
***2022 Project Progress Report:***

# *Measuring Recreation Use and Its Potential Impacts on Grazing Cattle at Rinker Rock Creek Ranch*

**By Jason W. Karl**

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**PRELIMINARY RESULTS for 2022:**

**BACKGROUND:** Outdoor recreation activity in Idaho, and across the West, has boomed in recent years. There has been a long-standing presumption that recreational use of public lands and open spaces is benign, but recent increases in the number of recreational users and the types of recreation have demonstrated that recreation use has potential to significantly impact lands and other land uses. The frequency of direct effects of recreation on livestock grazing has not been widely determined, and recreation impacts on grazing may include indirect effects (e.g., stress to livestock, reduced weight gains). The recent recreation boom has increased the need to understand recreation trends, impacts to lands and other land uses, and potential management options. Yet a strategy has not been developed for assessing direct and indirect effects of recreation on livestock grazing that takes advantage of the multiple data sources now available. Where costly trail counters or potentially inaccurate self-reported use (e.g., sign-in logs) have been the two main approaches for counting recreation users and types in many areas, new approaches may provide better data. Low-cost game/trail cameras have been shown to provide accurate data on recreation usage. Additionally, popular exercise-based social media platforms like STRAVA (https://www.strava.com/) that track exercise and outdoor recreation activities via mobile device GPS have been shown to correlate strongly with actual trail use. Both understanding recreation use patterns (in space and time) and determining if recreation users impact livestock productivity or health are subjects poorly represented in the scientific literature and of importance to land managers and livestock producers.

**HYPOTHESIS or OBJECTIVES:** This project has three objectives: (1) implement a low-cost approach for monitoring recreation use with camera traps and self-reported user data from Strava in a pasture being grazed at RRCR; (2) pair recreation use data with livestock location (GPS and accelerometer) data already being collected for another study in the pasture to test whether recreationists push or alarm livestock and quantify the level of avoidance; and (3) educate recreation users about responsible recreation around livestock and at RRCR.

Our hypotheses are: (1) trail cameras and STRAVA ride logs provide a low-cost and efficient means of monitoring recreation use and determining the type of user and timing of use; and (2) recreation users do not push or alarm livestock to the extent that livestock would avoid an area.

**PROCEDURES:** This project occurred in Blaine County at RRCR's Guy Canyon pasture. We used trail cameras to count recreation users and livestock numbers, personal GPS devices connected to the STRAVA app to track recreation users, and GPS/accelerometer collars to track cattle locations and behavior. Using the personal GPS devices of the participants and the GPS collars on the cattle will allow us to test our first

hypothesis: “trail cameras and Strava ride logs provide a low-cost and efficient means of monitoring recreation use and determining the type of user and timing of use.”

The route from Hatty Gulch through Guy Canyon to Rock Creek Road is a well-used route by mountain bikers on RRCR in spring and early summer. Cattle were scheduled to enter the Guy Canyon pasture on July 14, 2022 and remain there through August 1st. This defined the duration of the study.

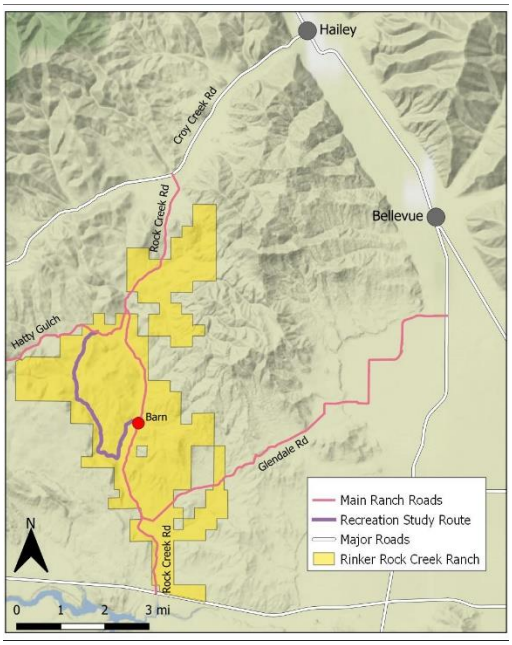


*Figure 1. Study route location within the UI’s Rinker Rock Creek Ranch.*

In early summer 2022, the project team purchased and installed six (6) trail cameras at intervals along this route (Figure 2). Cameras were maintained by RRCR interns, and the photos downloaded and backed-up weekly prior to and during the project.

