Solving the Bitterroot

How biologists and local volunteers finally figured out what was reducing the popular Ravalli County elk population. By Perry Backus

In 2009 the southern Bitterroot Valley’s elk herd—for years one of the state’s most productive populations and a source of pride among local hunters—was in trouble.

The ratio between cows and calves in certain areas was below anything Montana Fish, Wildlife & Parks biologists had ever seen during nearly 50 years of conducting annual spring monitoring flights. In some hunting districts, the ratio was half that needed for the population to sustain itself. The worst declines were in the West Fork of the Bitterroot where, not long before, the elk herd had grown dramatically following massive wildfires in 2000 that created abundant grassland parks where the animals could forage. In 2005, the West Fork herd numbered close to 1,900. Four years later, it had dropped to just 774.

Local hunters, accustomed to seeing abundant elk, were shocked by the declines.

Even worse news came in 2009, when FWP biologist Craig Jourdonnais (since retired) found only 9 calves per 100 cows in the West Fork during his annual spring monitoring flight. A heavily hunted elk population is also taking a hit from predators, like wolves were tipping the balance in the West Fork, Jourdonnais says. And that included Jourdonnais himself, as well as University of Montana researchers curious about the elk declines. Every one of them was in for a surprise.

EAST VERSUS WEST

Following a groundswell of local support that included financial backing from Bitterroot hunters and conservation clubs, researchers from FWP and the University of Montana joined forces to develop a three-year study. The goal was to understand the relationship between predators and elk in the valley’s southern reaches. Specifically, researchers wanted to figure out why calves weren’t surviving as well as they should. Were they born especially weak due to nutritional deficiencies in the mother elk caused by inadequate habitat? Were predators—wolves as well as black bears and mountain lions—the culprits? Or was it some combination of those and other factors?

Researchers focused on comparing the widely differing herd dynamics and habitat conditions in the southern Bitterroot’s East and West Fork areas. The East Fork had fewer wolves and, with less snowpack and more open winter range, was thought to contain better elk habitat. The steeper West Fork is more heavily timbered, receives more snow, and holds more wolves.

With the calf predation and habitat information, FWP wildlife managers hoped to figure out how to increase elk calf survival and thus the overall southern Bitterroot elk population. “But without reliable data on what the problem was, there was no way of devising a likely solution,” says Justin Gude, head of FWP’s wildlife research. “All we had were diverse opinions.”

The study began in February 2011, when researchers captured 44 cow elk—18 from the West Fork and 26 from the East Fork—and fit them with radio collars containing GPS units. The collars recorded each animal’s location every two hours for about a year before automatically releasing so they

NEEDLE IN A HAYSTACK

An FWP helicopter and ground crews were required to find newborn elk calves like this one in hundreds of square miles of the West and East Forks of the Bitterroot drainage. Once located, the calves were fitted with ear tags containing radio transmitters that biologists could follow to locate the animals’ fate during the next 12 months.
could be collected and biologists could download the data. Roughly the same num-
ber of cows were collared in the two years that followed, for a total of 124 research elk.
The information gathered by the GPS collars provided biologists with solid infor-
mation on where elk in the southern Bitter-
root moved through the seasons. For instance, many people had believed that a
significant portion of the West Fork herd migrated freely back and forth between
Montana and Idaho’s Salmon River watershed. This group included one
cow that made her way over a 7,000-foot
pass across the Bitterroot Divide.

In addition to tracking adult elk move-
ments, researchers collected information on
pregnancy rates and body fat levels to better under-
stand cow body condition and repro-
ductive performance. Biologists also studied
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ductive performance. Biologists also studied
the availability and abundance of various
grasses and forbs (flowering plants) the ani-
imals eat during different times of the year.
The goal: to learn what effect habitat has on
elk health, especially during pregnancy.
The project, which cost $500,000, was
funded in large part (more than 50 percent)
by donations from individuals, local groups,
national conservation organizations, and
science agencies hoping to understand the
cause of the Bitterroot elk declines.

WHAT THEY FOUND
It turned out that habitat may be why East
Fork elk produce more calves than those in the
West Fork. FWP research biologist Kelly
Proffitt, study co-leader, found that preg-
nancy rates in the East Fork varied across
three years from 83 percent to 97 percent,
averaging 90 percent, while rates in the
West Fork, varying from 57 percent to 82
percent, averaged 73 percent and the elk
there had far less body fat. “There may be
some nutritional limitations in the West
Fork herd preventing cow elk from accruing
enough fat reserves to remain pregnant,”
Proffitt says.

