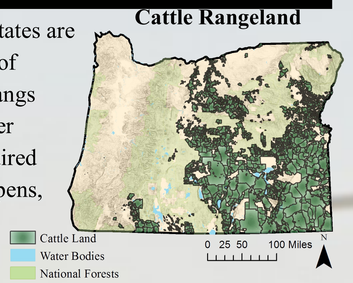
Born Free

Mapping Suitable Mustang Herds for Contraceptive Programs in Oregon

Introduction

Wild mustang populations in the western United States are increasing at an unsustainable rate for the amount of allotted free-range land designated to them. Mustangs must compete with cattle land for grazing and water sources. Non-lethal management methods are required for mustang population control including holding pens, adoption programs, contraception techniques, and sterilization. Currently, wild mustangs in captivity outnumber those in the wild with population estimates of 40,600 mustangs roaming free and 49,700 being kept in holding pens.



The Bureau of Land Management (BLM) is implementing a project titled *Mare Sterilization Research*, in Oregon that will sterilize mares by surgically removing both ovaries. This procedure is invasive and expensive and there are a number of mustang herds in Oregon that would benefit from a less permanent approach, such as immunocontraception injections. Porcine zona pellucida (PZP) is a contraceptive that has proven successful in inhibiting equine fertility in a variety of case studies and is a management method that can be delivered remotely and with little to no animal handling. Critics protest that a PZP program will not be successful because of the difficulties administrating the vaccine via dart guns, paired with the frightful nature of mustangs. This case study uses ArcGIS to locate the most suitable mustang herds to implement the PZP vaccine within the state of Oregon. This analysis uses mustang herd rangelands, human barriers, natural barriers, and food and water sources in order to provide insight into the mustang herds that are the most confined, and therefore easiest to administer the PZP vaccine.

Conclusion

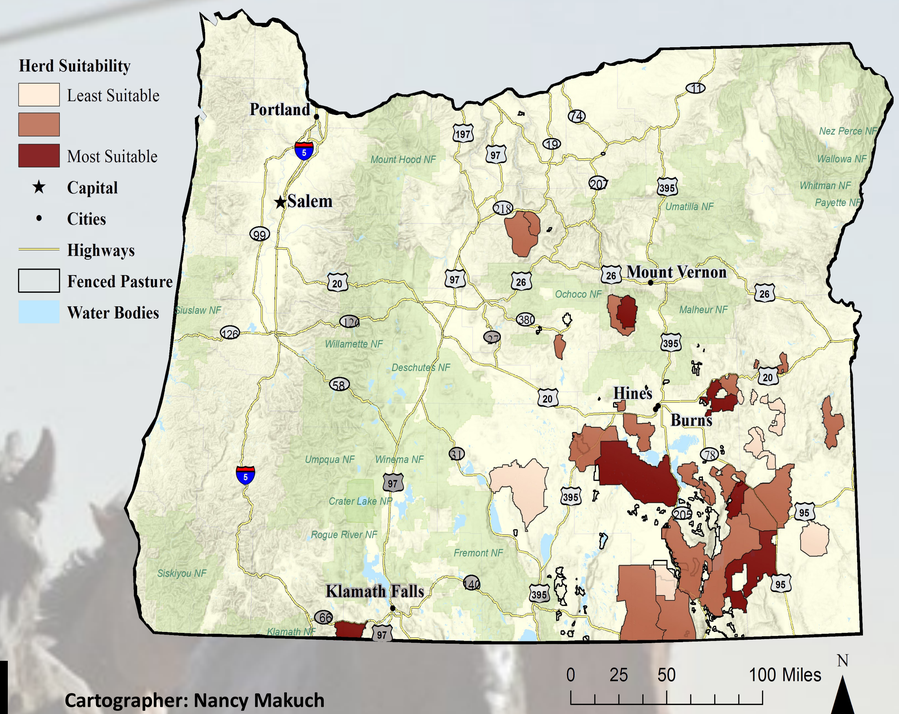
The Wild Free-Roaming Horse and Burro Act of 1971 was passed by Congress to keep wild horses wild. The act states, "wild free roaming horses are living symbols of the historic and pioneer the spirit of the west. They are considered an integral part of the natural system of public lands." Due to the 18% recruitment rate of mustangs, their population doubles every five years. There is enough public land space to maintain these populations however the land is shared with 9 million domestic livestock creating overgrazing issues which leads to starvation. The solution to this issue is not holding pens or adoption programs. The solution is reducing the fertility rate of mustangs to create a more sustainable and healthier population for the future.

