

SUMMARY REPORT

Winter 2024 Aerial Infrared Detection Survey of Wild Horse (*Equus ferus caballus*) in the Salt Wells Creek, Adobe Town, and White Mountain Areas in Southern Wyoming

October 23rd, 2024 – November 21st, 2024

Prepared for:

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Introduction

Aerial infrared (AIR) surveys are well-established methods for obtaining accurate population estimates of wildlife (e.g. Schoenecker et al 2018, Smith et al 2016, Gillette et al 2015). Aerial surveys, paired with infrared imaging, allow for landscape-scale surveys to be completed quickly and effectively, and prevents disturbance to wildlife. AIR surveys for federally managed horse populations have yielded greater than 90% confidence levels in survey detections and population estimates (Schoenecker et.al. 2018).

Owyhee Air Research (OAR) has previously accomplished two other surveys for wild horses in Southwestern Wyoming for the Rock Springs Field Office (RSFO), once in 2019 and another in 2022. The 2019 mission was an experimental survey to determine the efficacy of aerial infrared compared to traditional survey methods, while the 2022 survey was a full population census of several herd management areas (HMAs) in the region.

For the 2024 survey, OAR and the customer agreed to split the efforts up between the fall/winter of 2024 and the spring of 2025. The White Mountain, Salt Wells Creek, and Adobe Town areas were surveyed between October and November while the Divide Basin and Little Colorado areas will be surveyed sometime in the spring. If time and funding permit, a second survey of the White Mountain HMA may be conducted in the spring, in conjunction with the Little Colorado HMA.

OAR was given the following objectives for the 2024-2025 survey:

- Provide accurate detections and population estimates of horse groups within the assigned survey areas.
- Describe geospatial and demographic data including locations, group size, and group composition as it relates to age dynamics.

Survey Methods

On October 23rd, 2024, Owyhee Air Research began an aerial infrared survey for wild horses as contracted by the BLM - Rock Springs Field Office in Rock Springs, Wyoming. This survey was conducted throughout the Salt Wells Creek, Adobe Town, and White Mountain areas until completion on November 21st, 2024. An additional search area east of the Adobe Town HMA was requested by the customer during the project and surveyed using the same protocol. This area is referred to as the Adobe Town addition throughout this report.

The aircraft used for this survey was a light twin-engine, Partenavia P-68 Obv II, owned and operated by Owyhee Air Research. The aircraft was outfitted with an L3/Harris MX10 multi-sensor imaging system paired with a Churchill ARS navigational computer used to identify geographical location data. Survey transects were spaced at 0.50 statute miles and were flown north to south at an average altitude of 2000 ft AGL, and an average speed of 110 mph. Flights were conducted during early morning hours (2am-8am) to increase detectability. Each detection was counted, marked with an individual georeferenced marker, and video-recorded during the flight. A representative video clip of each detection in both IR and, when conditions permitted, EO (daylight), is included with this report and is further detailed and referenced in the included Microsoft Excel data sheet.

Surveys using infrared are primarily operated in the colder months between late fall and early spring to optimize visibility between target species and their environment. Winter weather patterns in western Wyoming are often characterized by snow, rain, and low clouds, all of which are not conducive to safe and effective aerial survey operations. Water and water vapor in the air can also be limiting for infrared surveys due to the scattering of light off water droplets (Richards et al 2020). Therefore, infrared surveys are most effective in optimal conditions, meaning an unencumbered survey area: clear skies or high cloud cover, and no precipitation. Given these constraints, OAR crews evaluated the daily weather reports and proceeded with survey flights when conditions were favorable and ended a survey flight early if conditions deteriorated during flight. Survey flights were not conducted on days where inclement weather conditions persisted throughout the survey area, i.e., precipitation, clouds, or fog below the minimum flight altitude of 1500 ft AGL.

Results by Area

White Mountain

The survey of the White Mountain HMA began on October 23rd and concluded on October 26th. There were 20 unique detections comprising 79 horses. The largest of these detections was a group of 10 horses.

Table 1. Results for wild horses in the White Mountain HMA from the 2024 Owyhee Air Research aerial infrared population survey.

Wild Horse Count	Dates	Acres	Detections	Largest Detection	Median Detection Size	Mean Detection Size
79	10/23/2024 – 10/26/2024	392,782	20	10	4	3.95

Salt Wells Creek

The survey of the Salt Wells Creek area started on October 26th, directly after the conclusion of the White Mountain HMA. Due to the north-south orientation of the transects through Salt Wells Creek, Adobe Town, and the addition, there were survey efforts that ended up covering portions of two or three of these areas in the same flight. Adding the survey area boundaries into the ARS system we were able to easily identify which area each group was detected in. The Salt Wells Creek area was completed on November 16th. In this area, there were 139 unique detections comprising 1,225 horses. The largest of these detections was a group of 52 horses.

Table 2. Results for wild horses in the Salt Wells Creek area from the 2024 Owyhee Air Research aerial infrared population survey.

