**Fission-Fusion Movement Dynamics of Semi-Free RoamingBison in North-Central Montana

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Plains bison (*Bison bison bison*), a keystone species in North American grasslands, exhibit fission-fusion dynamics in which they break into smaller groups and coalesce into bigger groupsover time. However, it is unclear what social and environmental factors drive these dynamics. We used both fine-scale behavioral observations and movement data from GPS ear tags to construct social networks and examine fission and fusion events for two bison herds over multiple years at American Prairie in northcentral Montana. These bison herds are semi-free roaming and graze year-round in 32.4 and 111.6 km^2 fenced pastures with minimal internal fencing. While the bison in our study did exhibit fission-fusion behavior, we did not observe stable sub-groups in time-aggregated social networks at the scales of months or growing seasons (eigenvector modularity ranged from -0.008 to 0.027). We used Mantel tests to assess the relationships between association strength and relatedness, age, and place of origin. We found that only first-order relatives were more likely to associate with one another, and therewas no significant impact of shared age or place of origin. The observed lack of stable sub- groups challenges prevailing assumptions and highlights the need for future research into the mechanisms of fission-fusion dynamics in bison under different management conditions.