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Holocene cold storage practices on the eastern Snake River Plain: A risk-mitigation strategy for lean times

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ABSTRACT

Previous archaeological research in southern Idaho has suggested that climate change over the past 8000 years was not dramatic enough to alter long-term subsistence practices in the region. However, recent isotopic analyses of bison remains from cold storage caves on the Snake River Plain contest this hypothesis. These results, when examined against an archaeoclimate model, suggest that cold storage episodes coincided with drier, warmer phases that likely reduced forage and water, and thus limited the availability of bison on the open steppe. Within this context we build a risk model to illustrate how environment might have motivated cold storage behaviors. Caching bison in cold lava tubes would have mitigated both intra-annual and inter-annual food shortages under these conditions. Our analysis also suggests that skeletal fat, more than meat, may have influenced the selection, transport and storage of bison carcass parts. Deciphering when and how cold storage caves were utilized can ultimately provide a more comprehensive understanding of foraging behaviors in a broad range of hunting-gathering economies.

1. Introduction

Previous investigations of prehistoric land use patterns on the eastern Snake River Plain (SRP) suggest that shifts in Holocene climate had little impact on long-term subsistence and settlement patterns in the region (see Henrikson, 2002 and discussion therein). This view derives from a series of large-scale, regional studies that show similarities between the seasonal round employed by foragers over thousands of years and 19th Century ethnographic accounts of the Shoshone, Bannock, and Paiute. Moreover, the Holocene archaeological record of southeast Idaho contains numerous sites documenting millennia of occupation, reflecting a level of continuity that belies the possibility of significant climate-induced adjustments in resource use.

We, however, suspect that this picture of long-term, adaptive stasis reflects more a deficiency in data, rather than a complete and accurate picture of the relationship between SRP environment and human adaptation. Lacking within this context have been any rigorous attempts to tie environmental trends with patterns observed in the SRP archaeological record. Over the past several years, efforts to expand our knowledge of Holocene climate have been initiated through analyses of the relationships between bison remains recovered from cold lava tubes on the eastern SRP and several paleoenvironmental indicators. In fact, recently acquired radiocarbon dates from these bison storage facilities suggest that the relationships between human behavior and the SRP environmental record are both more complicated and variable than previously thought.

Between 1987 and 2004, seven ice caves on the eastern SRP were discovered to contain sagebrush features designed to keep bison products insulated and frozen (Henrikson, 1996, 2003, 2004; Henrikson et al., 2006). These caves are scatted across the sagebrush steppe in Pleistocene-aged lava flows buried by a relatively thin layer of aeolian sediments (Fig. 1). Test excavations in five of these caves indicate that bison were the prey of choice for cold storage. These cold, lava tubes on the mid-latitude SRP provided a way to freeze bison remains throughout the year, despite significantly warmer temperatures during the summer months. Both recent observation and archaeological data suggest that these cold caves likely never became dysfunctional at any time and they maintain temperatures below freezing today (Henrikson, 2002, 2003; Henrikson and Guenther, 2012). Yet, despite the long-term dependability of these facilities, radiocarbon dates suggest that cold storage of bison occurred episodically during the Holocene (Table 1, Fig. 2).

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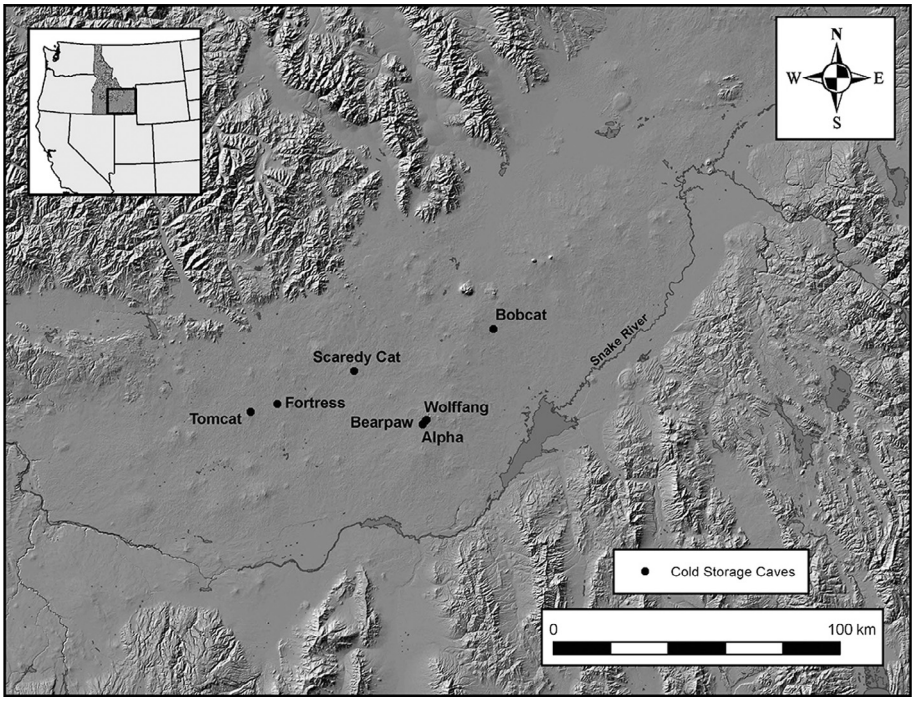