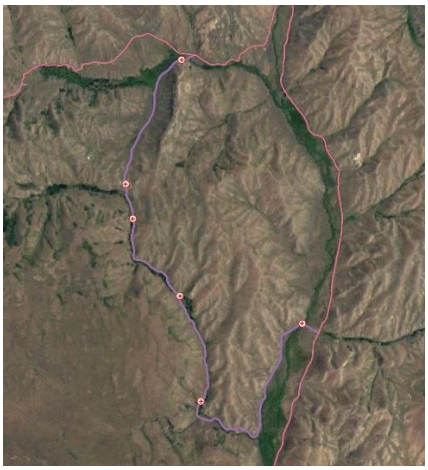

*Figure 2. Six trail cameras were installed in locking cases along the route through the study area.*

Access to the study pasture is via two roads with locked gates. Within the pasture, several additional fences with wire-strand “cowboy gates” cross the main access route that hikers or mountain bikers would use. Gates and fences can be challenging to cross safely with a bicycle, and gates left open pose challenges to livestock management. To reduce the possibility of gates being left open and improve the hiking or mountain biking

experience (which will help draw volunteers to ride in the study pasture) we installed wood-ladder stiles over the fences (Figure 3).

*Figure 3. Example of wood-ladder fence stile that were installed along the study route. These walk-over fence crossings eliminate the need for non-motorized recreationists to open and close pasture gates.*

Prior to initiating the project, we reached out to local recreation users through the Blaine County Recreation District, Wood River Trails Coalition, and local school mountain bike teams to describe the project, enlist volunteers, and deliver educational material about the Ranch and responsible recreation around livestock. Participants were asked to travel the route through Guy Canyon during the study period and send the project team their GPS log files if possible. We also placed flyers advertising the study with local businesses in Hailey and Ketchum to encourage participation.

Beginning on July 11, 2022, a team led by Dr. Jim Sprinkle placed GPS collars on 36 cows and 36 calves in the herd that was turned out in the Guy Canyon pasture (Figure 4). This team is working on a separate project examining the grazing efficiency of cattle, and their collars record both location (i.e., GPS) data as well as movement data via accelerometers which indicates whether the animal is grazing, walking, or resting. We will use the livestock location and movement data with camera photos and GPS data from the volunteers to test our second hypothesis: “recreation users do not push or alarm livestock to the extent that livestock would avoid an area.” GPS collar data has been retrieved from the livestock and is being pre-processed and quality-checked. Based on the camera and GPS track information, we will isolate events where recreational events were near cattle and look for evidence of behavior changes in the cattle.

