U.S. Department of the Interior
Bureau of Land Management
Billings Field Office

PRYOR MOUNTAIN WILD HORSE RANGE APPROPRIATE MANAGEMENT LEVEL (AML) RECALCULATION REPORT

December, 2016

PRYOR MOUNTAIN WILD HORSE RANGE (PMWHR)
AML RECALCULATION REPORT

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1. Actual Use Data

Wild horse actual use for the PMWHR for the years 2007 through 2016 is shown in Table 1. Results are for adult wild horses annually as of March 1.

Table 1 - PMWHR Actual Use by Wild Horses

Year	Population and Actual Use		
	Population On Range	Population Off Range	Actual Use
2007	154		154
2008	130	40	130
2009	156	39	156
2010	139	11	139
2011	166	0	166
2012	170		170
2013	145		145
2014	159		159
2015	172		172
2016	160		160
Average	155		155

2. Forage Utilization

Forge Utilization data was collected using the Key Forage Plant Species/Landscape Appearance methods for the PMWHR from 2007 through 2016. The results are depicted in Table 2. The table also depicts use patterns of wild horses during that time frame by Key Management Area, and analysis area.

Table 2 – Forage Utilization

Year	Observed Forage Utilization by Percent At KMA* and Inventory Units						
	Forest Service C-17	Burnt Timber C-18	Penn's C-19	Britton Spring C-20	Big Coulee C-21	National Park C-23	**Overall Rating for Use Area by Year**
2007	10 Light	45, (46) Moderate	70 Heavy	10, 72, 42 Moderate	86, 34 Severe	40 (56) Moderate	Heavy
2008		2 Light		62, 48 Mod/Heavy		64, (62) Heavy	Heavy
2009				74, 66, (62) Heavy	22, 25, 50 Light	(38) Light	Moderate
2010	54, 60, 54, Moderate	50, 58, (52) Moderate	64, (50) Heavy	62, 48, 34, (34) Moderate	62, 58, 78 Heavy	58, 54,40, (24) Moderate	Moderate
2011	66 Heavy	74, (64) Heavy	89, (72) Heavy	58, 83, (68) Heavy	82 Heavy		Heavy
2012	66 Heavy		56, 82, (68) Heavy				Heavy
2013	56 Moderate	(51) Moderate		62, 90, (84) Heavy			Heavy
2014	48, 41 Moderate	28, (10) Light	76, (58) Heavy		10, (42) Moderate		Moderate
2015	50, 82, 64, 60, Heavy	(49) Moderate	62, (60) Heavy	68, 52, (84) Heavy	60, (64) Heavy	70, 30, (22) Moderate	Heavy
2016	(53) Moderate	48, (44) Moderate	(82) Heavy	(91) Severe	(75), 59 Heavy	12 Light	Heavy
Overall Rating for Use Area Across Years	High Mod/Heavy	Moderate	Heavy	Heavy	Heavy	Moderate	

*KMA utilization data are noted in ( )

3. Precipitation Data/Climate

Data from the National Oceanic and Atmospheric Administration Weather Stations located at Lovell, Wyoming and Bridger, Montana were used to analyze precipitation patterns and climate descriptions for the PMWHR, since this is reflective of precipitation patterns for the south and north ends of the PMWHR.

Precipitation data, which is a function of climate, was used to calculate a yield index for each year (Sneva et al. 1983). The yield index was used to adjust the utilization levels for above or below normal precipitation (compared to long term average). In calculating the yield index the first step is to calculate the crop yield (effective precipitation). For the PMWHR, this includes precipitation falling from October through September. The crop yield is then divided by the normal crop yield (long term average) to determine the precipitation index for each year. The yield index is then calculated using the linear regression equation $Y = -23 + 1.23x$, where Y is the yield index and x is the precipitation index. Table 3 shows the yield indices for the analysis years.

Table 3. Yield Indices

Year	Crop Yield Lovell/Bridger	Precip. Index Lovell/Bridger	Yield Index Lovell/Bridger
2007	6.60/12.37*	1.05/1.04	106/105%
2008	6.37/11.52*	1.01/0.96	101/96%
2009	4.29/9.57*	0.61/0.80	61/75%
2010	5.45/10.14*	0.84/0.82	84/82%
2011	9.19/11.33*	1.46/095	157/94%
2012	3.03/5.13*	0.48/0.43	36/30%
2013	5.76/12.87*	0.92/1.09	90/111%
2014	5.82/12.91*	0.93/1.09	91/111%
2015	4.99/10.10*	0.79/0.85	74/81%
2016	7.76/9.72*	1.24/9.72	129/78%**

*30 year crop year average for Lovell, Wyoming is 6.28 inches and 11.85 for Bridger Montana
**2016 is calculated through October as the year isn't completed.

The PMWHR has two primary areas that have been heavily impacted by wild horses for decades; the low elevation cold semi-desert and the high elevation sub-alpine area. This impact was occurring during the 2007-2016 timeframe. These areas of the PMWHR are the limiting factors for the number of wild horses that the range can sustain. The weather patterns of the range for the low elevation areas are closer to what occurs in Lovell, Wyoming and the high elevation area weather patterns are more consistent with the patterns in Bridger, Montana. Since precipitation does not fall evenly across the landscape, the limiting factor for rangeland sustainability (land health) is the most heavily impacted area annually. The less precipitation, the higher the magnification of impacts from disturbance (i.e. over grazing). The higher yield index of the two is what was used to normalize the measured use to account for this limiting factor. In addition, this was the reason that water sources where installed in the mid-elevation areas of the wild horses range - to alleviate some of this per the HMAP.

4. Trend

In 2016, Daubenmire Trend Plots were re-read for six key areas. The plots compare the readings from 1996 to 2007 and 2007 to 2016. The comparison is based on the number of plants or frequency of each species that occurred between the three points in time. A comparison of cover data was not used to determine trend as cover changes can occur on a yearly basis due to precipitation. Daubenmire transect plot results are shown in Table 4.

Table 4 - Trend Analysis

Trend Plot	Years Read		Changes Detected		Indicated Trend	
			1996-2007	2007- Present	2007	2016
C-17 Burnt Timber F.S. Boundary	1996, 2007	2016	Bluebunch wheatgrass increased, mainly seedlings Bluegrass and June grass have decreased almost gone from the plot Black sagebrush has increased.	Bluebunch wheatgrass no change. June grass increase of 14%. Blue grama increased 20%, Forbs and shrubs no change detcted.	Steady to Slightly down-ward	Stable
C-18 Burnt Timber Catchment	1996, 2007	2016	400% increase in Bluebunch wheatgrass Indian rice grass now present with a 700% increase Black sage brush has decreased	Needle and Thread grass increased 35%. Bluebunch wheatgrass remained stable. Big sagebrush decreased while other shrubs remained stable.	Upward	Stable
C-19 Lone Pine Basin	2007	2016	No change detected	Idaho fescue 240% decrease. Mutton grass 800% decrease. yarrow 35%, increase pin cushion 73 increase %, Lupine 44% inrease.	One point in time	Down-ward
C-20 Turkey Flat	1996, 2007	2016	Bluebunch wheatgrass and June grass are no longer present Needle and	As in 2007 Bluebunch wheatgrass and June grass are not present on the	Down-ward	Down-ward

Trend Plot	Years Read		Changes Detected		Indicated Trend	
			1996-2007	2007- Present	2007	2016
			Thread grass 50% decrease Threeawn now present on site at a 900% increase	site. Cactus increased by 25% and Big sagebrush remained unchanged. Needle and Thread grass, increase of 35%.		
C-21 Sykes Catchment	1996, 2007	2016	50% increase in Bluebunch wheatgrass 50% increase in Junegrass Slight increase in winterfat	200% decrease Bluebunch wheat-grass June grass unchanged 400% increase bluegrass Black sage, Fringed sage and Snakeweed remained unchanged.	Upward	Down-ward
C-23 Mustang Flat	1996, 2007	2016	50% decrease in Bluebunch wheatgrass 50% increase in Needle and Thread grass increase in three-awn increase in snakeweed	No change except Juniper now detected	Down-ward	Stable

5. Rangeland Health Assessment

In 2016, the Billings Field Office completed a Land Health Assessment (LHA) for the PMWHR (Appendix 2). The report summarizes land health conditions within the horse range, production, and reaffirms the NRCS 2004 ratings of condition and production through the use of key management areas and documents the departure from Historic Climax Plant Community Potential (HCPC). The sites within the PMWHR have all experienced some degree of departure from the HCPC. Table 5 below summarizes the LHA analysis attribute rating departure from HCPC.

Most sites had a higher departure under the Biotic (vegetative) attribute rating than the soils and site stability attributes, as well as the hydrologic attributes. Much of this is due to the function of course fragments (large litter) and rock within the surface horizon minimizing bare ground and actually holding soil in place. On sites where course fragments were not present, these attributes were much more departed from the HCPC, with the exception of C-19, which has had a prolonged increase of mat forming vegetation, which is holding the soil in place.

