TAKING THE HIGH ROAD

Part of the Cody elk herd takes migration to new heights, trekking over high-mountain passes on their way from summer to winter ranges. Understanding these marathon movements helps humans appreciate the role we play to ensure animals can get to where they want to go — no matter where they travel.

STORY BY CHRISTINA SHORMA SCHMIDT
PHOTOGRAPHS BY JOE RIIS

Elk migrate over a ridge near the south fork of the Shoshone River in July. The journey includes 3- to 4-week-old calves that follow their mothers up an 11,000-foot slope as they migrate for the first time during the spring. The elevation gain is one of several challenges the elk face before they arrive in their summering grounds in the Thorofare Valley near southeastern Yellowstone National Park.

After years of reading studies, scrutinizing maps and following on foot and horseback the trails of migrating elk, Doug McWhirter has come to a conclusion.

"There is almost nothing that will prevent an elk from migrating where it wants to go," he said. "Until you actually go to places where those elk go, it is really hard to get an appreciation for what they do."

McWhirter, the Wyoming Game and Fish Department's Jackson wildlife coordinator spent 15 years as the Cody biologist. Since 2007, he has collaborated with Arthur Middleton, a research associate with the Wyoming Migration Initiative and an assistant professor at the University of California-Berkeley, to study elk in the Cody area.

Part of that study focuses on an extraordinary migration journey that, over the years, has more clearly defined elk movement, herd management and the role humans play along the route.

In late 2013, Middleton, along with photographer Joe Riis, filmmaker Jenny Nichols and artist James Prosek, began an intensive study combining GPS tracking with trail cameras, filmmaking and artwork to capture and share with the public remarkable details about the epic twice-annual treks Cody elk take between their summer and winter ranges.

As these elk make their annual migrations, they provide sustenance for predators and scavengers, quarry for hunters, support the businesses of guides and outfitters and are photo subjects for hundreds of thousands of tourists and travelers.

Middleton and his team radio-collared 30 elk from the Cody herd between late 2013 and 2015, with the GPS collars recording each animal's movements every two hours. They looked specifically at the route of the Greybull River/Carter Mountain elk, a sub-group of the Cody elk herd. While some are residents that stay in the area year round, the migrating portion of the herd travels 60 to 75 miles between its winter range near the Greybull River and southern Carter Mountain area to its summer range near the headwaters of the Yellowstone and Snake rivers in the southeast portion of Yellowstone National Park and the Teton Wilderness in the Bridger-Teton National Forest.

The migration is exhausting and dangerous, requiring the animals at one point to ascend a 12,000-foot peak in the Washakie Wilderness of the Shoshone National Forest, which is often still covered in snow. Then they must tread carefully 5,000 feet down the other side to cross a river swollen with snowmelt, only to immediately climb over an 11,000-foot peak. And these are just some of the obstacles. During their migration, the elk will climb, descend, swim and repeat several times, all while running a gauntlet of grizzly bears, wolves and other predators, with many cows trailing new calves at their heels.

A elk cow and young calf climb the steep, rough terrain near the Upper Greybull River during their spring migration.

Left: A grizzly bear trails a herd of migrating elk near the south fork of the Shoshone River during the spring migration in July. This photo was taken at the same location as the photo on the opening pages of this story.

"For some of the longest migrations, they are going through at least two or three major passes then crossing two major rivers. They are going through places that you just don't usually associate with elk," McWhirter said. "There are a number of places that are mind-blowing — places you'd be more likely to see a bighorn sheep."

The Cody elk herd numbers more than 6,000 and consists of both migratory and non-migratory groups of animals. It is a compilation of several smaller bands of elk, each of which takes a distinct route to summer ranges in or near Yellowstone National Park.

"There are half a dozen relatively major migration routes for the Cody elk herd," McWhirter said. "They all go to the same place as the Greybull River elk. They do it several different ways, but they end up in the same places."

Two other sub-populations of elk in the herd winter on the north and south fork drainages of the Shoshone River. While the North Fork elk have a more restrictive

range, the South Fork elk are distributed over thousands of acres of private land.

