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**United States Bureau of Land Management
 Burns District**

Checklist for Interdisciplinary Review of NEPA Documents

Environmental Document Title: Kiger/Riddle Mtn. HMA Plan Evaluation & Kiger Mustang ACEC Review

Document Number: (Evaluation)

Case/Project File Number:

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**Specialist's signature and surname indicates concurrence with document.*

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**Kiger and Riddle Mountain Herd Management Area Plan Evaluation And
Kiger Mustang Area of Critical Environmental Concern Review**

September 12, 2014



Photo by Bob Petit

RIDDLE MOUNTAIN AND KIGER HERD MANAGEMENT AREA PLAN EVALUATION

I. Introduction

The purpose of this Evaluation of the Riddle Mountain and Kiger Herd Management Area Plan (HMAP) is to assure HMAP Implementation is on track and to gauge progress toward achieving the selected habitat and population management and other relevant objectives.

The goals for HMAP monitoring and evaluation are twofold: to track implementation of the management actions/decisions outlined in the HMAP (implementation monitoring), and to collect the data/information necessary to evaluate the effectiveness of those decisions (effectiveness monitoring).

The HMAP is also evaluated to determine, whether management goals and objectives are still appropriate or need to be revised, whether progress is being made toward achieving the goals and objectives, or additional management actions are needed (adaptive management).

A. General Background Information

The Kiger (OR0010) and Riddle Mountain (OR0009) Herd Management Areas (HMAs) are located approximately 45 air miles southeast of Burns, Oregon (Map A). These are technically two different HMAs yet the horses residing in these HMAs are managed for the same characteristics known as the Kiger horse. These HMAs also have similar land management objectives as they lie on the north end of Steens Mountain and have similar ecology. The Kiger HMA contains 26,869 acres of BLM managed land (Map B). The Riddle Mountain HMA contains a total of 28,376 acres of BLM managed land (Map C).

The HMAs were designated for the long-term management of wild horses in the Drewsey Management Framework Plan, 1978. The Kiger HMA was originally the East Kiger and Smyth Creek HMAs which were then combined in 1985 or 1986. The Appropriate Management Level (AML) was originally set at 30 to 50 horses in the Riddle HMA and 50 to 80 in the Kiger HMA. It was adjusted upward to 33 to 56 in Riddle Mountain and 51 to 82 in Kiger through a Land Use Plan Amendment in 1986 as the result of a land exchange with the State of Oregon. The AML was reaffirmed at 672 Animal Unit Months (AUMs) in Riddle Mountain HMA and 984 AUMs in Kiger HMA in the Three Rivers RMP (1992). The 1992 Three Rivers RMP did not specify an AML range per HMA but the AUMs reaffirmed are the equivalent to the high end of AML. The Steens Mountain CMPA RMP/ROD (August 2005) reaffirmed 672 AUMs or an AML of 33 – 56 for Riddle Mountain HMA and

984 AUMs or an AML of 51-82 for Kiger HMA. The AML was established with public participation following an in-depth analysis of resource monitoring studies.

Kiger and Riddle Mountain HMAs both lie within livestock grazing allotments. Kiger HMA lies within several pastures of the Smyth-Kiger Allotment (#05331) and two pastures of Happy Valley Allotment (#05309). Riddle Mountain HMA lies within the Burnt Flat Allotment (#05604). The 2005 Steens ROD/RMP also allocated wild horse AUMs per allotment (refer to Table 1).

Table 1: AUMs and AML per Allotment in Kiger and Riddle Mountain HMAs.

HMA	Allotment	AUMs	AML per Allotment	AML per HMA
Kiger	Happy Valley (#05309)	132	7 to 11 *	51 - 82 Horses
	Smyth-Kiger (#05331)	852	44 to 71 *	
Riddle Mountain	Burnt Flat (#05604)	672	33 to 56	33 - 56 Horses

* AML per Allotment in Kiger HMA was not designated in the 2005 Steens ROD/RMP, but AUMs per Allotment were. For this table, AML per Allotment was calculated using the allocated AML per HMA and AUMs per allotment.

The vegetation types in both HMAs are primarily Mountain big sagebrush, low sagebrush, Idaho fescue, bluebunch wheatgrass and needlegrass. There are also range sites that are dominated by dense juniper. The elevations of the HMAs range from 4,360 to 6,240 feet in Kiger and 4,760 to 6,280 feet in Riddle Mountain.

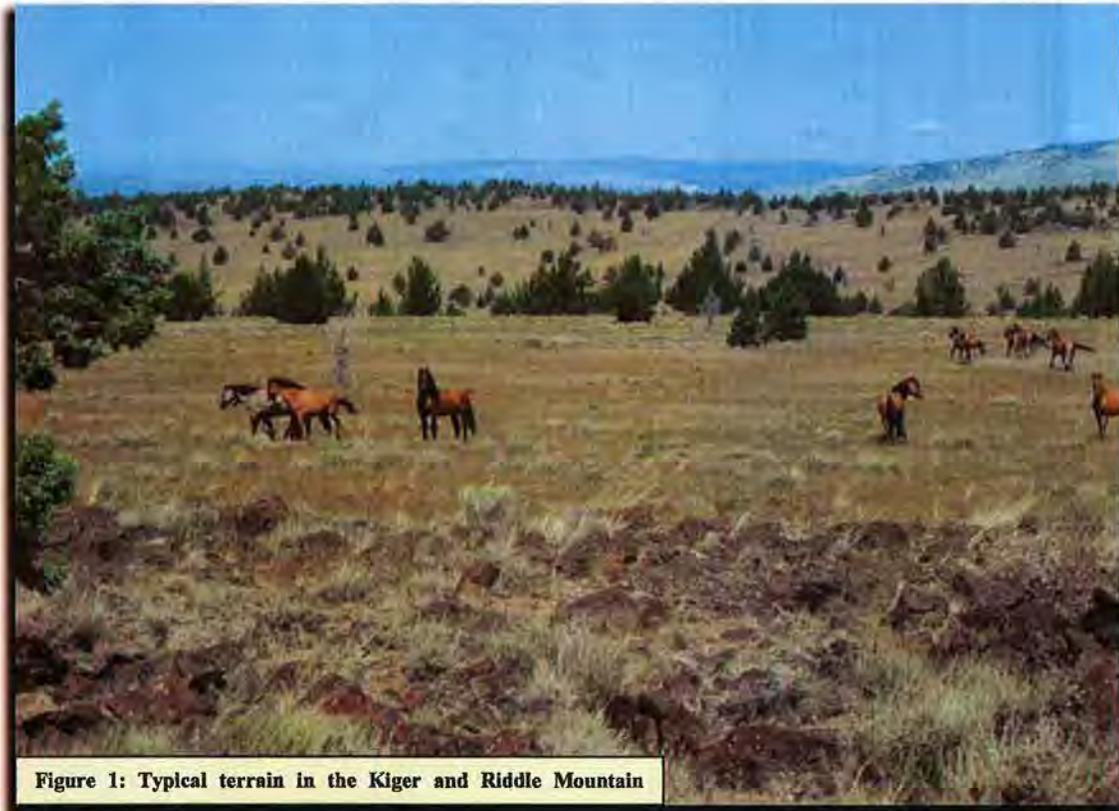


Figure 1: Typical terrain in the Kiger and Riddle Mountain

The makeup of the 1974 Kiger and Riddle Mountain wild horse herd included horses abandoned by homesteaders, escaped horses from ranches in the area, and offspring of licensed and trespass horses that have used the area in the past. The original herds in the East Kiger and Smyth Creek HMAs (Kiger HMA) were saddle type horses of mixed colors. Beginning in 1977 the conversion of the East Kiger herd to horses with Spanish Mustang Characteristics began with the introduction of horses from the Beatty Buttes area of Lakeview District BLM. The Riddle Mountain herd was converted to the dun factor Spanish Mustang type of horse primarily in 1987, 1989, and 1993 when horses from the Kiger HMA were introduced to replace horses removed from the HMA. Horses in the Smyth Creek HMA were converted to the dun factor Spanish Mustang type of horse in 1983 and 1987 when horses from East Kiger were released to replace gathered horses from Smyth Creek.



Figure 2: This photo shows the typical size, conformation and some of the color variations of the Kiger horse today.

Below is a brief history of the correspondence in BLM files leading up to the designation of the Kiger Mustang ACEC.

- Reverend Floyd Schwieger sent a letter dated June 14, 1983 to Oregon Senator Mark O. Hatfield voicing concern for maintaining and protecting the characteristics of the Kiger “primitive horses”. Senator Mark O. Hatfield then sent a letter to BLM’s Oregon State Office in 1983 suggesting the designation of

the Kiger herd area as a Wild Horse Range. The Secretary has the power to designate a wild horse range on public lands as sanctuaries for the protection and preservation of wild horses and to be managed principally, but not necessarily exclusively, for wild horse or burro herds.

- BLM responded with a letter dated August 18, 1983, “We do not feel that designation of a Wild Horse Range is warranted in this case, in that it would not provide for the multiple use type of management that we feel is proper for this area. We do feel, however, that some other form of recognition and designation which would fall within the authority of this office and which would identify the Kiger herd for more intensive management and provide for greater recognition and protection of the Kiger animals is worthy of serious consideration and implementation by BLM. “
- In November of 1988 the Burns District BLM received a letter from the Kiger Mesteno Association nominating the Kiger and Riddle Mtn. HMAs for designations as an ACEC as “priority habitat areas, being significant in historical and cultural values due to its resident herd of wild horses which have more than locally significant qualities or special worth when compared to other wild horse herds.”

The Kiger Mustang ACEC was designated in 1992 (Federal Register, Vol. 57, No. 202, Page 47671) to protect the historic values (the relevance criteria) which are of more than local significance (importance criteria). The wild horses that exist in the Kiger Mustang ACEC were found to be an important historic and cultural value because they exhibit Spanish Mustang characteristics (HMAP 1996). The two separate portions of the ACEC (Kiger and Riddle Mountain HMAs) provide protection for the Kiger Mustang’s unique characteristics, should something happen to one of the herds. The primary management goal of the Kiger Mustang ACEC is to perpetuate and protect the dun factor color and conformation characteristics of the wild horses present in the Kiger and Riddle Mountain HMAs (Proposed Three Rivers RMP, 1991).

B. Planning/Management History

The 1971 Wild Horse and Burro Act called for the protection and management of wild horses and burros. Horses in the Kiger and Riddle Mountain HMAs were unclaimed and according to the act HMAs were established. The following is a brief chronology of events for each HMA.

1. Riddle Mountain HMA

Planning

- The original Riddle Mountain HMAP was approved in 1975. The 1975 HMAP determined, “in the interest of preserving traces of the Spanish mustang, horses with dorsal stripes will be maintained within the herd. Beyond this no special effort will be made to select by color or type.
- The 1978 Drewsey Management Framework Plan (MFP) endorsed the Riddle Mountain Herd Management Area.
- A 1979 District Manager’s decision memo directed horses in the Riddle Mountain, East Kiger and Smyth Creek HMAs would be managed for Spanish Mustang characteristics. ... This places horses with the most primitive coloration in East Kiger with Smyth Creek tolerating an intermediate step away and Riddle Mountain having a variation in coloration but retaining the dorsal stripe and ear markings. – *This was the first formal documentation from Burns District BLM to manage wild horses in these herd areas for characteristics of the Spanish mustang.*
- A 1987 Drewsey MFP amendment modified the Riddle Mountain HMA boundaries by approximately 69,000 acres and reduced horse numbers due to a land exchange with the State of Oregon. Map D shows land designated inactive (HA). The portion of land removed from the HMA was designated inactive. The MFP affirmed an AML of 33 to 56 horses.
- Portions of the original Riddle Mountain HMAP were amended, revised and approved in 1988 to reflect the Drewsey MFP amendment (changes in herd numbers and herd area boundaries).
- The 1992 Three Rivers Resource Management Plan (RMP) established the Kiger Area of Critical Environmental Concern (ACEC) and established that the Riddle Mountain HMA would be managed for horses with Spanish Mustang characteristics.
- The 2005 Steens ROD/RMP designated Riddle Mountain HMA acreage of 28,346 and reaffirmed an AML of 33 to 56 horses and 672 AUMs.

Past Management – Physical Characteristics

Initially the herd was of the common saddle type of horse of mixed colors. Beginning in 1977 the conversion of this herd to horses with Spanish Mustang characteristics began with the introduction of 3 dun stallions, 1 blue roan mare, 1 claybank mare and 1 grulla filly from the Beaty’s Butte area of the Lakeview District. The Riddle Mountain herd was converted to the dun factor Spanish

Mustang type of horse primarily in 1987, 1989, and 1993 when horses from the Kiger HMA were introduced to replace horses removed from the HMA.

2. Kiger HMA

Planning

- The existing Kiger HMA was originally two separate herd areas, East Kiger and Smyth Creek. Separate HMAPs were written for these HMAs in 1974 and 1975, respectively. The 1974 East Kiger HMAP made no mention of color/type management objectives, only to control numbers within 20 to 30 horses. Color and type of horses described in the 1975 Smyth Creek HMAP describe horses of small to medium size with various colors, mostly sorrel, bay and black. “Also there may be other colors including a few horses with dorsal stripes, a characteristic of the Spanish mustang” (Smyth Creek HMAP, 1975). “The most important objective of this plan is to maintain and control a thriving herd of from 30 to 50 horses in the Smyth Creek herd management area in balance with the ecology and other uses of the area... (Smyth Creek HMAP, 1975).”
- The 1978 Drewsey MFP endorsed the East Kiger and Smyth Creek HMAs and horse numbers for them.
- A 1979 District Manager’s decision memo directed horses in the Riddle Mountain, East Kiger and Smyth Creek HMAs would be managed for Spanish Mustang characteristics. ... This places horses with the most primitive coloration in East Kiger with Smyth Creek tolerating an intermediate step away and Riddle Mountain having a variation in coloration but retaining the dorsal stripe and ear markings.
- Sometime between 1985 and 1986 the East Kiger and Smyth Creek HMAs were combined to form the Kiger HMA.
- A 1987 Drewsey MFP amendment modified the Kiger HMA by increasing horse numbers slightly, 51 to 82 horses.
- The 1992 Three Rivers RMP established the Kiger ACEC and established that the Kiger HMA would be managed for horses with Spanish Mustang characteristics.
- The 2005 Steens ROD/RMP reduced the acreage of the Kiger HMA by approximately 8,059 acres following boundary changes that reflected legislated Steens Land Exchanges. This portion of the HMA was designated

inactive. RMP acres for Kiger HMA total 26,873. The RMP also affirmed the AML at 51 to 82 horses and 984 AUMs. Map D shows the changes in the Herd Area boundary since the area was designated.

Past Management – Physical Characteristics

The original herds in the East Kiger and Smyth Creek HMAs were saddle type horses and of mixed colors. Management for the Spanish Mustang type of horse began in 1974 when most of the East Kiger herd was gathered. Twenty-one of these horses were returned to the HMA. Some of these horses had dorsal stripes.

In 1977 entire East Kiger herd of 34 horses was removed. A brown mare and a blue roan from this group of horses were returned to the HMA. Twenty other horses from the Beaty's Butte area of the Lakeview District were also released into the HMA. All of these horses had strong Spanish Mustang characteristics. Except for the roan mare, these horses were either dun or grulla with dorsal stripes and zebra stripes on the legs. These horses were the base herd from which today's Kiger and Riddle Mountain horses originated.

Horses of the Smyth Creek HMA were converted to the dun factor Spanish Mustang type of horse in 1983 and 1987 when horses from East Kiger were released to replace gathered horses from Smyth Creek.

II. Current Management Objectives

The following objectives are from four different documents providing management direction for the Kiger Mustangs and their habitat.

A. Land Use Plan Objectives

1. 1992 Three Rivers ROD/RMP –

Wild Horses and Burros – General WHB objectives and those specific to Kiger and Riddle Mountain HMAs.

- WHB 1: Maintain healthy populations of wild horses within the Kiger, Palomino Buttes, Stinkingwater, and Riddle Mountain HMAs, and wild horses and burros in the Warm Springs HMA.
- WHB 1.1: Continue to allocate the following acres and AUMs in active HMAs:

Kiger HMA	36,618 ac.	984 AUMs
Riddle Mountain HMA	28,021 ac.	672 AUMs

- **WHB 1.3:** Adjust wild horse and burro herd population levels in accordance with the results of monitoring studies and allotment evaluations, where such adjustments are needed in order to achieve and maintain objectives for a thriving natural ecological balance and multiple-use relationships in each HA.

Permanent adjustments would not be lower than the established minimum numbers in order to maintain viability. The appropriate management level would be based on the analysis of trend in range condition, utilization, actual use and other factors which provide for the protection of the public range from deterioration.

- **WHB 2:** Enhance the management and protection of herd areas and herds in the following HMAs: Kiger, Stinkingwater, Riddle Mountain, Palomino Buttes and Warm Springs.
- **WHB 2.1:** Acquire legal access to specific sources of private land and water upon which horses depend. Location of priority for acquisition:

Kiger HMA:

- Yank Springs, 480 acres, T. 20 S., R. 34 E., sec. 33, NW1/4, N1/2SW1/4, W1/2SE1/4 and SE1/4SW1/4; sec. 32, W1/2NE1/4 and NE1/4SE1/4.
- Poison Creek, 160 acres, T. 30 S., R. 33 E., sec. 13, SE1/4.
- Swamp Creek, 400 acres, T. 29 S., R. 33 E., sec. 36, S1/2 and S1/2NW1/4.

- **WHB 2.2:** Designate 64,639 acres of the Kiger and Riddle Mountain HMAs as an ACEC for the Kiger mustang.
- **WHB 2.3:** Select for high quality horses when gathered horses are returned to the range.

Table 2.7 Characteristics:

Herd	Color/Type	Markings	Size	Weight
Kiger/Riddle Mountain	Dun, red dun, grulla, buckskin (claybank) and variations; Spanish mustang type	Dorsal stripe	13-15 hands	750-1,000 lbs.

- **WHB 2.4:** Provide facilities and water sources necessary to ensure the integrity of the individual herds. (List of waterholes and cattleguards in Kiger on page 2-50, Table 2.8).

- WHB 3: Enhance and perpetuate the special or rare and unique characteristics that distinguish the respective herds in the RA.
- WHB 3.1: Limit any releases of wild horses or burros into an HMA to individuals which exhibit the characteristics designated for that HMA.

Areas of Critical Environmental Concern (ACEC) (2-137)

- ACEC 1: Provide special management attention to protect important natural, cultural or scenic resources on approximately 95,049 acres [This is acreage for all ACECs in the Resource Area].
- ACEC 1.7: Designate the Kiger and Riddle HMAs of 64,639 acres as the Kiger Mustang ACEC for unique characteristics of wild horses.

2. 2005 Steens Mountain CMPA ROD/RMP

Wild Horses and Burros (RMP-50)

Goal: Manage and maintain healthy wild horse herds in established HMAs at AMLs to maintain a thriving natural ecological balance between wild horse populations, wildlife, livestock, vegetation resources, and other resource values. Enhance and perpetuate the special or rare and unique characteristics that distinguish the respective herds

- *Objectives*:
 - Designate/retain/adjust HMAs.
 - The Kiger HMA is reduced in acreage and its boundary changed to reflect legislated Steens land exchanges.
 - Designate/retain/adjust Herd Areas in inactive status.
 - A portion of the Kiger Herd Area is designated inactive to reflect loss of public land resulting from Steens land exchanges.
 - Maintain/adjust AMLs and yearlong forage allocations for each HMA.
 - Maintain a thriving natural ecological balance within HMAs.
 - Maintain/improve year-round water sources to sustain wild horse herds.
 - Maintain herd viability, genetic diversity, and the genetic and physical characteristics that distinguish individual herds.

Areas of Critical Environmental Concern

- *Goal:* Retain existing and designate new ACECs if they meet relevance and importance criteria and require special management or protection.
- *Objectives:*
 - Objective 1. Retain and manage existing ACECs if they meet relevance and importance criteria and require special management or protection.
 - Objective 2. Designate and manage new ACECs that meet relevance and importance criteria and need special management or protection.

B. Management Plan Objectives

1. 1996 Riddle Mountain and Kiger HMAP

The 1996 HMAP shared common resource objectives with the Smyth-Kiger (#05331), Happy Valley (#05309), and Burnt Flat (#05604) Allotment Management Plans (AMPs). The 1996 HMAP is also part of the 1996 Kiger Mustang Area of Critical Environmental Concern (ACEC) Plan.

a. Horse Habitat Objectives

- *Population Control through Gathering, Potential Fertility Control, and Sex Ratios.*
 - *Gathering.* Key points of this objective are as follows:
 - Numbers of grazing animals must be controlled in order to maintain the health of the rangeland resources and to achieve resource objectives. Periodic wild horse gatherings using a helicopter and portable panels will be the primary means to manage horse numbers.
 - Gatherings will be conducted in accordance with existing Bureau procedures to ensure safe and humane treatment of the horses.
 - Subject to available funding every effort will be made to manage horse numbers between the low and high number of the AML range for each HMA.
 - The numbers of horses that will trigger gatherings are 56 for Riddle Mountain and 82 for Kiger.

- Numbers of horses to be maintained in the HMA after a gathering are 33 in Riddle Mountain HMA and 51 in Kiger HMA.
 - *Fertility Control* – Approved fertility control methods may be used to reduce reproductive rates and aid in managing horse numbers.
 - *Sex Ratio* – A 50 percent male and 50 percent female sex ratio is generally considered to be the standard for herd management. The herd may be managed for a 60 percent male and 40 percent female population to reduce reproduction rates and aid in managing horse numbers.
- *Riparian Management at Yank Springs*

Any action necessary to improve riparian habitat and to preserve the water source to Yank Spring Creek will be analyzed in cooperation with the private landowner. This may involve excluding cattle and horses from the headwaters of Yank Spring.
- *Development and Maintenance of Horse Watering Sources*

Reservoirs and public land water sources in the HMAs that are used by wild horses will be periodically maintained and cleaned. The Three Rivers RMP's Table 2.8 (page 2-50), Overlay #2 for Map #1, and Overlay #3 for Map #2 display important horse water sources.

Dependable water in the Kiger HMA on public land would be ensured if a well were developed in the Smyth Creek Allotment. This well would be desirable in times of extreme drought.
- *Gate and Fence Maintenance*
 - *Fence Maintenance* – Fences on the exterior of the HMAs are to be maintained to contain horses within the HMAs. Interior and exterior fence maintenance is assigned to grazing permittees.
 - *Kiger HMA Gate Management*. Key points of this objective are as follows:
 - Gates in fences on the Kiger HMA boundary are to remain closed year-round. Gates between public land and private land pastures will always be closed to prevent horses from entering

the private land pastures. Gates in pasture fences accessing public lands within the HMAs will usually stay closed during the cattle grazing season of April 1 through October 31.

- The Area Manager, Wild Horse Specialist, and Rangeland Management Specialist for the area are to determine, on an annual basis, which gates are to be opened or remain closed during the winter season.
- Efforts may be made, through gate management practices, to limit the number of horses in Yank Springs Pasture to prevent excess concentrations of horses in this pasture or other areas where concentrations become an issue.
- *Riddle Mountain HMA Gate Management.* Key points of this objective are as follows:
 - All gates on the perimeter of the Riddle Mountain HMA will remain closed with the following exceptions. The gate between the Louie Hughes Pasture and the Riddle Mountain Allotment (outside HMA) will be left open for a few days during early summer and fall. Gates in private land pastures inside and adjacent to the HMA will be opened for several weeks each fall to accommodate livestock gathering.
 - These gate management practices accommodate livestock management needs and do not compromise containment of horses in the HMA. Horses are not normally in these areas at these times of the year.
- *Fence Reconstruction in Riddle Mountain HMA.* “Horses often leave the HMA and enter private lands (Clark Field) in the area of T. 30 S., R. 35 E., WM, Section 26. ... A combination of new construction, fence relocation, and fence redesign will resolve this situation.”

b. Horse Herd Objectives

Maintain a healthy and sustainable herd of 33 to 56 wild horses in the Riddle Mountain HMA and 51 to 82 wild horses in the Kiger HMA that exhibit the dun factor colors and physical characteristics of Spanish Mustang horses that currently exist in the HMA.

- *Management Actions to Accomplish Horse Herd Objectives*

- *Physical and Conformation Characteristics Criteria*

The following physical and conformation characteristics will be managed for through gathering and return to the range practices:

- Dun factor colors (various color phases are dun, red dun, grulla, buckskin (claybank), and variations of these colors). Other colors will not be managed for.
 - Markings on these animals include dorsal stripes; zebra stripes on the knees and hocks; chest, rib and arm bars; shoulder patches and sawtooth marks alongside the dorsal stripes; dark color outlining the ears; the top one-third of the ears on their backside darker than the body color; fawn color inside the ears; multi-colored manes and tails; cobwebbing on the face; and face masks. The less white these horses have, the stronger the dun factor. Horses having the dun factor may have some or all of these markings.
 - Height ranges between 13 to 15 hands, and weight between 750 and 1,000 pounds.
 - Other characteristics: generally possess the physical characteristics of Spanish Mustang confirmation, light to medium bone, small feet, ear tips are very hooked and females with very fine muzzles.
- *Sex Ratios* – Maintain an approximate 50 percent female and 50 percent male ratio in the population unless a lower female component is desired to reduce herd reproduction rates.
 - *Age Structure* – Ideally all age classes would be represented in the population.

- *Exchanging Horses Between HMAs*

Periodically exchange stallions and/or mares between the Riddle Mountain and Kiger HMAs to maintain genetic diversity.

c. Monitoring Plan

Gathered horses will be examined to determine if the herd is successfully reproducing, progeny exhibit the desired physical and color characteristics and if appropriate age structures and sex ratios are being maintained.

2. 1996 Kiger Mustang Area of Critical Environmental Concern (ACEC) Management Plan

- The primary management objective for this ACEC is to perpetuate and protect the dun factor color and conformation characteristics of the wild horses present in the Kiger and Riddle Mountain HMAs.
- Objectives, management actions, and monitoring for the management of wild horses, livestock grazing, and rangeland resources can be found in the Kiger/Riddle HMAP, and AMPs for the Burnt Flat, Happy Valley and Smyth-Kiger Allotments.
- Educational opportunities will be provided to increase public knowledge of wild horses and BLM's land management role and responsibility in managing wild horses. Wilderness values of the Stonehouse Wilderness Study Area (WSA) (2-23 L) will be protected and enhanced. Ensure that any management actions are consistent with the wilderness Interim Management Policy (IMP) non-impairment criteria.

