

**Northern California and Nevada Border**

**Twin Peaks Wild Horse and Burro**

**Herd Management Area**

**Aerial Population Survey**

**April 3, 2016**



**“Spring Congregation”**

**Twin Peaks Wild Horse and Burro Herd Management Area**

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## Abstract

An independent aerial survey was completed over northeastern California and northwestern Nevada for the Twin Peaks Wild Horse and Burro Herd Management Area on April 3, 2016. The objective was to estimate the population of wild horses (*Equus caballus*) and wild burros (*Equus asinus*) and to monitor the habitat recovery from the 2012 Rush Fire, recent juniper removal projects, and trespass and impacts of livestock grazing. Approximately 218 miles of transect strips were flown within the Twin Peaks Herd Management Area boundary. Using the aerial strip transect method, the survey estimated the populations of wild horses and wild burros in the Twin Peaks Wild Horse and Burro Herd Management Area as follows:

760-844 wild horses (including some mules)

323-358 wild burros

Over 750 photographs and continuous GoPro video footage were taken during the flight; photos by Craig Downer and Jesica Johnston. The flight and photos were made possible due to the coordination and support from LightHawk, a 501(c) (3) non-profit organization with a mission that aims to “*accelerate conservation success through the powerful perspective of flight.*” We appreciate and sincerely thank LightHawk and the pilots for their continued support. All photos and GoPro video footage are available by request.



## Background



This report is part of an ongoing body of independent research consisting of both field and aerial surveys in the Twin Peaks Wild Horse and Burro Herd Management Area. This and other reports are intended to inform the public and provide input for the Bureau of Land Management (BLM) resource management decisions in this region.

The Twin Peaks Herd Management Area covers 789,852 acres of mostly public land with some small privately owned land interspersed. The Herd Management Area is approximately 35 miles wide east to west and 55 miles long north to south and is bordered by Highway 395 on the west, Honey Lake on the south, Cottonwood Mountains on the north and the Smoke Creek Desert on the east. In addition to being legal habitat for wild horses and burros, the Twin Peaks Herd Management Area encompasses seven Wilderness Study Areas; and provides habitat for many native

wildlife species, including populations of the greater sage-grouse (*Centrocercus urophasianus*) and the pygmy rabbit (*Brachylagus idahoensis*), both of which are candidate species for listing under the Endangered Species Act.

In August and September of 2010, the BLM's Eagle Lake Field Office captured and removed 1,581 wild horses and 159 wild burros from the Twin Peaks Wild Horse and Burro Herd Management Area. A total of 1,740 wild equids were removed from this section of public land that is legally designated for wild horses and burros. At the time of the roundup, the BLM claimed the wild horses and burros were in "excess". Their determination of "excess" was not made by using scientific criteria concerning their ecological carrying capacities, but instead by largely arbitrary and relatively static "appropriate management levels" (AMLs) determined by the BLM and chiefly favored to the permittees grazing domestic livestock within the HMA.

This area is subject to heavy livestock grazing by private ranching interests. The BLM allocates 18% of the forage to the wild equids living in the Twin Peaks Herd Management Area and 82% to privately owned livestock. This is in conflict with the mandate in Section 2 c of the Wild Free-Roaming Horses and Burros Act of 1971 which states that wild-horse-and-burro legal areas on BLM and US Forest Service lands shall be "devoted principally" to the welfare and benefit of the wild horses and burros themselves, rather than to livestock or other exploitive interests, such as mining companies and off-road-vehicle users (WFRHBA, 1971).

In 2013, the National Academies of Science (NAS) completed a comprehensive review and report. This study concluded that the Bureau of Land Management's Wild Horse and Burro program had failed to use scientifically rigorous methods to estimate population sizes and growth or to assess the impacts of intensive management actions on genetic viability (NAS, 2013). The NAS report found no evidence of excess wild horses and burros. This raised questions about the basis for BLM management decisions concerning wild horses and burros and related range issues. Population and

range information presented to justify decisions seemed to be scientifically under-informed or inaccurate.

In 2015, The Bureau of Land Management (BLM) did an aerial population census of seven North-Eastern California wild horse and burro Herd Management Areas in April and May. During a close examination of the BLM flight documents provided in a recent Freedom of Information Act (FOIA) request, it became clear that scientifically supportable and defensible population estimates of these wild horse and burro populations was not accomplished by BLM. An independent team of researchers reviewed and calculated the BLM written daily count sheets, spreadsheets, notes and the 215 photographs, looking for credible documentation of the BLM's census estimates of wild horse and burro populations. In doing so, it was discovered the BLM's aerial research was not scientifically justifiable. The BLM flight data sheets state they saw three-thousand and eighty-one (3,081) wild horses and wild burros and wild mules during their census flights but they only documented eight-hundred and sixty-five (865). Although on all five days of flight there were three BLM employees plus the helicopter pilot searching for wild horses and burros, two-thousand, two hundred and sixteen (2,216) of the alleged wild horses and burros tallied were un-documented. More than ever before, BLM field managers and wild horse and burro specialists are challenged to base management decisions on accurate and credible population estimates. Our research demonstrated that the BLM's aerial survey was not scientifically supportable and not defensible and therefore not credible. (Anderson, Gregg 2015).

