PRYOR MOUNTAIN WILD HORSE RANGE (PMWHR), MONTANA:  
ECOLOGICAL EVALUATION AND RESERVE DESIGN PROPOSAL

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Comments due in by 4 PM Mountain Time on Tues., Jan. 24, 2017 to BLM-Billings. Email to send input to is: [blm\_mt\_billings\_fo@blm.gov](mailto:blm_mt_billings_fo@blm.gov) Attn: James M. Sparks, Billings Field Manager (T. 406-896-5013).

**Introduction:**  
The Pryor Mountain wild horse herd and ecosystem is one of the world’s most intensively investigated, filmed and written about (see Bibliography). My evaluation seeks to bring past studies and documentation up to date by revealing more about the present state and condition of the Pryor Mountain herd and ecosystem. In June 2016, I conducted thirty-four (34) GPS-located ecological evaluations, in the form of 100-foot transects. I complemented these with additional observations, also taking many photographs. Then I compared my findings with earlier evaluations and did a literature review and interviews in order to achieve an informative report and Reserve Design proposal.

To begin, it is valuable to gain a visual overview of the Pryor Mountain ecosystem by inspecting certain maps e.g. Pryor Mountain Wild Horse Range map, Billings Field Office, or DeLorme Montana/Wyoming Atlas & Gazetteer, as well as USGS maps of the region. A revealing map is provided at this link: <https://en.wikipedia.org/wiki/Pryor_Mountains_Wild_Horse_Range#/media/File:Map_of_Pryor_Mountains_Wild_Horse_Range_-_2009.jpg>.

The dramatically accentuated terrain, including the Big Coulee canyon running north to south down the center of PMWHR; the Crooked Creek canyon on its west side, as well as the stupendously dramatic Bighorn Canyon, with cliffs dropping thousands of feet adjacent to the eastern boundary of the PMWHR – all lend themselves well to a successful Reserve Design implementation for the wild horses and their habitat. PMWHR’s abrupt topography provides natural barriers that act to limit the home ranges of the Pryor Mountain mustang bands. This limitation would contribute significantly to their natural self-stabilization of numbers.

It is my belief that as these mustangs fill their species’ ecological and native ancestral niche within the relatively contained and natural habitat in and around PMWHR, their intrinsic ability to self-stabilize will kick in. The mechanism for this involves the mustangs’ mature social units, or bands, in which elder stallions and mares inhibit reproduction by younger band members. Also involved is the biological limiting of reproduction as the horses’ niche space is filled and resources become more limiting. This happens with ecologically “climax” species world-wide, including the horse, and there is no reason it would not happen in the Pryors. It could happen if we people would only have sufficient patience to allow it, and it would be the fulfilling of the true and core mandate of the Wild Free-Roaming Horses and Burros Act of 1971 (WFHBA). The herd should stabilize within a few short generations, given the past stabilization of this herd before mountain lion hunting season was reestablished in the Pryor Mountains around a decade ago.

**Description of the Pryor Mountain Wild Horse Range (PMWHR):**   
PMWHR is chiefly located in the southeastern part of Carbon County, Montana, but extends slightly into Bighorn County, Wyoming (see map link above). It consists of 39,651 acres of BLM, U.S Forest Service, National Park Service, and private lands. Just to the south of this wild horse sanctuary is located the town of Lovell, where the headquarters and visitors center for the Bighorn Canyon National Recreation Area (BCNRA) is found as well as the Pryor Mountain Wild Mustang Center, which contains a wealth of information on the history, ecology, wild horse herd characteristics & individual horses (Cerroni, 2016).

The northern end of the PMWHR is more verdant and contains alpine meadows, including a variety of grasses, forbs and some shrubs, including extensive skunk cabbage stands. The northern end also includes forests, with smaller varieties of Douglas fir and limber pine. The southern end of the PMWHR is dry and desert-like, with juniper trees, sagebrush, rabbit brush, deer brush, and even prickly pear cacti. This end phases into ranches such as the historic Tillett Ranch.

PMWHR contains species found in both the Great Basin and Rocky Mountains, and is a noted center for biodiversity and species differentiation (Fahnestock & Detling, 2000 a).

According to the BLM, the PMWHR is supposed to be off-limits to grazing by livestock. However, during my ecological evaluation in June 2016 (as well as earlier for a brief visit in June 2015 & still earlier for a more extensive inspection in June of 2003), I observed much sign of cattle grazing, especially in the southern Wyoming portion & along the eastern portion of PMWHR in Montana bordering the BCNRA.

