

JACKSON HOLE



WILDLIFE
FOUNDATION



MOOSE DAY 2021 REPORT



Photo by Josh Metten

Summary

Prior to the mid-1800's, moose were very rare in Wyoming. They increased in number throughout the 20th century in western Wyoming and by the early 2000's biologists estimated there were over 13,000 in the state. The Jackson Moose Herd increased to a maximum number of 1184 in 1988, but since then, has decreased. Currently estimated to be around 400 individuals, the herd lost approximately 70% of its population in the last 35 years. The Wyoming Game and Fish Department (WGFD) monitors moose populations by performing aerial surveys to estimate their numbers. Since 2009, the Jackson Hole Wildlife Foundation (JHWF) has conducted an annual moose survey in the late winter. This survey contributes data which augment WGFD's aerial surveys. These volunteer-collected data are valuable because many observations are made on private land, where aerial surveys are not conducted. This year, the JHWF conducted the 13th annual Moose Day survey on March 6, 2021. Volunteer recruitment was record breaking, with 107 individuals counting 108 moose during the effort.

Introduction

Historically, it is thought that there were very few moose in Wyoming. In the late 1800's, Shiras moose (*Alces alces shirasi*) began to colonize western Wyoming, moving in from Montana and Idaho. The Wyoming moose population eventually increased to an estimated 13,657 in 2001, but recently, declines in the statewide population have been noted (Brimeyer and Thomas 2004, WGFD 2017). In 2014, the WGFD moose population estimate was approximately 4,050 animals (WGFD 2017).

In Jackson, moose surveys have been conducted by WGFD since 1985. The Jackson Moose Herd population peaked in 1988, when 1146 animals were counted and over the past three decades, the Jackson Moose Herd has declined by approximately 70% (Figure 1).

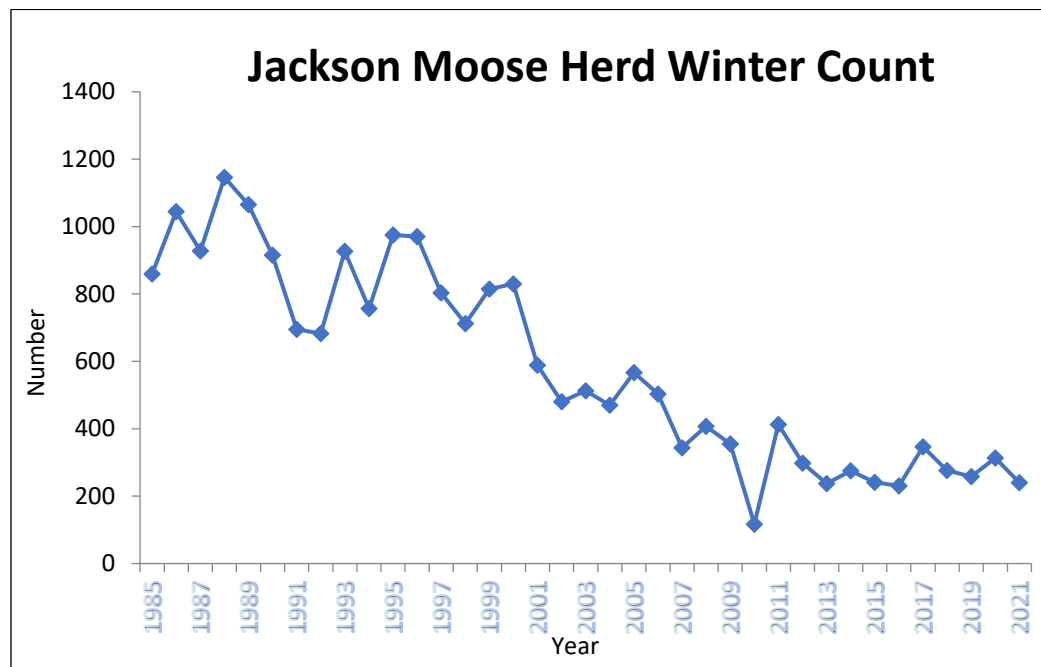


Figure 1. WGFD aerial survey data (including data from Moose Day since 2009) show a 70% decline in the Jackson Moose Herd over the past 36 years (Source: WGFD).