III. Analysis and Interpretation

A. Inventory and Range Condition

1. Target Utilization and Key Species by Pasture

Short-term impacts to vegetation resources are the result of the combined utilization levels, the season of use, and the duration of use. For the purposes of analysis, light utilization is defined as up to 40 percent, moderate utilization is defined as 41 to 60 percent, heavy utilization is defined as 61 to 80 percent, and severe is defined as 81 to 100 percent. Generally, the vigor of key herbaceous species can be sustained with light and moderate utilization, while heavy utilization reduces photosynthetic tissue below levels needed to maintain root reserves, diminishing the vigor of key species. However, the timing of grazing use relative to plant phenology and the occurrence of repeat grazing are usually considered more important factors affecting the health and vigor of key species as well as changes to vegetation community composition. Light and moderate utilization during periods when plants are withdrawing reserves from roots for growth, during regrowth, or during seed formation will impact herbaceous species greater than the same level of utilization during periods when the plant is not actively growing (2004 Steens PRMP, Appendix O - Volume 2). On Burns District, pastures with key species dominated by native grasses are typically managed with a target utilization level of 50%

(moderate). Key species across each pasture of the HMAs are Idaho fescue, Needlegrass, and bluebunch wheatgrass.

2. Ecological Site Inventory - Conducted in 1984.

See ecological status per pasture in Kiger HMA on Map E and per pasture in Riddle Mountain HMA on Map F.

3. Range Condition Inventory - Conducted in 1984.

See range condition per pasture in Kiger HMA on Map G and per pasture in Riddle Mountain HMA on Map H.

4. Standards for Rangeland Health

The 1996 HMAP shared common resource objectives with the Smyth-Kiger (#05331), Happy Valley (#05309), and Burnt Flat (#05604) Allotment Management Plans (AMPs). Resource objectives specific to each allotment have been adjusted over the years to conform to the five Oregon/Washington Standards for Rangeland Health (Standards) (August 1997). The resource objectives written for each allotment are unique to that piece of land, yet all are designed to provide management that will move range conditions toward achieving Standards. Interior Board of Land Appeals (IBLA) decisions (Animal Protection Institute of America, 118 IBLA 20; also refer to 117 IBLA 4, 117 IBLA 208, 118 IBLA 20, 21 and 131 IBLA 175) indicate analysis of grazing utilization, trend in range condition, actual use, and other factors demonstrate when management actions are necessary to either restore range to or continue to achieve a Thriving Natural Ecological Balance (TNEB). Analysis of these same factors also validates whether or not the five Standards for rangeland health are being achieved. It can be drawn from these IBLA decisions that achieving Standards equates to achieving a TNEB.

The five Standards are as follows:

Standard 1: Watershed Function – Uplands

Upland soils exhibit infiltration and permeability rates, moisture storage and stability that are appropriate to soil, climate and landform.

Standard 2: Watershed Function – Riparian/Wetland Areas

Riparian-wetland areas are in properly functioning physical condition appropriate to soil, climate, and landform.

Standard 3: Ecological Processes

Healthy, productive and diverse plant and animal populations and communities appropriate to soil, climate and landform are supported by ecological processes of nutrient cycling, energy flow and the hydrologic cycle.

Standard 4: Water Quality

Surface water and groundwater quality, influenced by agency actions, complies with State water quality standards.

Standard 5: Native, T&E, and Locally Important Species

Habitats support healthy, productive and diverse populations and communities of native plants and animals (including special status species and species of local importance) appropriate to soil, climate and landform.

Standards for Rangeland Health were last assessed for Burnt Flat, Smyth-Kiger and Happy Valley allotments in 2008, 2004 and 2005, respectively. Refer to Appendix A for a comprehensive table of the assessment results for each allotment. In summary, a majority of the standards were achieved across all of the allotments. The standards not achieved with wild horses being a causal factor were related to riparian condition along Yank and Smyth Creeks in Smyth-Kiger Allotment. Management actions have been taken, Yank Creek Enclosure and Smyth Creek Corridor Fence, which will help improve conditions and move toward achieving standards.

5. Upland Trend Data

Riddle Mtn. HMA:

Current trend in Burnt Flat allotment is predominately upward or stable at high elevation sagebrush plant communities. The greatest threat to sagebrush plant communities in this allotment is juniper encroachment. Additional trend plots should be established in known wild horse use areas, vs. livestock use areas, to reflect their impact on the condition in the HMA.

Kiger HMA:

Current trend in Smyth-Kiger allotment is predominately upward or stable at high elevation sagebrush plant communities and riparian areas. Areas of concern are in low/mid elevation pastures (Ant Hill, Swamp Creek, and parts of Yank Springs and Wood Camp) that are threatened by the spread of exotic annual grasses (cheatgrass, medusahead, and North Africa grass), juniper encroachment, and wild horse concentration areas.

Current trend in Happy Valley allotment is predominately upward or stable at high and low/mid elevation sagebrush plant communities. Areas of concern within the HMA are in low/mid elevation portions of each pasture (North Big Hill and South Big Hill) that are threatened by the spread of exotic annual grasses (cheatgrass and medusahead) and juniper encroachment. There have been vegetative treatments in each pasture to reduce these threats which includes 1) Frog Creek Juniper clear cut/machine pile/jackpot burn in

South Big Hill Pasture, 2) seeding of juniper treatments in South Big Hill Pasture, and 3) spraying of medusahead using Imazapic in both S. and N. Big Hill Pastures.

Refer to Appendix B for the Upland Trend Data summaries by allotment.

B. Resource Studies/Monitoring and Results

1. Utilization, Climate and Carrying Capacity

The key forage plant method on designated routes was used to collect utilization data following the livestock grazing use periods. There has been minimal utilization studies collected in Riddle Mtn. HMA, specifically Oriana Flat Pasture, making it difficult to analyze utilization levels compared to fluctuations in actual use numbers and yield index. Each pasture in the Kiger HMA, with the exception of Ant Hill, has had adequate utilization studies collected to aid in analysis of carrying capacity calculations. The available data indicate utilization levels have generally remained at or below the target level of 50% across both HMAs.

Utilization studies compile an overall percent utilization for the entire pasture. This being said, there are areas within certain pastures that receive heavy to severe utilization levels by wild horses and are a cause for concern. One such location is the portion (approximately 2,480 acres) of the 4,865 acre Wood Camp Pasture (Kiger HMA) that burned in the 2011 Smyth Creek Fire and Five Creeks Rangeland Restoration Project prescribed burn, and was seeded for post-fire rehabilitation purposes. Since the spring following the fire, a group of approximately 50 wild horses have made these burned areas their preferred grazing areas and leaving areas of the pasture that were not burned during the fire and burn treatments untouched. Kiger HMA is relatively small and has a high number of pastures as compared to many other HMAs in Oregon. The fencelines that divide the area limit the ability for wild horses to disperse across the HMA, increase the probability of entrapment during and sometimes following the livestock grazing season, and consequently cause distribution problems resulting in heavy to severe utilization levels in specific areas. Year round wild horse grazing or continuous horse grazing following livestock grazing (after the cattle move to another pasture) can cause the resultant level of grazing to be heavier than the vegetation can tolerate to maintain vigor and productivity. This also causes the area to be more susceptible to noxious weed introduction and spread.

The yield index from the Hart Mountain weather station was used for climate analysis and carrying capacity calculations. Yield index from 2000 through 2012 is shown below (Table 2). (Data is shown in percent of average precipitation.)

Table 2: 2000 through 2012 Yield Index using climate data from the Hart Mountain weather station.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Yield Index	59	111	77	118	90	169	93	73	131	107	128	152	64	data incomplete

2008 through 2011 were excellent precipitation years that provided average to above average plant growth across the district. The climate has been quite mild with the area seeing a regional drought since 2012.

For the purpose of calculating a potential carrying capacity for both Kiger and Riddle Mountain HMAs two methods were used and compared to each other. Burns District BLM has a standard table that factors in livestock actual use, utilization levels, target utilization levels, wild horse use, wildlife use, and climate to calculate a Potential Stocking Level per pasture. In addition to this method a new method was used to verify Burns District's standard carrying capacity table to Ecological Site Description (NRCS, 2014) forage production data per pasture. Table 4 below displays the findings for each calculation method.

Table 4: Carrying Capacity Calculation Results per Pasture.

Allotment	Pasture	BLM Acres	Burns District Carrying Capacity Calculation Table Results (Cumulative) (AUMs)		ESD Reference State Plant Community Grass/Glasslike Community Production (AUMs) 3		1/2 (50%) of Low ESD 4	Estimate of Current Annual AUM Authorizations ⁵
			Baseline 1	Actual Yield 2	Low	High		
Riddle Mtn. HMA								
Burnt Flat	Louie Hughes	2056	352	328	1165	2240	583	256
	Orana Flat	26241	5589	5195	12517	24444	6259	2802
Kiger HMA								
Happy Valley	N. Big Hill	2339	589	649	1033	1983	517	427
	S. Big Hill	3353	563	519	1392	3023	796	441
Smyth-Kiger	Swamp Creek	4534	814	830	1907	3742	954	695
	Yank Springs	2932	743	816	1281	2522	641	363
	Ant Hill	2350	inadequate data available		1188	2204	594	341
	Wood Camp	4865	1556	1549	2156	4209	1078	1079

	Ruins	5664	1916	1699	3021	5938	1511	1155
1	Baseline calculations are based on if the area received "normal" precipitation each year.							
2	Actual Yield calculations are based on the actual precipitation levels the area received over the years included in the analysis.							
3	Keep in mind these are (low to high) production ranges for the <i>reference state community</i> . Some areas of the pasture may be in transition from the reference state and therefore produce less forage.							
4	BLM has an annual target utilization level of 50%, which is calculated into the Burns District CC Calculations. During forage management planning one should base their plans on the low end of the potential stocking rate to be prepared for drought conditions on the range. This column was created to compare the Burns District CC Calculations to half (50%) of the low end of the ESD AUM Calculations.							
5	The numbers below represent the total of livestock average actual use per pasture, estimated wild horse actual use per pasture, and allocated wildlife AUMs per pasture.							

See Appendix C – Carrying Capacity Calculations Datasheets which include the data used for both methods of carrying capacity calculations.

When planning available forage within the HMAs it is reasonable to consider areas of certain pastures such as the north eastern portion of Riddle Mountain HMA's Oriana Flat Pasture that goes completely dry on drought years. When this happens approximately 50% of the HMA is unavailable for grazing as the distance to water is too great. As observed for many years, horses from the north end of Riddle Mtn. HMA tend to move onto Oregon State Land to the north where water is more reliable. These horses tend to stay on State lands until the next gather cycle. This scenario is not as apparent in the Kiger HMA as the pastures are smaller and there is more reliable water available in the form of perennial streams and springs.

2. Wild Horses

a. Population Management

The Kiger and Riddle Mountain wild horse herds have been gathered 12 times since 1974, most recently in 2011. From 1996 to present, five helicopter inventories of the HMA have been completed along with four helicopter drive gathers which are an adequate way to estimate numbers remaining on the range. Data from these inventories and wild horse gathers have helped define the needs of current and future horse population management.

Table 5: Riddle Mountain and Kiger HMA Population History during the evaluation period (since 1996).

		Gather			Census		TOTAL HORSES IN HMA
	DATE	Total Gathered	Total Removed	Total Released	ADULTS	FOALS	
<u>Riddle Mtn (AML 33-56)</u>							
census	11-Sep-96				65	20	85
gather	21-Sep-96	data not available					41
census	11-Aug-99				NA	NA	95
gather	6-Sep-99	62	52	10			43
census	17-Sep-02				81	16	97
census	27-Aug-03				110	34	144
gather	22-Sep-03	129	110	19			46
gather	4-Oct-07	79	63	19			29
census	12-Apr-10				57	11	68
gather	10-Jul-11	84	55	29			36
census	6-May-14				56	10	66
<u>Kiger (AML 51-82)</u>							
census	11-Sep-96				80	24	104
gather	16-Sep-96	data not available					53
census	11-Aug-99				NA	NA	87
gather	9-Sep-99	77	66	11			48
census	17-Sep-02				112	29	141
census	27-Aug-03				185	42	227
gather	10-Sep-03	111	111	0			116
gather	11-Nov-03	49	47	2			69
gather	7-Oct-07	111	73	38			44

census	12-Apr-10				81	16	97
gather	7-Jul-11	116	72	44			48
census	6-May-14				108	22	130
1 In April 2010, 57 adults were observed. By adding a 20% foal crop, as the foal crop was not accounted for in April, there would be approximately 68 horses in the HMA during 2010.							
2 In April 2010, 81 adults were observed. By adding a 20% foal crop, as the foal crop was not accounted for in April, there would be approximately 97 horses in the HMA during 2010.							

Both herds have demonstrated a 25 – 30% population growth rate resulting in a consistent need to gather to maintain AML and achieve a TNEB. Despite the fact that these herds are efficiently increasing their populations, there have been concerns for maintaining the genetic diversity of the two herds for many years.

b. Physical Characteristics and Genetics

When management of the Riddle Mtn. and Kiger (East Kiger and Smyth Creek) herds shifted to promoting and enhancing the Spanish Mustang characteristics in the 1970s and 1980s, horses that possessed these features have been selected and released/trans located to these HMAs from various HMAs across Oregon. The current herds are made up of horses from HMAs across Oregon including Beatty's Butte, Paisley Desert, South Steens, Palomino Buttes, Jackies Butte, Heath Creek-Sheepshead, Warm Springs and Coyote Lakes-Alvord-Tule Springs. Available records indicate there have been 10 horses trans located to Riddle Mtn. HMA and 36 horses trans located to Kiger HMA since 1977.

Originally horses were chosen that were “of small to medium size with various colors, mostly sorrel, bay and black... there may be other colors including a few horses with dorsal stripes, a characteristic of the Spanish mustang” (Smyth Creek HMAP, 1975). Physical requirements have become better defined over the years as demonstrated in *Horse Herd Objectives, 1(a) Physical and Conformation Characteristics Criteria* (Section IV HMA Objectives, above).

The Spanish characteristics highlighted by the dun factor¹ are readily apparent in the two herds today due to BLMs selection process. Since the early 1990's maintaining adequate genetic diversity in these relatively small population size herds has been a concern (Refer to Appendix D - Genetics Analysis Summary). Release records indicate horses were being exchanged between Riddle, Kiger and Smyth Creek even back in 1986. The release records following most of the gathers of these HMAs indicate an exchange of horses to help maintain adequate genetic variation. Exchanging horses between both HMA's and releases or translocations from other HMAs into the Riddle Mtn. and Kiger herds are of horses selected not only for their Spanish physical markers but also to add new genetics to the herds to help prevent a loss of genetic variability. It is well supported in population ecology that loss of genetic diversity and inbreeding is inevitable in small and isolated populations, and can occur in just a few generations. In mammals, inbreeding depression is the most important consequence of reduced population size. Immigration of unrelated individuals into an inbred population reduces the level of inbreeding dramatically (Franklin, 1980). In the absence of regular introduction of unrelated stock, Franklin suggests an effective size of at least 50 for large mammals (Franklin, 1980); Kiger HMA and especially Riddle Mtn. HMA would be at the low end of the effective size recommended by Franklin and therefore at risk for inbreeding if there were no introduction of unrelated stock.

Following the 2011 gather of wild horses from Riddle Mountain and Kiger HMA's, BLM contracted with Dr. Gus Cothran (Dept. of Veterinary Integrative Bioscience, Texas A&M University) to perform genetic variability analysis based upon DNA microsatellites from a subsample of wild horses from both HMA's. Genetic analysis reports for both HMA's were completed on March 29, 2012. Baseline genetic analysis reports were completed in 1988 and 1993 for Kiger and Riddle Mountain herds, respectively, and have been completed periodically since. Using previous genetic analysis reports from 2003 and 2009 (from Kiger and Riddle Mountain HMA's) Dr. Cothran assessed changes in genetic variability in the 2012 reports.

¹ Dun factor or dunning gene: The action of the dunning gene is twofold. First, it lightens the base color. The lightening process does not appear to affect the legs unduly, or the front of the face, leaving a darker 'mask'. There is also a great deal of variation in the size and contrast of the mask. The secondary characteristic of the dunning gene is to produce 'zebra' or primitive markings, such as dorsal stripe and leg barring. Other primitive markings include a mask; ear tips and ear edging; shoulder stripe or shadowing; neck striping or shadowing; cobwebbing in face; mane and/or tail guard hairs; or mottling (Horse Color Explained, 1999).

The 2012 genetic reports indicate genetic variability has declined in both herds since the 2009 analysis, however genetic variability is not at a critical level in either herd. For any living population, some level of genetic variability is lost from generation to generation and Dr. Cothran suggests that populations of less than 100 individuals are at greater risk of loss of variability than larger herds. For both herds, Dr. Cothran's reports say that "current variability levels are high enough that no action is needed at this point but the herd should be monitored closely due to the trend for loss of variability". In both reports, Dr. Cothran recommends exchanging a few individuals from each HMA as genetics are similar but different enough that variability levels could be improved through this exchange.

Table 6 below is a summary of genetic reports within Kiger and Riddle Mountain HMAs. The **observed heterozygosity** is a measure of how much diversity is found, on average, within individual animals in a WH&B herd and is insensitive to sample size, although the larger the sample, the more robust the estimate. Values below the mean for feral populations are an indication that the WH&B herd may have diversity issues. Herds with observed heterozygosity values that are one standard deviation below the mean are considered at critical risk. For DNA-based (hair) samples this value is 0.66. The **Fis** is a measure of inbreeding (ratio of 1-Ho/He). Critical level is $Fis > 0.25$ and suggestive of inbreeding problem.

Table 6: Observed heterozygosity and Fis summary from Riddle Mountain and Kiger HMAs from 2003 through 2012.

	Kiger		Riddle Mountain	
	Ho	Fis	Ho	Fis
2003	0.409	0.013	0.421	-0.086
2009	0.729	-0.060	0.724	-0.070
2012	0.671	0.034	0.679	-0.034
Critical level	<0.66	>0.25	<0.66	>0.25
WH Average	0.716	-0.012	0.716	-0.012
Domestic	0.710	0.012	0.710	0.012

c. Use Areas and Distribution

Riddle Mtn. HMA:

There are two general use areas for wild horses in this HMA; (1) on the northeast side in and around the Quail Creek watershed and (2) on the south side in and around the Squaw Creek watershed. Quail Creek is an ephemeral drainage and there is only one fairly reliable waterhole in the vicinity. An estimated 11,000 acres of the north end of the HMA were without water during 2013; this likely occurs on any drought year. For this reason, approximately 25 horses have moved north onto State of Oregon and Private lands where they are residing year round. This is not only a result of the drought cycle the area has received for the past two years as horses have been gathered off of State and private lands to the north during the 2007 and 2011 gathers; yield indices for these years were 73 and 152 respectively). When discussing the issue with the Department of State Lands Rangeland Management Specialist he reported monitoring in this area indicates a decline in rangeland condition due to the year round horses use occurring. The horses that generally reside around Squaw Creek also left the HMA during 2013. In 2013 range users reported seeing two groups of horses (18 and 25), one group in the McBain Flat area and one group to the north near Paul Creek in the Riddle Mountain Allotment (outside HMA). During the winter of 2012-2013 approximately 20 horses spent the winter on private and BLM lands near the mouth of Paul Creek. There are two reasons why these horses are moving west; (1) the area to the west was part of the Five Creeks Rangeland Restoration Project and received prescribed burning and seeding treatments which greatly increased forage quantity and quality, and (2) since the mid 1980's a few horses to be returned to the range following gathers of Riddle Mtn. and Kiger HMAs have been swapped (returned to the opposite HMA that they were gathered from) to maintain genetic diversity. Following the 2011 gather a larger number of horses were returned to Riddle Mtn. from Kiger HMA than have been in the past. It is assumed that many of these horses moving west are trying to go back to Kiger HMA, where they were originally from.

Kiger HMA:

The elevation range in Kiger HMA is from 4,360 to 6,240 feet. The HMA is mostly topographically divided by Smyth Creek Canyon which divides Happy Valley and Smyth-Kiger Allotments. The only travel corridor for horses to move between the two allotments is on the south end of S. Big Hill Pasture which has a closed gate for at least six months out of the year. As a result, the horse herd in the Happy Valley Allotment remains separated, for the most part, from the herd in Smyth Kiger Allotment. The horse use area in the Happy Valley Allotment portion tends to be centered on the north half of S. Big Hill Pasture where water, forage and cover are

readily available. There were 132 AUMs allocated to wild horses in the 2005 Steens RMP, which is the equivalent of 7 to 11 horses. Rangeland monitoring over the years indicate if numbers remain within AML in the North and South Big Hill Pastures, forage competition between horses and livestock is minimal. The major horse use areas in the Smyth-Kiger Allotment portion of the HMA tend to be at the lower elevations in Ant Hill, Wood Camp, Swamp Creek, and Yank Springs Pastures. Of these four pastures, only a small portion of the east side of Ant Hill is generally used. For some unknown reason, very little horse use has been observed in Ruins Pasture during this evaluation period.

Kiger HMA has a long history of wild horse distribution issues. Refer to Table 7 wild horse sighting records which show concentrations of horses.

Table 7: Wild horse concentration areas in Kiger HMA.

Date	Horse Count	Pasture
July 1990	40	Yank Springs Pasture
July 2003	52	Yank Springs Pasture
July 2003	62	Swamp Creek Pasture
May 2007	40	South Big Hill Pasture
July 2010	33	Wood Camp Pasture
April 2013	46	Wood Camp Pasture
April 2014	55 adults/7 foals	Wood Camp Pasture

As compared to other HMAs, Kiger HMA has a significantly greater amount of internal fenceline in relation to total acres. There are approximately 27.5 miles of internal fence in Kiger HMA (refer to Map B); the greater the amount of pasture fencelines in an HMA the greater the chance of entrapment of horses throughout the year. As these pastures are relatively small compared to pastures in other HMAs in Oregon, the effect of 25 plus horses caught in one pasture will be readily observed in the amount of vegetation utilized. Given the wild horse distribution history in Smyth-Kiger Allotment, this issue will not be remedied until consideration is given to some internal fence removal.

3. ACEC

The Kiger Mustang ACEC was designated in 1992 (Federal Register, Vol. 57, No. 202, Page 47,671) to protect the historic values (the relevance criteria) which are of more than local significance (important criteria). It was analyzed in the Three Rivers Resource Management Plan/Environmental Impact Statement (1992). The primary management objective for which this ACEC is to perpetuate and protect the dun

factor color and conformation characteristics of the wild horses present in the Kiger and Riddle Mountain HMAs. Management of the HMA can be located in the Kiger and Riddle Mountain Herd Management Area Plans and Allotment Management Plans for Burnt Flat, Happy Valley and Smyth-Kiger Allotments.

4. Livestock Grazing Management

There are three different allotments that allocate AUMs for livestock within the Kiger Mustang ACEC. These include Burnt Flat Allotment in the Riddle Mountain HMA and Happy Valley and Smyth-Kiger Allotments in the Kiger HMA. Grazing management objectives for each allotment are 1) season/timing of use on pastures that includes: graze/defer, defer, or graze/rest rotations to minimize livestock impacts to key plant species (Idaho fescue, bluebunch wheatgrass, and needle and thread grasses); and 2) moderate utilization on key plant species to minimize stress to grazed plants and meet habitat needs for wildlife and wild horses.

a. Burnt Flat Allotment

Livestock are managed in a one year rotation with 3,863 Active AUMs allocated and 571 EOU AUMs. Livestock pasture rotations within the Riddle Mountain HMA are developed to provide defer use or graze/trail on key plant species (Table 8).

Current trend in this allotment is predominately upward or stable at high elevation sagebrush plant communities (Appendix B - Upland Trend Data). The greatest threat to sagebrush plant communities in this allotment is juniper encroachment. Current vegetative monitoring shows no concerns with wild horse and livestock utilization in either pasture. Current trends indicate management does not need to be adjusted to meet rangeland health objectives.

Table 8: Burnt Flat Allotment General Livestock Grazing Management (1-Year Rotation)

Year	Pasture Number	Pasture Name w/ (%PL)	Approximate Cow Numbers	Approximate Use Dates	Approximate AUMs	Season of Use (Grazing Treatment Description)
1	1	Louie Hughes	900	06/10 - 06/20	325	Graze/Trail

			300	07/01 - 07/05	49	Graze/Trail
1	2	Oriana Flat	900	06/21 - 07/05	444	Defer
			1200	07/06 - 08/01	1065	Defer
			1200	09/16 - 10/31	1815	Defer
Cold Springs						
1	PV	Buck Pasture	NA	08/02 - 09/15	NA	Defer
		Tommie's Place				
		Clark Field				
Total AUMs for year 1 = 3699 - 571 EOU = 3128						

Table 9: Most Common Ecological Sites with Potential Vegetation for the Kiger-Riddle Mountain HMAs.

ID	Site Name	Biotic Name/Dominate and/or Potential Vegetation
<u>R023XY100OR</u>	LAKEBED	/Blechnis-Rumex
<u>R023XY200OR</u>	PONDED CLAY	/Artemisia cana ssp. bolanderi/Poa nevadensis-Leymus triticoides
<u>R023XY214OR</u>	CLAYPAN 10-12 PZ	/Artemisia arbuscula ssp. Arbuscula/Pseudoroegneria spicata ssp. Spicata-Festuca idahoensis
<u>R023XY216OR</u>	CLAYPAN 12-16 PZ	/Artemisia arbuscula ssp. arbuscula/Festuca idahoensis-Pseudoroegneria spicata ssp. spicata
<u>R023XY302OR</u>	SOUTH SLOPES 12-16 PZ	/Artemisia vaseyana/Pseudoroegneria spicata ssp. spicata
<u>R023XY308OR</u>	NORTH SLOPES 10-12 PZ	/Artemisia tridentata ssp. wyomingensis/Festuca idahoensis-Pseudoroegneria spicata ssp. spicata
<u>R023XY310OR</u>	NORTH SLOPES 12-16 PZ	/Artemisia tridentata ssp. vaseyana/Festuca idahoensis
<u>R023XY312OR</u>	SHALLOW NORTH 12-16 PZ	/Artemisia arbuscula/Festuca idahoensis
<u>R023XY316OR</u>	DROUGHTY LOAM 11-13 PZ	/Artemisia tridentata ssp. tridentata-Artemisia tridentata ssp. vaseyana/Festuca idahoensis-Achnatherum thurberianum
<u>R023XY318OR</u>	LOAMY 12-16 PZ	/Artemisia tridentata ssp. vaseyana/Festuca idahoensis
<u>R023XY404OR</u>	DEEP NORTH 12-18 PZ	/Artemisia tridentata ssp. vaseyana/Festuca idahoensis

b. Smyth-Kiger Allotment

Livestock are managed on a two year rotation and allocated 2,295 Active AUMs. Livestock pastures rotations within the Kiger HMA are developed to provide graze/defer on key plant species (Table 10). This grazing schedule has not been fully implemented because of the Five Creek Rangeland Restoration Project that treated juniper with prescribed fire in 2008, 2009, and 2011. Following treatments pastures were rested for vegetative restoration purposes such as seeding.