While the Bighorn River and BCNRA lie to its east, the Crow Indian Reservation lies to the north of the PMWHR. This reservation could provide an expanded habitat for the Pryor mustangs provided a cooperative agreement were to be reached under sections 4 &/or 6 of the WFHBA. Highway 310 parallels PMWHR’s western border & provides a ready access to a half or more of PMWHR. Stretching north from Lovell, Highway 37 provides access to the southeastern portion of PMWHR, including Mustang Flat, which lies just to the east of Sykes Ridge. This dry area is inhabited by only a few wild horse bands. The great majority of PMWHR’s wild horses occur higher up; and in June 2016 I found these just below the US Forest Service fence in the area of Penn’s Cabin and Mystic Reservoir, as well as descending along the Burnt Timber Ridge and Road.

Annual precipitation ranges from six inches in PMWHR’s southwestern corner to twenty inches in its northwestern corner. Thunderstorms are frequent in the Pryor Mountains and account for many wild horse deaths over the years (Kathrens, 2001). These thunderstorms fixate much nitrogen into the soils and contribute significantly to plant life in so doing (Ricklefs, 1979). Elevations range from 3,650 feet at the southern Wyoming section to over 8,700 feet on Big Pryor Mountain on the north.

PMWHR’s topography varies from flat benches and mesas (atop shallow to deep rocky canyons) to long ridges and projecting rocky peaks. Deep natural divides within PMWHR include such features as Commissary Ridge, Burnt Timber Ridge, and the deep & spectacular Crooked Creek Canyon. By far the most deep & spectacular canyon in this area contains the Bighorn River and lies just to the east of PMWHR. Also, on PMWHR’s northern end, the Dry Head cliffs compose a natural barrier that limits the expansion of the Pryor Mountain wild horse herd.

As a colorful, picturesque, intricate, and biologically diverse area, I found PMWHR to be enchanting. Here occurs a multi-faceted transition from dry prairie and bushland to alpine forest and meadow, from expansive mesas with plenty of grass to dramatic cliffs and canyons with intermittent meadows. As an ecologist, I recognize that PMWHR’s natural variety creates an ample “niche-space” for a host of producer plants, consumer animals, and decomposer lichens, fungi, etc., and that the process of all these species’ establishment has been going on not just for thousands but for millions of years. As the fossil record abundantly attests, horse kind has played a major role in the establishment of the Pryor Mountain’s great and inter-balanced biodiversity of species, again, not just for thousands but for millions of years. It actually helps restore this ecosystem because its ancestors and related equine kin evolved therewith & worked out their differences in harmonious ways ((MacFadden, 1992; MacFee, 2013).   
  
**PMWHR and Adjacent Lands are highly suitable for Reserve Design**Pryor Mountain’s natural barriers are ideally suited to a wise and caring Reserve Design approach to the conservation and self-limitation of these mustangs over time (Downer 2014 a; Downer 2014 b). It is my recommendation that officials allow the PMWHR wild horses to naturally partition the resources found here by setting up naturally attuned seasonal movement patterns over space and time. This will lead to their natural self-stabilization and prevent their overcrowding. The secret to the success of Reserve Design is for us humans to leave these bands alone and not to be continually gathering and removing them. If they are left undisrupted and allowed to fill their special niche in this horse-suitable ecosystem, they will become a self-stabilizing population living in balance and harmony with the many species of plants & animals that belong here in this amazing ecosystem. And relevant here also is a better protection of the Puma population, a natural predator of wild horses. Black Bears are also known to take weak, diseased, very young and very old mustangs and are found in the Pryors. It is also possible the Wolf could become reestablished here, though its close cousins, the Coyotes are prevalent and filling a much needed niche. A variety of songbirds, marmots, mule deer, bighorn sheep, Clark’s nutcrackers, Raven, & golden eagles are other impressive symbionts of the Pryor Mountain mustangs that I observed.

**Additional Background Information:**Thirteen years earlier (June of 2003), I had visited the PMWHR, observing the wild horses and their habitat, including the famous stallion Cloud and his band. At this time, these unique mustangs were inhabiting their traditional, upper summering meadows and forests (composed of Douglas fir, limber pine, certain spruce & other trees) on the Custer National Forest that adjoins BLM PMWHR land to the south. The Pryor herd had occupied this USFS area in 1971 when the Wild Free-Roaming Horses and Burros Act was first passed – which should give them the legal right to live here according to the act’s core intent. And even earlier, the PMWHR had been declared a nationally protected “range” in 1968 by Secretary of the Interior Stewart Udall (Fazio, 1997).

