



United States Department of the Interior

NATIONAL PARK SERVICE

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Memorandum

To: Glenn Plumb, Chief, Branch of Natural Resources, Yellowstone Center for Resources Gop

Through: P.J. White, Supervisory Wildlife Biologist, Yellowstone Center for Resources Pjw

From: Rick Wallen, Wildlife Biologist, Yellowstone Center for Resources

Subject: Abundance and Distribution of Yellowstone Bison, July 2008

Summary

We completed three aerial surveys of the Yellowstone bison population on June 14, July 8, and July 15, 2008, to document distribution and estimate population size. We compared these counts with breeding season age and sex composition surveys during July 2008 to estimate numbers of central and northern herd bison that survived the winter. We observed 2,943 bison on June 14, 2,881 on July 8, and 2,969 on July 15. We estimated there were a minimum of 2,969 bison with a 95 percent confidence range of 2,686-3,350. Thus, we recommend using a Yellowstone bison population estimate of 3,000 bison for discussions pertaining to the implementation of the Interagency Bison Management Plan during 2008-2009. A comparison of last year's population estimate to the number of surviving individuals in this year's estimate suggests an over-winter mortality of approximately 500 bison due to natural causes (in addition to the 1,728 bison that were culled by brucellosis risk management actions and hunter harvest). An April 15, 2008, distribution survey and estimate of 2,048-2,528 provided an initial idea of how many bison survived the past winter. The 2008 summer counts suggest the actual number of bison surviving the winter was near the upper end of the confidence interval reported in April. We counted fewer bison in the central herd than in the northern herd for the first time since repeated aerial surveying began during 1970. The central herd (i.e., number of bison breeding in the Hayden and Pelican Valleys) decreased from 3,531 bison during 2005 to 1,469 animals this year.

Introduction

We completed a post-calving and two breeding season aerial surveys of the Yellowstone bison population to document distribution and estimate population size. We compared these aerial

counts with ground surveys of breeding season age and sex composition during July to estimate numbers of central and northern herd bison that survived the winter. These annual counts were conducted to meet one of the conservation goals identified in the Surveillance Plan for Yellowstone Bison: Monitoring the Effects and Effectiveness of Management Actions.

Methods

We completed aerial surveys on June 14, July 8, and July 15, 2008, using two Piper Super Cub airplanes to survey 10 established count units, including the Blacktail and Mirror Plateaus; northern range; upper Lamar, Madison and Gibbon, Firehole, and Obsidian river/creek drainages; West Yellowstone; and Pelican and Hayden Valleys (Figure 1). The observer in each plane searched for and counted the numbers of bison in groups. The observer recorded the number of animals per group, habitat, percent snow cover and percent overhead obstructing cover. Calves were differentiated from adults during the June survey. The pilot recorded the location of bison groups using an onboard Global Positioning System. The interior count units were surveyed by Roger Stradley (Tracker Aviation) and Chris Geremia (Yellowstone Center for Resources) on June 14, Neil Cadwell (Tracker Aviation) and Chris Geremia on July 8, and Neil Cadwell and Doug Blanton (Yellowstone Center for Resources) on July 15. The northern count units were surveyed by Neil Cadwell and Jenny Jones on June 14, Doug Blanton and Steve Ard (Tracker Aviation) on July 8, and Jenny Jones and Steve Ard on July 15.

We estimated population size as the maximum count of bison and determined a 95 percent confidence interval by comparing variability across surveys (Hess, S. C. 2002. Aerial survey methodology for bison population estimation in Yellowstone National Park. Dissertation, Montana State University, Bozeman). We estimated central and northern herd bison abundance as the number of animals counted in the northern range and central interior count units during the single highest July count (Table 1). June survey information was not considered, since central herd animals were still on wintering areas in northern range count units. We estimated the relative numbers of bison surviving the winter from each herd by comparing these count data to concurrent ground surveys that differentiated calf and adult animals.

Results

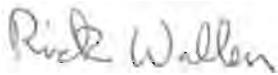
We observed 2,943 bison on June 14, 2,881 on July 8, and 2,969 on July 15 (Figure 1, Table 1). We estimated there were 2,969 bison with a 95 percent confidence range of 2,686-3,350 in the Yellowstone bison population. We estimated the central and northern herd sizes were similar, with 1,170 adults and 330 calves-of-the-year (1,500) counted in northern range units and 1,307 adults and 162 calves-of-the-year (1,469) counted in central interior units (Table 1).

