

Research Update



Advisory Board Meeting
Redmond, Oregon
April 14, 2016

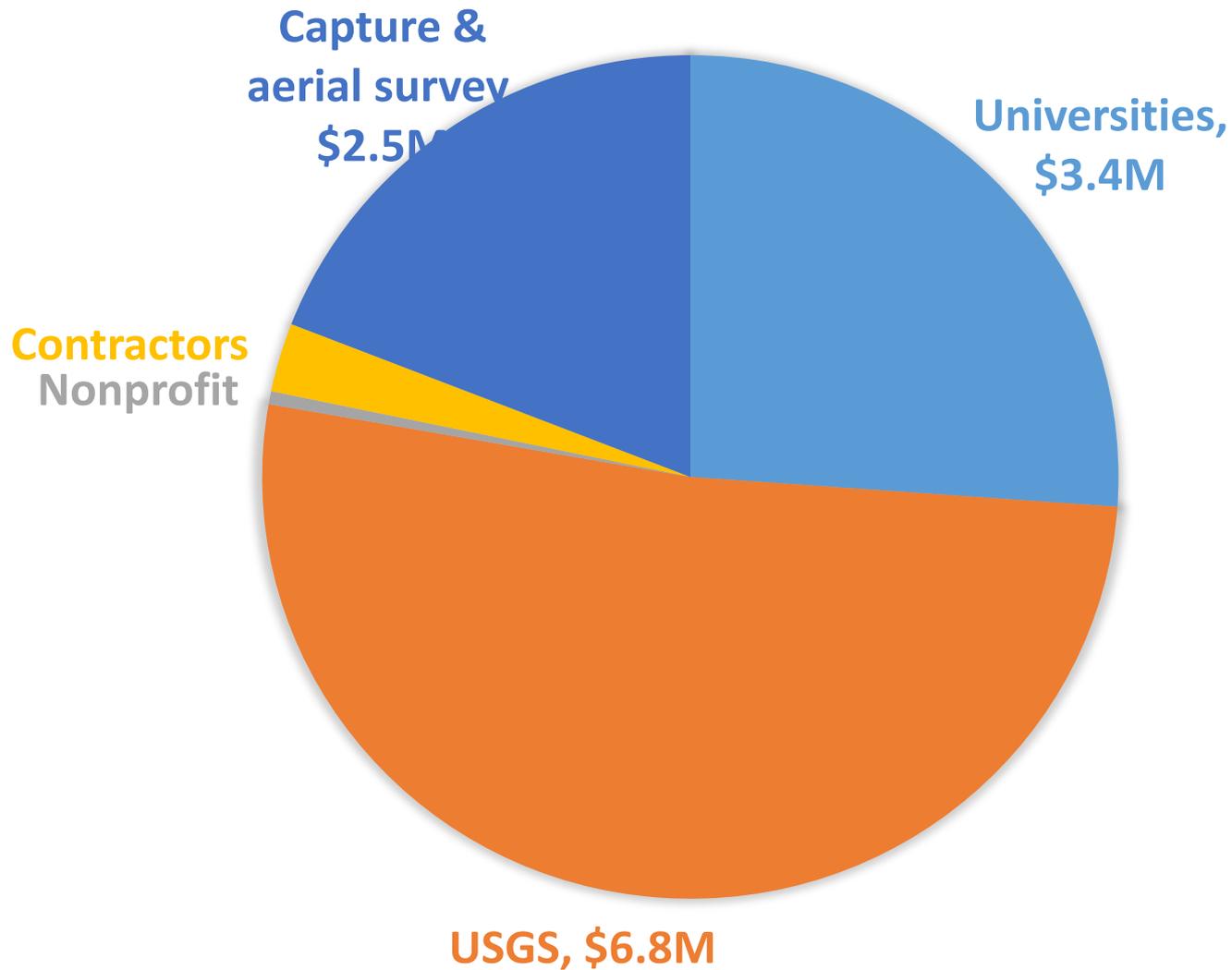
Wild Horse and Burro Program Research Advisory Team

- Reviews research proposals
- Collaborates with field staff
- Makes recommendation to division chief
- Current members, appointed by division chief
 - + Sue McDonnell, DVM (Advisory board liaison)
 - Paul Griffin (BLM WH&B research coordinator)
 - Bryan Fuell (BLM WH&B on-range division chief)
 - Alan Shepherd (BLM Nevada WH&B state lead)
 - Al Kane, DVM (USDA APHIS veterinarian)

