

Book Reviews

The Jackson Elk Herd: Intensive Wildlife Management in North America. By Mark S. Boyce. 1989. Cambridge University Press, Cambridge. 306 p. US\$75.00 hardbound. ISBN 0-521-34147-7.

This book began as a study funded by the Jackson Hole Elk Study Group (Bridger-Teton National Forest, Grand Teton National Park, National Elk Refuge, and Wyoming Game and Fish Department) to review data gathered on the Jackson elk herd since Anderson's 1958 monograph. As such, Boyce synthesized existing agency data, conducted statistical analyses, developed computer models, but apparently conducted no field research.

Though the relationship between elk (*Cervus elaphus*), other ungulates and vegetation in Jackson Hole has long been a subject of intense debate, Boyce neither clearly defined the critical differences at issue nor presented them as alternative hypotheses. To summarize the two main schools of thought, agency biologists at first (1900–1960s) believed: (1) Jackson Hole was not historical elk

winter range, (2) European settlement forced elk to winter in the valley, (3) supplemental feeding permitted the growth of an abnormally large elk herd which, (4) caused substantial damage to the winter range. However, they and Boyce now believe: (1) large numbers of elk have wintered in Jackson Hole for the last several thousand years, (2) feedlots have only replaced winter range lost to human developments, (3) therefore, today's elk populations are not unnaturally high, though the distribution of wintering animals may have changed, (4) serious, elk-induced range damage has not occurred except near feedlots, and (5) the elk population would be regulated by density-dependent homeostatic mechanisms if hunting ceased.

In his preface, Boyce tells his readers that "Much of this controversy ultimately stems from abundant misinformation," implying that his work does not misinform. His book, however, has important errors and omissions, two examples of which are illustrated here.

First, Boyce's work is predicated on the assertion that several thousand elk wintered in Jackson Hole for the last 8,000 or so years. On pages 212-213, Boyce presents a short review of faunal remains found in archaeological sites as support for this assumption. He cites the Dead Indian Creek Site as evidence that elk remains date to 4,000 BP. A review of the original report [Frison and Walker, 1984. *Wyo. Archaeol.* 27(1-2):11-122.], however, reveals that site is located 180 airline km northeast of Jackson Hole. Moreover, the faunal section indicates that 17 elk, 28 antelope (*Antilocapra americana*), 43 bison (*Bison bison*), 311 bighorn sheep (*Ovis canadensis*), and 812 mule deer (*Odocoileus hemionus*) bones were unearthed, respectively. Clearly, the ungulate remains at this site are dominated by mule deer and bighorn sheep, not elk. This situation is the exact opposite of the present situation along Dead Indian Creek and in Jackson Hole where elk constitute more than 80% of total ungulate numbers (Kay 1990. *Yellowstone's northern elk herd: A critical evaluation of the "natural regulation" paradigm*. Ph.D. Diss., Utah State Univ., Logan.).

More importantly, Boyce does not mention any of the archaeological work done in Jackson Hole. Over the years, more than 20 archaeological sites dating from 140 BP to 5,200 BP have been excavated in Jackson Hole, but not a single elk bone has been recovered. Archaeologist Gary Wright (1984. *People of the high country: Jackson Hole before the settlers*. Peter Lang.) concluded that large herds of elk did not inhabit Jackson Hole until the late 1800s. Though Native Americans used Jackson Hole for at least 8,000 years, according to Wright, those peoples subsisted mainly on vegetal foods because all ungulates were rare.

After reviewing hundreds of archaeological reports and interviewing prominent archaeologists throughout the West, I can unequivocally state that elk are rare in all Intermountain archaeological sites. Instead, ungulate faunal remains from those sites are dominated by bighorn sheep or deer. Of over 52,000 ungulate bones unearthed in western archaeological sites, only 3% were elk (Kay 1990). If large numbers of elk had "always" wintered in Jackson Hole, or other areas in the Intermountain West, their bones should appear more frequently in archaeological sites (Kay 1990).

In a 1984 letter to Leslie Pengelly, then director of the Wildlife Biology Program at the University of Montana, Wright said "keep in mind that I have (been) battling wildlife biologists from Grand Teton and Yellowstone Parks for some years. One told me, after a seminar I gave at the Jackson Hole Biological Research Station on the faunal resources of the region, "Even if you demonstrate that no elk were here, we would still continue to argue for them because our management policies require a herd of at least 10,000 elk by the end of the Pinedale ice (the last deglaciation)." If Boyce does not believe Wright and other archaeologists' work, he should at least

have told his readers why he does not. If he cannot, then the key assumption of his book is, at best, without foundation.

Boyce correctly identifies the condition and trend of aspen communities as one of the major points of debate over elk management in Jackson Hole. One school of thought holds that elk browsing has substantially impaired aspen communities while Boyce and others believe that the decline of aspen is due primarily to suppression of lightning fires and normal plant succession.

Boyce cites my work (Kay 1985. pp. 131-160 in G.W. Workman, ed. *Western elk management: A symposium*. Utah State Univ., Logan.) as evidence that the "current condition of aspen in Jackson Hole generally appears to have improved since the early 1970s." My early aspen research, however, was in error because it concentrated along roads and trails where human disturbance displaces elk. Subsequently, I sampled an additional 2,000 aspen stands in Jackson Hole away from roads and other areas of human disturbance. Practically no aspen stands >400-800m from roads have successfully regenerated. This information was relayed to Boyce well before the publication date of this book, but he apparently chose not to include it. Elk are severely curtailing aspen communities throughout much of Jackson Hole (Kay 1990).

Boyce also misrepresents John Hart's aspen research in the valley when he states "Remarkably, aspen decreased within exclosures as well as in areas browsed by elk" and implied that this proved elk were not responsible for the decline of aspen in Jackson Hole. Aspen stem densities did decline inside and outside exclosures, but for different reasons. Hart concluded that the density of aspen stems decreased outside exclosures because of repeated ungulate browsing while stem densities declined inside exclosures due to severe density-dependent competition between aspen stems for space, often called self-thinning. Hart did note that aspen stem densities were similar inside and outside exclosures, but those data have no bearing on biological interpretations since the outside stems, which are all nearly <.5 m tall, are not ecologically equivalent to the maturing trees (>10 m) within the exclosures.

I recently measured all the aspen exclosures in Jackson Hole and throughout the Greater Yellowstone Ecosystem (n=14). In all but one case, aspen protected from browsing successfully regenerated and developed characteristics of climax or stable aspen communities while those outside did not (Kay 1990). These exclosures show that elk are having a dramatic impact on aspen communities.

This book is subtitled "Intensive Wildlife Management in North America." If this is, in fact, intensive wildlife management, it is clear why most ecologists hold that discipline in low regard and why the developing field of conservation biology is leaving wildlife management in its wake (Wagner 1989. *Wildl. Soc. Bull.* 17:354-360.). Though Boyce reviewed the range studies conducted by the agencies since the late 1950s, one is struck by how little work has been done on that critical subject for the last 25 years. For instance, the latest browse utilization data for the Gros Ventre drainage reported by Boyce were collected in 1963. None of the agencies has conducted any long-term research on aspen or other plant communities nor is any in progress.

This book has a number of serious omissions and paints a selected view of elk ecology in Jackson Hole. It is written primarily from the perspective of the management agencies which all have a vested interest in maintaining the status quo. This book's main value is that it may generate independent research on subjects neglected by the agencies. It definitely is not the final word on elk management in Jackson Hole.—Charles E. Kay, Utah State University, Logan, Utah.