"The existence of these very large private cattle ranches basically enables these elk herds to persist," McWhirter said. "The private lands are a key component for the herds. These private lands and ranches are supporting elk through a large portion of the year."

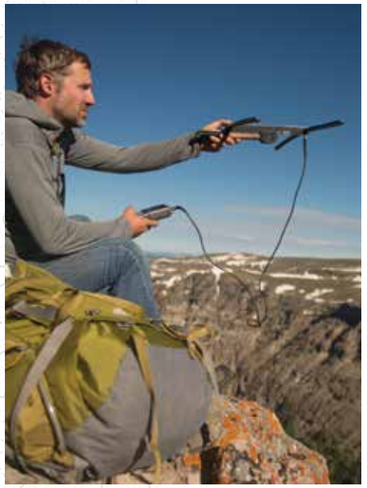
TREK TIMED WITH WEATHER

The routes the Greybull River elk take tend to be followed loyally from year to year, but the timing of migration varies, depending on weather factors.

As spring arrives, winter snow recedes and lush, green vegetation takes its place. This fresh, new growth is more abundant, nutritious and digestible than it will be at any other time of year. The green-up both lures and fuels the animals' movements towards their summer ranges.

"We don't have good estimates from Yellowstone elk, but one classic study of Alaskan caribou showed that a 14 percent increase in grass digestibility brought a 270 percent increase in weight gain," Middleton wrote, in the book "Invisible Boundaries."

McWhirter noted that some years, his trail cameras showed elk had already migrated 20 to 30 miles by mid- or late April. But in other years, if snow persisted later into the spring, movement was not in full swing until June. And in some cases, elk were migrating later



Arthur Middleton, a research associate with the Wyoming Migration Initiative, tracks elk in the Thorofare Valley using radio collar technology.

Elk trek up a ridge during their spring migration near the Upper Greybull River. The herd will climb more than 11,000 feet to the peak as the snow melts. This particular elk migration can take months to complete.

Migration studies pre-dated technology

Biologists and researchers have been gathering evidence of elk migration paths for decades.

One of the first large scientific studies of Yellowstone elk migration began in the 1960s, led by John Craighead, Gerry Atwell and Bart O'Gara who published their findings in 1972. Their focus was the Northern Yellowstone herd, but they also tracked individuals in five other herds including Sunlight and North Fork Shoshone elk.

Because it was prior to radio-collar technology, hundreds of hours of work went into putting neck bands on thousands of elk. To accomplish this, elk were herded by helicopter into corrals set up in various locations. Neck bands were placed on the elk, with a different colored band for each trap site. Later, the research team, Yellowstone National Park and Game and Fish personnel and others would look for the elk on summer ranges by foot, horseback or from the air, comparing the neck band color of an observed elk to where it was originally trapped.

More than 2,000 elk were neck-banded during the study, 132 of those from the North Fork group. There were 73 summer sightings of North Fork elk, with 56 seen south of Yellowstone Lake on Two Ocean Plateau, two near the northeast tip of Yellowstone Lake in Pelican Valley and 15 in the northeast corner of the park where they intermingled with elk banded in Sunlight Basin.

McWhirter said newborn elk calves were also caught and marked with ear tags to help understand movements.

"It took a lot of effort to tag the calves, but sometimes hunters found their elk had been ear-tagged and would return the tag," he explained. "You could then see where it was tagged and where it was killed. It is cool to look back and see people were figuring this stuff out before we had all this detailed technology."

Research continued and technology advanced. In the early 1980s, Bill Rudd, a graduate student at the University of Wyoming who later became a biologist, wildlife coordinator and assistant wildlife division chief for Game and Fish, did a study with radio collars and neck bands. His research focused on the North Fork Shoshone and Sunlight Basin elk.

Rudd used VHF (very high frequency) radio collars on 41 elk in those two locations and, though the collars weren't as sophisticated as today's versions, they yielded valuable information about animal movements.

