the UFO RMP area (Figure B. 4[Analysis area and bighorn sheep populations used in the RoC model]). Results across bighorn sheep populations were added to create the finale results. If an area intersected with at least one BHS CHHR, the results were given as "This allotment intersects the home range polygon and is

⁵ "Foray distance distributions files" provide the probabilities that individual ram or ewe forays will reach each of the 1-kilometer-wide concentric rings emanating from the Core Herd Home Range boundary. "Sample data" are provided with the model and were derived from 12 years of Hells Canyon (Idaho) area telemetry data used as part of the Payette National Forest analysis. "The foray distance distributions exhibited by the Hells Canyon area bighorn sheep were consistent with published observations of bighorn sheep movements from several other areas of western North America. These default data should be used unless other well-supported, scientifically derived estimates of foray distance distributions are available for the area under consideration." (USFS 2013, pages 4–12)

therefore not included in the RoC analysis.” The RoC Model assumes contact due to direct overlap and can be viewed similar to high probability of interaction under the POI Model.

Foray Analysis

Bighorn sheep, particularly rams, make occasional long-distance movements beyond their CHHR. Singer et al. (2001) defined these forays as any short-term movement of an animal away from and back to its CHHR. This life-history trait can put bighorn sheep at risk of contact with domestic sheep, particularly when suitable habitats are well connected and overlap with domestic sheep use areas (Singer et al. 2000; Gross et al. 2000), or even when domestic sheep use is outside of CHHR areas. The risk of contact between dispersing bighorn sheep and domestic sheep is related to the number of bighorn sheep in a herd, proximity of domestic sheep use areas (allotments) to a bighorn sheep CHHR, distribution of bighorn sheep source habitats across the landscape, and frequency and distance of bighorn sheep forays outside of the CHHR. The risk of contact can be increased by straying domestic sheep (stocking rates and numbers of straying sheep, frequency and distance of straying, distance grazing occurs from bighorn sheep source habitat, and straying sheep persistence on the range) although these risk factors were not analyzed.

The foray model analyzes how often bighorn sheep leave the CHHR, whether they travel far enough to reach an allotment, and whether they then actually intersect an allotment (i.e., rather than intersecting a different area at the same distance from the CHHR). For this analysis, information on habitat preference and foray distance (ram/ewe) is used to generate a Foray Probability Raster. Again, local bighorn herd information was limited and during the webinar discussion, it was agreed by BLM-UFO and CPW biologists to use the default Idaho (summer) values as the best available information in the absence of more local information (Table B. 2).

Table B. 2. Default Idaho (Summer) Relative Preference Values by Habitat Class

Habitat Class	Habitat Name	Relative Preference
1	Suitable	1
2	Corridor	0.177
10	Non-habitat	0.029

Probability That a Bighorn Sheep Will Intersect an Allotment Analysis

Many animals (particularly BHS ewes) may not travel far, even if they are observed outside of the CHHR. The probability that a bighorn sheep on a foray will reach an allotment decreases as the travelling distance increases. Bighorn sheep rams are more mobile and leave CHHRs significantly more than ewes and have a higher probability of interspecies contact. For this portion of the analysis, information on herd size, sex ratios and foray rates are needed. CPW population and sex ratio information typically includes juvenile bighorn. This model assumes that herd size and sex ratios are of adult animals only. CPW biologists provided their professional adjustment of adult survey numbers for model use (Table B. 3 Desert; Table B. 4 Rocky Mountain). For some areas, CPW population areas were combined into one CHHR unit because they did not have enough information to be able to divide the existing polygons. Again, local information was limited on foray rates and during the webinar discussion, it was agreed by BLM-UFO and CPW biologists to use the default Idaho (Summer) values as the best available information in the absence of more local information (Ram 0.141; Ewe 0.015).

Within the RoC model, given that an animal has reached a ring, the probability that it will be in an allotment is proportional to the size of the allotment and to the quality of the habitat in the allotment relative to the size and quality of habitat in the ring as a whole. Results from the analysis across all BHS populations are found in Table B. 6. An example interpretation of the results is given in a footnote at the bottom of the table.

Probability of Disease Outbreak Analysis

The RoC model assumes that allotments that intersect with the CHHR have contact with domestic sheep and therefore potential to transmit the disease. The sequence of events by which a disease outbreak could result from contact between a bighorn sheep and a domestic sheep or goats in an active allotment located outside of bighorn sheep CHHR can be broken down into a number of steps. To reach an occupied allotment, a bighorn sheep must (1) leave the CHHR; (2) travel far enough to reach the allotment; then (3) intersect the allotment (i.e., rather than some other area at the same distance from the CHHR). Once this occurs, in order for disease transmission to occur, the bighorn sheep must (4) come into contact with domestic sheep in the allotment and (5) contract the disease from the domestic sheep. For an outbreak to affect the animal's home herd, the infected bighorn sheep must (6) make its way back to the CHHR and (7) transmit the disease to other members of the herd. Uncertainty is identified within the literature regarding what frequency of interspecies contacts in a rangeland situation result in disease transmission and disease outbreaks within a bighorn sheep population (USFS 2013; Carpenter et al. 2014; O'Brien et al. 2014). Because of this uncertainty and lack of appropriate data, the BLM-UFO did not conduct herd specific modeling in regard to disease transmission and herd persistence.

There is no scientific evidence to support a specific assumption for acceptable risk-of-contact and disease outbreak. The results should be viewed as a means of comparing the relative risks of disease outbreaks, not as definitive values. Results of the model support the current knowledge and characteristics of the bighorn sheep herds and the science based on the understanding of disease outbreaks potentially occurring from contact of a bighorn sheep within an allotment.

A high degree of uncertainty exists regarding the probability that contact of a bighorn sheep with an allotment will lead to disease outbreak occurring within a herd (USFS 2013; Carpenter et al. 2014; O'Brien et al. 2014). Quantification of disease transmission and outbreaks in bighorn sheep populations following contact with domestic sheep or goats, and the subsequent ability of a population to recover, are key to interpreting the results from the above models; however, the mechanisms of disease transmission and resulting disease outbreaks in bighorn sheep is not fully understood. We currently lack empirical data to make recommendations as to the frequency of outbreaks and the effects on population persistence. Therefore, the BLM-UFO relied on the following to assist with the interpretation of RoC:

- The effects of respiratory disease outbreaks on bighorn sheep populations are often severe (Besser et al. 2012a, b). Controlled pen experiments identified in Besser et al. 2012b resulted in complete or nearly complete die-offs of bighorn sheep following contact with domestic sheep. It has also been documented that disease perturbations can affect lamb recruitment for several years following a severe population decline resulting from a disease outbreak that rapidly affects many animals in a specific area at the same

time (Besser et al. 2012a; Coggins and Matthews 1992; Foreyt 1990). Consequently, when bighorn sheep disease die-offs occur, there is a substantial immediate mortality (population decline) and a delayed recovery due to poor lamb recruitment that can follow the disease outbreak for many years (Besser et al. 2013). Population recovery is unlikely where interspecies contact, potentially resulting in disease transmission and subsequent disease outbreak, occurs within a few decades of each other (BLM/CPW 2015). There is no specific guidance on the number of decades required to recover from a disease outbreak; observations of herds that have experienced pneumonic events indicate it likely requires several.

- Another important trend of wild-domestic sheep disease transmission is that an illness's effect on individual bighorn populations can be long-lasting. Cahn and others (2011) explained the trend of suppressed lamb recruitment: "Whether mild or severe, most respiratory disease outbreaks in bighorn populations are followed by several years of pneumonia caused mortality of lambs resulting in low recruitment rates and juvenile survival. Continuing lamb infection apparently results from females that remain infective following an outbreak, although mortality or morbidity among the females may not be detectable. Such recurring lamb infections can substantially delay the recovery of depleted populations to pre-outbreak levels."

The BLM-UFO recognizes the uncertainty regarding the relationship between the number of bighorn sheep contacts with a domestic sheep allotment and predictions for disease transmission and outbreaks. Because of the uncertainty regarding the probability that contact of a bighorn sheep within an allotment will lead to disease outbreak within a population, modelers ran the disease model with assumptions for a range of values from 0.05 (1 in 20 contacts would result in a disease outbreak) to 1.00 (every contact would result in a disease outbreak). The range of values modeled include: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 1.00. Results for this calculation are found in Table B. 7.

It is important to disclose that accurate modeling of the impacts of disease events based on individual animals is difficult, as the dynamics of respiratory disease in the wild are only partly known. An individual-based model would require understanding many factors, such as the incubation period and active infection durations, the probability and rate of recovery from disease, the rate of effective contact between individuals within the herd, and the possible role of persistently infected individuals in harboring and spreading the disease. Variations in the resistance to disease of individual bighorn sheep and in the virulence of the disease-causing organisms themselves can also affect population dynamics.

Furthermore, modeling population dynamics of large herbivores at the individual level requires estimating numerous parameters, from adult and juvenile survival rates to age at sexual maturity, fecundity, and lamb survival (Gaillard et al. 2000). In addition, the average values for each of those life-history parameters may be modified by interacting impacts of density dependence, weather, forage availability, and predation. Properly estimating these parameters would require extensive age- and class-specific population data, ideally from the populations being modeled. Such data is not currently available.

In a review of other RoC model efforts, general trends appear to develop. The Payette National Forest Analysis (USFS 2010) stated that total foray contact rates >0.04 annually (less than a 25 year interval) were deemed unacceptable due to estimated disease return intervals and subsequent impacts to long term viability to bighorn herds. Additionally, they assumed that 1 in 4 contacts (0.25) would result in disease transmission based on local information. The Rio Grande National Forest (USFS 2013), stated that a disease event occurring within a bighorn herd every 25 years or less would result in High Risk to bighorn long term viability and a low probability of population persistence. This would result in a bighorn sheep population that is constantly being exposed to ongoing disease transmission and resultant outbreaks.

RoC Analysis Results

Given the assumption of 1 in 4 contacts results in a disease event, we generated relative risk rates using the following scheme.

0-25 years	High
25-50 years	Moderate
50-75 years	Some
75-100 years	Low
>100 years	Very Low

The RoC analyzed 259 allotments or allotment pieces (Table B. 8). Most of the assessed areas are allotted to cattle or horses (84.2%). A smaller portion of the UFO RMP area is allotted to sheep (15.1%) or cattle or sheep (0.8%). A majority of assessed areas was considered to be Very Low (48.3%), with a smaller portion as Low (6.2%), Some (3.5%) or Moderate (8.1%). Slightly more than one-quarter (25.5%) of assessed areas were considered High, including 15.8% of the areas that had direct overlap with CCHR. However, only 3.8% of areas assessed were considered High and were within domestic sheep areas. 1.5% were domestic sheep areas with direct overlap with CHHR, and 2.3% were domestic sheep areas outside CHHR.

Additional Discussion

Probability of Interaction Model

At the time that planning for this RMP began, there were no standardized approaches to modeling potential disease transfer between wild and domestic sheep. In the spring of 2012, the BLM-UFO completed a local probability of interaction model (PoIM) and used this for planning purposes. BLM-UFO worked in conjunction with CPW to develop the weighting factors described in Figure B 1⁶.

In the initial stages of spatial mapping of risk for bighorn sheep, scores for risk of exposure to domestic sheep were highest for the allotment zones within the bighorn sheep range. Those allotments with greater than 75% of their area fell within BHS occupied habitat automatically results in that being a high-risk allotment (See PoI Model Methods). In addition, zones greater than 9 miles from bighorn sheep range automatically receive a low-risk despite the resulting risk-layer results. Zones between 0 and 9 miles from bighorn sheep range had increasing point values in the zones closest to the bighorn sheep range, and lowest point values in the zones farthest from

⁶ Fall, 2011-Winter 2012. Series of meetings, phone calls and letters between CPW biologists and BLM.

the bighorn sheep range. In this way, proximity to bighorn sheep range within and outside of 9 miles had a weighted effect on all other inputs to the model. In order to reduce the risk of a biased model result, no other weighting was used in the model. Additional parameters for natural barriers to movement (domestic sheep or bighorn) and season of use were used to refine the model.

This risk assessment (probability of interaction model) is the first cut at the *landscape level* for RMP analysis. It was meant to be a generalized model to assess risk levels for the RMP analysis of effects. Once the UFO RMP is finalized, the BLM-UFO would assess each allotment in more detail during implementation, to evaluate site-specific risk factors and how to mitigate those factors. This is germane to the process of renewing grazing permits and will be discussed with the permittees before turnout. The BLM-UFO intends to develop the implementation process in cooperation with CPW and the permittees.

The PoIM was based on peer-reviewed research to the extent possible. However, Johnson (1995) is the origin of the assumptions that bighorn sheep and domestic sheep habitat overlap within 16 km (9.94 miles) is a high-risk situation and that habitat overlap beyond 33 km (20.50 miles) is a no-risk situation, and Johnson's paper is a Master's thesis, not a peer-reviewed document. This was additionally refined by Johnson and Swift (2000).

Distance information was based on the WAFWA bighorn sheep recommendations (WAFWA 2012), which state that buffer zones to minimize association between wild sheep and domestic sheep or goats are frequently said to be a minimum of 9 airline miles when applied to bighorn herds or populations rather than to individual, wandering bighorn. The Desert Bighorn Council (1990) recommends a 13.5-km (8.5-mile) buffer. Smaller buffer increments (0–2, 2–5 and 5–9 miles) were based on discussions with CPW and BLM-UFO biologists and professional judgment.

Natural barrier factors were assessed separately for bighorn sheep and domestic sheep. WAFWA (Wild Sheep Working Group 2012) recommends the use of geographic/topographic barriers that enhance species separation and seasonal or spatial separation through domestic sheep or goat management.

Each natural barrier was assessed individually, and barrier scores were cumulatively assessed for each combination of allotment and distance buffer zone (0–2, 2–5, and 5–9 miles). The barriers to movement between a particular buffer zone and bighorn sheep range are additive with distance from the range. Thus, if a continuous cliff band exists in the 0–2 mile buffer zone, this cliff also poses a barrier to movement in the 2–5 and 5–9 mile buffer zones, along with barriers assessed within those particular zones.

Domestic sheep are only permitted during a specific season. The permittee is only permitted a certain number of days during the time period on the permit. The seasonal overlap was assessed on the basis of the entire season of use that a permit could be on the allotments rather than on the actual number of days domestic sheep are permitted on the allotment, because the season when domestic and wild sheep may be attracted to each other biologically (i.e., during breeding season) was of greater concern than the amount of time. The BLM-UFO assumed that there is a

base level of attraction between wild and domestic sheep, but that during bighorn breeding season, attraction between wild and domestic sheep would increase.

Risk of Contact

In response to internal comments on the PoIM, the BLM-UFO conducted additional analysis using the currently available risk of contact (RoC) model and following the risk of contact tool user's guide (USFS 2013). With assistance from CPW biologist, the RoC model was run using the best available local bighorn population information to provide the parameters in the RoC model. However, much of the needed data was not available for individual Colorado BHS populations. The following assumptions were made:

Data Assumptions/Issues

1. CPW bighorn sheep overall range maps (CPW 2013a) approximate bighorn sheep Core Herd Home Range for the purposes of the RoC model.
 - a. Core Herd Home Range (CHHR) is the area occupied by bighorn sheep 95% of the time, based on telemetry or other location data.
 - b. Telemetry data to generate Core Herd Home Range within the model was unavailable for this population.
 - c. These areas overestimate the CHHR concept and therefore overestimate foray distances.
2. Suitable habitat is mapped for the time frame of interest (i.e. domestic sheep grazing period), and is mapped as suitable, corridor and non-habitat.
 - a. Domestic sheep grazing is predominantly during the winter months.
 - b. Year-round desert bighorn suitable habitat was mapped and provided by CPW for this modeling effort (Eichhoff 2015).
 - c. Summer Rocky Mountain bighorn suitable habitat was mapped and provided by CPW for this modeling effort for those populations.
3. Default values from Idaho BHS (Summer) approximate local desert and Rocky Mountain Populations for the domestic sheep grazing season for
 - a. BHS Habitat Preference
 - b. BHS Ram & ewe foray distances
 - c. BHS Foray Probabilities

Comparison of Model Results

Given the requirements of the different models, the number of units analyzed was different between PoIM (231) and RoC (259) (Table B. 5, Table B. 8). Model results were similar in some areas and different in others (Figure B. 5 [Comparison of PoIM and RoC Model Results for UFO RMP area]). Both models predict that Canal, Lee Lands, and Leopard Cr domestic sheep allotments are of high concern for disease transmission to BHS populations (Table B. 9). Additionally, both models place 22 cattle areas as high concern for disease transmission to BHS if they were converted to domestic sheep (Table B. 10). Six areas were placed in Moderate by both models (Alkali Flats [Table B. 9], Big Bear Cr., Cimarron 40, Roatcap, Slagle Pass [Table B. 10]). For some areas, results between the two models are very different (Cushman, Delta Pipeline, Petrie Mesa, Point Cr, Sandy Wash [Table B. 9]; Buckeye, Burro Ridge, Dry Cr Basin, Houser, Lion Cr Basin, Naturita Ridge, Piney, Pipeline, Sawtooth, Tabeguache Creek, Transfer Road, Ward Cr/Doughspoon [Table B. 10]). The difference between the models is the result of

different modeling methodologies, issues with assumptions or data quality, and/or different modeling data sets.

Both the PoIM model and the Draft Preferred Alternative were developed using the best available science, professional judgment, and knowledge of the local bighorn herd in 2011, when developed. Additionally, the RoC model provides additional information for the relationship between bighorn and domestic sheep in the area for the Proposed Plan. The models and the RMP are the first big-scale look at the management situation. At the time of future grazing permit renewal for these areas, the BLM-UFO will conduct NEPA analysis using more site-specific information and any new data to determine the bighorn herd's current condition and possible subsequent changes in management. At that time, the BLM-UFO will also utilize the currently accepted methodology and model to conduct the analysis.

Tables

Table B. 3. CPW Desert BHS herd population estimates* for RoC Model.

CPW Population Names	Uncompahgre/ Dominguez	Black Ridge	Middle Dolores	Upper Dolores
Game Management Unit	S62	S56	S63	S64
	DAU 60[#]		DAU 61[#]	
Adult Herd Size	120	150	42	92
	270		134	
Herd Sex Ratio/Numbers of (Rams:Ewes)	36:84	56:94	13:29	31:61
	93:177		44:90	
Ram Ratio (for reference)	43.7:100	60:100	44.8:100	50:100
	52.8:100		48.4:100	

* CPW 3-year average; # Populations were merged into one unit for analysis purposes; **Bold** text are numbers used for analysis.

Table B. 4. CPW Rocky Mountain BHS herd population estimates* for RoC Model.

CPW Population Names	Black Canyon	Cow Creek/ Wetterhorn	Lake Fork/ Pole Mountain	Dillon Mesa/W. Elk	Snowmass West	Snowmass East	Taylor River	Fossil Ridge	Lower Lake Fork	Main Canyon	Battlement Mesa
Game Management Unit	S80	S21	S33	S54	S25	S13	S26	S71	S81	S75	S24
		DAU=21					DAU=23				
Adult Herd Size	30	204	100	90	51	60	30	25	10	45	55
		304					50				
Herd Sex Ratio/Numbers of (Rams:Ewes)	8:22	82:122	44:56	28:62	16:35	20:40	13	5	4:6	10:35	16:39
		126:178					20				
Ram Ratio (for reference)	35:100	67.9:100	67.9:100	45:100	47.4:100	50:100	76:100	25:100	40:100	30:100	40:100
		67.9:100					67:100				

* CPW 3-year average; # Populations were merged into one unit for analysis purposes; **Bold** text are numbers used for analysis.