Another in-depth assessment found the Bureau of Land Management's administrative decisions for wild horses and burros in the Twin Peaks Herd Management Area to be politically driven. This study found a loose interpretation of both legal requirements and science in favor private livestock grazing interests (Johnston, 2011). See trespass cattle below grazing on public lands outside the permit conditions.





## Resource Allocation

The Twin Peaks Herd Management Area is the largest remaining population of wild horses and burros in California, even though a portion of the Herd Management Area occurs in Nevada. When carefully analyzed, wild horse and burro population estimates together with their BLM-assigned appropriate management levels and forage allocations demonstrate that the Twin Peaks HMA wild horses and burros are inadequately represented and unfairly allocated resources in BLM's management plans. Privately owned domestic livestock are given the majority of forage resources in spite of the legal provisions, including "land principally devoted," set forth to favor wild horses and burros in the unanimously passed Wild Free-Roaming Horses and Burros Act of 1971 (WFRHBA, 1971).



BLM's arbitrary "appropriate management levels" for wild horses and burros in the Twin Peaks Herd Management Area are: 448-758 for wild horses; and 72-116 for wild burros despite the unanimously passed 1971 Wild Free-Roaming Horses and Burros Act § **1331. Congressional findings and declaration of policy** *Congress finds and declares that wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West; that they contribute to the diversity of life forms within the Nation and enrich the lives of the American people; and that these horses and burros are fast disappearing from the American scene. It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands.*



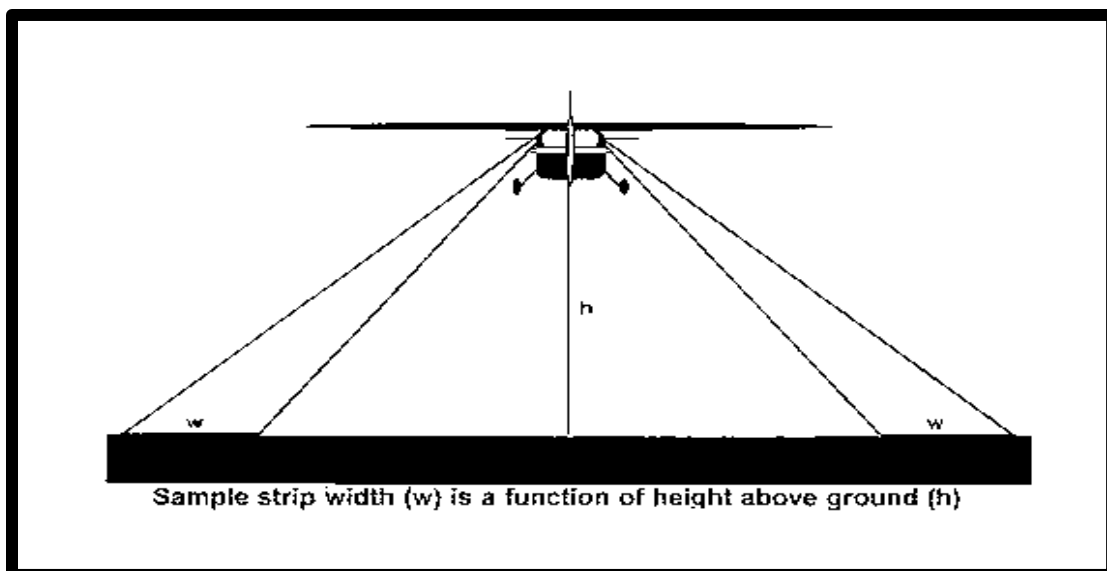
## Survey Methodology

Our most recent flight was completed in a 1957, Cessna 172 high-wing, “tail dragger” airplane. In addition to a veteran search-and-rescue pilot familiar with this region, survey participants included two experienced wildlife observers familiar with the Twin Peaks Herd Management Area and whose resumes include a variety of projects with wildlife aerial research.

Several scientifically accepted aerial methods exist to estimate wildlife populations within a large area. Here we employed the “aerial, straight-line-strip-transect” method for estimating relative population density. In this, the transect strip relative to the total area allows a density ratio to be determined. As modified by other variable factors, this ratio is then used to estimate a low-to-high population range. Our survey was adapted from the Guenzel methodology for estimating the population size of pronghorn and other wildlife species (Guenzel, 1997).

