

Declining fortunes of Yellowstone's migratory elk

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Twenty-five minute old elk calf in Mammoth Hot Springs. Credit, Jim Peaco; Yellowstone National Park. June 9, 2010.

(Phys.org) —In the late spring, the 4000 elk of the Clarks Fork herd leave crowded winter grounds near Cody, Wyoming, following the greening grass into the highlands of the Absaroka Mountains, where they spend the summer growing fat on vegetation fed by snowmelt. It's a short trip (40-60 kilometers) by migratory standards, and by modern standards, uncommonly free of roads, fences, metropolitan areas, and

other human-built barriers. But it crosses an important human boundary: the border into Yellowstone National Park.

The costs of migrating to the high green pastures have lately outstripped the benefits, according to a research report in the June issue of the Ecological Society of America's journal *Ecology*, published last week. Arthur Middleton and colleagues at the University of Wyoming, the Wyoming Game and Fish Department, and the U.S. Geological Survey reported that the migratory Clarks Fork herd has been returning to winter grounds with fewer and fewer calves over the last few decades. Herds that remain in the vicinity of Cody year-round have more surviving calves. Middleton et al. attribute the change in migration fortunes to climate change and a resurgence within the park of predators that hunt newborn [elk calves](#).

In a Forum edited by Marco Festa-Bianchet, of the Université de Sherbrooke, Québec, five working groups of ecologists commented on the data, praising Middleton and colleagues' work, but, in some cases, challenging their interpretation. Middleton and colleagues addressed the commentary in a rebuttal.

Historically, migratory hoofed beasts like elk have outnumbered sedentary members of their species by as much as an order of magnitude. John Fryxell, a Forum contributor, wrote a classic paper on this effect in the [American Naturalist](#) in 1988. Migration allows animals to capitalize on seasonal foods and to shelter from predators and the elements. Elk and their hooved brethren have benefited from chasing the spring "green-up" into higher terrain as snow retreats, leaving behind, at least temporarily, their predators, which are pinned down by the needs of young pups and cubs.

Middleton's observations therefore demonstrate a severe reversal of fortunes. Ecologists have reported troubled times for migrating animals

all over the world, and attributed the problems to habitat changes wrought by human development and climate change. Middleton et al. point to the same influences, but draw a subtle distinction which they believe makes this a novel case study.

The Yellowstone elk enjoy some of the best open range of modern times, and a migratory path unimpeded by conspicuous physical barriers of modern infrastructure. Middleton et al argued that drought and the return of predators, specifically bears, to Yellowstone are causing the observed low pregnancy rate and low calf survival for migratory elk.

"Many of the forum commentaries discuss the implications of our work for management and conservation of large carnivores and their prey in Yellowstone, especially wolves," said Middleton. "However, a persistent focus on the impact of re-introduced wolves among scientists, wildlife managers, and the public misses key roles of grizzly bears and severe drought in limiting elk populations."

Over the last two decades, summers have been hotter and dryer in the summer range of the migratory Clarks Fork elk. Satellite imagery shows that the length of spring vegetation "green-up," a critical time for female elk to gain the fat the need to support reproduction, shortened by 27 days over 21 years. During the same time period, wolves were reintroduced to the park, and the numbers of wolves and bears are growing. Both pressures are ultimately the result of human choices through our manipulations of predators and increasingly fierce drought that many studies have linked to human-caused climate change, the authors said.

Wyoming Fish and Wildlife irrigates fields in the Sunlight Basin Wildlife Habitat Management Area, 40 miles northwest of Cody, to provide forage for elk. Forum contributors Chris Wilmers and Taal Levi show that the non-migratory elk use the irrigated fields more heavily during drought years. Migrating elk do not receive this subsidy.

"I think Middleton has an intriguing idea, and it might be what's happening. We offer another hypothesis that also fits the data that they have. He says it's [climate change](#) on the summer range and more predators on the summer range. I think it's because there is irrigation that provides the sedentary elk with food. And I think it's also that there is predator control outside the park," said Wilmers.

While wolves and grizzlies have been thriving inside the park, predator control measures have intensified outside the park, Wilmers said. "My hypothesis is that in that crucial winter period, the migrants are coming down to range that the resident elk have already been feeding on all summer, and now they are competing for in the winter," he said. To distinguish between these two stories would require hypothesis testing, he said – pitting them against each other and testing them with more data.

Jack Massey, Sarah Cubaynes, and Tim Coulsen of Oxford University joined the conversation with their contribution "Will central Wyoming elk stop migrating to Yellowstone, and should we care?" The trends in vegetation and predator differential across the park boundary are compelling, they commented, but have those factors caused the change in elk demographics? Middleton et al.'s data cannot answer those questions, the Oxford group wrote. "We don't wish to sound critical of the huge effort they have put in. Nonetheless, despite their hard work, their data on elk condition and pregnancy rates come from a relatively small number of animals collected over only a relatively short time period. Given this, they are restricted to conducting a few piecemeal analyses and telling some compelling stories. But the problem with this approach is that it is easy to construct very many compelling stories."

Massey et al wrapped up their commentary with the reflection that the Middleton paper, like many reports which mention both wolves and elk, will likely be appropriated for political ends, and used by proponents of

large elk herds as evidence that wolves are destroying the elk population. The causes of elk decline, however, are not so clear or so simple. Should we maximize elk herds for hunting? Farm the animals? Leave the system to find its own equilibrium (to the extent that is possible in a human dominated world)? "As ever with such debate, whether we should care all depends on one's view on what our wilderness should look like," The Oxford group concluded. The answer to their title question depends on personal and community values, and cannot be answered by science alone.

More information: www.esajournals.org/toc/ecol/94/6

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