Table 10: Smyth-Kiger Allotment General Livestock Grazing Management (2-Year Rotation)

Year	Pasture Number	Pasture Name w/ (%PL)	Approximate Cow Numbers	Approximate Use Dates	Approximate AUMs	Season of Use (Grazing Treatment Description)
1	4	Ant Hill (91)	800	05/01 - 05/05	120	Graze
1	6	Wood Camp (100)	800	05/06 - 05/31	684	Graze
1	7	Ruins (77)	800	06/01 - 07/05	709	Graze
1	NA	Private (00)	NA	07/06 - 09/09	NA	Defer
				09/10 - 10/10		
1	2	Swamp Creek (91)	700	or 10/15 - 11/15	649	Defer
				09/15 - 10/15		
1	3	Yank Springs (93)	150	or 10/15 - 11/15	142	Defer
1	8	Hamilton Ind. (100)	0	Rest	0	Rest
1	9	Deep Creek (100)	0	Rest	0	Rest
Total AUMs for year 1 = 2304						
2	8	Hamilton Ind. (100)	100	04/15 - 05/25	135	Graze
2	4	Ant Hill (91)	700	05/01 - 05/05	105	Graze
2	2	Swamp Creek (91)	700	05/06 - 05/31	545	Graze
2	3	Yank Springs (93)	700	06/01 - 06/10	214	Graze

2	9	Deep Creek (100)	200	06/11 - 06/30	132	Grazed
2	NA	Private (00)	NA	07/01 - 07/31	NA	Defer
2	1	Ruins (77)	535	08/01 - 09/15	623	Defer
				09/15 - 10/15		
2	6	Wood Camp (100)	535	or 10/15 - 11/15	545	Defer
Total AUMs for year 2 = 2298						

Current trend in this allotment is predominately upward or stable at high elevation sagebrush plant communities and riparian areas (Refer to Appendix B - Upland Trend Data). Areas of concern are in low/mid elevation pastures (Ant Hill, Swamp Creek, and parts of Yank Springs and Wood Camp) that are threatened by the spread of exotic annual grasses (cheatgrass, medusahead, and North Africa grass), juniper encroachment, and wild horse concentration areas.

Wild horse concentrations are currently in areas of Wood Camp Pasture resulting in heavy utilization and in some localized areas severe utilization, which has been observed since 2010. The heavy concentration areas are occurring in the portions of Wood Camp Pasture burned and seeded in 2011. This horse behavior is of concern to meeting grazing management and rangeland health objectives of key plant species. Horses selectively graze immature and less stemmy varieties of forage with short, new growth continually overgrazed while surrounding areas grow past the point of desired maturity and palatability (Freeman and Redfearn, 2013). As desirable species of forages are grazed out in the spots of overgrazing, less desirable, weedy species tend to increase (Freeman and Redfearn, 2013). BLM observations and trend monitoring (photo and density) show impacts to fire rehabilitation seedings in seedling mortality (seeded in November 2011), trampling of plants and soil, and over utilization (Figure 3). In 2010 livestock grazing management was impacted by the permittee taking voluntary nonuse. This current trend in horse behavior is predicted to continue to affect livestock management pasture rotation and permitted AUMs. Adaptive management for livestock grazing is being implemented on an annual basis dependent upon wild horse concentration areas and utilization levels.

Current vegetative monitoring indicates concerns with wild horse continuous use in Wood Camp Pasture (Table 11). Current trends indicate wild horse management does need to be adjusted to meet rangeland health objectives. This would be achieved by increasing wild horse distribution throughout the HMA and discouraging wild horse concentration areas.

Table 11: Trend plot data analysis for Wood Camp Pasture in Smyth-Kiger Allotment. Density (plants/m²).

Trend Plot	Key Grass spp.	2012		2013	
		Mature	Juvenile	Mature	Juvenile
5331-17	AGCR	0.0	3.4	3.4	0.0
Drill seeded	SIHY	0.6	0.8	0.4	0.0
	POAM	0.0	0.2	0.0	0.0
	FEID	0.6	1.2	1.2	0.0
	BRIN	0.0	0.4	0.6	0.0
	TOTAL	1.2	6.0	5.6	0.0
5331-18	POAM	0.0	10.0	1.2	0.4
Aerial seeded	FEID	1.6	4.2	2.4	0.0
	BRIN	0.0	2.8	2.8	0.0
	SIHY	0.2	0.0	0.6	0.0
	POPK	1.6	0.4	1.0	0.0
	CAKO	1.8	0.2	2.0	0.0
	BRMA	0.4	0.0	0.0	0.0
	*AGSP	0.0	0.0	2.2	0.0
	TOTAL	5.6	17.6	9.4	0.4

Wild horse use was evident on trend plot 5331-17 when measured in 7/6/2012; AGCR, BRIN, and FEID measurements indicated the greatest survival rates between 2012 & 2013. Trend plot 5331-18 was measured in 6/29/2012 with no evidence of wild horse use, with observed use occurring in August 2012 and June 18, 2013. Seedling mortality was prevalent in aerial seeding treatments with POAM and FEID measurements indicating the greatest reduction in density and observations showing seedlings uprooted.
 *AGSP measured in 2013 was probably misidentified as juvenile POAM in 2012.



Figure 3: Clockwise from top left, all photos taken in Wood Camp Pasture. Areas seeded in 2011 with new, immature growth are being selected by horses resulting in seedlings being pulled up and killed. ◦ Severe utilization by wild horses in drill seeded area (2013). ◦ April 2014 utilization cage in Lambing Grounds area. Note almost all residual forage has been removed (although cows were in for one month in fall 2013) and each plant showing 2014 growth has been grazed. ◦ A group of 55 adults and 7 foals observed on April 10, 2014.



c. Happy Valley Allotment

Livestock management is on a three year rotation with 2,107 Active AUMs and 250 Exchange of Use (EOU) AUMs allocated. The South Big Hill and North Big Hill Pastures of Happy Valley Allotment are the only two that lie within the Kiger HMA. Livestock pasture rotations within the North Big Hill and South Big Hill Pastures, are developed to provide graze/defer or graze/rest on key plant species (Table 12). This grazing schedule has been fully implemented starting in 2011. For the 2014 grazing season Year 3 livestock rotation would be implemented (Table 12).

Current trend in this allotment is predominately upward or stable at high and low/mid elevation sagebrush plant communities (Refer to Appendix B - Upland Trend Data). Areas of concern within the HMA are in low/mid elevation portions of each pasture (North Big Hill and South Big Hill) that are threatened by the spread of exotic annual grasses (cheatgrass and medusahead) and juniper encroachment. There have been vegetative treatments in each pasture to reduce these threats which includes 1) Frog Creek Juniper clear cut/machine pile/jackpot burn in South Big Hill Pasture, 2) seeding of juniper treatments in South Big Hill Pasture, and 3) spraying of medusahead using Imazapic in both S. and N. Big Hill Pastures.

Current vegetative monitoring shows no concerns with wild horse and livestock utilization in both pastures. Current trends indicate management does not need to be adjusted to meet rangeland health objectives.

Table 12: Happy Valley Allotment General Livestock Grazing Management (3-Year Rotation)

Year	Pasture Number	Pasture Name	Approximate Cow Numbers	Approximate Use Dates	Approximate AUMs	Season of Use (Grazing Treatment Description)
1	1	North	Herd A - 350	04/10 - 05/11	368	Graze
1	2	South	Herd A - 350	05/12 - 06/12	368	Graze
1	9	South Big Hill	Herd A - 350	06/13 - 07/14	368	Graze
1	3	Government Field	Herd A - 350	07/15 - 07/28	161	Defer
1	4	Deep Creek	Herd A - 350	07/29 - 09/08	483	Defer
1	7	Fisher Field	Herd B - 120	04/15 - 05/25	162	Graze
1	6	Tank	Herd B - 120	05/26 - 06/24	118	Graze

1	5	West Field	Herd B - 120	06/25 - 08/09	181	Defer
1	12	Hay Meadow	8	04/01 - 10/15	50	
1	8	North Big Hill	0	Rest	0	Rest

Total AUMs for year 1 = 2209 - 250 EOU = 1959

2	5	West Field	Herd A - 350	04/10 - 05/11	368	Graze
2	8	North Big Hill	Herd A - 350	05/12 - 06/14	391	Graze
2	9	South Big Hill	Herd A - 350	06/15 - 07/16	368	Graze
2	4	Deep Creek	Herd A - 350	07/17 - 08/27	483	Defer
2	3	Government Field	Herd A - 350	08/28 - 09/10	161	Defer
2	6	Fisher Field	Herd B - 120	04/15 - 05/20	142	Graze
2	7	Tank	Herd B - 120	05/21 - 06/24	138	Graze
2	1	North	Herd B - 120	06/25 - 08/09	181	Defer
2	12	Hay Meadow	8	04/01 - 10/15	50	
2	2	South	0	Rest	0	Rest

Total AUMs for year 2 = 2282 - 250 EOU = 2032

3	1	North	Herd A - 350	04/10 - 05/11	368	Graze
3	8	North Big Hill	Herd A - 350	05/12 - 06/14	391	Graze
3	2	South	Herd A - 350	06/15 - 07/16	368	Graze
3	3	Government Field	Herd A - 350	07/17 - 07/30	161	Defer
3	4	Deep Creek	Herd A - 350	07/31 - 09/10	483	Defer
3	7	Fisher Field	Herd B - 120	04/15 - 05/25	99	Graze
3	6	Tank	Herd B - 120	05/26 - 06/24	209	Graze
3	5	West Field	Herd B - 120	06/25 - 08/09	154	Defer
3	12	Hay Meadow	8	04/01 - 10/15	50	
3	9	South Big Hill	0	Rest	0	Rest

Total AUMs for year 3 = 2283 - 250 EOU = 2033

5. Soils and Biological Soil Crusts

The soils in the Kiger and Riddle Mountain HMAs are dominated (>80%) by the Ninemile-Westbutte-Carryback soil association. This association is well drained, shallow and moderately deep soil that formed in residuum and colluvium and tends toward gravelly to very cobbly loams or stony to cobbly clays with areas of silty clay loam. It is found on plateaus, hills, and mountains that receive 12 to 16 inches of precipitation. Slopes range from 0-65 percent leading to a moderate hazard of water erosion. The associated native vegetation communities are mountain big sagebrush (*Artemisia tridentata vaseyana*) and low sagebrush (*Artemisia arbuscula*) with needlegrass species (*Achnatherum ssp*) and Idaho fescue (*Festuca idahoensis*).

Other associations within the HMAs include Baconcamp-Clamp-Rock outcrop, Raz-Brace-Anawalt, Felcher-Skedaddle, Pujade-Ausmus-Swalesilver and Fury-Skunkfarm-Housefield. These associations range from fine silty loams to very cobbly loams on slopes from 0 – 80% with associated vegetation including bluebunch wheatgrass, Thurber's needlegrass, Wyoming big sage, purple sage (*Salvia dorrii*), squirreltail, low sagebrush, needlegrass species, basin big sagebrush (*Artemisia tridentata tridentata*), black greasewood (*Sarcobatus vermiculatus*), basin wildrye (*Leymus cinereus*), inland saltgrass (*Distichlis spicata*), silver sagebrush (*Artemisia cana*), Sandberg's bluegrass (*Poa secunda*), creeping wildrye (*Leymus triticoides*), mat muhly (*Muhlenbergia richardsonis*), hardstem bulrush (*Schoenoplectus acutus*), sedges (*Carex sp*), tufted hairgrass (*Deschampsia cespitosa*), rushes (*Juncus sp*), quackgrass (*Elymus repens*), yarrow (*Achillea sp*), lupine (*Lupinus sp*), three-tip sagebrush (*Artemisia tripartite*), silver sagebrush (*Artemisia cana*), shrubby cinquefoil (*Dasiphora sp*), willow (*Salix sp*) and wild rose (*Rosa woodsii*).

Identification of biological soil crusts at the species level is often not practical for fieldwork. The use of some basic morphological groups simplifies the situation. Morphological groups are also useful because they are representative of the ecological function of the organisms (pg. 6, TR-1730-2). Using a classification scheme proposed in 1994 we can divide microbiota such as biological soil crusts into three groups based on their physical location in relation to the soil: hypermorphic (above ground), perimorphic (at ground) and cryptomorphic (below ground).

The morphological groups are:

1. Cyanobacteria - Perimorphic/cryptomorphic.
2. Algae - Perimorphic/cryptomorphic.

3. Micro-fungi - Cryptomorphic/perimorphic.
4. Short moss (under 10mm) - Hypermorphic.
5. Tall moss (over 10mm) - Hypermorphic.
6. Liverwort - Hypermorphic
7. Crustose lichen - Perimorphic.
8. Gelatinous lichen - Perimorphic.
9. Squamulose lichen – Perimorphic.
10. Foliose lichen - Perimorphic.
11. Fruticose lichen - Perimorphic.

Morphological groups 4, 5, 7, 8 & 9 will likely be the dominant groups represented in the project area. Depending on precipitation amounts and microsites, groups 6, 10 and 11 may also be well represented where the site specific conditions required for their growth exist. Morphological groups 1, 2 and 3 are difficult to discern in the field as they require specialized tools which are not easily useable in the field. Soil surface microtopography and aggregate stability are important contributions from biological soil crusts as they increase the residence time of moisture and reduce erosional processes. The influence of biological soil crusts on infiltration rates and hydraulic conductivity varies greatly; generally speaking infiltration rates increase in pinnacled crusts and decrease in flat crust microtopography. The northern Great Basin has a rolling biological soil crust microtopography and the infiltration rates are probably intermediate compared to flat or pinnacled crustal systems. Factors influencing distribution of BSCs (TR-1730-2) include, but are not limited to: elevation, soils and topography, percent rock cover, timing of precipitation, and disturbance. Generally, upland vegetation trends are indicators of the health and stability of Biological Soil Crusts.

6. Cultural Resources

Riddle Mountain HMA:

Archaeological inventory intensity in the Riddle Mountain HMA is probably not sufficient to adequately evaluate the cultural resources. However, this document is intended to report what is known and estimate what is expected to occur there. Seven hundred and forty acres have been inventoried in the HMA. Cultural survey has been in response to project clearance needs for the following types of projects: Fuel breaks, juniper cutting and treatment, wild horse trap sites, reservoirs and a guzzler. If the archaeological site density is similar to what is found in the adjacent Kiger HMA, it is

likely the Riddle Mt. HMA has a large number of sites. The well-watered topography with many acres of rocky low sage flats supporting edible roots and numerous ecotonal boundaries indicate an environment rich in food resources that would have attracted prehistoric inhabitants. In addition, historic activities, especially related to livestock management in the late 1800s and early to mid-1900s, are likely to leave traces in the HMA. Judging from the prehistoric site complexity seen in the Kiger HMA, the likelihood of finding seasonal base camps with considerable artifact complexity in Riddle Mt. HMA is high. It is also likely that a large proportion of these prehistoric sites will contain historic artifacts because sites favored by prehistoric people seem to have been favorites of the livestock herders as well.

Five cultural sites have been found in the Riddle Mtn. HMA. All are prehistoric base camps with many types of artifacts found on their surfaces. In addition, all of these base camps served as sheep/cow herder and firewood or post cutting camps as well. All of the sites have been affected by one impact or another with 25% affected by road construction, 50% affected by livestock grazing/wild horses and 50% affected by erosion.

No paleontological localities are known or likely to occur in the Riddle Mtn. HMA.

No specific sacred or modern-day traditional use locations are known to occur in the HMA. However, the Burns Paiute Tribe commented in the North Steens Transmission Line EIS that the Tribe considers Steens Mountain to be a sacred area. Judging from the little we know about prehistoric activities in the HMA, it is likely that some Burns Paiute families still use the area for sacred or economic purposes.

Kiger HMA:

9865 acres have been inventoried in the Kiger HMA. Cultural survey has been in response to project clearance needs for the following types of projects: rehabilitation seeding projects, spring developments, juniper cutting and fuels treatment, fence construction and cattle guard installation.

Fifty three cultural sites have been recorded. The majorities are prehistoric hunting and root gathering base camps with a wide variety of different types of artifacts. Similar to Riddle Mtn. HMA, about a quarter of prehistoric sites in the HMA also have an historic component that appear to be related to livestock herding and juniper firewood and fence post production. A number of prehistoric rock cairns, hunting blinds and historic rock fences have been recorded in the HMA. The probability is high for additional high significance prehistoric sites to be found in the HMA. A moderate number of historic ranching sites are also expected.

Most (83%) of the sites have been affected by one impact or another. See the Table 13 below for a breakdown of impact agents at sites in the HMA.

Table 13: Impact Agents to Cultural Sites in Kiger HMA.

Impact Agent	Percentage of Sites Affected
Livestock Grazing/Wild horses	41%
Unknown	13%
Erosion	12%
Wildfire	12%
Animal Burrowing	5%
Vandalism	4%
None	4%
Water Developments	4%
Historic Artifact Weathering	2%
Road Construction and Use	1%
Dispersed Recreation	1%

No paleontological localities are known or likely to occur in the Kiger HMA

No specific sacred or modern-day traditional use locations are known to occur in the HMA. However, the Burns Paiute Tribe commented in the North Steens Transmission Line EIS that the Tribe considers Steens Mountain to be a sacred area. Judging from what we know about prehistoric activities in the HMA, it is likely that some Burns Paiute families still use the area for sacred or economic purposes.

7. Riparian, Water Quality and Fish

Riddle Mtn. HMA:

- **Squaw Creek**

3.95 miles of Squaw Creek are in the Riddle Mountain HMA. 1.8 miles are public and 2.15 miles are under private ownership. All 3.95 miles are perennial. Private lands are not fenced and wild horses have access to both public and private lands. Squaw Creek photo monitoring was conducted in 2008 and 2010 and indicates the majority of Squaw Creek on public land is at potential. Riparian vegetation is comprised of a diverse hydric herbaceous and woody riparian community. A Proper Functioning Condition (PFC) Assessment was conducted in 2008 and rated the BLM managed portion of Squaw Creek at PFC. It appears as though livestock and wild horses were not accessing a majority of the BLM managed portion of Squaw Creek in the HMA due to terrain restrictions. Although wild horses have access to the private portions of Squaw Creek, monitoring by the BLM is not conducted there. Water Quality monitoring has not been conducted along Squaw Creek.

- **Buster Creek**

The headwaters and 2.2 miles of Buster Creek are within the Riddle Mtn. HMA. With the exception of the headwater springs (Louie Hughes Spring), the portion of the stream

within the HMA is intermittent. Five Vegetation Cross Sections were measured at the headwaters using the Winward 2000 method on September 23, 2011. The survey determined vegetation was Late Seral and dominated by Nebraska Sedge. This is evident in photo monitoring plots established in 2008. No other monitoring has been conducted along Buster Creek.

Kiger HMA:

- **Swamp Creek**

Five miles of Swamp Creek flows through the Kiger HMA. Of this, 3.84 miles are in public ownership and 1.2 is private. Of the five miles, only 1.5 miles are perennial. Private lands are not fenced and wild horses have access to both public and private lands. Photo monitoring through 2010 show good to excellent conditions along public portions of Swamp Creek. Stream banks appear stable and desirable stabilizing species are dominant. A PFC was conducted on Swamp Creek in 1998 and rated the stream at PFC. Water quality monitoring has not been conducted along Swamp Creek.

- **Frog Creek**

2.1 miles of Frog Creek flow through the Kiger HMA. Of this, 1.25 miles are perennial, 1.8 miles are under public ownership and 0.3 mile is privately owned. Private lands are not fenced and wild horses have access to private lands. Frog Creek provides habitat for Great Basin red band trout. A PFC Assessment was conducted on Frog Creek in 2005 and rated the stream at Functioning at Risk with no apparent trend. Notes indicate some small headcuts present due to a lack of stabilizing hydric herbaceous vegetation and high sediment loads from the road crossing upstream. Annual heavy livestock and wild horse grazing was limiting the recruitment of woody riparian species and the function of stabilizing herbaceous species. Photo monitoring showed mature willows with no younger age classes present. As a result, a .8 mile perennial section of Frog Creek under public ownership was fenced and excluded from wild horse and livestock grazing in 2012. Horses and livestock have access to the remaining .36 perennial miles. To facilitate large woody species recovery and increase shading, 50 cottonwood poles were planted within the enclosure in 2013. Water quality monitoring has not been conducted along Frog Creek.

- **Smyth Creek**

Smyth Creek is 16.4 miles long. Of this, 2.9 miles are within the Kiger HMA. The entire 2.9 miles are under public ownership. Smyth Creek provides habitat for redband trout (*Oncorhynchus mykiss*), a bureau special status species. The Oregon Department of Environmental Quality (ODEQ) has established water quality standards for the State of Oregon designed to protect the most sensitive of these multiple uses. In this case,

redband trout is designated as the most sensitive uses and to which the standards in this HMA are based upon. Because water temperature has one of the greatest effects on fish and fish habitat, water quality has been monitored by collecting water temperature data. In 2005 and 2006, water temperature data collected indicates water entering Kiger HMA above ODEQ's 68°F water temperature standard and then shows a cooling trend as Smyth Creek travels through the HMA. Shortly after Smyth Creek leaves the HMA, temperature data is collected again which shows the water temperature well below ODEQ's standard.

Photo monitoring indicated a majority of Smyth Creek in the HMA had a downward trend in riparian condition through 2009. Prior to 2009, photos showed sloughing banks, decadent willows with little to no recruitment, and an early to mid seral herbaceous component. In 2009, Smyth Creek was rested from livestock grazing and treated with prescribed fire. Livestock and wild horses were excluded from the area until 2011. In the fall of 2012, the portion of Smyth Creek in the HMA was fenced and excluded from livestock and wild horse use. Three large water gaps (240 feet to 670 feet wide) give wild horses and livestock access to water. With the described grazing rest, Smyth Creek photo trend monitoring indicates an upward trend in hydric herbaceous cover and woody riparian species recruitment. To further facilitate large woody species recovery and increased stream shading, 83 cottonwood poles were planted along Smyth Creek in 2012. By 2013, approximately 25 trees had survived. With drought conditions, Smyth Creek in the HMA was intermittent during the summers of 2012 and 2013.

- **Yank Creek**

Yank Creek is 2.7 miles long, of which 2.1 miles are in the HMA. Of this, 1 mile is perennial. This mile was fenced from livestock and wild horse use in 2004. Two small (less than 100 feet wide) water gaps exist and give wild horse and livestock access to perennial water. Yank Creek provides habitat for redband trout. Water temperature data, collected in 2009, specifies temperatures rose to 69° F, just over ODEQs 68°F temperature standard for salmonid bearing streams.

Encroached junipers were cut and hand piled along the riparian corridor in the fall of 2009 to improve riparian conditions. Photo monitoring data indicates upward trend in deep rooted riparian species since the creek was excluded from livestock and wild horses and juniper treatments were conducted.

8. Noxious Weeds

Our database currently lists 1203 noxious weed sites totaling 1458.3 acres in the Riddle HMA and 477 noxious weed sites totaling 412.2 acres in the Kiger HMA. There have

been 9 different noxious weed species documented in the Riddle HMA and 4 different noxious weed species documented in the Kiger HMA. The numbers and acreages associated with each are displayed in Table 14 below:

Table 14: Noxious Weed Distribution

Noxious Weed Species	Number of Sites	Acreage
<u>RIDDLE HMA</u>		
Canada thistle	671	62.3
Bull thistle	287	393.1
Scotch thistle	51	71.1
Whitetop	89	378.7
Diffuse knapweed	2	123.6
Perennial pepperweed	3	23.3
Mediterranean Sage	1	0.0008
Field bindweed	1	0.0008
Medusahead rye	98	406.1
<i>Totals</i>	<i>1203</i>	<i>1458.3</i>
<u>KIGER HMA</u>		
Canada thistle	245	2.4
Bull thistle	190	284.5
Scotch thistle	10	0.1
Medusahead rye	32	125.3
<i>Totals</i>	<i>477</i>	<i>412.2</i>
GRAND TOTAL	1680	1870.5

The majority of the Kiger HMA area has been systematically surveyed and mapped for weeds as part of the landscape-scale Five Creeks Project. Additional weed inventories have been conducted in association with various range improvement projects. The road network has been well inventoried. Treatments occur on a regular basis in this and surrounding areas. Most of the current weed sites occur along roads and have been

treated. Medusahead infestations have primarily been treated along roads to minimize opportunities for spread. Treatments in the HMAs are summarized in Table 15 below.

Table 15: Weed Treatments in Kiger and Riddle Mtn. HMAs by Year.

YEAR	ACRES Treated		YEAR	ACRES Treated
Kiger	1481.496		Riddle Mtn	1473.09
1997	5.6		1997	0.55
1998	21.9		1998	0.54
1999	2.36		1999	0.54
2000	18.3		2000	20.885
2001	0.2		2001	6
2002	2.2		2002	0.45
2003	29.02		2003	0.2
2004	30.13		2005	0.68
2005	17.68		2006	0.03
2006	24.63		2007	1
2007	8.38		2008	31.8174
2008	10.4078		2009	3.89
2009	42.3535		2010	1.75
2010	38.93		2011	15.16
2011	12.37		2012	1389.37
2012	830.335		2013	0.23
2013	386.48			
Grand Total = 2954.5887				

Areas subject to continuous use by horses, where vegetation is stressed or in early to mid-seral ecological status are more prone to invasion by noxious and invasive weeds. Areas where disturbance is high (such as heavily used waterholes, springs, or riparian areas) are more susceptible to introduction and spread of noxious weeds.

9. Special Status Species (SSS)

a. Aquatic Species

See Riparian, Water Quality and Fisheries section (h) for special status aquatic species.

b. Plant Species

There are no known federally listed Threatened or Endangered plant species or critical habitat found within the HMA boundaries.

c. Wildlife Species

There are no known federally listed Threatened or Endangered wildlife species found within the HMA(s) boundary. There is one species, greater sage-grouse (*Centrocercus urophasianus phaois*), found within the HMA(s) that have increased monitoring due to population concerns (SSS).