Discussion

The elusive nature of wild animals results in undercounts that negatively bias population estimates (Skalski et al. 2005. Wildlife Demography, Elsevier Academic Press). Thus, we recommend using a Yellowstone bison population estimate of 3,000 animals for discussions pertaining to the implementation of the Interagency Bison Management Plan during 2008-2009. A comparison of last years population estimate to the number of surviving individuals in this years estimate suggests an over-winter mortality of approximately 500 bison due to natural causes (in addition to the 1,728 bison that were culled by brucellosis risk management actions and hunter harvest).

An April 15, 2008, distribution survey and estimate of 2,048-2,528 provided an initial idea of how many bison survived the past winter. The 2008 summer counts suggest the actual number of bison surviving the winter was near the upper end of the confidence interval reported in April.

We counted fewer bison in the central herd than in the northern herd for the first time since repeated aerial surveying began during 1970 (Table 2). The central herd, or number of bison breeding in the Hayden and Pelican Valleys, has decreased from 3,531 bison during 2005 to 1,469 animals this year (Figure 2).



Rick Wallen

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*To be posted on the GYLSC website.

Table 1. The distribution of bison observed in each survey unit during aerial surveys in and adjacent to Yellowstone National Park on June 14, July 8, and July 15, 2008.

Survey Unit	June 14, 2008	July 8, 2008	July 15, 2008
NORTHERN COUNT UNITS:			
Blacktail Plateau	213	16	9
Northern Range (Mid-elevation)	1,553	686	871
Upper Lamar River Drainage	12	248	50
Mirror Plateau	10	388	570
CENTRAL COUNT UNITS:			
Obsidian Creek Drainage	68	9	5
Madison-Gibbon River Drainages	17	25	3
West Yellowstone	215	4	1
Firehole River Drainage	660	8	11
Hayden Valley	150	1,426	1,372
Pelican Valley	45	71	77
Total	2,943	2,881	2,969
Northern Herd	---	1,338	1,500
Central Herd	---	1,543	1,469

Table 2. Maximum numbers of bison counted during aerial breeding season surveys from 1970-2007 in and adjacent to Yellowstone National Park.

Year	Count Date	Central Herd	Northern Herd	Total
1970	July 29, 1970	261	217	478
1971	July 27, 1971	388	328	716
1972	July 29, 1972	411	126	537
1973	July 27, 1973	492	292	784
1974	July 29, 1974	545	287	832
1975	Aug. 1, 1975	782	185	967
1976	Aug. 3, 1976	854	306	1,160
1977	Aug. 2, 1977	970	218	1,188
1978	Aug. 8, 1978	1,165	414	1,579
1979	Aug. 2, 1979	1,144	563	1,707
1980	Aug. 4, 1980	1,459	629	2,088
1981	July 29, 1981	1,461	575	2,036
1982				
1983	July 21, 1983	1,184	88	1,272
1984	Aug. 9, 1984	1,552	695	2,247
1985	Aug. 1, 1985	1,609	742	2,351
1986	July 29, 1986	1,778	998	2,776
1987	July 31, 1987	2,036	940	2,976
1988				
1989	July 29, 1989	1,885	592	2,477
1990	July 30, 1990	2,203	818	3,021
1991	July 28, 1991	2,290	822	3,112
1992	July 25, 1992	2,676	681	3,357
1993	July 22, 1993	2,635	686	3,321
1994	July 22, 1994	2,974	1,140	4,114
1995	July 28, 1995	3,062	866	3,928
1996	July 25, 1996	2,593	785	3,378
1997	July 30, 1997	1,715	455	2,170
1998	Aug. 4, 1998	1,399	493	1,892
1999	Aug 17, 1999	1,904	540	2,444
2000	July 13, 2000	1,924	508	2,432
2001	July 25, 2001	2,564	719	3,283
2002	July 29, 2002	2,902	813	3,715
2003	Aug. 8, 2003	2,923	888	3,811
2004	Aug. 4, 2004	3,339	876	4,215
2005	Aug. 1, 2005	3,531	1,484	5,015
2006	July 26, 2006	2,512	1,377	3,889
2007	Aug. 6, 2007	2,624	2,070	4,694
2008	July 15, 2008	1,469	1,500	2,969

Notes: Additional count data from 1901-1969 can be found in volume I of the Interagency Bison Management Plan Final Environmental Impact Statement (2000:285). During 1982 and 1988, neither late July nor early August surveys were completed. Also, extremely poor counting conditions were experienced during the 1983 survey.