Table B. 5. Summary of POIM results for the UFO RMP area.

Type of Livestock	Number of areas assessed (%) / Risk Category				
	High	Moderate	Some	Low	Total
Cattle	26 (11.3%)	43 (18.6%)	62 (29.0%)	67 (26.8%)	198 (85.7%)
Cattle or Horse			1 (0.4%)	1 (0.4%)	2 (0.9%)
Cattle or Sheep			2 (0.9%)		2 (0.9%)
Horse				2 (0.9%)	2 (0.9%)
Sheep	3 (1.3%)	6 (2.6%)	11 (4.8%)	7 (3.0%)	27 (11.7%)
Total	29 (12.6%)	49 (21.2%)	76 (32.9%)	77 (33.3%)	231

Table B. 6. RoC Model Results for Desert Bighorn Risk of Contact with Allotments (Probability that a bighorn sheep will intersect an Allotment) (ex. Interpretation on pg 22)

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Adobe	05027	Cattle	0.005786	0.001632	0.009545	0.00069 9	0.01024 4	
Alder Cr-A	17253	Cattle	0.000611	0.000329	0.010857	0.00087 7	0.01173 4	
Alder Cr-B	17253	Cattle	0.000611	0.001144	0.010781	0.00305 4	0.01383 5	
Alkali Flats	14017	Sheep	0.009295	0.002794	0.116135	0.00663 7	0.12277 2	
Allen Reservoir	05050	Cattle	0.019497	0.006029	0.035328	0.00285 9	0.03818 7	
Anthracite Cr	14525	Cattle	0.017408	0.005453	0.056528	0.00405 9	0.06058 7	
Aspen Ditch-A	14551	Sheep	0.001227	0.000267	0.001406	0.00009 4	0.00149 9	
Aspen Ditch-B	14551	Sheep	0.001241	0.000288	0.001451	0.00010 5	0.00155 6	
Bald Hills	05510	Cattle	0.007959	0.002039	0.102362	0.00503 5	0.10739 7	
Baldy	05568	Cattle	*					
Barkeley Draw Com	07303	Cattle	0.004518	0.001574	0.028067	0.00219 9	0.03026 6	
Beaver Canyon	17060	Cattle	0.004952	0.001135	0.087972	0.00303 1	0.09100 3	
Beaver Hill	05522	Sheep	0.007369	0.002546	0.084104	0.00586 4	0.08996 9	
Beaver Rim	07204	Horse	0.003112	0.000307	0.055292	0.00082 1	0.05611 3	
Ben Lowe	14013	Cattle	*					
Big Bear Cr-A	07207	Cattle	0.005396	0.000537	0.095006	0.00134 5	0.09635 1	

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Big Bear Cr-B	07207	Cattle	0.002751	0.003495	0.041613	0.00857 0	0.05018 3	
Big Bucktail	17061	Cattle	0.002254	0.001260	0.021435	0.00234 6	0.02378 2	
Big Gulch-40	05036	Sheep	0.002280	0.002284	0.002882	0.00082 4	0.00370 6	
Big Gulch-A	03630		0.000741	0.000355	0.000867	0.00012 3	0.00099 0	
Bigh Gulch-B	03630		0.000178	0.000103	0.000212	0.00003 7	0.00024 9	
Big Pasture	05044	Cattle	0.023384	0.006496	0.043031	0.00329 6	0.04632 7	
Black Bullet	05045	Cattle	0.019316	0.012926	0.021937	0.00429 2	0.02622 9	
Blue Cimarron	16036	Cattle or Sheep	0.027424	0.020987	0.037759	0.00739 2	0.04515 1	
Bolinger Ditch	07219	Cattle	0.000385	0.000038	0.006815	0.00010 1	0.00691 5	
Bramier Draw	07235	Cattle	0.000786	0.000213	0.004874	0.00028 7	0.00516 1	
Broad Canyon	17199	Cattle	0.002080	0.000524	0.012903	0.00070 8	0.01361 1	
Buck	07232	Cattle or Horse	0.000027	0.000011	0.000241	0.00001 9	0.00026 0	
Buckeye	17033	Cattle	*					
Burn Canyon	17022	Cattle	0.000493	0.000615	0.003122	0.00116 0	0.00428 2	
Burro Creek	05556	Cattle	^					
Burro Ridge	05532	Cattle	0.011198	0.001363	0.174460	0.00259 9	0.17705 8	
Busted Boiler	03648	Cattle	^					
Canal	14012	Sheep	*					
Carpenter Ridge Com	17100	Cattle	*					
Carpenter Ridge Com/Horse Bench	17100	Cattle	*					
Cedar	05570	Cattle	0.007198	0.002186	0.016240	0.00103 4	0.01727 4	
Cedar Cr-A	05535	Cattle	0.036759	0.010278	0.041586	0.00347 3	0.04505 9	
Cedar Cr-B	05535	Cattle	0.001290	0.000495	0.001461	0.00016 4	0.00162 5	
Cedar Point	05012	Cattle	0.015913	0.003484	0.020203	0.00122 6	0.02142 9	
Chaffee	00019	Cattle	0.004756	0.001827	0.045020	0.00320 2	0.04822 1	
Chaffee Gulch	05528	Cattle	0.003681	0.001534	0.018223	0.00264 8	0.02087 1	
Cimarron 40	03658	Cattle	0.004898	0.000119	0.082878	0.00004 8	0.08292 7	
Cimarron Stock	03650	Cattle	*					

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Driveway								
Coal Canyon	17107	Cattle	0.002032	0.000712	0.012714	0.00098 3	0.01369 7	
Coal Creek	05509	Cattle	0.000488	0.000153	0.002749	0.00016 2	0.00291 1	
Coal Gulch-A	14517	Sheep	0.008236	0.002008	0.025047	0.00144 1	0.02648 8	
Coal Gulch-B	14517	Sheep	0.001537	0.001560	0.003810	0.00090 3	0.00471 3	
Coke Ovens	17027	Cattle	0.013751	0.002810	0.085313	0.00379 3	0.08910 6	
Collins	05043	Cattle	0.001771	0.000388	0.002474	0.00014 6	0.00262 0	
Cone	03635	Cattle	^					
Cookie Tree	05560	Cattle	^					
Coventry	07222	Cattle	0.003194	0.000480	0.050329	0.00086 0	0.05118 9	
Cow Cr	05566	Cattle	*					
Crawford Reservoir	05018	Cattle	0.008256	0.001787	0.010066	0.00068 3	0.01074 9	
Creek Bottom	03632	Cattle	^					
Cushman	05506	Sheep	0.048246	0.009514	0.541295	0.02156 1	0.56285 6	
Cut Off	05052	Cattle	0.000409	0.000084	0.000461	0.00002 8	0.00048 8	
Dave Wood Road	05518	Sheep	0.003991	0.000960	0.050038	0.00225 0	0.05228 8	
Davis Mesa	17037	Cattle	*					
Deep Cr	14524	Cattle	0.007625	0.002362	0.023364	0.00159 7	0.02496 1	
Deer Basin/Midway-A	14019	Sheep	0.008094	0.001779	0.096718	0.00419 0	0.10090 8	
Deer Basin/Midway-B	14019	Sheep	0.011010	0.002621	0.135599	0.00579 0	0.14138 9	
Deer Basin/Midway-C	14019	Sheep	0.000086	0.000024	0.000622	0.00002 9	0.00065 1	
Delta Pipeline	03277	Sheep	0.033100	0.007320	0.274724	0.01272 8	0.28745 2	
Dexter Creek	05551	Cattle	*					
Dirty George	14023	Cattle	0.001878	0.000812	0.005095	0.00057 2	0.00566 7	
Doby Canyon	17042	Cattle	0.002468	0.000698	0.016656	0.00123 7	0.01789 3	
Dolores Canyon	17004	Cattle	*					
Doug Cr	05028	Cattle	0.014318	0.004593	0.025417	0.00200 9	0.02742 6	
Downing	05541	Cattle	0.000212	0.000072	0.000511	0.00004 3	0.00055 5	
Dry Cedar-A	05537	Sheep	0.016474	0.005417	0.045904	0.00249 6	0.04840 0	

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Dry Cedar-B	05537	Sheep	0.000253	0.000041	0.002774	0.00003 1	0.00280 5	
Dry Cedar-C	05537	Sheep	0.000283	0.000013	0.004466	0.00000 9	0.00447 5	
Dry Cr	14549	Cattle	0.010641	0.003496	0.012042	0.00115 5	0.01319 7	
Dry Cr Basin	05513	Cattle or Sheep	0.025462	0.005323	0.305510	0.01272 7	0.31823 7	
Dry Cr Place	05525	Cattle or Horse	0.001081	0.000253	0.008871	0.00037 3	0.00924 4	
Dry Gulch	05540	Cattle	0.014868	0.005812	0.019056	0.00417 7	0.02323 3	
Dry Park	07300	Cattle	0.000954	0.000668	0.011884	0.00156 7	0.01345 1	
Duroy	03637	Cattle	^					
E Fork Dry Cr	05514	Cattle	0.003329	0.000686	0.043084	0.00171 4	0.04479 8	
E Gould Reservoir	05041	Cattle	0.017926	0.004185	0.028847	0.00196 8	0.03081 4	
E Paradox Com-A	17101	Cattle	*					
E Paradox Com-B	17101	Cattle	0.020310	0.004307	0.126002	0.00581 4	0.13181 6	
E Roatcap Ind	14512	Cattle	0.000056	0.000013	0.000063	0.00000 4	0.00006 7	
Far Away	17213	Cattle	0.000539	0.000157	0.009248	0.00041 9	0.00966 7	
Feedlot	17078	Cattle	*					
Fire Mtn Canal	14508	Cattle	0.000737	0.000283	0.000831	0.00009 3	0.00092 4	
Flatiron	05501	Cattle	0.022379	0.011204	0.265040	0.02835 7	0.29339 6	
Franklin Mesa	05512	Cattle or Sheep	0.012334	0.002724	0.135192	0.00611 0	0.14130 1	
Gravel Pit	07063	Cattle	0.000713	0.000366	0.005371	0.00062 6	0.00599 7	
Green	05503	Cattle	0.005921	0.003108	0.076050	0.00816 0	0.08420 9	
Hairpin	05569	Cattle	0.022462	0.010830	0.026337	0.00390 4	0.03024 1	
Hamilton Mesa	07209	Cattle	0.002749	0.000822	0.017101	0.00114 1	0.01824 2	
High Park	05549	Cattle	0.006109	0.003119	0.011948	0.00335 9	0.01530 6	
Highway 90	05521	Sheep	0.009925	0.003306	0.113440	0.00761 8	0.12105 8	
Hillside	05562	Cattle	*					
Home Ranch	07201	Cattle	0.002185	0.000788	0.014222	0.00125 5	0.01547 7	
Horsefly	05523	Cattle	0.000835	0.000289	0.013765	0.00062 7	0.01439 1	
Horsefly Com	07301	Cattle	0.001082	0.000192	0.018614	0.00051	0.01912	

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
						1	5	
Houser	07076	Cattle	0.029500	0.013270	0.183016	0.01791 5	0.20093 1	
Hubbard Cr	14516	Sheep	0.001942	0.002108	0.004215	0.00113 4	0.00534 9	
Jumbo Mtn	14527	Cattle	0.008211	0.002841	0.014354	0.00163 7	0.01599 1	
Juniper Knob	14505	Cattle	0.002160	0.000441	0.002436	0.00014 6	0.00258 2	
Kinnikin	03643	Cattle	^					
La Sal Cr	17011	Cattle	*					
Lavender	07075	Cattle	0.039684	0.022901	0.246197	0.03091 6	0.27711 3	
Lee Bench	14011	Cattle	0.005296	0.002520	0.069209	0.00668 2	0.07589 1	
Lee Lands-A	17003	Sheep	*					
Lee Lands-B	17003	Sheep	0.008701	0.000469	0.154046	0.00121 6	0.15526 2	
Leopard Cr	07205	Sheep	*					
Leroux	14550	Cattle	0.009498	0.002287	0.010714	0.00075 5	0.01146 8	
Leroux Cr	14504	Cattle	0.001343	0.000380	0.001515	0.00012 5	0.00164 0	
Lillylands/West	17024	Cattle	0.006749	0.001764	0.041870	0.00238 1	0.04425 1	
Lion Canyon	17012	Cattle	*					
Lion Cr Basin	17044	Cattle	*					
Little Baldy	07223	Cattle	0.001763	0.001207	0.031326	0.00322 2	0.03454 8	
Little Maverick Draw	07210	Cattle	0.000441	0.000167	0.002919	0.00024 3	0.00316 1	
Log Hill	05529	Cattle or Sheep	0.001672	0.001142	0.016056	0.00208 3	0.01813 9	
Lower Beaver Canyon	07211	Cattle	0.000048	0.000977	0.000855	0.00260 8	0.00346 2	
Lower Hamilton	07234	Cattle	0.001671	0.000421	0.010369	0.00056 9	0.01093 8	
Lower Horsefly-A	05520	Sheep	0.000560	0.000070	0.007245	0.00010 7	0.00735 2	
Lower Horsefly-B	05520	Sheep	0.002540	0.000467	0.040917	0.00094 3	0.04186 0	
Lower Horsefly-C	05520	Sheep	0.000738	0.000200	0.006355	0.00025 3	0.00660 8	
Lower Pinion	07213	Cattle	0.000616	0.000389	0.005219	0.00072 0	0.00593 9	
Lower Roc Creek	07216	Cattle	0.007578	0.002911	0.047016	0.00393 0	0.05094 7	
Lower Roubideau Cyn	05000	Cattle	*					
Mailbox Park-A	17001	Cattle	0.000014	0.000003	0.000210	0.00000 4	0.00021 5	

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Mailbox Park-B	17001	Cattle	0.001413	0.000629	0.015355	0.00116 8	0.01652 3	
Maverick Draw	17018	Cattle	0.000787	0.000339	0.005437	0.00056 0	0.00599 7	
McDonald Cr	14532	Sheep	0.017173	0.003884	0.019673	0.00134 5	0.02101 8	
McKee Draw	07206	Cattle	0.000768	0.000708	0.007690	0.00124 8	0.00893 8	
Mesa Cr-A	17014	Cattle	*					
Mesa Cr-B/First Park	17014	Cattle	0.009200	0.002404	0.057077	0.00324 5	0.06032 3	
Mesa Cr-C	17014	Cattle	*					
Middle Hamilton Lse	07233	Cattle	0.001173	0.000296	0.007278	0.00039 9	0.00767 8	
Milk Cr	14544	Cattle	0.000037	0.000013	0.000047	0.00000 6	0.00005 2	
Moonshine Park	05563	Cattle	*					
Morrow Point	03631	Cattle	*					
Mud Springs	07230	Cattle	0.001129	0.000553	0.011678	0.00104 5	0.01272 4	
Muddy Cr	14519	Sheep	0.006602	0.002567	0.016419	0.00156 2	0.01798 1	
N Saddle Peak	14540	Cattle	0.001577	0.000508	0.002703	0.00021 7	0.00292 0	
N Wickson Draw	17023	Cattle	0.001006	0.000338	0.006243	0.00045 7	0.00670 0	
Naturita Canyon-A	07203	Cattle	0.001055	0.000230	0.006547	0.00031 1	0.00685 7	
Naturita Canyon-B	07203	Cattle	0.000059	0.000015	0.000368	0.00002 0	0.00038 8	
Naturita Canyon-C	07203	Cattle	0.000049	0.000015	0.000302	0.00002 0	0.00032 2	
Naturita Canyon-D	07203	Cattle	0.000061	0.000019	0.000381	0.00002 5	0.00040 6	
Naturita Canyon-E	07203	Cattle	0.000609	0.000184	0.003778	0.00024 8	0.00402 6	
Naturita Canyon-F	07203	Cattle	0.000269	0.000081	0.001668	0.00011 0	0.00177 8	
Naturita Ridge	17035	Cattle	0.062360	0.013224	0.386878	0.01785 2	0.40473 0	
Needle Rock	14542	Horse	0.000569	0.000178	0.000972	0.00007 7	0.00104 9	
Norwood Hill	07218	Cattle	0.001836	0.000100	0.032617	0.00026 6	0.03288 3	
Nyswanger	17082	Cattle	*					
Oak Hill	07225	Cattle	0.001005	0.000311	0.017862	0.00083 0	0.01869 2	
Oak Hill 40	03644	Cattle	^					
Oak Mesa	14506	Cattle	0.007195	0.001880	0.008115	0.00062 0	0.00873 6	
Oak Ridge Com	14528	Cattle	0.005351	0.001375	0.014046	0.00096	0.01501	

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
						7	3	
Onion Lakes	05533	Cattle or Sheep	0.011575	0.001282	0.154453	0.001158	0.155611	
Overland	14511	Cattle	0.000210	0.000049	0.000237	0.000016	0.000253	
Park	17030	Cattle	0.004831	0.001070	0.029973	0.001445	0.031417	
Parkway	17062	Cattle	0.000853	0.000211	0.005545	0.000309	0.005854	
Petrie Mesa	14022	Sheep	0.036802	0.009590	0.339704	0.017094	0.356798	
Piney	05516	Cattle	0.020442	0.009790	0.266032	0.025710	0.291741	
Pinion	03641	Cattle	^					
Pipeline	05507	Cattle or Sheep	0.025079	0.006472	0.288450	0.014289	0.302739	
Pocket Ind	17085	Cattle	*					
Point Cr	14021	Sheep	0.027646	0.006135	0.327320	0.014210	0.341530	
Popp Ranch	14531	Cattle	0.001263	0.000436	0.001588	0.000184	0.001773	
Radio Tower	02660	Cattle	0.003787	0.001273	0.023495	0.001718	0.025213	
Ragsdale	03708	Cattle	^					
Rawhide/Coffee Pot-A	05034	Sheep	0.009168	0.004268	0.016004	0.001509	0.017513	
Rawhide/Coffee Pot-B	05034	Sheep	0.018411	0.014541	0.022776	0.005171	0.027947	
Rawhide/Coffee Pot-C	05034	Sheep	*					
Rawlings Ind	17021	Cattle	*					
Ray (Wray) Mesa	03298	Cattle	*					
Redvale	07227	Cattle	0.002511	0.000934	0.016378	0.001304	0.017681	
Reynolds/McDonald-A	14530	Cattle	0.000422	0.000136	0.000604	0.000061	0.000664	
Reynolds/McDonald-B	14530	Cattle	0.033291	0.008301	0.038364	0.002952	0.041316	
Ridgway Reservoir	00001	Cattle	^					
Rim Rock	05051	Cattle	*					
Smith Fork Rim	03526	Cattle	*					
River	17079	Cattle	*					
River Allotment	07200	Cattle	0.002920	0.001252	0.042982	0.003131	0.046113	
Roatcap	05504	Cattle	0.009721	0.006274	0.120063	0.016222	0.136285	
Roatcap/Jay Cr	14507	Cattle	0.018193	0.005564	0.020521	0.001836	0.022357	
Roc Cr	17020	Cattle	0.033260	0.019194	0.206345	0.025911	0.232256	