Table 5 - Land Health Assessment

		Attribute Rating (Degree of Departure from HCPC)			
Site	**Reporting Unit / Total Acres/ BLM Surface Acres**	**Soil and Site Stability**	**Hydrologic Function**	**Biotic Integrity**	**Reporting Category**
C-17- (Upper Burnt Timber)	Forest Service / 7,212 / 2904	Slight to Moderate	Slight to Moderate	Moderate	Meeting (at risk)
C-18 (Lower Burnt Timber)	Burnt Timber / 6,715 / 6,715	Moderate	Moderate	Moderate	Not Meeting
C-19 (Sykes, BT Intersect)	Penn's / 5,684 / 5,011	None to slight	Slight to moderate	Moderate	Not Meeting
C-20 (Turkey Flat)	Britton Springs / 5,429 / 5,420	Moderate	Moderate	Moderate	Not Meeting
C-21 (Sykes Ridge)	Big Coulee / 6,975 / 6,926	Slight to Moderate	Slight to Moderate	Moderate	Not Meeting
C-23 (Mustang Flat) NPS	National Park / 7,792 / 14	Slight to Moderate	Slight to Moderate	Slight to Moderate	Meeting

6. Condition/Production

NRCS* Rangeland Health Rating for Site Index Units reaffirmed by 2016 Land Health Assessment

Overall Site Index Unit	Rangeland Health Rating out of 5
Britton Springs	2
National Park	2.25
Big Coulee	3
Burnt Timber	2.5
Forest Service	3.25
Penn's Cabin	3.75

*refer to NRCS report page 35 Pryor Mountain Wild Horse Range Survey and Assessment April 2004, as well as the report in its entirety.

Similarity Index (S.I.)* estimates the state of succession at a given site by measuring composition and comparing it to the composition of the historic climax plant community (HCPC). This is estimated as a percentage of the HCPC, from 1% to 100% with 100% representing the plant community as though it has climaxed without substantial disturbance. The S.I. provides a quantitative measure of health in terms of species diversity and productivity. It gives a relative idea of where the ecological sites plant community is ecologically, and where it can potentially go.

*Condition based on S.I. for site index units reaffirmed with 2016 Land Health Assessment

Overall Site Index Unit	Percentage of HCPC
Britton Springs	21 percent
National Park	44 percent
Big Coulee	29 percent
Burnt Timber	27 percent
Forest Service	45 percent
Penn's Cabin	18 percent

*refer to NRCS report page 23 Pryor Mountain Wild Horse Range Survey and Assessment April 2004 as well as the report in its entirety.

7. Use Correlation Analysis

Use correlation analysis compares the wild horse use patterns, observed utilization, land health assessment and indicated trend to display the situation on the PMWHR. The level of use by the number of wild horses exceeding the AML is directly correlated to not meeting land health standards and the indicated trend. Where forage use has been heavy or overused by wild horses land health standards are not being met and trend is downward. Conversely the analysis indicates when use levels are moderate and closer to 45% allowable use, indicated trend is stable and land health standards are being met for the most part.

Table 6. Use Correlation Analysis

Year	Use Correlation Analysis					
	Forest Service C-17	Burnt Timber C-18	Penn's C-19	Britton Spring C-20	Big Coulee C-21	National Park C-23
Overall Utilization Rating Across Years 2007-2016	Moderate	Moderate	Heavy	Heavy	Heavy	Moderate
Land Health Assessment 2016	Meeting (at risk)	Not Meeting	Not Meeting	Not Meeting	Not Meeting	Meeting
Indicated Trend 2016	Stable	Stable	Downward	Downward	Downward	Stable

8. Carrying Capacity Calculation

Carrying Capacity was previously calculated using the two formulas as follows:

$$\frac{\text{Actual Use}}{\text{Measured Utilization (\%)}} = \frac{\text{Proper Stocking Level}}{\text{Desired Utilization (45\%) **}}$$

$$\frac{\text{Actual Use}}{\text{Adjusted Utilization (\%) *}} = \frac{\text{Proper Stocking Level}}{\text{Desired Utilization (45\%) **}}$$

* Value from utilization, adjusted using yield index
** Allowable use level as identified in the PMWHR HMAP from the NRCS recommended objective to maintain the range.

The formulas take into consideration all the above information 1-7 and the analysis in these sections. In order to determine the Appropriate Management Level (AML) of wild horses to properly manage the conditions on the PMWHR, the following calculations indicate calculated carrying capacity. The limiting factors to meet proper use levels are the highly utilized areas in correlation the high value of the yield index that is indicative of use patterns as identified in Table 2.

8A. Carrying Capacity Calculation with Measured Utilization:

Actual Use = Desired Use
Measured Utilization Desired Utilization

Year	Utilization	Wild Horse Actual Use	* Proper** Carrying Capacity
2007	70%	154	99
2008	62%	130	94
2009	66%	156	106
2010	62%	139	101
2011	83%	166	90
2012	66%	170	116
2013	84%	145	78
2014	58%	159	123
2015	84%	172	92
2016	91%	160	79

*Actual use for 2008, 2009, and 2010 does not include wild horses that were outside the PMWHR
**Calculated using 45% as desired utilization

The average proper stocking level is 98 wild horses. 98 wild horses is the maximum number that can be maintained without damage to the range and to achieve a thriving natural ecological balance.

Finding:
Wild Horse AML = 98 adult wild horses year round.

8B. Carrying Capacity Calculation with Adjusted Utilization:

Actual Use = Desired Use
Adjusted Utilization * Desired Utilization

*From measured utilization, adjusted as per yield index from precipitation

Year	Utilization	Yield Index	Corrected Utilization	Wild Horse Actual Use	*Proper** Carrying Capacity
2007	70%	106%	74%	154	94
2008	62%	101%	63%	130	93
2009	66%	75%	50%	156	140
2010	62%	84%	52%	139	120
2011	83%	157%	100%	166	74
2012	66%	36%	24%	170	318
2013	84%	111%	93%	145	70
2014	58%	111%	64%	159	112
2015	84%	81%	68%	172	114
2016	91%	129%	100%	160	72

*Actual use for 2008, 2009, and 2010 does not include wild horses that were outside the PMWHR
**Calculated using 45% as desired utilization

Finding:
Wild Horse AML = The average proper stocking level is 121 adult wild horses year round.

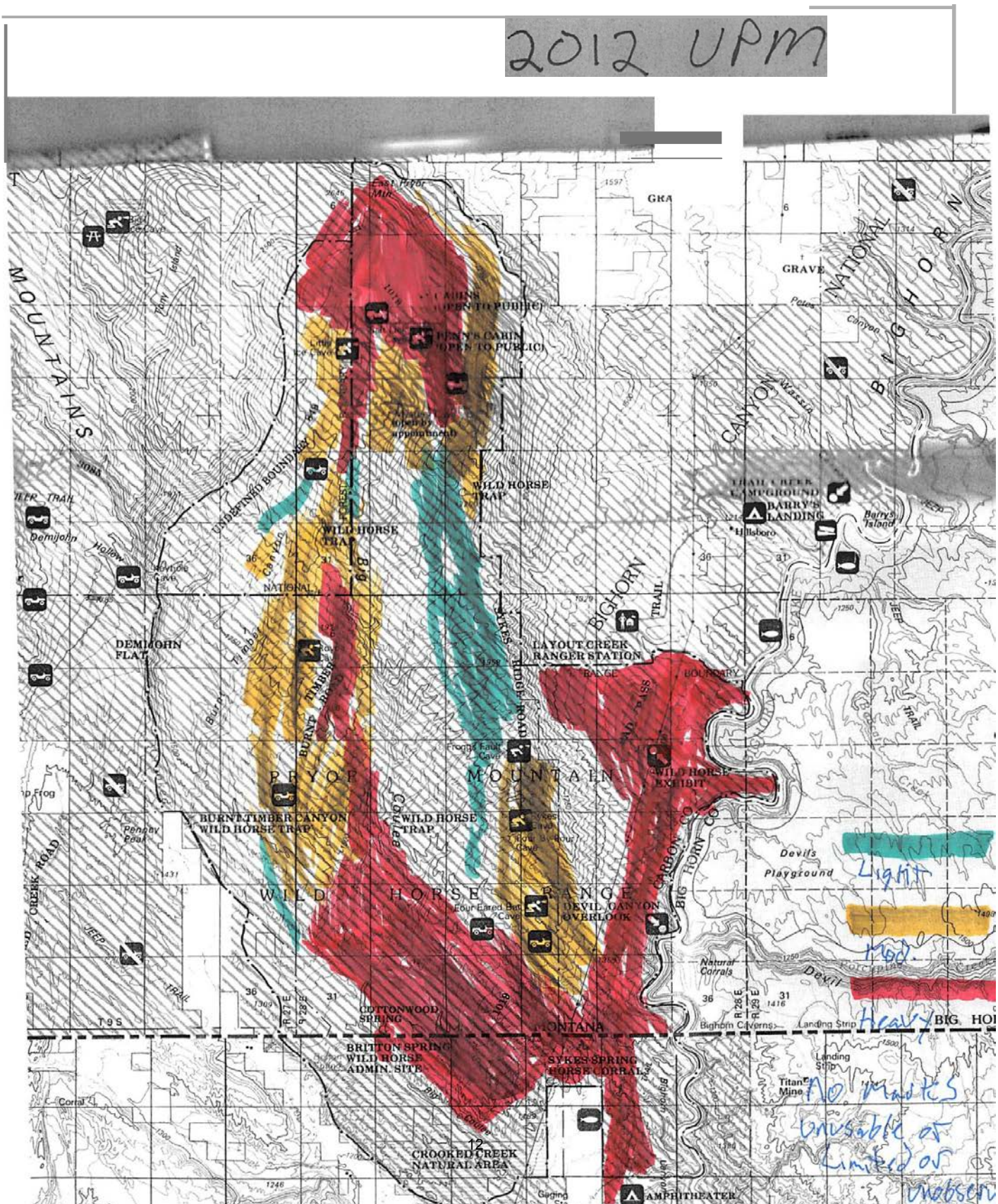
Based upon monitoring data adjusted for precipitation, an AML of 121 adult wild horses is the maximum numbers that can be maintained without damage to the range and to achieve a thriving natural ecological balance.

