



CAN *Glory Days* COME AGAIN TO THE CLEARWATER?

by Paul Queneau

PHOTO: RMEF

A partnership of wildlife and land managers, researchers and RMEF is pinpointing how and where we can do the greatest good for what's left of one of the West's classic boom-and-bust herds.

September 16, 1805, was one of the toughest days for the Corps of Discovery on a journey loaded with hardships.

"I have been wet and as cold in every part as I ever was in my life," Captain William Clark wrote in his journal as they crossed the Bitterroot Mountains and descended into the heavy forests surrounding the Lochsa River. *"Indeed I was at one time fearfull my feet would freeze in the thin mockersons which I wore."*

Desperate for meat, they'd shot one of their horses. The situation didn't improve for weeks as they pushed deeper into the Clearwater country, finding not a single elk until they crossed into present-day Oregon. Ironically, they'd soon spend a long, wet winter on the Pacific coast consuming so many Roosevelt's elk that Meriwether Lewis wrote he'd rather eat dog flesh than stomach another bite of wapiti.

He'd soon get his wish. On their return trip back up the Clearwater the following June, they again saw no elk, but hit snow *"in every derection from 6 to 8 feet deep."* With the help of three Nez Perce guides whom Clark called *"most admirable pilots,"* they finally crossed into what is now Montana by month's end, *"leaveing those tremendous mountanes behind us—in passing of which we have experienced cold and hunger of which I shall ever remember."*

Despite that experience, the Nez Perce assured them the Clearwater held elk. That bore out half a century later in 1861 when prospectors camped near the South Fork of the Clearwater and spotted a herd of at least 700. Then they struck another form of gold and Elk City was born. By fall, prospectors flooded the valley, and a scattering of shacks boomed to a town of 2,000 people, five general stores and five saloons.

But the gold rush busted out just as quickly, and Elk City shrank to its current population of 200 the following year. For elk, though, the true boom was yet to come.

A century later, the basin brimmed with mind-boggling numbers of elk. The Lochsa Herd alone held some 16,000. But by 2010 that herd would plunge to less than 2,000 animals.

The Clearwater encompasses national forest, state, private and tribal land spanning the width of the Idaho panhandle from Lewiston to Lolo Pass. Extreme swings

seem to be the name of the game here. The basin climbs from 754 feet in elevation at its western edge to more than 8,500 near the Continental Divide to the east. Along the way it leaps from less than 10 inches of annual precipitation to more than 80—high desert to temperate rainforest. That allows this landscape to host the most diverse ensemble of vegetation of any watershed in the Lower 48, from prickly pear to devil's club.

Such ecological turbulence begs to be measured, explored and, after considerable effort, understood. Lewis and Clark started documenting this diversity with help from the Nez Perce's ancestral knowledge as they mapped and cataloged the basin's streams, plants and animals.

But perhaps the most ambitious chapter is now being written. Over the past decade, the Clearwater has become a 9-million-acre laboratory, an effort which RMEF has helped support from the start. Its findings have the potential to turn the tide toward a brighter and more prosperous future for elk and other wildlife in the Clearwater, building on a history of hard-won cooperation.

Flattened by Fire

In the middle of the night on August 21, 1910, Lolo-Bitterroot National Forest Supervisor Elers Koch awoke to his phone ringing. As he answered, the voice on the other end of the line was dire: "Mr. Koch, the fires have all gone wild."

Hurricane-force winds spurred dozens of burns that had smoldered for months across western

Montana and northern Idaho. Over the next 48 hours, the blaze engulfed 3 million acres of forest from western Montana across Idaho's Panhandle into eastern Washington. The flames reduced whole towns to ash and killed at least 87 people.

It became known as the Great Burn. The fire's path blackened part of the Clearwater, but most of the watershed was spared, at least for a time. In 1929, a fire started on Bald Mountain and soon spread to both sides of the Lochsa River. Yet that blaze was trivial compared to what came five years later in August 1934, following 45 days without rain.

A thunderstorm raced across the Selway, igniting 18 fires in one afternoon. They quickly merged into one beast. Combined with the burns of 1929, they torched more than a quarter-million acres of the Clearwater Basin, transforming dense forests that had darkened the fortunes of Lewis and Clark into wide-open country.

With the forest canopy peeled away, the ashes soon sprouted lush greenery stretching horizon to horizon. Grasses, forbs and vast brush fields fattened cow elk that each June gave birth to more and more generations of strapping calves, catapulting the fortunes of the herd.