Sage grouse

Riddle Mountain HMA

There are 13 sage grouse leks within a 4 mile buffer (Hagen 2011) of the Riddle Mountain HMA boundary (See Table 16). Nine leks are actually within the HMA boundary. Ninety six percent of the HMA is classified as sage grouse habitat (refer to Map I – Sage grouse Habitat Map, Riddle Mtn. HMA). Approximately 29,911 acres (91 percent) is Preliminary Priority Habitat (PPH) and approximately 1,642 acres (5 percent) is Preliminary General Habitat (PGH). Instruction Memorandum (IM) 2012-044, BLM National Greater Sage-Grouse Land Use Planning Strategy explains the history behind and defines PPH and PGH. Approximately 3,000 acres of the HMA was treated with the use of prescribed fire and 69 acres cut and piled as part of the Five Creeks project. In this relatively small portion of the HMA, the Five Creeks treatment was minimally successful at removal of encroaching juniper. Those areas where juniper were removed either by prescribed burning or cutting and piling, the overall suitability of habitat was improved for year-round use by sage grouse. Currently a majority of the area treated is likely not used by sage grouse. With time the sagebrush plant community will become more abundant in the treated areas and it is likely that the sage grouse will increase their use in the area. Currently it is unlikely that the wild horses are limiting sage grouse in direct or indirect ways. Removing juniper likely increased the amount of ground water in the treatment areas. Increased ground water will likely manifest itself in seeps and riparian areas throughout the HMA. Seeps and riparian areas are important

habitats for late brood rearing life processes of the sage grouse. Currently, many of the riparian areas are excluded with fences thus protecting them from cattle and wild horses. As new mesic or previously xeric areas manifest, efforts should be made to monitor these areas. If monitoring indicates these areas are not meeting riparian health standards, action to protect these areas should be taken to redistribute or exclude large herbivores while allowing access by sage grouse.

Table 16: Sage grouse leks within 4 mile buffer distance to Riddle Mountain HMA. Name-ODFW, Status-ODFW lek status, land-surface management agency, Distance- distance from HMA boundary expressed in miles

NAME	STATUS	LAND	DISTANCE
COMEGYS LAKE #1	Occupied Pending	Private	0.2
COMEGYS LAKE #2	Unoccupied Pending	BLM	0
FOLLY FARM	Occupied	BLM	2.5
JUNIPER GRADE	Occupied Pending	BLM	0
JUNIPER RANCH	Unoccupied Pending	BLM	2.6
LAMBING CANYON #1	Unoccupied Pending	BLM	0
LAMBING CANYON #2	Unoccupied Pending	BLM	0
MARYS LAKE	Occupied Pending	BLM	0
OREANA FLAT	Occupied Pending	BLM	0
QUAIL CREEK	Unoccupied Pending	BLM	0
SQUAW CREEK STEENS	Occupied Pending	BLM	0.5
SQUAW FLAT	Occupied Pending	BLM	0
SQUAW FLAT #2	Occupied Pending	BLM	0

Kiger HMA

There are three sage grouse leks within a 4 mile buffer (Hagen 2011) of the Kiger HMA boundary (see Table 17), one of which is located within the HMA boundary. Ninety eight percent of the HMA is classified as sage grouse habitat (refer to Map J – Sage grouse Habitat Map, Kiger HMA). Approximately 2,065 acres (7 percent) is Preliminary Priority Habitat (PPH) and approximately 27,807 acres (91 percent) is Preliminary General Habitat (PGH).

In general, trend studies have shown that on most years, grazing early in the year provides perennial vegetation the ability to regrow and set seed. Trend studies have shown that on most years combined grazing utilization from cattle, wild horses, and wildlife does not exceed proper use factor and healthy land standards. As long as this trend continues, ample residual herbaceous component needed for sage grouse nest concealment should be available.

Approximately 12,357 acres (41 percent) of the HMA were treated with the use of prescribed fire and juniper cutting as part of the Five Creeks project. The Five Creeks treatment removed encroaching juniper improving the overall suitability of habitat for year-round use by sage grouse. Currently, majority of the area is likely not used by sage grouse. With time, the sagebrush plant community will become more abundant in the treated areas, and the sage grouse will increase their use of those areas. Currently, it is unlikely that wild horses are limiting sage grouse directly or indirectly. Removing juniper likely increased the amount of ground water in the treatment areas. Increased ground water will likely manifest itself in seeps and riparian areas throughout the HMA. Seeps and riparian areas are important habitats for late brood rearing life processes of the sage grouse. Currently, many of the riparian areas are excluded with fences thus protecting them from cattle and wild horses. As new mesic or previously xeric areas manifest, efforts should be made to monitor these areas. If monitoring indicates these areas are not meeting riparian health standards, action to protect these areas should be taken to redistribute or exclude large herbivores while allowing access by sage grouse.

Table 17: Sage grouse leks within 4 mile buffer distance to Kiger HMA. Name-ODFW, Status-ODFW lek status, land-surface management agency, Distance- distance from HMA boundary expressed in miles

NAME	STATUS	LAND	DISTANCE
COMEGYS LAKE #1	Occupied Pending	Private	3.6
DOLLAR LAKE	Occupied Pending	BLM	1.7
LITTLE KIGER	Occupied Pending	BLM	0

Refer to Map J – Sage grouse Habitat Map in reference to the Kiger HMA.

10. Wildlife

The HMAs provide important shrub communities, such as sagebrush, bitterbrush, and serviceberry to mule deer. Antelope bitterbrush is considered key forage component of habitat for mule deer (Kufeld et. al 1973). Ungulates are dependent on browse species in

the winter season when forage is limited (Bender et al. 2007). In the spring and early summer ungulate species use both annual and perennial forb species when available. Forbs are an important component of deer diet especially coming out of the winter season when their fat reserves are low and females are in the last trimester of their gestation period. Forbs are typically very palatable and contain a high percent of protein. Mule deer populations are below management objective in this game unit. Currently, the specific cause(s) responsible for mule deer being at 50% of the management objective is unknown. Recently, Oregon Department of Fish and Wildlife (ODFW) concluded an effort to reduce the abundance of mountain lion (*puma concolor*), in the Steen Mountain management unit. It is believed that predator population numbers are currently higher than historically, when mule deer numbers were higher (Rod Klus pers. comm.). A study, conducted in the mid 1970's, evaluating mule deer survival in the Steen Mountains management unit indicated that a large number of the current year's fawns were killed by coyotes (*canis latrans*) during their first winter. The specific role of habitat quality and predisposition of mule deer to predation is currently unclear, (Rod Klus pers. comm.), however, it's commonly thought that precipitation and consequently, forage quality are related to predation.

Riddle Mountain HMA:

There has been no formal wildlife habitat monitoring in the HMA with the exception of riparian monitoring and upland trend monitoring analyzed above. Currently a majority of the HMA offers quality habitat for wintering big game species. However, there are areas in the HMA encroached by juniper showing indication of habitat degradation to ungulate winter range. Approximately 836 acres (3 percent) of the HMA is classified as deer winter range. Approximately 9,000 acres (28 percent) of the HMA is classified as elk winter range. Riddle Mountain HMA is in the ODFW's Steens wildlife management unit for deer and antelope and High Desert wildlife management area for elk. Deer numbers are at only 50 percent of the current and proposed management objective for the Steens unit.

With deer numbers at half of management objectives, 83 AUMs is probably sufficient. However, if deer numbers approach management objectives, then there may be the need to allocate more AUMs to deer. Elk numbers are at 120 percent of both the current and proposed management objectives for the High Desert unit. Currently 64 AUMs are allocated for elk within the allotment, which is probably not sufficient with the amount of elk use the HMA receives. Antelope can also be found within the HMA regularly. Currently 15 AUMs are allocated to antelope in this HMA, and again this is probably not sufficient for the amount of antelope inhabiting the HMA.

Table 18. Animal Unit Months (AUMs) allocated to wildlife for competitive forage per pastures.

HMA	Allotment	Pasture	Wildlife AUMs
Riddle Mtn.	Burnt Flat	Louie Hughes	11
Riddle Mtn.	Burnt Flat	Oriana Flat	131
Kiger	Smyth-Kiger	Ant Hill	26
Kiger	Smyth-Kiger	Rinns	61
Kiger	Smyth-Kiger	Swamp Creek	47
Kiger	Smyth-Kiger	Wood Camp	52
Kiger	Smyth-Kiger	Yank Spring	30
Kiger	Happy Valley	North Big Hill	16
Kiger	Happy Valley	South Big Hill	25

Kiger HMA:

There has been no formal wildlife habitat monitoring in the HMA with the exception of riparian monitoring, mule deer relative use study, and upland trend monitoring analyzed above. Currently the HMA offers quality habitat for wintering big game species. The Five Creeks Project addressed encroaching juniper across a large portion of the HMA, however, there are areas where juniper encroachment continues to degrade the quality of ungulate winter range within the HMA. Approximately 14,461 acres (48 percent) of the HMA is classified as deer winter range. Approximately 18,617 acres (62 percent) of the HMA is classified as elk winter range. Antelope can also be found within the HMA regularly. Kiger HMA is in the ODFW's Steens wildlife management unit for deer and antelope and High Desert wildlife management area for elk. Deer numbers are at only 50 percent of the current and proposed management objective for the Steens unit. Overall, it's not likely that the current wild horse herd numbers are limiting to elk, antelope, and mule deer populations. Perhaps the most significant limiting factor for mule deer populations is seasonal precipitation (Bender et al. 2007). This limitation, as related to the HMA, is twofold; one in the form of key forb growth and the other in the form of competition for surface water with other ungulates, wild horses, and livestock (Holecheck et al. 2011). On an average precipitation year, this should not be an issue. Currently there are 231 AUMs allocated for wildlife on the HMA, which is probably sufficient with the mule deer, elk, and antelope use the HMA receives. Additionally, certain environmental conditions could increase the typically low dietary overlap between wild horses and mule deer. In times of drought, where ephemeral water sources may be scarce, horses may occupy areas traditionally occupied by deer. These areas, characterized by steep slopes

and higher elevations, support key browse species important to deer. Deep snow may also cause horses to congregate and potentially over utilize key browse species. The potential for competition for both surface water and key browse species will likely become exacerbated if wild horse numbers exceed the levels they have been managed at during this evaluation period. At the current level of wild horses and mule deer this will likely not be an issue. Mule deer are dependent on forb production especially in the late spring and early summer (Bender et al. 2007). In times, in areas with low residual cover, forbs may be especially susceptible to overgrazing by horses. Because of horses' flexible lips and long incisors, they are able to crop vegetation close to the soil surface, which can delay re-growth of grazed plants (The Wildlife Society, 2011). This is because of the mouth anatomy of equids, having both upper and lower incisors allowing them to bite the plant closer to the ground (Holecheck et al. 2011). Mule deer rely on forb production to recover from the winter, meet their elevated nutritional needs related to the stress of late gestation and lactation, and to build up fat reserves for the winter periods. Overall, the Five Creeks project treatments should allow for more forb growth where juniper was removed provided adequate late winter and spring precipitation following treatment years. At the current mule deer numbers in the area, it's unlikely that mule deer are experiencing density dependent limitations as related to the forage competition, both among and between other herbivores. However, if and when mule deer and wild horse numbers increase in areas, special consideration should be given to monitoring potential competition for forage between wild horses and mule deer.

11. Migratory Birds

Migratory birds are known to use the HMA(s) for nesting, foraging, and resting as they pass through on their yearly migrations. There has been no formal monitoring of migratory birds on the HMA(s). Birds of Conservation Concern for the Great Basin Region that may inhabit the HMA(s) include Brewer's sparrow (*Spizella breweri*), sage sparrow (*Amphispiza belli*), and loggerhead shrike (*Lanius ludovicianus*) (USFWS 2008). These species tend to select more sagebrush or shrubland type habitat, avoiding or reducing use in areas encroached by dense stands of juniper.

Ideally, the HMA(s) would be a "patchy" combination of shrub steppe, grass, and to a smaller proportion, associated with gravelly slopes and shallow soils, juniper trees. Interspaces of low vegetative cover are beneficial to forbs, insects, and small mammals which provide, both directly and indirectly, an important food source for migratory birds and raptors.

In general, grazing in the spring increases potentially direct negative effects on the amount of herbaceous screening (concealment) cover of nests sites, which in turn may increase the risk of predation. Grazing during the spring season also increases potential for disturbance or flushing of nesting birds. Areas within a mile or two of the few reliable

water sources would continue to receive the heaviest utilization and be at risk of losing native plant cover as noxious weeds become established. These factors are not expected to affect; directly or indirectly, populations of migratory birds.

IV. Evaluation of Objectives and Management Actions

The following objectives are derived from four different documents (1992 Three Rivers Resource Area RMP, 2005 Steens ROD/RMP, 1996 Riddle Mountain and Kiger HMAP, and 1996 Kiger Mustang ACEC Management Plan) yet, in general, provide management direction to address similar aspects of the physical characteristics of the Kiger Mustang, herd health and populations, and habitat condition. Key objectives from the four documents have been combined and summarized below. Analysis follows each objective regarding whether or not it has been achieved.

- *Maintain healthy populations of wild horses through gathering, potential fertility control, and sex ratio adjustments (50% male and 50% female) while maintaining all age classes. Continue to allocate the following acres and AUMs per HMA.*

Kiger HMA – 36,618 acres, 984 AUMs, 51 – 82 horses (AML)

Riddle Mountain HMA – 28,021 acres, 672 AUMs, 33 – 56 horses (AML).

- Analysis: Healthy populations of wild horses have been maintained in both HMAs with consistent reproductive rates that cause the high end of AML to be met or surpassed within 4 years of gathering to low AML. Fertility control has not been applied to horses within Kiger and Riddle Mtn. HMAs. A 50/50 sex ratio has remained on the range following the past several gathers with consideration given to providing all age classes. The AUMs and AML ranges have not changed. The Kiger HMA acreage was decreased during the Steens Act Land Exchanges when two portions of the original Smyth Creek Allotment (#5307) were made privately owned land. BLM's current GIS data gives Kiger HMA 26,869 BLM managed acres and Riddle Mtn. HMA 28,376 BLM managed acres.
Objective has been met.
- *Maintain a thriving natural ecological balance (TNEB) between wild horse populations, wildlife, livestock, vegetation resources, and other resource values. Monitor this and adjust horse populations to achieve TNEB. Base AML on analysis of trend in range condition, utilization, actual use and other factors.*
 - Analysis: In general there has been no evidence of forage overlap between wild horses, wildlife and livestock as a result of wild horse populations managed within AML. Forage overlap does occur

periodically in Kiger HMA where distribution of wild horses becomes impaired and upwards of 30-40 horses are found residing in one pasture (refer to Table 7: Wild horse concentration areas in Kiger HMA). These distribution issues appear to become more common when wild horse populations are reaching or exceeding the high end of AML.

Adjustments within the HMAs have been made to address and reverse specific rangeland health standards not achieved with wild horses as a causal factor. Currently, utilization and trend data indicate wild horse concentrations (approximately 50 wild horses) in Wood Camp Pasture are causing a downward trend in condition of the area (2,480 acres) burned in the 2011 Smyth Creek Fire and Five Creeks Rangeland Restoration Project 2011 Unit 4 Prescribed Fire. These burned areas were seeded in rehabilitation efforts and the horses are drawn to the new growth and seeded species. In the spring of 2013 all Wood Camp Pasture gates were found closed and a ground count of 46 horses in the Lambing Grounds were observed. An immature seeding, gate management and the extent of internal fences in Kiger HMA are the likely causes of wild horse distribution issues.

Forage overlap on BLM administered lands does not appear to be an issue in Riddle Mtn. HMA as the wild horse use areas have generally been adjacent to or separate from the livestock use areas. Areas where wild horse and livestock use areas typically overlap are generally around watering sources on private land. There are wild horse and livestock distribution issues in the HMA based upon the lack of evenly distributed reliable water sources. The southern end of the HMA has a perennial stream, Squaw Creek, where a large portion of the horses reside. Most of Squaw Creek is privately owned. The northern end has no perennial water with water sources drying up mid-summer; thus forcing wild horses to seek water north of the HMA on State and privately owned lands. Wild horse populations have generally been managed within AML.

Overall, wild horses and population management within AML are not a causal factor for Standards for Rangeland Health not achieved. There are distribution issues in Kiger HMA and a lack of reliable water in Riddle Mtn. HMA which should be addressed. **Portions of this objective are met.**

- *Acquire legal access to private land and water upon which horses depend; (1) Yank Creek, (2) Poison Creek, and (3) Swamp Creek.*

- Analysis: Yank Creek was private land at the time the objective was written. The headwaters and a majority of the stream are now under BLM management. Poison Creek is still privately owned and BLM has no legal access for wild horse use. Nevertheless, the area where the Diamond Grade Spur Road crosses Poison Creek is always open and accessible by wild horses. The portion of Swamp Creek described in the objective is still privately owned with BLM having no legal access for wild horse use. The headwaters of Swamp Creek are generally open to wild horse use year round.
- If privately owned portions of Poison and Swamp Creeks were ever fenced so that wild horses could not access water, BLM would then pursue acquisition of legal access to private land and water. **Objective is partially met.**
- *Designate the Kiger Mustang ACEC on 64,639 acres (1992 Three Rivers RMP) ... Retain and manage existing ACECs if they meet relevance and importance criteria and require special management or protection (2005 Steens ROD/RMP).*
 - Analysis: The Kiger Mustang ACEC on 64,639 acres was designated in the 1992 Three Rivers RMP and still exists today. The actual BLM acreage has changed since this designation due to land exchanged following the 2000 Steens Act but the ACEC boundary line has yet to be changed in GIS. Actual BLM acres within the ACEC boundary should be equivalent to the total BLM acres within the Kiger and Riddle Mtn. HMAs; 55,245 acres. **This objective has been met.**
- *Manage for the following physical and conformation characteristics through gathering and return to range practices;*

Color	Markings	Conformation	Size	Weight
Dun, red dun, grulla, buckskin (claybank) and variations; Spanish mustang type.	Dun factor characteristics including but not limited to; dorsal stripes; zebra stripes on knees and hocks; chest, rib and arm bars; dark color outlining the ears with fawn color inside ears; multi-colored manes and tails; cobwebbing on the face; and face masks.	Spanish mustang conformation. Light to medium bone, small feet, hooked ear tips, and females with very fine muzzles.	13 - 15 hands	750 - 1,000 lbs.

- Analysis: Horses gathered and currently present in the HMA possess the color, markings, conformation, size and weight characteristics listed in the table above. **Objective has been met.** Average height of Kiger/Riddle horses gathered in 2011 (5 yr.+) was 14.2 hands. There were 24 mares (5 yrs.+) with an average height of 14.3

hands and 18 stallions (5 yrs. +) with an average height of 14.1 hands. The photos below show some of the “original” Kiger Mustangs and more recent photos of Kiger Mustangs possessing the color, marking and conformation characteristics described above. See Figure 9 – Figure 13 below.

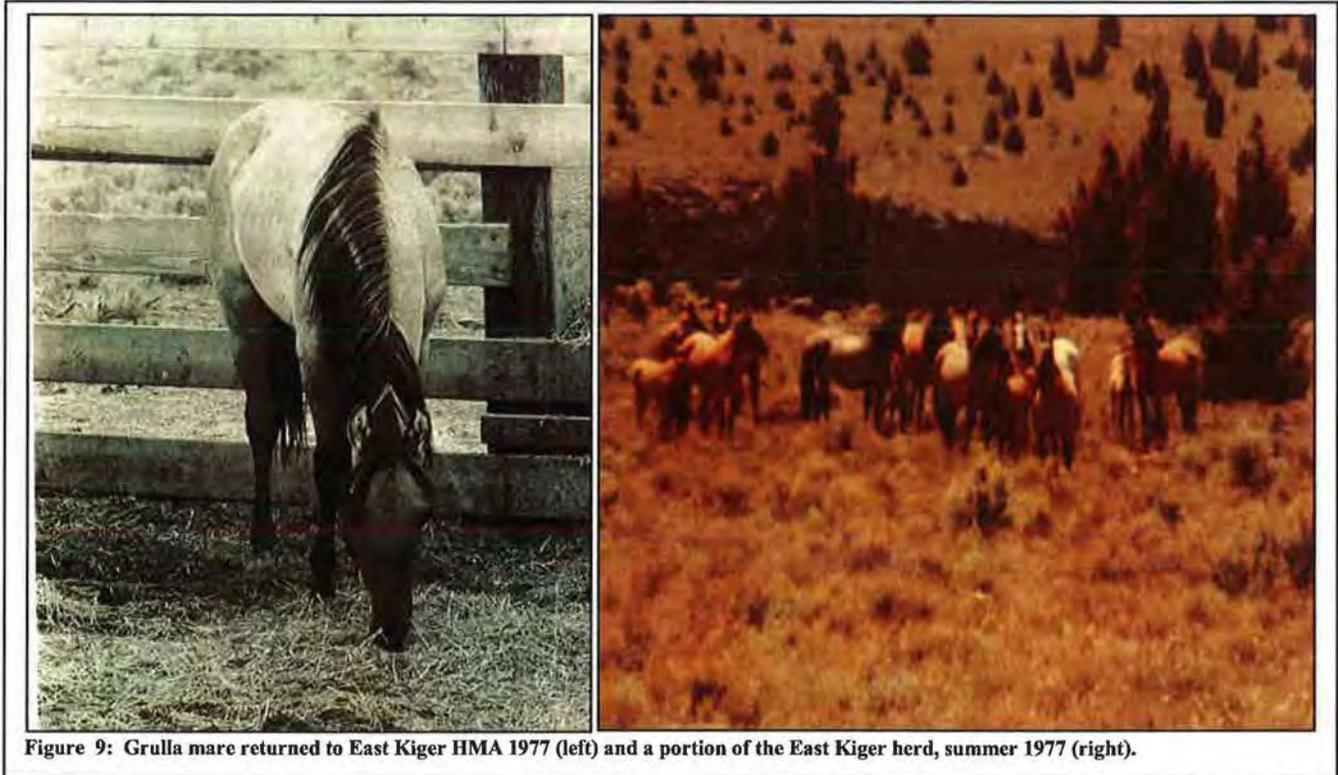


Figure 9: Grulla mare returned to East Kiger HMA 1977 (left) and a portion of the East Kiger herd, summer 1977 (right).



Figure 10: (Above) This photo shows the typical size, conformation and some of the color variations of the Kiger horse today. (Below) Mares in trap during 2011 gather. Dun factor is apparent given the characteristics shown including dorsal stripes, stripes on legs, light colored guard hairs on tail, masking on face, and bi-colored mane. These horses are compact and light to moderately muscling.



Figure 11: There are outliers present in the HMAS as displayed by this stallion observed in Kiger HMA, summer 2013. This horse may show heavier muscling than is desired for a Kiger Mustangs.





Figure 12: Mares returned to Kiger HMA following the 2011 gather. These mares show display the color, markings, light build and size described in the 1996 HMA Plan.



Figure 13: Stallions gathered during 2011 from Riddle Mtn. and Kiger HMAs showing the “dun factor” characteristics. The build of the top two stallions shows the light to moderate build desired with the stallion on the bottom left representing some of the outliers present in the herd with heavier muscling yet possessing several of the other desired characteristics (i.e. bi-colored mane and tail, masking, arm bars, no white).

- *Improve riparian habitat and preserve the water sources to Yank Spring Creek [Yank Creek was privately owned at the time the objective was written].*
 - Analysis: Review riparian section (h) above. Yank Creek is now BLM managed, was fenced in 2004 from wild horse and livestock grazing with two water gaps installed, encroaching juniper were removed in 2009, riparian condition is improving. **Objective has been met.**
- *Fences on the exterior of the HMAs are to be maintained to contain horses within the HMAs. Interior and exterior fence maintenance is assigned to the permittees.*
 - Analysis Kiger HMA: Fences on the exterior of the HMA seem to be functioning to keep wild horses within the HMA as there have been no real problems with horses outside of the HMA. **Objective met in Kiger HMA.**
 - Analysis Riddle Mountain HMA: Fences on the northern boundary of Riddle Mtn. HMA are in fair to poor condition. They appear to be able to turn a cow but a horse could likely jump over because the fence is low and/or leaning. Fences on the western boundary of the HMA appear to be in good condition but gate management and/or broken sections of fence may have provided wild horses' access to the adjacent allotment, Riddle Mountain. Current observations indicate at least 25 wild horses are residing year round on State lands to the north of the HMA and approximately 40 wild horses have been observed in the Riddle Mountain Allotment to the west of the HMA. During 2013 only one horse was observed by BLM staff within the Riddle Mtn. HMA. **Objective not met in Riddle Mtn. HMA.** See gate management objective below for discussion of horses being outside HMA.
- *Gate management: Efforts may be made, through gate management practices, to limit the number of horses in areas where concentrations become an issue.*

Gates in fences on the Kiger HMA boundary are to remain closed year-round. Gates between public land and private land pastures will always be closed to prevent horses from entering the private land pastures. Gates in pasture fences accessing public lands within the HMAs will usually stay closed during the cattle grazing season of April 1 through October 31.

All gates on the perimeter of the Riddle Mountain HMA will remain closed with the following exceptions. The gate between the Louie Hughes Pasture and the Riddle Mountain Allotment (outside HMA) will be left open for a few days during

early summer and fall. Gates in private land pastures inside and adjacent to the HMA will be opened for several weeks each fall to accommodate livestock gathering.