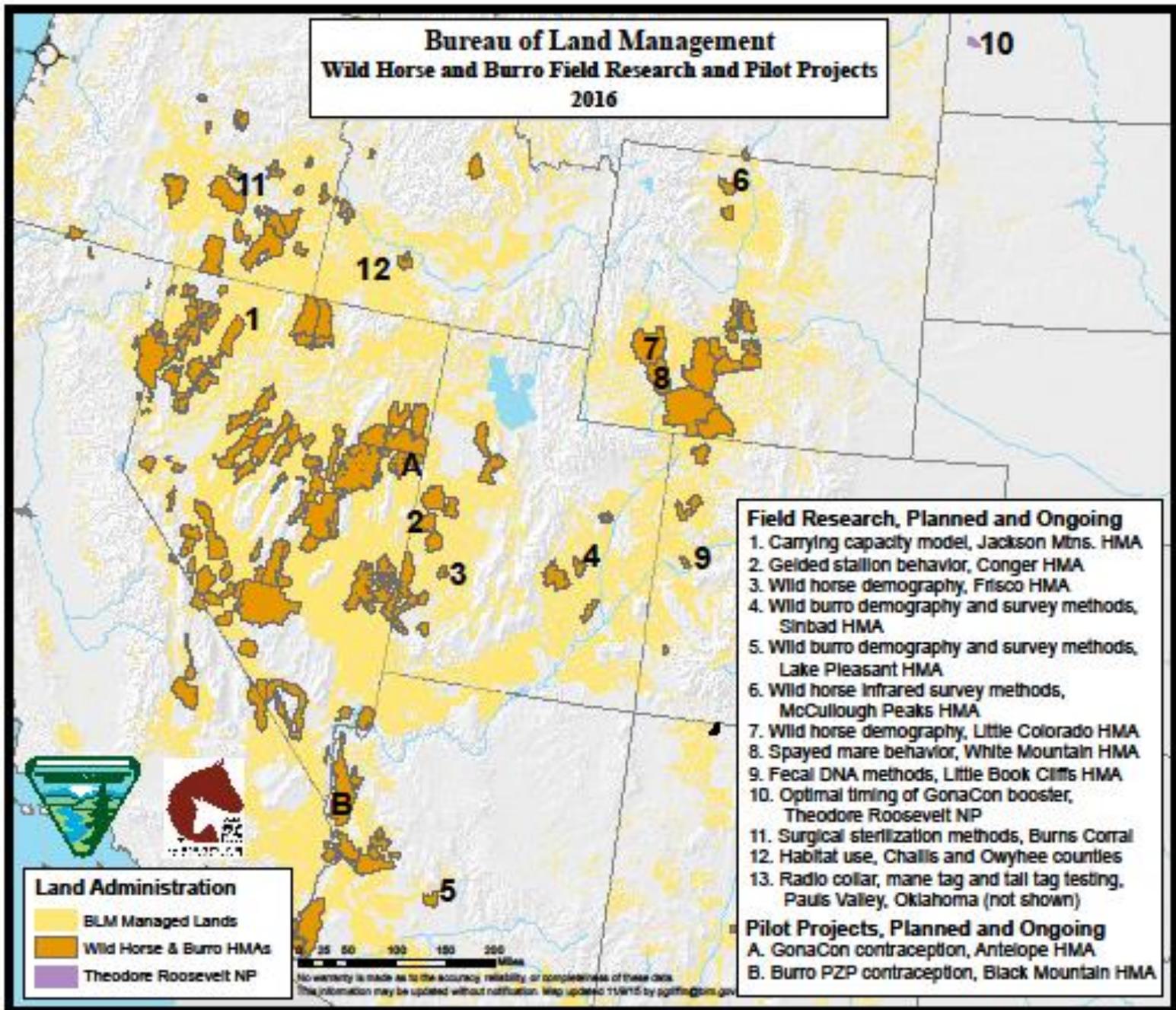
Research & Pilot Projects

- Evaluate Spay & Neuter effects
- Improve WH&B contraception
- Improve population models
- Improve burro survey methods
- Gauge public opinion, improve marketing
- Improve understanding of ecology and genetics

\$13.1 MILLION, FY14-FY20 FUNDS



**Bureau of Land Management
Wild Horse and Burro Field Research and Pilot Projects
2016**



Focus: Spay safety in Oregon

Location: Burns corrals

Researcher: Oregon State University

Evaluate:

1. Spay technique
2. Tubal ligation
3. Laser ablation of oviduct papilla

Focus: Burro studies in Utah

Location: Sinbad HMA

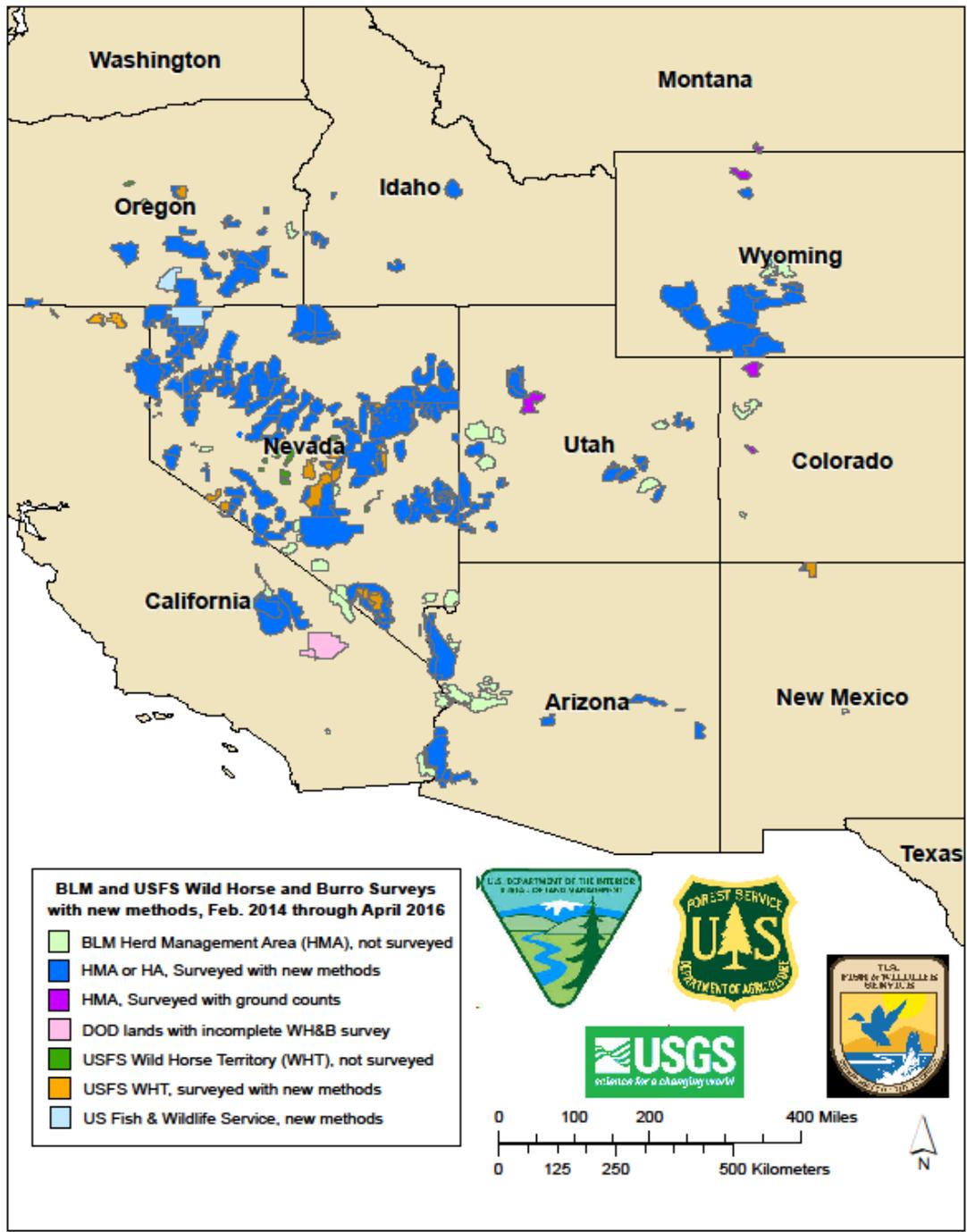
Researcher: US Geological Survey

Evaluate:

1. Burro demography & behavior
2. Aerial survey
 - Use data from radio collars
 - Infrared camera aerial survey

Population estimation

- Most estimates come from aerial surveys, then account for annual growth and animals removed
- New surveys widely used since Feb. 2014
- Most HMAs surveyed with new methods by end of FY16
- Interagency agreement with USGS for technical assistance; USGS is re-hiring the position



I. Research and Pilot Projects

Research studies and pilot projects funded by BLM in FY2015 included \$5.1 million for 16 studies. This includes eight university-led research studies aimed at developing new or improved contraception methods for wild horses and burros; four USGS studies; one population genetics study; one habitat use study; and two socioeconomic studies.

The total cost of projects already funded by BLM in FY2016 is \$2.8 million for five studies: four USGS studies and one project with the Humane Society of the United States. Also, pending proposal approvals, we anticipate that three more USGS studies will be funded during the remainder of FY2016, at an additional cost of \$2.2 million. Starting in FY2016, BLM is funding animal capture and aerial survey costs to support the research studies; these costs will total approximately \$2.5 million between FY2016 and FY2020. If milestones of certain university projects are met, then \$587K of funding will be added to those projects, using FY2017, FY2018, or FY2019 WH&B program appropriations.

The following summary tables list ongoing and proposed WH&B research and pilot projects led by universities, non-governmental organizations, and the USGS, as of March 30, 2016. The BLM web page that presents overviews of many of these research projects (http://www.blm.gov/wo/st/en/prog/whbprogram/science_and_research/usgs_partnership.html) refers to 20 BLM-funded research projects that are numbered here (studies #2 and #3 were originally proposed to BLM as two separate studies, but are funded by a single grant agreement). Studies or pilot projects not numbered here were not listed in a 2015 BLM press release about university-led contraception projects and USGS projects.

I.A. WH&B Research led by universities and contractors; pilot project led by non-governmental organization (NGO)

Research entity; Project Name	Start date – End date; budget	Location	Description
1. Oregon State University; Functional assessment of ovariectomy (spaying) via colpotomy of wild mares	Sept. 2015 – Dec. 2016; \$42,063	BLM corrals in Burns, OR	<p>Researchers will help determine whether ovariectomy via colpotomy can be safely and effectively performed on wild mares. Pilot data from Sheldon NWR suggests the potential for surgery-related health complications from ovariectomy in adult female horses is low (near 1%).</p> <p><u>Status:</u> A draft EA for this and the following studies was released to the public in January 2016. BLM Oregon is preparing responses to public comments in advance of a record of decision, which may or may not have been issued by the time of the April 2016 Advisory Board meeting in</p>

			Redmond, Oregon. The draft EA can be accessed at: https://eplanning.blm.gov/epl-front-office/projects/nepa/56292/67242/73184/MareSterilizationResearchEA_12172015.pdf
2, 3. Oregon State University; Evaluation of minimally invasive methods of contraception in WH&B mares	Sept. 2015 – Dec. 2016; \$315,189	BLM corrals in Burns, OR	The project will evaluate two procedures, tubal ligation and hysteroscopically-guided laser ablation of the oviduct papilla in standing sedated mares. The proposed procedures do not involve major surgery; they are expected to have minimal complications while approaching 100% effectiveness. These surgeries would leave the ovaries intact, so mares are expected to continue cycling. <u>Status:</u> A draft EA for these and the preceding studies was released to the public in January 2016. BLM Oregon is preparing responses to public comments in advance of a record of decision, which may or may not have been issued by the time of the April 2016 Advisory Board meeting in Redmond, Oregon. The draft EA can be accessed at: https://eplanning.blm.gov/epl-front-office/projects/nepa/56292/67242/73184/MareSterilizationResearchEA_12172015.pdf
4. University of Kentucky; Tubo-ovarian ligation via colpotomy as a method for sterilization in mares	Sept. 2015 – Sept. 2018; \$391,369	Lexington, KY	The project will help determine the effectiveness of a custom-designed instrument for placement of a polyamide (nylon) cable tie around the ovarian pedicle and oviduct of mares via colpotomy for tubo-ovarian ligation. The ovaries are expected to not be functional after this procedure, so the results should be similar to ovariectomy (spaying). This study will be in domestic mares. <u>Status:</u> The research team has contracted for the device that will be used to hold and tighten the nylon cable tie in the surgery. Preliminary trials with tissue from necropsied horses evaluated the tightness of the cable ties necessary to constrict blood flow, without cutting into oviduct tissues. The first of these surgeries are likely to take place later this spring.
5. Colorado State University;	Sept. 2015 – Aug. 2020;	Theodore Roosevelt	Goals include: to determine the optimum re-vaccination schedule; the duration of effectiveness; and safety and physiological side-effects (if any)

Re-immunization of Free-Ranging Horses with GonaCon Immunological Vaccine	\$322,919	National Park, ND	<p>in feral horses following re-vaccination with GonaCon; and to develop and test a safe and effective dart configuration and injection system. This study is in feral horses on the Theodore Roosevelt National Park in North Dakota.</p> <p><u>Status:</u> The research team administered GonaCon to two study groups in September, and administered the booster dose to one of those groups in March. The second study group will be boosted in September. In total, groups of mares will have received a GonaCon booster six months, one year, two years, and four years after initial dosage. The team will monitor pregnancy status and foaling rates in all these individuals.</p>
6. Colorado State University; The Effect of Immunization against Oocyte Specific Growth Factors in Mares	Sept. 2015 – Aug. 2019; \$797,932	Fort Collins, CO	<p>This project will focus on vaccination against two proteins in wild horse and burro females; the proteins may result in permanent sterility through premature oocyte depletion. The long-term goal is to develop a vaccine that can cause permanent sterility after a single dose. This study is in domestic mares.</p> <p><u>Status:</u> The research team has synthesized the peptides and prepared the two vaccines under trial. Treatment animals have received both a preliminary and booster dose. The team is monitoring oocyte follicle development and blood hormone levels frequently. They may administer a third dose later this spring, depending on antibody titer measurements.</p>
7. Ohio State University; Electrospun delivery to enhance the effectiveness of immunocontraception strategies in equids	Jan. 2016 – Dec. 2020; \$799,565	Columbus, OH	<p>This project will attempt to develop a new delivery vehicle for porcine zona pellucida (PZP) – currently used as a vaccine contraceptive in some wild horse herds – that would increase the duration of the vaccine’s effectiveness. This project will seek to use electrospun nanofiber technology that can allow for long-term, ‘burst’ delivery of PZP to horses and burros, to result in prolonged contraception. The research is in domestic mares.</p> <p><u>Status:</u> The research team started work in January. They are testing the properties of several different polymers that might be used for the nanofiber capsule.</p>