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Rock Ditch	05538	Cattle	0.000126	0.000037	0.000629	0.00002 3	0.00065 2	
Round Top	00002	Cattle	^					
Rowher Canyon	17080	Cattle	*					
S Dry Cr	14548	Cattle	0.010282	0.003144	0.011608	0.00103 8	0.01264 6	
S Piney-A (Olathe Reservoir East)	05515	Cattle or Sheep	0.003132	0.000722	0.040075	0.00168 7	0.04176 2	
S Piney-B	05515	Cattle or Sheep	0.018089	0.007097	0.231140	0.01747 5	0.24861 6	
San Miguel Rim	03639	Cattle	^					
San Miguel River	03640	Cattle	^					
Sandy Wash	05502	Sheep	0.020198	0.009368	0.246753	0.02381 2	0.27056 6	
Saw Pit	03636	Cattle	^					
Sawtooth	17032	Cattle	*					
Second Park	17105	Cattle	0.012555	0.003023	0.077894	0.00408 2	0.08197 5	
Section 35	14547	Cattle	0.000855	0.000256	0.002395	0.00015 8	0.00255 3	
Sewemup	03646	Cattle	^					
Shavano Mesa	05511	Sheep	0.005201	0.001197	0.063177	0.00285 7	0.06603 5	
Shinn Park	05534	Sheep	0.073631	0.015434	0.083669	0.00602 3	0.08969 2	
Simms Mesa-A	05519	Sheep	0.000480	0.000130	0.001457	0.00012 8	0.00158 5	
Simms Mesa-B	05519	Sheep	0.001221	0.000920	0.011483	0.00177 6	0.01325 9	
Slagle Pass	05547	Cattle	0.005813	0.000558	0.086024	0.00068 6	0.08671 0	
Slaughter Grade	03651	Cattle	^					
Smith Fork Ind	05049	Cattle	0.025896	0.012459	0.029619	0.00421 8	0.03383 8	
South Branch	14004	Cattle	0.002206	0.000899	0.013448	0.00100 5	0.01445 3	
South of Town	14534	Sheep	0.010049	0.004487	0.011368	0.00148 9	0.01285 6	
Spring Cr	05517	Cattle	^					
Spring Creek Canyon	03659	Cattle	^					
Spring Crk & Hwy 90	03638	Cattle	*					
Spring Gulch	05029	Cattle	*					
Stevens Gulch Com	14513	Cattle	0.005086	0.001108	0.006439	0.00041 1	0.00684 9	
Stingley Gulch	14503	Cattle	0.006308	0.001929	0.007115	0.00063 7	0.00775 2	
Stock Driveway	14521	Cattle	0.002184	0.000692	0.005123	0.00039 7	0.00552 0	
Sundown	03633	Cattle	*					

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr		
			Ram	Ewe	Ram	Ewe	Herd
Sunrise Gulch Com	17102	Cattle	*				
Sunshine Mesa	14541	Cattle	0.006437	0.001426	0.007260	0.000470	0.007731
Swain Bench	17081	Cattle	*				
Tabeguache Cr	17031	Cattle	0.025582	0.006866	0.164013	0.010500	0.174513
Tappan Cr-A	05575	Sheep	0.000244	0.000026	0.003489	0.000040	0.003529
Tappan Cr-B	05575	Sheep	0.000044	0.000007	0.000636	0.000012	0.000648
Taylor Draw	05555	Cattle	0.005691	0.001685	0.090401	0.003627	0.094028
Third Park Com	17103	Cattle	0.010779	0.002286	0.066870	0.003086	0.069956
Tinkler Ind	05530	Cattle	0.001981	0.001309	0.007034	0.002543	0.009577
Transfer Road	05505	Cattle	0.021507	0.008115	0.260493	0.020283	0.280776
Tuttle Draw	17106	Cattle	0.020981	0.004287	0.130167	0.005787	0.135954
Twenty Five Mesa N	14008	Cattle	*				
Twenty Five Mesa N Proposed	14008	Cattle	^				
Twenty Five Mesa S-A	07008	Cattle	0.001188	0.000506	0.008257	0.000878	0.009135
Twenty Five Mesa S-B	07008	Cattle	0.000663	0.000370	0.005360	0.000616	0.005977
Uncompahge Bench	07007	Cattle	0.009129	0.003201	0.057178	0.004422	0.061599
Uncompahgre Com-A	07302	Cattle	0.000982	0.000102	0.017442	0.000272	0.017714
Uncompahgre Com-B	07302	Cattle	0.001052	0.000308	0.018696	0.000823	0.019518
Uncompahgre Com-C	07302	Cattle	0.004680	0.000098	0.083149	0.000262	0.083411
Uncompahgre Com-D	07302	Cattle	0.004344	0.000029	0.077177	0.000078	0.077254
Uncompahgre Com-E	07302	Cattle	0.002434	0.000002	0.043246	0.000005	0.043251
Upper Mail Box	07208	Cattle	0.000216	0.000081	0.003479	0.000191	0.003670
Upper Maverick Draw	07202	Cattle	0.000855	0.000529	0.005889	0.000821	0.006710
Upper Terror Cr	14514	Cattle	0.000463	0.000343	0.000823	0.000152	0.000975
W Roatcap	14510	Cattle	0.000144	0.000049	0.000163	0.000016	0.000179
W Stevens Gulch	14515	Cattle	0.008353	0.001959	0.009422	0.000647	0.010069
W Youngs Peak	14536	Cattle	0.016611	0.003329	0.019074	0.001166	0.020240

Allotment Name	Allotment Number	Type of Livestock	Probability of Contact		Rate of Contact / 10 yr			
			Ram	Ewe	Ram	Ewe	Herd	
Wakefield	03628	Cattle	^					
Ward Cr/Doughspoon	14025	Cattle	0.051155	0.014199	0.257059	0.01576 0	0.27281 9	
Washboard Rock-A	05548	Cattle	0.015798	0.004511	0.076412	0.00314 6	0.07955 7	
Waterdog Basin	05546	Cattle	0.001399	0.000222	0.009594	0.00011 1	0.00970 5	
Weimer Hill Place	03660	Cattle	^					
Wells Gulch	14016	Sheep	0.014522	0.007551	0.179680	0.01774 8	0.19742 7	
White Ranch	14015	Cattle	0.011673	0.004484	0.153065	0.01190 6	0.16497 1	
Wickson Draw	17010	Cattle	0.006772	0.001916	0.042010	0.00258 6	0.04459 7	
Wilbanks-A	14502	Cattle	0.010570	0.003542	0.012681	0.00125 4	0.01393 6	
Washboard Rock-B	14502	Cattle	0.000130	0.000044	0.000150	0.00001 5	0.00016 5	
Williams Cr	14523	Cattle	0.003363	0.001105	0.009386	0.00069 3	0.01008 0	
Willims Ditch	07220	Cattle	0.000219	0.000064	0.001358	0.00008 6	0.00144 3	
Winter/Monitor Mesa	14010	Cattle	*					
Youngs Peak	14537	Cattle	0.015303 ^a	0.003260	0.018164 ^b	0.00119 5	0.01935 9 ^c	

* This allotment intersects the home range polygon and is therefore not included in the RoC analysis.

^ This is a proposed allotment in the RMP that was not included in the RoC model run.

Sample Interpretation for Youngs Peak:

^a Given that a ram is on foray, there is a 1.5% probability that it will contact this allotment.

^b Given the probability of ram on foray, predicts a rate of 0.2 ram contacts with allotment in 10 years.

^c Given the probability of foray of bighorn in the population, predicts a rate of 0.2 contact with allotment in 10 years.

Table B. 7. Predicted years between potential disease events for allotments that did not intersect with CHHR, based on RoC Model results.

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Adobe	05027	Cattle	0.010244	98	98	108	130	195	390	976	1952
Alder Cr-A	17253	Cattle	0.011734	85	85	95	114	170	341	852	1704
Alder Cr-B	17253	Cattle	0.013835	82	72	80	96	145	289	723	1446
Alkali Flats	14017	Sheep	0.122772	8	8	9	11	16	33	81	163
Allen Reservoir	05050	Cattle	0.038187	26	26	29	35	52	105	262	524
Anthracite Cr	14525	Cattle	0.060587	17	17	18	22	33	66	165	330
Aspen Ditch-A	14551	Sheep	0.001499	667	667	741	889	1334	2668	6671	13342
Aspen Ditch-B	14551	Sheep	0.001556	643	643	714	857	1285	2570	6426	12851
Bald Hills	05510	Cattle	0.107397	9	9	10	12	19	37	93	186
Barkeley Draw Com	07303	Cattle	0.030266	33	33	37	44	66	132	330	661
Beaver Canyon	17060	Cattle	0.091003	11	11	12	15	22	44	110	220
Beaver Hill	05522	Sheep	0.089969	11	11	12	15	22	44	111	222
Beaver Rim	07204	Horse	0.056113	18	18	20	24	36	71	178	356
Big Bear Cr-A	07207	Cattle	0.096351	10	10	12	14	21	42	104	208
Big Bear Cr-B	07207	Cattle	0.050183	20	20	22	27	40	80	199	399
Big Bucktail	17061	Cattle	0.023782	42	42	47	56	84	168	420	841
Big Gulch-40	05036	Sheep	0.003706	270	270	300	360	540	1079	2698	5397
Big Gulch-A	03630		0.000990	1010	1010	1122	1346	2020	4039	10098	20196
Big Gulch-B	03630		0.000249	4013	4013	4459	5351	8026	16052	40130	80259
Big Pasture	05044	Cattle	0.046327	22	22	24	29	43	86	216	432
Black Bullet	05045	Cattle	0.026229	38	38	42	51	76	153	381	763
Blue Cimarron	16036	Cattle or Sheep	0.045151	22	22	25	30	44	89	221	443
Bolinger Ditch	07219	Cattle	0.006915	145	145	161	193	289	578	1446	2892
Bramier Draw	07235	Cattle	0.005161	194	194	215	258	388	775	1938	3875
Broad Canyon	17199	Cattle	0.013611	73	73	82	98	147	294	735	1469
Buck	07232	Cattle or Horse	0.000260	3844	3844	4271	5125	7688	15376	38440	76879

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Burn Canyon	17022	Cattle	0.004282	234	234	259	311	467	934	2335	4671
Burro Creek	05556	Cattle			^						
Burro Ridge	05532	Cattle	0.177058	6	6	6	8	11	23	56	113
Busted Boiler	03648	Cattle			^						
Cedar	05570	Cattle	0.017274	58	58	64	77	116	232	579	1158
Cedar Cr-A	05535	Cattle	0.045059	22	22	25	30	44	89	222	444
Cedar Cr-B	05535	Cattle	0.001625	616	616	684	821	1231	2462	6155	12311
Chaffee	00019	Cattle	0.048221	21	21	23	28	41	83	207	415
Chaffee Gulch	05528	Cattle	0.020871	48	48	53	64	96	192	479	958
Cimarron 40	03658	Cattle	0.082927	0	12	13	16	24	48	121	241
Coal Canyon	17107	Cattle	0.013697	73	73	81	97	146	292	730	1460
Coal Creek	05509	Cattle	0.002911	344	344	382	458	687	1374	3435	6870
Coal Gulch-A	14517	Sheep	0.026488	38	38	42	50	76	151	378	755
Coal Gulch-B	14517	Sheep	0.004713	212	212	236	283	424	849	2122	4243
Coke Ovens	17027	Cattle	0.089106	11	11	12	15	22	45	112	224
Collins	05043	Cattle	0.002620	382	382	424	509	763	1526	3816	7632
Cone	03635	Cattle			^						
Cookie Tree	05560	Cattle			^						
Coventry	07222	Cattle	0.051189	20	20	22	26	39	78	195	391
Crawford Reservoir	05018	Cattle	0.010749	93	93	103	124	186	372	930	1861
Creek Bottom	03632	Cattle			^						
Cushman	05506	Sheep	0.562856	2	2	2	2	4	7	18	36
Cut Off	05052	Cattle	0.000488	2048	2048	2275	2730	4095	8191	20477	40954
Dave Wood Road	05518	Sheep	0.052288	19	19	21	25	38	76	191	382
Deep Cr	14524	Cattle	0.024961	40	40	45	53	80	160	401	801
Deer Basin/Midway-A	14019	Sheep	0.100908	10	10	11	13	20	40	99	198
Deer Basin/Midway-B	14019	Sheep	0.141392	7	7	8	9	14	28	71	141
Deer Basin/Midway-C	14019	Sheep	0.000651	1536	1536	1707	2048	3073	6145	15363	30726
Delta Pipeline	03277	Sheep	0.287454	3	3	4	5	7	14	35	70
Dirty George	14023	Cattle	0.006951	144	176	196	235	353	706	1765	3529

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Doby Canyon	17042	Cattle	0.017893	56	56	62	75	112	224	559	1118
Doug Cr	05028	Cattle	0.027426	36	36	41	49	73	146	365	729
Downing	05541	Cattle	0.000555	1803	1803	2003	2404	3606	7212	18031	36062
Dry Cedar-A	05537	Sheep	0.048400	21	21	23	28	41	83	207	413
Dry Cedar-B	05537	Sheep	0.002805	357	357	396	475	713	1426	3565	7130
Dry Cedar-C	05537	Sheep	0.004475	223	223	248	298	447	894	2235	4469
Dry Cr	14549	Cattle	0.013278	75	76	84	101	152	303	758	1516
Dry Cr Basin	05513	Cattle or Sheep	0.318237	3	3	3	4	6	13	31	63
Dry Cr Place	05525	Cattle or Horse	0.009244	108	108	120	144	216	433	1082	2164
Dry Gulch	05540	Cattle	0.023233	43	43	48	57	86	172	430	861
Dry Park	07300	Cattle	0.013451	74	74	83	99	149	297	743	1487
Duroy	03637	Cattle			^						
E Fork Dry Cr	05514	Cattle	0.044798	22	22	25	30	45	89	223	446
E Gould Reservoir	05041	Cattle	0.030814	32	32	36	43	65	130	325	649
E Paradox Com-B	17101	Cattle	0.131816	8	8	8	10	15	30	76	152
E Roatcap Ind	14512	Cattle	0.000067	14903	14903	16559	19871	29806	59613	149031	298063
Far Away	17213	Cattle	0.009667	103	103	115	138	207	414	1034	2069
Fire Mtn Canal	14508	Cattle	0.000924	1082	1082	1202	1442	2164	4327	10818	21636
Flatiron	05501	Cattle	0.293396	3	3	4	5	7	14	34	68
Franklin Mesa	05512	Cattle or Sheep	0.141301	7	7	8	9	14	28	71	142
Gravel Pit	07063	Cattle	0.005997	167	167	185	222	333	667	1667	3335
Green	05503	Cattle	0.084209	12	12	13	16	24	48	119	238
Hairpin	05569	Cattle	0.030241	33	33	37	44	66	132	331	661
Hamilton Mesa	07209	Cattle	0.018242	55	55	61	73	110	219	548	1096
High Park	05549	Cattle	0.015306	65	65	73	87	131	261	653	1307
Highway 90	05521	Sheep	0.121058	8	8	9	11	17	33	83	165
Home Ranch	07201	Cattle	0.015477	65	65	72	86	129	258	646	1292
Horsefly	05523	Cattle	0.014391	69	69	77	93	139	278	695	1390
Horsefly Com	07301	Cattle	0.019125	52	52	58	70	105	209	523	1046

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Houser	07076	Cattle	0.200931	5	5	6	7	10	20	50	100
Hubbard Cr	14516	Sheep	0.005349	187	187	208	249	374	748	1869	3739
Jumbo Mtn	14527	Cattle	0.015991	63	63	69	83	125	250	625	1251
Juniper Knob	14505	Cattle	0.002582	387	387	430	516	775	1549	3873	7746
Kinnikin	03643	Cattle			^						
Lavender	07075	Cattle	0.277113	4	4	4	5	7	14	36	72
Lee Bench	14011	Cattle	0.075891	13	13	15	18	26	53	132	264
Lee Lands-B	17003	Sheep	0.155262	6	6	7	9	13	26	64	129
Leroux	14550	Cattle	0.011468	87	87	97	116	174	349	872	1744
Leroux Cr	14504	Cattle	0.001640	610	610	678	813	1220	2439	6098	12196
Lillylands/West	17024	Cattle	0.044251	23	23	25	30	45	90	226	452
Little Baldy	07223	Cattle	0.034548	29	29	32	39	58	116	289	579
Little Maverick Draw	07210	Cattle	0.003161	316	316	351	422	633	1265	3163	6326
Log Hill	05529	Cattle or Sheep	0.018139	55	55	61	74	110	221	551	1103
Lower Beaver Canyon	07211	Cattle	0.003462	289	289	321	385	578	1155	2888	5776
Lower Hamilton	07234	Cattle	0.010938	91	91	102	122	183	366	914	1829
Lower Horsefly-A	05520	Sheep	0.007352	136	136	151	181	272	544	1360	2720
Lower Horsefly-B	05520	Sheep	0.041860	24	24	27	32	48	96	239	478
Lower Horsefly-C	05520	Sheep	0.006608	151	151	168	202	306	605	1513	3026
Simms Mesa-A	05519	Sheep	0.001585	631	631	701	841	1262	2524	6311	12622
Simms Mesa-B	05519	Sheep	0.013259	75	75	84	101	151	302	754	1508
Lower Pinion	07213	Cattle	0.005939	168	168	187	225	337	674	1684	3368
Lower Roc Creek	07216	Cattle	0.050947	20	20	22	26	39	79	196	393
Mailbox Park-A	17001	Cattle	0.000215	4659	4659	5176	6211	9317	18634	46586	93172
Mailbox Park-B	17001	Cattle	0.016523	61	61	67	81	121	242	605	1210
Maverick Draw	17018	Cattle	0.005997	167	167	185	222	334	667	1668	3335
McDonald Cr	14532	Sheep	0.021018	48	48	53	63	95	190	476	952
McKee Draw	07206	Cattle	0.008938	112	112	124	149	224	448	1119	2238
McKee Draw	07206	Cattle	0.008938	112	112	124	149	224	448	1119	2238
Mesa Cr-B	17014	Cattle	0.060323	17	17	18	22	33	66	166	332