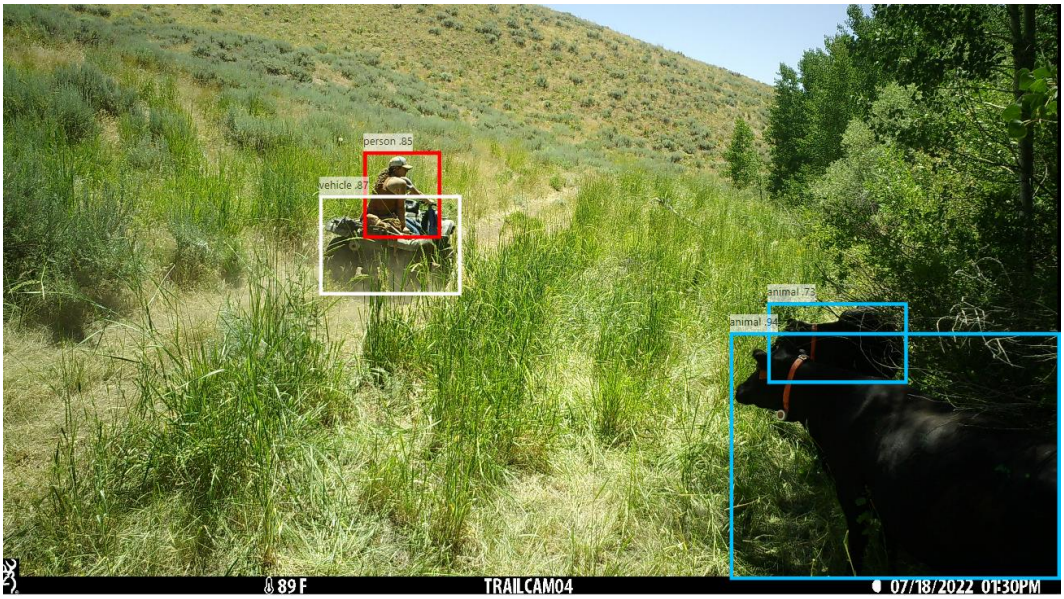

*Figure 4. Cattle with GPS collars displaying alert behavior when an ATV travels by. Boxes on the photo show the result of the CameraTraps AI identifying two animals, a person and a vehicle in the photo.*

Photos from the project are being analyzed using two applications designed for extracting data from motion-detecting cameras. Microsoft's CameraTraps AI is an open-source set of scripts and machine-learning models that scan photos for the presence of recognizable objects. The current model for CameraTraps AI can identify three categories of objects in a photo – animal, person, vehicle – with over 99% accuracy (see Figure 4). This tool is invaluable for screening out empty photographs and quickly sorting photographs with people in them. The second tool, Timelapse, is a graphic interface for sorting, classifying, and extracting information from photos. Timelapse reads the results from CameraTraps AI and displays boxes on the photos for each recognized object. For each photo with people in them, we are identifying how many people, what type of activity (hiking, biking, motorized), and extracting the date and time of the event. We are then selecting the photos before and after that event to determine presence of cattle, if cattle have GPS collars, and indicators of behavior (e.g., alertness, fleeing). Timestamps of the photos will help pair public access events with the GPS collar data.

**ACCOMPLISHMENTS or RESULTS:** The study was implemented as proposed with only minor changes. The six cameras along the study route took over 50,000 photos during the study duration. Analysis of the photos with CameraTraps AI and Timelapse is ongoing. Recreation participation in the study was lower than expected, in part due to high temperatures during the study. However, we did see a number of participants in the study area (Figure 5). Study PI Karl made six bike trips through the study area on different days. Anecdotally, he observed more evidence of cattle being alarmed and flighty than he typically sees from cattle. The frequent trips ranch staff made on ATVs through the study area may also provide an opportunity to look at the effects of motorized access on livestock behavior.

*Figure 5. Example photo from the study showing a cyclist traveling through the study area. Boxes on the photo show the result of the CameraTraps AI identifying a person and a vehicle in the photo.*

The average duration of the GPS collars was 11.4 days for cows and 10.6 days for calves (Figure 6). Because the collars were installed 3 days before the official beginning of the study (though cameras were in place and cows were in the pasture prior to the official study start date), we may have good GPS data available for only the first half of the study. We will evaluate this when we have the cleaned GPS collar data available.