In 2003, the mustangs I observed appeared to be amply dispersed and ecologically harmonious. They were not overcrowding their highland meadows and interspersed woodlands, but complementing them in the many ways horses complement ecosystems (Downer 2014 a & b). So in 2016, it was very disturbing to witness how these horses were being blocked from their traditional highland habitat by a two-mile-long, buck-and-pole fence that very effectively kept them from inhabiting their legitimate ancestral grounds. Dr. Ron Hall had documented these horses in their summering meadows in 1971 in his scientific study (Hall, 1972). And this makes the U.S. Forest Service’s depriving them of their natural home actually illegal (see The Cloud Foundation, 2016).

**Study Methodology:**   
Between June 9 and 14, 2016, I conducted 34 ecological evaluations throughout the PMWHR. These were in the form of 100-foot transects and followed methodologies described in the manual: “Interpreting Indicators of Rangeland Health” (BLM *et* al, 2005). By “evaluation” I refer to a type of in-field observational study of the life community, including its soil, moisture, and the living plants and animals themselves. Much of this “evaluation” depends upon my own assessment of the ecosystem as a professional ecologist and can be compared with BLM-Billings recent ecological assessment (see Bureau of Land Management, 2016). Concerning the latter, I think it justified to say that much of the BLM’s analysis comes from the point of view of traditional livestock- or big-game-serving interests that favors ruminant herbivores such as cattle, sheep, including bighorn, deer, elk, etc.

My ecological evaluations take into consideration three major ecosystem attributes:   
(1) Soil and Site Stability (soil);  
(2) Hydrologic Function (water); and   
(3) Biotic Integrity (the living community).

Following BLM *et al.* (2005), the five evaluation categories represent Departure from Expected (normal, healthy ecosystem) and are as follows: N-S = None to Slight; S-M = Slight to Moderate; M = Moderate; M-E = Moderate to Extreme; and E-T = Extreme to Total.

**Results of Ecological Evaluation**  
Table 1 and Chart 1 give the results of my 34 ecological evaluations (June 2016).

Table 1.  
Totals for Each Rating Category for Each Ecological Attribute  
(1) Soil & Site Stability: N-S = 7; S-M = 18; M = 7; M-E = 2; E-T = 0  
(2) Hydrologic Function: N-S = 7; S-M = 16; M = 9; M-E = 2; E-T = 0  
(3) Biotic Integrity: N-S = 12; S-M = 17; M = 3; M-E = 2; E-T = 0  
Totals: N-S = 26; S-M = 51; M = 19; M-E = 6; E-T = 0

Chart 1.

None of the transect evaluations revealed the most “Extreme to Total” “Departure from Expected” for any of the three attributes: soil, water, living community. However, a slight number, six out of 102 total (5.8%) displayed a “Moderate to Extreme” departure. In the “Moderate” “Departure from Expected” were 19 out of 102, or 18.6% of the evaluations. Those displaying a “Slight to Moderate” “Departure from Expected” were 51 out of 102 -- exactly one half, or 50%. Those displaying a “None to Slight” “Departure from Expected” were 26 out of 102, or 25.5% -- ca. one quarter.

**Interpretation of Results, with some conclusions and recommendations:** *Soil and Site Stability* and *Hydrologic Function* had very similar evaluation results. Although there were slightly more *Moderate Departures from Expected* in the *Hydrologic Function* than in *Soil and Site Stability*. These results reflect the very close relationship that exists between soils and water. Indeed, particularly in drier ecosystems such as the Pryor Mountains, the health of soils relates to an ecosystem’s ability to retain water throughout the year, i.e. the amount of water retained in the aquifer and the height of the water table. And plant and animal life are very much dependent upon the health of soils and water. Soils, water and the community of living organisms are – all three – tightly bound and usually inseparable; and this particularly relates to wild horses and whether or not they are being allowed to fill their age-old, ecological niche. Horses are post-gastric, as opposed to ruminant, digesters, and this makes them more capable of contributing to healthy soils and, so, to healthy water tables. It is certain that they contribute more humus through their droppings, humus being the organic constituent of soil that binds it together while retaining both nutrients and water vital to plant growth.