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Middle Hamilton Lse	07233	Cattle	0.007678	130	130	145	174	260	521	1302	2605
Milk Cr	14544	Cattle	0.000065	15477	19173	21304	25564	38347	76693	191733	383467
Mud Springs	07230	Cattle	0.012724	79	79	87	105	157	314	786	1572
Muddy Cr	14519	Sheep	0.017981	56	56	62	74	111	222	556	1112
N Saddle Peak	14540	Cattle	0.002920	342	342	381	457	685	1370	3425	6849
N Wickson Draw	17023	Cattle	0.006700	149	149	166	199	299	597	1493	2985
Naturita Canyon-A	07203	Cattle	0.006857	146	146	162	194	292	583	1458	2917
Naturita Canyon-B	07203	Cattle	0.000388	2574	2574	2860	3432	5148	10296	25741	51482
Naturita Canyon-C	07203	Cattle	0.000322	3104	3104	3449	4139	6209	12417	31043	62087
Naturita Canyon-D	07203	Cattle	0.000406	2466	2466	2740	3288	4931	9863	24656	49313
Naturita Canyon-E	07203	Cattle	0.004026	248	248	276	331	497	994	2484	4968
Naturita Canyon-F	07203	Cattle	0.001778	563	563	625	750	1125	2250	5626	11252
Naturita Ridge	17035	Cattle	0.404730	2	2	3	3	5	10	25	49
Needle Rock	14542	Horse	0.001049	954	954	1060	1272	1907	3815	9537	19074
Norwood Hill	07218	Cattle	0.032883	30	30	34	41	61	122	304	608
Oak Hill	07225	Cattle	0.018692	53	53	59	71	107	214	535	1070
Oak Hill 40	03644	Cattle									
Oak Mesa	14506	Cattle	0.008736	114	114	127	153	229	458	1145	2289
Oak Ridge Com	14528	Cattle	0.015013	67	67	74	89	133	266	666	1332
Onion Lakes	05533	Cattle or Sheep	0.155611	6	6	7	9	13	26	64	129
Overland	14511	Cattle	0.000253	3947	3947	4386	5263	7895	15790	39474	78949
Park	17030	Cattle	0.031417	32	32	35	42	64	127	318	637
Parkway	17062	Cattle	0.005854	171	171	190	228	342	683	1708	3416
Petrie Mesa	14022	Sheep	0.356798	3	3	3	4	6	11	28	56
Piney	05516	Cattle	0.291741	3	3	4	5	7	14	34	69
Pinion	03641	Cattle									
Pipeline	05507	Cattle or Sheep	0.302739	3	3	4	4	7	13	33	66
Point Cr	14021	Sheep	0.341530	3	3	3	4	6	12	29	59
Popp Ranch	14531	Cattle	0.001773	564	564	627	752	1128	2257	5641	11283

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Radio Tower	02660	Cattle	0.025213	40	40	44	53	79	159	397	793
Ragsdale	03708	Cattle			^						
Rawhide/Coffee Pot-A	05034	Sheep	0.017513	57	57	63	76	114	228	571	1142
Rawhide/Coffee Pot-B	05034	Sheep	0.027947	36	36	40	48	72	143	358	716
Redvale	07227	Cattle	0.017681	57	57	63	75	113	226	566	1131
Reynolds/McDonald-A	14530	Cattle	0.000664	1506	1506	1673	2007	3011	6022	15055	30110
Reynolds/McDonald-B	14530	Cattle	0.041316	24	24	27	32	48	97	242	484
Ridgway Reservoir	00001	Cattle			^						
River Allotment	07200	Cattle	0.046113	22	22	24	29	43	87	217	434
Roatcap	05504	Cattle	0.136285	7	7	8	10	15	29	73	147
Roatcap/Jay Cr	14507	Cattle	0.022357	45	45	50	60	89	179	447	895
Roc Cr	17020	Cattle	0.232256	4	4	5	6	9	17	43	86
Rock Ditch	05538	Cattle	0.000652	1534	1534	1705	2046	3069	6137	15344	30687
Round Top	00002	Cattle			^						
S Dry Cr	14548	Cattle	0.012646	79	79	88	105	158	316	791	1582
S Piney-A	05515	Cattle or Sheep	0.041762	24	24	27	32	48	96	239	479
S Piney-B	05515	Cattle or Sheep	0.248616	4	4	4	5	8	16	40	80
San Miguel Rim	03639	Cattle			^						
San Miguel River	03640	Cattle			^						
Sandy Wash	05502	Sheep	0.270566	4	4	4	5	7	15	37	74
Saw Pit	03636	Cattle			^						
Second Park	17105	Cattle	0.081975	12	12	14	16	24	49	122	244
Section 35	14547	Cattle	0.002553	392	392	435	522	783	1567	3917	7833
Sewemup	03646	Cattle			^						
Shavano Mesa	05511	Sheep	0.066035	15	15	17	20	30	61	151	303
Shin Park/South Canal	05534	Cattle	0.066035	15	15	17	20	30	61	151	303

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Shinn Park	05534	Sheep	0.089692	11	11	12	15	22	45	111	223
Slagle Pass	05547	Cattle	0.086710	12	12	13	15	23	46	115	231
Slaughter Grade	03651	Cattle			^						
Smith Fork Ind	05049	Cattle	0.033838	30	30	33	39	59	118	296	591
South Branch	14004	Cattle	0.015474	65	69	77	92	138	277	692	1384
South of Town	14534	Sheep	0.012856	78	78	86	104	156	311	778	1556
Spring Cr	05517	Cattle			^						
Spring Creek Canyon	03659	Cattle			^						
Stevens Gulch Com	14513	Cattle	0.006849	146	146	162	195	292	584	1460	2920
Stingley Gulch	14503	Cattle	0.007752	129	129	143	172	258	516	1290	2580
Stock Driveway	14521	Cattle	0.005520	181	181	201	242	362	725	1812	3623
Sunshine Mesa	14541	Cattle	0.007731	129	129	144	172	259	517	1294	2587
Tabeguache Cr	17031	Cattle	0.174513	6	6	6	8	11	23	57	115
Tappan Cr-A	05575	Sheep	0.003529	283	283	315	378	567	1134	2834	5668
Tappan Cr-B	05575	Sheep	0.000648	1543	1543	1715	2057	3086	6172	15431	30862
Taylor Draw	05555	Cattle	0.094028	11	11	12	14	21	43	106	213
Third Park Com	17103	Cattle	0.069956	14	14	16	19	29	57	143	286
Tinkler Ind	05530	Cattle	0.009577	104	104	116	139	209	418	1044	2088
Transfer Road	05505	Cattle	0.280776	4	4	4	5	7	14	36	71
Tuttle Draw	17106	Cattle	0.135954	7	7	8	10	15	29	74	147
Twenty Five Mesa S-A	07008	Cattle	0.009135	109	109	122	146	219	438	1095	2189
Twenty Five Mesa S-B	07008	Cattle	0.005977	167	167	186	223	335	669	1673	3346
Uncompahge Bench	07007	Cattle	0.061599	16	16	18	22	32	65	162	325
Uncompahgre Com-A	07302	Cattle	0.017714	56	56	63	75	113	226	565	1129
Uncompahgre Com-B	07302	Cattle	0.019518	51	56	63	75	113	226	565	1129
Uncompahgre Com-C	07302	Cattle	0.083411	12	51	57	68	102	205	512	1025
Uncompahgre Com-D	07302	Cattle	0.077254	13	12	13	16	24	48	120	240
Uncompahgre Com-E	07302	Cattle	0.043251	23	13	14	17	26	52	129	259
Upper Mail Box	07208	Cattle	0.003670	273	23	26	31	46	92	231	462

Allotment Name	Allotment Number	Type of Livestock	Herd Rate of Contact ^a	Years Between Contact ^b	Years Between Potential Disease Events ^c						
					1:1 (1.0)	1:1.1111 (0.9)	1:1.3333 (0.75)	1:2 (0.50)	1:4 (0.25)	1:10 (0.10)	1:20 (0.05)
Upper Maverick Draw	07202	Cattle	0.006710	149	149	166	199	298	596	1490	2981
Upper Terror Cr	14514	Cattle	0.000975	1025	1025	1139	1367	2051	4102	10255	20510
W Roatcap	14510	Cattle	0.000179	5599	5599	6221	7465	11197	22394	55986	111972
W Stevens Gulch	14515	Cattle	0.010069	99	99	110	132	199	397	993	1986
W Youngs Peak	14536	Cattle	0.020240	49	49	55	66	99	198	494	988
Wakefield	03628	Cattle			^						
Ward Cr/Doughspoon	14025	Cattle	0.274489	4	4	4	5	7	15	37	73
Ward Cr/Doughspoon	14025	Cattle	0.274489	4	4	4	5	7	15	37	73
Washboard Rock-A	05548	Cattle	0.079557	13	13	14	17	25	50	126	251
Waterdog Basin	05546	Cattle	0.009705	103	103	114	137	206	412	1030	2061
Weimer Hill Place	03660	Cattle			^						
Wells Gulch	14016	Sheep	0.197428	5	5	6	7	10	20	51	101
White Ranch	14015	Cattle	0.164971	6	6	7	8	12	24	61	121
White Ranch	14015	Cattle	0.164971	6	6	7	8	12	24	61	121
Wickson Draw	17010	Cattle	0.044597	22	22	25	30	45	90	224	448
Wilbanks-A	14502	Cattle	0.014274	70	72	80	96	144	287	718	1435
Wilbanks-B	14502	Cattle	0.000173	5787	6069	6743	8091	12137	24274	60686	121372
Williams Cr	14523	Cattle	0.010080	99	99	110	132	198	397	992	1984
Willims Ditch	07220	Cattle	0.001443	693	693	770	924	1386	2771	6928	13856
Youngs Peak	14537	Cattle	0.019359	52	52	57	69	103	207	517	1033

^a From

Table B. 6, last column.

^b 1/Herd Rate of Contact

^c Grey shaded cells for allotments show potential disease event rates more frequently than 25 years.

^ This is a proposed allotment in the RMP that was not included in the RoC model run.

Table B. 8. Summary of RoC Model results for the UFO RMP area.

Type of Livestock	Number (%) of areas assessed							Grand Total
	High *	High	Moderate	Some	Low	Very Low	^	
Cattle	37 (14.3%)	19 (7.3%)	14 (5.4%)	7 (2.7%)	13 (5.0%)	102 (39.4%)	22 (8.5%)	214 (82.6%)
Cattle or Horse						2 (0.8%)		2 (0.8%)
Cattle or Sheep			1 (0.4%)			1 (0.4%)		2 (0.8%)
Horse				1 (0.4%)		1 (0.4%)		2 (0.8%)
Sheep	4 (1.5%)	6 (2.3%)	6 (2.3%)	1 (0.4%)	3 (1.2%)	19 (7.3%)		39 (15.1%)
Grand Total	41 (15.8%)	25 (9.7%)	21 (8.1%)	9 (3.5%)	16 (6.2%)	125 (48.3%)	22 (8.5%)	259

Table B. 9. Comparison of PoIM and RoC Model Results for Bighorn Risk of Contact with Domestic Sheep Allotments

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
Alkali Flats	14017	Sheep	Moderate	14017	Alkali Flats	Moderate
Aspen Ditch	14551	Sheep	Some	14551	Aspen Ditch-A	Very Low
					Aspen Ditch-B	Very Low
Beaver Hill	05522	Sheep	Low	05522	Beaver Hill	Moderate
Big Gulch-40	05036	Sheep	Moderate	05036	Big Gulch-40	Very Low
Canal	14012	Sheep	High	14012	Canal	High *
Coal Gulch	14517	Sheep	Low	14517	Coal Gulch-A	Very Low
					Coal Gulch-B	Very Low
Cushman	05506	Sheep	Some	05506	Cushman	High
Dave Wood Road	05518	Sheep	Low	05518	Dave Wood Road	Low
Deer Basin/Midway	14019	Sheep	Some	14019	Deer Basin/Midway-A	Moderate
					Deer Basin/Midway-B	Moderate
					Deer Basin/Midway-C	Very Low
Delta Pipeline	03277	Sheep	Some	03277	Delta Pipeline	High
Dry Cedar	05537	Sheep	Some	05537	Dry Cedar-A	Low
					Dry Cedar-B	Very Low
					Dry Cedar-C	Very Low
Highway 90	05521	Sheep	Some	05521	Highway 90	Moderate
Hubbard Cr	14516	Sheep	Low	14516	Hubbard Cr	Very Low

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
Lee Lands	17003	Sheep	High	17003	Lee Lands-A	High *
					Lee Lands-B	Moderate
Leopard Cr	07205	Sheep	High	07205	Leopard Cr	High *
Log Hill	05529	Cattle or Sheep	Some	05529	Log Hill	Very Low
Lower Horsefly Combined	05520	Sheep	Low	05520	Lower Horsefly-A	Very Low
					Lower Horsefly-B	Low
					Lower Horsefly-C	Very Low
				05519	Simms Mesa-A	Very Low
					Simms Mesa-B	Very Low
McDonald Cr	14532	Sheep	Some	14532	McDonald Cr	Very Low
Muddy Cr	14519	Sheep	Low	14519	Muddy Cr	Very Low
Onion Lakes	05533	Cattle or Sheep	Some	05533	Onion Lakes	Moderate
Petrie Mesa	14022	Sheep	Some	14022	Petrie Mesa	High
Point Cr	14021	Sheep	Some	14021	Point Cr	High
Rawhide/Coffee Pot	05034	Sheep	Moderate	05034	Rawhide/Coffee Pot-A	Very Low
					Rawhide/Coffee Pot-B	Very Low
					Rawhide/Coffee Pot-C	High *
Sandy Wash	05502	Sheep	Some	05502	Sandy Wash	High
Shavano Mesa	05511	Sheep	Some	05511	Shavano Mesa	Some
Shinn Park/South Canal	05534	Cattle	Some	05534	Shin Park	Moderate
Shinn Park	05534	Sheep	Moderate			
South of Town	14534	Sheep	Moderate	14534	South of Town	Very Low
Tappan Cr	05575	Sheep	Low	05575	Tappan Cr-A	Very Low
					Tappan Cr-B	Very Low
Wells Gulch	14016	Sheep	Moderate	14016	Wells Gulch	High

[#] Using ArcGIS , natural breaks in the data were determined using the 'Natural Breaks (Jenks)' option for displaying graduated color groups (Jenks 1967; Esri 2012) with four categories for those allotments falling within 9 miles of BHS habitat in the UFO: High, Moderate, Some, and Low.

[@] High—Intersects with BHS range or Disease Contact less than 25 years (assume 1:4 contacts results in disease event); Moderate—Disease Contact 25-50 years; Some—Disease Contact 50-75 years; Low—Disease Contact 75-100 years; Very Low—Disease Contact greater than 100 years.

* Allotments intersect the CHHR for RoC model.

^ This is a proposed allotment in the RMP that was not included in the RoC model effort.

Table B. 10. Comparison of PoIM and RoC Model Results for Bighorn Risk of Contact with Non-Domestic Sheep Allotments

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
Adobe	05027	Cattle	Moderate	05027	Adobe	Very Low
Alder Cr	17253	Cattle	High	17253	Alder Cr-A	Very Low
					Alder Cr-B	Very Low
Allen Reservoir	05050	Cattle	Moderate	05050	Allen Reservoir	Very Low
Anthracite Cr	14525	Cattle	Some	14525	Anthracite Cr	Some
Bald Hills	05510	Cattle	Some	05510	Bald Hills	Moderate
Baldy	05568	Cattle	High	05568	Baldy	High*
Barkeley Draw Com	07303	Cattle	Low	07303	Barkeley Draw Com	Very Low
Beaver Canyon	17060	Cattle	Some	17060	Beaver Canyon	Moderate
Beaver Rim	07204	Horse	Low	07204	Beaver Rim	Some
Ben Lowe	14013	Cattle	Moderate	14013	Ben Lowe	High *
Big Bear Cr	07207	Cattle	Moderate	07207	Big Bear Cr-A	Moderate
					Big Bear Cr-B	Low
Big Bucktail	17061	Cattle	Low	17061	Big Bucktail	Very Low
Big Gulch	03630	Cattle	Some	03630	Big Gulch-A	Very Low
					Big Gulch-B	Very Low
Big Pasture	05044	Cattle	Moderate	05044	Big Pasture	Low
Black Bullet	05045	Cattle	Moderate	05045	Black Bullet	Very Low
Blue Cimarron	03642	Cattle	Moderate	03642	Blue Cimarron	Low
Bolinger Ditch	07219	Cattle	Low	07219	Bolinger Ditch	Very Low
Bramier Draw	07235	Cattle	Low	07235	Bramier Draw	Very Low
Broad Canyon	17199	Cattle	Low	17199	Broad Canyon	Very Low
Buck	07232	Cattle or Horse	Low	07232	Buck	Very Low
Buckeye	17033	Cattle	Some	17033	Buckeye	High *
Burn Canyon	17022	Cattle	Low	17022	Burn Canyon	Very Low
Burro Creek	05556	Cattle	Some		Burro Creek	^
Burro Ridge	05532	Cattle	Some	05532	Burro Ridge	High
Busted Boiler	03648	Cattle	Low		Busted Boiler	^
Carpenter Ridge Com	17100	Cattle	Moderate	17100	Carpenter Ridge Com	High *
Horse Bench	03634	Cattle	Moderate	03634	Carpenter Ridge Com/Horse Bench	High *
Cedar	05570	Cattle	Some	05570	Cedar	Very Low

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
Cedar Cr	05535	Cattle	Moderate	05535	Cedar Cr-A	Low
					Cedar Cr-B	Very Low
Chaffee	00019	Cattle	Some	00019	Chaffee	Low
Chaffee Gulch	05528	Cattle	Some	05528	Chaffee Gulch	Very Low
Cimarron 40	03658	Cattle	Moderate	03658	Cimarron 40	Moderate
Cimarron Stock Driveway	03650	Cattle	High	03650	Cimarron Stock Driveway	High *
Coal Canyon	17107	Cattle	Low	17107	Coal Canyon	Very Low
Coal Creek	05509	Cattle	Some	05509	Coal Creek	Very Low
Coke Ovens	17027	Cattle	Some	17027	Coke Ovens	Moderate
Collins	05043	Cattle	Moderate	05043	Collins	Very Low
Cone	03635	Cattle	Some		Cone	^
Cookie Tree	05560	Cattle	Moderate		Cookie Tree	^
Coventry	07222	Cattle	Low	07222	Coventry	Low
Cow Cr	05566	Cattle	High	05566	Cow Cr	High *
Crawford Reservoir	05018	Cattle	Some	05018	Crawford Reservoir	Very Low
Creek Bottom	03632	Cattle	Low		Creek Bottom	^
Cut Off	05052	Cattle	Some	05052	Cut Off	Very Low
Davis Mesa	17037	Cattle	Moderate	17037	Davis Mesa	High *
Deep Cr	14524	Cattle	Low	14524	Deep Cr	Very Low
Dexter Creek	05551	Cattle	High	05551	Dexter Creek	High *
Dirty George	14023	Cattle	Low	14023	Dirty George	Very Low
Doby Canyon	17042	Cattle	Low	17042	Doby Canyon	Very Low
Dolores Canyon	17004	Cattle	High	17004	Dolores Canyon	High *
Doug Cr	05028	Cattle	Some	05028	Doug Cr	Very Low
Downing	05541	Cattle	Some	05541	Downing	Very Low
Dry Cr	14549	Cattle	Low	14549	Dry Cr	Very Low
Dry Cr Basin	05513	Cattle	Some	05513	Dry Cr Basin	High
Dry Cr Place	05525	Cattle or Horse	Some	05525	Dry Cr Place	Very Low
Dry Gulch	05540	Cattle	Some	05540	Dry Gulch	Very Low
Dry Park	07300	Cattle	Low	07300	Dry Park	Very Low
Duroy	03637	Cattle	Moderate		Duroy	^
E Fork Dry Cr	05514	Cattle	Some	05514	E Fork Dry Cr	Low
E Gould Reservoir	05041	Cattle	Moderate	05041	E Gould Reservoir	Very