<p>8. Louisiana State University; The use of membrane disrupting peptide / peptoid LHRH conjugates to control WH&B populations</p>	<p>Sept. 2016 – Aug 2019; \$850,002</p>	<p>Baton Rouge, LA</p>	<p>A project for the development of an injectable agent that would decrease female and male gonad viability. Preliminary data from other species suggest that administration of this drug by a slow-release delivery system will destroy the cells that control spermatogenesis in the male and follicle growth, oocyte development, ovulation and cyclicity in the female. The drug acts by targeting cells that produce gonadotropin releasing hormone (GnRH). The project will also assess the drug’s effect on pregnant mares, both in early and late gestation. The research is in domestic mares and stallions.</p> <p><u>Status:</u> The research team has created a number of candidate peptide-conjugates and peptoid-conjugates. The group will soon be running <i>in vitro</i> trials to see which peptides and peptoids have the best success at targeting cells that express (GnRH), while not damaging cells that do not express GnRH.</p>
<p>Humane Society of the United States (NGO); Applicability and efficacy of ZonaStat-H on wild burros in northwestern Arizona</p>	<p>Oct. 2015 – Dec 2019; \$64,975 (matched with \$350K from HSUS)</p>	<p>Black Mountain HMA, AZ (in and near the town of Oatman)</p>	<p>This BLM-HSUS collaborative project proposes to use HSUS staff to aid in delivering ZonaStat-H (a PZP vaccine) to wild burros in the vicinity of Oatman, Arizona. The project will deliver the drug to nearly-tame burros in the town of Oatman, and will also use trapping and darting to deliver the drug to less habituated burros outside of town.</p> <p><u>Status:</u> A financial assistance agreement (grant) was finalized to support the portion of the pilot project funded by BLM. The much larger fraction of the funding comes from a HSUS donor or donors. The BLM Kingman, Arizona, district office is leading in the preparation of a draft Environmental Assessment related to the project. That draft EA may be ready for release to the public by late April.</p>
<p>Ipsos Public Affairs (contractor); Assessing knowledge, attitudes, preferences, and non-market values regarding WH&B</p>	<p>Aug. 2014 – Dec 2016¹; \$236,943</p>	<p>National polling</p>	<p>This socioeconomic research is intended to gain better understanding of public perceptions, values, and preferences regarding the management of wild horses and burros on public rangelands. Data for the research will be gathered through a series of focus groups, and then a national survey.</p> <p><u>Status:</u> In March 2015, BLM published a notice in the Federal Register</p>

populations and management			stating the intention to conduct focus groups in preparation for a national survey of the public's knowledge and values concerning wild horses and burros. BLM received over 6000 public comments, of which approximately 74 were unique (i.e., not form letters). BLM is preparing responses to those comments in a supporting statement to the Office of Management and Budget (OMB). Pending OMB approval, the next step of the project will be to convene the focus groups. Information from those focus groups will then inform a set of candidate questions for the national survey of the general populace; those questions will also need OMB approval.
Great Lakes Marketing Research (contractor); Analysis and evaluation of demand for off-range wild horses and burros	Oct. 2015 – Dec. 2016 ¹ ; \$109,300	Phone interviews with BLM staff, and 30 outside parties	This is a project to assess future demand for wild horses and burros through adoption and sales and to develop strategies for placing more animals into private care. The research project will also evaluate the current adoption and sales programs to identify ways to strengthen them. <u>Status:</u> The research contractor conducted a number of interviews with BLM staff and BLM partners. The contractor is preparing analysis for reporting.
University of Idaho; Focus on Impact of Wild Horses on Riparian Areas	Aug. 2014 – Jan. 2016 (<i>concluded</i>); \$19,999	Challis, ID and Owyhee county, ID	This small-scale project used wildlife cameras to record use of riparian areas by wild horses, livestock, and wildlife. Preliminary results suggest that wildlife may not have used the monitored habitats at times when horses were present to the same degree as did livestock. <u>Status:</u> The Masters student on this project is preparing her thesis, which will likely be defended in spring 2016.
WEST, Inc. (contractor); Testing double-observer plus distance methods for aerial surveys	Feb. 2016 -- ~June 2016; \$0 (<i>funded by Wyoming Department of Agriculture</i>)	Various Wyoming HMAs	This research is permitted by BLM, but BLM did not seek it or guide it; it is funded by the state of Wyoming. Contractors will conduct aerial surveys similar to those now used by BLM (“double-observer” method), but will also record distance to the observed horse groups very accurately. It is not clear how estimated population sizes will be validated, because true population size is only known in one Wyoming HMA. <u>Status:</u> The contractor consulted with Wyoming BLM and has completed

			some number of aerial surveys using this method. Analyses are pending.
University of Toledo; Development of a 3-4 year controlled release PZP contraceptive vaccine for wild horses	Dec. 2015- Sept. 2016 (<i>extension of project</i>); \$104,714	Toledo, OH	This grant agreement includes production costs of PZP-22 of use by BLM, and was originally intended to support development of a 3-year or 4-year PZP pellet vaccine. Early results showed, though, that PZP-22 was not providing the second year of contraception that was expected. <u>Status:</u> The researchers are the BLM's source for PZP-22 pellets. Those pellets provide only 1 year of reliable contraception, but are convenient for providing the PZP booster dose without needing to re-capture or dart a horse. In this final year of the project, the researchers are studying pellet materials, aiming to improve the PZP-22 pellet coating.
Texas A&M University; BLM Wild Horse and Burro genetic testing	Feb. 2015 – Feb. 2020; \$45,000	Various HMAs	This study analyzes genetic diversity for wild horse and burro populations, based on hair samples taken during capture operations. <u>Status:</u> This study is ongoing, with analysis of hair samples provided to the researcher.

