Experience Counts

Improving translocation success of elk in Alberta

By Jacqueline Frair, Evelyn Merrill, James Allen, and Mark Boyce

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On a bitter cold Alberta morning in January, we awoke well before dawn anticipating the long haul ahead. It was moving day at Elk Island National Park near Edmonton, Alberta. A large crew of park biologists stood ready to sort and load 82 elk into cattle trailers. Also present were volunteers to drive the elk to various release locations in the central Rocky Mountain foothills, reporters to document the process, Alberta Fish and Wildlife biologists to oversee the transfer and releases, and the University of Alberta researchers who would study the movement and fate of these animals in their new locations. This was not the first time for this complicated and tightly coordinated effort, nor would it be the last. For these particular elk, the translocation process began one month earlier when the animals followed their noses to hay in holding pens.

To fully understand the why and how of translocating elk, we must go back in time to the turn of the 20th century.

Elk Ups and Downs

Nobody knows how many elk once roamed Alberta, although historical records indicate they were common. We do know for certain that Alberta nearly lost its elk altogether at the turn of the 20th century, as occurred throughout the species' range in North America. Following European settlement of Alberta, massive land conversion to agriculture combined with unregulated hunting reduced elk populations to a few strongholds, largely in rugged mountain areas[1]. A series of wildfire years compounded by severe winters further reduced elk numbers. Those burned areas turned into expanses of prime elk habitat, which elk may well have found in time, but natural recolonization would have been a slow process at best.

Wishing to jumpstart the recolonization process, biologists turned to Banff National Park where elk were still plentiful. Elk were shepherded into corrals, loaded into trailers, and hauled deep into the eastern foothills of the Rocky Mountains. The elk readily took to their new home, assisted by strict hunting regulations and low wolf numbers. More translocations followed from both Banff and Elk Island national parks to other suitable areas around the province, which spurred a steady growth of Alberta's elk population into the 1950s. Simultaneously, hunting restrictions slackened, wolf populations rebounded, and recovering burned-forest areas began to shade out the herbaceous forage required by elk. As a result, Alberta experienced another decline in elk numbers.

Management steps taken in the early 1980s included tighter elk hunting restrictions, more liberal harvesting of wolves, and prescribed burning to set back vegetation succession. Translocation remained a prime management tool, but not just for augmenting populations. Additionally, it was used to remedy human-elk conflicts as Alberta's elk populations again prospered. The conflicts included elk-vehicle collisions, crop damage in agricultural fringe areas such as southwest of Calgary, chasing and wounding of people in the mountain parks, and elk starting to overgraze Elk Island National Park, a fenced area in the prairie parklands. Between 1994 and 1998, approximately 1,025 elk were moved from the park to the Clearwater area[1].

Were the translocations successful? There's more than one way to answer that question. The first, whether the elk survived the translocation procedures, has the clearest answer. When biologists first started the translocations, many elk died from the stress of capture. Methodological improvements have made today's researchers very adept at safely capturing, handling, and transporting elk and today Alberta boasts an essentially 100 percent survival rate. The second question, whether the elk translocation achieved the desired aim, is more difficult to answer.

In Search of "Success"

Although 1,025 elk in total were released into the Clearwater area, the population estimate remained essentially the same as before the translocations at around 2,200 elk. What happened to the translocated animals? Did they simply leave the area headed for home, or did most them die before contributing to population growth? What did they die from? These are key questions for evaluating the success of translocation. First, however we need to define what we consider to be "success."

When animals are released into new, unoccupied habitat, success means that a self-supporting, free-ranging population becomes established there. But when the objective is to augment an already existing population, success is better defined as achieving a high rate of retention (that is, elk stay where we put them) and a high rate of survival following release. So by this definition, were Alberta's elk translocations successful? And if so, what elements fostered success? Previous efforts suggested that conditions in release areas, variability in habitat quality, predation risk, and hunting all play a role. Good habitat is a necessary, but not the only condition for a successful translocation. High quality habitat without predators does not ensure success; likewise, the presence of predators in an area does not ensure failure.