Interpretation of 8A and 8B:

The re-calculation of the appropriate management level formula indicates that a maximum AML of 98 or 121 wild horses. The previous AML was determined to be from 90 to 120 adult wild horses. The recalculation indicates that the AML of 90-120 wild horses would achieve a thriving natural ecological balance.

The calculation is well within the previous AML and accomplished what the HMAP intended. Further re-establishing or adjusting the AML at 98-121 would be inconsistent with the 4700 handbook that directs the low AML be determined based upon reducing the population between gathers so that the high AML is not exceeded.

APPENDIX 1
USE PATTERN MAP



APPENDIX 2
LAND HEALTH ASSESMENT

Allotment Standards Conformance Review

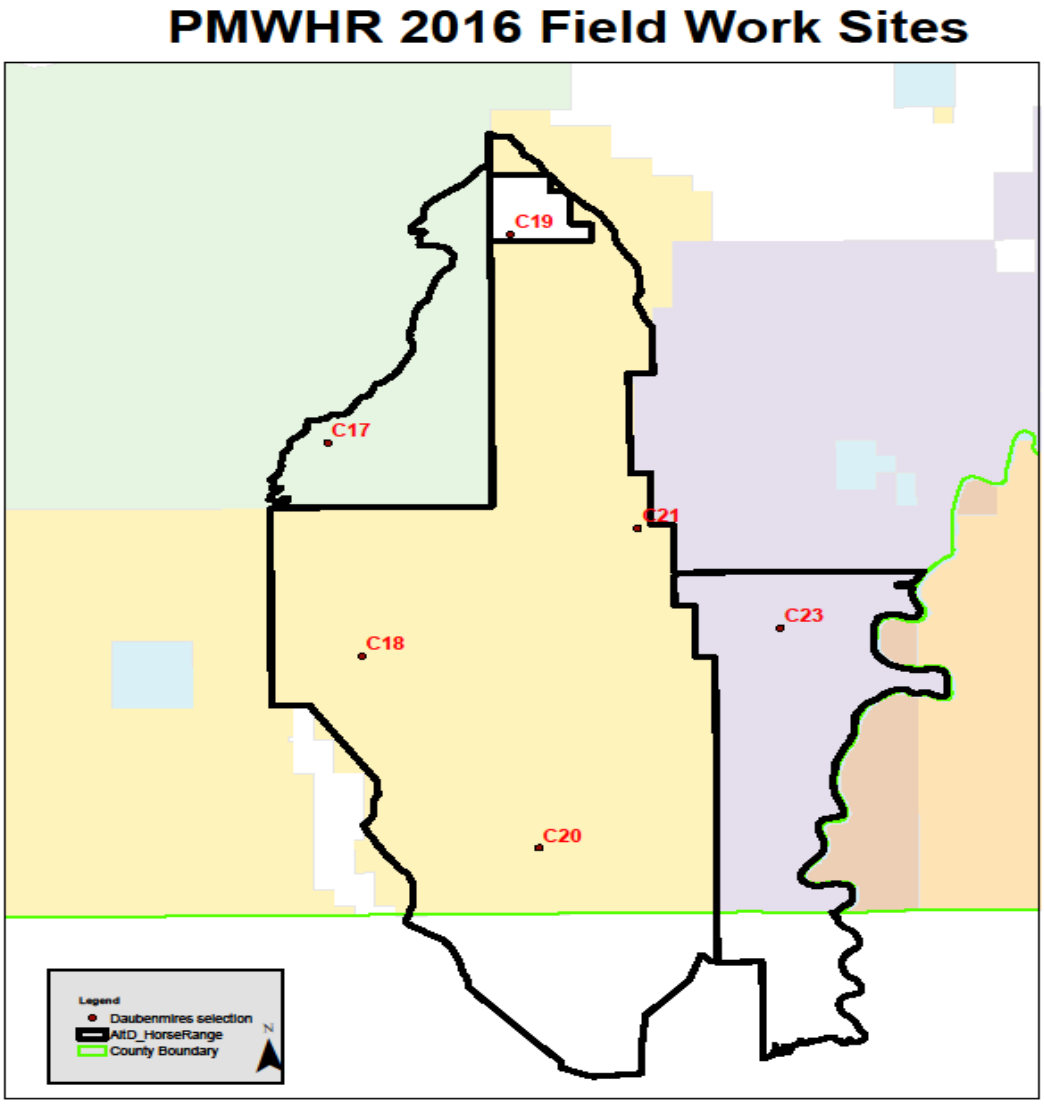
Allotment: Pryor Mountain Wild Horse Range / 00001 **Date: 10/11/2016**
Location: Pryor Mountain (Carbon County) **By: Crowe, McKenzie**

Description:

The PMWHR is located in the southeastern portion of Carbon County, Montana, and northern Big Horn County, Wyoming. The area is approximately 50 miles south of Billings, Montana, and 10 miles north of Lovell Wyoming. The area is high in diversity and complex in nature. Elevations range from 3850 feet to 8750 feet above sea level. Annual precipitation varies with elevation from 6 inches of precipitation in the lower elevations to upwards of 20 inches in the alpine high elevation. Plant communities also vary with elevation and precipitation from cold desert shrub to sub-alpine forests and meadows. Soils vary in depth from shallow (less than ten inches) to 20-40 inches deep depending on site locations and position on the landscape. Water is considered limited as there are five perennial water sources.

Standard 1. (Upland Health):

In 2016 Land health assessments were conducted on 6 sites across the PMWHR. The map below shows the location of the study sites within the PMWHR.



These sites have all experienced some degree of departure from the HCPC (Historic Climax Plant Community). The table below summarizes the degree of departure each site exhibits from the reference state or the HCPC

		Attribute Rating (Degree of Departure from HCPC)			
Site	**Reporting Unit / Total Acres/ BLM Surface Acres**	**Soil and Site Stability**	**Hydrologic Function**	**Biotic Integrity**	**Reporting Category**
C-17- (Upper Burnt Timber)	Forest Service / 7,212 / 2904	Slight to Moderate	Slight to Moderate	Moderate	Meeting (at risk)
C-18 (Lower Burnt Timber)	Burnt Timber / 6,715 / 6,715	Moderate	Moderate	Moderate	Not Meeting
C-19 (Sykes, BT Intersect)	Penn's / 5,684 / 5,011	None to slight	Slight to moderate	Moderate	Not Meeting
C-20 (Turkey Flat)	Britton Springs / 5,429 / 5,420	Moderate	Moderate	Moderate	Not Meeting
C-21 (Sykes Ridge)	Big Coulee / 6,975 / 6,926	Slight to Moderate	Slight to Moderate	Moderate	Not Meeting
C-23 (Mustang Flat) NPS	National Park / 7,792 / 14	Slight to Moderate	Slight to Moderate	Slight to Moderate	Meeting

Most sites had a higher departure under the Biotic attribute rating than the soils and site stability as well as the hydrologic attributes. Much of this is due the function of course fragments and rock within the surface horizon minimizing the bare ground and actually holding soil in place. On sites where course fragments were not present, these attributes were much more departed with the exception of C-19 which has had a prolonged increase of mat forming vegetation.

C-17

The upper burnt timber transect has the building blocks to improve quickly given appropriate management. Currently the community is composed of 26% Bluebunch wheatgrass, however many of these plants are very small and in low vigor. At the time of inspection the field personnel did not know if the plants would set seed during the current year due to extremely low vigor. This has resulted in very low production (450-500 lbs. annual production), impacting bare ground as well as litter production. Canopy cover on this site is 30%. The surface rock (10%) on this site is helping to maintain site stability, and minimize erosion.