This decline is due to a variety of factors, including habitat deterioration, recolonization of wolves and grizzly bears, warming temperatures due to climate change, disease and parasites, and vehicle collision mortalities (Courtemanch, pers. comm. 10/4/2021). Currently, the herd is estimated to be approximately 400 animals, which is about 400 below the WGFD management objective of 800 animals (WGFD 2021). Even though the overall herd numbers are low, the number of moose calves seen during the winter has increased in recent years. The WGFD measures a “calf to cow ratio” which is the number of calves per 100 cow moose seen during the survey. In 2009 this ratio was 15 calves per 100 cows and the ratio has increased to 55 calves per 100 cows in 2021, which indicates a slowly growing population (Figure 2; Courtemanch, pers. comm. 10/4/2021).

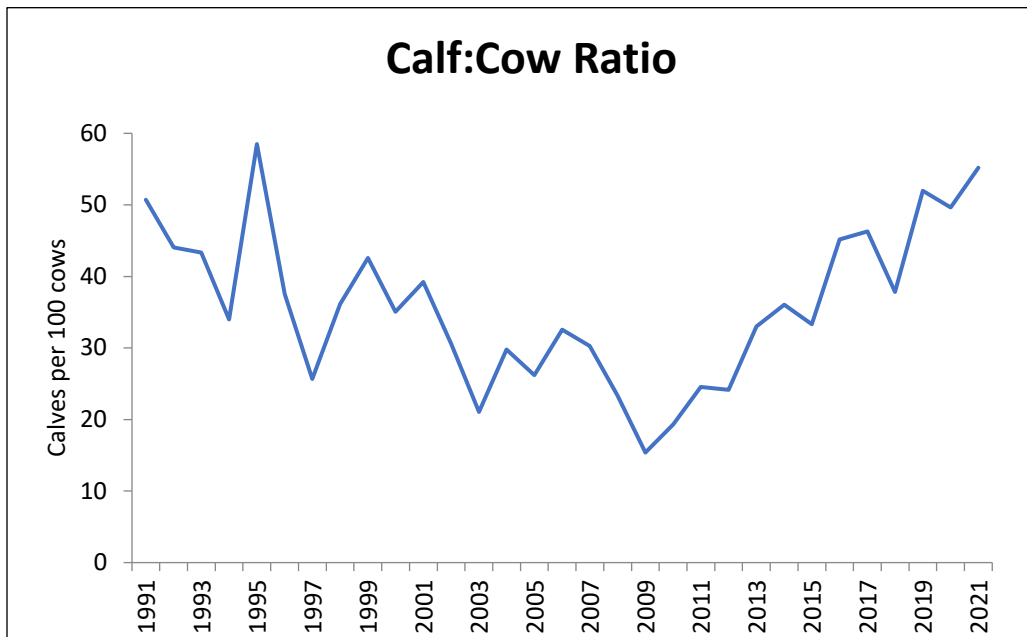


Figure 2. WGDF aerial survey data (including data from Moose Day since 2009) show an increasing calf:cow ratio in the Jackson Moose Herd over the past 30 years, which indicates a slowly growing population. (Source: WGFD)

Jackson Hole Wildlife Foundation (JHWF) conducts an annual moose survey in which a corps of volunteers survey Teton County, Wyoming for moose during one day in late February or early March. The results from this moose survey augment the Wyoming Game and Fish Department (WGFD) aerial survey data, which are used to estimate the population of the Jackson Moose Herd. Some data are also collected from the Sublette Moose Herd on the southern end of Teton County and the Targhee Moose Herd on the west side of the Teton Range. Data collected by Moose Day volunteers are especially valuable because many of these moose observations are on private lands in areas where WGFD does not conduct helicopter surveys. Combining Moose Day observations with WGFD helicopter survey data provides a more comprehensive view of overall herd numbers (Courtemanch, pers. comm. 10/4/2021).

Methods

Study Area

Surveys took place in Teton County, Wyoming. We divided Teton County into 36 areas which ranged as far north as Arizona Creek in Grand Teton National Park, east along the Gros Ventre River, west to the Idaho border near Alta, and south to the Teton County border (Figure 3).