Even if a cow could produce a calf, there
was a good chance the young elk wouldn’t
survive long. During the study, biologists
placed ear tags containing tiny radio trans-
mitters on a total of 286 newly born elk
calves. They monitored the signals during
each animal’s first year. When the transmit-
ter indicated that a calf had died (by a
special signal that the young elk hadn’t
stirred in several hours), biologists raced to
the site and investigated.

If they were able to arrive at the death
scene before too many scavengers de-
graded evidence, they could identify the
cause of death: natural causes such as star-
nation or freezing, human hunters, or pre-
dation by bears, wolves, or mountain lions.
Researchers learned that West Fork
calves had about a 40 percent higher risk of
mortality than East Fork calves. “This wasn’t
especially surprising because we knew going in that the West Fork was a
harsher environment for elk,” says Proffitt.

However, what did shock the scientists
was the makeup of calf mortality.

Figuring out which of the three large
carnivores may have killed a calf required
knowledge of the species’ unique trade-
marks, explains Proffitt. A mountain lion
often attacks prey from the front end, leav-
ing deep wounds around the neck and jaw
area. The carcass may show claw marks
throughout the body. Mountain lions also
tend to pluck all hair away from an area be-
fore they feed, and they often cache their
kills. Bears usually kill with a crushing blow, cause more damage, and are far less
tidy than lions. A wolf kill site, as one re-
searcher described it, looks like a bomb has
exploded, with bones and other body mate-
rrial scattered over a large area. Wolves also
leave abundant tracks and scat.

Of the 171 calves in both study areas
whose fates were documented (the 115 re-
main ing calves had unknown dates prima-
ry due to ear tag failures), 33 percent
survived to age one and 67 percent were
confirmed dead. When investigating the
mortalities, researchers were surprised that
56 percent were killed by lions, compared to
5 percent by wolves (see pie chart on page
29 for other causes). “When we look at the
number of elk calves that we can document
were killed by wolves, the number is fairly
insignificant,” says project co-leader Mark
Hebblewhite, a professor of wild ungulate
habitat biology at the University of Mon-
tana. “For instance, we didn’t have even one
confirmed wolf kill this past year. Not to have even one out of 36 confirmed elk
calf fatalities is shocking to me.”

None of this is to say that wolves in the
Bitterroot aren’t eating elk. Researchers
examined wolf scat and found that elk com-
prise 61 percent of the carnivores’ diet. But
because the number of Bitterroot wolves is
relatively small when compared to the num-
ber of elk and lions, wolves aren’t the large
carnivore taking the biggest bite out of elk
numbers; lions are.

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Backers big and small

Financial support for the Bitterroot Elk
Research Project came from
Ravalli County Fish & Wildlife Association
Montana Bowhunters Association
Heligates Hunters & Anglers
Rocky Mountain Elk Foundation
Safari Club International Foundation
Western Montana Chapter of the
Safari Club International
Shikar-Safari Club International
McIntire-Stennis Foundation (USDA)
Montana Mapping & GPS
Montana Institute on Ecosystems
U.S. Forest Service (USFS)
Shikar-Safari Club International

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CATCH AND RELEASE
Clockwise from facing page: Helicopter capture teams follow a herd in
pristine to near, from the air; a 3-month-old calf; volunteers examine tooth eruption patterns in a
newborn calf to estimate its age; volunteers re-
lease a calf after weighing, aging, and determin-
ing the animal’s sex; an ear tag and ear tag
applicator. The tags emitted a steady radio sig-
nal for an entire year. If a tagged calf remained
stationary for more than six hours, indicating
that it had died, its tag gave off a distinct double-
pulse signal. Alerted to the fatality, biologists
rushed to the site to investigate the cause.
Residents of the Bitterroot Valley have been volunteering to help their elk population for more than a century. According to an early article in the Missoulian-Sentinel (date unknown), the Stevensville Rod and Gun Club sponsored two shipments of 100 Yellowstone National Park elk in 1912. Waves of club members cooked and served community dinners to pay for the shipments. Local residents modified their horse-drawn wagons to transport the elk to the Burnt Fork drainage east of Stevensville.