Wild Horse Count	Dates	Acres	Detections	Largest Detection	Median Detection Size	Mean Detection Size
1225	10/26/2024 – 11/16/2024	1,170,664	139	52	6	8.81

Adobe Town

The Adobe Town HMA was surveyed from November 8th until completion on November 20th. As mentioned previously, it was flown in tandem with sections of the Salt Wells Creek and the Adobe Town addition. Further, Adobe Town HMA is bisected by field office jurisdictions, with part of the HMA being under the Rock Springs Field Office, and the rest of the HMA being under the Rawlins Field Office (Figure 1). There were 323 unique detections comprising 2,229 horses through the entirety of the HMA with 758 horses being detected in the RSFO portion, and 1,471 horses being detected in the RFO portion. The largest of these detections was a group of 78 horses.

Table 3. Results for wild horses in the Adobe Town HMA from the 2024 Owyhee Air Research aerial infrared population survey.

Wild Horse Count	Field Office	Dates	Acres	Detections	Largest Detection	Median Detection Size	Mean Detection Size
758	Rock Springs	11/13/2024 – 11/16/2024	102,665	105	26	7	7.22
1471	Rawlins	11/8/2024- 11/20/2024	374,690	218	78	5	6.72
2229	All	11/8/2024- 11/20/2024	477,355	323	78	6	6.90

Adobe Town Addition

An additional area outside of Adobe Town was requested to be surveyed. This area extended south to the state line bordering Colorado and east to Wyoming State Highway 789. The crew began the survey of this area on November 15th and finished on November 21st. A total of 22 unique detections were found consisting of 141 horses.

Table 4. Results for wild horses in the Adobe Town addition from the 2024 Owyhee Air Research aerial infrared population survey.

Wild Horse Count	Dates	Acres	Detections	Largest Detection	Median Detection Size	Mean Detection Size
141	11/15/2024 – 11/21/2024	182,187	22	16	6	6.41

Total

During the survey, 3,674 horses were observed in 504 independent detections. The average group size was approximately 7 individuals while the largest group detected consisted of 78 individuals in the Adobe Town HMA. The total results are broken down by in Table 5.

Discussion

Double Counting

Error associated with double counting is a concern in any population census survey. Many survey methodologies include parameters intended to mitigate the possibility of double counting. Animals move, and thus the best-case scenario for a population census of any given area is to complete that entire area in a single survey effort. If the area cannot be completed in a single effort, counted animals may move into areas yet to be surveyed, and thus be counted a second time on the second effort. Conversely, uncounted animals may move into area already surveyed and be completely missed. As mentioned above, OAR flight crews geo-reference each detected animal at the time of the detection. Those georeferenced markers are transferrable from one flight to the next and as a result can be compared with detections during the following flight to rule out probable double counts. In this present survey, multiple double count probabilities were ruled out when groups of horses moved between survey flights. The team reviewed markers and georeferenced videos to compare group composition and, where applicable, group coloration, as well as group location to determine if similar detections were considered double counts. While there is considerable data available to use as evidence for making these determinations of groups being previously detected or not, there is no way to indicate with absolute certainty that this is the case. Those detections that were deemed as double counts have been removed from the datasheet and the totals for the survey do not contain these observations.

Future Recommendations

While OAR is confident in the methods and results reported, future surveys in these survey areas should note the following:

The aerial sensor operator indicated a high concentration of private lands along the south and east bounds of the Adobe Town addition survey area. For future surveys of this area, it is recommended that the boundaries of the area are cleaned up to remove any groupings of land that are not vital to the

survey efforts. This will allow for more efficient surveying and less time spent observing domesticated horses.

Conclusion

Owyhee Air Research continually strives to optimize survey efficiency. In addition to a demonstrated higher detection rate, higher safety margins, decreased margin of error, and the ability to record high-resolution video footage of each detection, aerial IR survey flights with Owyhee Air Research are more cost efficient and provide more defensible data than many traditional survey methods.

Supplemental Materials:

In addition to this report, the following data are included:

- MS Excel Database of all detected groups and individuals
- KML file showing a map of the transects and location of all detections
- Video documentation of all detections

Citations

- Richards, D. A., & Hoelter, D. T. (Eds.). (2020, December 30). *Can thermal imaging see through fog and rain?* Teledyne FLIR. Retrieved December 28, 2022, from <https://www.flir.com/discover/rd-science/can-thermal-imaging-see-through-fog-and-rain/#:~:text=There%20are%20other%20climatic%20conditions,the%20infrared%20signal%20is%20diminished>
- Gillette, G.L., Reese, K.P., Connelly, J.W., Colt, C.J., Knetter, J.M. 2015. Evaluating the Potential of Aerial Infrared as a Lek Count Method for Prairie Grouse. *The Journal of Wildlife Management*. 6(2).
- Schoenecker, K. A., Doherty, P. F., Hourt, J. S., & Romero, J. P. (2018). Testing infrared camera surveys and distance analyses to estimate feral horse abundance in a known population. *Wildlife Society Bulletin*, 42(3), 452–459. <https://doi.org/10.1002/wsb.912>
- Smith, K.T., Beck., J.L., Mong, T.W., and Blomquist, F.C. 2016. Identification of Columbian Sharp-tailed Grouse Lek Sites in South Central Wyoming. *Western North American Naturalist*. 76(1).