2016/06/09


6-9-16
PMJHB
0001
C-17
2016/06/09

C-18

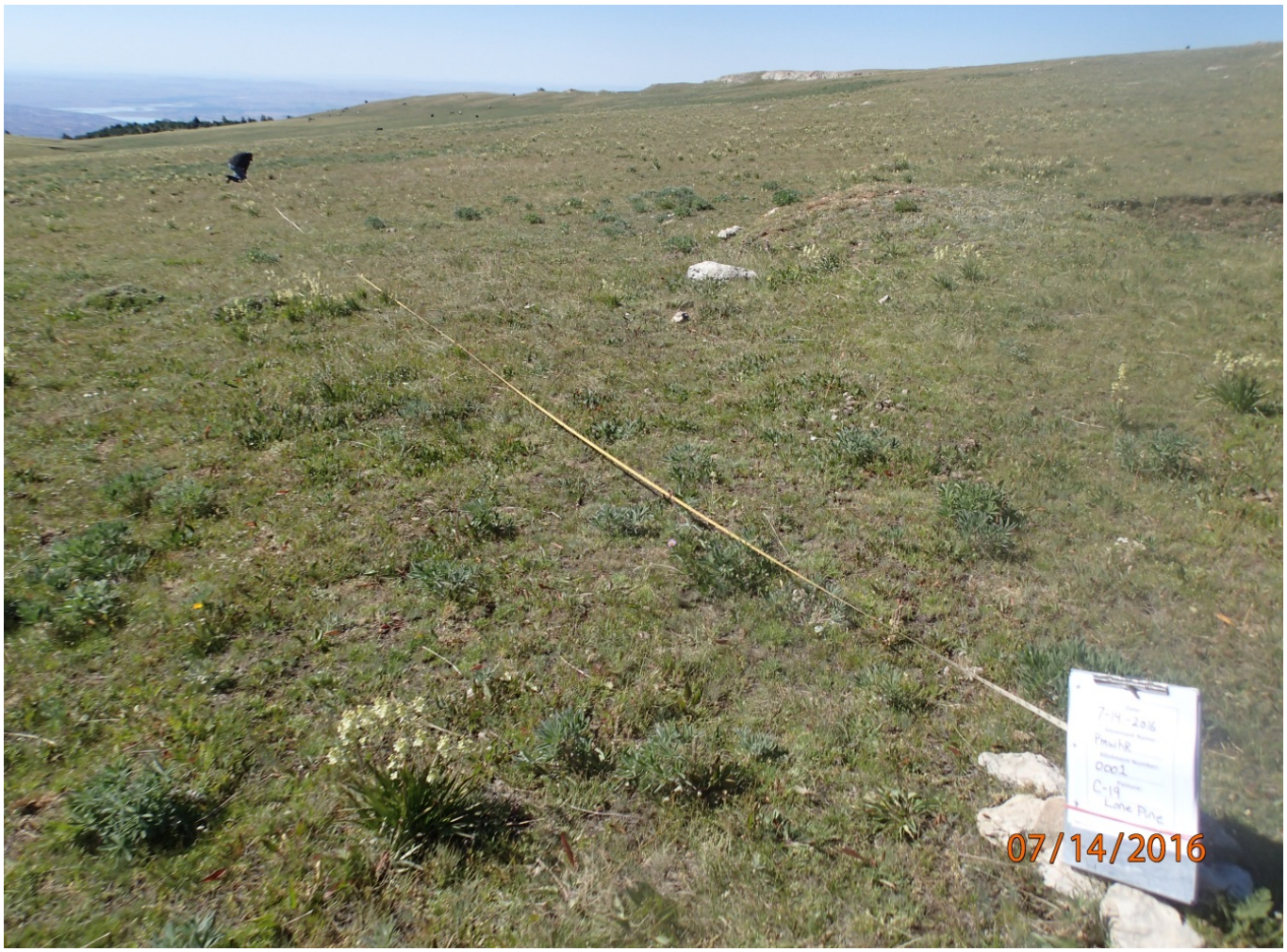
The site is in poor condition. Current use is not allowing plants to complete phonological development and will decline if conditions persist. Estimated utilization of current year's growth was already at 50% based on landscape appearance visual descriptions (6/9/2016). This has resulted in poor vigor and performance leaving soils exposed to wind and water erosion (photos below show deposition and water flow patterns). Both of which are plainly evident throughout the site. The plant community does have the building blocks to improve quickly if given an opportunity with approximately 15% canopy cover from deep rooted perennial bunchgrasses, much of which is blue bunch wheatgrass. Total canopy cover for this site was 30% while bare ground was 54%. Production was estimated to be <300 lbs/acre. Given the proportion of bluebunch wheatgrass on the site it appears that increased horse use in the area is a newer issue brought on by possibly a guzzler in the area.


Date
6-9-16
Allotment Name
PALOMA
Allotment Number
0001
Pasture
C-18
2016/06/09


2016/06/09

C-19:

This site has very low usable herbaceous production and vigor of these plants is low. The current plant community has departed to the point that low mat forming phlox and carex plants dominate the vegetative community. These mat forming species are so abundant that they are helping to stabilize the soils. Evidence of past heavy erosion is apparent across the landscape, however active erosion is minimal. These factors resulted in the "none to slight" departure rating of the soil attributes. The Daubenmire transect found plant cover to be 92%. Across the landscape there are numerous hummocks. These hummocks appear to be ant mounds. While on site hummocks were dug through and found that most were full of ants. The soils map units do not describe this soil well. Soil pits showed a limestone layer at 16" with 2" of dark granular surface horizon. This was expected. Compositionally the site has shifted. Perennial grasses are in very low vigor. Trend data shows that Idaho fescue has declined since 1985 (30%) to 2016 (12%). Additionally Danthonia has declined. These species have been replaced by carex and phlox. The carex appears to no be preferred forage for the horses as recent fall utilization shows much less use on this species compared to the grasses. Additionally, within the grazing cage few reproductive culms developed, suggesting that plant vigor is extremely low, even when protected for a full growing season. Comparing the productivity and vigor of these rangelands to those on USFS lands which the horses cannot access shows a stark contrast in species performance, production and vigor.




07/14/2016

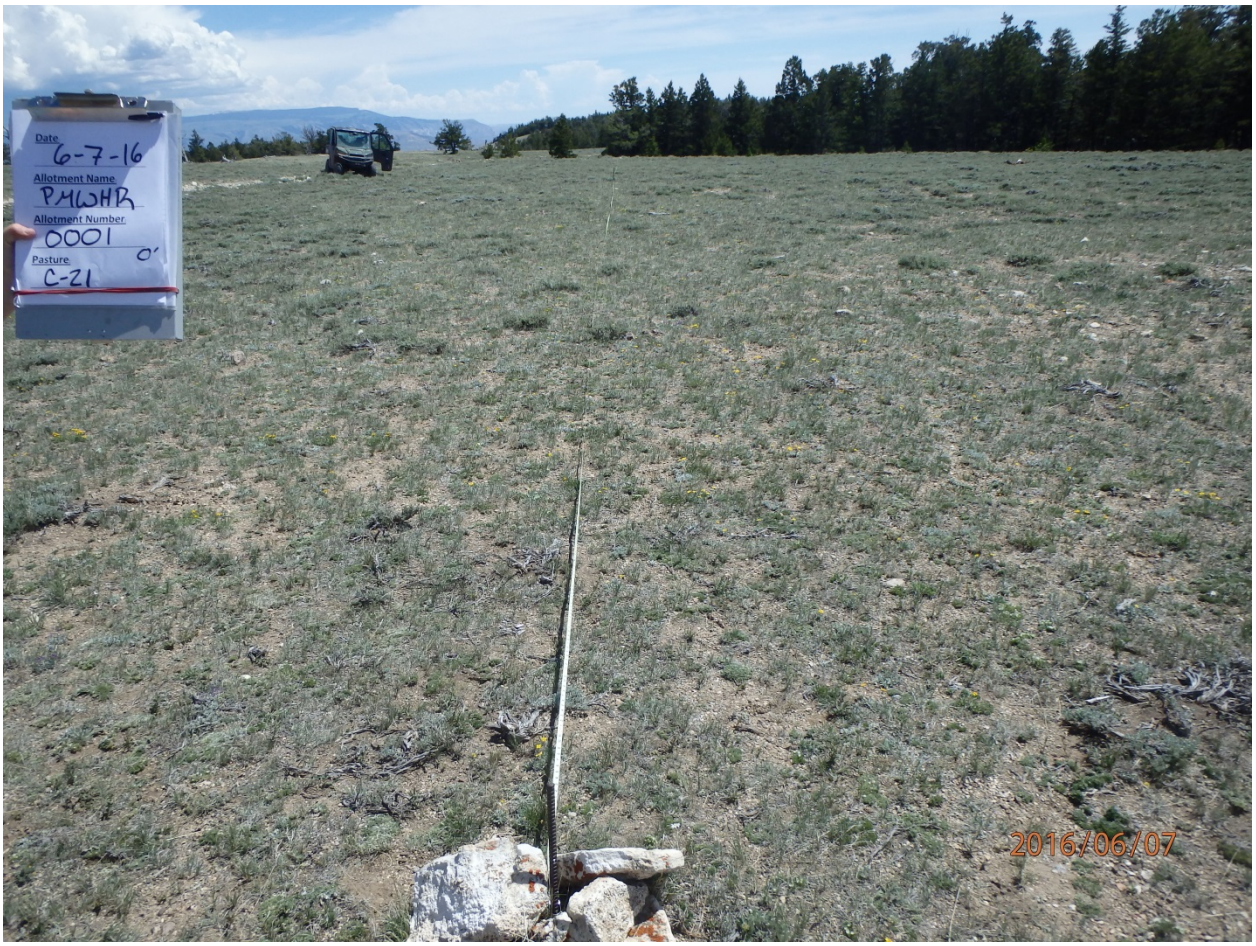

07/14/2016

C-20

This transect site is located on a loamy site, which has the potential to be fairly productive. However the site is in very poor condition. The plant community is dominated by blue grama and Sandberg blue grass. These plants do not provide the structural component needed to minimize erosion. As a result soils are actively moving and eroding both by wind and by water. Though highly departed and actively eroding some of the building blocks for recovery continue to be present in trace amounts. This did lead to the moderate departure rating for the Biotic attribute rather than a moderate to extreme rating. The exclosure shows a large contrast in species composition and ground cover based on ocular metrics. Clipping analysis found that <100 lbs of production on grazed rangelands. In addition due to poor forage composition and production sagebrush is declining. The trend analysis shows that sagebrush canopy cover has declined from 12% in 1981 to less than 1% currently. If this continues erosion will increase significantly.