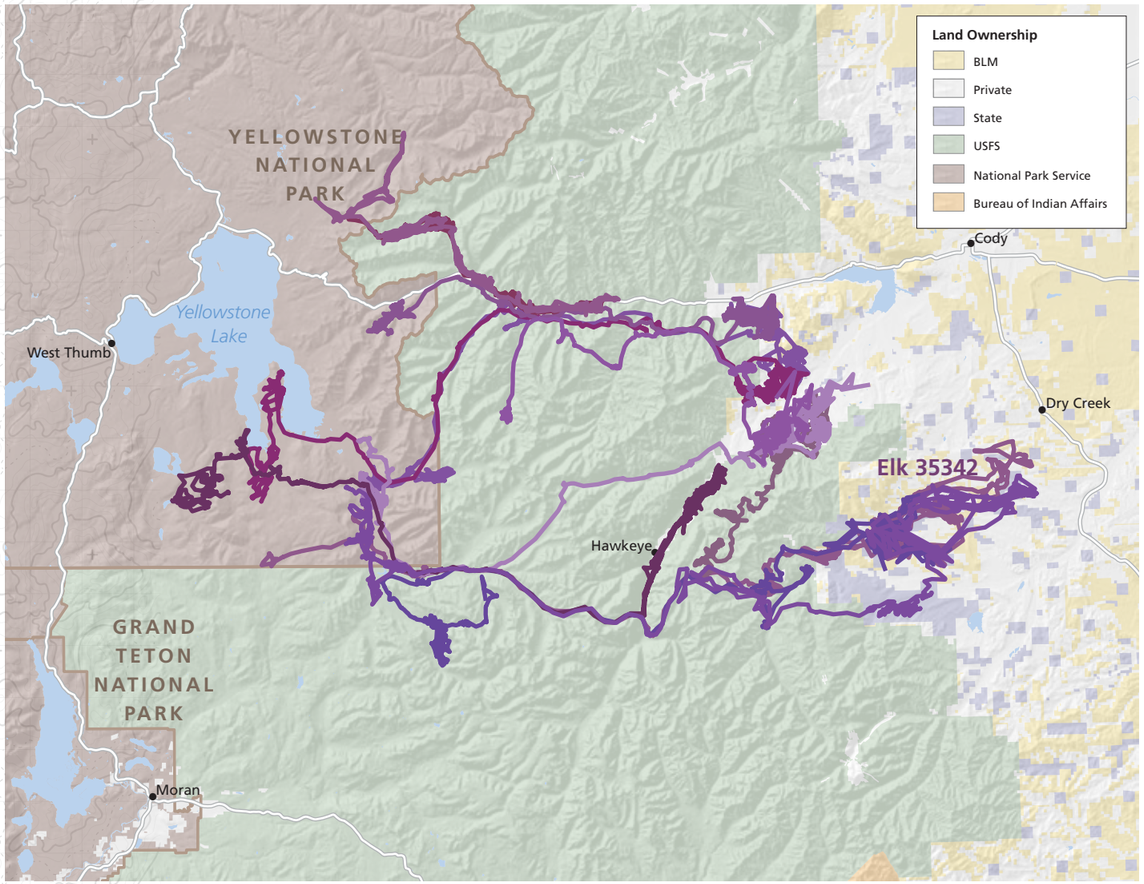
"We were able to document movement patterns and the timing of migration in more detail than could be done by just observations of neck bands," Rudd said. "Mine was a management-related project. We were documenting movements and timing of movements in relation to harvest and working with Game and Fish, the public and outfitters to understand what proportions of the population were resident or migrant and when they were moving relative to hunting seasons."

This study was followed by another in the early 1990s by Thermopolis biologist Kevin Hurley.

"It was Kevin's work that put a collar on Greybull River elk for the first time," McWhirter said. "His study defined the movement patterns we know today, but since they too were VHF collars — which have to be searched for by frequency to obtain a location — there were still gaps in our understanding."

In addition to these formal studies, elk movements were documented over the years by many Game and Fish personnel including Jim Oudin, Dave Bragonier, Bill Morris, Rex Corsi, Tim Fagan and Jim Yorgason as well as local hunters and outfitters.