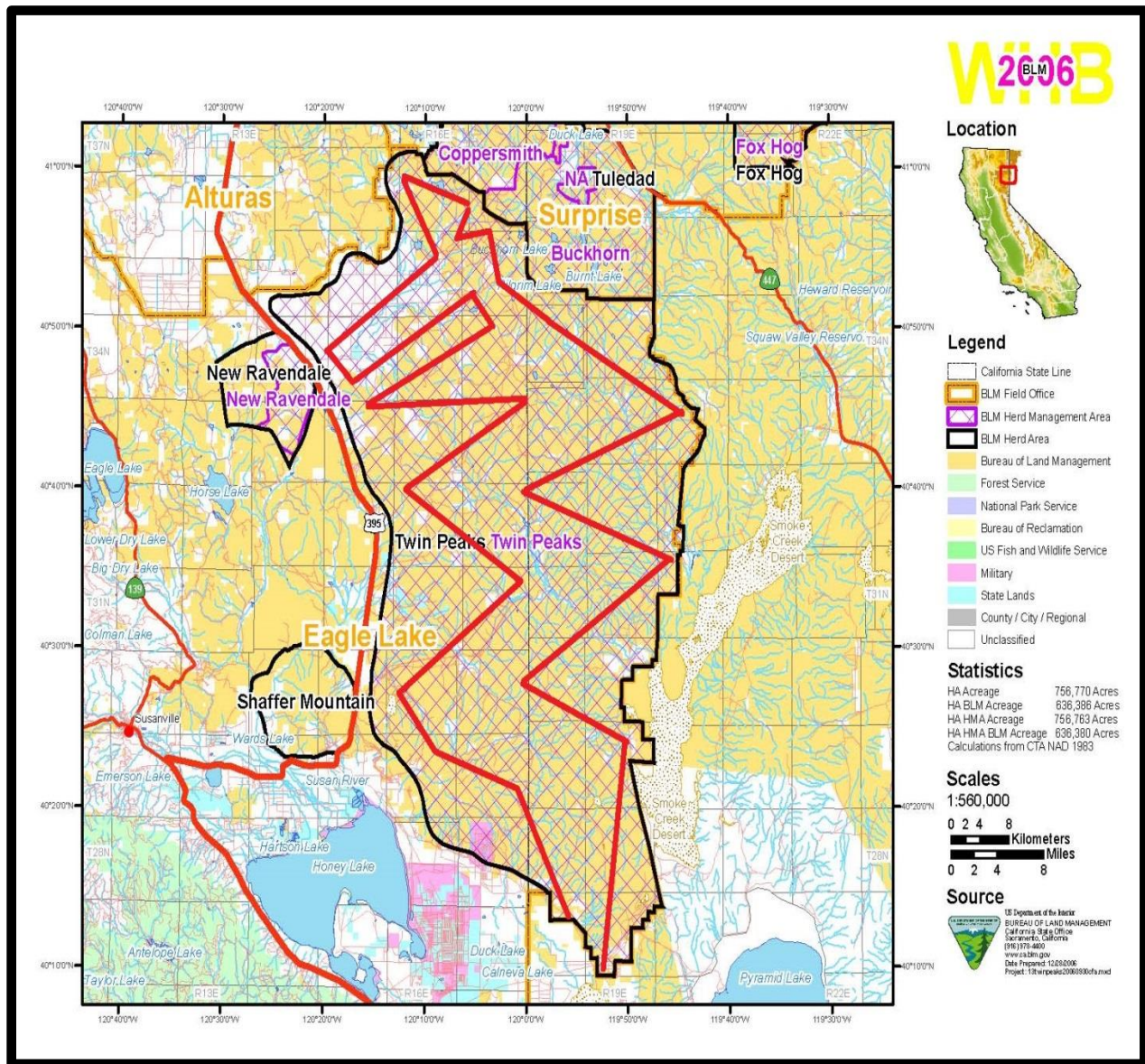
Conducting a complete flight in a single day provides more accurate data. Such sampling includes a variety of habitats with adequate transect spacing and minimizes concerns about equid movements, which increase over time and could lead to multiple counts of the same individuals.

### Aerial Transect Technique





## Flight Map and Survey Transects



## Flight Itinerary and Specific Details with Census Data

On April 3, 2016, the aerial survey flight left the Reno-Stead Airport at 8:32 AM and returned at 11:28 AM with no stops. The weather presented mostly clear skies with light wind. There was approximately 10 miles of visibility. A temperature reading of 45° Fahrenheit was taken at flight departure.