"It Was a Pretty Easy Elk Hunt!"

Jim Peek, professor emeritus of wildlife resources at the University of Idaho, is widely regarded as the greatest living authority on the history of elk and elk management in the Clearwater Basin. In 2020, he co-authored *The Lochsa Elk Herd: History*

and *Future*, chronicling the epic rise and fall of this legendary herd.

Peek says for elk, those massive fires layered one drastic change atop another, sweeping across country where poisoning, trapping and year-round hunting had all but exterminated wolves, mountain lions and grizzlies. Soon elk were everywhere.

George Hatley outfitted there on horseback in the 1950s back when the road ended at the Lochsa Ranger Station.

"They'd ride 12 miles upriver from the Ranger Station, cross the Lochsa, then go up on Dutch Ridge where they had a camp," Peek says as he shares Hatley's photos showing mountains covered in boundless meadows fat with gourmet elk forage such as redstem ceanothus.

"George told me that he never *really* learned how to hunt elk, because as soon as they set up their wall tents they had bulls running through camp right between their horses," Peek says. "It was a pretty easy elk hunt!"

With tens of thousands of elk roaming the Clearwater, hunting them became a huge boon to the region's economy. Tom Toman, who worked as RMEF's staff biologist for 25 years before retiring in 2020, remembers being captivated by the allure of the Clearwater long ago.

"As a kid growing up in Casper, Wyoming, I always wanted to hunt there even though I was surrounded by elk country," he says. "Back then it seemed like in nearly every issue of *Outdoor Life* and *Sports Afield*, if there was an elk hunting article, the

Clearwater was featured. So, by the time I came to the Elk Foundation and found out that 70 percent of that herd was gone, I was astonished."

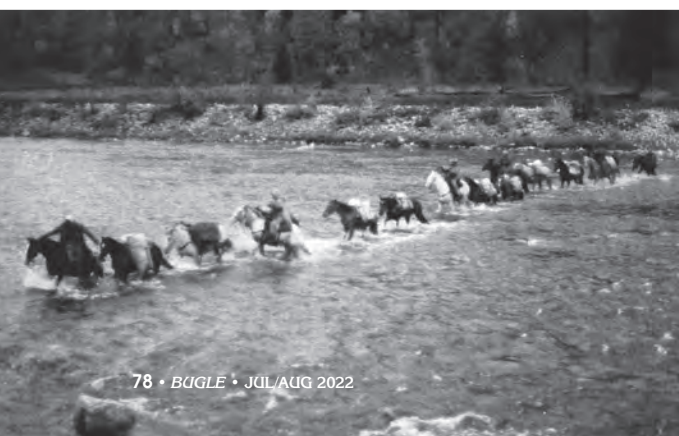
The heyday for elk in the Clearwater would last a little over three decades. It was still going strong in 1980 when Idaho Fish and Game surveyed elk populations along the Lochsa River and counted 38 calves for every 100 cows, a forecast of good herd health and future productivity. That fall hunters killed more than 300 elk on the Lochsa.

Fast-forward to 2010, when biologists counted just seven calves per 100 cows. That's a herd peering into the abyss. Hunters that fall killed just 30 elk—a 90 percent drop from 30 years previous. The easy answer was to pin the plunge on burgeoning wolf packs and other large predators in the basin. Yet elk populations across the Clearwater were in a steepening descent well before wolves returned to the picture.

In the late 1990s and into the 2000s, wolves proliferated. So did arguments and litigation about how best to manage practically every aspect of the Clearwater's natural resources. By 2008, tensions were so high that Idaho's U.S. Senator Mike Crapo intervened. His office helped launch the Clearwater Basin Collaborative (CBC) seeking ways to restore the basin to health.

"The Most Broken Relationship I'd Ever Seen"

Orville Daniels joined the CBC as RMEF's representative in 2009. He'd spent 37 years with the



Fueled by Fire

For a good chunk of the 20th century, the mountains surrounding the Lochsa River (lower left) hosted Idaho's most prolific elk herd. This wild ascent began after huge wildfires peeled back the forest canopy between 1910 and 1934 and predators were largely exterminated. The herd grew to more than 16,000 and attracted hunters from across the country (left), but the heyday couldn't last. As forests closed back in, wolves and other predators rebounded too. With a few especially harsh winters like 1996-97 taking a further toll, the herd dwindled to less than 2,000 today.

