Carnivore Management and Elk Recruitment
2020 Summary of Final Research Report

Balancing elk and carnivores: Can we have both?

That was a question very much unanswered in west-central Montana in April 2009, when FWP documented a record-low 9 calves per 100 cows in the West Fork of the Bitterroot watershed (Hunting District 250). In the presence of black bears and increasing numbers of gray wolves and mountain lions, FWP managers and the public wondered aloud if the decreasing elk population could recruit enough calves to sustain itself.

FWP eliminated opportunities for hunters to harvest antlerless elk, but that action alone was not expected to address the problem of historically low calf survival and recruitment. So, in 2010, FWP, with the critical support of partners including the University of Montana, initiated research to identify causes and recommend possible solutions to the calf survival problem.

The Bitterroot Elk Study was completed in 2015, demonstrating that predation by mountain lions was a leading cause of mortality in elk calves during their first year of life. While black bears and wolves are known to exert a substantial impact on elk calves elsewhere, their effects on calf survival were relatively less as compared to mountain lions in this study.

With an elk management problem still at hand, FWP concurrently began research on mountain lion density in the Upper Bitterroot study area in 2012. The results of that research indicated that lion densities were higher than estimates made previously.

While it stands to reason that fewer mountain lions could mean fewer losses of elk calves to mountain lion predation, important questions remained. Elk and mountain lions are equally valued as part of Montana's wildlife heritage and FWP is charged with stewardship of both resources. Could a moderately increased harvest of mountain lions continue to conserve these predators, while reducing their abundance enough to boost calf recruitment?

Evaluating the Impacts of Mountain Lion Harvest on Elk

FWP and Montana State University collaborated to find answers to these questions by following a real-life management experiment in the Upper Bitterroot and surrounding portions of west-central Montana in FWP Region 2.

This follow-up study set out to assess the effects of liberalized mountain harvest regulations on mountain lion abundance and elk populations. The study was conducted in FWP administrative Region 2 of west-central Montana. Portions of this study were focused in the East Fork and the West Fork drainages of the Bitterroot River (Bitterroot study area), an area managed for mountain lion population reduction, and the Rock Creek and Flint Creek portions of the Upper Clark Fork watershed (Upper Clark Fork study area), an area managed for stable mountain lion populations.

Hound handlers used biopsy darts to collect muscle samples from mountain lions for DNA analysis to determine individual identity. Photo: L. Hensen.

We collared a sample of mountain lions and used the movement information to help estimate population abundances. Photo: J. Knight.

Key Findings

We estimated mountain lion abundance in one watershed managed for reduced populations (Bitterroot) and in one watershed managed for stable populations (Upper Clark Fork) before and four years after implementation of the liberalized harvest regulations in 2012. Management success (percent of the prescribed quota achieved) was high in both the Bitterroot and Upper Clark Fork study areas. Mountain lion abundance declined in the Bitterroot study area (i.e., treatment area) by approximately 29%. In the Clark Fork study area (i.e., the control area), we found no evidence of changes in overall abundance.