C-21

The biotic component of this site is also struggling, however soil and hydrologic attributes are fairly stable. This is partly due to the species composition, slope, and aspect of this site. The plant community is dominated by phlox, sagebrush, junegrass, and bluebunch wheatgrass. Bunch grasses are in very poor vigor, and identification was very difficult. Many of the bunchgrasses do not form a bunch but are single or a few culm plants often appearing as new seedlings rather than established plants. These plants are not seedlings. Most grasses do not grow more than a couple inches, and even within caged areas rarely produce reproductive culms. Outside of the cages low growing black sagebrush is protecting bunchgrasses where the grasses are nested. Bare ground on this site is at 25% which is higher than expected, however ESD's for a silty limey site have not been developed. Similar bunchgrass communities in healthy condition would have much lower bare ground values. Fall utilization studies show 75% use on this site, however sage protected plants greatly influenced this value, as interspace plants are commonly heavily utilized. Soil pits revealed that 18 inches of soil is present before hitting limestone.


Date
6-7-16
Allotment Name
PMSHR
Allotment Number
0001
Pasture
C-21
2016/06/07

C-23

This transect site is in the best condition of all of the transect sites. All attributes were rated at slight to moderate departure with decent bunchgrass community. These conditions are not mirrored on adjacent rangelands. Many of the areas along the Highway up to this site are in very poor condition and are heavily utilized. Horse use on this site is low. It appears that this site is a transitory range. Water availability may be a reason for low utilization in this area. Bunchgrasses have increased since 1985.

Allotment Recommended Action:
Removal of more wild horses is recommended to improve the rangeland health. Rangeland health will not improve with the current levels of use or distribution patterns. Mid elevation ranges could possibly use additional water to reduce use on low and high elevation rangelands and more evenly distribute grazing.

<u>Standard 2 (Riparian):</u>
Miles City STANDARD #2: *Riparian areas and wetlands are in proper functioning condition.*
This means that the functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water, and vegetation. Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid flood plain development; improve flood water retention and ground water recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity.

The riparian/wetland vegetation is controlling erosion, stabilizing streambanks, shading water to reduce stream temperature in the summer and provide thermal protection in the winter, stabilizing shorelines, filtering sediment, aiding flood plain development, dissipating energy, delaying floodwater, and increasing recharge of ground water where appropriate to landform. The stream channels and flood plain dissipate the energy of high water flows and transport sediment appropriate for the geomorphology (e.g., gradient, size, shape, roughness, confinement, and sinuosity), climate, and landform. Soils support appropriate riparian-wetland vegetation, allowing water movement, filtering sediment, and storing water for later release. Stream channels are not entrenching and water levels maintain appropriate riparian/wetland species.

Riparian Areas are defined as an area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and streambanks are typical riparian areas. Excluded are such sites a ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.

Proper functioning condition of riparian areas are Indicated by:

Hydrologic
- flood plain inundated in relatively frequent events;
- amount of altered streambanks;
- sinuosity, width/depth ratio, and gradient are in-balance with the landscape setting (i.e., landform, geology, and bioclimatic region);
- riparian zone width; and - upland watershed not contributing to riparian degradation.

Erosion Deposition
- flood plain and channel characteristics, i.e., rocks, coarse and/or woody debris adequate to dissipate energy;
- point bars are vegetating;
- lateral stream movement is associated with natural sinuosity;
- system is vertically stable;
- stream is in-balance with water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition); and
- bare ground.

Vegetation
- reproduction and diverse age structure of vegetation;
- diverse composition of vegetation;
- species present indicate maintenance of riparian soil moisture characteristics;
- streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events;
- utilization of trees and shrubs;
- healthy riparian plants; and
- adequate vegetative cover present to protect banks and dissipate energy during high flows.

There are two riparian areas on BLM public lands within the PMWHR; Crooked Creek and Cottonwood Spring. There is another riparian area, Layout Creek, within the PMWHR on the National Park Service land.

A 2012 assessment of 3.3 miles of Crooked Creek on BLM found it to be in Properly Functioning Condition. The Crooked Creek riparian area is stable with minimal land use impacts, as 1998, 2005, and 2008 surveys also

indicated it in Properly Functioning Condition. Furthermore, during a 2014 fisheries survey, it was noted the riparian system was in excellent condition. Crooked Creek, on BLM, lies at the bottom of a gorge that is nearly inaccessible to horses and humans. The downstream end of the assessment area, near the private/BLM boundary, shows some minimal evidence of horse use. Crooked Creek riparian area continues to show an upward trend as conditions were altered during a 2005 debris flow following the Red Waffle fire. In general, riparian resources in Crooked Creek are in near pristine condition such as would be found in a wilderness setting with virtually no anthropogenic impacts identified.

Cottonwood Spring, 0.12 acres, was assessed in 1998 and determined to be Functioning at Risk. In 2014, the spring was developed to provide off site water and fenced to protect it from impacts associated with wild horse use. A PFC assessment was conducted in Novmeber 2016, resulting in a FAR rating, with an upward trend. With the rarity of riparian resources associated with the PMWHR, it is crucial to continue to monitor and attempt to improve conditions at this site.

Layout Creek is a small spring and stream supporting riparian resources on NPS lands within the PMWHR. The stream flows 3.9 miles (intermittent in the lower reaches) to Yellowtail Reservoir, an impoundment of the Bighorn River. The riparian area is narrow and consists primarily of shrubs, cottonwood, and conifers with a limited diversity of riparian obligate herbaceous species. The riparian area consists of about 9.5 total acres. A portion of the stream and riparian area is within a deep gorge or very rocky canyon that is inaccessible to wild horses. Additionally, much of the stream is within a fenced area that excludes horse use. Layout Creek is an A channel type stream with minimal floodplain development and depositional areas; it is very well armored with rock and cobble. Impacts to the riparian area from wild horses using the stream for a water source are minimal due to the lack of favorable forage and accessibility. The riparian area was assessed in 2016 and found to be in Properly Functioning Condition.

Standard 3 (Water Quality):

In 2016 Crooked Creek was assessed by the Montana Department Of Environmental Quality (MT-DEQ). The assessment report rating for the the Aquatic Life & Cold Water Fishery use as follows “This stream is rated as partially supporting based on low macroinvertebrate scores and indications of habitat impacts.” “Identified threats or impairments result from pollution categories such as dewatering or habitat modification and, thus, the calculation of a Total Maximum Daily Load (TMDL) is not required.” No other beneficial uses were assessed.

Recommended Action: *As there is no dewatering taking place on the PMWHR but further downstream. There are no actions needed to address the dewatering on the PMWHR.*

Standard 4 (Air Quality):

Air quality standards are currently being met.

Recommended Actions:

Manage the allotment to attain upland health standards and reduce wind erosion.

Standard 5 (Habitat):

Miles City STANDARD #5: *Habitats are provided for healthy, productive, and diverse native plant and animal populations and communities. Habitats are improved or maintained for special status species (federally threatened, endangered, candidate or Montana species of special concern).*

This means that native plant communities will be maintained or improved to ensure the proper functioning of ecological processes and continued productivity and diversity of native plant lifeforms. Where native communities exist, the conversion to exotic communities after disturbance will be minimized. Management for

native vegetation is a management priority. Ecological processes including hydrologic cycle and energy flow are maintained and support healthy biotic populations. Plants are vigorous, biomass production is near potential and there is a diversity of species characteristic of and appropriate to the site. The environment contains all the necessary components to support viable populations of a sensitive/threatened and endangered species in a given area relative to site potential. Viable populations are wildlife or plant populations that contain an adequate number of reproductive individuals distributed on the landscape to ensure the long-term existence of the species.

As indicated by:
- plants and animals are diverse, vigorous and reproducing satisfactorily, noxious weeds are absent or insignificant in the overall plant community;
- an effective weed management program is in place;
- spatial distribution of species is suitable to ensure reproductive capability and recovery;
- a variety of age classes are present (at least two age classes);
- connectivity of habitat or presence of corridors prevents habitat fragmentation
- diversity of species (including plants, animals, insects and microbes) are represented; and
- plant communities in a variety of successional stages are represented across the landscape. This will be accomplished by allowing progression of succession in conjunction with livestock grazing.