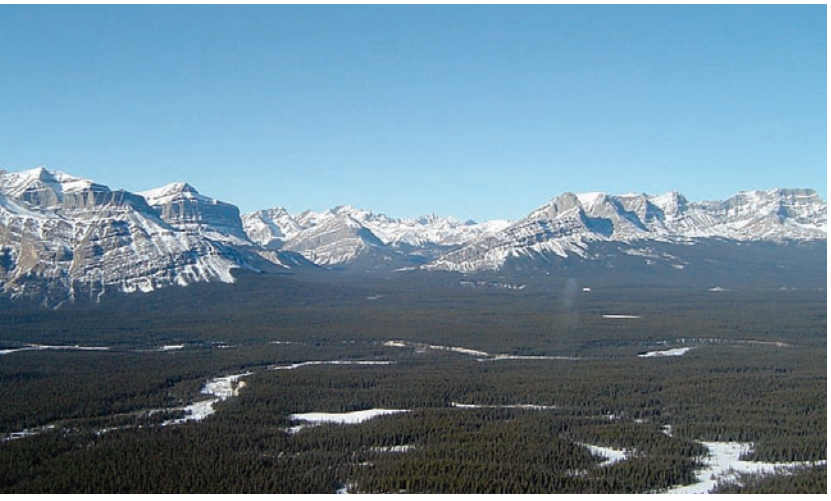
Is mortality risk the more important factor, or is it the interaction with habitat that really matters? How do past experiences of elk influence translocation success? These are the questions we sought to investigate with an underlying goal of improving the success of future translocations.

Accounting for Elk Experience

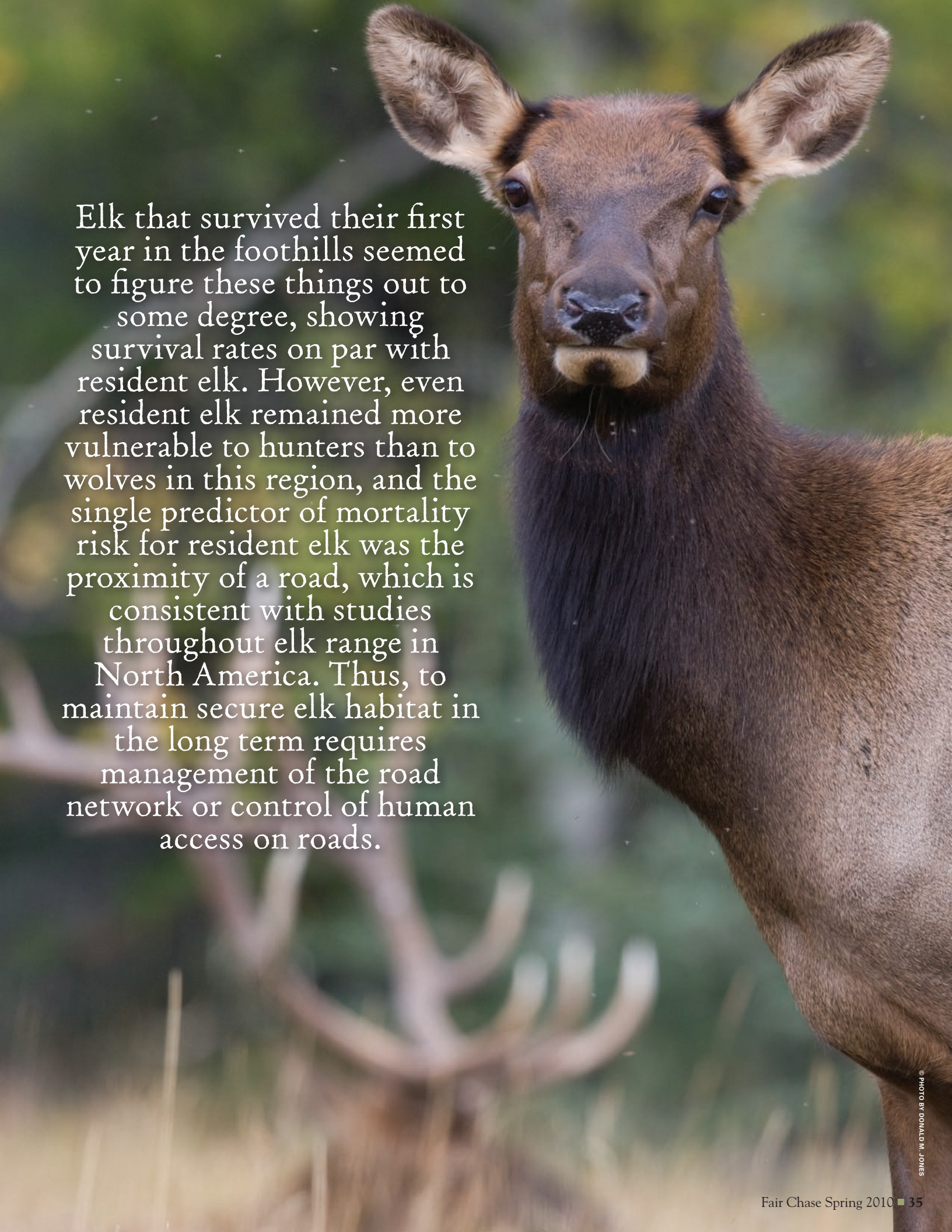
Our study took place from 2000 to 2005 in the Clearwater Forest of Alberta. Three populations of elk were available as sources for translocation. In Banff and Jasper national parks, biologists needed to reduce elk numbers around town sites to mitigate vegetation impact and public safety concerns. A herd-reduction program in the Cross Conservation Area near Calgary sought to reduce crop damage and elk-vehicle collisions. And, Elk Island National Park undertook a herd-reduction program to maintain the ecological integrity of the park.