The Ravalli County Fish & Wildlife Association and other local conservation groups continue to use fund-raising dinners to help pay for wildlife projects throughout the Bitterroot Valley, including the recent elk study. Scientists say that elk calves radio-tagged over the last three years as part of the study could very well be direct descendants from those 1912 boxcar elk. Very few native elk existed in the Bitterroot during the early 1900s. The 1912 transplant augmented existing populations and started a new chapter in the Bitterroot wildlife conservation story.

—Craig Jourdonnais

**100 years of elk conservation**

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**Stepping up**

by Craig Jourdonnais

Five years ago, the decline of elk in the southern Bitterroot was a complete mystery. Sure, many people thought they knew the reason, but there was no proof. Today we know a huge amount about that elk herd, its habitat, and the role of large carnivores. That’s largely due to the dedication and contribution of the “Bitterroot Crew.”

Professional wildlife biologists from FWP, the University of Montana, and federal agencies provided valuable leadership and scientific expertise for the capture teams. But research director Kelly Proffitt and local volunteer Mark Hebblewhite needed help. They understood the importance of organizing dependable, disciplined, and experienced field teams for calf capture. So they sounded the call for more volunteers who had experience traveling through wild, rugged places in tough weather conditions.

Volunteers came from across Montana to help with the often grueling work. A calf capture field day might begin at 4 a.m. and last well into the night. Bedtime, if we didn’t fall asleep at dinner, often came after midnight.

One volunteer was Hailey Jacobson, then a senior at Missoula’s Hellgate High School, who loves competitive swimming and biology. Her interest in science has taken her to Costa Rica and the Baja peninsula, yet the influence on their and other Montanans’ way of life.

Johnson, and local ranchers, farmers, and hunters have chosen to participate in conservation work primarily for one reason: to leave a positive influence on their and other Montanans’ way of life.

Elk caught in Yellowstone National Park, at the time home to the continent’s last herds, being released near Butte in the early 1900s. Similar transplant operations were conducted in the Bitterroot Valley.

MORE LIONS

Faced with this new knowledge, researchers wanted to learn how many mountain lions lived in the southern Bitterroot. To find out, the biologists used new population modeling techniques coupled with DNA sampling collected from live and hunter-harvested animals. They were surprised to learn there were far more lions in the area than previously thought. The upshot was that one possible way to boost overall elk calf survival would be to increase the number of lions that hunters could harvest. “This was a case where it’s very clear that if FWP had initially listened only to popular opinion and killed a bunch of wolves, they would have done nothing but waste time and money without doing anything for elk,” Hebblewhite says.

Ravalli County Fish & Wildlife Association president Tony Jones admits he was surprised. “Everyone assumed it was wolves, and I did too,” he says. “It turns out that elk in the Bitterroot die for a lot of reasons. They drown in creeks, get hit by cars, and are killed by lions, bears, and wolves.”

Jones says the study has helped him and others in the area better understand what has happened to the Bitterroot elk herd over the past 15 years. The West Fork elk herd peaked at nearly 2,000 animals in 2005 following relatively restrictive cow elk hunting seasons, heavy mountain lion harvest by hunters, and, at the time, few wolves in the area. But from there the population went downhill. Required by state statutes to lower elk numbers to more closely meet objectives outlined in the state’s elk management plan, FWP responded by increasing cow harvest quotas. At the same time, concern that lion numbers were dropping too low led FWP to cut back on lion harvest quotas so the population could rebound. Meanwhile, wolf numbers started rising. The combination of increased human and carnivore harvest was more than even the Bitterroot’s once-rebuke elk population could sustain. “It was like the perfect storm,” Jones says.

“People here were worried they might lose their elk herd, and that’s why you saw them step forward,” Jones adds. “It says a lot about how much folks in the Bitterroot care about elk. They wanted to know what was happening to their elk, and they were willing to reach into their pockets and help pay the bill.”

Elk calf mortality

Bitterroot Elk Research Project results, 2014

- 36% due to lion predation
- 24% unknown causes
- 14% unknown predation
- 11% bear predation
- 8% natural, non-predation causes
- 5% wolf predation
- 2% human-related causes (such as hunting and fence entanglement)