The PMWHR is an extremely diverse area in topography, geology and vegetative communities; this correlates to many different wildlife habitat types. The lowlands of the south end (3800 feet) are comprised of a sagebrush/salt-shrub dominated cold desert, receiving approximately 6” of precipitation per year. To the north and higher in elevation, the precipitation increases until you reach the 8,750 foot summit of East Pryor Mountain, 27 inches annual precipitation and a sub-alpine fir/open meadow dominated plant community. In between are a number of plant communities, ranging from grasslands dominated by bluebunch wheatgrass, shrublands of Wyoming big sage and rubber rabbitbrush, Utah juniper/bluebunch wheatgrass, Utah juniper/Curl-leaf mountain mahogany, Douglas Fir/Forb and Englemann Spruce/Forbs, to only name a few. A 2003 comprehensive rangeland health assessment conducted by the USDA NRCS, identified 30 unique plant communities on the PMWHR.

Several different health assessments have been conducted in the PMWHR over the last decade or slightly longer. Horse range managers have conducted production and rangeland health surveys in 2016 and 2007. A forest and fuels composition inventory was conducted in 2001 with subsequent forest health assessments in recent years to support the 2010 PMWHR Prescribed Fire EA. In 2004, the NRCS conducted a very comprehensive rangeland health assessment that is useful in establishing trend and documenting and comparing current plant communities.

The 2016 rangeland health assessments were conducted on six sites, representing the types of plant communities commonly grazed by wild horses. Each of these sites indicated a moderate departure from HCPC (biotic integrity/plant life) with the exception of one that was slight to moderate. Trends were noted as downward or unapparent. Soil and hydrologic function largely followed the biotic integrity ratings, however some areas, particularly higher in the sub-alpine meadows, did not have unhealthy soil and hydro conditions due to exceptional plant cover (increaser species not preferred by wild horses comprise most of the plant community and make up nearly 92% ground cover). Overall, the conditions documented in the 16’ rangeland health assessment transects represent a moderate portion of the wildlife habitat in the PMWHR. These sites were established to evaluate and monitor rangeland health in preferred wild horse habitat types (chiefly grass/shrub dominated types). A large portion of the PMWHR is woodland and/or tall shrubby juniper and mountain mahogany. The vegetative transects used for the upland health assessments do not represent conditions of wildlife habitat in the many woodland/shrubland communities.

Over the last 15 years the forests of the PMWHR have been inventoried and evaluated to determine forest health. Over the past century on the PMWHR, wildfire suppression has caused a departure from the natural fire regime. In addition, the western spruce budworm, mountain pine beetle, and Douglas-fir beetle have infested forests in the PMWHR causing tree mortality or reduced vigor. Forest and fuel load health assessments resulted in a Condition Class 3 determination, meaning: "Greater than 66 percent departure: Fire regimes have been substantially altered. Risk of losing key ecosystem components is high. Fire frequencies may have departed by multiple return intervals. This may result in dramatic changes in fire size, fire intensity and severity, and landscape patterns. Vegetation attributes have been substantially altered". As compared to reference conditions, open-structured, middle-aged and late stands are under-represented or at trace levels on the landscape. The mortality resulting from infestation has resulted in overly abundant early succession. The closed structure stands are overly abundant on the landscape compared to reference conditions. Current fire severity has increased compared to reference conditions.

The wildlife assemblage on the PMWHR consists of large mammals such as mule deer, bighorn sheep, black bear, mountain lion and a rare elk occurrence; small mammals including squirrels, porcupine, coyote, bobcat; a variety of neotropical migratory birds, dusky grouse, raptors and wild turkey (uncommon); the richest and most diverse assemblage of bats in Montana, due to the karst topography and abundance of caves.

With regard to wildlife habitat, this means that most of the grassland/shrubland complexes and the woodland/forest complexes of the PMWHR are at risk or are not meeting the land health standard. The complexity of the topography and plant communities in the PMWHR creates many opportunities for wildlife habitat to thrive. Some important wildlife habitats have not been specifically assessed since the 2004 NRCS assessment. Information from that report along with more recent documents indicates healthy wildlife habitats do exist, particularly if the plant communities are not preferred forage for the wild horse population. Overall, the wildlife habitat is affected at many levels by the unhealthy forest and grassland/shrubland vegetative communities. The reduced vigor and diversity of grasses and forbs on much of the range reduces forage availability for bighorn sheep and mule deer, but also lowers the insect production and forb forage for many other species, particularly birds and potentially bats as well. The thick, unhealthy forest habitat types, in many cases, have little to no understory; again reducing overall forage values for much of the range. The heightened risk of severe/catastrophic wildfire is another consideration when evaluating the wildlife habitat. A natural fire regime would produce a much desired mosaic of diverse age classes and stand densities of timber that would typically support more understory growth and more wildlife species (more shrub/forb/grass and insect forage).

Taking a closer look at the indicators of wildlife habitat health:

- *plants and animals are diverse, vigorous and reproducing satisfactorily, noxious weeds are absent or insignificant in the overall plant community;*
    - As discussed above, plant communities are less diverse than HCPC would suggest and vigor of many grassland species is rated low to very low, at risk of non-recoverable. Wildlife populations appear to be diverse and healthy, with migratory bird records robust and diverse; mule deer and bighorn sheep are common as are mountain lion and black bear. Noxious weeds are insignificant horse range wide, with the exception of halogeton being abundant in lower elevation transects in the Britton Springs assessment area (represented by the Turkey Flats survey transect).
- *an effective weed management program is in place;*
    - BLM weed management actively coordinated with Carbon county weed program.
- *spatial distribution of species is suitable to ensure reproductive capability and recovery;*

    - Informal field observations show this indicator meets criteria.
- *a variety of age classes are present (at least two age classes);*
    - plant communities in some portions of the horse range show minimal regeneration, however at least two age classes of plants are present. Informal field observations of wildlife species satisfy this indicator.
- *connectivity of habitat or presence of corridors prevents habitat fragmentation;*
    - habitat connectivity is not an issue on the PMWHR. Several rough, low traffic vehicle routes do not effect wildlife movement.
- *diversity of species (including plants, animals, insects and microbes) are represented;*
    - The diversity, vigor and abundance of plant species is documented in the forest health assessments and rangeland health transects, overall a diverse plant community persists on the PMWHR. Animal life is diverse. In areas with poor plant life ratings, surely the insect and microbial assemblages are in a state of departure from desired conditions, however overall across the range diversity is likely maintained (many small pockets of habitat/plant communities are off limits to wild horse grazing due to topographical barriers throughout the range, supporting robust plant communities which in turn would support insect and microbial assemblages).
- *plant communities in a variety of successional stages are represented across the landscape.*
    - Plant communities throughout the PMWHR are moderately departed from HCPC and suffer from over grazing by wild horses. Woodland/Forest health is also departed from HCPC due to wildfire suppression. Overwhelmingly, from the lowland desert to the upland alpine regions, plant communities are characterized as unhealthy with respect to succession and the hypothetical climax plant community. In the Britton Springs assessment area, plant communities and overall ecological conditions are at risk of being non-recoverable to an HCPC.

The PMWHR, while clearly suffering from over grazing by wild horses, appears to support a diverse and healthy assemblage of wildlife, meeting standard #5 in five of the six assessment areas. Several plant communities have been identified at risk of losing the potential to recover from the lowered state of vigor they are currently in. Continued over grazing by wild horses could have long lasting detrimental effects to wildlife habitat and for the habitat wild horses rely on. The wildlife habitat standard #5 is being met in five of the six assessment areas. The standard is not being met in the Britton Springs assessment area.

Allotment Recommendation:

In order to improve wildlife habitat, PMWHR wide, reduced numbers of horses is recommended to relieve pressure on the vegetative communities assessed as moderately departed from HCPC. In addition, woodland treatments to reduce stand densities, allowing understory development and reducing the risk of catastrophic wildfire would promote and ultimately conserve wildlife habitat on the PMWHR.