Table 5. Total results for wild horses during the 2024 Owyhee Air Research aerial infrared population survey of the requested areas overseen by the Bureau of Land Management in Southwestern Wyoming.

Survey Area	Total Wild Horse Count	Dates	Acres	Detections	Largest Detection	Median Detection Size	Mean Detection Size
Salt Wells Creek	1225	10/26/2024 – 11/16/2024	1,170,664	139	52	6	8.81
Adobe Town	2229	11/8/2024 – 11/20/2024	477,355	323	78	6	6.90
White Mountain	79	10/23/2024 – 10/26/2024	392,782	20	10	4	3.95
Adobe Town Addition	141	11/15/2024 – 11/21/2024	182,187	22	16	6	6.41

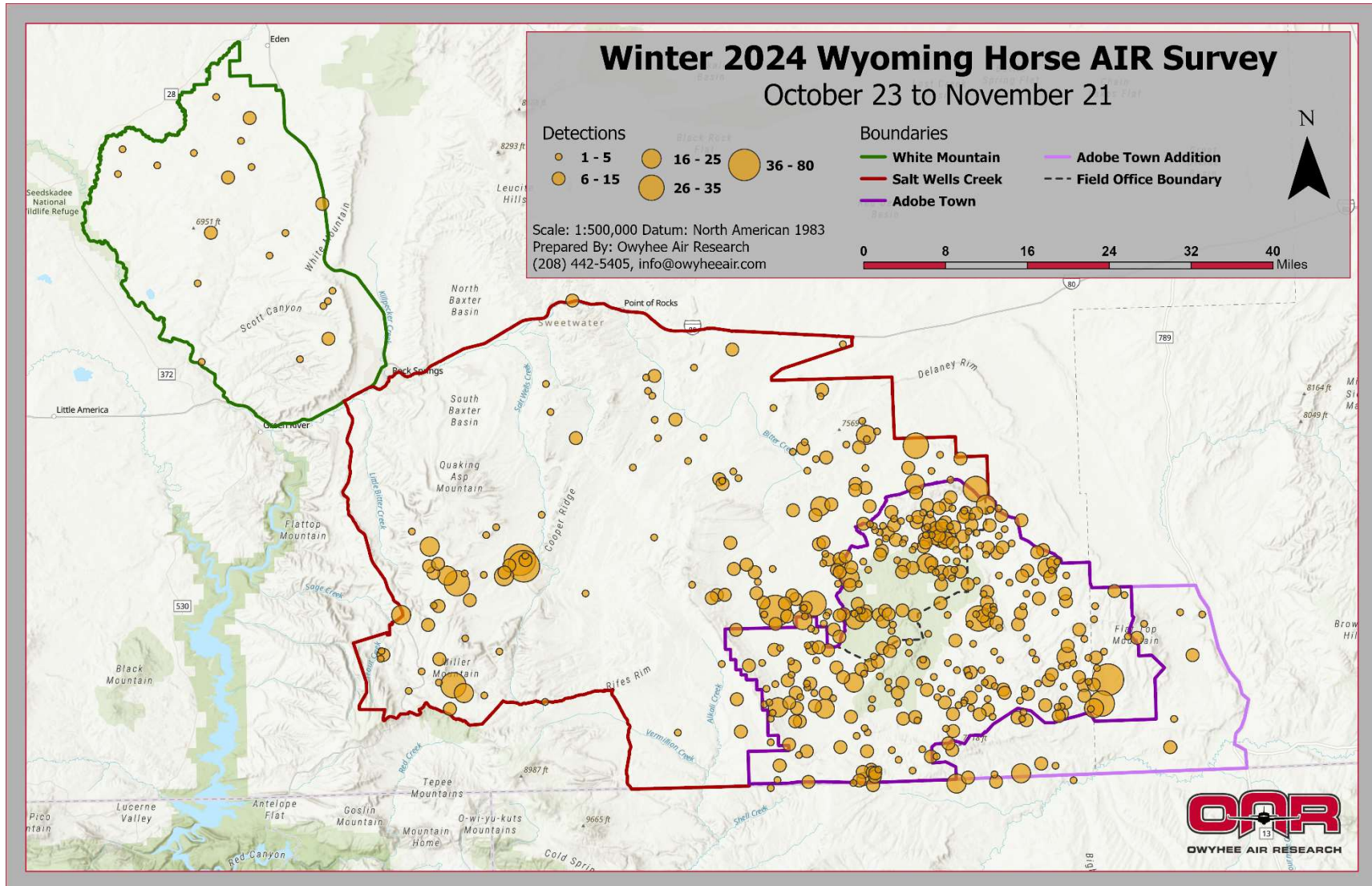


Figure 1. Survey area boundaries and horse detection densities for the White Mountain, Salt Wells Creek, Adobe Town, and Adobe Town addition areas. Each point is a detection, and the diameter of each indicates how many individuals were observed. The dashed line, along with the boundary for Adobe Town, demarcates the Rawlins Field Office jurisdiction to the east from that of the Rock Springs Field Office to the west.