Elk from each of the three source areas represented a distinct background and set of experiences. Elk from the mountain parks were familiar with wolves and

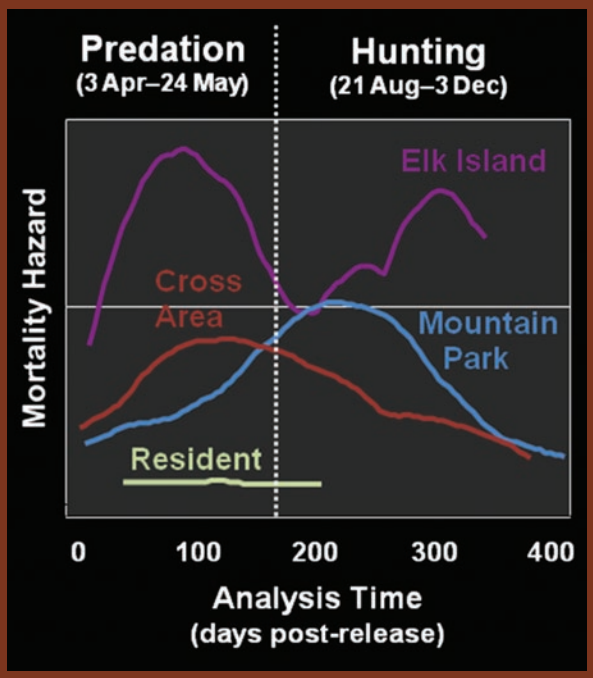
Release of the elk in the Clearwater Forest in the central east slopes of the Rocky Mountains in Alberta, Canada.



[1]GUNSON, J. R. (1997). *MANAGEMENT PLAN FOR ELK IN ALBERTA*, DRAFT. ALBERTA ENVIRONMENTAL PROTECTION, NATURAL RESOURCES SERVICE, FISH AND WILDLIFE DIVISION, EDMONTON, ALBERTA.

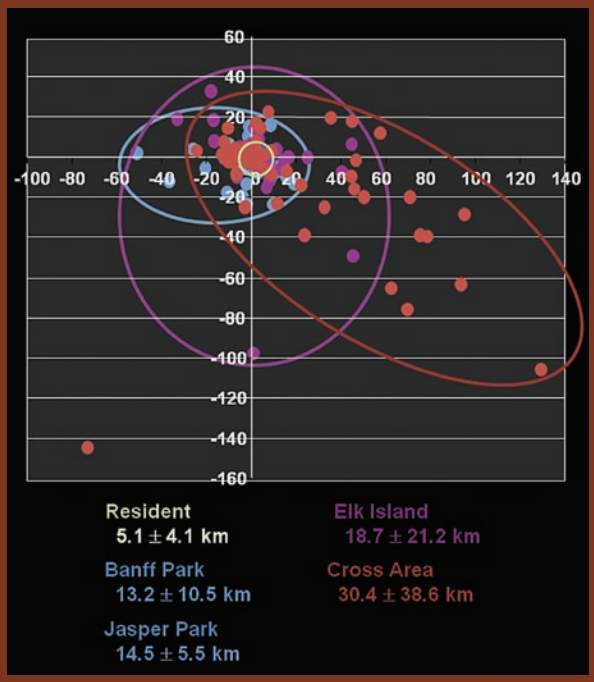


Elk that survived their first year in the foothills seemed to figure these things out to some degree, showing survival rates on par with resident elk. However, even resident elk remained more vulnerable to hunters than to wolves in this region, and the single predictor of mortality risk for resident elk was the proximity of a road, which is consistent with studies throughout elk range in North America. Thus, to maintain secure elk habitat in the long term requires management of the road network or control of human access on roads.