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
						Low
E Paradox Com	17101	Cattle	Moderate	17101	E Paradox Com-A	High *
				17101	E Paradox Com-B	Moderate
E Roatcap Ind	14512	Cattle	Low	14512	E Roatcap Ind	Very Low
Far Away	17213	Cattle	Low	17213	Far Away	Very Low
Feedlot	17078	Cattle	Moderate	17078	Feedlot	High *
Fire Mtn Canal	14508	Cattle	Moderate	14508	Fire Mtn Canal	Very Low
Flatiron	05501	Cattle	Moderate	05501	Flatiron	High
Franklin Mesa	05512	Cattle	Some	05512	Franklin Mesa	Moderate
Gravel Pit	07063	Cattle	Low	07063	Gravel Pit	Very Low
Green	05503	Cattle	Some	05503	Green	Moderate
Hairpin	05569	Cattle	Moderate	05569	Hairpin	Very Low
Hamilton Mesa	07209	Cattle	Low	07209	Hamilton Mesa	Very Low
High Park	05549	Cattle	Moderate	05549	High Park	Very Low
Hillside	05562	Cattle	High	05562	Hillside	Very Low*
Home Ranch	07201	Cattle	Low	07201	Home Ranch	Very Low
Horsefly	05523	Cattle	Some	05523	Horsefly [%]	Very Low
Horsefly (W)	05523	Cattle	Some			
Horsefly Com	07301	Cattle	Low	07301	Horsefly Com	Very Low
Houser	07076	Cattle	Some	07076	Houser	High
Jumbo Mtn	14527	Cattle	Low	14527	Jumbo Mtn	Very Low
Juniper Knob	14505	Cattle	Some	14505	Juniper Knob	Very Low
Kinnikin	03643	Cattle	Some		Kinnikin	^
La Sal Creek	17011	Cattle	High	17011	La Sal Cr	High *
Lavender	07075	Cattle	Moderate	07075	Lavender	High
Lee Bench	14011	Cattle	Moderate	14011	Lee Bench	Some
Leroux	14550	Cattle	Some	14550	Leroux	Very Low
Leroux Cr	14504	Cattle	Some	14504	Leroux Cr	Very Low
Lillylands/West	17024	Cattle	Low	17024	Lillylands/West	Low
Lion Canyon	17012	Cattle	Moderate	17012	Lion Canyon	High *
Lion Cr Basin	17044	Cattle	Some	17044	Lion Cr Basin	High *
Little Baldy	07223	Cattle	Some	07223	Little Baldy	Very Low
Little Maverick Draw	07210	Cattle	Low	07210	Little Maverick Draw	Very Low

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results[#]	Allotment Number	RoC Allotment Name	RoC Results[@]
Log Hill	05529	Cattle or Sheep	Some	05529	Log Hill	Very Low
Lower Beaver Canyon	07211	Cattle	Low	07211	Lower Beaver Canyon	Very Low
Lower Hamilton	07234	Cattle	Low	07234	Lower Hamilton	Very Low
Lower Pinion	07213	Cattle	Low	07213	Lower Pinion	Very Low
Lower Roc Creek	07216	Cattle	High	07216	Lower Roc Creek	Low
Lower Roubideau Cyn	05000	Cattle	High	05000	Lower Roubideau Cyn	High *
Mailbox Park	17001	Cattle	Low	17001	Mailbox Park-A	Very Low
					Mailbox Park-B	Very Low
Maverick Draw	17018	Cattle	Low	17018	Maverick Draw	Very Low
McKee Draw	07206	Cattle	Some	07206	McKee Draw	Very Low
McKee Draw (E)	07206	Cattle	Some	07206	McKee Draw	Very Low
Mesa Cr	17014	Cattle	Moderate	17014	Mesa Cr-A	High *
					Mesa Cr-C	High *
Mesa Cr/First Park	03645	Cattle	Low		Mesa Cr-B	Some
Middle Hamilton Lse	07233	Cattle	Low	07233	Middle Hamilton Lse	Very Low
Milk Cr	14544	Cattle	Low	14544	Milk Cr	Very Low
Moonshine Park	05563	Cattle	High	05563	Moonshine Park	High *
Moonshine Park (N)	05563	Cattle	High	05563	Moonshine Park	High *
Morrow Point	03631	Cattle	High		Morrow Point	High *
Mud Springs	07230	Cattle	Low	07230	Mud Springs	Very Low
North Saddle Peak	14540	Cattle	Low	14540	N Saddle Peak	Very Low
North Wickson Draw	17023	Cattle	Low	17023	N Wickson Draw	Very Low
Naturita Canyon	07203	Cattle	Low	07203	Naturita Canyon-A	Very Low
					Naturita Canyon-B	Very Low
					Naturita Canyon-C	Very Low
					Naturita Canyon-D	Very Low
					Naturita Canyon-E	Very Low
					Naturita Canyon-F	Very Low
Naturita Ridge	17035	Cattle	Some	17035	Naturita Ridge	High
Needle Rock	14542	Horse	Low	14542	Needle Rock	Very

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results[#]	Allotment Number	RoC Allotment Name	RoC Results[@]
Allotment-not ACEC						Low
Norwood Hill	07218	Cattle	Low	07218	Norwood Hill	Very Low
Nyswanger	17082	Cattle	High	17082	Nyswanger	High *
Oak Hill	07225	Cattle	Low	07225	Oak Hill	Very Low
Oak Hill 40	03644	Cattle	Some		Oak Hill 40	^
Oak Mesa	14506	Cattle	Some	14506	Oak Mesa	Very Low
Oak Ridge Com	14528	Cattle	Low	14528	Oak Ridge Com	Very Low
Onion Lakes	05533	Cattle or Sheep	Some	05533	Onion Lakes	Moderate
Overland	14511	Cattle	Low	14511	Overland	Very Low
Park	17030	Cattle	Some	17030	Park	Very Low
Parkway	17062	Cattle	Low	17062	Parkway	Very Low
Piney	05516	Cattle	Some	05516	Piney	High
Pinion	03641	Cattle	Low		Pinion	^
Pipeline	05507	Cattle	Some	05507	Pipeline	High
Pocket Ind	17085	Cattle	Moderate	17085	Pocket Ind	High *
Popp Ranch	14531	Cattle	Some	14531	Popp Ranch	Very Low
Radio Tower	02660	Cattle	Low	02660	Radio Tower	Very Low
Ragsdale	03708	Cattle	Low		Ragsdale	^
Rawlings Ind	17021	Cattle	Moderate	17021	Rawlings Ind	High *
Ray (Wray) Mesa	03298	Cattle	Moderate	03298	Ray (Wray) Mesa	High *
Redvale	07227	Cattle	Low	07227	Redvale	Very Low
Reynolds/McDonald	14530	Cattle	Some	14530	Reynolds/McDonald -A	Very Low
					Reynolds/McDonald -B	Low
Ridgway Reservoir	00001	Cattle	Moderate		Ridgway Reservoir	^
Rim Rock	05051	Cattle	High	05051	Rim Rock	High *
Smith Fork Rim	03526	Cattle	High	03526	Smith Fork Rim	High *
River	17079	Cattle	High	17079	River	High *
River Allotment	07200	Cattle	Low	07200	River Allotment	Low
Roatcap	05504	Cattle	Moderate	05504	Roatcap	Moderate
Roatcap/Jay Cr	14507	Cattle	Some	14507	Roatcap/Jay Cr	Very Low
Roc Cr	17020	Cattle	High	17020	Roc Cr	High
Rock Ditch	05538	Cattle	Low	05538	Rock Ditch	Very Low
Round Top	00002	Cattle	Moderate		Round Top	^
Rowher Canyon	17080	Cattle	Moderate	17080	Rowher Canyon	High *

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
S Dry Cr	14548	Cattle	Some	14548	S Dry Cr	Very Low
South Piney	05515	Cattle	Some	05515	S Piney-A	
					S Piney-B	High
San Miguel Rim	03639	Cattle	Low		San Miguel Rim	^
San Miguel River	03640	Cattle	Low		San Miguel River	^
Saw Pit	03636	Cattle	Moderate		Saw Pit	^
Sawtooth	17032	Cattle	Some	17032	Sawtooth	High *
Second Park	17105	Cattle	Some	17105	Second Park	
Section 35	14547	Cattle	Some	14547	Section 35	Very Low
Sewemup	03646	Cattle	High		Sewemup	^
Shinn Park/South Canal	05534	Cattle	Some	05534	Shin Park	Moderate
Shinn Park	05534	Sheep	Moderate			
Slagle Pass	05547	Cattle	Moderate	05547	Slagle Pass	Moderate
Slaughter Grade	03651	Cattle	Low		Slaughter Grade	^
Smith Fork Ind	05049	Cattle	Moderate	05049	Smith Fork Ind	Very Low
South Branch	14004	Cattle	Low	14004	South Branch	Very Low
Spring Cr	05517	Cattle	Low		Spring Cr	^
Spring Creek Canyon	03659	Cattle	Low		Spring Creek Canyon	^
Spring Crk & Hwy 90	03638	Cattle	Moderate	03638	Spring Crk & Hwy 90	High *
Spring Gulch	05029	Cattle	High	05029	Spring Gulch	High
Stevens Gulch Com	14513	Cattle	Low	14513	Stevens Gulch Com	Very Low
Stingley Gulch	14503	Cattle	Some	14503	Stingley Gulch	Very Low
Stock Driveway	14521	Cattle	Some	14521	Stock Driveway	Very Low
Sundown	03633	Cattle	High	03633	Sundown	High *
Sunrise Gulch Com	17102	Cattle	High	17102	Sunrise Gulch Com	High *
Sunshine Mesa	14541	Cattle	Some	14541	Sunshine Mesa	Very Low
Swain Bench	17081	Cattle	Moderate	17081	Swain Bench	High *
Tabeguache Creek	17031	Cattle	Some	17031	Tabeguache Cr	High
Taylor Draw	05555	Cattle	Moderate	05555	Taylor Draw	Moderate
Third Park Com	17103	Cattle	Some	17103	Third Park Com	Some
Tinkler Ind	05530	Cattle	Low	05530	Tinkler Ind	Very Low
Transfer Road	05505	Cattle	Some	05505	Transfer Road	High
Tuttle Draw	17106	Cattle	Some	17106	Tuttle Draw	Moderate
Twenty Five Mesa N	14008	Cattle	High	14008	Twenty Five Mesa N	High *
Twenty Five Mesa N (proposed)	14008	Cattle	Moderate	14008	Twenty Five Mesa N	^
Twenty Five Mesa S	07008	Cattle	Low	07008	Twenty Five Mesa	Very

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results [#]	Allotment Number	RoC Allotment Name	RoC Results [@]
					S-A	Low
					Twenty Five Mesa S-B	Very Low
Uncompahge Bench	07007	Cattle	Some	07007	Uncompahge Bench	Some
Uncompahgre Com	07302	Cattle	Some	07302	Uncompahgre Com-A	Very Low
					Uncompahgre Com-B	Very Low
					Uncompahgre Com-C	Very Low
					Uncompahgre Com-D	Moderate
					Uncompahgre Com-E	Some
Upper Mail Box	07208	Cattle	Low	07208	Upper Mail Box	Low
Upper Maverick Draw	07202	Cattle	Low	07202	Upper Maverick Draw	Very Low
Upper Terror Cr	14514	Cattle	Low	14514	Upper Terror Cr	Very Low
W Roatcap	14510	Cattle	Low	14510	W Roatcap	Very Low
W Stevens Gulch	14515	Cattle	Low	14515	W Stevens Gulch	Very Low
W Youngs Peak	14536	Cattle	Some	14536	W Youngs Peak	Very Low
Wakefield	03628	Cattle	Low		Wakefield	^
Ward Creek-Doughspoon	14025	Cattle	Some	14025	Ward Cr/Doughspoon	High
Ward Creek-Doughspoon (south)	14025	Cattle	Some	14025	Ward Cr/Doughspoon	High
Washboard Rock	05548	Cattle	Moderate	05548	Washboard Rock-A	Some
Waterdog Basin	05546	Cattle	Some	05546	Waterdog Basin	Very Low
Weimer Hill Place	03660	Cattle	Low		Weimer Hill Place	^
White Ranch	14015	Cattle	Moderate	14015	White Ranch	High
White Ranch (proposed)	14015	Cattle	Moderate	14015	White Ranch	High
Wickson Draw	17010	Cattle	Low	17010	Wickson Draw	Low
Wilbanks	14502	Cattle	Low	14502	Wilbanks-A	Very Low
					Wilbanks-B	Very Low
Williams Cr	14523	Cattle	Low	14523	Williams Cr	Very Low
Williams Ditch	07220	Cattle	Low	07220	Willims Ditch	Very Low
Camel Back Pasture	14010	Cattle	High	14010	Winter/Monitor Mesa	High
Winter-Monitor Mesa	14010	Cattle	High	14010	Winter/Monitor Mesa	High *
Winter-Monitor	14010	Cattle	High	14010	Winter/Monitor	High

POIM Allotment Name	Allotment Number	Type of Livestock	POIM Results[#]	Allotment Number	RoC Allotment Name	RoC Results[@]
Mesa (proposed)					Mesa	
Youngs Peak	14537	Cattle	Some	14537	Youngs Peak	Very Low

[#] Using ArcGIS , natural breaks in the data were determined using the 'Natural Breaks (Jenks)' option for displaying graduated color groups (Jenks 1967; Esri 2012) with four categories for those allotments falling within 9 miles of BHS habitat in the UFO: High, Moderate, Some, and Low.

[@] High—Intersects with BHS range or Disease Contact less than 25 years (assume 1:4 contacts results in disease event); Moderate—Disease Contact 25-50 years; Some—Disease Contact 50-75 years; Low—Disease Contact 75-100 years; Very Low—Disease Contact greater than 100 years.

* Allotments intersect the CHHR for RoC model.

[^] This is a proposed allotment in the RMP that was not included in the RoC model run.

[%] Same as Horsefly and Horsefly (W) combined

Figures

Figure B. 2. CPW Rocky Mountain BHS Suitable Habitat Model for RoC Analysis Area.

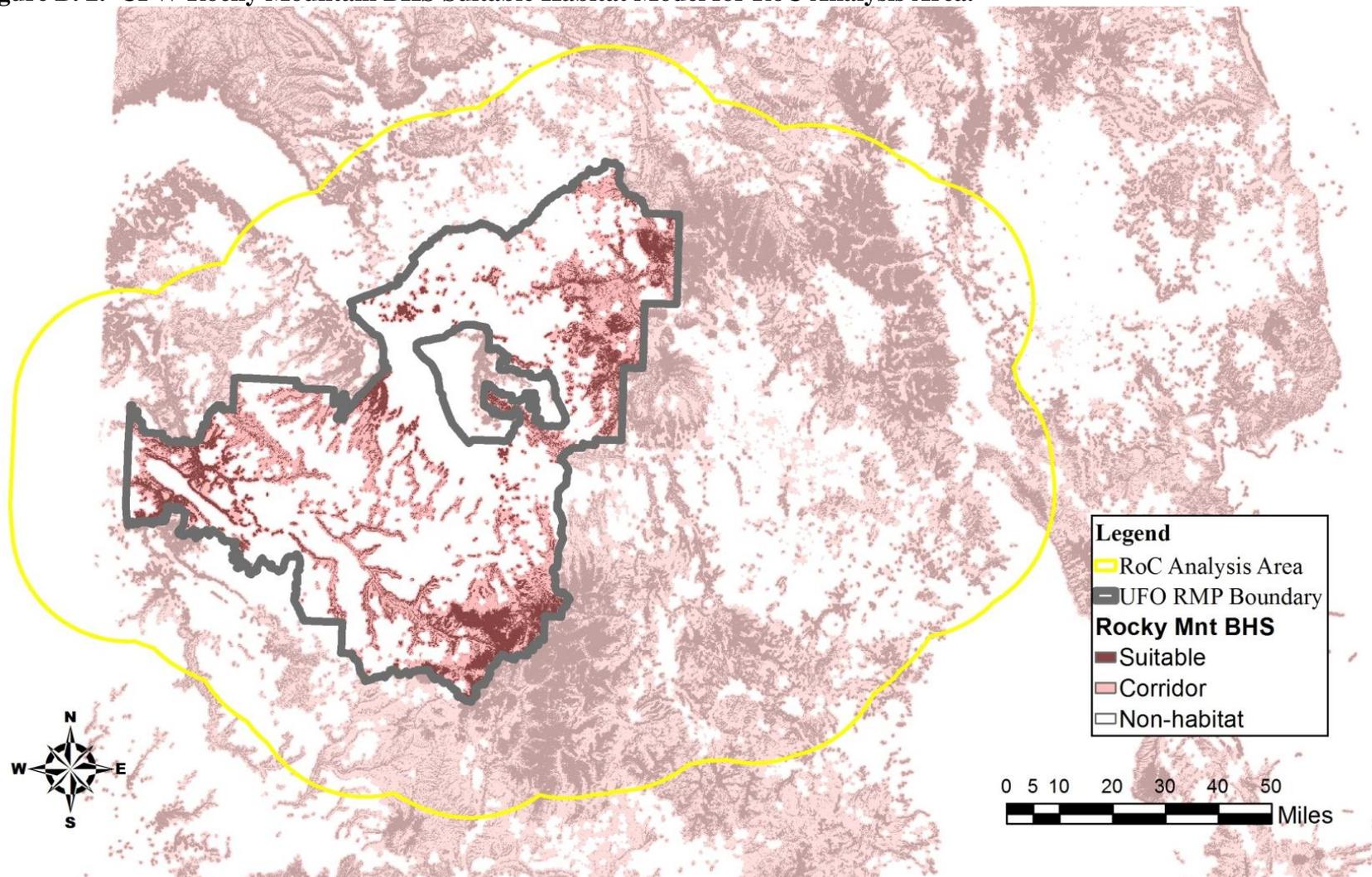


Figure B. 3. CPW Desert BHS Suitable Habitat Model for RoC Analysis Area.