- Analysis Kiger HMA: Resource specialists present in an IDT meeting for this HMAP Evaluation agreed that currently the AMLs authorized in the HMAs are not a problem, if maintained, but there is a wild horse distribution problem in the Kiger HMA. There is a history of large (30-50 horses) groups of horses living in one single pasture year round, just as seen in Wood Camp in 2010, 2011, 2012 and 2013. On a visit to the HMA in March 2013, the wild horse specialist found all six gates on the Wood Camp Pasture closed with approximately 50 horses trapped inside. As it was so early in the season, it is reasonable to believe that these gates had been closed all winter. Monitoring indicates large numbers of horses residing in one pasture has been a problem in other pastures (i.e. Yank Springs and Swamp Creek) in past years as well. Horses do tend to establish home ranges and stay within them year round, but these extreme cases in these relatively small pastures may be due to the high number of pastures within the HMA and the increased possibility of becoming entrapped during the April through October livestock season of use.
Objective not met in Kiger HMA.
- Analysis Riddle Mtn. HMA: During the summer of 2013, one wild horse was observed in the Riddle Mtn. HMA. Horses had been using the area around Squaw Creek and Squaw Lake but the condition of the sign indicated they had moved on to another location and not returned. The lack of water on the north half of the HMA is likely the reason the horses from that side moved north onto the State lands. Monitoring and observations from range users indicate there are approximately 25 horses on the State land to the north and 40+ horses (two groups) to the west in the Riddle Mtn. Allotment, outside the HMA. During the winter of 2012-2013 a group of horses wintered in the Dry Pasture of Riddle Mtn. allotment and on private lands on Paul Creek approximately six miles from the HMA boundary. There are multiple reasons why the horses may be moving west including but not limited to; gate management, the improved condition of the range following the Five Creeks Rangeland Restoration Project, and the mixing of released horses from Riddle and Kiger HMAs following each gather (they may be trying to return to where they originally came from). **Objective not met in Riddle HMA.**
- *Periodically exchange horses between the Riddle and Kiger HMAs to maintain genetic diversity.*

- Analysis: This has been happening regularly following each gather since the mid 1980's. Genetic analyses from 2011 indicate "current variability levels are high enough that no action is needed at this point but the herd should be monitored closely due to the trend for loss of variability" (Cothran, 2011). **The genetic diversity portion of this objective has been met; horses have been exchanged between the two HMAs.** However, **one probable reason** there have been 40+ horses outside the HMA in the Riddle Mtn. Allotment is that they are trying to return to where they originally came from. The difference between 2011 and previous gathers is that a larger proportion of horses were swapped between the HMAs. For example, 53% of the mares returned to Riddle Mtn. HMA were from other HMAs (8 from Kiger and 1 from Warm Springs).
- *Educational opportunities will be provided to increase public knowledge of wild horses and BLM's land management role and responsibilities in managing wild horses - [Part 1]. Wilderness values of the Stonehouse Wilderness Study Area (WSA) (2-23 L) will be protected and enhanced – [Part 2]. Ensure that any management actions are consistent with the wilderness Interim Management Policy (IMP) non-impairment criteria - [Part 3]. (1996 Kiger Mustang ACEC Plan).*
 - Analysis – Part 1: To provide outreach to the public about the significance of the Kiger Mustang, BLM has hosted five special adoptions (Kiger Mustang Adoption 1996 & 1999; Kiger Mustang-A-Fair October 23-26, 2003; Kiger Mustang Adoption November 8-11, 2007; Kiger Kraze October 6-8, 2011) where only Kiger Mustangs were available. These have become large events with adoption catalogs produced and mailed to potential adopters, vendor booths, training demonstrations and competitive bidding. The correspondence and outreach associated with these adoption events have resulted in a majority of the Kiger and Riddle Mountain HMA gathered horses being adopted versus sent to long term holding. **This objective has been met.**
 - Analysis – Part 2: The Wilderness Study Report (October 1991), Volume 1 pages 131 – 140 describe the Stonehouse WSA (2-23L). In this report the only mention of wild horses is, "Most of the WSA is in the Riddle Mountain Wild Horse HMA, and a small area on the eastern edge is in the Heath Creek-Sheepshead HMA. Management of the HMAs would not be significantly affected by any of the alternatives." There is no further discussion as to why wild horses might add to or enhance wilderness characteristics therefore **it is unknown how the wilderness values of the Stonehouse WSA would be "protected and enhanced" by the management of the Kiger Mustangs in**

the Kiger Mustang ACEC. Part 2 of this objective should be not be carried forward to further planning documents.

- Analysis – Part 3: Few new actions have occurred in the HMA portion of the Stonehouse WSA since 1991. Any actions that have occurred were consistent with the Wilderness IMP non-impairment criteria and are now consistent with the WSA Manual (6330). **This portion of the objective has been met.**

V. Recommendations

A. Objectives that Conform to the Land Use Plans, HMAP, ACEC Plan, AMPs, and Standards for Rangeland Health.

These objectives were created to consolidate the resource objectives for each allotment management plan, maintain objectives specific to the unique characteristics of the Kiger Mustang and to achieve the Standards for Rangeland Health.

1. Forage and Range Condition:

Manage available forage and wild horse herd populations in a manner which (1) ensures adequate forage is available, even following a series of drought years, and (2) maintains or improves range condition across the HMAs to achieve or move toward achieving the Standards for Rangeland Health.

- Addresses the following resource concerns: wild horse forage availability in fluctuating climatic conditions, rangeland condition, noxious weeds, special status, locally important, and candidate species habitat.
- Achieves the following Rangeland Health Standards: 1, 3, 5
- Management actions needed to address the objective:
 - Maintain wild horse populations within the existing AML for each HMA.
 - Current total AUM allocations (wild horses, livestock and wildlife) per HMA are less than 50 percent of the low level potential forage production calculated using ESD Reference State Condition. Using low level production values to set a conservative stocking rate helps account for drought conditions when forage production is less than site potential. Planning to utilize only 50% of the low level production would help to prevent exceeding BLMs 50% target utilization level, even on drought years.
 - When wild horses are found to be congregating in specific areas year round, attempt to break this pattern by encouraging horse movement within the

HMA out of the concentration areas to improve distribution and to prevent heavy to severe utilization levels over multiple years which would likely degrade range condition.

- Gate Management (refer to objective 5 of this Section).
- Where various options are available in a livestock grazing rotation to conform to the guidelines for grazing management, consider removing internal fencelines in Kiger HMA. Removing fencelines may reduce the probability of wild horse distribution problems.
- Apply adaptive management during annual livestock grazing authorizations when wild horse numbers cannot be immediately maintained within AML and utilization/trend studies indicate the need. Adaptive management options include but are not limited to; adjusting season of use in a pasture, providing alternative water sources to allow livestock to use areas of the HMA not typically grazed by livestock and wild horses due to the distance to water, reducing livestock numbers and/or AUMs.
- Pursue juniper treatments in Riddle Mtn. HMA to restore areas of juniper encroachment with perennial shrub and herbaceous species.
- Treat noxious weeds where found using the most appropriate methods.
- Monitoring needs and schedule:
 - Upland trend data collection using the Modified Pace 180° method once every five years in both HMAs.
 - Livestock and Wild horse Utilization Landscape Appearance Method (TR 1734-3) annually by pasture.
 - Establish additional upland trend monitoring sites in Riddle Mtn. HMA to better represent conditions across the HMA.

2. Special Status (SS) and Threatened and Endangered (T&E) Species:

Manage for habitats that support healthy, productive and diverse populations and communities of special status and threatened and endangered plant and/or animal species.

- Addresses the following resource concerns: greater sage-grouse (*Centrocercus urophasianus phaois*), redband trout (*Oncorhynchus mykiss*).
- Achieves the following Rangeland Health Standards: 5

- Management actions needed to address the objective:
 - Maintain wild horse numbers within AML to prevent degradation of habitat.
 - Same as management actions provided in Objective 1 – Forage and Range Condition.
- Monitoring needs and schedule: Same as monitoring provided in Objective 1 – Forage and Range Condition.
 - Upland trend data collection using the Modified Pace 180° method once every five years in both HMAs.
 - Livestock and Wild horse Utilization Landscape Appearance Method (TR 1734-3) annually by pasture.
 - Establish additional upland trend monitoring sites in Riddle Mtn. HMA to better represent conditions across the HMA and within wild horse use areas.
 - Refer to Objective 3 (below) “Water” objective for monitoring needs and schedule for riparian habitat which Bureau special status species redband trout depend upon.

3. Water:

Manage available water sources and wild horse herd populations in a manner which (1) provides an adequate year-round quantity and quality of water present in the HMAs to sustain WH&B numbers within AML and (2) maintains or improves the condition of riparian resources associated with such water sources across both HMAs to achieve or move toward achieving Proper Functioning Condition (PFC).

- Addresses the following resource concerns: Horses leaving Riddle Mtn. HMA in search of reliable water;
- Achieves the following Rangeland Health Standards: 2 and 4.
- Management actions needed to address the objective:
 - Currently wild horses are leaving Riddle Mountain HMA in search of more reliable year-round water on State lands to the north. Developing a solar well on the north end of Riddle Mtn. HMA would provide year-round water and help keep horses inside the HMA. There is adequate forage available in this portion of the HMA, just not enough water. Habitat manipulations which increase

water availability in non-forested areas would likely increase the amount of suitable habitat for wild horses (Wockner et. al 2003).

- Construct a well somewhere along the fenceline between Ant Hill and Wood Camp Pastures. Fifteen to 20 horses use Ant Hill Pasture in the fall/winter months and the only water available is on private land.
- Protect riparian areas from year-round, heavy to severe utilization levels when monitoring indicates wild horses are the cause.

- **Monitoring needs and schedule:**

- Continue to collect riparian photos at established photo points once every two to five years along Squaw Creek, Louie Hughes Springs (Riddle Mtn. HMA) and Frog Creek, Little Poison, Smyth Creek, Yank Creek and Swamp Creek (Kiger HMA).
- Conduct Multiple Indicator Monitoring (MIM) assessments within five years on fish bearing streams.

4. Cover and Space:

Maintain within each HMA the terrain and vegetation needed to provide wild horses with escape (hiding) cover and shelter from the prevailing weather. Limit barriers (natural or human-induced) preventing free movement of wild horses throughout the HMA or between forage and water.

- Addresses the following resource concerns: wild horse distribution issues in both Riddle Mtn. HMA due to lack of water and in Kiger HMA due to internal fences.
- Achieves the following Rangeland Health Standards: All. Improved distribution generally reduces risk of wild horse concentration. Concentrations generally lead to rangeland degradation.
- Management actions needed to address the objective:
 - Continued juniper treatments as funding becomes available, especially in Riddle Mtn. HMA where less treatment activity has occurred. NEPA analysis would be conducted on any areas proposed for juniper treatments that have not already been analyzed in a previous document. Large tracks of Phase III juniper may create a barrier as horses would likely not use the area as “horses prefer... lower forest canopies and open non-forested vegetation types (non-forested, grassland and shrubs)” (Wockner et. al 2003). In Phase III juniper stands horses

would find minimal available forage. Treatment and rehabilitation of these areas would make them more preferable to horses by making them more open and increasing the amount and availability of forage species.

- Kiger HMA – remove fencelines within Kiger HMA when livestock grazing management can be adjusted to continue to achieve Standards and conform to the Guidelines for livestock grazing management (i.e. provide periodic growing season rest to rangeland vegetation). Suggested fencelines would be, (1) the north-south fence separating Ant Hill and Wood Camp Pastures and (2) the fenceline that runs north from the north end of the Yank Creek Exclosure toward the southeast corner of the private Ham Brown Pasture.
- Monitoring needs and schedule:
 - Annual wild horse utilization studies and use area mapping.
 - Annual wild horse and livestock use supervision to determine movement patterns and monitor distribution issues.

5. Gate Management and Fence Maintenance:

Ensure proper gate management that provides horses the opportunity to move freely throughout the HMA. Maintain exterior HMA fences to contain horses within the HMA.

- Addresses the following resource concerns: Horses leaving the boundary of Riddle Mtn. HMA and distribution issues in Kiger HMA.
- Achieves the following Rangeland Health Standards: Riddle Mtn. HMA – N/A. Kiger HMA– All standards. Improved distribution generally reduces risk of wild horse concentration which leads to rangeland degradation.
- Management actions needed to address the objective:
 - Interior and exterior fence maintenance is assigned to the grazing permittees as a term and condition of their grazing permits.
 - Kiger HMA Gate/Fence Management:
 - Boundary gates are to remain closed year-round.
 - Interior gates are to remain open as much as possible during the grazing season. Both gates in the double gate setups for wild horse passage must be opened (not just one).

- Gates between public land and private land pastures will always be closed to prevent horses from entering the private land pastures.
- The Field Manager, Wild Horse Specialist and Rangeland Management Specialist, in coordination with the permittee, are to determine on an annual basis which gates are to be opened or remain closed during the winter season.
- Efforts may be made through gate management practices to limit the number of horses in any given pasture to prevent excess concentrations where it has become an issue.
- Consider pulling back sections of fence (less than ¼ mile) where horses tend to travel, once cattle are out of the HMA, to allow more ease of movement between pastures.

➤ Riddle Mountain HMA Gate/Fence Management:

- All gates on the perimeter of Riddle Mountain HMA will remain closed with the following exceptions: The gate between the Louie Hughes Pasture and the Riddle Mountain Allotment (outside HMA) will be left open for a few days during early summer and fall.
- Gates in private land pastures inside and adjacent to the HMA will be opened for several weeks each fall to accommodate livestock gathering.
- Construct temporary/pitless type cattle guards on the roads going through the fenceline dividing BLM from State lands at (1) T.29S., R.36E., Sec. 8 NWSE – Mahon Res. Quail Creek Road, and (2) T. 29S., R.36E., Sec. 18 SENE – south east of Neal’s Lake.
- Post “Please Close Gate” signs at select perimeter gates where horses would likely travel through if left open.
- Improve northern boundary fence from Louie Hughes Pasture to the East Rim to help prevent horses from crossing to State Land. The work should be done following successful development of a well and reliable water on the north end of the HMA.

◦ Monitoring needs and schedule:

- Monitor gate management on an annual basis.
- Annual wild horse use supervision to determine movement patterns and where there may be distribution issues.

6. Physical Characteristics:

Manage for the following physical and conformation characteristics through gathering and return to range practices;

Color: Dun, red dun, grulla, claybank and variations.

Markings: Primitive markings including but not limited to; dorsal stripe; leg bars; cobwebbing or face mask; chest, rib and arm bars; mottling/shadowing along neck, arm and thigh; shoulder stripe and shadow; dark ear trimming; bi-colored manes and tails; dark hooves. Minimal to no white markings.

Conformation: Spanish mustang type conformation – Not coarse or heavy-boned; light to moderately muscled; muscles in hip and thigh should be long and smooth; well defined withers typically higher than the hind end; deep girth; low set tail; medium sized feet; hooked ear tips; and medium size head that tapers slightly from jaw to muzzle (fine muzzles); head profile can be straight, concave or slightly convex.

Size: 13 – 15 hands

Weight: 750-1,000 lbs.

- Addresses the following resource concerns: Maintaining the unique characteristics of the Kiger Mustang.
- Achieves the following standards: 5 – Locally Important Species
- Management actions needed to address the objectives:
 - During and following gathers, continue to select horses for the herd that possess the physical traits listed above.
 - If analyses indicate concern for genetic variability levels in the Kiger and/or Riddle herds, continue to translocate horses from other herd areas that possess the above characteristics and consider translocation of black and or bay mares possessing the Spanish type conformation described above.
- Monitoring needs and schedule: Monitor annually the color and conformation of the horses residing in the HMAs. Following each HMA gather monitor and evaluate the height, conformation, color and markings of the horses captured and released/returned to the range.

7. Genetics:

Maintain adequate levels of genetic variability in both Riddle Mountain and Kiger HMA herds by maintaining observed heterozygosity values above 0.66 for DNA-based (hair) samples.

- Addresses the following resource concerns: Trend for loss of variability due to the small herd size.
- Achieves the following standards: 5 – Locally Important Species
 - Management actions needed to address the objectives: Continue to exchange relatively small numbers of horses between Riddle and Kiger HMAs to help maintain high genetic variability. Only core breeding age mares (5-10 years of age) would be considered for exchange between HMA's, unless genetic objectives cannot be achieved with mares alone.
 - If analysis indicates observed heterozygosity at or below the critical level, translocates mares with the characteristics listed in Objective 6 and from Oregon HMA's which have contributed horses to Kiger and Riddle Mtn. HMA's in the past.
- Monitoring needs and schedule:
 - Continue to collect DNA samples for genetic analysis (IM 2009-062) during each gather.

B. Additional Recommendations

1. Kiger Mustang ACEC Plan Update, ACEC Boundary Adjustment and Further Discussion

Kiger Mustang ACEC Plan Update:

The most recent and only Kiger Mustang ACEC Management Plan was signed in March 1996. An update of the plan should be considered since it has been 18 years since the original management plan was created. The primary objective of the Kiger Mustang ACEC, "to perpetuate and protect the dun factor color and conformation characteristics of the wild horses present in the Kiger and Riddle Mountain HMAs" is almost identical to the 1996 Kiger and Riddle Mountain HMAP primary horse herd objective to, "Maintain a healthy and sustainable herd of 33 to 56 wild horses in the Riddle Mountain HMA and 51 to 82 wild horses in the Kiger HMA that exhibit the dun factor colors and physical characteristics of Spanish Mustang horses that currently exist in the HMA".

Recommendation: Since the primary management objective for the ACEC and HMA is the virtually the same the Kiger Mustang ACEC Management Plan and the Kiger and Riddle Mountain HMA Plan should be one in the same document.

ACEC Boundary Line Adjustment:

Map K Kiger Mustang ACEC and Kiger and Riddle Mtn. HMA Boundaries display the differences in the boundary lines. Since the 1992 ACEC designation, the public land

portions of the ACEC have changed, mainly due to the Steens land exchanges (2000). The ACEC boundary has never been adjusted to conform to the congressionally ordered land exchanges, yet the HMA boundaries have. The HMA boundary is currently accurate to the extent of the Kiger Mustang's available habitat. The difference in acreage between the ACEC boundary and the HMAs boundary is 5,080 acres. **Recommendation: Adjust ACEC boundary to match Kiger and Riddle Mtn. HMA boundaries.**

Current GIS acres:

ACEC total – 68,044 ac.

BLM(includes WSA) 55,555 ac.

State 368.6 ac.

PV 12,121.4 ac.

HMAs total – 62,964 ac.

Kiger BLM 26868.7 ac.

Kiger PV 3424.7 ac.

Riddle BLM 28,375.9 ac.

Riddle PV 3,926 ac.

Riddle State 369.2 ac.

Kiger Mustang ACEC Relevance Discussion

Since the primary management objective for the ACEC and HMAs is to maintain and protect the dun factor and Spanish characteristics of the Kiger Mustang, both Management Plans are essentially doing the same thing. There is nothing additional that one plan does that the other does not in regards to management of the Kiger Mustang. The issue has been raised regarding why the Kiger Mustang ACEC was ever designated when an HMA Plan for the Kiger and Riddle Mountain herds would protect the same characteristics. **Recommendation: There is no recommendation at this time for action regarding the status of the Kiger Mustang ACEC, just some background information provided for future reference.**

Since 1975, various BLM documents discuss management actions and objectives to maintain and manage for Spanish mustang characteristics in the Riddle Mountain and Kiger (East Kiger and Smyth Creek) HMAs.

- **1975 Riddle Mountain Wild Horse Management Plan - Objective:** “To retain that trace of Spanish mustang blood now present in the herd.”
Management Actions - Selection of Type and Color: “In the interest of preserving traces of the Spanish mustang, horses with dorsal stripes will be maintained within the herd. Beyond this no special effort will be made to select by color or type.”
- **Memo to File (1979).** A meeting was held on December 3, 1979 to discuss the future horse management for Riddle Mtn., East Kiger and Smyth Creek HMAs. Present were Chris Vosler (District Manager), Chad Bacon (Riley Area Manager), Ron Harding (Wild Horse Specialist) and Bill Phillips (Drewsey Resource Area Manager) The following decisions were made:
 - These HMAs will be managed for horses showing Spanish Mustang characteristics.
 - East Kiger HMA will be managed for those horses of dun or grulla color with dorsal stripes, leg stripes and/or shoulder stripes with dark border around the inside of the ear. These horses should have a minimum of white markings with horses with no white having preference over those showing white. These horses should be of small or medium size.
 - Smyth Creek HMA should be managed for the same type and marking as East Kiger HMA. However, small amounts of white and off coloration will be allowed.
 - Riddle Mountain HMA will be managed for horses with dorsal stripes and a dark border in the ears. Color can vary as long as the dorsal stripes and ear markings are present.
 - Horses not showing at least some degree of quality will be culled from the herds. Color alone will not be the basis for retaining horses in these herds.
- **1980 Spanish Mustang herd Management Plan (unsigned).**
- **1988 Riddle Mountain Wild Horse Management Plan – Objective:** “To retain that trace of Spanish mustang blood now present in the herd.”

Management objectives to preserve the Spanish mustang characteristics of the horses in the Riddle Mountain HMA and the current Kiger HMA were being developed in the late 1970’s, when the herds were created, and then fully developed in the 1996

Kiger and Riddle Mountain HMAP. In addition to the horse herd characteristics, the HMAP includes objectives to protect and manage the habitat where the Kiger Mustangs exist. The 1996 Kiger and Riddle Mountain HMAP provides for the same protection of the Kiger Mustang as the ACEC does.

BLM Manual 1613 – Areas of Critical Environmental Concern, part .33 E – Rationale for Designating or Not Designating, describes reasons why a decision may be made not to provide special management attention to a proposed ACEC. One reason being, “Special management attention is not required to protect the potential ACEC because standard or routine management prescriptions are sufficient to protect the resource or value from risks or threats of damage/degradation. (That is, the same management prescriptions would have been provided for the area in absence of the important and relevant values.)”.

Absolutely nothing would change regarding the protection and management of the unique characteristics of the Kiger Mustang if the ACEC designation were revoked.

The 1996 ACEC Plan incorporated wording about mineral leases and wilderness values, completely unrelated to wild horse management. The 1996 ACEC Plan states “fluid energy minerals leases would be subject to a “no surface occupancy” stipulation. . . . Development of solid leasable minerals, mineral materials, and locatable minerals is restricted.” Surveys and analysis have never been conducted in the area of the ACEC to determine if the potential for mining/mineral withdrawal exists. The Burns District Geologist is scheduled to survey the Kiger Mustang ACEC area during 2014 for mining/mineral withdrawal potential. The 1996 ACEC Plan also states “Wilderness values of the Stonehouse Wilderness Study Area (WSA) (2-23L) will be protected and enhanced.” It is unknown what an ACEC designation would do to protect wilderness values that a WSA designation doesn’t already do itself.

After digging through historic files, Burns BLM really didn’t have anything “official/signed” saying that we were managing for specific characteristics of the Spanish mustang type prior to the 1992 ACEC designation. For now we should just update the management plan and boundary.

2. Wild Horse Management Action Triggers

During development of the HMAP/EA determine what triggers (i.e. utilization levels, horse numbers, etc.) would help to determine when management actions are needed to prevent degradation of specific resources.

3. Adaptive Management

Adaptive management is a system of management practices based on clearly identified outcomes and monitoring to determine if management actions are meeting desired outcomes; and, if not, facilitating management changes that would best ensure outcomes are met. Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain and, in this context, adaptive management affords an opportunity for improved understanding. Knowing uncertainties exist in managing for sustainable ecosystems, some changes or adjustments in wild horse management and livestock grazing management may be authorized, which include, but are not limited to, (1) Wild Horses – encouraging improved distribution through moving horses to other areas of the HMA; developing water to make available areas of forage typically unused due to the lack of water; removing barriers to movement. (2) Livestock - adjusting the rotation, timing, season of use of grazing, and livestock numbers. The following list includes indicators that management warrants adjustments:

- Previous year's utilization monitoring, use area monitoring and/or other appropriate monitoring methods.
- Current year's climatic conditions (i.e. Drought conditions causing a lack of available water where generally available).

The changes/adjustments in wild horse management and livestock grazing management would help balance utilization levels across the HMA; protect riparian areas, water sources and wildlife habitat; prevent and disperse congregation which could damage multiple resources values. Changes in management would be conducted to continue to achieve resource objectives and land health standards. Adjustments/reductions in livestock AUMs may be authorized if wild horse populations could not be managed through gathering or the use of available and approved population growth suppression methods (i.e. immunocontraceptive, etc.). The amount and timing of livestock AUM reduction would be determined on an annual basis dependent upon climatic conditions, wild horse population, water availability, etc.

4. Maintenance of Range Improvements

Maintain existing range improvements including water holes, spring developments, riparian exclosures, etc. across both HMAs. Maintenance can be done within Stonehouse WSA under the authority of the Maintenance of Range, Wildlife, and Wild Horse Improvements in Wilderness Study Areas in the Burns District Environmental Assessment OR-020-05-080.

5. Increased Kiger Mustang Information along Kiger Mustang Viewing Road

Place a sign at the junction of the Kiger Mustang Viewing Road and Happy Valley Road which includes; information about the Kiger Mustang; a map of the Kiger and Riddle Mtn. HMAs showing general horse use areas; information on the condition of the Kiger Mustang Viewing Road (i.e. high clearance and four-wheel drive needed); information about habitat conditions with emphasis on the purpose and results of the Five Creeks Rangeland Restoration Project.