The evaluations also suggest that the third attribute: Biotic Integrity is able to adjust, or compensate for disturbances to Soil Site Stability and Hydrologic Function attributes of the ecosystem. For Biotic Integrity, a greater number of evaluations fall in the “None to Slight,” i.e. 12, and “Slight to Moderate,” i.e. 17, categories. And a lesser number fall in the “Moderate” category, i.e. 3. This signifies that plants and animals are adapting, or adjusting, to disturbances in Soils and Site Stability as well as to disturbances in Hydrologic Function. Indeed, a certain degree of disturbance to an ecosystem may be healthy, helping to maintain vigor and long-term survivability in wildlife populations. But, as I have observed throughout the West, animals can be “set up” to make it appear that they are causing problems, when in fact they are being unfairly targeted. In the case at hand, this especially applies when fences unnaturally restrict the wholesome seasonal migrations of the wild horses – definitely the case with the US Forest Service fence that has recently been erected contrary to the WFHBA in the PMWHR! This restriction of natural range puts pressure on the land that is left accessible to the horses, and artificially skews the data to make it appear that the horse is the culprit for habitat damage, ultimately being caused by us people! Adequate range is necessary for any animal to maintain an ecosystem in good order, and it is the legal duty of both the BLM and the US Forest Service to provide this.

Overall results indicate that the PMWHR ecosystem is in fairly good condition. Consequently, I believe PMWHR could tolerate an increase in its wild horse population, but only provided that the Forest Service fence be removed so that the wild horses can resume their generations-old, seasonal migrations to and from the summering meadows and woodlands in the higher portions of their original home range. In this greater, more legitimate and complete habitat, I consider the wild horses to be below their Carrying Capacity, i.e. not to have filled their ecological niche.

Recently, BLM Billings Montana District Office conducted a reevaluation and recalculation of what should be the Appropriate Management Level for the wild horses of the PMWHR and solicited public comment to their report and proposal. The link to this document is: <https://eplanning.blm.gov/epl-front-office/projects/nepa/70745/93955/113272/AML_Recalculation_with_RLH_Final_document_-_508.pdf>. Comments are due on by close of business day, which is 4 pm for BLM in Billings, Montana (Mountain Standard Time) on Tuesday, January 24, 2017.

In the above BLM report, it was revealed that BLM has a project to provide watering sources at mid-elevations in order to release the horses grazing pressure on the lowland wintering habitat as well as on the highland summering habitat. This is an excellent idea, for once the horses become accustomed to these sites, the fuller carrying capacity and a more truly long-term viable population for the Pryor Mountain mustangs could be realized. Nonetheless, I was quite disappointed so see that the report’s authors merely decided on an Appropriate Management Level range of 90 to 120 horses, touting it as an increase from the slightly lower former AML of 85 to 105 horses (also in the public letter announcing the report from James M. Sparks, Billings BLM Field Manager, December 21st, 2016).

As of last census in 2016, there were 160 wild horses estimated to survive in the PMWHR. Given an AML of 90 to 120 horses for an average of 105 horses and given there are 39,651 acres in the PMWHR, BLM is planning to allow only one individual wild horse to remain per 378 acres of PMWHR land! Even some of the very driest areas in the West can support one wild horse per 100 to 200 acres of habitat. Given the more well-watered nature of the Pryor’s, I would recommend a considerably higher population level for these horses and consider this low level to be a danger to the future genetic well-being of the herd.

Along with its rangeland evaluation, the BLM justifies the above low AML level in its above linked recalculation study released in December 2016. It is entitled: Pryor Mountain Wild Horse Range Appropriate Management Level (AML) Recalculation Report.

**Serious disruption to Pryor Mountain Mustangs by recent Custer National Forest Fence**The two-mile long buck-and-pole fence was first constructed by Custer National Forest supervised personnel in the Fall of 2011 (for photos of fence & Pryor mustangs see: http://us1.campaign-archive1.com/?u=b16d80346618d3ce64e8e9877&id=1da2b712f2&e=746161bd52). It is a massive, A-frame structure that is several feet high and wide and effectively prevents wild horses from foraging and sheltering in their traditional upland meadows and woodland that lie to its northwest. Seasonal migratory trails had become established over many generations before the fence was built; and the wild horses were certainly using these trails at the passage of the WFHBA in 1971, making them integral parts of the legal wild horse Herd Area (BLM-Billings) and Territory (Custer National Forest). Furthermore, this habitat was already a legal Wild Horse Range since its declaration in 1968. Consequently, the deprivation of the upland habitat for the wild horses has been a source of major controversy, including legal suits. And a major litigant, The Cloud Foundation (TCF) recently proposed the opening of two gates in this “buck-and-pole” fence. TCF recommended that this occur on August 1of each year and that this aperture would allow the horses to graze mature grasses that had already set seed. As pointed out by TCF, it is also of crucial importance to recognize that this grazing by the horses would serve to prevent catastrophic wildfires by reducing dry flammable vegetation. (See The Cloud Foundation, 2016.)