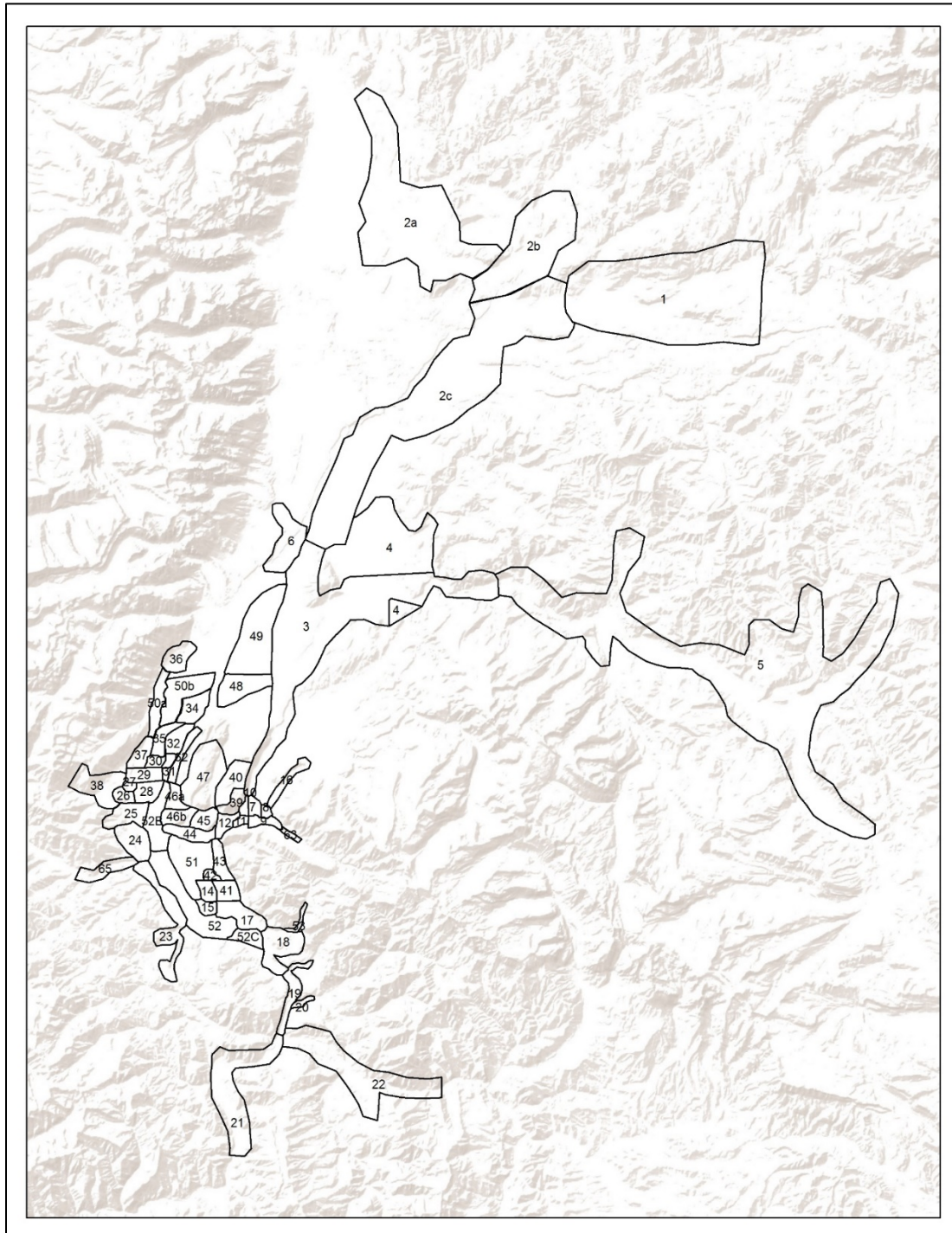


Figure 3. Map showing Moose Day study area broken into survey sections in Teton County, WY.

Volunteers

We recruited JHWF's certified Nature Mapping Jackson Hole (NMJH) volunteers to assist with data collection on this project, as well as enlisting the help of area biologists, JHWF staff and board members, and other interested community members. Prior to Moose Day, we held a virtual training seminar in cooperation with WGF, which was led by wildlife biologist Aly Courtemanch. The seminar included information on moose identification, aging, and sexing. We also trained surveyors on how to spot signs of parasites, such as winter ticks and carotid artery worms, and gave a brief history of the Jackson Moose Herd. We organized surveyors into teams of at least two per search area throughout Teton County, Wyoming.