¹ End date for the knowledge and values study will depend somewhat on the timing of OMB approval for questions that will be asked of the public.

I.B. Research led by USGS Fort Collins Science Center

Project Name	Start date – End date; budget	Location	Description
9. Developing a suitable radio collar or radio tag for feral horses and burros	June 2014 – April 2016; \$139,248	Pauls Valley, OK	<p>The project developed and tested four radio collar designs and two designs for mane and tail radio tags. The study included behavioral assessments and frequent monitoring for any injuries caused.</p> <p><u>Status:</u> The radio collars either fell off the animals at the appointed time, or were removed from the animals in order to make a close observation of the timing of the drop-off mechanism. No substantial injuries were observed in mares, stallions, or jennies, but the collars went over the ear of several stallions. USGS will be recommending not using stallion collars at this time but, rather, relying on radio tags braided into the tail. One of the four manufacturers provided collars that were too flimsy to withstand use.</p>
10. Evaluating behavior and ecology of geldings among a breeding population	May 2015 – Sept. 2020; \$826,099 ²	Conger HMA, UT	<p>The aim of the study is to determine the behavioral and demographic effects of having a portion of a herd be gelded male (neutered) wild horses. There will be one year of pre-treatment data. Researchers will monitor movements and social interactions of geldings, stallions, mares, and foals. 30 stallions will be monitored with GPS tail tags, and 30 mares will be fitted with GPS and / or VHF radio collars.</p> <p><u>Status:</u> A draft Environmental Assessment presenting the proposed action is in preparation, with BLM Utah aiming to release that document to the public this spring. The treated herd would be in Conger HMA, and a control herd would be in Frisco HMA.</p>
11. Evaluating behavior and ecology of spayed free-roaming mares	July 2015 – Dec. 2020; \$772,151 ²	White Mountain HMA, WY	<p>The aim of the study is to determine the behavioral and demographic effects of having a portion of spayed mares in a wild horse population. These spayed mares would have no ovaries, but would have their uterus intact. There will be one year of pre-treatment data. 30 mares will be fitted with GPS and / or VHF radio collars, and 30 stallions would be monitored with GPS tail tags. Researchers will monitor movements and</p>

			<p>social interactions of spayed mares, control mares, stallions, and foals.</p> <p><u>Status:</u> BLM Wyoming received public comments following release of a public scoping document was released to the public in December 2015. A draft Environmental Assessment presenting the proposed action is in preparation, with BLM Wyoming aiming to release that document to the public this spring. The treated herd would be in White Mountain HMA, and a control herd would be in Little Colorado HMA.</p>
12. Population demography and ecology of wild horses in two sentinel herds in the western United States	August 2015 – Dec. 2020; \$1,287,654 ²	Frisco HMA, UT, and Little Colorado HMA, WY	<p>The study will involve collecting data on: survival, fertility, fecundity, and recruitment rates; movement patterns; range use; habitat selection; and social behavior of wild horses. Wild horse populations in this study will serve as ‘control’ HMAs for gelding field studies (Frisco HMA, Utah) and spayed mare field studies (Little Colorado HMA, Wyoming). In each study HMA, 30 mares will be fitted with GPS and / or VHF radio collars, and 30 stallions will be fitted with GPS tail tags. These projects will also provide demographic data sets for use in updated population models.</p> <p><u>Status:</u> Draft Environmental Assessments are in preparation by BLM Utah and BLM Wyoming, as part of the gelding and spay behavioral effects studies listed above.</p>
13. Demography of two wild burro populations in the western USA	August 2015 – Dec. 2020; \$717,081 ²	Sinbad HMA, UT Lake Pleasant HMA, AZ	<p>The study will involve collecting data on: survival, fertility, fecundity, and recruitment rates; movement patterns; range use; habitat selection; and social behavior of wild burros. These data will be used to improve our understanding of burro ecology, and in population modeling.</p> <p><u>Status:</u> A Record of Decision for the Environmental Assessment covering the portion of the study in the Sinbad HMA, Green River District, Utah, was issued in February 2016 and was not legally contested. That Record of Decision is on the web at: http://www.blm.gov/style/medialib/blm/ut/natural_resources/wild_horses_and_burros/sinbad_burro.Par.83604.File.dat/Sinbad%20DR-FONSI-EA.pdf</p>

			<p>Burro captures in the Sinbad HMA began in March with bait and water trapping; at the time of this writing, helicopter gathering of remaining burros may be taking place soon. 25-30 burro jennies that will be returned to the range will be fitted with GPS radio collars and /or VHF radio collars.</p> <p>In support of the Lake Pleasant HMA, Arizona, portion of the study, the Hassayampa District Office is preparing a draft Environmental Assessment that should be ready for public comment later this spring.</p>
14. Developing and testing aerial survey techniques for wild burros	April 2015 – April 2018; \$185,139 ²	Sinbad HMA, UT Lake Pleasant HMA, AZ	<p>This project will test two new population survey methods for wild burros. The first will use infrared cameras and accurate measures of distance from the transect to each burro group. The second will use information from radio collared burros to inform statistical models that estimate the number of burros not seen by observers in aerial surveys. The existing simultaneous double-observer method, when applied to burros, leads to unknown underestimates of true burro population size.</p> <p><u>Status:</u> A simultaneous double-observer survey and an infrared camera survey were both completed in the Sinbad HMA. Results of the infrared survey are pending analysis. Survey conditions for both surveys were not optimal, with patchy snow in the juniper woodland. 25-30 burro jennies will be radio collared and returned to the range, in keeping with the record of decision for the Sinbad HMA, noted above. The same collared jennies will be used for both studies. The next double-observer survey will happen after radio collared burros are returned to the range, as will the next infrared survey there.</p> <p>The timing of surveys at the Lake Pleasant HMA in Arizona will depend on the Environmental Assessment process. The general research plan there would be similar to at Sinbad HMA, with radio collared burros providing information about animals that are not detected by observers during aerial surveys.</p>
15. Non-invasive genetic sampling of free-roaming horses	April 2014 – April 2015; \$178,538	Little Book Cliffs, CO	<p>The study involved the collection and analysis of fecal DNA as a noninvasive method to determine genetic diversity and estimate population size. Horse feces was also tested for presence of invasive</p>