Aerial transects were randomly selected and flown to cover both previously burned and un-burned portions of the Twin Peaks Herd Management Area. A total of 218 transect miles were surveyed; and totals of 249 wild horses and 45 wild burros were counted in these. Our observed area included all five BLM-assigned wild horse and wild burro “home ranges” within the HMA. Flight height above ground level varied from 800 to 1,000 feet; and there was an adjusted transect strip of 0.31 to 0.41 of a mile on each side of the plane. Our transects included all nine of the major livestock grazing allotments within this wild horse and burro herd management area. The Twin Peaks wild horse and burro herd management area is separated into livestock grazing allotments by fencing and/or natural barriers in order to control domestic livestock movements. However, these fences also restrict wild horse and wild burro movements as well as other wildlife; and this is contrary to the “free roaming” lifestyle mandate for wild horses and burros under the Wild Free Roaming Horses and Burros Act (WFRHBA,1971).

## **Results**

Based on the density of wild horses and wild burros observed along all of the transects, we estimate that approximately:

- 760-844 wild horses (including mules) and;
- 323- 358 wild burros

currently remain in the Twin Peaks Wild Horse and Burro Herd Management Area.

These results are consistent with previous population estimates using the same transect methodology. See Table 1 below and whose sources are: Downer, Johnston, 2010; Downer, Johnston, 2012; Downer, Johnston, Scott, 2013; Downer, Johnston, 2014.

## **Previous Independent Surveys**

This flight is the fifth independent aerial population survey for the Twin Peaks Wild Horse and Burro Herd Management Area since the massive removal of wild horses and



burros during the summer of 2010. Previous surveys – which include both aerial and ground transects – have found small populations of wild horses and wild burros to remain within the HMA. Our surveys have also documented significant fire damage to soils and vegetation and the slow recovery of such within burned areas. We have also documented the continuing and major livestock trespass on the public lands of the Twin Peaks HMA and vicinity. The latter is producing major ecological impacts that are detrimental to the recovery of natural habitats of many wildlife species, including the returned-North-American-native wild horses. Our earlier aerial survey reports, including photos and videos, have been formally published and are available for reference.

**Table 1: Wild Horse Population Estimates**

<b>Wild Horse Population Growth</b>				
<b>2010</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2016</b>
Horses	Horses	Horses	Horses	Horses
84-265	312-387	351-459	447-593	760-844

Our surveys indicate that the Twin Peaks wild horse population is increasing. The 2016 census is slightly higher due to the fact that this flight occurred during the spring foaling season. Independent research has demonstrated that the annual foal survival rate is approximately 10% for wild horses in the Great Basin region (Gregg, LeBlanc, Johnston 2014). The higher population increase observed in our five aerial surveys is probably a compensatory reproductive response to the massive wild horse and wild burro removals in 2010. Compensatory reproduction occurs when an animal's population is greatly reduced, and this can be either as a direct or indirect consequence of management actions, including bait and water trapping and helicopter-aided removals and chemical or surgical contraception. Compensatory reproduction involves an increase in fertility and foal and adult survival, and is largely attributed to reduced competition for food, shelter, and other species-specific habitat requirements (NAS, 2013).

**Table 2: Wild Burro Population Estimates**

<b>Wild Burro Population Growth</b>				
<b>2010</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2016</b>
Burros	Burros	Burros	Burros	Burros
NA	NA	230-287	101-120	323-358

The survey and population estimates for remaining Twin Peaks wild burros reveal a major irregularity. This may relate to the burros' small population size and is undoubtedly related to the documented burro removals that have recently occurred. Since 2010, the BLM Eagle Lake Office has trapped and removed at least 22 burros from the Twin Peaks Herd Management Area. These removals occurred between October 2012 and November of 2013. Furthermore, in 2014, the BLM officials filed a decision record stating that they would be capturing and removing from 90-110 wild burros from the Twin Peaks Herd Management Area (NEPA Register, 2015). It is currently not known whether this action has been completed, but the smaller burro population detected during the 2014 survey indicates that it has. In addition, in January of 2017 the BLM Eagle Lake field office signed a categorical exclusion document stating that they will be capturing and removing an additional 150 wild burros from the Twin Peaks HMA area within the following 12 months (NEPA File # DOI-BLM-CA-2017-06-CX).

### **Spring Congregation**

This flight documented a large grouping of wild horses. These are what some call "Spring Congregations" and are related to birthing and mating rituals that many species, including wild horses, perform after winter cold temperatures pass and there is a springing and greening up of forage, and a general renewal of life. In the case of horses with their 11-month gestation period, this involves the giving birth to newborn foals,



shortly after which the mares again cycle into sexual receptivity, or estrus. This then leads to overt competition among stallions for access to and favor of the mares. The vying stallions display some attention-grabbing behaviors, strutting and prancing about, and sometimes actually rearing up, kicking, biting, i.e. fighting, though usually these contests for mares are resolved without serious damage to one another. See picture below for photo documentation of the “Spring Congregation” seen during this flight in a remote region in the Twin Peaks HMA.