Renowned filmmaker Ginger Kathrens has been documenting the ongoing use of the Pryor Mountain highland meadows since 1994 (Kathrens, 2001). She has observed that snowfall causes wild horses to descend in November & early December down to warmer & more sheltered areas, such as along the Burnt Timber (Tillett) Ridge on the west & along the Sykes Ridge on the east. She knows that the wild horses have suffered due to the erection of the fence; and this is indicated by their thinner condition. As they go into the winter season, the wild horses’ fitness often proves critical to their survival. But since the fence’s construction, more wild horses have been disappearing, presumably dying of starvation or from exposure to extreme winter storms that are customary in the Pryor Mountains. These disappearances are more frequent from late autumn to early spring (my interviews of local observers).

Most recently, the famous stallion “Cloud” has gone missing and was presumed dead as of summer 2016. In fact, during June 2016, I searched high and low for Cloud, covering an extensive area throughout the PMWHR and adjacent areas while doing my ecological assessments. Though I never caught sight of him, I did spy some palomino look-alikes, likely his offspring or relatives.

As of last census in 2016, there were 160 wild horses estimated to survive in the PMWHR, but the AML is 90-120 horses, which gives an average of 105 horses. Given there are 39,651 acres in the PMWHR, this indicates that BLM is planning to have one individual wild horse per 378 acres! Even some of the very driest areas in the West can support one wild horse per 100 to 200 acres, provided there are dependable water sources. I would recommend a considerably higher population level for these horses and consider this low level a danger to the future genetic well-being of the herd. Along with its rangeland evaluation, the BLM justifies this low level in its recent & above linked study.

**Important Facets of Pryor Mustangs from Literature Review with Critique with Recommendations:  
T**he “Pryor Mountain Complex – Land Use Decision” was produced jointly by the BLM-Billings Field Office and the Custer National Forest (BLM, USFS, 1973) and gave much valuable information. However, the government authors of this document excessively favored local ranchers in defining which areas were to be occupied and protected for the Pryor Mountain mustangs and in assigning their allowable population level, or Appropriate Management Level (AML). On page 25, the document reveals that PMWHR had ca. 265 wild horses when it was legally established by then Secretary of Interior Stewart Udall in 1968. This population level should have been allowed to remain and to self-stabilize, as it was Nature showing us the level that could be accommodated here. But BLM officials arbitrarily opted to set an upper limit at 140 horses, which was subsequently lowered to 85-105 then on May 22, 2009 slightly increased to an AML range of 90 to 120 horses. As already indicated, this substandard level has recently been reinstated by the BLM-Billings office (see Sparks, 2016; & justifying document <http://bit.ly/AMLRecalculationReport>). Accessible through this link, the study justifying this herd size I consider to be tendentious in its conclusions and to fail to adequately value the Pryor Mountain wild horses and their wild-horse-containing ecosystem in their own right. I believe that this study applies limited and narrow standards that lack needed flexibility. The standards being employed are geared to portray the wild horses as a negative and destructive presences, while ignoring their positive and necessary contributions to ecosystems and the possibilities that exist to accommodate them at truly viable levels in the PMWHR and adjoining lands (Downer, 2014 a & b).

PMWHR’s founding 1973 document (BLM, USFS 1973) revealed that officials chose to adopt as AML the exact same population size that local rancher Lloyd Tillett recommended to BLM. Again, I believe that In so doing, they overlooked eminent wild horse authorities and their recommendations for a much larger population level in order to assure this precious herd’s long-term genetic viability. To quote from page 36 of the 1973 document: “Lloyd Tillett, a rancher on the boundary of the horse range, has probably had more contact with the horses over the years than anyone. It is Mr. Tillett’s opinion that at least 80 mares and 60 studs [sums to 140] are necessary to maintain competitive interaction in the horse population in the Pryors. Mr. Tillett also feels that these horses are as pure a strain of mustang type horse as exists in the country and to chance losing the population by reducing the number below 130-140 would be foolhardy.”