to estimate population size, genetic diversity, and consumption of invasive species			species, and seed germination success. <u>Status:</u> Feces collection and genotyping concluded in 2015. Preliminary results seem to support this as a potential method for population estimation, suitable in small areas. USGS is analyzing results.
16. Modeling Carrying capacity of free-roaming horses	Sept. 2014 – Sept. 2015; \$0 (study funded by USGS)	Based on data from Jackson Mountains HMA, NV	This project's aim is to develop a coarse model to evaluate changes in animal carrying capacity in response to changes in vegetation production. The resulting model may help BLM to adapt plans in response to climatic change. <u>Status:</u> USGS has received data from various sources including BLM and remote sensing. Analysis is in progress.
17. Development of a population model and cost analysis for managing wild horses (WinEquus II); in review	February 2016 – Feb. 2021; \$459,859	USGS offices in Fort Collins, CO	This project will update the existing model used by managers for wild horse population projections. The updated model will compare population modeling outcomes and projects the costs, benefits and expected population growth resulting from management actions that involve PZP, removals, spaying, gelding and other population growth suppression tools. <u>Status:</u> BLM requested in 2014 that USGS develop a research proposal to study this topic. This USGS proposal is in review; it is not yet funded.
18. Evaluating the efficacy and safety of Silicone O-ring intrauterine devices as a horse contraceptive through a captive breeding trial; in review	January 2016 – September 2020; \$771,153	Stillwater, OK	This work will determine any effects on mare health resulting from the long-term presence of a silicone O-ring IUD. In a previous study, this IUD prevented pregnancy in domestic mares during one breeding season. <u>Status:</u> BLM requested in 2014 that USGS develop a research proposal to study this topic. This USGS proposal is in review; it is not yet funded.
19. Testing efficacy of contraceptives for female burros; under	5 year project. Proposal not yet received.	Axtell, UT	This study will examine the efficacy of various contraceptive methods for burros, potentially including intrauterine devices (IUD), PZP vaccine, GonaCon-Equine vaccine, and one more drug identified through

development	Estimated cost \$1M		<p>university-led research projects.</p> <p><u>Status:</u> BLM requested in 2014 that USGS develop a research proposal to study this topic. The USGS proposal is in preparation.</p>
20. Second pen trials of the SpayVac PZP vaccine	Jan. 2014 – Sept. 2015 <i>(concluded)</i> ; \$127,379	Pauls Valley, OK	<p>The goal of this study was to repeat an earlier trial that indicated that SpayVac had long-lasting effects. SpayVac is a PZP-based immunocontraceptive with liposome technology.</p> <p><u>Status:</u> This “SpayVac II” pen trial was discontinued in spring 2015, after initial results indicated that the SpayVac vaccine did not lead to the expected contraception in captive mares.</p>
Testing the Accuracy of High-definition Infrared Imaging for Wild Horse Aerial Surveys	August 2015 – Dec. 2016; \$0 (<i>study funded by Wyoming Department of Agriculture</i>)	McCullough Peaks HMA, WY	<p>In this project, the aerial surveys with high-definition infrared cameras are designed to compensate for problems of imperfect detection by also recording the distance from the transect to detected horse groups. Comparisons of estimated population size to the known value for this HMA will be a direct test of the survey method.</p> <p><u>Status:</u> A first infrared aerial survey was conducted at the McCullough Peaks HMA in fall 2015. Estimated population size from that survey will be compared to known population size. Results are under analysis. A second infrared aerial survey at the same HMA is slated to take place this spring, at night.</p>

² The costs to BLM of aerial surveys are not included in the USGS project budgets. Those aerial surveys will be led by BLM.

I.C. Pilot Project led by BLM

Water Canyon Wild Horse Growth Suppression Pilot Program	2015-2025	Antelope HMA, NV	<p>The goal of the project is to stabilize the number of wild horses in the Water Canyon area of the HMA at 25-30 animals. In this project, captured wild mares from the Water Canyon area of the Antelope HMA were treated with an initial dose of the GonaCon-Equine immunocontraceptive vaccine, held in captivity an additional several weeks, given a booster dose of GonaCon, then released.</p>
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			<p><u>Status:</u> The record of decision was issued in August 2015 (http://on.doi.gov/1PKK0Jg). In total, 53 animals were gathered from the area, of which 15 mares were gathered, marked, treated, boosted, and released. Monitoring by BLM staff is ongoing.</p>
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II. Population Inventories (Aerial Surveys)

Program-wide, BLM has made improvements to the estimation of wild horse and burro population sizes. The National Academy of Sciences (NAS) 2013 Report found that the BLM’s wild horse and burro aerial survey methods at that time may have undercounted numbers by as much as 20 to 30 percent on a national basis. The NAS recommended that the BLM adopt new population survey methods developed by the United States Geological Survey, using more complete surveys and statistical analysis to account for animals that are undetected during aerial survey flights. The BLM intends to continue to use the new methods and to survey one third of the 179 HMAs annually, on a rolling basis. In 2014, the BLM began using the recommended methods and completed new-method surveys in 77 of the 179 herd management areas (HMAs). In 2015, the BLM completed new-method surveys in 56 HMAs, and in 2016 we anticipate that BLM will complete new method surveys in at least 67 HMAs. From 2014 to the present, the vast majority of areas in HMAs has been surveyed with these new methods (see map, below).

The areas surveyed include surrounding lands outside the HMA, where wild horses may also be found. BLM makes efforts to survey contiguous HMAs together, to avoid the possible effects of animals moving between HMAs being counted twice, or not at all. Observation data are analyzed so that BLM obtains a total population estimate for the surveyed HMA, including both the number of animals seen and the estimated number of animals that were present but not seen by any observer.