The areas of “congregation” are often areas on warm southerly facing hillsides (as seen above) and have plentiful water and forage of high nutritive value, due to certain minerals in the soils favoring the growth of plants. Some of these areas contain certain clays containing sought-after minerals that the horses will directly imbibe as dissolved spring water or by actually eating clayey muds. Sometimes they lick mineral-laden rocks or soils containing these precious minerals in the form of salts. We have observed the “spring congregations” of wild horses in the Pine Nut Mountains of western Nevada and other areas of the West for many years, and this sighting provides new insights into wild horse behavior. The bands that come in from the herd’s home range may sum to hundreds of individual horses. (Hutchins, 2003.)

## Genetics

Since the BLM's immense removal in 2010, the Twin Peaks wild horse and wild burro populations appear to be recovering, but significant concerns remain for these relatively small, isolated populations. The large-scale removals have subjected them to greatly reduced genetic diversity. And this problem is compounded by extensive fencing within the HMA that restricts gene flow between and among the diverse bands. Fencing separates the wild horses and wild burros here into what BLM terms "home ranges" (also an ecological term signifying the annual, or other time period, distribution of an individual or group of animals). The BLM has obscured its meaning to signify livestock grazing allotment areas and their usually arbitrary boundaries. These allotments are defined by fence-lines and/or natural barriers that restrict and control livestock movement and grazing pressures. However, these fences negatively impact the wild horses' and wild burros' free-roaming behavior including their naturally and instinctively occurring rest and rotation of vegetated areas that they forage on. The fences also impede the interchange of breeding adults between and among the fence-divided diverse bands. The resulting fragmentation of these equid social units paves the way for inbreeding and jeopardizes the long-term survival vigor of our precious and unique Twin Peaks wild horse and wild burros. All of this, of course, is very much contrary to the true and core intent of the Wild Free-Roaming Horses and Burros Act of 1971.

Genetic testing was completed on 94 wild horses removed from the Twin Peaks Herd Management Area (Cothran, 2011). The results revealed alarming population subdivisions occurring within the Twin Peaks Herd Management Area. Indeed, according to this scientific analysis, this mustang herd's heterozygosity (genetic variation) is "*approaching concern levels*" (Cothran, 2011). And this was the herd's genetic status in 2010 *prior* to the removal of 1,637 wild horses, which, of course, greatly reduced the population and therefore the gene pool. The present genetic diversity of the remaining Twin Peaks wild horses is definitely substandard and puts the entire herd at risk of inbreeding. This is a General Public issue and the General Public must insist that the Twin Peaks herd, as many other similarly persecuted herds



throughout the West, be restored to viable levels on unfenced legal lands containing sufficient habitat for their long-term survival.

As concerns the smaller but none-the-less valued wild burros, genetic testing was also completed. This was done on 39 individuals that were removed from the Twin Peaks Herd Management Area during the violent 2010 roundups. Results evinced a serious population subdivision among these burros. Indeed, according to the report, the *“population size based upon appropriate management levels is somewhat below the minimum viable population level”* (Cothran, 2012). As with the wild horse evaluation, this reflects the population’s genetic health in 2010 *prior* to the removal of 160 wild burros. It is therefore plain that this ill-conceived roundup has significantly reduced the numbers of an already substandard wild burro population – and this compounds our concerns regarding their genetic health and future vigor and long-term survival.

Reduced genetic diversity can *“impair vigor, fertility, and disease resistance and could limit ability to respond to environmental variation”* (Goodloe et al., 1991). In addition, research has shown that significantly reducing populations, as the BLM did here in 2010, can:

- (a) result in genetic bottlenecks; and
- (b) cause hidden population structures resulting in behavioral isolation, further restricting gene flow (Ashley, 2004).

In conclusion: decisions to further reduce herd populations and attendant genetic diversity would put the Twin Peaks wild horse and wild burro herds in danger of a die-off if any natural or manmade disaster were to occur in the Twin Peaks herd management area. This could be in the form of a catastrophic wild fire, extreme drought and prolonged high temperatures, an extremely severe winter (such as is now happening in 2016-2017), massive predation, epidemic disease, and many other serious and proven threats, often interrelated. Additional removals of already compromised and underpopulated wild horse and wild burro populations would jeopardize their long-term

ecological adaptation and survival, as well as their inherent and innate ability to self-regulate their population numbers, given the chance.

Here, we take the opportunity to remind the reader that 2,500 individuals is the population level that is recommended for viability by the IUCN Species Survival Commission Equid Specialist Group (Duncan, 1992).

