Bison Spatial Mapping Protocol – Summer 2008

Pilot Study - Version 1

Goals and Rationale for Study

This summer, we will begin a pilot study of the habitat use of the bison herd, which the refuge has identified as important information for future management. To conduct this research, we will make use of Global Positioning System (GPS) data in combination with Geographic Information System (GIS) software to map out and analyze the space use of the herd in their summer range before and during the annual breeding season, or rut. Each refuge in the US Fish & Wildlife system with a bison herd has been asked to "assess its natural resources and priorities, and identify a long-term carrying capacity for bison in the context of meeting all refuge purposes." The bison herd at FTN is rotated through 10 grazing units from April through September on the 'summer range' of the. Identification of long-term carrying capacity of the bison herd will require a consideration of grazing unit size, rotation schedule, and time in each unit because these factors may impact abundance of key grass species and range types. Anecdotal observations suggest that the bison herd shifts their grazing and movement patterns during the rut in July and August. This may be due to rutting bulls eating less and cows running more, and the possible tendency of the herd to 'hang' in one place longer. Non-systematic observations imply that during the rut, longer periods of time in the same unit may result in both (a) the herd utilizing many different regions of the unit, and (b) hanging in the same locations, such as around gates, resulting in greater damage to vegetation.

Our plan for year #1 of the study (2008) is to characterize the locations of the herd during 4 weeks of pre-rut (June) and 4 weeks of rut (10 July-9 August) while holding unit size and forage utilization (AUM) approximately constant. The purpose of the first year study is to establish whether or not grazing and space use patterns of the herd change during the rut compared with pre-rut. Ultimately, many range factors will have to be taken into consideration, such as temperature, soil type, range type, hydrology, and elevation. Some factors, such as temperature, unit size, time in unit, and perhaps range type (from remote sensing infrared), could be collected and statistically held constant in the analysis. If herd grazing and movements are significantly different during rut, this will imply the need to manage the herd differently during the rut months. In this case, we might follow up with a year #2 study involving the participation of a range scientist to characterize plant community impacts. This study has the potential to address two important points in bison conservation. Can we assume that bison (1) behave like cattle terms of their feeding ecology?, and (2) behave the same as historical bison that migrated hundreds of miles each year? Overall, this research will increase our current understanding of bison habitat use and carrying capacity in the national wildlife refuge system.

Methodology

For this pilot study, we will field test our methodology, tweaking and fine-tuning our protocol as we go along. For our first version will start simple, using paper maps on which we will draw the approximate locations of the different groups in the herd at various times of day. We will simultaneously collect data on the compass bearings and distance of animals on the perimeter of the groups in relation to a GPS reference point for later input into the GIS mapping software. (I will later assess the feasibility of eventually performing this task electronically in the field, once the 'bugs' have been worked out in the hardware and software to be used for this task.) At the time that we characterize the location of each

group on the map, we will collect data on group size, composition, and activity budget. These variables can later be analyzed in relation to habitat factors such as vegetation, soil, slope, and so forth. Each team member will be assigned a particular task, which can be rotated during the day. Our initial goal will to establish skills and experience to collect this data quickly and efficiently so that we can characterize the spatial location of the entire herd in each unit several times a day throughout their stay in that unit.

Protocol Tasks

1. Mapmaker and data recorder – Will sketch the approximate extent (polygon) of each group on a paper map of the unit, taking into consideration landmarks on the ground and map. The polygon of the group area will be identified on the map with a letter (A, B, C, etc.). This sketch will include points that refer to the reference point (GPS location) and outlying animals on the perimeter of the herd. Each point will be numbered, with the reference point numbered "0" and each perimeter animal numbered 1, 2, 3, and so forth. The paper map itself will be identified with date and the time of day (military time) that sketching began and ended. In a separate notebook, the following information will be entered for each group:

Date and time of day of map	*(6/9/08, 900-1030)*
Group letter	*(Group A)*
Time of day started	*(900-915)*
GPS location of reference point	*(0 = UTM coordinates)*
Distance/bearing of perimeter animals	*(1 = 240m/125^{o}, 2=…)*
Group size	*(55)*
Composition of group	*(43 bulls, 10 cows, 2 calves)*
Activity budget	*(25 lie, 30 fd)*

2. GPS and herd counter – Will take the GPS location of the reference point (a vantage point) for each group using the Garmin GPS unit. Will then use binoculars to first count the total animals in the group, and then count the number of animals engaged in the following activities during that "snapshot of time": Lie = lying down, Std = standing up doing nothing, Fd = grazing, Mv = moving without feeding. All of this information will be relayed to the data recorder.

3. Distance measurer – Will measure the distance from the reference point to particular animals on the perimeter of the group using a laser rangefinder, coordinating with the Bearing measurer. Communicates the data to the recorder.

4. Bearing measurer – Will measure the compass bearing from the reference point to particular animals on the perimeter of the group using a magnetic compass, coordinating with the Distance measurer. Communicates the data to the recorder.