VI. Interdisciplinary Team Participants Signatures

Lisa Grant

Preparer, Wild Horse and Burro Specialist

11/3/14

Date

Archaeologist

Date

Fisheries Biologist

Date

Rangeland Management Specialist

Date

District Rangeland Management Specialist

Date

Recreation

Date

Special Areas Coordinator

Date

Supervisory Natural Resource Specialist

Date

T&E Plant Coordinator

Date

Weeds Specialist

Date

Wildlife Biologist

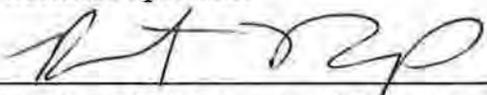
Date

Geologist

Date

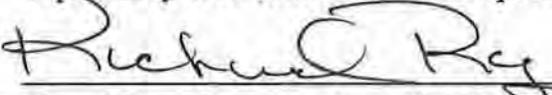
Wilderness Specialist

Date



Supervisory Wild Horse and Burro Specialist

Date



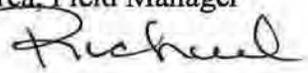
Three Rivers Resource Area, Field Manager

Date



Steens Mountain Cooperative Management and Protection
Area, Field Manager

Date



Date

VII. Maps

- A. Vicinity Map
- B. Kiger HMA Map
- C. Riddle Mountain HMA Map
- D. HMA and HA Boundary Map
- E. Kiger HMA – Ecological Site Inventory Map
- F. Riddle Mountain HMA – Ecological Site Inventory Map
- G. Kiger HMA – Range Condition Inventory Map
- H. Riddle Mtn. HMA – Range Condition Inventory Map
- I. Riddle Mtn. HMA – Sage grouse Habitat Map
- J. Kiger HMA – Sage grouse Habitat Map
- K. Kiger Mustang ACEC and Kiger and Riddle HMA Boundaries

VIII. Appendices

- A. Standards for Rangeland Health Summary
- B. Upland Trend Data Summary
- C. Carrying Capacity Calculations Datasheets
- D. Genetics Analysis Summary

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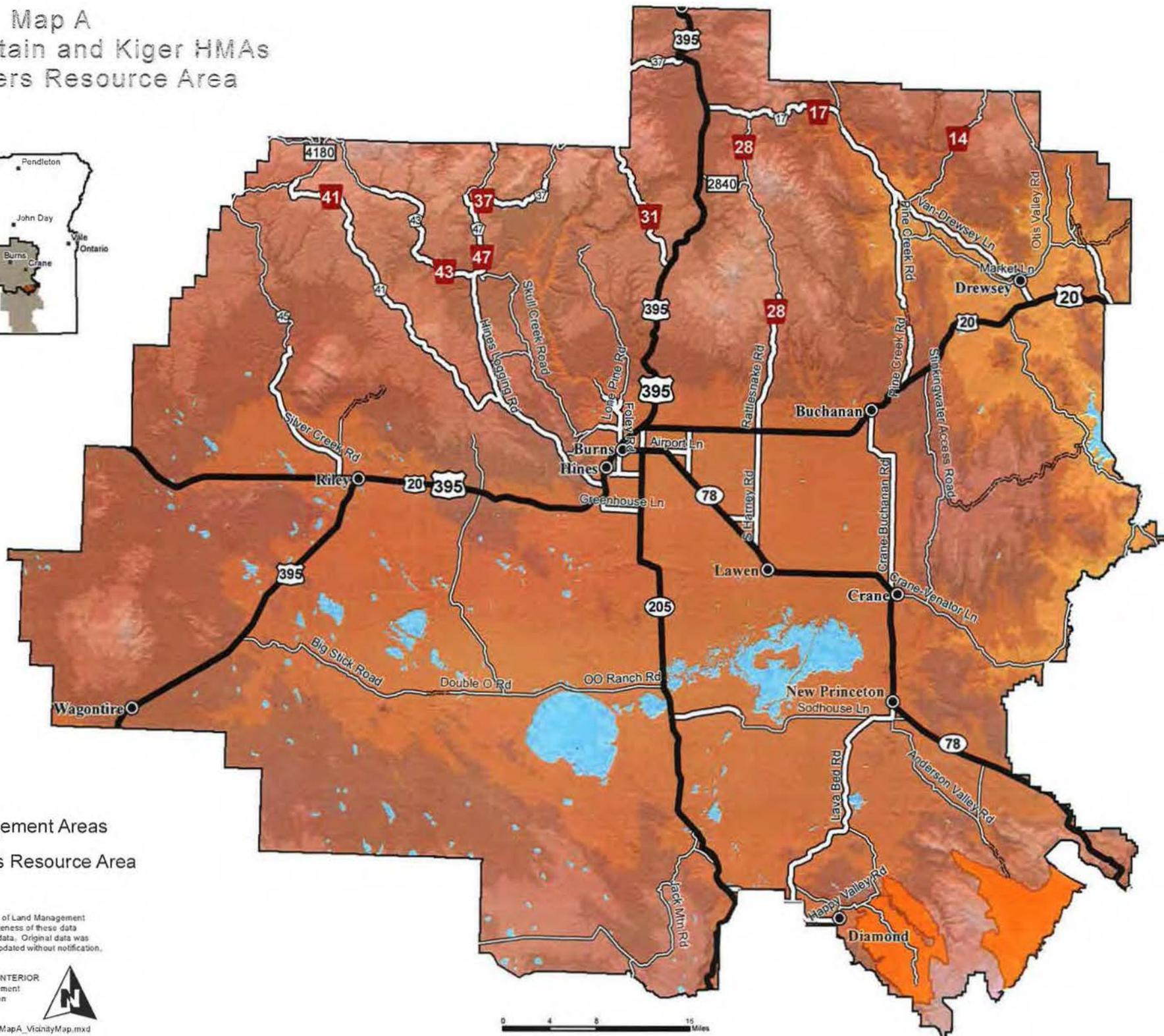
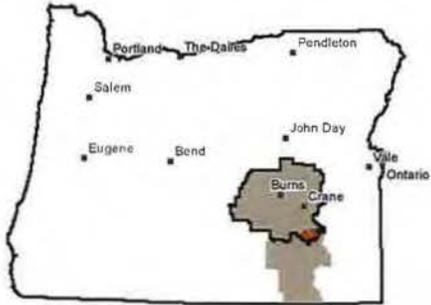
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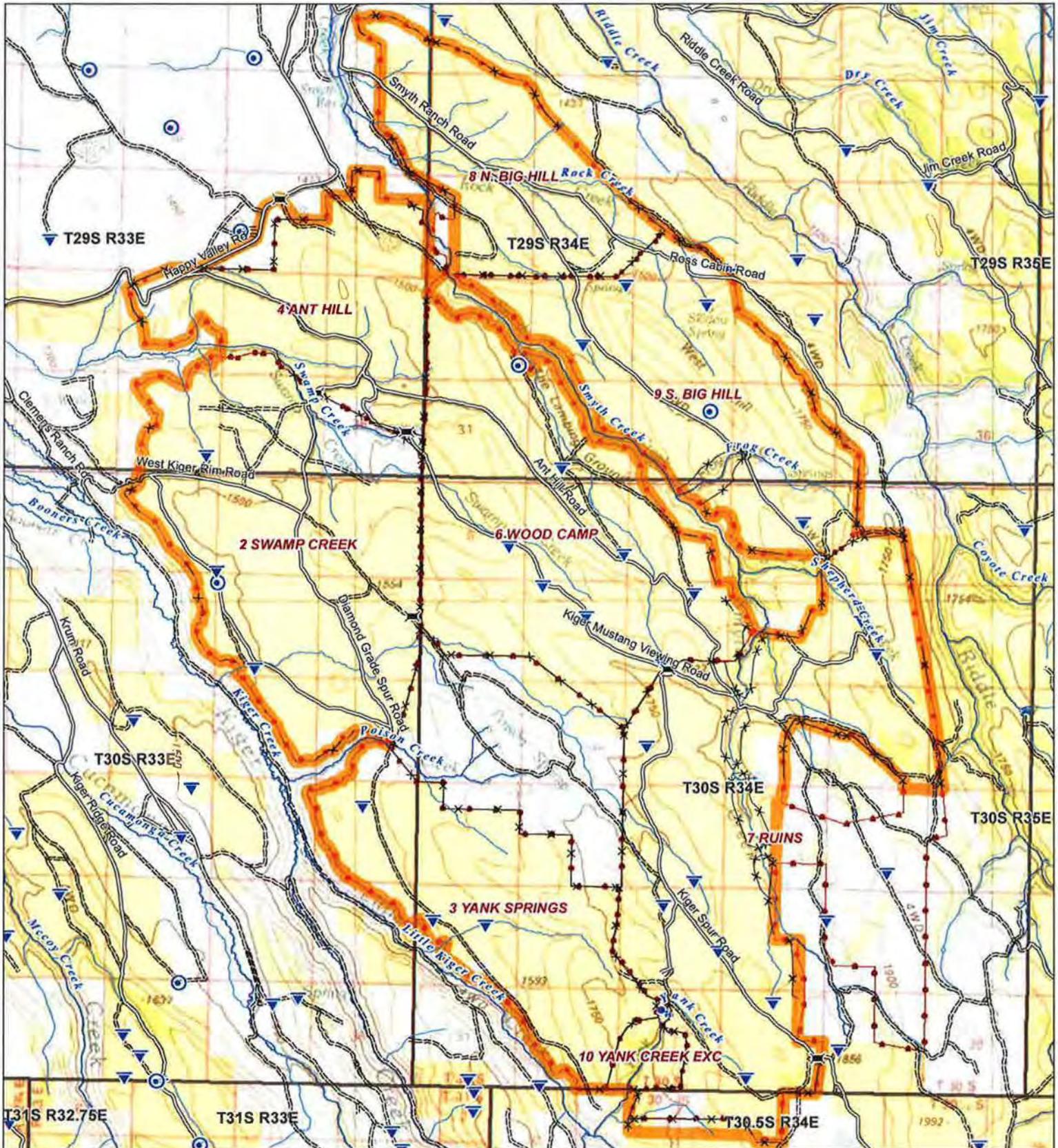
Map A Riddle Mountain and Kiger HMAs Three Rivers Resource Area



- Herd Management Areas
- Three Rivers Resource Area

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.



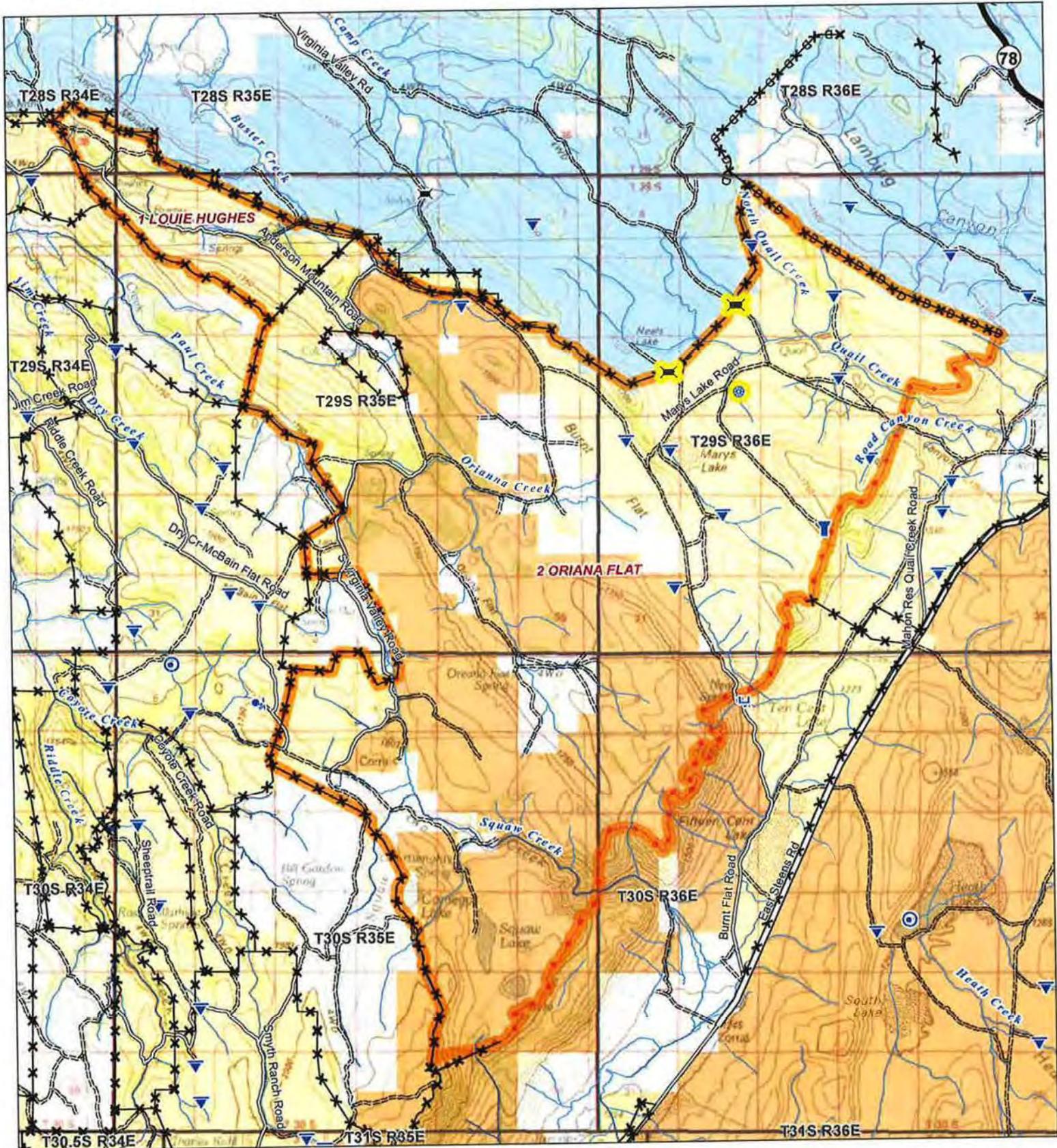


- Wildlife Hard Management Area
- Reservoir
- Waterhole
- Spring Development
- Trough
- Fence
- Callguard
- Non-Paved Improved Road
- Status/Unknown Road Surface
- Pasture
- Bureau of Land Management
- Private/Unknown

1 Miles



Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.



- | | | |
|------------------------------|----------------------------------|--------------------|
| Herd Management Area | BLM Wilderness Study Area | Reservoir |
| Pastures | Bureau of Land Management | Waterhole |
| Fence | Slate | Spring Development |
| Drift Fence | Private/Unknown | Guzzler |
| Highways | Cattleguard | Trough |
| Paved Road | Proposed Cattleguard | |
| Non-Paved Improved Road | Proposed Well (general location) | |
| Natural/Unknown Road Surface | | |

1 Miles

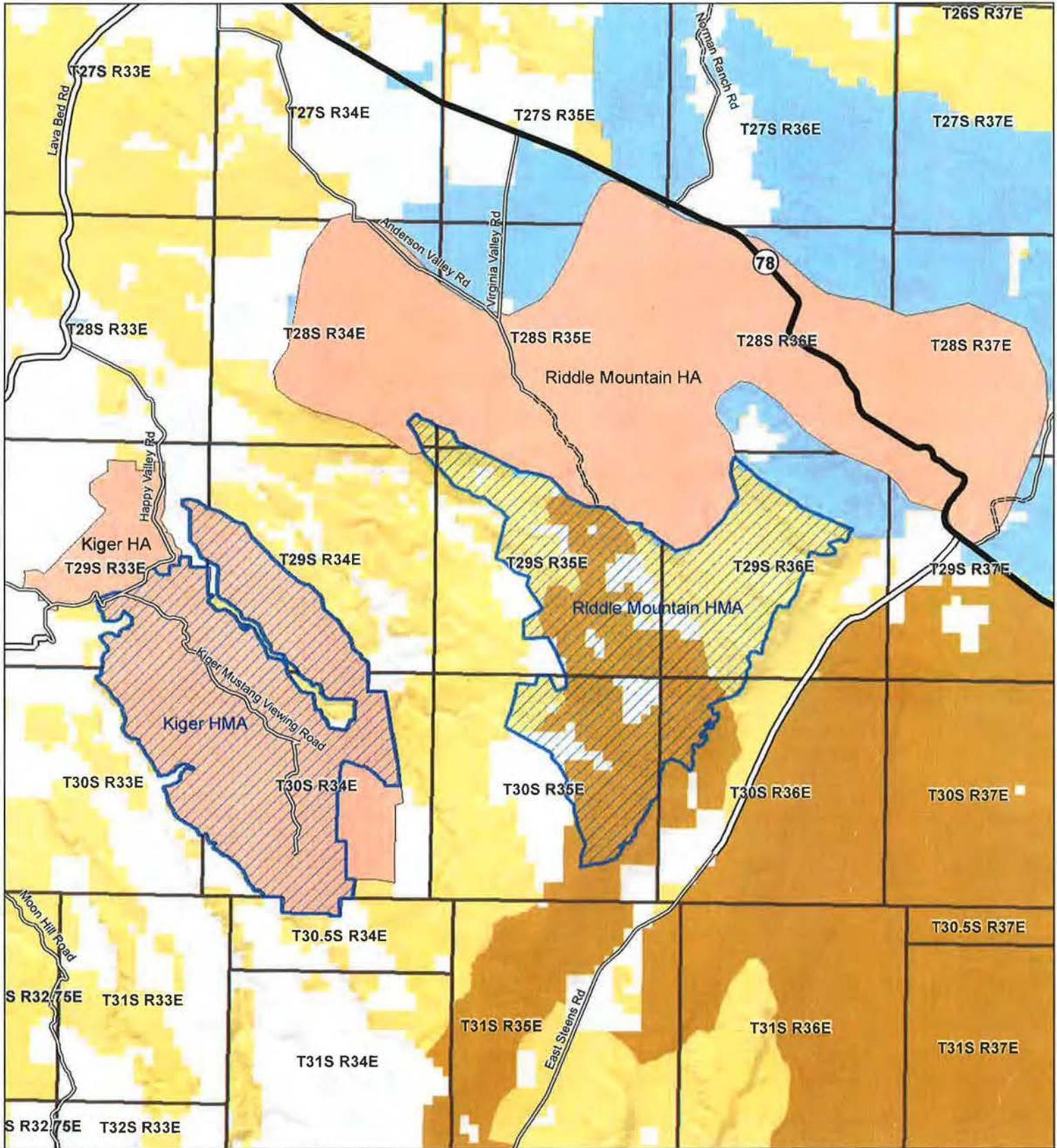
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W:\HMA\Kiger\Riddle\HMAP_EVAL_Maps\MapC_RiddleMinHMA.mxd

Map D

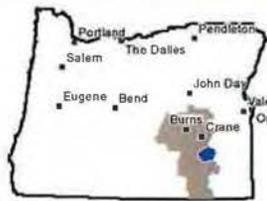
Riddle Mountain and Kiger HMA and HA Boundaries



- Herd Management Areas
- Herd Area
- Highways
- Paved Road
- Non-Paved Improved Road
- Natural/Unknown Road Surface

- BLM Wilderness Study Area
- Bureau of Land Management
- State
- Private/Unknown

3 Miles



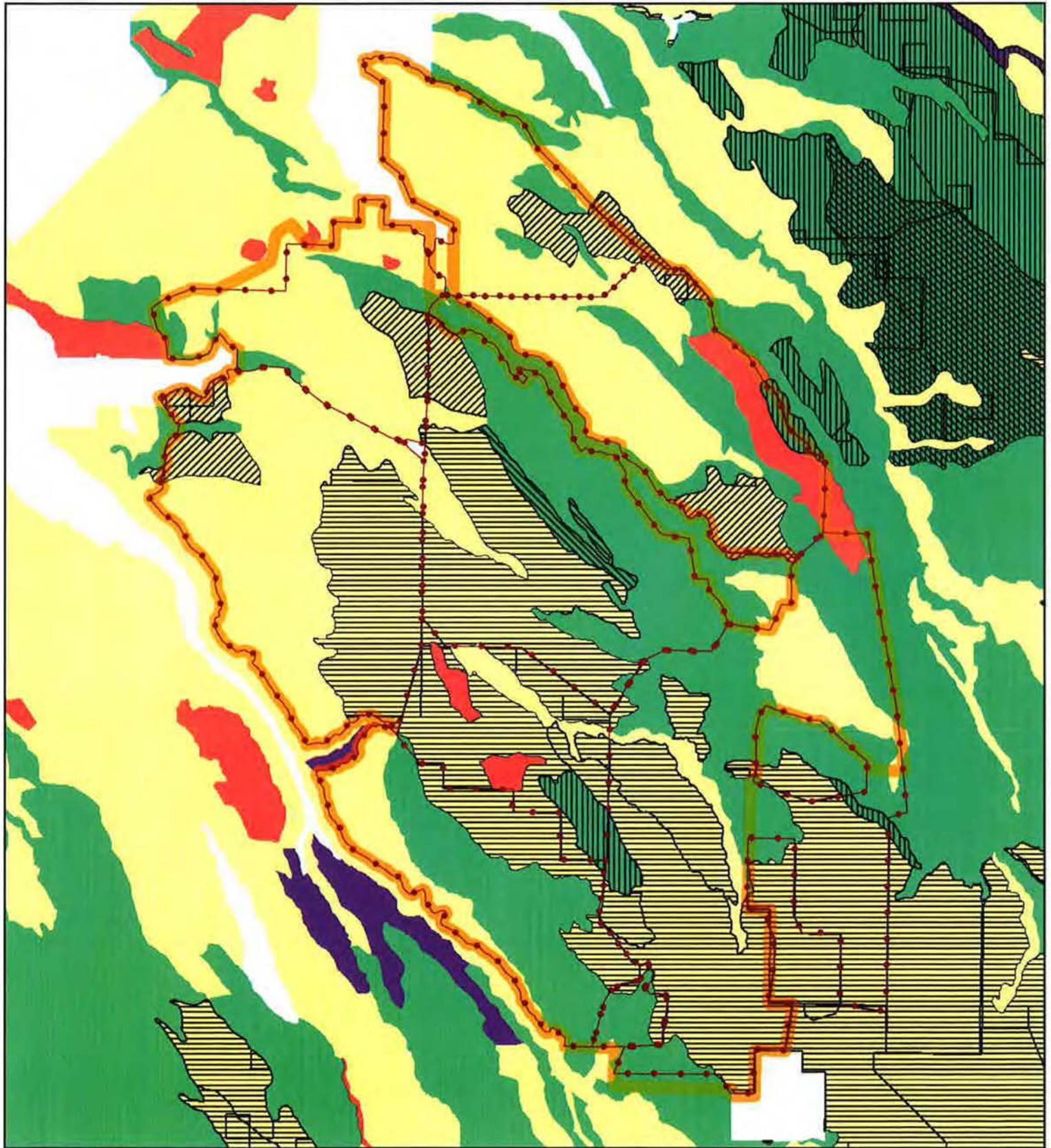
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IHMA\KigerRiddleHMA_EVAL_Maps\MapD_HMA_HA_Boundaries.mxd



ESI Field Data: Collected 1984-1992

Ecological Status

E	M
L	M;E
L;M	M;L
L;M;P	P
L;P	P;L
	P;M

Herd Management Area
 Pastures

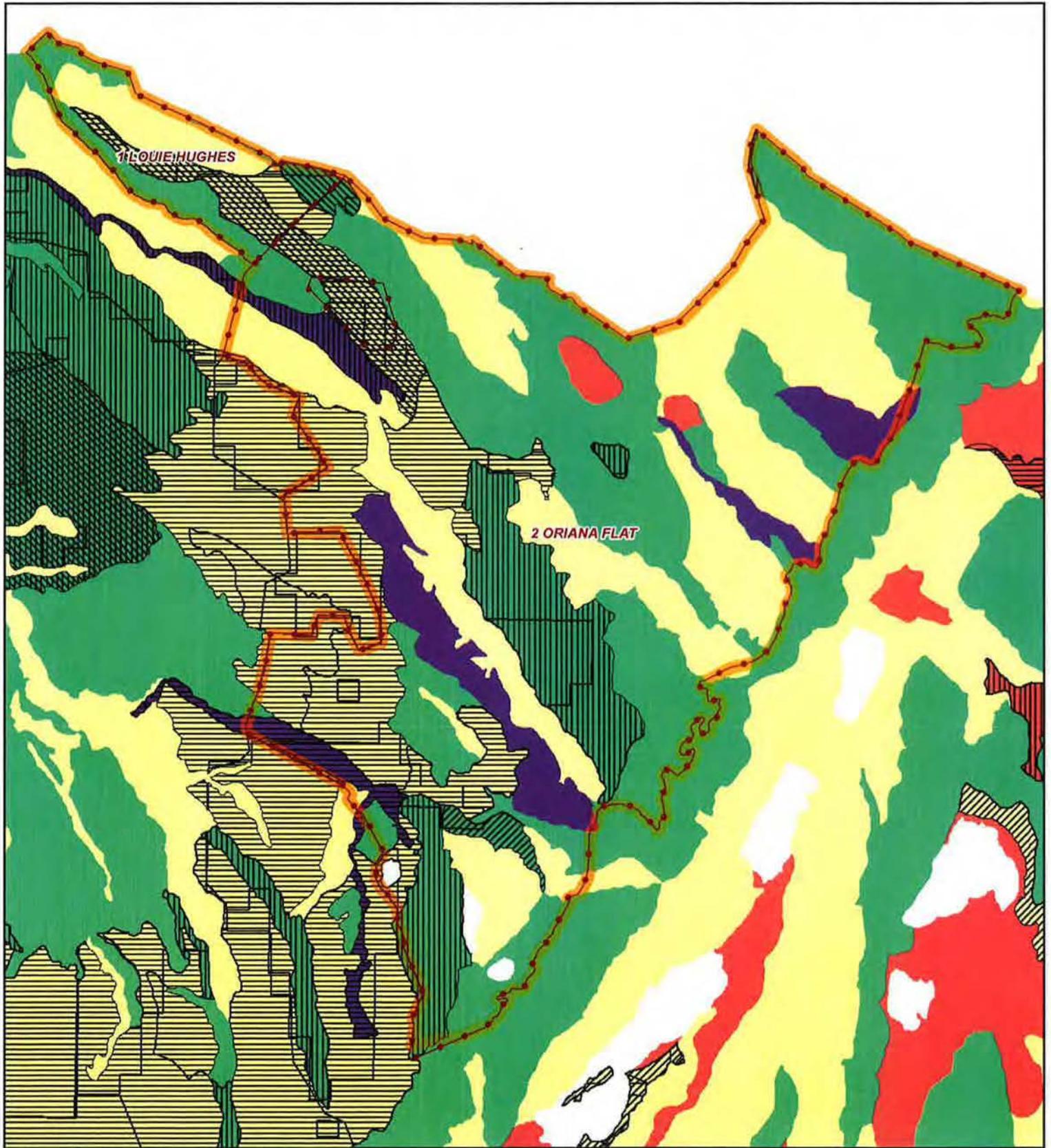
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Map F Riddle Mtn. HMA ECOLOGICAL STATUS