"The people who hunt, guide and recreate in these places have known about these movements for a long time," McWhirter said. "And Native Americans probably understood those movements as well. But with new tools we learn a little more and add another piece to the puzzle. Folks who see those things on the ground might only know in detail about one segment of it, but they might not know where they go past that. So where GPS collars are really handy is they fill in those data gaps throughout the length of that entire migration and add the timing element and how much it varies from year to year."



The Wyoming Migration Initiative combines radio-collar tracking data to create a map that shows what routes elk take from their summer and winter ranges.

Map from the Atlas of Wildlife Migration: Wyoming's Ungulates, (in production) Oregon State University Press. ©2018 University of Wyoming and University of Oregon

into the summer as well.

"One thing that amazed me is when we started looking at our cameras, we had years where elk started migrating in April and there were still groups of elk making that migration all the way through August," he said. "My previous concept was migration was relatively brief. Even if it took a week or two, you just go from point A to point B, you stay there and then you go back. But if the forage is so good where they are going it is absolutely worth it to them, even if it is August, to keep going, to keep moving."

He said bulls tend to migrate first, followed by cows who are either not pregnant or have not yet calved. The lone cows are then followed by mixed groups of cows with calves.

Fall migration towards winter ranges seems to rely even more heavily on weather.

"Fall migrations were triggered by snowfall," said Bill Rudd, former Game and Fish wildlife division chief whose radio collar elk study in the 1980s analyzed two years of data. "The main migration occurred when snow climbed from 2.5 inches to 8 inches at Lake Yellowstone. Spring migrations were more relaxed and variable."

MANAGEMENT GOALS

As these elk make their annual migrations, they provide sustenance for predators and scavengers, quarry for hunters, support the businesses of guides and outfitters and are photo subjects for hundreds of thousands of tourists and travelers.

Beyond that, detailed documentation of these elk migration routes has several wildlife management implications.

For McWhirter, an important one is the possibility of using trail cameras in identified migration bottlenecks to count and classify gender and age of elk as they move between ranges. Results of these classifications reveal information on population dynamics and calf survival rates. The surveys are currently done from a plane or helicopter, which is dangerous and expensive in rugged, high-elevation backcountry.

"During winter, the migratory elk mix with

Wes Livingston, a contracted wildlife capture specialist, leans out of an R44 helicopter and fires a net on a cow elk that will be fitted with a GPS collar and released. No tranquilizers are used, making it a quick collaring process. Tracking elk gives wildlife managers information about their annual movements, which have an impact on predators, scavengers and hunters.

non-migratory elk and when you go look at them, you may get a skewed picture of what is going on," he said. "You have to survey them when they are separated. If we can find ways to use cameras, it can be easier, safer and even yield better data.

"Whether they migrate or not can have a huge impact on their exposure to predators and their ability to find great habitat," he continued. "Different population segments can perform differently; they can have higher or lower levels of calf recruitment for different reasons. It is important for us to see how they are performing so we can apply management appropriately."

The photos, videos and data gathered by Middleton, McWhirter, Rudd and others over the decades have increased not just understanding of and appreciation for the annual movements of elk, but also highlighted the importance of partnerships in managing and conserving the herds.

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Doug McWhirter, the Wyoming Game and Fish Department's Jackson wildlife coordinator

"I think there's a lot of pride in the fact that these migrations are still intact and that these animals do what they do," McWhirter said. "The big message from my perspective is that this just demonstrates that everybody has a role to play in maintaining these migrations. Private landowners, state lands, Bureau of Land Management, Forest Service lands, the park service — we are all in that mix. I see it as a cause for celebration that those migrations are what they are. They are fantastic and every single one of those collaborators makes that possible."

— Christina Schmidt Shorma is an Oklahoma transplant who came to Wyoming in 1999. She has a degree in wildlife management and a minor in journalism from Oklahoma State University. She lives with her husband Dustin in Dayton.

The graph below shows the elevation changes one elk faced during its migration, which takes the herd across land owned by various entities.

Graphic from the Atlas of Wildlife Migration: Wyoming's Ungulates, (in production) Oregon State University Press. ©2018 University of Wyoming and University of Oregon

Journey of Elk 35342: Elevation and Land Ownership