## **Fire**

The Rush Fire in 2012 burned 315,577 acres within the Twin Peaks HMA boundary. Monitoring of the subsequent impacts of this fire have demonstrated the slow recovery of fragile desert ecosystems in the Great Basin region. Ecological surveys have documented a slow recovery in these areas, areas which if subjected to continued pressures from humanity, such as from off-road-vehicles, livestock grazing, massive ground and water disrupting mining projects, as well as ground water pumping and removing for subdivisions, golf courses, industries, etc., will only result in barren wastelands, not the healthy desert ecosystems these areas should be as wild-horse and burro containing enhanced life communities. (Downer, 2015).

In the Twin Peaks HMA, many areas burned by the Rush Fire still exhibit deeply scorched soils that support little in the way of vegetation. In these areas, the fire burned through the topsoil to lower soil horizons. This deeper penetration occurred especially in ravines where strong drafts developed and where taller and thicker trees and bushes grew. More level and less heavily vegetated sites exhibited soils that were not as deeply scorched. Overall, the Rush Fire's burned area displays a patchwork mosaic pattern. Thus, there are many non-burned areas of varying sizes within the fire's perimeter.

## **Juniper Removal**

Western Juniper trees (*Juniperus occidentalis*) are native to north-eastern California (Munz, 1963). They grow in some of the most inhospitable landscapes imaginable, thriving in an environment of baking heat, bone-chilling cold, intense sub-light, scarce

water, and fierce winds. Such trees can withstand drought conditions that kill other arid-adapted plant species. They generally grow very slowly. A juniper standing only five feet tall may be 50 years old and can live from 350 to 700 years. Despite their longevity, junipers rarely exceed 30 feet in height and three feet in diameter. Including other species in this genus, junipers are key plant species in high desert habitats. They supply a wide range of critical ecosystem services including nutrient cycling, climate regulation, maintaining water balances, and carbon sequestration. In addition, they benefit wildlife by providing critical habitat, including food and shelter. For example, rabbits, rodents, coyotes and a large variety of bird species utilize juniper berries as a staple food source. They also prevent erosion and retain valuable moisture in desert environments.

Junipers contribute important general ecosystem benefits. Their thick, yellow-green foliage provides shade and protection in many an otherwise open landscape. They absorb moisture to later release it through transpiration during dry seasons as well as year-round. Thus junipers provide a more humid atmosphere that is favorable to many sympatric species of plants and animals and on a broad scale when their woodlands are allowed to fill their niche. Juniper litter (dead needles under and around the trees) is a valuable asset to the land – it is nature's compost that deepens soils and makes them more nutrient-rich and beneficial to the health of many other species. Not only do these trees slow soil erosion, but they slow snow melt and reduce excessive rain run-off, both of which may create deep gullies and undercut water tables. In general, forest ecosystems, including pure juniper and mixed pinyon-pine-juniper woodlands, supply a wide range of critical ecosystem services (Jones and Lynch 2007; Czajkowski et al. 2009; Motz et al. 2010).

The unnatural and excessive removal of native plants, such as junipers, leads to severe erosion and sedimentation. Their increase is a natural response to the higher temperatures that are being caused by Global Climate Change. Junipers provide ecosystem services for desert communities and complete an essential niche as water preservers and purifiers in arid climates. Juniper and juniper-containing forests should



be conserved rather than destroyed as BLM has and continues to do in the Twin Peaks HMA and other public lands areas.



2016 Aerial photograph of Juniper destruction in Twin Peaks wild horse and burro HMA. Note the barren “restoration” areas (lower half with bulldozer trails). Contrast 2015 reddish burned area (top center) versus the natural juniper forest area (top right).

BLM touts this juniper forest destruction as so-called “restoration” projects on our public lands that involve the large-scale removal of junipers. These public lands “restoration” projects are not true restoration, but rather a destruction of the natural ecosystem for private, corporate livestock interests. This forest destruction not in conjunction with the BLM’s stated mission to create a “thriving ecological balance” on our public lands.

## Reserve Design

Through employing sound principles of Reserve Design, more long-term viable and ecologically well-adapted, self-sustaining equid populations should be allowed to establish themselves. Provided certain barriers to their expansion, these wild horse and wild burro populations would self-limit according to the availability of food, water and shelter and in relation to other factors such as predation and climatic exigencies. Though BLM officials fail to acknowledge natural limitations, sound evidence exists proving that wild horse and burro populations on public lands can self-regulate their numbers without interference, such as herd-disrupting helicopter roundups contracted by the BLM (see Wolfe, 1980; NAS, 1982).