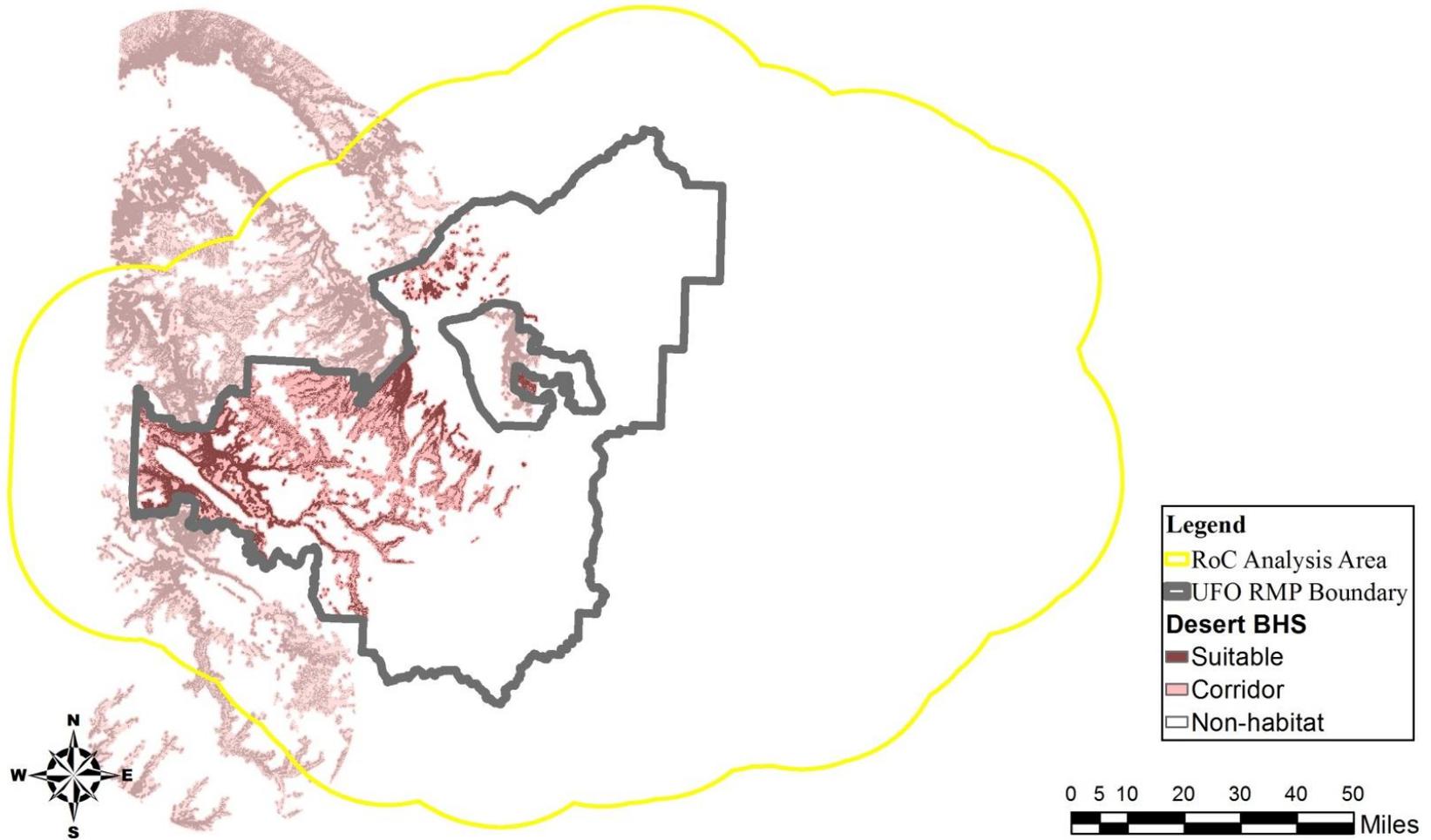


Figure B. 4. Analysis area and bighorn sheep populations used in the RoC model.

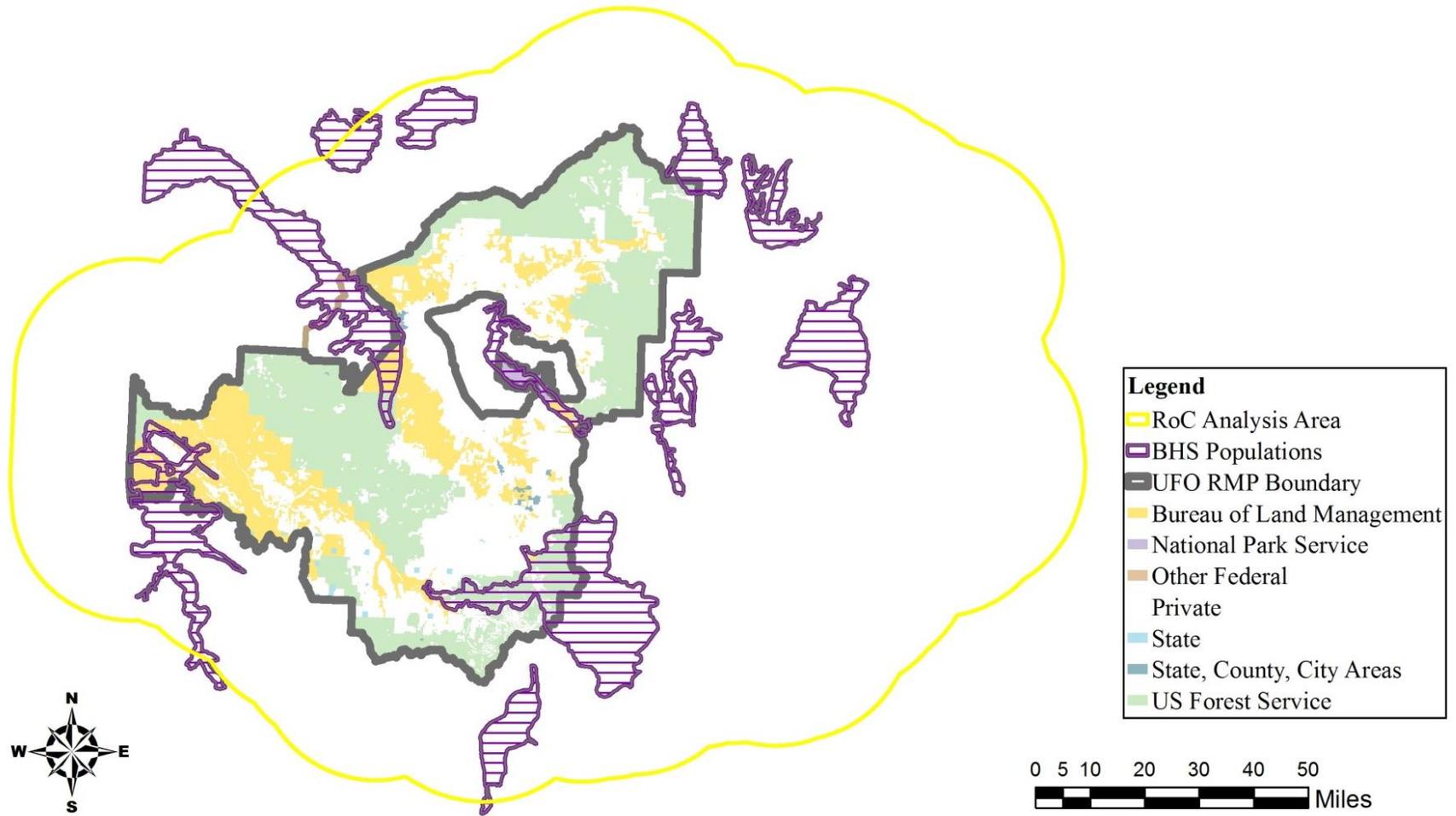
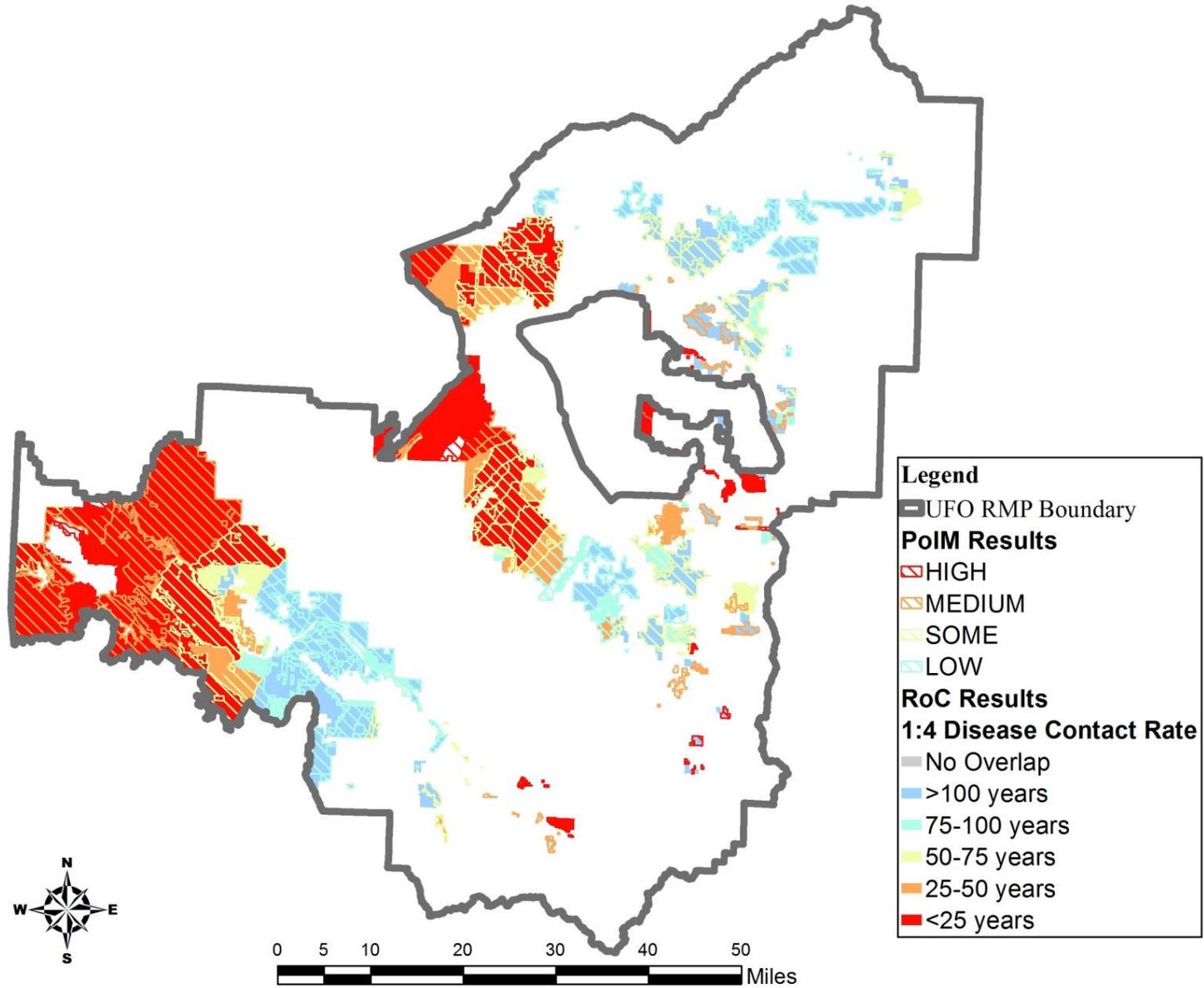


Figure B. 5. Comparison of PoIM and RoC Model Results for UFO RMP area.



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APPENDIX C

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
1	Colorado Wool Growers Association, many times in many ways.	BLM is not following multiple use mandate	Thank you for your comment. BLM’s multiple-use mandate is subject to other regulations, such as 43 CFR 4180, which requires management of public lands be conducted in a manner which meets, or makes significant progress towards meeting, land health standards. The North Delta Permit Renewal EA explores a range of alternatives to determine what action will best achieve our challenging mission to manage for healthy public lands while providing a wide variety of resource uses.	
2	Danny and Monita Todd, Delta County Livestock Association, Colorado Wool Growers Association	The proposed action will harm the economy.	BLM appreciates and shares the views expressed on the important economic contribution that public lands make to the local ranching industry. Please see the section on socio-economics under the chapter Affected Environment and Environmental Consequences for a detailed analysis of impacts under each alternative.	
3	Delta County Livestock Association, Danny and Montia Todd, Mark LeValley, Hannah LeValley	Public lands provide economic stability.	Thank you for your comment and additional economic data. BLM recognizes the economic importance of public land grazing permits. Please see the section on socio-economics under the chapter Affected Environment and Environmental Consequences for a detailed analysis of economic impacts under each alternative.	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
4	Delta County Livestock Association, Mark LeValley, Colorado Wool Growers Association	Wells Gulch enclosure land health status shows a flaw in BLM's LHA process.	Thank you for your comment. BLM did not include a data point within the fenced enclosure in the Wells Gulch allotment. Therefore, the enclosure was grouped with the surrounding area, which met land health standards (with problems).	
5	CWGA, multiple times.	BLM is not following the NEPA process correctly.	Thank you for your comment. BLM has followed the NEPA process as outlined in NEPA handbook H-1790-1 and is compliant with Council on Environmental Quality's (CEQ) NEPA regulations (40 CFR Parts 1500–1508). This process included a 30 day scoping period, where all groups, individuals, federal, state, and local governments could share knowledge and opinions on the North Delta Permit Renewal EA.	
6	Delta County Livestock Association, Delta County BoCC, CWGA many times	Risk of contact literature, or disease transmission studies, are flawed.	The Bighorn/Domestic Sheep Risk of Association Modeling appendix for the UFO RMP Amendment efforts addresses all comments relative to the modeling effort, risk of contact literature, and disease transmission studies. This appendix was cited in the Draft EA, and many of these commenters had previously read and commented on this Appendix as part of the UFO RMP efforts, and a previously released version for the Dominguez-Escalante NCA RMP efforts. The content of this Appendix has now been included in this EA as Appendix	Appendix B

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			B. This analysis was used to estimate potential effects to bighorn sheep from domestic sheep grazing for this action. The results from this model were not used to drive any of the alternatives for this action.	
7	Rocky Mountain Bighorn Society, Wild Sheep Foundation, Kevin Hurley, Wild Earth Guardians	RoC model is flawed, particularly regarding disease outbreak interval.	See response to Comment Summary 2; See Appendix B, now included in the EA for explanation of difficulties in calculating the potential for disease transmission, the RoC model's use of probability that foraging bighorn will reach a domestic sheep allotment and the calculation of disease outbreak interval. As explained in Appendix B, extremely limited data on local bighorn populations made running the RoC model filled with assumptions from data from other populations. As stated in the EA with assistance from CPW biologists, the RoC model was run using the best available local bighorn population information, however, much of the needed data was not available for individual bighorn populations. This may have resulted in questionable results for this area.	Appendix B
8	CWGA	RoC model is not compliant with Data Quality Act, ESA, or presidential orders on	See responses for Comment Summary #7	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		scientific integrity and transparency.		
9	CWGA, Delta County BoCC, Delta County Livestock Association, Mark LeValley, all commented multiple times	BLM is violating the sheep MOU or the MOU provides adequate guidelines.	<p>The purpose of the referenced MOU for Management of domestic sheep and bighorn sheep is “to provide general guidance for cooperation in reducing contact between domestic and bighorn sheep in order to minimize potential interspecies disease transmission and to ensure healthy bighorn sheep populations while sustaining an economically viable domestic sheep industry in Colorado” (pg 1 of MOU). This MOU states that all parties agree that contact between wild and domestic sheep occurs; contact results in increases in probability of respiratory disease outbreaks in bighorn; not all disease outbreaks can be attributed to domestic sheep; bighorn and domestic sheep may be attracted to each other; and “The goal is to minimize contact by decreasing the opportunities for domestic/bighorn sheep interaction; while still recognizing that some vacant sheep allotments are important to the domestic sheep industry as forage reserves or for other economic or management reasons” (pg 2 of MOU).</p> <p>This analysis does not violate the MOU, and in fact supports the goal that all parties agreed to.</p>	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>This analysis was used to estimate potential effects to bighorn sheep from domestic sheep grazing for this action. The results from this model were not used to drive any of the alternatives for this action. The action alternatives make strides to minimize contact by decreasing the opportunities for domestic/bighorn sheep interaction, as directed by the MOU. No alternative, including the No Action, prevents contact for these populations because of the surrounding domestic sheep under other land ownership.</p>	
10	Delta County Livestock Association, Mark LeValley, CWGA	BLM is favoring single species management.	<p>Bighorn sheep (Desert and Rocky Mountain) are a BLM sensitive species. If affects from a proposed action are expected for a sensitive species, it is required that effects analysis from the action (and alternatives) be disclosed in the NEPA analysis (BLM Manual 6840.2B). Additionally, Western Association of Fish and Wildlife Agencies (WAFWA) recommends that land management agencies and state wildlife agencies cooperate to complete comprehensive risk assessments of domestic sheep grazing allotments to inform the land use planning process.</p> <p>Because there is not direct overlap of domestic sheep allotments and bighorn Core Herd Home Ranges, and that the</p>	Please see the Terrestrial Wildlife section and Appendix B for clarification

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>model results may be questionable (see responses to Comment Summary # 7), bighorn disease issues did not drive any of the alternatives. General concern for potential interaction between bighorn and domestic sheep, as per the MOU, resulted in a list of BMPs to be used to reduce the likelihood of interspecies interaction and reduce potential impacts from the proposed action. These BMPs were developed from the WAFWA recommendations. BMPs have not all been tested, but are the best available data for methods to reduce potential interaction, especially outside of bighorn CHHR.</p>	
11	Delta County Livestock Association, Mark LeValley	BLM has no authority or expertise to dictate management of LPDs	<p>Thank you for your comment. Under 43 CFR 4130.3-2, BLM may specify in grazing permits or leases other terms and conditions which will assist in achieving management objectives or provide for proper range management. Requirements for Livestock Protection Dogs in the North Delta EA are based on Western Association of Fish and Wildlife Agency guidelines, which are standard accepted practices for conservation of bighorn sheep.</p>	
12	CWGA twice	BLM is not using all available research on	<p>Thank you for your comment. Appendix B incorporates the current literature on the bighorn/domestic sheep disease</p>	Please see Appendix B in the EA.