Allotment Name:	**Allotment Number:**	**Assessment Date:**	**Assessor(s):**	**Reviewer(s):**
Pryor Mountain Wild Horse Range	0001	6/9/2016-10/11/2016	Crowe, Fink, Huber, McKenzie	Crowe McKenzie

Public Land Acres: 27092					
Land Health Reporting Categories	Standard 1: Upland Health	Standard 2: Riparian miles/acres	Standard 3: Water Quality	Standard 4: Air Quality	Standard 5: Habitat
1. Public Land Achieving	6666	7.2 / 61.5	7.2 / 61.5	7.2 / 61.	
2. Public Land Not Achieving:					5429 (16)
a. Significant Factor is Undetermined					
b. Significant Factor is non-BLM, or not BLM Authorized					
c. Current Management or Disturbances Affect Land Health	20364 (16)				5429 (16)
d. Current management or Disturbances Affect land Health but Ways to Achieve Significant Progress are Unknown					
e. Current management or Disturbances Changed- Significant factors addressed-To Result in Significant Progress Towards Achieving.					
f. Current Management or Disturbances are Appropriate-Monitoring Data indicate Making Significant Progress Towards Achieving					
3. Public Land Where Fundamental Does Not Apply	62				
4. Public Land Unevaluated					

Causal Factors: If selecting category two. Please reference casual factor code(s)						
1: Drought	4: Lack of Fire X	7: OHV use	10: Regulated Flow	13: Tree/Shrub Encroachment X	16: Wild Horse/Burro X	19: Other
2: Fluid Mineral Development	5: Livestock Grazing	8: Prescribed Fire	11: Roads	14: Upstream/Downstream Channel Conditions	17:Wildfire	
3: Introduced Seeding	6: Mining	9: Recreation	12: Timber Management	15: Weeds	18:Wildlife	

AUTHORIZED OFFICER'S DETERMINATION:

In relation to the Standards and Guidelines approved for the State of Montana and based on my review of the Assessment Team's recommendation for appropriate management actions and other relevant information, I have determined that the allotment(s):

_____ Meets all standards for Healthy Rangelands

_____ Fails to meet, but is making significant progress toward meeting all the standards.

__X__ Fails to meet one or more of the standards and is not making significant progress toward meeting.

I have determined that livestock grazing use **is not** a significant factor if failing to achieve the standards. Accordingly, pursuant to 43 CFR 4180.2(c), the following actions are to be taken:

_____

_____

Other causal factors (e.g. recreation, weeds, mining, horses, oil and gas etc.) **is** a significant factor if failing to achieve the standards. Explanation:_**Wild horse use levels and distribution patterns not conducive to improve rangeland health conditions/standards achievement. Lack of fire and conifer encroachment also leading to unhealthy forests, increases use on rangelands**

___/s/ James M. Sparks_____ _____11/10/16_____

Billings Field Manager Date

APPENDIX 3
CLIMATE and PRECIPITATION DATA LOVELL WYOMIMNG
http://www.wrcc.dri.edu/climatedata/climsum/

LOVELL, WYOMING (485770)

1981-2010 Monthly Climate Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	31.3	38.4	49.5	58.5	67.6	77.4	86.0	84.6	73.1	59.2	43.2	32.7	58.6
Average Min. Temperature (F)	7.0	12.9	22.7	31.3	41.4	49.7	54.8	51.9	41.8	31.3	19.5	9.3	31.2
Average Total Precipitation (in.)	0.21	0.17	0.32	0.64	1.17	1.06	0.61	0.44	0.63	0.58	0.22	0.23	6.28

Unofficial values based on averages/sums of smoothed daily data. Information is computed from available daily data during the 1981-2010 period. Smoothing, missing data and observation-time changes may cause these 1981-2010 values to differ from official NCDC values. This table is presented for use at locations that don't have official NCDC data. No adjustments are made for missing data or time of observation. Check NCDC normals table for official data.

Total of Precipitation (Inches)

(485770)

File last updated on November 17, 2016
a = 1 day missing, b = 2 days missing, c = 3 days, ..etc..,
z = 26 or more days missing, A = Accumulations present Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value. MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5 Individual Months not used for annual or monthly statistics if more than 5 days are missing. Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

2007	0.08	0.44	0.66	1.00	1.39	-----z	0.38	0.21	0.14	1.97	0.17	0.16	6.60a
2008	0.52	0.00	0.18	0.15	2.58	0.09	0.06a	0.00	1.59	0.46	0.35	0.39	6.37
2009	0.29	0.10	0.02	0.20	0.16	2.29a	0.45	0.26	0.08	0.44	0.00	-----z	4.29a
2010	0.31	0.00	0.08	0.50	1.37	1.29	0.59	0.68	0.10	0.09	0.30	0.14	5.45
2011	0.12	0.72	0.29	0.95	2.43	1.56	0.03	0.26	0.05	2.37	0.30	0.11	9.19
2012	0.08	0.38	0.12	0.49	0.59	0.19	0.08	0.04	0.00	0.70	0.23	0.13	3.03
2013	0.41b	0.00	0.05	0.29	1.02	0.20	0.83	0.04	1.95	0.70	0.00	0.27	5.76
2014	0.10	1.30	0.11	0.36	0.62	1.37	0.14	1.03	0.28	0.06	0.38	0.07	5.82
2015	0.06	0.16	0.00	0.60	1.32	0.90	0.25	0.34	0.16	0.86	0.34	0.00	4.99
2016	0.00	0.00	0.10	0.97	1.11	0.23	0.51	0.02	2.81	2.01	-----z	-----z	7.76b

Period of Record General Climate Summary - Temperature

Station:(485770) LOVELL															
From Year=1897 To Year=2012															
	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	29.6	4.6	17.2	63	13/1953	-42	01/1924	31.5	2006	-5.3	1979	0.0	15.9	30.8	10.8
February	36.7	10.9	23.9	71	22/1982	-48	05/1899	35.8	1954	4.9	1936	0.0	8.9	27.7	5.3
March	47.6	20.7	34.2	79	28/1925	-23	11/1932	45.9	1925	19.5	1899	0.0	3.5	28.1	1.6
April	59.2	30.8	45.0	90	30/1939	-16	02/1936	53.4	1915	38.1	1975	0.0	0.3	17.1	0.0
May	69.1	41.0	55.1	99	10/1898	18	01/1954	63.3	1958	49.0	1950	0.6	0.0	3.7	0.0
June	78.9	49.0	63.9	111	29/1919	29	10/2012	73.0	1988	56.7	1998	4.9	0.0	0.1	0.0
July	88.3	54.3	71.3	107	11/1939	33	17/1897	76.2	1966	62.2	1993	15.1	0.0	0.0	0.0
August	85.9	51.1	68.5	105	06/1979	28	26/1910	74.1	1983	63.3	1918	11.0	0.0	0.1	0.0
September	74.0	40.8	57.4	99	05/1978	14	25/1926	64.2	1966	49.0	1965	1.5	0.0	3.8	0.0
October	61.1	30.6	45.8	89	01/1938	-8	30/1991	53.4	1963	35.5	1919	0.0	0.4	18.6	0.0
November	44.8	18.9	31.9	75	25/1937	-27	26/1919	40.2	1999	15.8	1985	0.0	4.3	28.1	1.6
December	33.0	8.4	20.8	66	02/1995	-43	13/1919	30.1	1939	5.3	1919	0.0	13.2	30.5	7.0
Annual	59.0	30.1	44.6	111	19190629	-48	18990205	48.3	1934	40.1	1978	33.2	46.7	188.4	26.4
Winter	33.1	8.0	20.7	71	19820222	-48	18990205	28.8	1934	5.9	1979	0.0	38.0	88.9	23.1
Spring	58.6	30.9	44.8	99	18980510	-23	19320311	51.3	1910	38.5	1917	0.6	3.9	48.9	1.7
Summer	84.4	51.5	67.9	111	19190629	28	19100826	72.0	1961	61.9	1993	31.0	0.0	0.2	0.0

Fall	60.0	30.1	45.0	99	19780905	-27	19191126	50.9	1963	37.1	1985	1.5	4.7	50.4	1.6

Table updated on Oct 31, 2012

For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May

Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

APPENDIX 4
CLIMATE and PRECIPITATION DATA BRIDGER MONTANA
http://www.wrcc.dri.edu/climatedata/climsum/

BRIDGER, MONTANA (241102)

1981-2010 Monthly Climate Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	36.6	42.1	51.7	60.2	69.4	78.3	87.3	86.2	75.4	61.5	45.3	36.0	61.0
Average Min. Temperature (F)	14.0	17.4	24.3	31.7	40.2	47.7	53.0	51.0	42.0	32.7	22.9	14.2	32.7
Average Total Precipitation (in.)	0.43	0.45	0.72	1.56	2.14	1.80	0.91	0.64	1.11	1.09	0.54	0.44	11.85

Unofficial values based on averages/sums of smoothed daily data. Information is computed from available daily data during the 1981-2010 period. Smoothing, missing data and observation-time changes may cause these 1981-2010 values to differ from official NCDC values. This table is presented for use at locations that don't have official NCDC data. No adjustments are made for missing data or time of observation. Check NCDC normals table for official data.