Fig. 1. Map of the Snake River Plain showing the locations of cold-storage caves discussed in this paper. Alpha and Black Widow (not identified) Caves share a location. Bearpaw and Wolffang cave collections have yet to be analyzed and are not included in this study.

Table 1
Radiocarbon data for Snake River Plain cold-storage caves.

Site name	Sample description	Radiocarbon	Two sigma range cal. BP	
		Age BP	Minimum	Maximum
Alpha Cave	*B. bison* vertebrae	960 ± 40	786	938
Alpha Cave	*B. bison* radius	980 ± 40	795	958
Alpha Cave	*B. bison* scapula	990 ± 40	890	963
Black Widow Cave	*B. bison* scapula	1000 ± 40	891	975
Alpha Cave	*B. bison* ulna fragment	1050 ± 40	915	1058
Alpha Cave	*B. bison* innominate fragment	1050 ± 40	915	1058
Alpha Cave	*B. bison* ulna fragment	1070 ± 40	927	1059
Tomcat Cave	*Artemisia* sp. stalk	1170 ± 60	962	1188
Tomcat Cave	*Artemisia* sp. stalk	1240 ± 60	1053	1290
Fortress Cave	*C. canadensis* antler tine	1350 ± 40	1228	1334
Scaredy Cat Cave	Basket fragment	1470 ± 40	1259	1415
Alpha Cave	*C. canadensis* antler tine	1690 ± 40	1259	1701
Alpha Cave	*C. canadensis* antler tine	1880 ± 40	1714	1897
Tomcat Cave	*Artemisia* sp. stalk	2120 ± 60	1966	2209
Tomcat Cave	*Artemisia* sp. stalk	2240 ± 60	2114	2354
Tomcat Cave	*Artemisia* sp. stalk	2350 ± 60	2301	2540
Tomcat Cave	*Artemisia* sp. stalk	2400 ± 60	2339	2549
Scaredy Cat Cave	*U. arctos* femur	2600 ± 60	2676	2849
Bobcat Cave	*B. bison*	2780 ± 80	2750	3777
Alpha Cave	*B. bison* femur fragment	3600 ± 40	3826	3993
Scaredy Cat Cave	*Artemisia* sp. stalk	3810 ± 70	4068	4415
Scaredy Cat Cave	*Artemisia* sp. stalk	3840 ± 70	4078	4425
Scaredy Cat Cave	*Artemisia* sp. stalk	3900 ± 70	4146	4453
Bobcat Cave	*Artemisia* sp. stalk	4110 ± 70	4506	4829
Scaredy Cat Cave	*Artemisia* sp. stalk	4210 ± 60	4569	4865
Bobcat Cave	*Artemisia* sp. stalk	4360 ± 70	4828	5077
Alpha Cave	*C. canadensis* antler tine	4370 ± 50	4839	5056
Scaredy Cat Cave	*B. bison* humerus	4450 ± 40	4957	5093
Scaredy Cat Cave	*Artemisia* sp. stalk	5740 ± 80	6394	6731
Scaredy Cat Cave	*Artemisia* sp. stalk	6370 ± 90	7155	7444
Scaredy Cat Cave	*Artemisia* sp. stalk	6680 ± 80	7434	7665
Scaredy Cat Cave	*Artemisia* sp. stalk	6850 ± 70	7579	7833
Scaredy Cat Cave	*Artemisia* sp. stalk	6930 ± 60	7661	7873
Scaredy Cat Cave	*Artemisia* sp. stalk	8190 ± 100	8972	9460