Moose Survey

Each survey team was assigned an area. Most surveyors traveled in teams by car, intermittently getting out of the car, walking, peering over snowbanks, and scanning with binoculars. They scouted along main highways and throughout neighborhoods. Other surveyors skied and snowshoed public lands and private tracts. One team snowmobiled into the Gros Ventre drainage. Surveyors recorded the time, date, location, age, sex, and health condition of each moose encountered in their survey area, using either the NMJH progressive web application as a data entry portal or paper data sheets with subsequent data entry to the database online. As time and energy permitted, we encouraged surveyors to Nature Map other species seen in their survey area, with prioritization given to moose.

Data Analysis

Each moose observation was vetted and verified by WGF staff. Observations were compared spatially and temporally to avoid double counting. We used Microsoft Excel™ to compare total moose numbers between years, as well as to calculate surveyor hours and effort. We also compared moose numbers to temperature and snow water equivalent (SWE) using Microsoft Excel™. We used [Weather Underground](#) to access weather and visibility conditions on the day of the survey, retrospectively. We used ArcMap 10.8.1™ to process and display spatial data for Moose Day. We used the Integrate (Data Management) and Spatial Join (Analysis) tools to bin points into half-mile diameter areas and then displayed these data on a map. We assessed surveyor effort in two ways. We calculated the number of surveyor hours by summing the total hours each individual surveyor contributed to the project. We calculated total effort by summing the total hours each people unit (team of surveyors traveling together) contributed to the project. People units represent the surveyors' effort covering the search areas more accurately than the total number of hours each person contributed.

Results

Moose Survey

On March 6, 2021, we found 108 moose. Moose were detected in the following areas: Alta, Buffalo Valley, Gros Ventre River bottom (including the Upper Gros Ventre), neighborhoods south of Teton Village, Cache Creek, East Jackson, and south of Jackson (Figure 4).