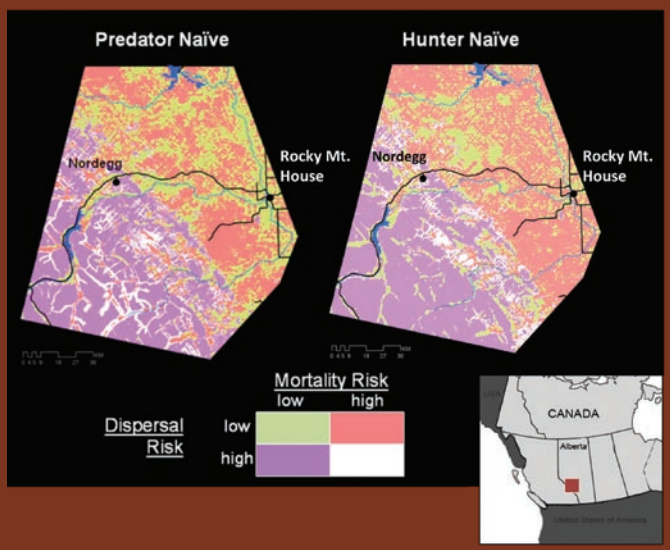


Smoothed mortality hazard of elk released into the central foothills of Alberta, Canada from 2000 to 2004. We show separate estimates for resident elk and each of 3 sources of translocated elk. Cross Area elk show one mortality peak related to predation in late winter after release and Mountain Park elk show one peak related to fall hunting, whereas Elk Island elk show two mortality peaks related to both predation and human hunting. By comparison resident elk mortality is very low.

(Modified from Frair et al. 2007, *Journal of Wildlife Management* 71:541–554).



Retention of translocated elk at release site in the central foothills of Alberta, Canada, from 2000 to 2004. Portrayed are distances (km) from any release site to the last location of the animal approximately 8–11 months after release for each of the sources of translocated elk and resident elk during the same period.



Map of optimal release sites in the Clearwater forest in the central east slopes of the Rocky Mountains of Alberta for elk. Light green color represent sites where there is low dispersal and low mortality from either predators (left) or from human harvest (right).

habituated to humans. In contrast, elk from the Cross area were not familiar with wolves but somewhat familiar with humans, having been exposed during recent special hunts. Rounding out the picture were animals from Elk Island National Park, unfamiliar with both wolves and hunters and therefore naïve to the two major mortality risks in the central foothills. Animals from these source populations were released at multiple sites throughout Alberta's central foothills from December to March in each year of the study. This enabled us to investigate the degree to which translocation success was affected by studying where elk came from and where they were released.

Together, 478 elk of all ages and both sexes were released at 38 different sites in the central foothills. Of these, we tracked the movement and fate of 139 adult females wearing radio collars. We also radio-collared 91 adult resident females of the central foothills to see how translocated elk fared compared to animals already exposed to local habitat quality and mortality risks. As expected, the two largest sources of elk mortality in the region were large carnivores, primarily wolves, and human hunters. Resident female elk maintained high survival rates (91 percent), whereas translocated animals suffered low survival rates (16-50 percent) during the first 12 months following release. During that critical first year, equal numbers of elk mortalities resulted from both wolves and humans, including legal and illegal take, including unregulated harvest (any age and sex) by First Nations hunters. It is important to note that no regulated hunting of adult females occurred in the study area; rather, the fall hunt was limited to three- or six-point bulls depending upon hunting area. By the start of their second winter in the study area, the survival rate of resident and translocated elk did not differ. This suggested a steep learning curve with respect to local risks in that first year. For mature resident elk, hunting mortalities occurred two to three times more often than wolf predation, indicating that elk were able to mitigate their risk of wolf predation somewhat but remained vulnerable to hunting mortality.