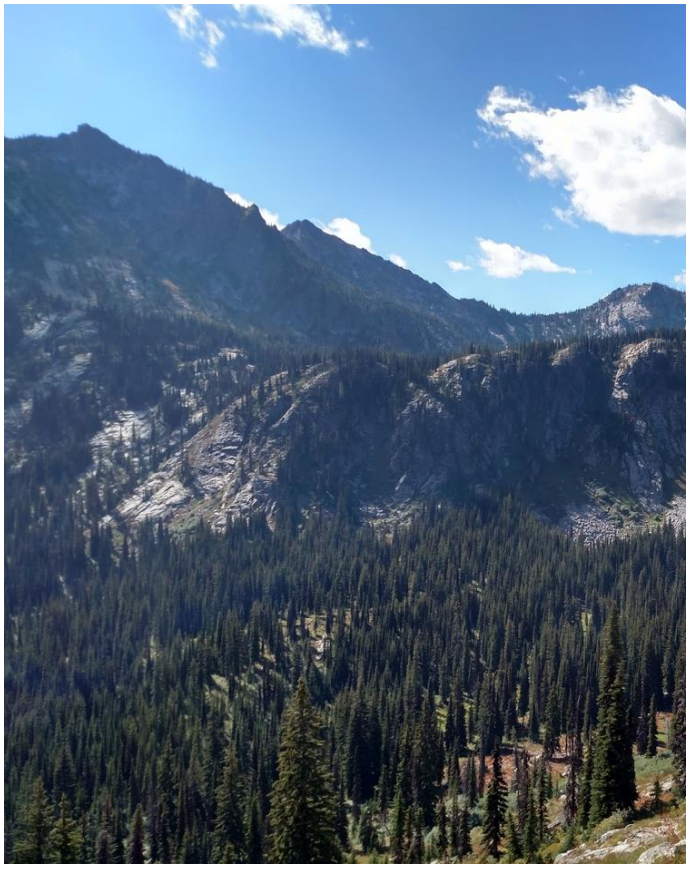
We marked a sample of elk calves in the Bitterroot study area before (2011-2012), during (2012-2014), and after (2016-2018) liberalized mountain lion harvest regulations and estimated calf survival to age 1 as well as causes of mortality. We estimated that rates of annual elk calf survival during the period of liberalized regulations nearly doubled, but by 4 years after the treatment were only about 10 percent higher than pre-treatment levels.

Below: A young mountain lion in the Bitterroot. Bottom Right: An example of elk summer range on the east side of the Bitterroot Valley.

Key Findings

We developed a population model to estimate and compare elk recruitment and population growth rate during the 5 years prior to and 5 years following implementation of the liberalized mountain lion harvest regulations. We found evidence that the liberalized mountain lion harvest regulations resulted in short-term increases in elk recruitment and population growth rates within two Bitterroot elk populations with reduced mountain lion populations. The effects of the harvest treatment on recruitment declined during the 5 years following treatment. In contrast, elk recruitment in two Upper Clark Fork populations with stable mountain lion populations was similar during the pre- and post-treatment periods. These changes in elk recruitment corresponded to similar changes in elk population growth rates. Similar to results from marking and monitoring survival of a sample of calves, our results from this analysis suggest that elk calf recruitment increased because of liberalized mountain lion harvest regulations, although increases in elk recruitment were strongest immediately following implementation of the treatment and diminished over time.

We evaluated the relative effects of factors that wildlife managers have some degree of control over, such as carnivore density, and factors that wildlife managers cannot control such as weather and landscape attributes on elk calf recruitment in 17 elk hunting districts across west-central Montana from 2004-2017. We found strong associations between weather and recruitment suggesting that weather may mediate the effects of reduced carnivore densities on elk populations.



Conclusions: Our results demonstrate a situation in western Montana where carnivore predation affected elk, and where carnivore populations were managed sustainably as a valued wildlife resource while also moderating predation effects on elk. Elk recruitment and population trend increased immediately after the mountain lion harvest treatment was implemented and lessened over time as mountain lion harvest was reduced. Regional elk recruitment trends were strongly correlated with weather covariates, indicating that weather effects mediate the effects of reduced carnivore densities on elk populations. Our results help set realistic expectations regarding the effects of management programs on carnivore and ungulate populations and allow managers to better design programs to meet carnivore and ungulate population objectives.

Top photo: C. Jourdonnais
Bottom photo: T. Brown. Elk calves were outfitted with VHF eartags and their survival to age 1 was monitored.

LEARN MORE

For more information about the Carnivore Management and Elk Recruitment project, please visit http://fwp.mt.gov/fishAndWildlife/diseasesAndResearch/research/elk/ or contact Kelly Proffitt, FWP wildlife research biologist, at **kproffitt@mt.gov**.

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