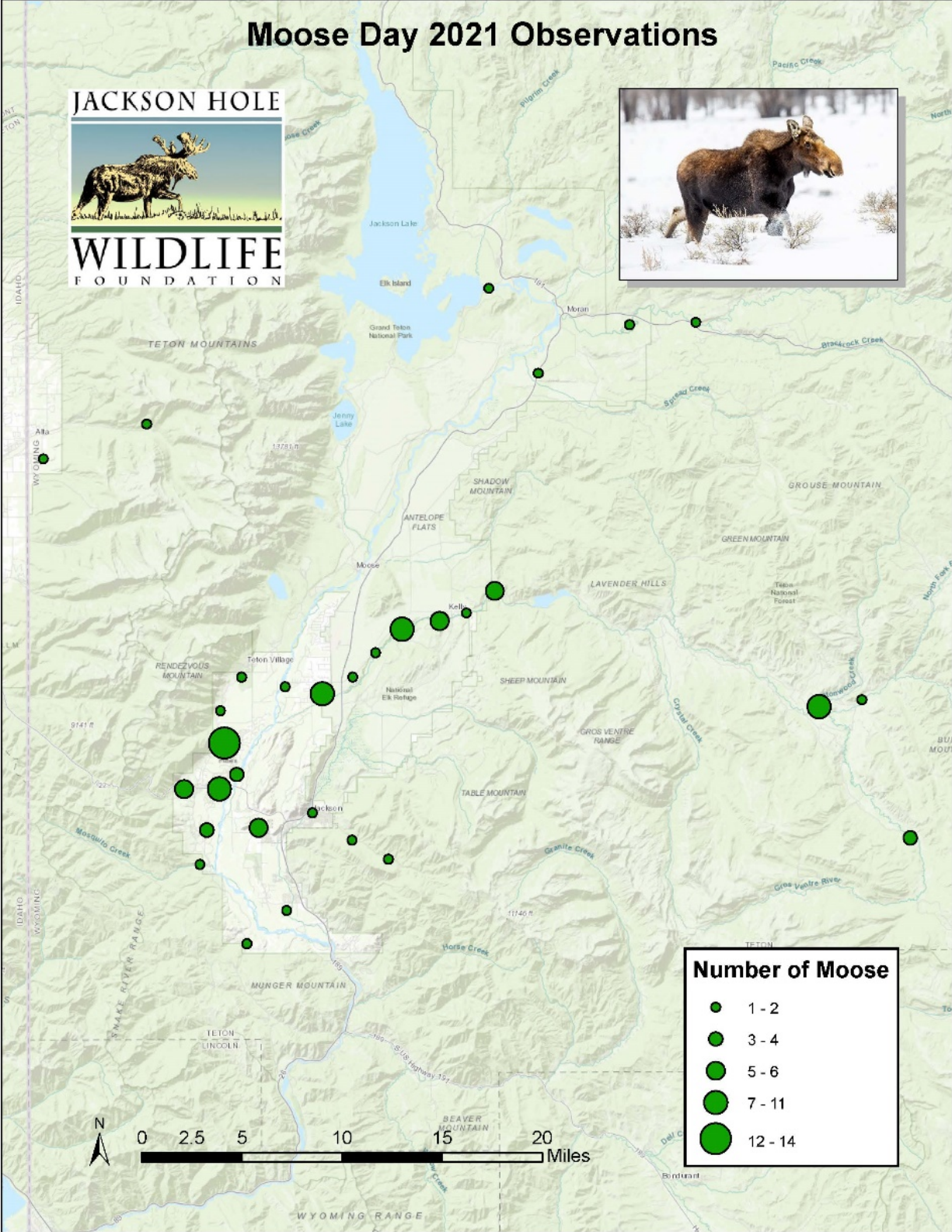


Figure 4. Map showing the number and locations of moose detected during the Moose Day 2021 survey. Moose were most frequently encountered along the Gros Ventre River and in the neighborhood south of Teton Village. (Photo of moose along the Gros Ventre by Jenny McCarthy)

Moose Day numbers have fluctuated throughout the years, with an average of 101 moose per year seen and a median of 95 moose seen. There is no strong trend seen in these data (Figure 5).

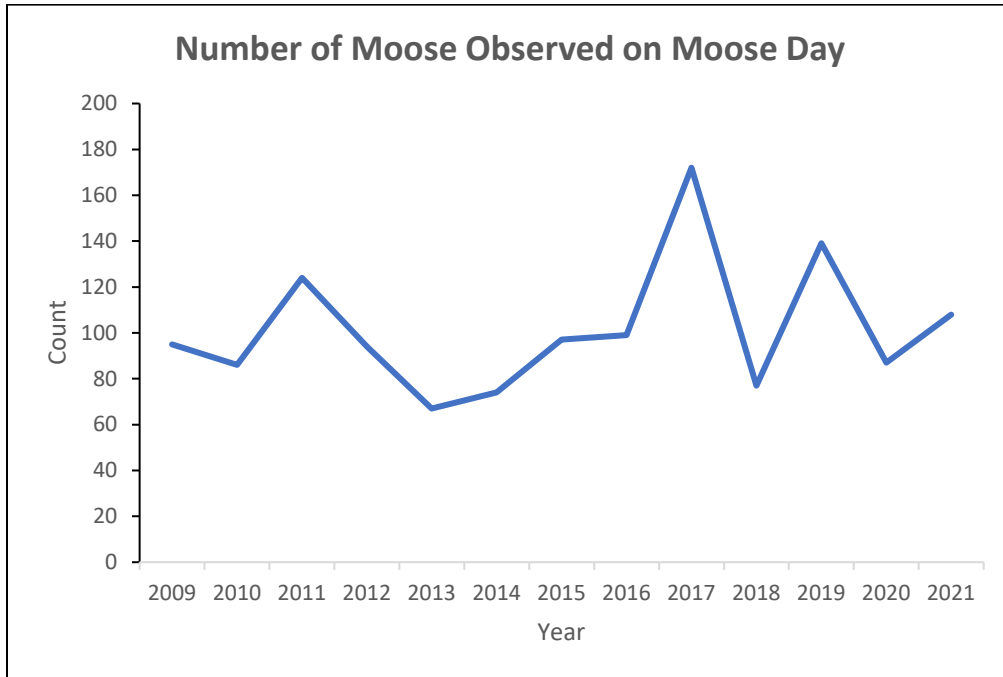


Figure 5. The number of moose observed during each Moose Day survey from 2009-2021.

We documented 46 females, 22 males, and 40 moose of unknown sex. We classified 84 moose as adults and 22 as juveniles. Two moose were unable to be aged and were classified as unknown (Figure 6).