The accuracy of these surveys can be measured in two ways: in terms of the estimated fraction of horses and burros that were present but not seen by observers (i.e., missed), or in terms of the width of the confidence interval around the total population estimate. First, the estimated percentage of horses missed in aerial surveys tends to be from 1% to 10% – this value is lowest in HMAs with extremely good visibility but can be as high as ~30% in densely forested areas. Burros tend to be harder to see; the estimated percentage of burros not seen is typically from 5% to 20%. Second, the width of confidence intervals around population estimates from aerial surveys can be measured as the coefficient of variation (CV), which is the standard error divided by the mean. The CV for horse surveys tends to be less than 10% for most individual HMAs, indicating that results from such surveys are fairly precise. For burro surveys, the CV tends to be higher, typically from 10% to 25% which, in most cases, is still precise enough to make well-informed

management decisions. BLM is funding USGS research to improve the accuracy of burro population survey estimates, and is supportive of research into other new survey methods, such as the use of heat-sensing infrared cameras in aerial surveys.

A peer-reviewed journal paper on the accuracy of the simultaneous double-observer method for aerial horse surveys is currently in review. The authors are Bruce Lubow, the statistician who analyzes horse and burro survey data for BLM, and Jason Ransom, who used to work for USGS on wild horse studies, including population survey methods studies.

The BLM reports national on-range population estimates annually. The quality of these estimates has been improved by the more reliable estimates from individual aerial surveys. The March 1, 2015 estimate was 58,150 (47,329 horses and 10,821 burros) and the data for March 1, 2016 will be published by May 1. It is expected that the 2016 values will be consistent with an approximate overall population growth rate of about 20% per year, minus the number of animals removed from the range by BLM.

BLM has an interagency agreement for USGS to provide technical support and training in the new survey methods to BLM staff. The current agreement expires at the end of FY2016. BLM is preparing a new interagency agreement along the same lines. Until he started with BLM in June 2015, Paul Griffin was the USGS staff person providing that aerial survey support and training. USGS advertised the job opportunity in the fall. No replacement has yet been hired; lists of unqualified applicants have repeatedly been sent to the USGS Fort Collins Science Center to be considered for interviews. USGS may need to re-advertise the job with more clear requirements for applicants to substantiate their experience. In the meantime, Dr. Griffin is devoting substantial time to providing the technical support for BLM staff as they prepare for, and provide data from aerial surveys.

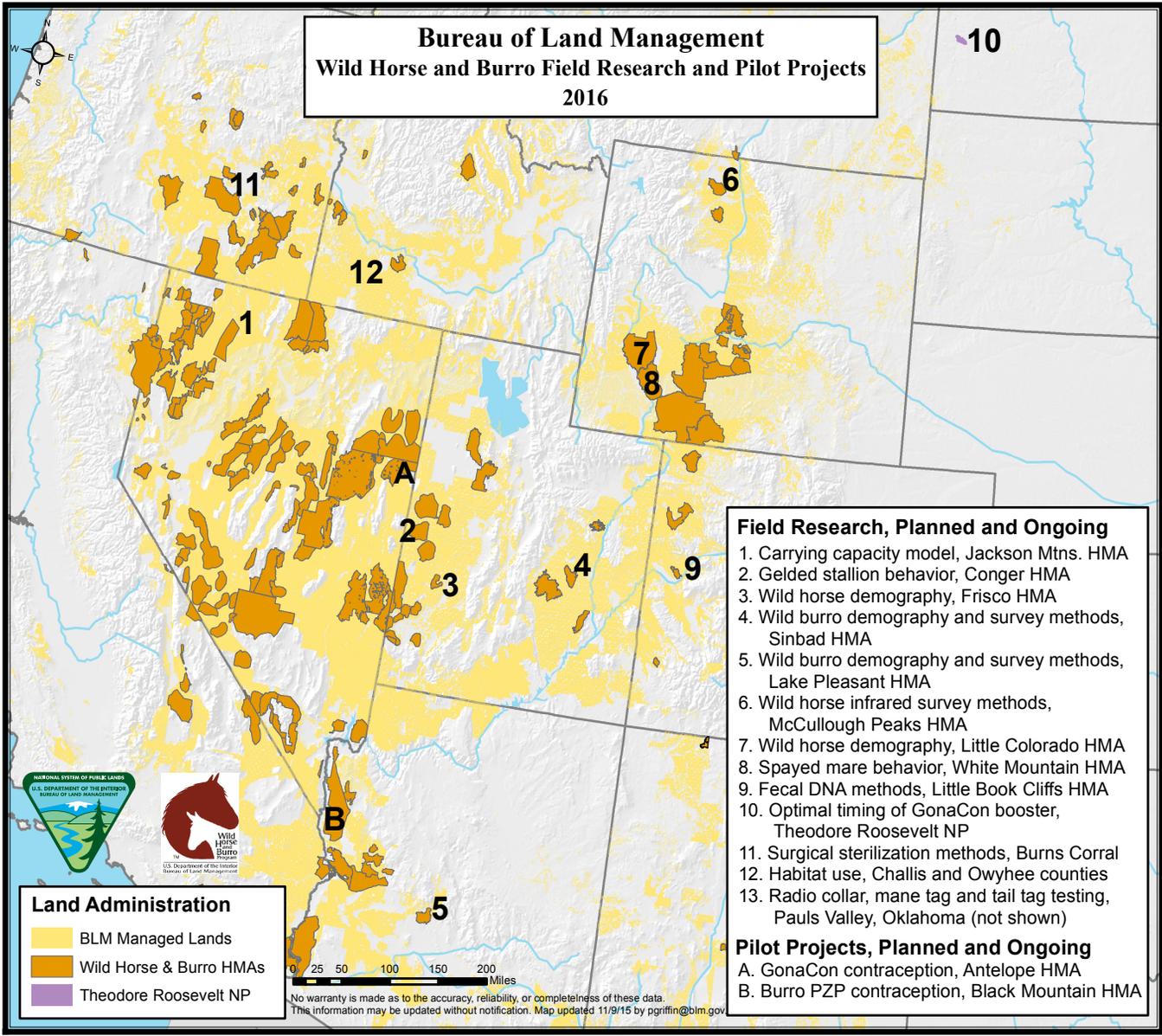
Attached Maps

Map 1, Field studies and pilot projects. Map showing locations of ongoing BLM wild horse and burro research and pilot projects that have a field component. Some of these projects are in the planning phase, others in data collection, and others in analysis.

