

Golden Eagle (*Aquila chrysaetos*) detections in Mesa Verde National
Park during 2006 Population Level Survey of Golden Eagles
in the Western United States

Prepared For:

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Introduction and Methods

Researchers have suggested golden eagle (*Aquila chrysaetos*) populations may be declining in portions of their range (Bittner and Oakley 1999, Leslie 1992, Steenhof et al. 1997). However, there are few baseline data describing golden eagle populations across their range in the western United States (Kochert & Steenhof 2002; Good et al 2007a). We used aerial line transect distance methodology with a double-observer modification to estimate golden eagle population numbers from 15 August to 11 September 2006 after most golden eagles had fledged and before fall migration (Good et al 2007a). The overall goal of this project was to provide a thorough, objective, and scientifically rigorous population estimate of the Golden Eagle population in the study area comprised of Bird Conservation Regions (BCRs) 9 - Great Basin, 10 - Northern Rockies, 16 - Southern Rockies / Colorado Plateau, and 17 - Badlands and Prairies (North American Bird Conservation Initiative 2000), within the boundary of the United States (Figure 1).

The long-term objective was to estimate Golden Eagle population sizes in the study area using aerial line transect procedures such that, if replicated annually, would have at least 80% power to detect an annual rate of total population change greater than or equal to 3 percent per year over a 20-year period using a test of size $\alpha = 0.1$ (or 90% confidence interval).

The following report details results from aerial golden eagle surveys conducted during the 2006 survey in or adjacent to Mesa Verde National Park. For a comprehensive description of methods and bio-regional survey results and analyses from 2006 see Good et al 2007b.

Golden Eagle populations in the western U.S. may cycle on a 10 year basis, concurrent with jackrabbit populations (Smith and Murphy 1979, Steenhof et al. 1997), Kochert and Steenhof (2002) suggested studies conducted for less than 10 years may not accurately reflect population status. Other than work conducted by researchers at the U.S. Geological Survey (USGS) Snake River Field Station, Boise, Idaho, few long-term monitoring studies of Golden Eagle populations have been conducted in the U.S. (McIntyre and Adams 1999, McIntyre 2001, Leslie 1992, Bittner and Oakley 1999). The United States Fish and Wildlife Service (USFWS) issued a request for proposals (Solicitation number 982103R041) to design and conduct Golden Eagle population surveys in Bird Conservation Regions (BCRs) 9,10,16, and 17 within the boundary of the U.S. On July 28, 2003, the USFWS awarded Western EcoSystems Technology (WEST), Inc., (Cheyenne, Wyoming) a contract to design and conduct aerial surveys for Golden Eagles and provide estimates of population sizes within the defined study area. An initial survey was conducted in 2003 (Good et al 2004) and the second round occurred in 2006.

In 2006 we flew aerial line transect surveys using double-count procedures to estimate population sizes of Golden Eagles in the study area from August 15 — September 11, 2006. This provided a survey period that occurred after most Golden Eagles have fledged and before fall migration had started (Fuller et al. 2001). Surveys were conducted using Cessna 205 and 206 aircraft flown at approximately 161 km/hr and at

either 107m or 150m Above Ground Level (AGL), depending on terrain and safety. Three observers were present on every survey flight. The third observer was used to evaluate detection rates (i.e., number of Golden Eagles missed). Using double-observer methods (i.e., use of the third rotating observer), in combination with traditional line transect methodology, we estimated the probability of detecting each Golden Eagle and adjusted our density and abundance estimates accordingly (Good et al 2004, Good et al 2007a).

Results and Discussion

We flew 100 km of linear aerial transects on one transect (#150) in and adjacent to Mesa Verde National Park (Figure 1). The transect originated east of the park and preceded west through the northern section of Mesa Verde National Park west of the park. No golden eagles were observed while flying on transect in or adjacent to the National Park.

We flew 221 (partial and complete) transects across the entire survey area for a total of 17,755 km of transect flown. We observed 163 Golden Eagle groups on 77 transects, for a total of 210 total birds: 47 adult; 38 juvenile; 19 sub-adult; 15 unknown immature; 51 unknown adult; and 40 of unknown age. We estimated a total of 26,401 Golden Eagles (Percentile 90% CI: 17,942 — 35,439) were present in the study area during the late summer, early fall of 2006. Estimates of total golden eagle population size were similar between 2003 and 2006. During 2003, we estimated that 27,392 were present in the study area. The purpose of the 2003 and 2006 surveys was to provide the USFWS with a population estimate for golden eagles that was statistically reliable enough to adequately manage golden eagle populations, and robust enough to adequately detect changes in populations. Based on the results of the 2006 survey, the point estimates for population size was similar between the two years, and the 90% confidence intervals overlapped. The primary difference between the two estimates was the variation within BCR's between years, and a wider confidence interval for the 2006 estimate. Continued monitoring of golden populations with a consistent protocol over a longer period of time and during consecutive years will yield more insight into abrupt changes and trends in golden eagle populations over the entire study area, and the ability of the methods to detect changes within BCRs may be better evaluated.

As mentioned above, the first three years of surveys were designed to be 'pilot' years, allowing for improvements in methods and sampling. We feel one more year of survey data will provide for a better assessment of the methods and their power to detect abrupt changes and trends over time. Although pressures on Golden Eagle populations and habitat are potentially increasing, due to factors such as increasing habitat loss (Kochert et al 1999), it is not known at what level those pressures translate into a potential Golden Eagle population decline. Baseline data, such as estimates of the current population size of Golden Eagles in the U.S., are needed in order to assess the magnitude and potential effects of these threats to Golden Eagle populations in the future

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Figures

Figure 1: Linear aerial transect #150, Mesa Verde National Park; no golden eagles detected on transect.