The Twin Peaks HMA and surrounding HMAs and public as well as private lands provides a vast and complete habitat that could serve viable populations for both wild horses and wild burros. It counts on sufficient elevational gradient providing for seasonal migrations, up in warmer seasons and down in colder seasons. Also, the desolate ecosystems to its east and south would act as natural barriers to these herds expansion. By employing certain measures to ensure adequate forage, water, shelter, mineral sources, and other habitat requirements for viable population levels, these wild horses and wild burros would settle into their respective ecological niches here. Once they filled their niches, their population numbers would self-stabilize as concomitantly they became specifically well-adapted to the unique Twin Peaks ecosystem, which also contains a significant population of the horses' and burros' natural predators, especially mountain lions (*Felis concolor*). The existing perimeter fencing would serve as a boundary to prevent the wild horses and burros from expanding into more human-inhabited areas, although this is not necessarily the case.

Through detailed observation of the herds and their various social groups, an intelligent plan could be devised. This plan would follow the sound principles of Reserve Design (Peck 1998) and, thus, allow for truly long-term genetically viable, harmoniously ecologically adapted, and naturally self-stabilizing populations of wild horses and wild

burros (Downer 2010 a; Downer 2014 a & b). Much of the success would depend upon planning and public support to protect the wild horses and burros and ecosystem of the Twin Peaks and adjoining lands to provide for the complete and viable habitats for both species, it may also be necessary to employ those provisions under the WFRHBA for Cooperative Agreements that are to be found in this Act's Sections 4 and 6. The public overwhelmingly supports the restoration of wild horse and burros in their rightful and legally intended habitats under provisions of the WFRHBA and other related laws and provisions.

## **Conclusions**

Our aerial and on-ground research into the status of Twin Peaks HMA's wild horse and wild burro populations and ecosystems have revealed substantial issues. Our ongoing research of these equid populations indicate that the habitats and populations are slowly trying to recover, but both still remain at significant risk. The repeated major population reductions of these relatively small and isolated populations of wild horses and burros has undermined their genetic health and disrupted ecological adaptations to the unique Twin Peaks ecosystem. Genetic bottlenecks have produced a serious loss of genetic variation for both the horses and the burros. Consequently, both their short-term and their long-term viability has been dangerously compromised. Further loss of genetic variation and disturbances to social infrastructures of these horses and burros will compromise their ability to adapt to rapidly changing ecological conditions in the Twin Peaks Herd Management Area.

The BLM's "appropriate management level" is artificially determined and provides minimal privilege to the wild horses and burros in favor of private livestock interests. Any greater density is considered "overpopulation" by the BLM. This arbitrary assignment of population does not consider ecosystem, genetic and population dynamics and sets up the remaining population for inbreeding and decline.



The Twin Peaks HMA wild horse and wild burro AMLs conflict directly with population levels that would occur naturally were these equid herbivores allowed to fill their respective ecological niches here. A horse or burro can efficiently utilize habitats in the great basin and subsist on marginal and dry vegetation. BLM fails to adhere to basic ecological principles for maintaining natural habitats or the ecosystem services wild horses and burros provide in the Great Basin regions. Implementing Reserve Design measures including the removal of permitted livestock would restore the “thriving natural ecological balance” in this region and protect the future survival of California’s wild horses and burros; while preserving their legal land and freedom.



## References

- Anderson, Gregg, (2015) Independent Analysis of Bureau of Land Management Aerial Census.
- Ashley, (2004). Population Genetics of Feral Horses: Implications of Behavioral Isolation. *Journal of Mammalogy*, 85, 611-61.
- Bell, (1970). The use of the herb layer by grazing ungulates in the Serengeti. In *Animal Populations in Relation to Their Food Source*. British Ecological Society Symposium. Ed. Adam Watson. Oxford, U.K.: Blackwell Science Publications.
- Cothran, (2011). Genetic Analysis of the Twin Peaks Herd Management Area, CA. Department of Veterinary Integrated Bioscience: Texas A&M University.
- Cothran, (2012). Genetic Analysis of the feral burro herds from the Twin Peaks of California. Department of Veterinary Integrated Bioscience: Texas A&M University.
- Downer, (2007). *Wild Horses: Living Symbols of Freedom*. Minden, NV.
- Downer, (2010a). Proposal for Wild Horse/Burro Reserve Design as a Solution to Present Crisis. *Natural Horse*, 2010. Vol 12, Issue 5, Pages 26-27.
- Downer, (2010b). Public Comment. *Twin Peaks Wild Horse and Burro Gather Plan*.
- Downer, (2014a). *The Wild Horse Conspiracy*. Minden, NV.  
<http://thewildhorseconspiracy.org/> & [www.amazon.com/Wild-Horse-Conspiracy-Craig-Downer/dp/1461068983](http://www.amazon.com/Wild-Horse-Conspiracy-Craig-Downer/dp/1461068983) or as eBook [www.amazon.com/dp/B009XJ64P4](http://www.amazon.com/dp/B009XJ64P4)
- Downer, (2014b), The Horse and Burro as Positively Contributing Returned Natives in North America, *American Journal of Life Sciences*. Vol. 2, No. 1, 2014, pp. 5-23. doi: 10.11648/j.ajls.20140201.12
- Downer, (2015) Pine Nut Mountains Ecological Report. For Friends of Animals. Submitted to BLM, Carson City District Office, Nevada.
- Downer, Johnston, (2010). Twin Peaks Herd Management Area Post Roundup Survey.