Map 2, Inventories. Map showing areas that have been surveyed since 2014 using the new methods that account for horses and burros not seen by observers, as recommended by the National Academies of Sciences. Of the small number of HMAs not yet surveyed with these methods, most will be during the rest of FY2016.

Bureau of Land Management
Wild Horse and Burro Field Research and Pilot Projects
2016

10



Field Research, Planned and Ongoing

1. Carrying capacity model, Jackson Mtns. HMA
2. Gelded stallion behavior, Conger HMA
3. Wild horse demography, Frisco HMA
4. Wild burro demography and survey methods, Sinbad HMA
5. Wild burro demography and survey methods, Lake Pleasant HMA
6. Wild horse infrared survey methods, McCullough Peaks HMA
7. Wild horse demography, Little Colorado HMA
8. Spayed mare behavior, White Mountain HMA
9. Fecal DNA methods, Little Book Cliffs HMA
10. Optimal timing of GonaCon booster, Theodore Roosevelt NP
11. Surgical sterilization methods, Burns Corral
12. Habitat use, Challis and Owyhee counties
13. Radio collar, mane tag and tail tag testing, Pauls Valley, Oklahoma (not shown)

Pilot Projects, Planned and Ongoing

- A. GonaCon contraception, Antelope HMA
- B. Burro PZP contraception, Black Mountain HMA

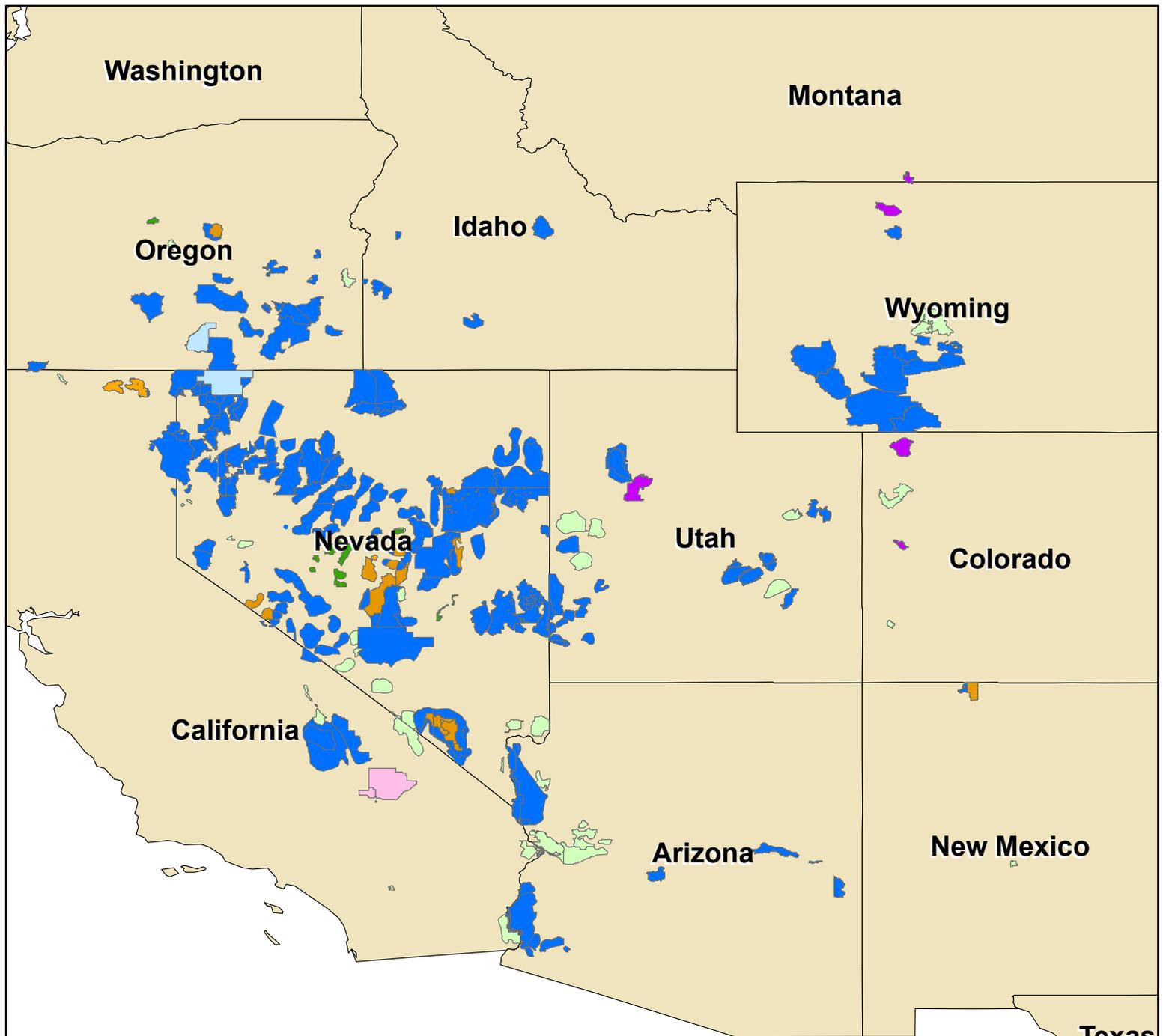


Land Administration

- BLM Managed Lands
- Wild Horse & Burro HMAs
- Theodore Roosevelt NP



No warranty is made as to the accuracy, reliability, or completeness of these data.
 This information may be updated without notification. Map updated 11/9/15 by pgriffin@blm.gov



BLM and USFS Wild Horse and Burro Surveys with new methods, Feb. 2014 through April 2016

- BLM Herd Management Area (HMA), not surveyed
- HMA or HA, Surveyed with new methods
- HMA, Surveyed with ground counts
- DOD lands with incomplete WH&B survey
- USFS Wild Horse Territory (WHT), not surveyed
- USFS WHT, surveyed with new methods
- US Fish & Wildlife Service, new methods