Previous experience played an important role in survival after translocation. Animals naïve only to one of the two main mortality sources (either wolves or human hunters) exhibited similar mortality rates of 50–55 percent in their first year. That means that animals from either the mountain parks or the Cross region fared equally well in terms of their first-year survival rates, although the timing of death differed. Elk naïve to predators experienced higher mortality soon after

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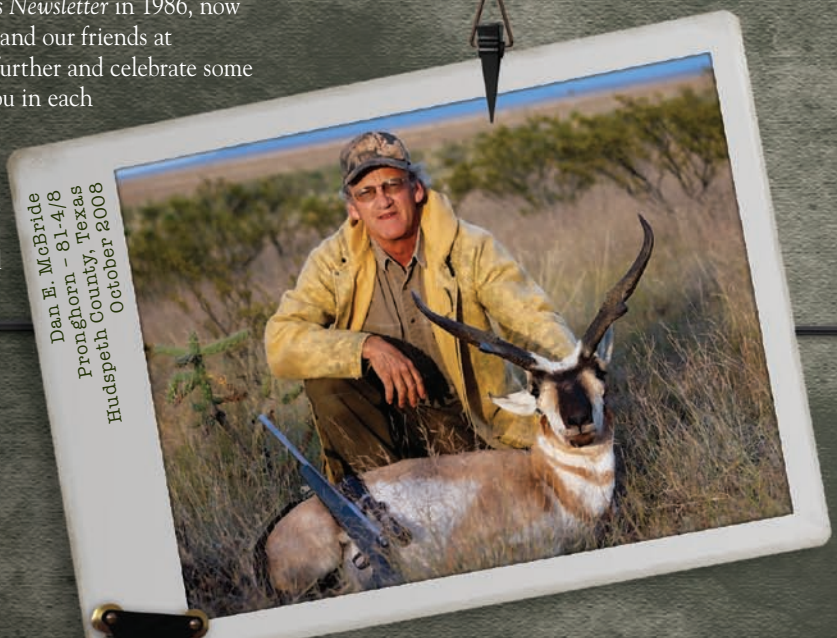
The hunting experience is remembered and reflected back upon in many ways. In the old days, just the meat, head skins, hides, horns, antlers or tusks were salvaged as mementoes of successful hunts. With the advent of the camera, photographs were added to what we could carry with us across time to remember the hunt and honor the animals taken. Today, we can add video to this list. Even with living pictures available, still photographs taken with great pride and care remain a very important part of our hunting culture.

The Boone and Crockett Club has a tradition of honoring trophies and the fair chase hunts that produce them, including photographs from the field. Examples of outstanding trophies entered and accepted into the Records program have been shown in our Trophy Photo Gallery ever since the Club began publishing it's *Associates Newsletter* in 1986, now titled *Fair Chase* (1994). In keeping with this tradition, the Club, and our friends at Swarovski, thought it would be a good idea to take this one step further and celebrate some of the best examples of field photography, and share them with you in each issue of *Fair Chase*.

This year, starting with the spring edition, your editors will be sifting through hundreds of entry photos looking for exemplary examples of trophy field photography. At the end of the year, we will be selecting the most outstanding examples and awarding prizes provided by Swarovski Optic to the top three photos. All field photographs from accepted trophies in 2010 are eligible. Editors' picks will be featured in the Spring, Summer, and Fall issues, with the top picks and award winners published in the Winter 2010 issue.



Dan E. McBride
Pronghorn – 81-4/8
Pronghorn County, Texas
Hudspeth County, Texas
October 2008

L. Victor Clark
Stone's Sheep – 165-3/8
Ogilvie Mts., Yukon Territory
September 2009

Kanina M. Fulton
Mountain Caribou – 373-5/8
Rabbit River, BC
September 2006

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FIRST PRIZE - STM 65 HD

Compact, lightweight telescope for long walks and extended stalking trips in difficult terrain, such as in the mountains. Fluoride-containing HD lenses minimize color fringing (chromatic aberration) and deliver contrast-rich images with razor-sharp outlines. Ideal for digital photography through the telescope. A straight angle simplifies locating the target. Extremely rugged and unusually lightweight with state of the art magnesium technology.

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ADDITIONAL PRIZES WILL BE LISTED IN THE NEXT ISSUE OF FAIR CHASE

translocation, in late winter. In contrast, elk naïve to humans experienced higher mortality in the fall. Animals from Elk Island National Park, naïve to both humans and wolves, experienced very low survival rates (16 percent) despite having the best physical condition of any source population at their time of capture. Their mortality risk appeared consistent with both the late winter peak in predation and the early fall peak in hunting mortalities,

Survival was only one piece of the puzzle. We also wanted our "problem" elk to stay within 30 kilometers of where we released them, rather than moving into areas where they were likely to again become a nuisance. Mountain park elk demonstrated the highest fidelity to release sites with 73 percent retention, followed by Elk Island animals (54 percent), and Cross animals (44 percent)—a pattern that reflected their familiarity with the habitats in the release areas. Mountain park elk came from montane areas, Elk Island animals from the edge of the boreal and prairie aspen parklands, and Cross animals from very different habitats in prairies. Animals from the Cross area showed the largest overall movements, with a maximum move distance of 145 kilometers (up and over the mountains into British Columbia). However, such large movements were rare. Elk that settled more quickly had higher overall survival rates in the first year. By the start of their second year in the study area, all translocated elk had settled down into a predictable home range similar to, and even overlapping, that of resident elk.