For professional land managers to merely assert a rancher’s opinion, governed largely by his own vested interest, while not seeking out that of wild-horse-specialized biologists concerning what would be a vigorous and long-term-viable mustang population level falls short of what is expected of fair-minded public lands protectors and managers. Where is the insertion of equine population/conservation biologists’ recommendations concerning adequate population sizes?

In 1992, the IUCN Species Survival Commission Equid Specialist Group (composed of the world’s scientific authorities on members of the horse family) recommended an interbreeding population of 2,500 individuals in order to maintain viability in the wild (Duncan, 1992, page 5). Since the Pryor Mountain herd is quite isolated from other wild horse herds (the closest being the McCullough Peaks HMA to the south with a very small and genetically non-viable AML), I consider the AML of 90-120 to be a prescription for their decline and demise through inbreeding or chance (stochastic) die-out. Additionally, this herd of “Spanish Colonial Mustang” heritage and their historical habitat in the Pryor Mountains and surrounding areas could possibly be protected as a unique and living heritage under the National Historic Preservation Act.

Even at its high range of 120, the current AML falls 30 short of the typically BLM-endorsed level for genetic viability: 150 adult horses. Though the equine geneticist and veterinarian E. Gus Cothran is often cited as the professional who justifies this 150 level, in fact he later actually recommended around 10 times this figure, or ca. 1,500. (See Cothran & Singer, 2000; Animal Welfare Institute, 2008; Animal Welfare Institute, 2007; Downer, 2014 a).

To quote from page 146 of my book (Downer, 2014 a): “A letter of July 2, 1992, by E. Gus Cothran, Ph.D., director of the Equine Blood Typing Research lab and directed to Mr. David Jaynes at the BLM Office in Billings, Montana, proves revealing. While conciliatory in tone, Cothran obviously felt compelled to emphasize: ‘… the revision documents do not address the potential concerns that exist for the herd based upon the recommendations in my report on the genetic status of the herd. The main point is that a breeding population of 50 [from a total population of 150] is a minimum number, therefore there is little room for error when managing the herd at this size. Second, the population subdivision was a strong point for maintaining genetic variation in the herd. If this is no longer possible, then there is potential [negative] effect.’ … Cothran seems to be issuing a warning to BLM officials about the serious consequences of reducing the wild horses of the Pryor Mountains to such a sub-minimally viable population level as the agency plans.” Genetic analyses conducted by Cothran also proved the PMWHR wild horses to be a unique type of Spanish mustang (see Reed, 2015, page 30). And this brings me to my serious concerns about the administration of PZP to this small and sub-viable mustang population.

**Serious Concerns about the Deleterious, Short- and Long-Term Effects of PZP on Wild Horses:**  
Many of the PMWHR mares have been darted with PZP, a drug that is classified by the FDA as a pesticide and that is used to inhibit the reproduction among wild horses. PZP administration can produce total sterility of mares and many other alarming negative effects, both affecting individuals and their social bands and herds (Downer, 2016). In 2015, 77 mares were treated with this fertility control agent, which has caused considerable adverse effects, both to individual horses and to the population as a whole. These horses are simply not as spirited – and nowhere in the WFHBA did it ever say to domesticate the wild horses! Quoting from my article and as substantiated by scientific and professional studies, here are some of the adverse effects that PZP can and does cause to the horses:

1. PZP weakens immune systems of individuals and their herds, since it inhibits reproduction in horses with stronger immune systems. Horses with weaker immune systems are precisely those who reproduce in greater numbers in PZP-treated herds. Eventually, PZP weakens wild horse herds’ overall immune systems. (Reference: Gray & Cameron, 2010.)
2. Increased stress is experienced by mares who have been successfully darted by PZP and by other members of their social bands. This is because of PZPed mares’ frustration in completing their natural reproductive cycle, which affects the other members of their bands. Ironically, it is precisely the mature and stable, more content and non-PZPed bands that do, in fact, cause a slowing of reproductive rates, as years of research by the International Society for the Protection of Mustangs and Burros (ISPMB) and others abundantly proves. (Reference: Sussman, 2015.)
3. PZP adversely affects mares’ hormonal systems and consequently the social groups to which they belong. PZPed mares become irritable, aggressive, and more masculine, causing disharmony in their bands. PZP lowers estrogen and increases testosterone in mares and also produces ovarian cysts. Cysts increase testosterone levels. (Reference: U.S. National Library of Medicine. National Institutes of Health.)
4. Auto-immune oophoritis, a.k.a. ovaritis or inflammation of ovaries, and also stillbirths result from PZP. Autoimmune oophoritis can lead to the development of other autoimmune diseases. (Reference: Kaur & Prabha, 2014.)
5. PZP-darted herds in Little Book Cliffs, McCullough Peaks, and Pryor Mountains wild horse legal herd management areas gave birth nearly year-round, i.e. 341 days, rather than in the normal spring season. This exposed PZPed wild mares and their offspring to extremes of temperature, and, consequently, to suffering and death. (Reference: Ransom *et al*. 2013.)
6. It is quite disturbing that PZP antibodies transfer to foals from the mare through the placenta while they are in the womb as well as through mare’s milk. These antibodies react with and bind to the *zona pellucida* of female newborns. Yet, BLM regularly administers PZP to pregnant and lactating mares in spite of these published scientific findings. (Reference: Sacco *et al*. 1981.)
7. Weakening of immune system subjects wild horses to mal-adaptiveness to unforeseen major changes such as are occurring due to Global Warming, or catastrophes such as epidemics or wildfires. (Reference: Gray & Cameron, 2010, *op cit.*)
8. PZP causes the immune system to attack and destroy the ovaries and produces a large variety of adverse effects. (References: Gray & Cameron, 2010, *op cit*.; Kaur & Prabha, 2014, *op. cit*.)
9. By extending the lifespans of PZPed mares, PZP creates abnormal numbers of aged, sterile mares. This disadvantages younger horses, who continue to be taken away by BLM roundups to reach arbitrary AMLs. This appeases livestock or other wild-horse-adverse interests on the public lands, rather than respecting the General Public, whose majority values wild horses and burros and wants them to be fairly treated. (Reference: Knight & Rubenstein, 2014.)
10. PZPed mares are no longer reproductively active in the wild horse population, thus diminishing the genetic viability of the herd. The resources they consume would otherwise contribute to reproducing adults and their offspring and maintain the vigor of the herd into ongoing future generations that adapt to ongoing environmental changes, thus assuring their long-term survival. (Reference: Ransom *et al.* 2013, *op. cit.*)
11. PZP is a safety hazard to humans, especially to females who administer it. (Ref.: Devlin, 2015.)

For these and related reasons, I believe that PZP will seriously harm and undermine the vigor of wild horse and burro populations that our nation’s laws mandate us to protect and preserve, as well as to manage. The restoration and maintenance of herd vigor is essential to the ongoing ecological adaptation and long-term survival of each herd. Healthy reproduction is key to healthy wild horse and burro individuals, bands and herds. Tampering with reproduction produces a variety of aberrations that lead to dysfunctional and disordered wild horses. This results in a decline of the herds.

I have heard from many people who closely observe and/or live near wild horses treated with PZP. They describe many still-born or defective foals produced by mares in whom the effects of PZP have worn off, permitting them to again try to reproduce. Also please consider that after a few to several years of yearly application, PZP generally produces total sterility in mares, depending upon the strength of their individual immune systems. This calls into serious question the proclaimed “reversibility of PZP” to enable mares to reproduce again! To reiterate: of great concern is the fact that PZP is less effective in those mares with weakened immune systems. Hence, the wide-spread use of PZP among America’s last wild horse/burro herds – nearly all below minimum viable population (MVP) level – will seriously undermine their long term survival.

But thankfully there exists an honorable alternative to PZP, and similar horse-disrespectful “quick fixes.” As a wildlife ecologist, I have formulated a sound alternative to PZP and similar invasive proposals. This *Reserve Design* strategy would restore long-term viable, ecologically well-adapted, and naturally self-stabilizing populations of wild horses and burros throughout the West. (References concerning Reserve Design: Peck, 1998; Soule & Terborgh, 1999; Downer, 2010; Downer, 2014 a, search “Reserve Design” in Index.) [End quote from Downer 2016.]  
 **Additional & Final Points to Stress, with Conclusions and Recommendations:**  
Allowing the Pryor Mountain mustangs to return to their highland meadows and forests during summer and fall would strengthen the ecosystem and reduce fire hazard significantly. This would also greatly improve the health and long-term viability of the Pryor mustang population.

Compared to my observations in June 2003, in June 2016, I observed more major build-up of dead vegetation in the highland meadows and woodlands of the Pryor Mountains,. This dry fuel buildup is setting the stage for a catastrophic wildfire that could destroy much of Pryor Mountain’s highland forests, meadows, as well as bushlands and seriously set back ecological succession and bio-diversity in this very biodiverse region (Cerroni, 2016).

