

## DEVELOPMENT OF AERIAL SURVEY METHODOLOGY FOR BISON POPULATION ESTIMATION IN YELLOWSTONE NATIONAL PARK<sup>TWS</sup>

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Aerial survey methods for statistically rigorous bison population estimation are being developed for Yellowstone National Park (YNP) to support sound resource management decisions and to understand bison ecology. This survey methodology quantifies a sampling universe and sampling units, standardizes search effort, and employs a stratified sampling design, which accounts for undetected animals. Including seasonally occupied areas outside YNP boundaries, 76 survey units with area of 2,339 km<sup>2</sup> comprise the entirety of our designated survey extent, roughly equivalent to 26 percent of the area of YNP. The same survey units and total extent are used both in winter and in summer, but survey units have different strata designations for each season. During winter, 52 percent of the entire survey area is designated to be in the high density stratum, although in summer, 41 percent of this area is in the high density stratum. Concurrent intensive ground surveys, or 'double sampling', in the Madison-Gibbon-Firehole areas and the Northern Range in winter were used to estimate the magnitude and variability in detectability during specific aerial surveys. In comparing these simultaneous ground and aerial surveys primarily in winter, only 84.3 percent of the groups were detected on average from aircraft, although 94.8 percent of individual bison were detected. During the summer breeding period, as much as 70 percent of the entire bison population is aggregated in significantly larger, highly visible groups in Hayden Valley than observed during winter. Low variability between counts and high detectability suggest that precise and unbiased population estimates should be readily obtainable.