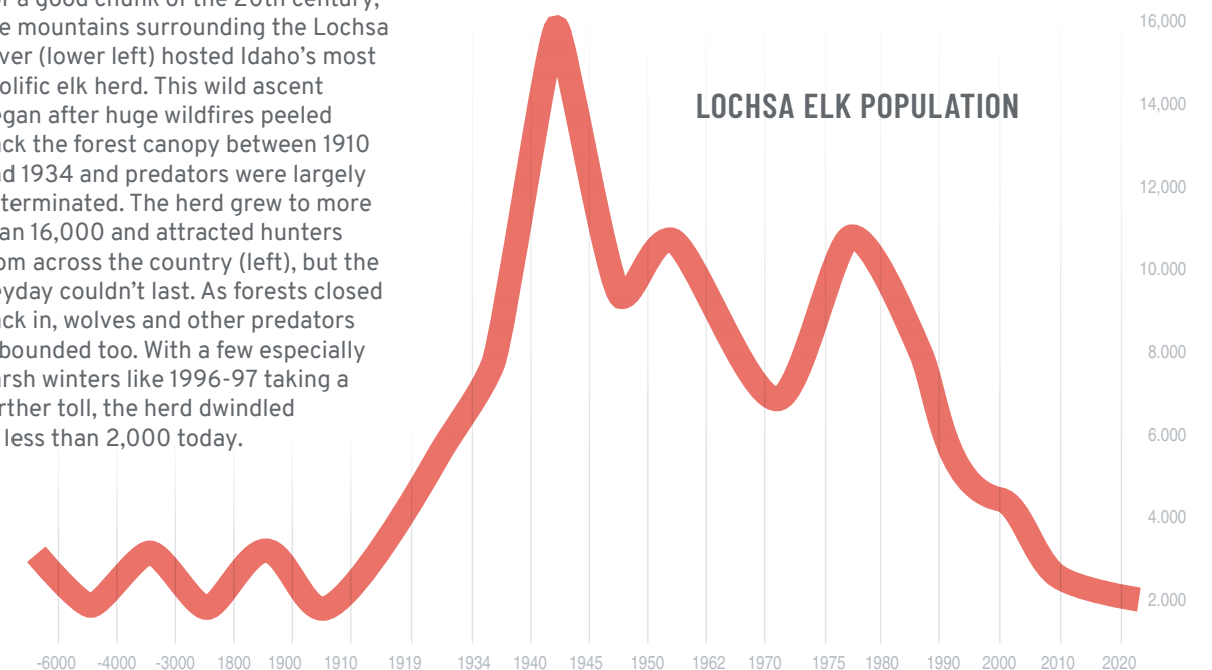


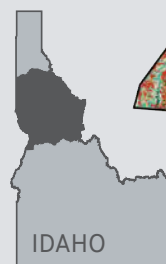
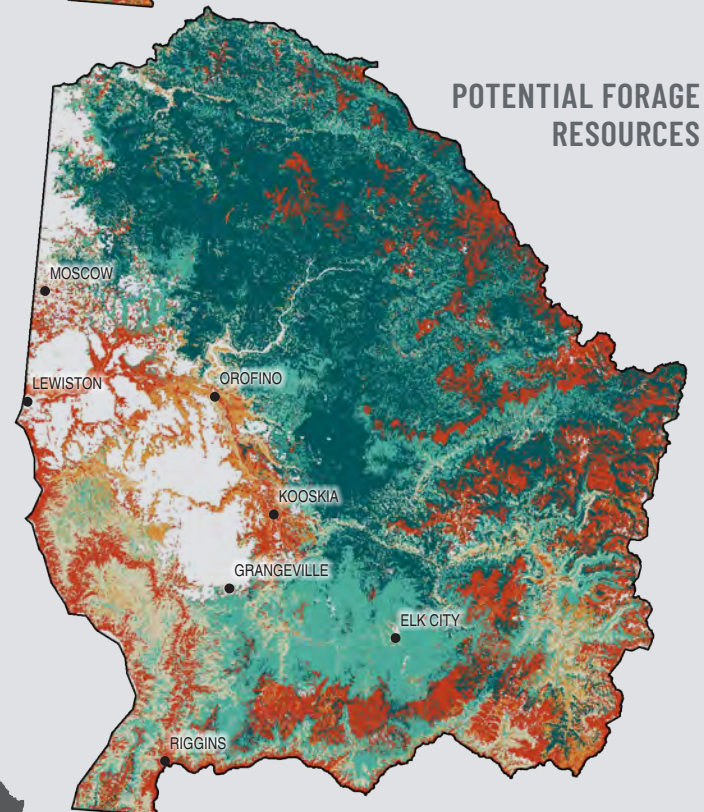
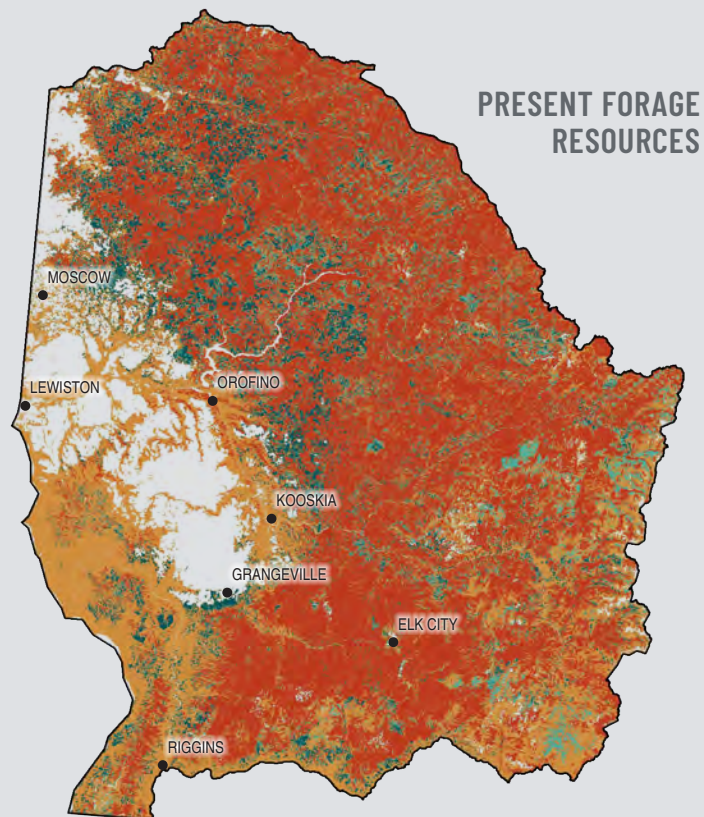
PHOTO BOTTOM LEFT: GEORGE HATLEY / OTHER TWO PHOTOS: ARCHIVES AND SPECIAL COLLECTIONS, MANSFIELD LIBRARY, UNIVERSITY OF MONTANA / GRAPH DATA: COURTESY OF JIM PEEK

Restoring Good Greens for Elk Deep in the Red

From prickly pear to devil's club, Idaho's Clearwater has some of the most diverse vegetation in the Lower 48. But for elk, practically all of it is a tough place to make a living. Analyzing soils, precipitation, canopy cover, plant species and other factors, researchers created these maps of the Clearwater's forage resources. Poor to marginal nutrition dominates today, as shown at right. But the map below shows the incredible potential for high-quality forage and explains how this landscape once supported vast elk herds. Only a megafire may bring that scale of change, but researchers have pinpointed places where prescribed burns, forest thinning and other stewardship can do the most to boost the abundance, diversity and palatability of elk forage.



BUFFET VS. BEREFT: Over time the forage in most western forests declines to a point where elk cannot make a living in summer as the canopy blocks out sunlight (top). But well-targeted burns and thinning can create a nutritional bonanza (bottom).



- NO DATA
- EXCELLENT
- GOOD
- MODERATE
- MARGINAL
- POOR

U.S. Forest Service including as supervisor of the Bitterroot, Lolo and Clearwater national forests, so was intimate with the basin and its challenges. Daniels was well known for speaking his mind on issues even if it clashed with the Forest Service's direction coming from D.C. He brought that candor to the collaborative's table.

"When I joined the CBC, I found so much dysfunction when it came to elk it was mind-boggling," Daniels says. "The fight between the Forest Service and Idaho Fish and Game was so strong they weren't even talking to each other. It was the most broken relationship I had ever seen. I asked Tom Toman from RMEF to come speak to the CBC. That seemed to crack through the dam."

Toman recalls the meeting well. It commenced with yet another round of finger-pointing.

"Forest Service folks felt IDFG was mismanaging the wildlife, and IDFG felt the opposite, that the forest was mismanaged."