ESI Field Data: Collected 1984-1992

Ecological Status

- | | |
|-------|-----|
| E | M |
| L | M;E |
| L;M | M;L |
| L;M;P | P |
| L;P | P;L |
| P;M | |

- Herd Management Area
- Pastures

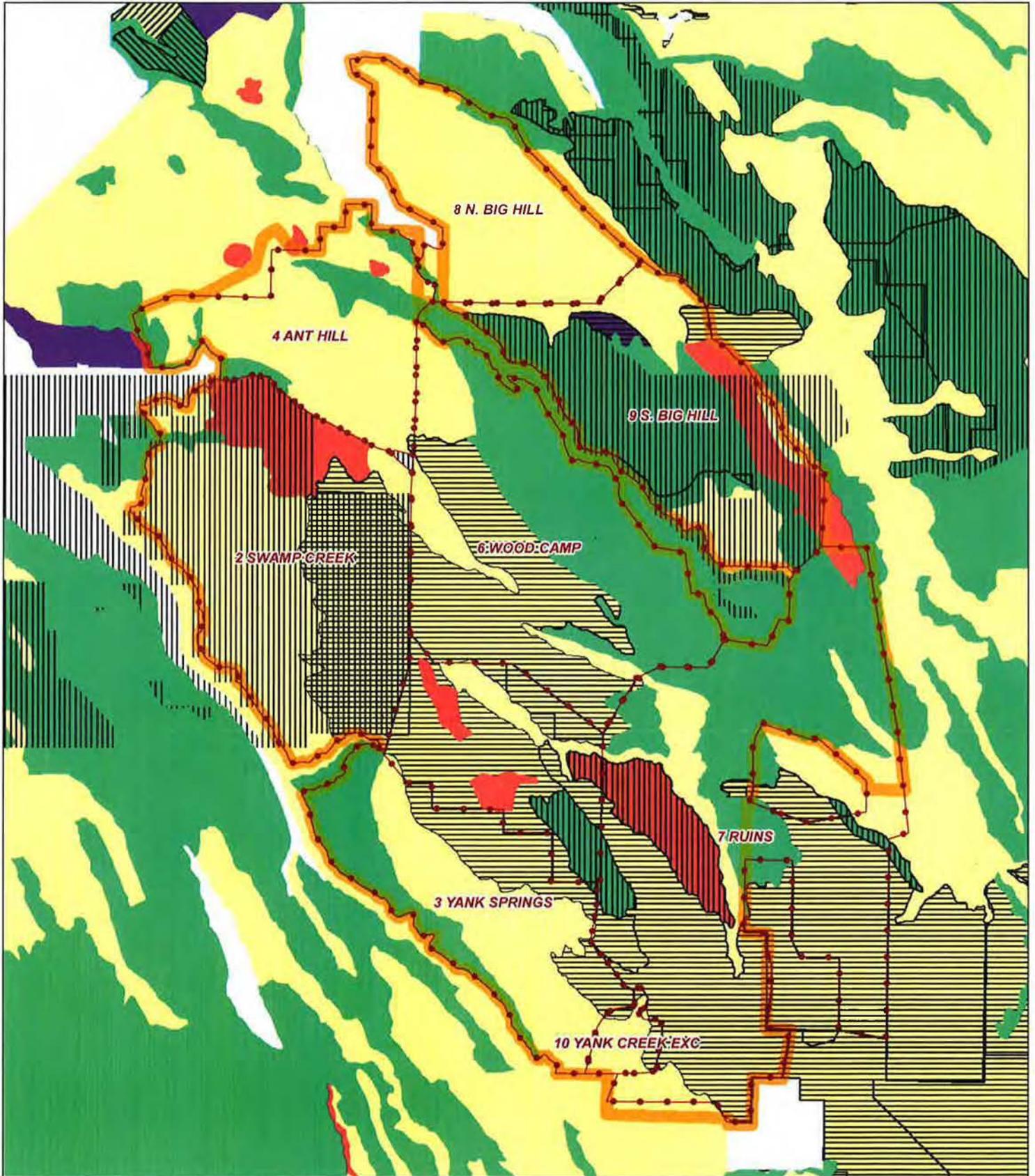
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Map G Kiger HMA RANGE CONDITION



ESI Field Data: Collected 1984-1992

Condition Class

	EXCE		GOOD
	EXCE;GOOD		GOOD;EXCE
	FAIR		GOOD;FAIR
	FAIR;GOOD		POOR
	FAIR;POOR		POOR;FAIR

Herd Management Area
 Pastures



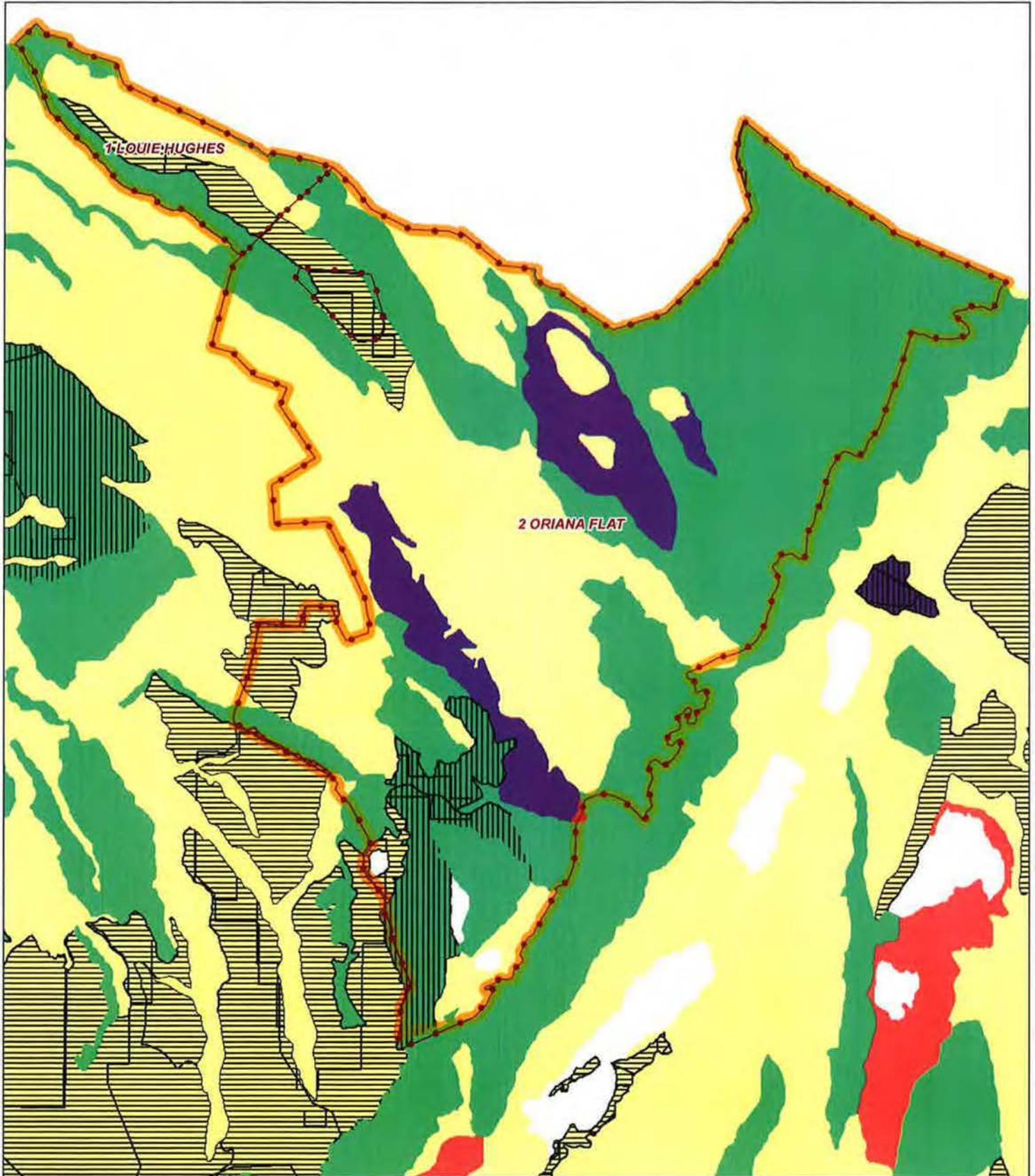
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Map H Riddle Mtn. HMA RANGE CONDITION



ESI Field Data: Collected 1984-1992

Condition Class

 EXCE	 GOOD
 EXCE;GOOD	 GOOD;EXCE
 FAIR	 GOOD;FAIR
 FAIR;GOOD	 POOR
 FAIR;POOR	 POOR;FAIR

 Herd Management Area
 Pastures



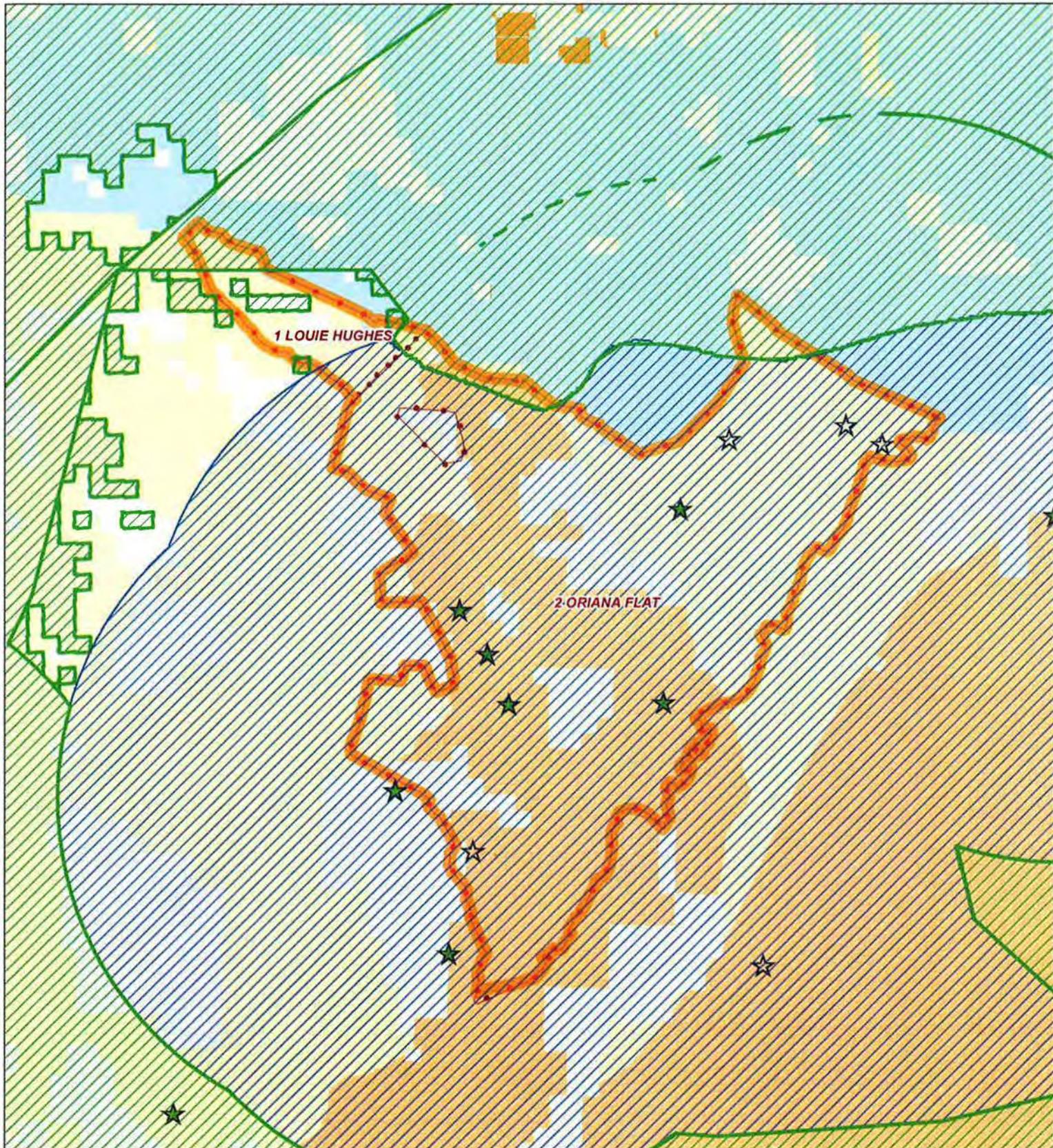
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.

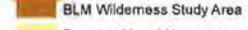
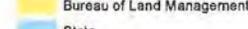
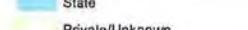
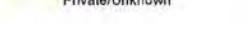
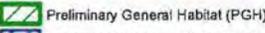
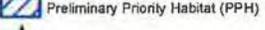
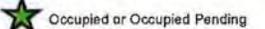


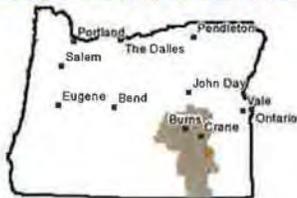
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 Burns District, Oregon



Riddle Mtn. HMA Sage-grouse Habitat



-  Wildhorse Herd Management Areas
 -  BLM Wilderness Study Area
 -  Bureau of Land Management
 -  State
 -  Private/Unknown
 -  Preliminary General Habitat (PGH)
 -  Preliminary Priority Habitat (PPH)
 -  Occupied or Occupied Pending
 -  Unoccupied Pending, Historic or Unknown
- 



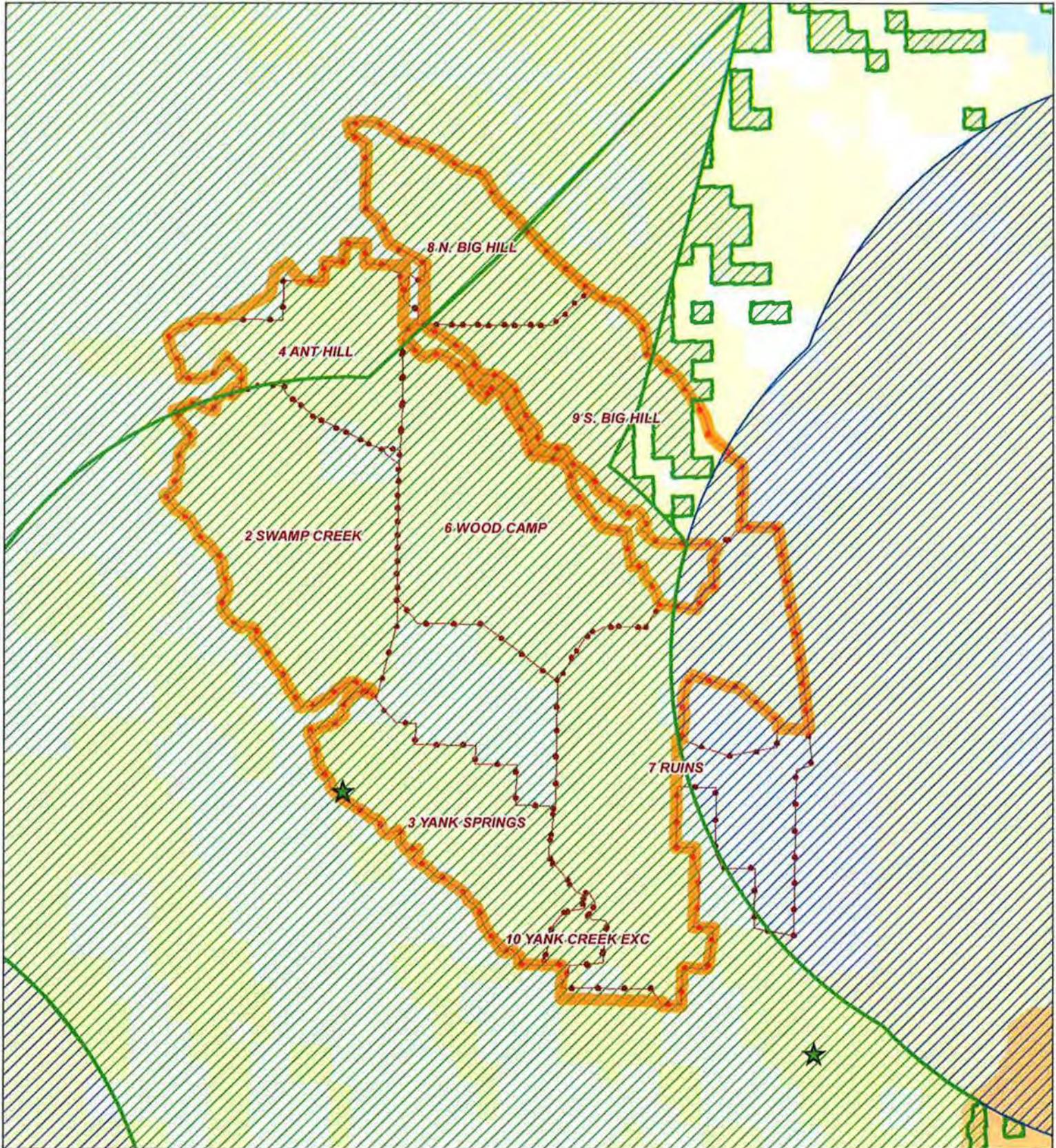
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.

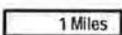


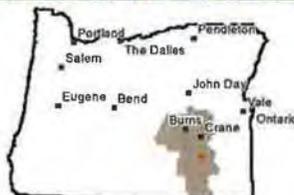
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Burns District, Oregon



Kiger HMA Sage-grouse Habitat



-  Wildhorse Herd Management Areas
 -  BLM Wilderness Study Area
 -  Steens Mtn Wilderness
 -  Bureau of Land Management
 -  State
 -  Private/Unknown
 -  Preliminary General Habitat (PGH)
 -  Preliminary Priority Habitat (PPH)
 -  Occupied or Occupied Pending
 -  Unoccupied Pending, Historic or Unknown
-  1 Miles



Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources and may be updated without notification.

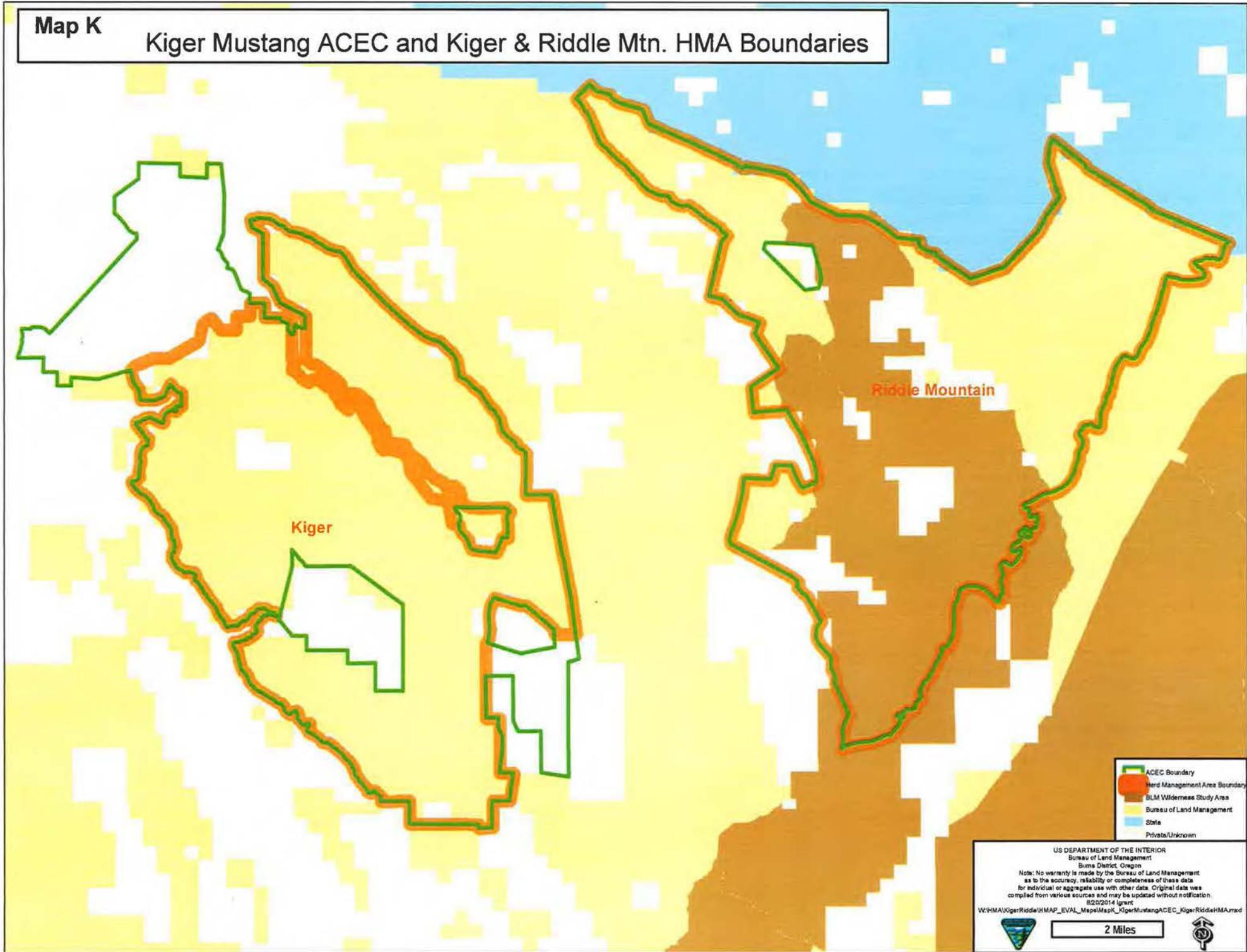


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Map K

Kiger Mustang ACEC and Kiger & Riddle Mtn. HMA Boundaries



Appendix A

Standards for Rangeland Health Summary

Allotment/Assessment Year	Standard ¹	Achieved (Y/N)	Causal Factor (For Standards Not Achieved)	Comments
Riddle Mtn. HMA				
Burnt Flat (2008)	1	Y	NA	Western juniper encroachment poses significant risks to watershed function in the western portion of the allotment.
	2	Y	NA	
	3	Y (75%)	Conversion of mountain big sagebrush/bunchgrass plant communities to Phase III juniper woodlands has resulted in reduced structural and functional diversity on approx. 25% of the allotment.	In 2010 approximately 2,600 BLM acres on the northwest side of the HMA were treated with prescribed burning and 69 acres of juniper were cut and piled within spring riparian areas and aspen stands. These actions will help to move toward achieving the standard yet there are more acres needing treatment.
		N(25%)		
	4	Y (Squaw Crk)	Baseline data on Louie Hughes Spring indicate actions taken by BLM contribute to meeting state water quality standards yet there has been no formal water quality data collected. Juniper encroachment may soon have a measureable negative effect on the proper functioning condition of the spring.	Juniper were cut and piled around Louie Hughes Spring riparian area in July 2013.
		Unknown (Louie Hughes Spr)		
	5	Y	Phase III juniper woodlands have resulted in a loss of critical sage-grouse habitat. If left untreated, this standard may not be achieved.	A portion of the encroached juniper has been treated. See Standard 3 "comments" above.
Kiger HMA				
Smyth-Kiger (2004)	1	Y	Yank Springs pasture is functioning at risk due to changes in plant community attributes which might be caused by overgrazing and trampling by horses.	Through two gather cycles (2007 & 2011) and returning horses back to various portions of the HMA, distribution and overgrazing by horses has not been a concern in Yank Spring Pasture in recent years.
	2	N	Livestock and wild horses are causal factors on Yank and Smyth Creeks.	Yank Creek Enclosure was constructed in 2004 with two water gaps built as watering points. Smyth Creek Corridor Fence was constructed in 2012 with three water points and crossings.

	3	Y		
	4	Y (Yank Crk)		Water temperature monitoring from 2010 indicate Yank Creek is still below ODEQ's 68 degree standard.
		N (Smyth Crk)	Livestock and wild horses.	Smyth Creek Corridor Fence was constructed in 2012 with three water points and crossings.
	5	Y (sage-grouse & redband in Yank Crk)		
		N (redband trout and malheur mottled sculpin in Smyth Crk)	Livestock and wild horses	Smyth Creek Corridor Fence was constructed in 2012 with three water points and crossings.
Happy Valley (2005)	1	Y		Achieved in portion of allotment within the HMA.
	2	Y		
	3	N	Areas of S. Big Hill and N. Big Hill pastures included in the 1999 prescribed fire area are lacking a diverse community structure. Juniper encroachment in areas of these pastures has eliminated an understory.	In 2012, 576 acres of juniper were cut with 140 acres machine piled with a seed mix applied to burned piles to aid understory recovery. In 2012, a 59 acre patch and a buffer along the roads within the Rx fire area received herbicide application to control medusahead rye.
	4	N	Riddle Creek - upstream conditions, not current management. Smyth Creek - severity of juniper encroachment.	Smyth and Riddle creeks are not in the HMA.
	5	N (redband trout)	Redband trout on Smyth and Riddle Creeks.	
		Y (sage-grouse)	Portions of S. Big Hill pasture are currently less than ideal for sage-grouse habitat due to juniper encroachment. Areas of N. and S. Big Hill pastures consist of early seral grasses and have potential for ideal sage-grouse habitat.	See "comments" in Standard 3.