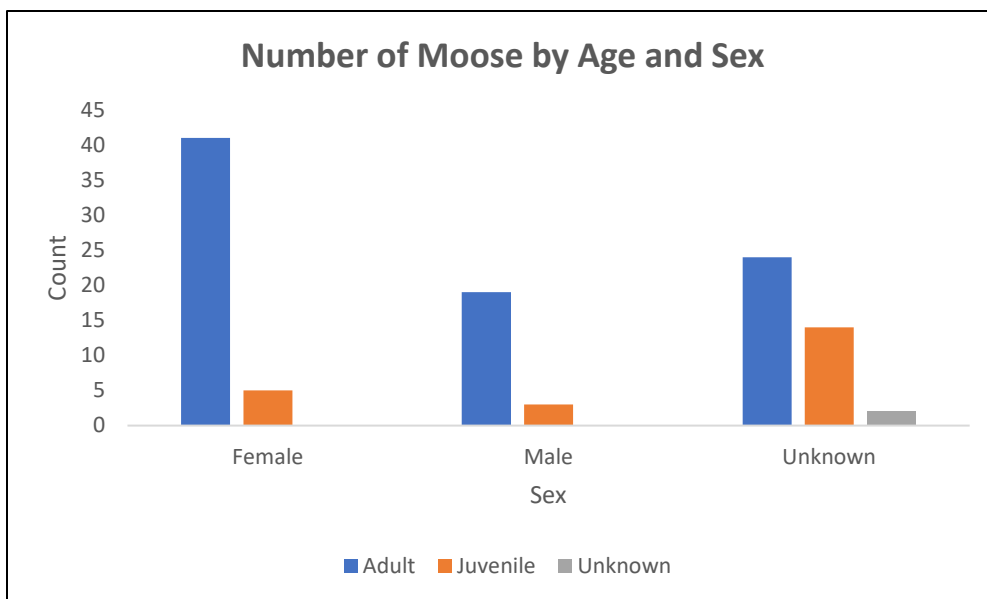


Figure 6. The number of male, female, and unknown sex moose per age class detected during the Moose Day 2021 survey.

We observed most moose in great shape with glossy coats. There were two reports of moose with ticks and one report of a moose with nicked ears (a sign of carotid artery worms).

We observed and Nature Mapped many other iconic Greater Yellowstone Ecosystem wildlife species including river otter, marten, coyote, red fox, mule and white-tailed deer, elk, bighorn sheep, trumpeter swan, Canada goose, mallard, greater sage-grouse, bald eagle, great gray and great horned owl, mourning dove, mountain chickadee, horned lark, American robin, Townsend's solitaire, and red-winged blackbird (Figure 7).



Figure 7. River Otter tracks observed during the Moose Day 2021 survey. Photo by Kent Clements

Surveyor Effort

In 2021, 107 surveyors comprising 36 people units spent 323.66 total hours (158.75 hours by car, 101.25 hours by ski, 33.5 hours on snowmobile, 23.16 hours walking on foot, and 7 hours by snowshoe) surveying for the Moose Day survey. The total effort (effort per people unit) was 159.975 hours.

In addition to trained Nature Mappers, agency biologists representing Grand Teton National Park, Bridger-Teton National Forest, and Wyoming Game and Fish Department participated in the Moose Day survey. Staff and board members of the Jackson Hole Wildlife Foundation also participated.

Volunteer participation has risen through the years, with 2021 breaking the record for highest participation in the event ever (Figure 8).