By mapping the most suitable herds in Oregon, mustangs are one step closer to the freedom they were born into. In this case study a suitability analysis was run on eight different factors including, cities, fence lines, highways, herd management areas, water boundaries, food sources, predator territories, and slope. Mustang herds were given a score of 1 if they were likely to be confined to their rangeland due to each factor, and 0 if they were not. The more confined a herd is the more likely a PZP vaccine program can be administered successfully. The six mustang herds in the state of Oregon that PZP programs should be implemented first are as follows:

Herd Name	Pokegama	Warm Springs	Stinkingwater	Murders Creek	Heath Creek	Coyote Lake
Score	7	6	6	5	5	5

A future analysis should be run to include other prey species distributions, such as deer, elk, moose, and bighorn sheep. These species compete for the same resources as mustangs and would provide further insight into which herds would experience more pressure from moving away from their rangeland.

Final Suitability Analysis for Oregon Mustangs



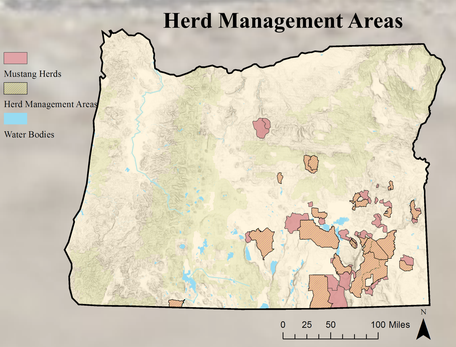
Cartographer: Nancy Makuch
Date: May, 11, 2016
MCM 1009: GIS for Conservation Medicine

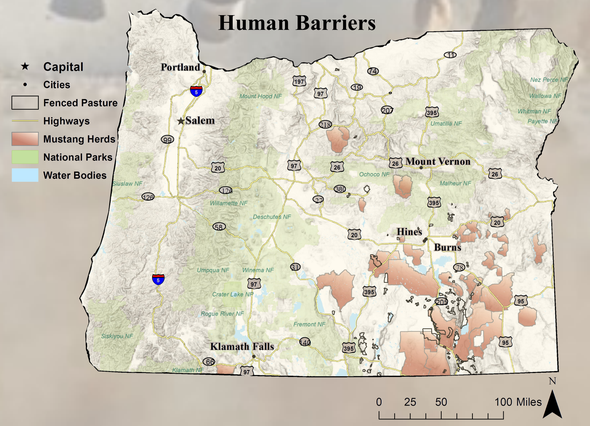
Data Sources:
Bureau of Land Management
OregonGIS
ESRI GIS

Tufts

Human Barriers

Mustangs are a prey species with a well developed fight-or-flight response. When they feel threatened they bolt. They are also social animals and congregate in herds, therefore when one horse bolts the rest of the herd will follow. A suitability analysis was created to determine which mustang herds are most confined based on human barriers. The **Herd Management Areas** map depicts the 38 mustangs herds found in Oregon as well as the 19 BLM herd management areas. A suitability analysis was conducted to determine which mustang herds were located within management boundaries (herds within the boundaries were given a score of 1 and the herds that were not were given a score of 0). Herds within management areas are more suitable for PZP programs because they will have constant monitoring. The **Human Barriers** map depicts the human barriers mustangs are surrounded by. Due to their timid nature, mustangs avoid these barriers that include, cities (population of 500+), fenced in pastures, and highways. A suitability analysis was created to determine the herds that were closest to these barriers. A herd was given a score of 1 if they: are 15 miles away from a city, 5 miles away from a highway, or 2 miles away from a fence line.





Natural Barriers

A suitability analysis was conducted to determine which mustang herds are most confined based on natural barriers. Natural barriers that confine the mustang herds in Oregon include water bodies, land gradients, and predator distributions. The **Food Suitability** map depicts the most suitable food sources for mustangs (in green). It also displays the most suitable herds to implement a PZP program based on the average food suitability within a 10 mile buffer of each herd. The lower the food suitability, the higher the suitability to implement a vaccination program. An individual mustang will eat an average of 10-20 lbs of grass a day and the herds in Oregon range from 30 to 260 mustangs. Mustangs that are confined in an area surrounded by unsuitable food sources will be more likely to stay put even during a PZP program because they can not risk starvation. Mustangs must also avoid predation. Mustangs have very few natural predators, the only one in Oregon being the cougar. This is one significant factor as to why mustang populations are too high. Mustangs use their heightened sense of smell and hearing to avoid cougar habitats. The **Predator Suitability** map depicts cougar distributions (in yellow) throughout Oregon. By looking at the map it is clear that mustang ranges and cougar ranges do not intersect often. A suitability analysis was created to calculate mustang herds that are within a 15 mile radius of cougar ranges. A suitability score of 1 was given to the herds within a 15 mile radius of cougar distributions because they are more likely to stay in their existing range than venturing out into cougar territory. Besides mustang behavior, another reason mustang and cougar distributions do not overlap often is due to the terrain both species prefer. Cougars prefer more mountainous terrain whereas mustangs prefer open grasslands.. In the **Slope Suitability** map a suitability analysis was created to determine which mustang herds are most confined based on slope. The average slope of a 10 mile buffer zone around each herd was calculated and mapped. The higher the average slope the less likely a herd will bolt and spread out; making the herd more easily accessible to administer the PZP vaccine (these herds were given a score of 1).