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		sheep (ARS).	issue. Without a citation for the “research data from the USDA Agricultural Research Service”, we cannot respond to the comment that this data has been ignored.	
13	Delta County Livestock Association, CWGA twice	BLM failed to consider best available science that shows livestock grazing can be beneficial.	Thank you for your comment. BLM appreciates and recognizes that some studies show livestock grazing can be beneficial to land health. However, the 2012 North Delta Land Health Assessment showed a reduction of perennial vegetation across a 10 year period for some areas, which caused a failure to meet land health standards as required by 43 CFR 4180.	
14	Delta County BoCC, Hannah Todd, CWGA	BLM failed to look at site specific details and make case-by-case determinations , and is using generalizations and a one size fits all approach.	Thank you for your input. The BLM has looked at the specific language and statements commenters reviewed, and have made changes where appropriate to ensure wording is clear and conveys the intended information.	
15	CWGA	Vegetation analysis is not based on fact.	Thank you for your input. The vegetation analysis in the EA is based on the North Delta Land Health Assessment completed in 2014. This assessment combines information from numerous permanent long term trend vegetation transects that are consistent with BLM protocol, and which were read in 2013. Supplemental information from	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			National Resource Conservation Service draft Ecological Site Descriptions is also used.	
16	CWGA, Western Watersheds Project	Drought monitoring tool is inappropriate for this area or is inefficient.	Thank you for the input. The monitoring tool relies on a combination of regional-scale information from the U.S. Drought Monitor, in combination with local climate and vegetation data. This tool is consistent with guidance from BLM at the national level, and has been designed to be feasible to implement. It has recently been developed by this office in coordination with Delta County Staff and local ranchers to deal with a difficult and unpredictable issue.	
17	CWGA several times, Western Slope Wool Growers Association, Ernie Etchart, Joe Sperry several times	Trend data conclusions are flawed because BLM used different methods.	Thank you for your input. The trend data conclusions are based on vegetation changes recorded over a 4-11 year period from permanent long term transects, Each reading of the transects was followed the same methodology.	
18	Ross Allen, SW CO Grazing Advisory Board, Western Slope Wool Growers Association, Ernie Etchart all several	LHA conclusions or process are flawed and subjective.	Thank you for your input. The trend data and land health conclusions are based on vegetation changes recorded over a 10 year period from permanent long term transects, Each reading of the transects followed the same methodology.	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
	times			
19	Ross Allen, SW CO Grazing Advisory Board	BLM did not or should include permittees in the process.	The Uncompahgre Field Office sent a scoping notice to all interested publics on May 9, 2011 inviting them to participate in the Land Health Assessment. There was a scoping letter sent for the preliminary EA Nov. 17, 2014, and a 30 day comment period on the preliminary EA Aug. 24, 2015 There were multiple individual conversations in addition, to a meeting held on 10-15-15 to discuss with the permittees their concerns.	
20	Keith and Mary Lawrence three times	Impacts of climate change are not addressed, especially for actions with long term impacts, and for plant communities and ungulates.	Thank you for your comment. Changes were made to the EA to address climate change.	Please see Table 10 and Terrestrial Wildlife and T&E sections where specific species were addressed.
21	RMBS twice, Kevin Hurley twice each	There are no maps of the CHHR, occupied habitat, or analysis area.	See Appendix B for more detailed discussion and various maps of habitat (desert and Rocky Mountain BHS) and for all BHS Core Herd Home Ranges used for the RoC Model.	
22	RMBS, WSF, Kevin Hurley	There is a discrepancy between page 7 and Table 1 and 2, regarding number of sheep grazing	Thank you for your comment. The Purpose and Need section identifies 6 domestic sheep grazing allotments that would authorize 4 grazing permit authorizations.	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		allotments.		
23	Keith and Mary Lawrence, RMBS, WSF, Kevin Hurley, WEG all multiple times	There is no justification for how the cumulative impact analysis area was chosen; not inclusive enough.	Please see the cumulative impact section for each discipline and justification as to why the CIAA was chosen.	Cumulative Impact Section.
24	WEG, RMBS	The No Grazing and or No Action alternatives were not analyzed in detail.	Thank you for your comment. Please see Affected Environment and Environmental Consequences. Detailed analysis of the No Grazing Alternative for individual resources and resource uses can be found in this section. It should be noted “there is no bighorn CHHR within the North Delta area, there are no effects to core habitat areas”	
25	Danny and Monita Todd, Delta County Livestock Association, Mark LeValley, Hannah Todd	The area is not well suited for pronghorn.	Thank you for your comment. Colorado Parks and Wildlife is responsible for the management of wildlife, including pronghorn. It is BLM’s responsibility to manage for landscapes that meet all land health standards, and provide for habitat for viable wildlife populations. Achievement of land health standards provides for, in many cases, beneficial habitat to wildlife. As stated in the EA, this population has high levels of disease (BT/EHD) that may be limiting the population. Pronghorn mortalities from motor vehicles is low (2) as compared to other sources (4 coyote, 1	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			fence, 3 unknown).	
26	Delta County BoCC, Delta County Livestock Association, Mark LeValley, Hannah Todd	AUM reductions without other changes in management (use areas, rest, rotation) will not improve land health.	Under the Proposed Action, BLM would include changes in management other than AUM reductions. These changes would include use-area delineations, planned grazing strategies, and periodic rest. Specific plans for each allotment would be made on an individual basis during implementation. Please see Table 8 Summary of Alternatives.	Please see Table 8 of the EA
27	Delta County BoCC several times, Delta County Livestock Association, Mark LeValley	Historic photographs show land health has remained the same or improved over time.	BLM appreciates local knowledge and input of land health and change over time, and recognizes that historic information such as photographs are useful for making anecdotal comparisons. Vegetation transect data collected using widely accepted scientific methods, including a comparison to historic data, photographs, and range site descriptions, was used to determine land health in the North Delta Land Health Assessment.	
28	Delta County Livestock Association, Mark LeValley, Hannah Todd	Grazing is beneficial in reducing the occurrence of wildfires	Fire cycles were not identified as being outside the historic range therefore; they were not analyzed in detail in the EA. In addition, the proposed action would seek to improve LH and avoid changes that would increase fire return intervals.	
29	Delta County BoCC, Western Slope Wool Growers Association,	Increase in weeds being correlated with livestock is unsubstantiated; other	BLM recognizes that there are multiple reasons why an area can fail to meet land health standards. Please see the North Delta Land Health Assessment for details on what factors were determined to	

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	Ernie Etchart	environmental factors influence weed spread.	be causal in failing to meet land health in any particular area.	
30	RMBS, Keith and Mary Lawrence	Huff and Dominguez Rims allotment split and impacts to sheep on those proposed allotments is not analyzed.	As described in the Background /Introduction section of the EA, Due to the Dominguez Escalante National Conservation Area (D-E NCA) Proposed Resource Management Plan, 3,464 acres will be removed from the Alkali Flats allotment to create the Huff Allotment #04294, and 6,536 acres will be removed from the Wells Gulch allotment to create the Dominguez Rims allotment #04293. The allotments are divided along the highway, and the D-E NCA boundary. Huff and Dominguez Rims allotments are within the D-E NCA and will be analyzed under a separate permit renewal process in the future. The remaining portions of Alkali Flats and Wells Gulch are within this permit renewal process.”	Please see Background /Introduction section of the EA.
31	RMBS, Keith and Mary Lawrence, WSF, Kevin Hurley,	The BLM should have a reduced sheep grazing alternative to benefit bighorn.	The range of alternatives is driven by issues. The range of alternatives includes continued management (No Action) with addition of BMPs for bighorn, a reduced AUM alternative (BLM Preferred) with addition of Terms and Conditions to reduce the likelihood of interaction between domestic sheep and bighorn, and the No Grazing (Alternative 2) Alternative with removal of all domestic grazing from BLM lands in the area. Since there is	Please see the Scoping and Issues section as well as Alternatives sections for more details on issues.

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>not overlap of domestic sheep allotments with bighorn CHHR, the main concern for interaction is from bighorn on foray outside of the CHHR. These alternatives represent the range of alternatives to address the issue of potential interaction between domestic sheep and bighorn on foray.</p> <p>See response to comment summary #10 and 24. The portions of Alkali Flats and Wells Gulch allotments that are close to the Gunnison River (DE NCA) and overlap with the CHHR are excluded from the action alternatives.</p> <p>Scoping statements have been addressed through the RoC model effort; allotments in this proposal do not overlap with CHHR; and the additional of BMPs to permit terms and conditions to improve separation between wild and domestic sheep.</p>	
32	RMBS	Scoping statement regarding bighorn/desert sheep (pg 29) is not followed through with in Table 8.	Was an oversight that it was not included in Table 8.	Please see Scoping and Issues section
33	WWP	The criteria the BLM used in calculating AUMs is unclear.	Thank you for your comment. See table 5 in the EA for information on how AUMs were calculated.	Please see table 5.

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34	WWP multiple times	BO/BA for cactus is outdated and BLM should re-consult on the issue for this EA.	<p>The BLM has determined that the BA is not outdated. The document attached as “a recent FWS publication” is dated April 2, 2013 and the final BA analyzing the effects of BLM’s livestock grazing program on Colorado Hookless Cactus was formally accepted by FWS on May 16, 2012. When one compares the relevance of information submitted in both documents there are strong similarities between the two.</p> <p>The document submitted by WWP entitled “Impacts to federally listed cacti species from livestock on the Colorado Plateau in Utah” on pg. 52 summarizes the affects to cacti by livestock. The programmatic BA for Colorado Hookless cactus analyzes the same effects on pgs. 32 & 33 in generality regarding the 3 species evaluated and more specifically to Hookless cactus on pgs. 36&37.</p> <p>The same document submitted by WWP also has recommended future actions that are suggested to reduce or minimize impacts to the cacti evaluated on pgs. 53&54, similar conservation measures are represented in the Biological Opinion for Colorado Hookless Cactus on pgs. 13-17 as well as in the proposed action for the North Delta Land Health Unit.</p>	

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			<p>In addition the BLM has concluded that the livestock grazing program has adverse effects to Colorado Hookless Cactus (PBA pg. 47) and FWS has reached a finding of “No Jeopardy” (PBO pg.50). The information presented by WWP would not change those conclusions given the similarity of affects described and recommendations presented to alleviate identified affects.</p> <p>Also the thresholds established in the BO for re-initiation of consultation (BO pg. 53&54) have not been reached.</p>	
35	Kevin Hurley, WSF, RMBS several times, WEG	No analysis of how alternatives will conserve BHS in the absence of separation; No analysis or proof of bighorn sheep BMP effectiveness	See response to comment summaries #10 and 24. Effects to bighorn sheep from all alternatives were in as much detail as is possible given the limited amount of local data and difficulties with the RoC model (see response to comment summary #7 and EA Appendix B). Current conditions based on current management (No Action) are presented in the Terrestrial Wildlife Affected Environment section; Action alternatives are presented in the Environmental Consequences section analyzed	Please see Terrestrial Wildlife section, in addition to Appendix B.
36	WSF, Kevin Hurley, RMBS	Literature is outdated or no longer valid.	Thank you for the information. Reference to Schommer and Woolever 2008 has been changed to Wehausen et. al. 2011.	Please see Reference Section
37	RMBS, WSF	RoC model is flawed,	The commenter has misconceptions about the RoC	Please Terrestrial

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		<p>especially regarding interspecies contact assumptions.</p>	<p>model. The RoC model identifies a potential rate of contact that a bighorn sheep will contact a domestic sheep allotment based on relatively infrequent forays of bighorn sheep and can be used to consistently evaluate various management alternatives (USFS Bighorn Sheep Risk of Contact Tool Users Guide, pg 1). The RoC Tool utilizes a core herd home range (CHHR), a summer habitat model, and active domestic sheep allotments to calculate the probability of ram and ewe forays outside the CHHR and the rate of <u>contact with domestic sheep allotments</u>. The RoC Tool only models the probability that foraging bighorn sheep will reach allotments: it does not model their interactions with domestic sheep occupying those allotments (The Frequently Asked Questions (Version 1.0; pg 1) for the RoC model). Also, the probability of contact with an allotment is based solely on the habitat suitability and distance of the allotment from the CHHR. The presence or absence of domestic sheep in an allotment plays no role in the model in the probability that bighorn sheep will reach that allotment. Estimating the probability that contact with an allotment will result in a disease outbreak is a different question. See Terrestrial Wildlife section, with more detail in Appendix B,</p>	<p>Wildlife section in the EA.</p>

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			“Probability of Disease Outbreak Analysis” section).	
38	WSF, Kevin Hurley, CPW, WEG twice	Concerned with domestic/wild sheep interaction by stray domestic sheep.	Thank you for your concern for domestic/wild sheep interaction by stray domestic sheep. See response to comment summaries #10 and 24. Permittees have herders and working dogs to attempt to keep domestic sheep bands together; None of these allotments are within CHHR so interaction concern is for bighorn on foray outside of CHHR; Design Features and Terms and Conditions are designed to minimize (not completely eliminate) probability of contact (Terrestrial Wildlife section).	Please see Terrestrial Wildlife section of the EA.
39	WSF, Kevin Hurley, CPW, RMBS, WEG	Questionable impact indicator. Emphasis on overlap between domestic grazing and bighorn rut may reduce contact, but foray can happen any time of year.	<p>There are two impact indicators for bighorn sheep. Because none of these allotments overlap directly with bighorn CHHR, the main issues of concern for this species where related to interaction between bighorn on foray outside of CHHR with domestic sheep and the potential for disease transmission. These indicators were used to measure a relative level of (1) predicted disease (RoC Model) and (2) seasonal overlap of increased attraction between wild/domestic sheep.</p> <p>The EA analysis did not state that bighorn/domestic sheep attraction was only during this period, or that bighorn would foray only during this season (Appendix B). If BLM was to permit sheep</p>	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			grazing in these allotments, by reducing the number of days of temporal overlap of higher attractiveness, the likelihood of interaction may be reduced.	
40	Delta County BoCC, Hannah Todd	Reductions on Wells Gulch allotment are arbitrary because failure to meet land health is not attributed to current livestock grazing.	Thank you for your comment. In the Modified Grazing Alternative section, AUMs were adjusted for each allotment in the project area using a number of factors and following a specific methodology. Although Wells Gulch met land health standards, the AUMs in that allotment were over allocated according to range site potential. Please see page 14 for a description of how appropriate AUMs were determined for the Proposed Action.	Please Modified Grazing Alternative section
41	RMBS, WSF, Kevin Hurley	RoC analysis was only done for the Proposed Action.	See response to comment summary #31. A reduction in sheep grazing areas alternative would be within the current range of alternatives (No Grazing and Proposed Action).	Please see Comment #31.
42	RMBS, WEG	BLM needs to have an emergency response or action plan in the event that contact or close contact were to occur.	While it is not in writing, the UFO has implemented actions to address contact and near contact between domestic and wild sheep. Since the beginning of the bighorn/domestic sheep interaction modeling effort (2011), BLM, CPW and Permittees have been working together to monitor potential interaction between bighorn and domestic sheep. CPW reports to BLM and grazing permittees if they locate stray sheep in areas of	Please the Terms and Conditions section of the Modified Grazing Alternative

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>concern, and permittees try to collect the strays as quickly as possible. CPW has already stated that if a bighorn is seen in contact with domestic sheep, they will take care of the individual. If sheep permittees see bighorn in the vicinity of their flocks, they have agreed to report these to BLM, and this action has been included in the new Terms and Conditions of their permit. The cooperative nature of this activity appears to be working, and can be modified if new information comes to light. To date, no bighorn sheep have been detected in direct contact with domestic sheep.</p>	
43	WSF, Kevin Hurley, RMBS all several times	The RoC model does not include a description of the methods used, assumptions in puts, and outputs.	<p>See response to comment summary #6, #37 and EA Appendix B. As explained in the Terrestrial Wildlife section and Appendix B, the best available data to run the RoC model was limited. Seasonal habitat maps for bighorn populations were only available for summer (Rocky Mountain bighorn) and year-round (desert bighorn). Domestic sheep grazing periods are winter. Given the data issues in running this model, the results should be considered as very preliminary and questionable. Because of limited seasonal data availability, model runs by alternative is not informative to the decision.</p> <p>“Disease outbreak interval” was</p>	Please see Appendix B in the EA.

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>address in the EA (Appendix B). Table 34 describes the predicted years between potential disease events for allotments, based on the RoC Model. Table 35 also discusses acres of allotments that RoC model predicts to have disease outbreaks in local bighorn populations as part of the effects analysis.</p> <p>Explanation of what constitutes High, Moderate, Some, Low and Very Low risk bighorn populations for the RoC model is explained in Appendix B, under “RoC Analysis Results”.</p>	
44	WSF, Kevin Hurley twice, RMBS	Risk of contact literature, or disease transmission studies, are flawed, particularly how Payette data was used	<p>See response to issue summary #6 and EA Appendix B. Appendix B incorporates the current literature on the bighorn/domestic sheep disease issue.</p> <p>To summarize the discussion in the EA and Appendix B, disease outbreak results from a series of actions from bighorn. First, to reach an occupied allotment, a bighorn sheep must (1) leave the CHHR; (2) travel far enough to reach the allotment; and (3) intersect the allotment (i.e., rather than some other area at the same distance from the CHHR). For disease transmission to occur, the bighorn sheep must (4) come into contact with domestic sheep in the allotment and (5) contract the disease from the domestic sheep. Finally, for an outbreak to affect</p>	Appendix B

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>the animal’s home herd, the infected bighorn sheep must (6) make its way back to the CHHR and (7) transmit the disease to other members of the herd.”</p> <p>As described in Appendix B, there is uncertainty regarding the relationship between the number of bighorn sheep contacts with a domestic sheep allotment and predictions for disease transmission and outbreaks. Similar to USFS 2010, a range of values were used to calculate Potential disease events .</p> <p>The 25-year disease outbreak threshold (years between potential disease events) used for relative risk rates (footnote d for Table 34) is based on the more local information for population persistence (Rio Grande NF and CPW references).</p>	
45	RMBS	The bighorn sheep population the analysis is for is not clear on Tables 33 and 34	See response to comment summary #43.	Please see comment #43.
46	RMBS, WEG	BLM should stop using flawed local model (POI) for bighorn sheep risk of contact.	Both the PoIM and RoC models used the best available data at the time of model development. As described in the EA and Appendix B, both models have flaws, due to local data availability and assumptions, and because of this, both models should be not be taken as a	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			reliable assessment of the true situation in the area for bighorn and domestic sheep. They do, however provide a generalized view of the potential issues for the larger landscape.	
47	WEG twice, CWGA	BHS analysis relies on general modeling without any site-specific data or analysis.	See response to comment summary #6, 7, 35 and 46.	
48	CWGA, WEG	BLM should analyze risk of disease transmission rather than risk of contact.	Risk of disease transmission/outbreak was analyzed in the EA, however given all of the model issues discussed previously (Appendix B and other comment summary responses here), limited local data makes modeling problematic.	
49	Keith and Mary Lawrence	EA does not analyze the level of grazing impacts optimal to protect biological soil crust and their role in maintaining healthy vegetation.	While the soils section does not specifically state what level of grazing is optimal for preventing impacts to biological soil crust, it does use the Wells Gulch allotment as an example of how appropriate levels of grazing can prevent degradation to biological soil crust in the N. Delta land health area. In addition, several literature citations are used to underscore the importance of crust in a healthy vegetation community.	
50	Kevin Hurley, RMBS	Analysis lacking a description of the nature of	Addition to EA Terrestrial Wildlife section for clarification, at beginning of Discussion under Desert and Rocky Mountain	Please see Terrestrial Wildlife section

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		both species that leads to contact: gregarious; old vs new world breeds	bighorn.	
51	Kevin Hurley	CPW manages desert bighorn sheep with the same emphasis as Tier 1 Rocky Mountain bighorn sheep is not clear.	<p>The Colorado Bighorn Sheep Management Plan 2009-2019 (CDOW 2009; pg 3) describes only two Tiers: primary (Tier 1) and secondary (Tier 2) core populations. See pg 13 (CDOW 2009) for more detailed definitions of Tier 1 and Tier 2 populations. Populations outside of Tier 1 or 2 are uncategorized.</p> <p>CPW’s desert bighorn addendum makes the change to desert herds. “Three herds make up Colorado’s desert bighorn population: Black Ridge, Dominguez (Uncompahagre), and Dolores River. These bighorn herds are a high priority (Tier 1) for CPW, based on CPW’s desert bighorn addendum;” and “The Black Canyon population was considered by CPW to be a Tier 2 population, however, because population numbers are low, they are no longer managed as a core population (Tier 2) for management.”</p>	
52	Kevin Hurley	Need a rationale for how <25 years was		Please see response to comment #43.