Total of Precipitation (Inches)

(241102)

File last updated on November 17, 2016
a = 1 day missing, b = 2 days missing, c = 3 days, ..etc.., z = 26 or more days missing, A = Accumulations present Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5 Individual Months not used for annual or monthly statistics if more than 5 days are missing. Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

2007	0.38 e	0.10	1.05	1.16	2.12	3.14	0.93	0.20	0.95	2.15	0.12	0.07 b	12.37
2008	0.26	0.50	0.12 a	0.24	3.61	1.34	0.52	0.06	2.42	1.67	0.19	0.59 c	11.52
2009	0.00 c	0.38 a	0.92 b	1.82	0.50	2.47	1.02	0.46	0.37	1.63 a	0.00	0.27 h	9.57 a
2010	0.26 a	0.15 b	0.13	1.04	2.34	1.45	0.53	1.55	0.36	0.51	1.53	0.29 a	10.14
2011	0.05	0.32 c	0.65 k	0.73	6.40	0.85	0.26	0.39 a	0.26	1.09	0.77	0.21	11.33 a
2012	0.00	0.04	0.34	0.82	1.92	0.24	0.21	0.44	0.00	0.48	0.39	0.25 a	5.13
2013	0.43	0.41 a	0.14 a	0.58	3.21	1.07	0.93	0.10	2.40	2.46 e	0.20	0.94 b	12.87
2014	1.49 a	0.81 b	1.17 f	2.18	1.78	2.22	0.00	1.12	1.18	0.07	1.58	0.48	12.91 a
2015	0.03	0.32	0.22	1.10	3.03	0.97	0.62	0.82	0.03	1.89	0.18	0.89	10.10
2016	0.00	0.00	0.77	1.74	1.97	0.00	0.84	0.61	1.83	1.96	0.00 u	----- z	9.72 b

BRIDGER, MONTANA

Period of Record General Climate Summary - Temperature

Station:(241102) BRIDGER															
From Year=1900 To Year=2012															
	Monthly Averages			Daily Extremes				Monthly Extremes				Max. Temp.		Min. Temp.	
	Max.	Min.	Mean	High	Date	Low	Date	Highest Mean	Year	Lowest Mean	Year	>= 90 F	<= 32 F	<= 32 F	<= 0 F
	F	F	F	F	dd/yyyy or yyyymmdd	F	dd/yyyy or yyyymmdd	F	-	F	-	# Days	# Days	# Days	# Days
January	34.4	11.8	23.1	73	23/1919	-34	17/1930	42.8	1934	5.4	1916	0.0	11.1	29.2	7.2
February	39.9	16.2	28.1	71	11/1951	-35	15/1936	41.7	1954	7.0	1936	0.0	7.1	25.8	4.0
March	48.9	22.7	35.8	79	22/1910	-26	06/1920	47.5	1910	21.0	1912	0.0	3.2	26.0	1.4
April	59.7	31.7	45.7	89	24/2012	-3	02/1936	54.2	1915	37.5	1975	0.0	0.4	16.5	0.0
May	69.5	40.2	54.8	98	29/1919	16	01/1931	63.4	1934	47.3	1927	0.8	0.0	4.4	0.0
June	78.7	47.6	63.1	106	27/1919	27	01/1916	73.8	1988	54.7	1998	4.4	0.0	0.3	0.0
July	88.1	53.0	70.6	110	25/1933	35	04/1915	79.7	1936	61.8	1993	14.0	0.0	0.0	0.0
August	86.6	50.7	68.6	106	10/1928	28	25/1992	75.1	1971	63.2	1911	12.2	0.0	0.1	0.0
September	75.3	41.8	58.6	101	03/1950	9	24/1926	66.6	1998	46.2	1965	2.7	0.0	3.3	0.0
October	62.6	33.3	48.0	92	02/2011	-13	24/1919	54.3	1955	33.1	1925	0.0	0.5	14.4	0.1
November	46.8	23.3	35.0	84	02/1914	-26	13/1959	45.6	1949	17.3	1985	0.0	3.5	24.7	1.3
December	36.6	15.1	25.9	72	27/1980	-37	24/1983	36.9	1939	8.7	1983	0.0	9.8	28.6	4.4
Annual	60.6	32.3	46.4	110	19330725	-37	19831224	49.6	1953	42.6	1912	34.2	35.6	173.2	18.4
Winter	37.0	14.4	25.7	73	19190123	-37	19831224	35.1	1934	13.6	1979	0.0	28.0	83.6	15.6
Spring	59.4	31.5	45.4	98	19190529	-26	19200306	51.3	1910	38.4	1917	0.8	3.6	46.9	1.4

Summer	84.4	50.4	67.4	110	19330725	27	19160601	73.6	1931	62.3	1993	30.6	0.0	0.4	0.0
Fall	61.6	32.8	47.2	101	19500903	-26	19591113	52.9	1953	39.9	1985	2.8	4.0	42.4	1.4

Table updated on Oct 31, 2012

For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb. Spring = Mar., Apr., and May

Summer = Jun., Jul., and Aug. Fall = Sep., Oct., and Nov.

APPENDIX 5

CARRYING CAPACITY CALCULATION WITH MEASURED UTILIZATION

2007:
Actual use 154 wild horses (45% desired utilization)/70% measured utilization = 99 wild horses

2008:
Actual use 130 wild horses (45% desired utilization)/62% measured utilization = 94 wild horses

2009:
Actual use 156 wild horses (45% desired utilization)/66% measured utilization = 106 wild horses

2010:
Actual use 139 wild horses (45% desired utilization)/62% measured utilization = 101 wild horses

2011:
Actual use 166 wild horses (45% desired utilization)/83% measured utilization = 90 wild horses

2012:
Actual use 170 wild horses (45% desired utilization)/66% measured utilization = 116 wild horses

2013:
Actual use 145 wild horses (45% desired utilization)/84% measured utilization = 78 wild horses

2014:
Actual use 159 wild horses (45% desired utilization)/58% measured utilization = 123 wild horses

2015:
Actual use 172 wild horses (45% desired utilization)/84% measured utilization = 92 wild horses

2016:
Actual use 160 wild horses (45% desired utilization)/91% measured utilization = 79 wild horses

Total: 99+94+106+101+90+116+78+123+92+79/10 years= 98 wild horses

APPENDIX 6

CARRYING CAPACITY CALCULATION WITH ADJUSTED UTILIZATION

The calculations are for adjusted utilization is based upon the following formula CY/ACY=PI(1.23)-.23=YI(MU)=AU. This formula calculates Crop yield (CY) precipitation measured from October to September of each year Divided by the 30 year average crop year (ACY) for Lovell Wyoming changed from 6.79 in 2006 the last AML calculation to 6.28 presently indicative of a drier climate trend. This equals the precipitation index (PI) that is then multiplied by the constant regression equation of (1.23)-.23 which equals the Yield Index (YI) this is multiplied by the measured utilization (MU) which equals adjusted utilization (AJU). Adjusted utilization is then used in the carrying capacity formula. The limiting factor for carrying capacity is also the greater PI and YI value which is used for the formula. Then: actual use (desired utilization)/adjusted utilization=Proper Carrying Capacity.

2007: CY=6.60 and 12.37 / ACY 6.28 and11.85 = PI 1.05 and 1.04 (1.23)-.23=YI 106%(MU 70%)=74%AJU actual use 154 wild horses (45% desired utilization)/74% adjusted utilization = PCC 94 wild horses

2008: CY=6.37 and 11.52 / ACY 6.28 and 11.85 = PI 1.01 and .97 (1.23)-.23=YI 101%(MU 62%)=63%AJU actual use 130 wild horses (45% desired utilization)/63% adjusted utilization = PCC 93 wild horses

2009: CY=4.29 and 9.57 / ACY 6.28 and 11.85 = PI 0.68 and 0.80 (1.23)-.23=YI 75%(MU 66%)=50%AJU actual use 156 wild horses (45% desired utilization)/50% adjusted utilization = PCC 140 wild horses

2010: CY=5.45 and 10.14 / ACY 6.28 and 11.85 = PI 0.87 and 0.85 (1.23)-.23=YI 84%(MU 82%)=52%AJU actual use 139 wild horses (45% desired utilization)/52% adjusted utilization = PCC 120 wild horses

2011: CY=9.19 and 11.33 / ACY 6.28 and11.85 = PI 1.46 and 0.95 (1.23)-.23=YI 157%(MU 81%)=100%AJU* actual use 166 wild horses (45% desired utilization)/100% adjusted utilization PCC = 74 wild horses

2012: CY=3.03 and 5.13 / ACY 6.28 and 11.85 = PI 0.48 and 0.43 (1.23)-.23=YI 36%(MU 89%)=24%AJU actual use 170 wild horses (45% desired utilization)/24 % adjusted utilization = PCC 318 wild horses

2013: CY=5.76 and 12.87 / ACY 6.28 and 11.85 = PI 0.92 and 1.09 (1.23)-.23=YI 111%(MU 84%)=93%AJU actual use 145 wild horses (45% desired utilization)/93% adjusted utilization = PCC 70 wild horses

2014: CY=5.82 and 12.91/ ACY 6.28 and 11.85 = PI 0.93 and 1.09 (1.23)-.23=YI 111%(MU 86%)=64%AJU actual use 159 wild horses (45% desired utilization)/64% adjusted utilization = PCC 112 wild horses

2015: CY=4.99 and 10.10 / ACY 6.28 and 11.85 = PI 0.79 0.85 (1.23)-.23=YI 81%(MU 89%)=68%AJU actual use 172 wild horses (45% desired utilization)/68% adjusted utilization = PCC 114 wild horses

2016: CY=**7**.76 and 9.72 / ACY 6.28 and 11.85 = PI 1.24 and 9.72 (1.23)-.23=YI 129%(MU 90%)=100%AJU* actual use 160 wild horses (45% desired utilization)/100% adjusted utilization = PCC 72 wild horses

Total: 94 +93+140+120+74+318+70+112+114+72/10 years=121 wild horses

*adjusted utilization cannot exceed 100% use