Downer, Johnston, (2012). Twin Peaks Wild Horse and Burro Herd Management Area Aerial Population Survey October 4, 2012.

Downer, Johnston, Scott, (2013). Twin Peaks Wild Horse and Burro Herd Management Area Aerial Population Survey November 26, 2013. [http://protectmustangs.org/wp-content/uploads/2014/02/PM-Twin\\_Peaks\\_Flight\\_11.26.13\\_FINAL.pdf](http://protectmustangs.org/wp-content/uploads/2014/02/PM-Twin_Peaks_Flight_11.26.13_FINAL.pdf)

Downer, Johnston, (2014). Twin Peaks Wild Horse and Burro Herd Management Area Aerial Population Survey December 22, 2014.

Duncan, P. (1992). Zebras, Asses, and Horses: An Action Plan for the Conservation of Wild Equids. IUCN Species Survival Commission, Equid Specialist Group. Gland Switzerland: International Union for Conservation of Nature.

Goodloe, Warren, Cothran, Bratton, Trembicki, (1991) Genetic Variation and Its Management Applications in Eastern U.S. Feral Horses. *The Journal of Wildlife Management*, 55, 412-421. Retrieved from <http://www.jstor.org/stable/3808969>

Gregg, LeBlanc, Johnston, (2014). Wild Horse Population Growth. <http://rtfitchauthor.com/2014/04/28/report-wild-horse-population-growth/>

Guenzel, (1997). Estimating Pronghorn Abundance Using Aerial Line Transect Sampling. Wyoming Game and Fish Department, Cheyenne WY. <http://www.ruwpa.st-and.ac.uk/distance.book/pronghorn.html>

Hutchins, M. Editor. Grzimek's Animal Life Encyclopedia. 2<sup>nd</sup> Edition. 2003. Vol. 15: Mammals IV. See section: Horses, zebras, and asses, pages 225 to 236, by Patricia D. Moehlman, PhD.

Johnston, (2010). Public Comment. *Twin Peaks Wild Horse and Burro Gather Plan*.

Johnston, (2011). California's, Wild Horses and Burros: Twin Peaks Herd Management Area. [http://csusdspace.calstate.edu/bitstream/handle/10211.9/1492/WHB\\_Thesis\\_Final%201.30.11.pdf?sequence=1](http://csusdspace.calstate.edu/bitstream/handle/10211.9/1492/WHB_Thesis_Final%201.30.11.pdf?sequence=1)



Munz, (1963). A California Flora. Univ. of California Press Berkeley & Los Angeles.

National Academy of Sciences (NAS), (1982). *Wild Free-Roaming Horses and Burros*. National Academy Press. Washington DC, 1982.

National Academy of Science, (2013). "Using Science to Improve the BLM Wild Horse and Burro Program – A Way Forward"

[http://www.nap.edu/openbook.php?record\\_id=13511&page=R1](http://www.nap.edu/openbook.php?record_id=13511&page=R1)

National Research Council. *Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward* (2013). Washington, DC: The National Academies Press.

[http://www.nap.edu/catalog.php?record\\_id=13511](http://www.nap.edu/catalog.php?record_id=13511)

NEPA Register, (2015). CA-N050-2015-03 CX Wild Horse and Burro: Removal of Nuisance Burros on Private Land.

[http://www.blm.gov/ca/forms/nepa/search.php?ob=initiation\\_date&fo=Eagle%20Lake](http://www.blm.gov/ca/forms/nepa/search.php?ob=initiation_date&fo=Eagle%20Lake)

Peck, Sheila, (1998). Chapter 5: Reserve Design. **In**: Planning for Biodiversity: Issues and Examples. Island Press, Washington, D.C. Pages 89-114.

Wild Free-Roaming Horse and Burro Act of 1971 (WFRHBA), (1971). Department of the Interior: Bureau of Land Management (PUBLIC LAW 92-195). Retrieved from

[http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications\\_Directorate/public\\_affairs/wild\\_horse\\_and\\_burro/documents/Par.34639.File.dat/whbact\\_1971.pdf](http://www.blm.gov/pgdata/etc/medialib/blm/wo/Communications_Directorate/public_affairs/wild_horse_and_burro/documents/Par.34639.File.dat/whbact_1971.pdf)

Wolfe, Jr., M.L., (1980). Feral Horse Demography: A Preliminary Report.

<http://www.jstor.org/stable/3897882>