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		determined to be high risk, and how it relates to analysis.		
53	Kevin Hurley	There are no details on the RoC model analysis; would like full analysis details for RMBS and DBS. Wants to see results of the DENCA RoC analysis in the cumulative impacts analysis.		Please see response to comment #43.
54	Kevin Hurley	Lack of explanation on what constitutes high, moderate, or low risk to bighorn sheep populations.		Please see response to comment #43.
55	CPW,	These allotments are not meeting LHS and livestock grazing is contributing	Refer to comment WWP find comment.	
56	CPW	Precipitation and elevations are not conducive to	Thank you for the comment. The changes in grazing dates take into account spring grazing, and the detriment which can occur if not	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		seed set on native vegetation when spring grazing occurs.	properly managed in this elevation and precipitation zone.	
57	CPW	Use all possible restoration tools to improve LHA in a much shorter time frame.	BLM seeks opportunity for land health restoration projects whenever possible. However, specific restoration projects in the North Delta LHA area are outside the scope of this decision.	
58	CPW, RMBS	BHS habitat fragmentation can be beneficial or is not a deterrent to both BHS and domestic sheep/goats.	Smith et al 1991 describes natural barriers to BHS movement, including water, dense vegetation, cliffs (continuous, non-traversable cliff complexes), valleys or plateaus and man-made barriers (canals, reservoirs, impassable fencing, major highways and high-use roadways, and centers of human activity. These features of the landscape may not absolutely prevent bighorn movement, but may cause a reduction in movement from more suitable habitats.	
59	Danny and Monita Montoya, Delta County BoCC	Favors No Action Alternative.	Thank you for your comment. BLM appreciates public opinion and participation in the permit renewal process.	
60	Delta County BoCC	BLM asserts exaggerated claim on historic grazing	Thank you for your comment.	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		magnitude.		
61	Delta County BoCC	BLM should commit to clip/weigh monitoring, not ocular estimates.	Thank you. Monitoring protocols are implementation level activities and are outside the scope of this project. BLM remains flexible and chooses monitoring systems based on best available science and staff capabilities within the field office.	
62	Delta County BoCC, Delta County Livestock Association, Western Slope Wool Growers Association	North Delta herd of antelope contracted BT/EHD from cattle in the area is a faulty assumption; bighorn and antelope have BT/EHD issues. Shouldn't be blamed on domestic livestock.	The EA Terrestrial Wildlife section provides background information that pronghorn herds in the area have tested positive for Blue Tongue (BT) and Epizootic Hemorrhagic disease (EHD). Additionally, that other ungulates (cattle, domestic sheep, mule deer, and bighorn) are susceptible or carriers of the diseases. The EA (pg 107) stated that with the continued presence of domestic livestock, high rates of BT and EHD in the pronghorn population would continue.	Please see Terrestrial Wildlife section in the EA.
63	Western Slope Wool Growers Association, Earnie Etchart	Ecological Site Descriptions should not be relied upon to determine what a landscape should look like.	Thank you for your comment. Range site descriptions have long been a standard in the study and application of Rangeland Science/Ecology, and they are widely accepted by professionals and academia in the field.	
64	Western Slope Wool Growers Association, Ernie	Favors 50% utilization rates because data shows that can be	Thank you for your comment. There are numerous literature available stating suggested ranges in utilization rates on salt desert shrub communities. See	Please see the reference section of the EA.

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
	Etchart, WWP	effective management, or does not favor because there is no scientific basis.	Reference section in the EA.	
64	Hannah Todd	Permittees put improvements like fences, trails, and water that benefit public lands.	Thank you for your comment. See Alternative 2 (No Grazing).	Please see Alternative 2 (No Grazing)
65	RMBS	A 10 year average of actual use should be the starting point of AUM reductions.	Thank you for your comment.	Please see table 5 in the EA.
66	RMBS	No monitoring plan developed to monitor the effectiveness of separation between bh and domestic sheep.	See response to comment summary #10, 24, Appendix B. Bighorn populations have persisted in this area, despite domestic sheep grazing throughout the Uncompahgre valley since the late 1800s. CPW considers both of these populations to be stable, although Black Canyon in very small. Monitoring of the implementation or effectiveness of the bighorn Design Features and Terms and Conditions will be conducted through regular monitoring activities of the BLM range program and CPWs bighorn sheep program. The BLM conducts Allotment	Please see Appendix B

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>Supervision Checks to determine if Terms and Condition of the grazing permit are being met. This includes requiring that permittees report to BLM any bighorn in proximity of domestic sheep. CPW is responsible for monitoring and managing the bighorn herds, including monitoring of bighorn movement and disease issues.</p> <p>These models are the first big-scale look at the management situation. Currently CPW does not feel that they have enough telemetry data for local populations to better define CHHR or foray behavior (EA Appendix B pg 182). The BLM and CPW are working cooperatively to gather additional information on the bighorn/domestic sheep interaction issue into the future. At the time of future grazing permit renewal for these areas, the BLM-UFO will conduct NEPA analysis using more site-specific information and any new data to determine the bighorn herd's current condition and possible subsequent changes in management. At that time, the BLM-UFO will also utilize the currently accepted methodology and model to conduct the analysis.</p>	
67	RMBS	There is no explanation of how Adobe	The BLM has addressed changes in the allotments that have issues and acres within ACEC. These	Please see the ACEC section of

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		Badlands ACEC can continue in static or downward trend (as stated in the Proposed Action analysis) and still meet ACEC goals.	proposed changes address land health standards, and move the area towards meeting LHS over time. See the ACEC section of the EA for further information.	the EA
68	RMBS	The analysis does not address DBH as a sensitive species according to BLM regulations.	See also response to comment summary #49.	Please see Terrestrial Wildlife section in the EA.
69	RMBS	Figure 10 legend incomplete	See response to issue summary #21. Also see Appendix B for more detailed maps of habitat.	Please see Appendix B in the EA for more information.
70	RMBS	RMBS favors no reauthorization of domestic sheep grazing in areas with elevated risk to BHS.	See response to comment summaries # 10 and 24.	
71	WEG	BLM did not notify WEG of comment period.	Thank you for your comment. In August 2015 BLM sent a certified return-receipt letter to Wild Earth Guardians at the current address on file, informing them of the release of the Draft North Delta Permit Renewal EA, the start of the 30 day public	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			comment period, and where the draft document could be accessed.	
72	WEG	EA is not sufficient to cover the scope of the action request an EIS level analysis.	The BLM UFO addressed effects from the proposed action and a range of reasonable alternatives given best available information and assumptions. The field office prepared an Environmental Assessment (EA), because an EA is intended to be a concise public document that provides sufficient evidence and analysis for determining the significance of effects from a proposed action (40 CFR 1508.9) and that serves as a basis for reasoned choice. Based upon the EA analysis, either an EIS or a FONSI will be prepared.	
73	WEG	The 4 high risk allotments border the lower risk allotments and are within 22 miles of each other, so they should all be high risk.	The probability of contact with an allotment is based solely on the habitat suitability and distance of the allotment from the CHHR (Frequently Asked Questions [Version 1.0]; pg 1). Results from the RoC model are dependent on the suitable habitat model (Rocky Mountain [EA Figure B.3] and Desert bighorn [EA Figure B.4]), as well as distance from CHHR (See Appendix B). Some allotments, even though farther from CHHR, had more suitable and/or corridor habitat, and thus would end up with higher predicted rates of contact than those allotments with less or no suitable and/or corridor habitat (EA Figure B.5).	Please see Appendix B in the EA. In addition to figure B.3, B.4, and B.5.
74	WEG	The analysis	The analysis concludes that “If	Please see

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		states that populations would not recover from a disease outbreak, which violates BLM Manual 6840. (on page 105)	<p><u>the model result is accurate</u>, this results in those local populations of bighorn sheep never recovering from those disease outbreaks.” and “...the RoC model was run using the best available local bighorn population information ... however much of the needed data was not available. This may result in <u>spurious model results.</u>” There is much discussion in the EA, and in more detail in Appendix B, of uncertainty with the results from the model run. Key points of discussion from the EA analysis:</p> <ul style="list-style-type: none"> • Bighorn populations have persisted in this area, despite domestic sheep grazing throughout the Uncompahgre valley since the late 1800s. CPW considers both of these populations to be stable, although Black Canyon is very small. • There is no direct overlap of CHHR and domestic sheep allotments; interaction would only come from bighorn on foray outside of CHHR. (See response to comment summary #10) • Lack of robust data for accurate modeling of potential interactions and disease outbreaks results in an unreliable model. It is uncertain that current 	pages Terrestrial Wildlife section in the EA, along with Appendix B.

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			<p>model results reflect the real world situation.</p> <ul style="list-style-type: none"> Proposed timing of the domestic sheep grazing coincides with periods of lower foray potential for both species of bighorn. Additional design criterial and Terms and Conditions will provide additional actions to reduce the potential for interaction. <p>Based on this information, the EA concludes that “Under this alternative, population trends for bighorn would be expected to continue.” This does not violate BLM Manual 6840.</p>	
75	WEG	Non-impairment standard for wilderness study area not discussed.	“Certain activities allowed in wilderness areas, such as recreational hiking, use of pack stock, or domestic livestock grazing, are recognized as acceptable within a WSA, although, in the literal sense, they cause surface disturbance.” BLM Manual 6330	BLM Manual 6330
76	WEG	EA merely reduces number of domestic sheep and does try for effective separation.		See response to comment #35
77	WWP	The BLM is not doing enough to address the problem in a quick and effective way.	Thank you for your comment. The BLM has addressed the grazing issues to move the area towards meeting Land Health Standards. Additional restoration efforts are outside the scope of the EA. Nonetheless, the BLM is working with a PhD student to figure out the how to better	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			restore salt desert shrub communities for future restoration projects.	
78	WWP	Why does BLM use a nebulous category “meeting with problems” when there is a list of problems that should make the area not meeting.	Thank you for clarifying this point. The UFO uses this subcategory of “meeting” for lands where health indicators overall are adequate for a “meeting” determination, but some problems are evident in a minority of the land health polygon putting it at risk of decline. This subcategory is useful for proactive management to prevent problems from increasing, and is described in the 2002 North Delta Land Health Assessment.	
79	WWP	Other resource use issues and impacts need to be addressed in this EA.	Thank you for your comment. Analysis of land uses other than grazing in the North Delta Land Health Assessment unit are not a part of the Purpose and Need for the EA, and are outside the scope of this analysis.	
80	WWP	The utilization rate of 35% is not supported in literature or by ESD	Thank you for your comment. See Reference section in the EA for utilization rate information. They are shown as a range of 25-35%. In addition, range site descriptions do not suggest utilization rates.	See the Reference section of the EA.
81	WWP	All grazing promotes weeds	Thank you for your comment. The BLM is in agreement any disturbance has the potential to spread weeds including grazing. Please see Term and Condition modification.	Please see Terms and Conditions section in the EA.
82	WWP	BLM has strict guidelines against	Thank you for your comment. See the Glossary for definition of supplemental feeding. For	Please see the Glossary

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		supplemental feeding.	additional information on supplemental feeding regulations see BLM H 4130-1.61(c), and 43 CFR §4100.0-5.	section of the EA page
83	WWP	Utilization is missing from the T&C	Thank you for your comment. See page 18 for the additional Term and Condition dealing with utilization.	Modified Term and Condition to reflect comment.
84	WWP	Drought utilization levels are actually higher than the 35% non-drought standard	There is a range from 2.5-4” stubble height depending upon key species, grass category short stature, mid stature and the differences in growth of species before, during, and immediately following drought. Please see reference section Research Note RM-438, A Modified Utilization Gauge for Western Range Grasses and reference 8 and 9.	Please Reference section.
85	WWP	Use areas and periodic rest is vague and a clear plan should be presented.	BLM recognizes that use areas and rotation are an important part of range management. In order to remain flexible and design plans based on site specific objectives, detailed use areas, pasture rotations, and rest strategies for each allotment will be made during implementation, and are outside the scope of this EA.	
86	WWP	There is no rationale for how mancos shale was determined to be suitable for grazing.-	1978 Grazing EIS, NRCS Range Site Descriptions, 1989 Uncompahgre RMP.	
87	WWP	Reduces utilization by	Thank you for your comment	Please see Table 5

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		30% but permits the same number of AUMs, which does not make sense.		and 6 in the EA.
88	WWP	It is unclear if invasive species were a part of vegetative cover.	Thank you for your comment. Invasive species were a part of the vegetative cover collected. The invasive species found in the North Delta unit typically are annuals, so do not contribute to perennial cool or warm season grass or perennial forb cover totals discussed in the EA.	
89	WWP	How can areas with 65% of the community dominated by invasive annuals meet LHS.	Thank you for your comment. The Land Health Assessment documented exotic species as dominant in the plant community at sites that represent 65% of the land health unit. These were areas that were determined to not meet standards, or meet with problems. In cases where they were determined to meet with problems, other aspects of the plant community were sufficiently present or functional so that the sites could not qualify for a “not meeting” determination.	
90	WWP	“Proper grazing” is not defined	Thank you for your comment. See the Glossary section of the EA for the definition of Proper Grazing.	Please see Glossary.
91	WWP	EA does not address forage allocation for wildlife and livestock to correct problems with	Generally, appropriate forage allocation for wildlife is assumed to be correct when lands are found to be meeting for Land Health Standard 3. A review of the literature indicated a 35% utilization rate would be	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		overbrowsing.	appropriate for this area to provide for utilization for domestic livestock and wildlife and to move these lands toward meeting Land Health Standard 3. With the addition of rest rotation for these allotments under the proposed action, additional slight improvement to the vegetation community is expected. These changes should result in movement toward meeting land health standards. If improvement is not seen, then adaptive management would result in changes to grazing management and potentially additional reductions in utilization.	
92	WWP	Failure to define forays is not an adequate excuse to eliminate it from the analysis.	<p>The EA states that “defining a bighorn foray <u>season</u> is problematic.” As explained in the EA and Appendix B, information for local populations was limited, and CPW did not feel that their existing local telemetry data was suitable for the modeling effort. Without this information, the foray season analysis is not possible. Since local information was not available, foray probabilities were calculated based on assumptions for foray from Idaho populations, where the model was developed.</p> <p>See response to comment summary #43.</p>	Appendix B
93	CWGA	The EA does not strike a	Thank you for your comment. The BLM followed	

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		balance between grazing and environmental pressures.	4180.1 Fundamental of Rangeland Health and 4180.2 Standards and Guideline for Grazing Administration. In addition BLM implemented the direction under Federal Land Policy and Management Act (FLPMA) Section 101, Part 8, BLM's legal mandate is to manage public lands in accordance with the principles of multiple-use and sustained yield.	
94	CWGA	Adobe Badlands should not qualify for WSA because it is already trammed.	Thank you for your comment. Wilderness Study Area designation is outside the scope of this EA.	
95	CWGA	Opposes WSR designation for Gunnison River.	Thank you for your comment. Wild and Scenic River designation for the Gunnison River is outside the scope of this EA.	
96	CWGA	Soil, selenium and salinity issues can't be solely attributed to agriculture. The Colorado River Salinity Control Forum is an effective mechanism to deal with soil issues.	<p>There are contributions of salinity and selenium from all of the uses on public lands, but as shown with recent studies cited within the Surface Water Quality section, the contribution of all the uses is small in comparison to irrigated agriculture.</p> <p>The Salinity Control Forum worked with Congress to pass the Colorado River Basin Salinity Control act of 1974 to minimize salt contributions to the Colorado River from BLM administered lands.</p>	
97	CWGA	There is no	The analysis concludes that	Please see

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
		<p>evidence to support grazing threatens cactus; other environmental factors are influencing. Not all populations are known, so permittees can't stay away from every population. Grazing may be beneficial to cactus.</p>	<p>grazing does not impact cactus populations relative to other environmental stressors. The analysis also concludes that livestock concentrations do in fact have population level effects to cactus populations and that invasive annual plant dominated rangelands inhibit cactus recruitment resultant from poor rangeland health.</p> <p>Cactus is not a driving factor for the proposed permit changes, all proposed changes are designed to address land health issues.</p> <p>The "Plant Threatened or Endangered Terms and Conditions" specifically address documented impacts to cactus from domestic livestock grazing. PTE1: addresses livestock concentrations which have documented negative effects. This T&C is less restrictive than what was previously established for the Deer Basin/Midway, Alkali Flats permits which requested that such concentrated uses be kept ¼ mile from sensitive cactus resources.</p> <p>PTE2: addresses implementing more sustainable grazing management and further suggests that BLM is not restricting grazing relative to cactus. BLM strives to manage grazing in such a manner that prevents re-grazing of an area where cactus is present. Further this T&C does not reflect any</p>	<p>Terms and Conditions and T & E section of the EA.</p>

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>change from some previous permits in the unit and is less restrictive than those older permits. The previous permit for the Alkali Flats allotment currently has a T&C that states “within ¼ mile of known T&E habitat a bed ground shall not be used for more than 5 nights in a grazing season.”</p> <p>PTE5 also highlights that BLM is not restricting grazing within occupied cactus habitat but mirrors the objectives for upland vegetation communities to manage for land health. The current land use plan for the Uncompahgre Basin signed in 1989 for management unit 5 and contains the Deer Basin/Midway and Alkali Flats allotments established a utilization rate of 35% on key forage species if the basal groundcover is less than the objectives identified (< 10% basal ground cover of desirable vegetation on Stony Salt Desert range sites). Many of the study sites assessed in the North Delta LHA fall below this desired objective. Similarly, this T&C is currently on the Alkali Flats allotment permit as well. The intent here is to improve vegetation resource condition for all benefiting resources including livestock grazing which will also improve conditions for cactus populations.</p> <p>It is the full intent of the BLM to</p>	

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			provide the permittee with maps of their respective allotment identifying known cactus locations. Upon completion of the BO in 2012 BLM provided each operator in the unit a map of their respective allotments indicating known location of cactus. It is the understanding of the BLM that unless a population is indicated on the maps provided to the operators those areas will be considered uninhabited until a subsequent survey suggests otherwise.	
98	Ross Allen	BLM and CPW are saying two different things to the public regarding domestic sheep's influence on antelope.	Concern for this pronghorn population was focused on the low fawn:doe and buck:doe ratios and possible malnutrition and/or lack of hiding cover that may be related to the issues for not meeting Standard 3. Standard 3 may not be providing adequate browse, forbs and hiding cover for the sustainability of pronghorn herds. These concerns were most pronounced in the salt-desert shrub communities, which coincide with pronghorn habitat. The most concerning indicators include exotic invasive plants, low perennial cool season grass cover, low perennial forb cover, low native plant diversity, limited areas of low perennial warm season grass cover, low shrub vigor and cover, and heavy shrub hedging. The vegetation section of the EA attributes problems to many factors, including historical heavy use (not just grazing), changes in the stability of ecological sites,	Please see the Vegetation section of the EA. In addition please see comment #25 and 62.

Comment Summary #	Commenters	Comment Summary	Response	If changes to the EA were made they are noted here
			<p>and changes in vegetative composition due to past and some current unintentional mismanagement of grazing.</p> <p>See also response to comment summary #25 and 62.</p>	
99	Ross Allen	AUM adjustments the permittee agreed to on a field trip with BLM personnel have been changed. Why?	Thank you for your comment. BLM discussed the AUM allocation in 1981 AMP, but no commitments were made to proposed AUM allocation. AUM calculation are explained in table 5.	Please see Table 5 of the EA.
100	Ross Allen	LHA was done during a drought.	Thank you for the comment. In the North Delta unit, drought conditions have been prevalent in late summer/early fall for more than half of the years over the past decade. Upland land health data was collected in late summer and fall 2013, which was rated by the US drought monitor as abnormally dry to moderate drought. Most of the initial readings of the trend transects which form the basis for the recent Land Health Assessment occurred in 2002 (an extreme drought year), or 2009 (a non-drought year.) Variations in weather conditions were taken into consideration for LH standard determinations and identification of causal factors.	

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