¹ **Standards for Rangeland Health** : (1) Watershed Function - Uplands, (2) Watershed Function - Riparian/Wetland Areas, (3) Ecological Processes, (4) Water Quality, (5) Native, T&E, and Locally Important Species

APPENDIX B: Upland Trend Data

Smyth-Kiger Trend Plots and Results

Pasture & Plot#	Year	Foliar Cover (%) - Modified Pace 180, Step Point					Ground Cover (%)	Vegetative Composition (%) - Nearest Plant Pace			Perennial Density (Mature)		State Current		State Trend
		Shrub/Tree	Grass	Forb	Annual Grasses	Total		Basal – Herbaceous	Shrub	Grass	Forb	Key Grasses	Forbs	Data Trend	
Ant Hill 01	2012	24	18	1	31	74	7	28	68	4	2.8	1.8	B	B	C
	2010	21	N/A	N/A	N/A	N/A	28	22	75	3	N/A	N/A	B	B	
	2001	40	N/A	N/A	N/A	N/A	8	55	40	5	N/A	N/A	A	A	
	1976	5	N/A	N/A	N/A	N/A	22	17	82	1	N/A	N/A	A	A	
ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown)/DroughtyLoam 11-13 PZ; ARTR/FEID/ACTH7; Vegetative Composition 85% grass, 5% forbs, 10% shrub; Ground Cover not available – site is at state B trending towards states C-low elevation sagebrush “at risk to conversion to exotic annual grasses” and C-high elevation sagebrush “trending towards juniper woodland”															
Ant Hill 02	2012	3	48	0	73	124	28	3	97	0	8.8	0.2	B	B	C
	2010	1	N/A	N/A	N/A	N/A	45	1	98	1	N/A	N/A	B	B	
	2001	16	N/A	N/A	N/A	N/A	13	21	78	1	N/A	N/A	A	A	
ESD: DroughtyLoam 11-13 PZ; ARTR/FEID/STTH2; Vegetative Composition 85% grass, 5% forbs, 10% shrub; Ground Cover not available – site is at state B trending towards states C-low elevation sagebrush “at risk to conversion to exotic annual grasses” and C-high elevation sagebrush “trending towards juniper woodland”															
Swamp Creek 09	2012	7	62	3	20	92	33	7	92	1	5.4	1.8	B	B	A
	2010	12	N/A	N/A	N/A	N/A	51	12	85	3	N/A	N/A	B	B	
	2001	3	N/A	N/A	N/A	N/A	26	83	83	3	N/A	N/A	B	B	
	1986	9	N/A	N/A	N/A	N/A	23	10	90	0	N/A	N/A	A	A	
ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – state B trending towards state A for mid elevation sagebrush															
Swamp Creek 11	2012	0	54	12	6	72	27	0	94	6	6.8	3	B	B	A
	2010	2	N/A	N/A	N/A	N/A	22	2	88	10	N/A	N/A	B	B	
	2001	0	N/A	N/A	N/A	N/A	12	0	59	41	N/A	N/A	B	B	
	1987	12	N/A	N/A	N/A	N/A	10	23	74	3	N/A	N/A	A	A	C
ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown)/DroughtyLoam 11-13 PZ; ARTR/FEID/STTH2; Vegetative Composition 85% grass, 5% forbs, 10% shrub; Ground Cover not available – state B trending towards state A for mid elevation sagebrush															
Wood Camp 05	2012	1	70	24	16	111	40	1	82	17	12.4	15	B	B	A
	2010	1	N/A	N/A	N/A	N/A	33	1	81	18	N/A	N/A	B	B	

	2001	0	N/A	N/A	N/A	N/A	31	1	76	23	N/A	N/A	B	B	
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown)														
Wood Camp 18	2013	4	45	84	6	139	39	6	33	61	12.6	30	B	B	A
	2012	1	36	33	2	72	8	0	65	35	5.6	24.2	B	B	
	2011	14s/13t	N/A	N/A	N/A	N/A	29	18s/13t	43	26	N/A	N/A	C	C	E
	ESD: North Slopes 12-16 PZ; ARTRV/FEID; Vegetative Composition 70% grass, 10% forbs, 20% shrub; Ground Cover not available – state B following Five Creeks treatment in 2011 and trending towards state A for high elevation sagebrush with concerns of continuous wild horse use but current trend shows trend trajectory moving towards state A.														
Wood Camp 17	2013	0	11	66	2	79	6	0	65	35	6.2	9.6	B	B	A
	2012	0	16	29	0	53	12	0	58	42	1.4	10.6	B	B	
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – state B following Smyth Creek Fire 2011 and trending towards state A for mid elevation sagebrush, but at risk to continuous wild horse use that could change trajectory trend towards state C “invasion by exotic annual grass”														
Yank Springs 10	2012	13	40	16	11	80	27	15	68	17	7	18.6	A	A	A
	2010	19	N/A	N/A	N/A	N/A	30	25	60	15	N/A	N/A	A	A	
	2001	22	N/A	N/A	N/A	N/A	19	40	43	17	N/A	N/A	A	A	
	1993	19	N/A	N/A	N/A	N/A	15	25	45	30	N/A	N/A	N/A	N/A	
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – state A is currently at a stable state and trend trajectory is hard to predict														
Yank Springs 13	2013	0	41	34	19	94	22	0	71	29	3.6	9.4	B	B	A
	2012	0	28	14	19	61	18	0	82	18	3.4	6.4	B	B	
	2010	33	N/A	N/A	N/A	N/A	18	37	59	3	N/A	N/A	C	C	
	2001	26	N/A	N/A	N/A	N/A	12	38	54	8	N/A	N/A	C	C	
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – state B following Five Creeks treatment in 2011 and trending towards state A for high elevation sagebrush														
Ruins 03	2012	3	49	9	23	84	24	7	85	8	7.6	2.2	B	B	A
	2010	6	N/A	N/A	N/A	N/A	17	6	78	16	N/A	N/A	B	B	
	2009	15	N/A	N/A	N/A	N/A	17	17	71	12	N/A	N/A	C	C	D
	2001	10	N/A	N/A	N/A	N/A	17	25s/11t	47	17	N/A	N/A	C	C	
	1993	24	N/A	N/A	N/A	N/A	9	35s/9t	46	10	N/A	N/A	C	C	
	1987	20	N/A	N/A	N/A	N/A	10	41s/1t	57	1	N/A	N/A	C	C	
	1975	4	N/A	N/A	N/A	N/A	6	18	79	3	N/A	N/A	A	A	C
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) -														
Ruins 04	2012	5	58	64	0	127	41	3	61	36	13.4	23	B	B	A
	2011	1	N/A	N/A	N/A	N/A	58	1	58	41	N/A	N/A	B	B	
	2010	2	N/A	N/A	N/A	N/A	25	4	45	51	N/A	N/A	B	B	
	2001	35	N/A	N/A	N/A	N/A	19	45s/1t	36	18	N/A	N/A	C	C	E

	1993	43	N/A	N/A	N/A	N/A	13	51	38	11	N/A	N/A	N/A	N/A	
	1987	17	N/A	N/A	N/A	N/A	15	33	51	16	N/A	N/A	A	A	C
	1975	N/A	N/A	N/A	N/A	N/A	9	27	38	35	N/A	N/A	A	A	
	ESD: Loamy 12-16 PZ; Vegetative Composition 75% grass, 10 % forbs, 15% shrubs; Ground Cover data not available														
Ruins 07	2012	39	59	38	37	173	24	39	41	20	8	7	A	A	C
	2011	34	N/A	N/A	N/A	N/A	14	41	37	21	N/A	N/A	A	A	
	2010	27	N/A	N/A	N/A	N/A	26	34	44	22	N/A	N/A	A	A	
	2009	29	N/A	N/A	N/A	N/A	27	35	47	18	N/A	N/A	A	A	
	2001	4	N/A	N/A	N/A	N/A	30	7	35	58	N/A	N/A	C	C	E
	1975	N/A	N/A	N/A	N/A	N/A	N/A	22	72	6	N/A	N/A	A	A	C
	ESD: North Slopes 12-16 PZ; ARTRV/FEID														
Ruins 15	2012	0	77	12	30	119	40	0	86	14	12.8	18.2	B	B	A
	2011	0	N/A	N/A	N/A	N/A	48	0	67	32	N/A	N/A	B	B	A
	2010	0	N/A	N/A	N/A	N/A	31	0	68	32	N/A	N/A	B	B	A
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown)														

Happy Valley Trend Plots and Results

Pasture & Plot#	Year	Foliar Cover (%) - Modified Pace 180, Step Point					Ground Cover (%)	Vegetative Composition (%) - Nearest Plant Pace			Perennial Density (Mature)		State Current		State Trend
		Shrub/Tree	Grass	Forb	Annual Grasses	Total		Basal-Herbaceous	Shrub	Grass	Forb	Key Grasses	Forbs	Data Trend	
North Big Hill 05	2008	00	N/A	N/A	N/A	N/A	22	00	90	10	N/A	N/A	B	B	C
	2003	00	N/A	N/A	N/A	N/A	12	02	84	14	N/A	N/A	B	B	
	1993	00	N/A	N/A	N/A	N/A	15	00	95	5	N/A	N/A	B	B	
	1976	00	N/A	N/A	N/A	N/A	09	00	100	00	N/A	N/A	B	B	
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – Site is at risk to exotic annual grasses BRTE & TACA and trending towards state C for low elevation sagebrush.														
South Big Hill 06	2008	00	N/A	N/A	N/A	N/A	18	00	82	18	N/A	N/A	B	B	C
	2004	00	N/A	N/A	N/A	N/A	18	00	79	21	N/A	N/A	B	B	
	2003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	B	B	
	1993	03	N/A	N/A	N/A	N/A	30	06	87	7	N/A	N/A	B	B	
	1986	11	N/A	N/A	N/A	N/A	27	12	88	00	N/A	N/A	A	A	
	ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown)/ DroughtyLoam 11-13 PZ; ARTR/FEID/ACTH7; Vegetative Composition 85% grass, 5% forbs, 10% shrub; Ground Cover not available – Site is at risk to exotic annual grasses BRTE & TACA and trending towards state C for low/mid elevation sagebrush.														

Burnt Flat Trend Plots and Results

Pasture & Plot#	Year	Foliar Cover (%) - Modified Pace 180, Step Point					Ground Cover (%)	Vegetative Composition (%) - Nearest Plant Pace			Perennial Density (Mature)		State Current		State Trend
		Shrub/Tree	Grass	Forb	Annual Grasses	Total		Basal – Herbaceous	Shrub	Grass	Forb	Key Grasses	Forbs	Data Trend	
Louie Hughes 01	2010	30	N/A	N/A	N/A	N/A	23	35	51	14	N/A	N/A	C	C	E
	2008	22	N/A	N/A	N/A	N/A	29	28	60	12	N/A	N/A	C	C	
	2000	15	N/A	N/A	N/A	N/A	16	22	71	7	N/A	N/A	C	C	
	1997	7	N/A	N/A	N/A	N/A	12	19	73	19	N/A	N/A	C	C	
	1986	38	N/A	N/A	N/A	N/A	13	55	34	11	N/A	N/A	C	C	
	1975	N/A	N/A	N/A	N/A	N/A	32	N/A	N/A	N/A	N/A	N/A	A	A	C
ESD: Loamy 12-16 PZ; ARTRV/FEID/STTH2; Vegetative Composition 75% grass, 10 % forbs, 15% shrubs; Ground Cover data not available – site is encroached by JUOC and is trending towards state E for high elevation sagebrush.															
Oreana 02	2008	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D	D
	2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D	
	1994	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D	
	1990	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	D	
	1975	N/A	N/A	N/A	N/A	N/A	23	N/A	N/A	N/A	N/A	N/A	N/A	D	
ESD: Juniper Tableland 12-16 PZ; JUOC/ARAR/FEID/PSSPS – site is in state D for high elevation sagebrush															
Oreana 03	2008	23	N/A	N/A	N/A	N/A	25	29	47	24	N/A	N/A	D	D	D
	1994	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	C	C	D
	1975	N/A	N/A	N/A	N/A	N/A	17	N/A	N/A	N/A	N/A	N/A	C	C	D
ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – site has converted to mostly a JUOC woodland															
Oreana 05	2008	37	N/A	N/A	N/A	N/A	22	51	30	19	N/A	N/A	A	A	A
	2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	
	1994	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	
	1990	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	
	1975	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	A	A	
ESD: Claypan 12-16 PZ; ARAR8/FEID/PSSPS/POSE4; Vegetative Composition 60% grass, 10% forbs, 30% shrub; Ground Cover 20-30% (basal & crown) – site is in state A for high elevation sagebrush.															
Oreana New	2013	1	31	14	0	46	28	1	64	28	11.4	14	B	B	A
ESD: North Slopes 12-16 PZ; ARTRV/FEID; Vegetative Composition 70% grass, 10% forbs, 20% shrub; Ground Cover not available – site burned in the Slope Fire in 2012, which was trending towards state C but is now trending towards state A for high elevation sagebrush															

Appendix:

Allotment: Burnt Flat
Pasture: Louie Hughes
Acres: 2056

$$\text{Potential Stocking Level} = \frac{\text{Utilization} \times \text{Actual Use}}{\text{Measured Utilization} \times \text{Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2004	50	300	16	11	36	363	70	0.90	63.00	288	288	7.1	241
2005	50	352	16	11	48	427	50	1.69	84.50	253	270	7.6	223
2007	50	262	16	11	24	313	43	0.73	31.39	499	346	5.9	299
2008	50	166	16	11	36	229	32	1.31	41.92	273	328	6.3	281
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		270	16	11	36	333			0.00	0	0	0.0	0

Appendix:

Allotment: Burnt Flat
Pasture: Louie Hughes
Acres: 2056

$$\text{Potential Stocking Level} = \frac{\text{Utilization X Actual Use}}{\text{Measured Utilization X Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2004	50	300	16	11	36	363	70	1.00	70.00	259	259	7.9	212
2005	50	352	16	11	48	427	50	1.00	50.00	427	343	6.0	296
2007	50	262	16	11	24	313	43	1.00	43.00	364	350	5.9	303
2008	50	166	16	11	36	229	32	1.00	32.00	358	352	5.8	305
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		270	16	11	36	333							

Appendix:

Allotment: Burnt Flat
Pasture: Oriana Flat
Acres: 26241

$$\text{Potential Stocking Level} = \frac{\text{Utilization} \times \text{Actual Use}}{\text{Measured Utilization} \times \text{Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2006	50	1240	555	151	792	2738	23	0.93	21.39	6400	6400	4.1	5631
2008	50	836	555	151	444	1986	19	1.31	24.89	3990	5195	5.1	4426
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		1038	555	151	618	2362							

Appendix:

Allotment: Burnt Flat
Pasture: Oriana Flat
Acres: 26241

$$\text{Potential Stocking Level} = \frac{\text{Utilization X Actual Use}}{\text{Measured Utilization X Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2006	50	1240	555	151	792	2738	23	1.00	23.00	5952	5952	4.4	5183
2008	50	836	555	151	444	1986	19	1.00	19.00	5226	5589	4.7	4820
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		1038	555	151	618	2362			0.00	0	0	0.0	0

Appendix:

Allotment: Smyth-Kiger
Pasture: Swamp Creek
Acres: 4534

$$\text{Potential Stocking Level} = \frac{\text{Utilization X Actual Use}}{\text{Measured Utilization X Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2004	50	672	0	47	216	935	66	0.90	59.40	787	787	5.8	589
2007	50	723	0	47	96	866	42	0.73	30.66	1412	1100	4.1	901
2008	50	570	0	47	108	725	48	1.31	62.88	576	925	4.9	727
2009	50	583	0	47	132	762	41	1.07	43.87	868	911	5.0	713
2010	50	136	0	47	204	387	30	1.28	38.40	504	830	5.5	631
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		537	0	47	151	735							

Appendix:

Allotment: Smyth-Kiger
Pasture: Swamp Creek
Acres: 4534

$$\text{Potential Stocking Level} = \frac{\text{Utilization} \times \text{Actual Use}}{\text{Measured Utilization} \times \text{Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2004	50	672	0	47	216	935	66	1.00	66.00	708	708	6.4	510
2007	50	723	0	47	96	866	42	1.00	42.00	1031	870	5.2	671
2008	50	570	0	47	108	725	48	1.00	48.00	755	831	5.5	633
2009	50	583	0	47	132	762	41	1.00	41.00	929	856	5.3	658
2010	50	136	0	47	204	387	30	1.00	30.00	645	814	5.6	616
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		537	0	47	151	735			0.00	0	0	0.0	0

Appendix:

Allotment: Smyth-Kiger
 Pasture: Yank Springs
 Acres: 2932

$$\text{Potential Stocking Level} = \frac{\text{Utilization} \times \text{Actual Use}}{\text{Measured Utilization} \times \text{Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2006	50	104	0	30	204	338	11	0.93	10.23	1652	1652	1.8	1506
2007	50	230	0	30	60	320	47	0.73	34.31	466	1059	2.8	913
2009	50	266	0	30	84	380	54	1.07	57.78	329	816	3.6	670
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		200	0	30	116	346							

Allotment: Smyth-Kiger
Pasture: Yank Springs
Acres: 2932

$$\text{Potential Stocking Level} = \frac{\text{Utilization} \times \text{Actual Use}}{\text{Measured Utilization} \times \text{Yield Index}}$$

Year	Target Utilization	Livestock Actual Use	Livestock Exchange Of Use	Wildlife AUMS	Wild Horse Actual	TOTAL Use	Percent Utilization	Yield Index	Percent Adjusted Utilization	PSL	Cumulative PSL	Acres Per AUM	Livestock AUMS
2006	50	104	0	30	204	338	11	1.00	11.00	1536	1536	1.9	1390
2007	50	230	0	30	60	320	47	1.00	47.00	340	938	3.1	792
2009	50	266	0	30	84	380	54	1.00	54.00	352	743	3.9	597
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
						0			0.00	0	0	0.0	0
Average actual use		200	0	30	116	346							

Calculation of Carrying Capacity using Ecological Site Description Reference State Plant Community Grass/Grasslike Production.

Allotment	Pasture	Agency	Ecological Site ID Number	GIS Acres	Reference State Plant Community Grass/Grasslike Production (lbs/acre) ^{1&2}		Reference State Plant Community Grass/Grasslike Production (GIS Acres multiplied by lbs./ac.)		Estimated AUMs Per Pasture [One Animal Unit Month (AUM) is the amount of forage necessary to sustain one adult horse for one month (or approximately 800 pounds of air dried forage)]	
					Low	High	Low	High	Low	High
BURNT FLAT	1 LOUIE HUGHE	BLM	023XY216OR;023XY316OR	1.30	336	660	435.81	856.06		
			023XY216OR;023XY318OR	89.44	336	660	30052.92	59032.52		
			023XY216OR;023XY318OR;023XY217OR	442.96	336	660	148835.95	292356.34		
			023XY301OR	185.21	560	960	103717.71	177801.79		
			023XY302OR	678.28	420	840	284879.38	569758.75		
			023XY310OR	5.33	560	1050	2986.47	5599.63		
			023XY318OR;023XY216OR	149.47	525	1050	78472.07	156944.13		
			023XY418OR;023XY509OR	504.54	560 ³	1050 ³	282542.40	529767.00		
		BLM Total		2056.54			931922.70	1792116.22	1165	2240
	2 ORIANA FLAT	BLM	No data available.	126.00	NA	NA	NA	NA		
			023XY100OR	319.05	650	1300	207381.78	414763.55		
			023XY200OR	789.74	510	1275	402769.42	1006923.54		
			023XY214OR	2309.73	294	480	679060.22	1108669.74		
			023XY216OR	9246.74	336	660	3106903.59	6102846.33		
			023XY216OR;023XY217OR	2548.33	336	660	856239.23	1681898.49		
			023XY216OR;023XY316OR	40.54	336	660	13621.22	26755.96		
			023XY216OR;023XY318OR	64.32	336	660	21611.54	42451.24		
			023XY216OR;023XY318OR;023XY217OR	2684.39	336	660	901955.17	1771697.65		
			023XY300OR	202.74	375	675	76026.83	136848.29		
			023XY300OR;023XY214OR	184.04	375	675	69014.45	124226.01		

			023XY302OR	1588.95	420	840	667358.54	1334717.08		
			023XY310OR	2369.59	560	1050	1326968.63	2488066.19		
			023XY312OR	1195.81	400	800	478324.93	956649.86		
			023XY312OR;023XY404OR;023XY418OR	1130.48	400	800	452193.31	904386.63		
			023XY318OR;023XY216OR	668.06	525	1050	350733.90	701467.79		
			023XY418OR;023XY509OR	647.71	560 ³	1050 ³	362717.60	680095.50		
			023XY507OR	124.42	325	585	40436.10	72784.99		
			BLM Total	26240.65			10013316.44	19555248.83	12517	24444
HAPPY VALLEY	8 N. BIG HILL	BLM	023XY212OR	204.65	320	640	65489.23	130978.45		
			023XY216OR	46.73	336	660	15700.57	30840.41		
			023XY216OR;023XY316OR	1916.12	336	660	643817.92	1264642.35		
			023XY302OR	0.27	420	840	115.50	230.99		
			023XY316OR	170.88	595	935	101671.50	159769.50		
			BLM Total	2338.66			826794.72	1586461.71	1033	1983
	9 S. BIG HILL	BLM	023XY214OR;023XY300OR	424.96	294	480	124938.50	203981.23		
			023XY216OR	394.81	336	660	132655.74	260573.78		
			023XY216OR;023XY217OR	1282.64	336	660	430966.93	846542.18		
			023XY216OR;023XY316OR	482.32	336	660	162060.92	318333.96		
			023XY216OR;023XY318OR	75.29	336	660	25296.77	49690.08		
			023XY300OR	462.87	375	675	173576.71	312438.07		
			023XY302OR	121.40	420	840	50987.00	101974.00		
			023XY310OR	0.50	560	1050	277.93	521.12		
			023XY310OR;023XY216OR	308.68	560	1050	172860.12	324112.72		
			BLM Total	3553.47			1273620.61	2418167.13	1592	3023
SMYTH-KIGER	2 SWAMP CREE	BLM	023XY216OR	1884.15	336	660	633072.73	1243535.73		
			023XY216OR;023XY316OR	2599.27	336	660	873354.40	1715517.58		
			023XY300OR;;023XY310OR	51.06	375	675	19147.82	34466.08		

		BLM Total	4534.47			1525574.96	2993519.38	1907	3742
	3 YANK SPRINGS	BLM	023XY216OR	2124.10	336	660	713696.25	1401903.35	
			023XY216OR;023XY316OR	588.49	336	660	197733.24	388404.57	
			023XY216OR;023XY318OR	6.52	336	660	2190.90	4303.55	
			023XY302OR	0.02	420	840	6.54	13.08	
			023XY318OR;023XY216OR	211.37	525	1050	110968.97	221937.94	
			023XY416OR	1.02	510 ⁴	1275 ⁴	518.72	1296.80	
		BLM Total	2931.51			1025114.62	2017859.29	1281	2522
	4 ANT HILL	BLM	023XY200OR	17.01	510	1275	8675.98	21689.94	
			023XY212OR	25.33	320	640	8106.58	16213.16	
			023XY216OR;023XY316OR	1537.09	336	660	516461.57	1014478.09	
			023XY300OR	29.81	375	675	11177.36	20119.24	
			023XY300OR;;023XY310OR	92.47	375	675	34676.67	62418.01	
			023XY308OR	54.10	525	975	28401.70	52746.01	
			023XY310OR;023XY216OR	216.69	560	1050	121348.66	227528.75	
			023XY316OR	372.50	595	935	221638.97	348289.82	
			024XY113OR	4.57	NA ⁵				
		BLM Total	2349.57			950487.49	1763483.00	1188	2204
	6 WOOD CAMP	BLM	023XY216OR	1807.05	336	660	607169.54	1192654.45	
			023XY216OR;023XY316OR	2657.20	336	660	892820.77	1753755.09	
			023XY310OR	158.27	560	1050	88628.64	166178.70	
			023XY310OR;023XY216OR	242.63	560	1050	135870.24	254756.71	
		BLM Total	4865.15			1724489.19	3367344.94	2156	4209
	7 RUINS	BLM	023XY214OR;023XY300OR	0.09	294	480	27.92	45.58	
			023XY216OR	1707.82	336	660	573828.95	1127164.00	
			023XY216OR;023XY217OR	765.50	336	660	257208.55	505231.07	
			023XY216OR;023XY316OR	185.96	336	660	62481.21	122730.94	
			023XY216OR;023XY318OR	114.97	336	660	38629.49	75879.35	
			023XY216OR;023XY318OR;023XY217OR	95.16	336	660	31973.19	62804.48	
			023XY300OR	71.33	375	675	26750.36	48150.65	

		023XY302OR	241.98	420	840	101630.61	203261.21		
		023XY310OR	631.63	560	1050	353710.12	663206.47		
		023XY318OR;023XY216OR	1849.10	525	1050	970777.80	1941555.59		
		BLM Total	5663.54			2417018.17	4750029.35	3021	5938
¹ Grass/Grasslike production values were derived from the Natural Resources Conservation Service Ecological Site Descriptions (https://esis.sc.egov.usda.gov/Welcome/pgApprovedSelect.aspx).									
² For areas in the HMAs with an overlap of 2+ ecological site descriptions, forage production values of the dominant soil type was included in this table.									
³ There were no annual production values for this ecological site. A majority of the aspen stands present within the HMAs are located in the deep soils of north facing slopes. Therefore, for the purposes of this forage calculation exercise "R023XY418OR Aspen 16-35 PZ" was given the same grass/grasslike production values as "R023XY310OR North Slopes 12-16 PZ" which are also found in the HMAs.									
⁴ There were no annual production values for this ecological site. Site "R023XY416OR Wet Meadow" is generally associated with "R023XY200OR Pondered Clay". Therefore, for the purposes of this forage calculation exercise the annual production values from Pondered Clay, also found in the HMAs, were given to the Wet Meadow acre.									
⁵ There is no ecological site description for R024XY113OR on the NRCS website. As there were only 4 acres of this ecological site, it was left out of this analysis.									

Genetics Analysis Summary			
Kiger HMA			
Sample Type	Sample Size	Date Samples Received for Analysis	Notes
blood	105	Letter from E. Gus Cothran, Ph.D. dated Oct. 19, 1989	"...blood typed 105 horses from Kiger...must be emphasized at this point that all results are preliminary. No firm conclusions can be drawn...Genetic variability within the Kiger sample was relatively high... This high degree of variability is likely, although not necessarily, due to a mixed origin of this herd or recent introductions. It is, however, not possible to determine at this point, which breeds specifically were involved in the ancestry of the Kiger herd... The tree shows the Kiger herd clustering most closely with the known Spanish breeds."
		Letter from E. Gus Cothran, Ph.D. dated Dec. 29, 1989	"My interpretation of these preliminary analyses is that the feral horses (including the Kiger herd) show characteristics of both Spanish horses and other breeds such as the Arab and Morgan. However, they also have quite a few unique attributes and cannot simply be considered a mongrel group. A good deal of work remains and much is in progress."
		1993	Data unavailable.
		2003	Data unavailable.
DNA (hair)	12	May 22, 2009	"Genetic similar results suggest a herd with mixed ancestry that likely includes some Spanish heritage, although earlier blood typing analysis suggested that the ancestry is primarily North American... Current variability levels for both herds [Kiger & Riddle] are at a level where the herds should be closely monitored although there is no action that is needed at this point. Genetic variation should be checked again in about five years to see if there is a continued decrease in variation as appears to have occurred."

DNA (hair)	40	Nov. 15, 2011	<p>"Heterozygosity and other variability values calculated from the Kiger HMA in 2009 were significantly higher than just three years later which shows that there is something greatly different in the herd now... These results indicate a herd with mixed origins with no clear indication of primary breed type but there does appear to be some Spanish blood based upon the 2011 sample. Evidence of Spanish influence has not been as apparent as it now is... Current variability levels are high enough that no action is needed at this point but the herd should be monitored closely due to the trend for loss of variability...less than 100 individuals are at high risk of loss of variability... It should be noted that the Riddle Mountain herd is genetically very close to the Kiger herd but different enough that exchange of a few individuals of these herds could restore variability levels."</p>
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Genetics Analysis Summary			
Riddle Mountain HMA			
Sample Type	Sample Size	Date Samples Received for Analysis	Notes
		1993	Data unavailable.
blood	14	Nov. 7, 2003	"The Riddle herd has high genetic variability although there appears to have been a decline in variation over the past 10 years... This is a fairly rapid loss of heterozygosity and may be due to a population bottleneck. The herd appears to be mainly of North American saddle stock origins... No immediate action is needed for the Riddle Mountain herd because variability levels are high. However, the rate of loss of variation is a potential concern...the AML is low enough that it is possible that deleterious recessive genes could become common enough to show an effect despite high variability levels. The herd should be monitored for possible physical defects or lowered fecundity."
DNA (hair)	13	May 22, 2009	"Genetic similar results suggest a herd with mixed ancestry that likely includes some Spanish heritage, although earlier blood typing analysis suggested that the ancestry is primarily North American... Current variability levels for both herds [Kiger & Riddle] are at a level where the herds should be closely monitored although there is no action that is needed at this point. Genetic variation should be checked again in about five years to see if there is a continued decrease in variation as appears to have occurred."
DNA (hair)	21	Nov. 15, 2011	"In comparison to horses sample in 2009, heterozygosity levels have declined considerably...This all indicates a loss of diversity...These results indicate a herd with mixed origins with no clear indication of primary breed type...Current variability levels are high enough that no action is needed at this point but the herd should be monitored closely due to the trend for loss of variability...less than 100 individuals are at high risk of loss of variability... It should be noted that the Riddle Mountain herd is genetically very close to the Kiger herd but different enough that exchange of a few individuals among these herds could restore variability levels."