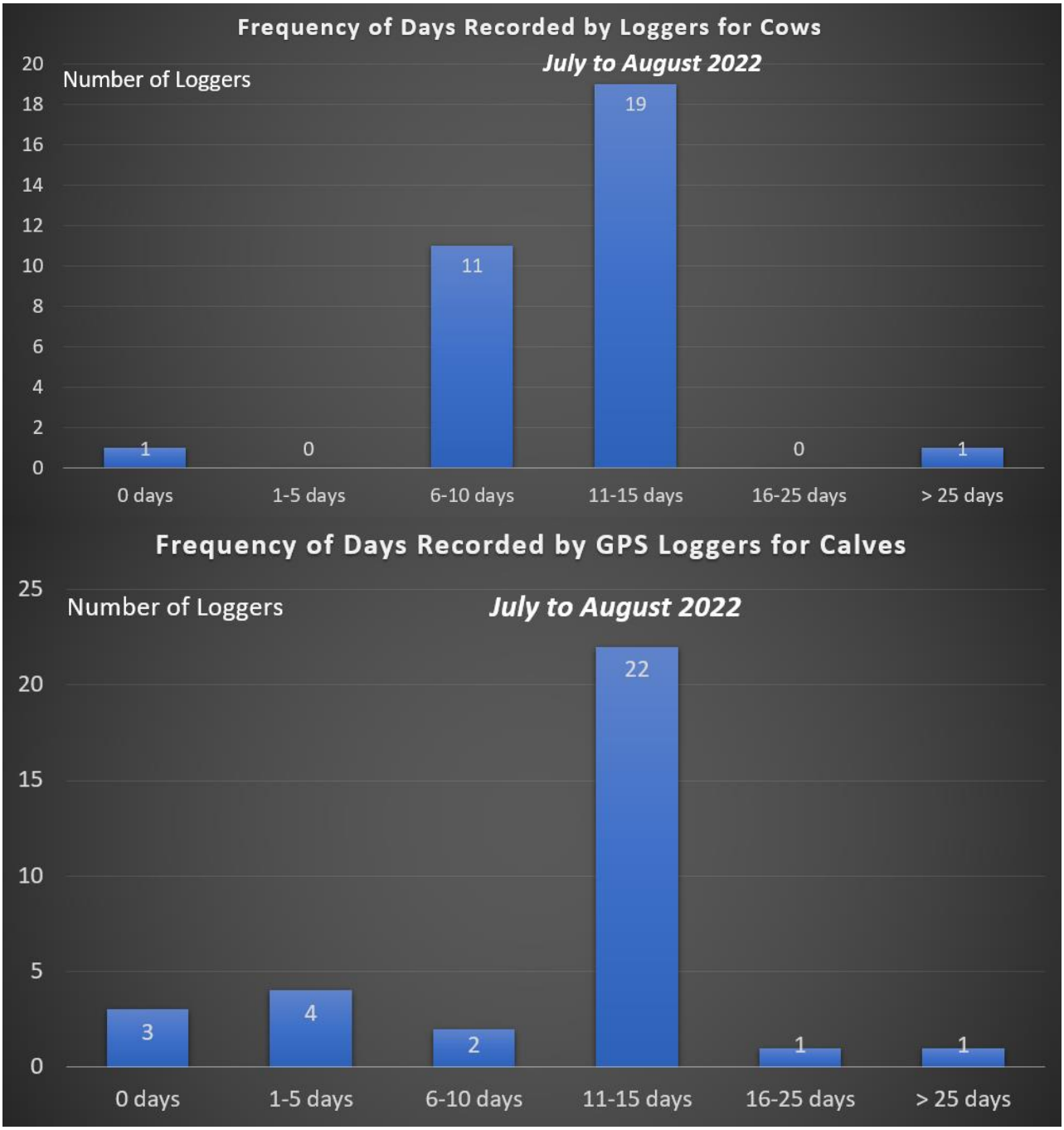


*Figure 6. Histograms of duration (i.e., battery life) of GPS loggers on cows (top) and calves (bottom) that were collared as part of this study. The majority of GPS loggers lasted between 11 and 15 days.*

**PUBLICATIONS or OUTPUTS:** This project is ongoing. Analysis is expected to be completed before Spring 2023. We have met with the Blaine County Recreation District, Wood River Trails Coalition to provide updates on status of the project. Once analysis is complete, we will produce a final report and convene a meeting with project stakeholders.