Lightning is common in the Pryor Mountains and frequently causes wildfires. In addition to reducing dry vegetation, wild horses droppings help build more fertile and moisture-retaining soils, provided they are not over-concentrated. Also horses disperse more and a greater variety of seeds in their feces when compared with ruminant herbivores such as cattle.

Wild horses graze quite differently from ruminant livestock allowed to graze in their habitat. While many forms of livestock pull grass out by the roots when they graze because they lack upper incisors, horses, with their upper and lower incisors, crop off, or prune, the tops of grasses, and can actually promote greater shoot growth & root strength, provided they are not over-concentrated.

Studies of vegetation between 1992 and 1996 indicate that wild horses were not negatively impacting vegetation. These studies involved twelve experimental exclosures to wild horse foraging. Vegetation was just as healthy where the horses grazed as where they did not (Gerhardt & Detling, 2000). Indeed, the plots that were grazed by the wild horses may actually have been healthier when we consider the possibility for overcrowding of plants and increased catastrophic and soil-sterilizing fires.

Building up the PMWHR mustang herd to a more viable level and expanding its occupied habitat would also bolster the local economies both in Montana and Wyoming. A successful wild-horse-viewing tour operation already exists out of the Pryor Mountain Wild Mustang Center in Lovell, Wyoming; and this contributes significantly to the local economy, e.g. ecotourists staying in motels, purchasing meals and supplies, as well as paying for the tours (Cerroni, 2016, *op. cit.*). A similar tour operation could fill an economic niche from the Montana side, perhaps out of Bridger, Billings or even Warren. This economical contribution would fit well into the Reserve Design approach to these magnificent animals and their long-term and beneficial conservation (Downer, 2010, 2014 a & b; Peck, 1998; Soule & Terborgh, 1999).

**Final Words:**In contrast to my recent observations of June, 2016, in June, 2003 there was a greater liveliness among the Pryor Mountain mustangs. I believe that, among other factors, the Pryor mustangs’ current subdued behavior has much to do with:   
(1) the USFS fence that is an enormous impediment to their former, more wide-ranging lifestyle; and   
(2) the intensive darting of the wild mares with PZP, a substance made of pigs’ ovaries that coats the eggs of mares (Ransom *et al., 2013;* Devlin, 2015; Downer, 2016).   
Both (1) and (2) are major steps toward the domestication of these wild horses and, as such, legally conflict with the core intention of the Wild Free-Roaming Horses and Burros Act of 1971, which is still much supported by the general public of the United States.

The unanimously passed WFHBA clearly states that in and around their legal areas, wild horses and burros are to be allowed to integrate into the public lands ecosystem like wildlife, not be domesticated and that they are to maintain their “free-roaming” lifestyles! Concordant with this, the WFHBA also states that these equids are to be treated with “minimum feasible management” (Section 3 a). I believe that the WFHBA is being seriously violated in the PMWHR and that this violation follows the same pattern as the “broken treaties” by which the U.S. government betrayed Native American rights and legally designated homelands, disrespectfully allowing their occupation and despoliation by miners, ranchers, farmers, and other exploiters and disrupters of the natural world (see Brown, 2009). It is crucial that we learn important lessons from past history, including mistakes!

It is of vital importance that the precious Pryor Mountain herd be rescued through a sound Reserve Design approach to their conservation and management. Those of us who still appreciate and care for these and other wild horses in the wild must answer the higher summons to restore the true intent of the Wild Free-Roaming Horses and Burros Act and to reinstate justice to the wild horses and wild burros and their unique wild-horse/burro-containing ecosystems. For here they play a uniquely vital and life-enhancing role.

Were BLM-USDI and USFS-USDA sincere about preserving and protecting, as well as “managing” those relatively few remaining wild horses and burros in the United States, they would give Reserve Design serious consideration. These officials would recognized it as an honest solution that benefits the entire General Public and in a way very married to their Quality of Life. Surely where there is a will there is a way, as the old saying goes, and often in addition to the BLM and Forest Service lands where the wild horses have a legal right, there exist additional lands that can be made available to the wild horses in order to provide complete and viable habitats for truly long-term viable, ecologically well-adapted and naturally self-stabilizing populations, or herds by exercising Sections 4 and 6 of the WFHBA.

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