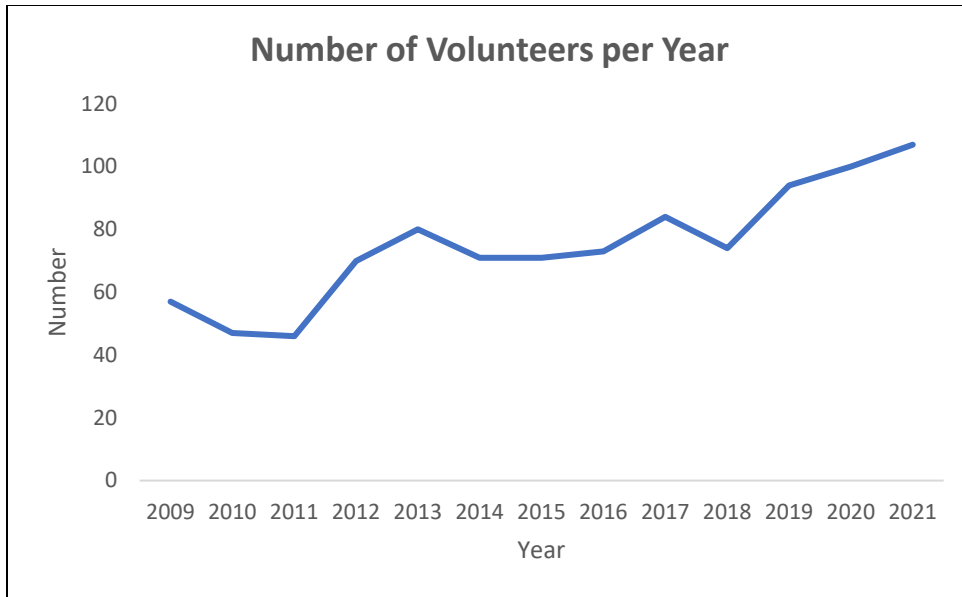


Figure 8. The number of volunteers which have participated in Moose Day has risen throughout the years. 2021 had record participation with 107 volunteers.

Weather

Conditions on March 6, 2021 between 6:00 am – 4:00 pm were mostly clear. The NNE wind averaged 8.8 mph. Temperatures started out chilly at 3°F at 6AM, reaching 20°F by noon, with a high of 44°F by the late afternoon. The day average temperature was 22°F. Visibility was excellent (10 miles in any direction; Weather Underground 2021). The Snake River Basin was at 100% of the 30-year median snow water equivalent (SWE) on March 6, 2021 (WWRDS SNOTEL precipitation update found [here](#)).

We did not find a strong correlation between SWE or temperature and the number of moose seen during Moose Day (Figures 9 and 10).

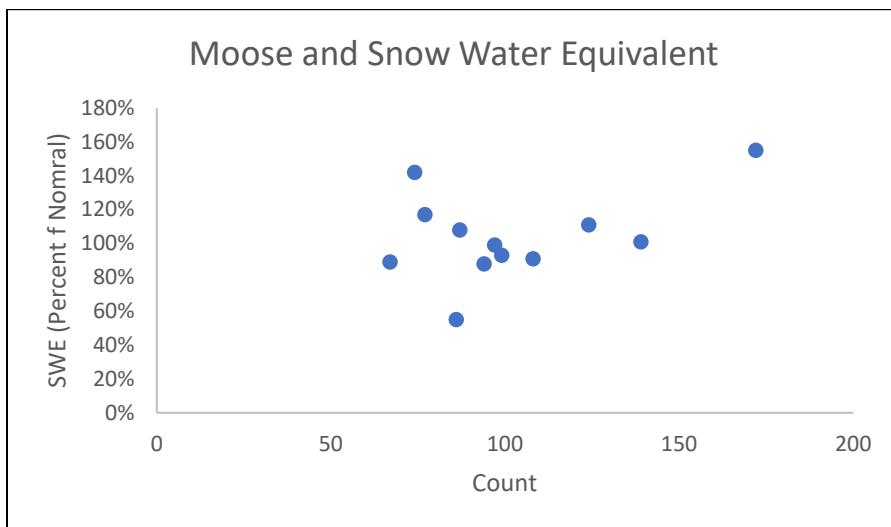


Figure 9. There was no strong correlation between snow water equivalent percent of median on Moose Day and number of moose seen on Moose Day between 2009 and 2021.

