

Undetected species losses, food webs, and ecological baselines: a cautionary tale from the Greater Yellowstone Ecosystem, USA

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Appendix Chronology and apparent changes in white-tailed jack rabbit *Lepus townsendii* abundance in Yellowstone and Grand Teton National Parks between first written descriptions and 2005. Two caveats are necessary. Firstly, I assume that *L. townsendii* was correctly identified, as it is the sole hare species that occurred regularly within the grassland and sagebrush habitats of both National Parks. Snowshoe hares *L. americana* also occur but typically in more mesic and higher elevation areas. While misidentification is possible, it is unlikely given that the latter has shorter ears and larger feet relative to body size. In addition, whereas historical reconstructions are subject to multiple interpretations due to different and changing usages of names (Schullery, 1997), it is evident that early reports were not of snowshoe hares (see below). Secondly, whereas species' presence can be confirmed by observation or acquisition of body products, the demonstration of absence is more difficult (Reed, 1996; Roberts & Kitchener, 2006).

Abundance	Year(s) at site	Agency ¹	Observer	Comment	Reference
Yellowstone Present					
Locally abundant	2000 1875	NPS	L. Barnofsky, archaeologist G.B. Grinnell, naturalist	In Lamar Cave, 2,000 years ago 'Where ... coyotes or ... wolves have been killed or driven off, the hares still exist in great numbers'	Barnofsky, 1994 Ludlow, 1876 ²
Common	1926	NPS	M. Skinner, superintendent	'Jackrabbits with their large white tails are common between Gardiner and ..., and may also be seen almost anywhere in the open northern sections of the Park'	Yellowstone Park files ³
Restricted	1940	NPS	A. Murie, biologist	'Occurs only on the north side of the park and is not abundant, although tracks can be found on its range'	Murie, 1940
Virtually non-existent	1990-1991	Yellowstone Ecosystem Studies	K. Johnson & R. Crabtree, biologists	'Extensive surveys ... in Lamar Valley and Blacktail Plateau ... resulted in only one sighting'	Johnson & Crabtree, 1999
Zero	1991-1993	USDA	E. Gese, biologist & professor	'Never saw a rabbit in Lamar Valley ... no remains found in coyote scats'	Gese <i>et al.</i> , 1995, & pers. comm., 2004
Zero	1979-2004	NPS	R. Renkin, naturalist	'Have never seen evidence (sightings, scat, tracks)... of jackrabbits in Lamar Valley'	R. Renkin, pers. comm., 2004
Zero	1970s-1980s	NPS	D. Houston, biologist	'I don't remember ever seeing a jackrabbit in ... Lamar Valley'	D. Houston, pers. comm., 2004
Zero	1995-2004	NPS	D. Smith, Wolf Project Leader	'I've never seen a white-tailed jackrabbit in the park'	D. Smith, pers. comm., 2004

Appendix (Continued)

Grand Teton	US Biological Survey	O. Murie, biologist	Regular occurrence	Unpubl. field notes ⁴
Regularly noted	1928-1939	O. Murie, biologist		
Many then none	1939	S. Burr, rancher	'There were jillions; however, a plague wiped out all....'	Jackson Hole Historic Society
Spotty	1948-1949, 1956	N. Negus & J. Findley, mammalogists and professors	'... Commonly in the vicinity of Kelly... less common and few were seen as far north as Elk'	Negus & Findley, 1959
Zero	1970-2005	F. Camenzind, biologist	Observed one carcass near the airport in 1978 and one in 2005	F. Camenzind, pers. comm., 2005
Zero	1960s-1990s	S.G. Clark, biologist	Can't remember last time one was observed	S.G. Clark, pers. comm., 2001
Zero	1973-1975	J. Weaver, biologist	None in 1,500 coyote faeces	Weaver (1977)
Zero	1970-2001	D. Craighead, biologist	Never observed	D. Craighead, pers. comm., 2002
Zero	1989-2005	S. Cain, biologist	Never observed	S. Cain, pers. comm., 2004
Zero	1990-2004	J. Bohne, biologist	Never observed	Bohne, pers. comm., 2002-2004
Zero	1982-2003	B. Smith, biologist	Never observed	B. Smith, pers. comm., 2003
Zero	1980s-2004	B. Hayse, naturalist	Never observed	B. Hayse, pers. comm., 2003-2004
Two	1997 observation 1995-2004	S. Gunther, naturalist	'I feel strongly they were jackrabbits because of their long ears and long hind legs'	S. Gunther, pers. comm., 2004
Zero	1998-1999	R. Wigglesworth, biologist	Never observed; none in 339 coyote faeces	Wigglesworth <i>et al.</i> , 2001
Zero	1980s-2002	T. Campbell, biologist	Never observed	T. Campbell, pers. comm., 2002
Zero	1995-2004	J. Berger, biologist	Never observed	J. Berger, unpubl. data
Zero	2001-2004	K. Berger	Never observed	K. Berger, pers. comm., 2004
One	2005	T. Kerasote, naturalist	'I had a good look, and it was a jack rabbit, not a snowshoe hare'	T. Kerasote, pers. comm., 2005

¹NPS, National Park Service; USDA, U.S. Department of Agriculture; USFWS, U.S. Fish & Wildlife Service; WCS, Wildlife Conservation Society; WGF, Wyoming Game and Fish

²May have referred to parts of Montana north of the Park (P. Schullery, pers. comm.)

³Quote provided by P. Schullery

⁴O. Murie historic archives, Teton Science School, Kelly, Wyoming

⁵USFWS records at the National Elk Refuge, Jackson, Wyoming; a single White-tailed jack rabbit observation in 1991