Thus, for the objective of retention, we learned that getting elk to settle more quickly is desirable. We also learned that larger release group sizes had higher retention. And, we found that characteristics of the release site also played an important role, both for retention and for survival.

Accounting for Habitat Characteristics

Surprisingly, we did not find high quality foraging habitat to be related to elk survival during that critical first year following release. Animals naïve to wolves were more likely to die in areas selected by wolves, whereas animals naïve to hunters were more likely to die in areas near roads. Wolves hunted in this region, and avoided areas near roads. Thus elk were actually more likely to be predated by wolves in areas away from roads, but more likely to be shot by hunters next to roads. This posed a "damned if you do, damned if you don't" scenario, with roads creating a spatial trade-off in mortality risks for translocated elk. Seismic lines, cut through habitat in the exploration of oil and gas, also were risky areas for elk. Both hunting and wolf-related mortality risks were higher close to a seismic line or trail.

Although exposure to foraging habitat did not determine elk survival, it was the strongest predictor of where elk chose to stay.

This isn't an argument against predator harvest, it is simply a caution that predator harvest alone may not be sufficient to improve the success of elk translocations into areas where wolves occur.

Translocated elk keyed into areas of high forage, but ultimately were less likely to survive if those areas contained roads or seismic lines. For translocated elk, a road leading to a clearcut created what might be called an "ecological trap." Ecological traps are thought to be common in dynamically changing landscapes where formerly secure habitats become risky but animals fail to recognize and respond to the change in risk. Thus elk from Banff National Park may once have found safety in wide open spaces adjacent to roads (e.g., the golf course). Similar settings in the central foothills, however, carry a high mortality risk. Elk that survived their first year in the foothills seemed to figure these things out to some degree, showing survival rates on par with resident elk. However, even resident elk remained more vulnerable to hunters than to wolves in this region, and the single predictor of mortality risk for resident elk was the proximity of a road, which is consistent with studies throughout elk range in North America. Thus, to maintain secure elk habitat in the long term requires management of the road network or control of human access on roads.

Putting the Pieces Together

So, what happened to the elk translocated into the Clearwater area in the mid-1990s? Given what we observed in this study, the great majority of those animals likely died. Past release sites were selected based solely on the basis of having abundant forage. Our research showed that the success of elk translocations depends not only on providing good habitat, which will keep elk in the area, but on the familiarity of the elk with the mortality risks in the release areas. Our ability to identify what factors influenced elk selection of habitats and the relative hazard associated with these habitats allowed us to map out optimal release locations for animals with different past experiences. This provides managers with a more refined approach to identify potential release sites in the area.

We further observed that areas predicted to have high wolf occurrence were more risky in the years of highest wolf abundance. But we caution that reducing wolf numbers prior to translocation may not improve translocation success as desired. Even after a year of better-than-average trapping success in the region, we observed similar overall mortality rates among translocated animals but with more deaths due to accidents and starvation rather than wolf predation. Thus, translocated elk appear prone to die in that critical first year from various causes, including stress from being handled, reduced physical condition during the winter months, and difficulty finding sufficient food and cover in their new home. Wolves may simply take them before something else does. This isn't an argument against predator harvest, it is simply a caution that predator harvest alone may not be sufficient to improve the success of elk translocations into areas where wolves occur. Instead, we suggest exploiting natural variation in predation risk. This can be accomplished by hedging a translocated elk's chance of avoiding wolves at the outset, and buying them more time to learn about such risks. ■

ABOUT THE AUTHORS

Dr. Jacqueline Frair, who completed her Ph.D. research under Dr. Evelyn Merrill at the University of Alberta, is now an assistant professor at SUNY College of Environmental Science and Forestry. Drs. Evelyn Merrill and Mark Boyce are professors at the University of Alberta. James Allen was area biologist at the time of the study and is now Head of the Game and Priority Species Program in Alberta Fish and Wildlife.