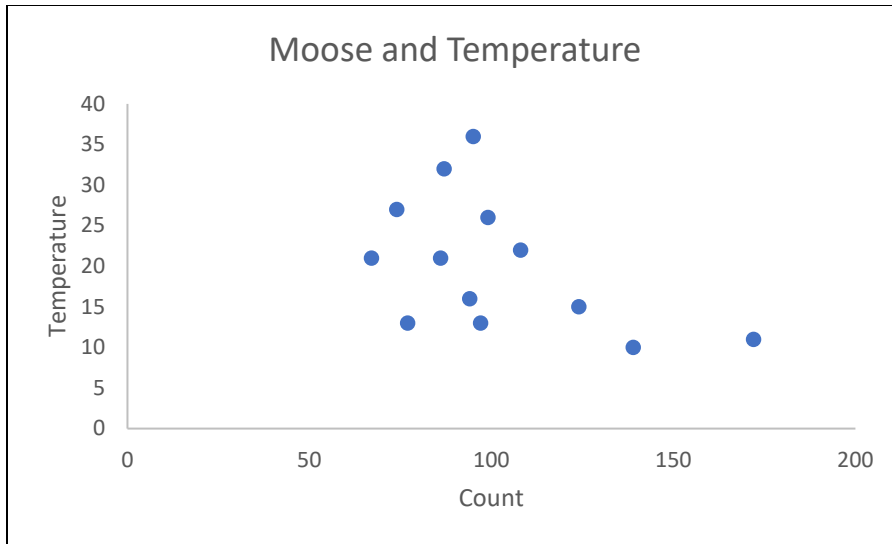


Figure 10. There was no strong correlation between average daily temperature on Moose Day and number of moose seen on Moose Day between 2009 and 2021.

Discussion

Moose Survey

The total Moose Day count of 108 is slightly up from the long-term average of 101 moose. Similar proportions of male and female moose were documented this year when compared to previous years and age class proportions were similar to previous years as well.

In 2017, we recorded 172 moose. This record number was mostly due to the 57 moose detected by the snowmobile crew which traveled into the Upper Gros Ventre to the Darwin Ranch. This same route only produced 14 moose in 2021. These differences in counts are likely due to different weather conditions, snow depths, and spatial distribution of moose in the area, and are not necessarily an indication of a population decline in the Gros Ventre drainage.

One limitation of Moose Day is that moose need to be within sight distance of roads or trails where surveyors can observe them. Therefore, these data are especially useful when paired with aerial survey data that encompass the larger area.

Volunteers

Over 13 years, the number of Moose Day volunteers has risen, and 2021 again marked an all-time high with 107 volunteers participating in the survey. Most are long-time Nature Mappers and Jackson Hole residents, but several participants were newcomers to the community who helped survey their neighborhoods. Our Moose ID clinic was well attended. We will continue to provide this educational experience for our volunteers as it increases participants' ability to properly age and sex moose, as well as providing an update to participants on the state of the Jackson Moose Herd.

Weather

The Natural Resources Conservation Service (NRCS) installs, operates, and maintains an extensive, automated system to collect snowpack and related climate data in the western United States called SNOTEL (SNOWpack TELemetry). Snow water equivalent (SWE) is the measurement of the amount of water contained within the snowpack. Higher SWE indicates a denser snowpack and lower SWE indicates a less dense snowpack. The percent of the median on a given date tells us how snowpack and its water content compares to previous years on the same date. This year the percent of the median was 100%, meaning SWE was similar to the median measurements of previous years. Intuitively, it seems that higher snowpack in the mountains would mean more moose congregating in the valleys, where they are visible to Moose Day surveyors. However, our data show no correlation between SWE percent of median and number of moose detected on Moose Day. There was also no correlation between average temperature on Moose Day and the number of moose detected.

Acknowledgements

Thank you to all the volunteers who spent time on Moose Day 2021 searching for moose in Teton County. First, thank you to Frances Clark, who has generously dedicated countless hours of volunteer time to organizing Moose Day and Nature Mappers for many years. We also give special thanks to our partner agencies and their staff for their contributions to the cooperative cause of Moose Day. This year Morgan Graham of Teton Conservation District, Ben Wise of Wyoming Game and Fish Department, Sarah Dewey and Carson Butler of Grand Teton National Park, and Jason Wilmot of Bridger-Teton National Forest participated in the survey. Several representatives from Jackson tour companies participated as volunteers on Moose Day 2021. We appreciate the time of AJ DeRosa (JH Vintage Adventures), Josh Metten (EcoTour Adventures), and Matt Fagan (Buffalo Roam Tours). We also thank owners and property managers for giving their generous permission to our teams to survey Snake River Ranch, Spring Creek Ranch, Jackson Hole Winery, Jackson Hole Golf and Tennis, Teton Pines, Astoria Park Conservancy, Snake River Sporting Club, and Teton Science Schools. Thanks to the many other private landowners who allowed us access to their properties and submitted data to the Moose Day 2021 survey. And finally, many thanks to Aly Courtemanch, lead for Moose Day at WGFD. Without her, we would not have Moose Day!

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