Figure 1. Number and distribution of bison observed in each count unit during replicate aerial surveys of areas in and adjacent to Yellowstone National Park on June 14, July 8, and July 15, 2008 (clockwise from top left).

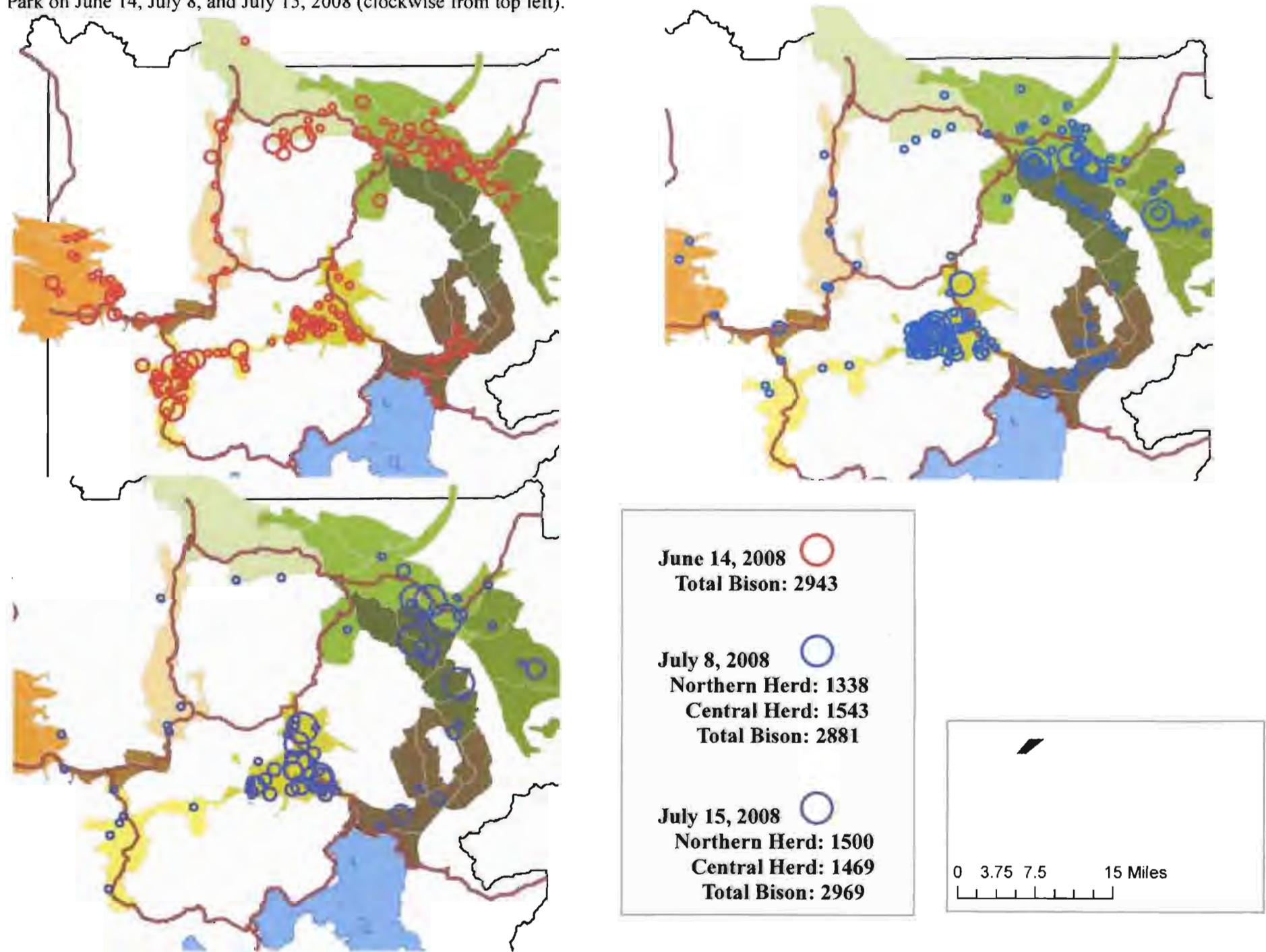


Figure 2. Summer counts of Yellowstone bison by breeding range since the inception of the Interagency Bison Management Plan in 2000.