Toman encouraged the group to keep in the forefront of their minds that elk are an excellent barometer for overall forest health *and* a key piece of the social fabric of the Clearwater.

"I just sat down to talk about the value of elk, to everybody, not just the hunters," Toman says. "But Orville and I also really emphasized that it's not just about elk, but all critters on the landscape."

The group agreed on that much, and with one bridge built, more followed. They also agreed that the Clearwater needed better data about the health of both the forest and the elk. In 2012 the CBC launched an initiative to assess animal fitness, nutritional status and habitat use for elk across the basin and apply this knowledge to restore habitat and improve stewardship. Dave Cadwallader, IDFG's Clearwater Region supervisor and a member of CBC since its inception, reached out to a group of ace researchers from Oregon.

Half Time Machine, Half Crystal Ball

You'd be hard pressed to find any scientific research of elk habitat quality or nutrition published in the past two decades that doesn't cite the work of John and Rachel Cook, Michael Wisdom or Mary Rowland. Based in La Grande, Oregon, they have each devoted nearly all of their careers to studying how habitat conditions and nutrition impact elk and other wildlife.

By measuring the impact of nutrition, their computer models can help predict elk pregnancy rates, body fat and habitat use. Working with the CBC and Idaho Department of Fish and Game, RMEF and other partners, they deployed their expertise on the Clearwater—quite literally from the ground up.

The research team used satellite imagery of forest canopy cover, soil types and other key habitat

indicators, while also measuring body condition, pregnancy status and habitat use of almost 250 elk wearing GPS collars deployed by IDFG in seven herds spread across the Clearwater and St. Joe river basins. In addition, Deborah Monzingo, then a graduate student at Washington State University guided by WSU ecology professor Lisa Shipley along with John and Rachel Cook, laid thousands of vegetation plots and collected the forage quality and quantity data used in many of the resulting nutrition models.



GOOD MEDICINE: Prescribed burns like this one have proven invaluable for creating vibrant habitat in the Clearwater.

Crunching hundreds of data streams, including forage measures collected by Monzingo, they created a "heat map" of habitat quality, one that's part crystal ball, part time machine. It reveals not just the current conditions of elk forage in the basin, but which spots hold the greatest potential.

"We wanted to be able to extrapolate over time going back as far as 1870 to reconstruct what's happened to forage resources and be able to estimate carrying capacity on the Clearwater's elk summer ranges to see where we stand today compared to where things were 50, 100 and 150 years ago," says John Cook, principal research scientist for the National Council for Air and Stream Improvement (NCASI), where his wife Rachel also works as project leader.

Their research has shown time and again how critical summer range is for many western elk herds. Pregnancy rates, calf growth, timing of birthing, body fat levels and resilience to harsh winter weather all connect to the quality and quantity of what they eat between June 1 and October 31. Across the Clearwater summer forage proved once again to be a vital lever impacting the health of elk herds.

PHOTOS FROM BOTTOM LEFT: COURTESY OF RACHEL COOK / COURTESY OF RACHEL COOK / RMEF
MAPS: COURTESY OF PACIFIC NORTHWEST RESEARCH STATION AND NCASI

“For many decades, everyone figured if a deer or elk population had a nutrition problem, it was linked to winter range where anyone can plainly see they’re starving to death,” John says. North Idaho certainly has tough winters that can kill legions of elk, as happened in the extraordinarily harsh winter of 1996-97. But in most winters, as long as elk have good fat levels, they will weather the storms.

“Elk are surprisingly resilient during this time of deprivation, with physical adaptations that allow them to lower their metabolism to survive. Contrast that to spring, summer and early fall when all their core productivity is happening—when calves are being born and females are producing milk, and when

every elk is busy trying to lay on the fat that may be very important for carrying them through winter.” The tougher the winters, the more animals need summer ranges with abundant high-quality forage.

Like Carboard Boxes Spread Around the Landscape

The Cook’s research has shown that many places which appear awash in greenery often lack the A-list plants that pregnant or lactating cow elk and growing calves need most. It all hinges on having an ample supply of forage high in digestible energy, protein and other nutrients without an overabundance of plant

toxins that elk try to avoid.

“Everywhere that we’ve done this work we see the same thing—the majority of the vegetation out there is not useful for these animals,” Rachel says. “That is based on measurements we took as we put tame animals in the field again and again over a 12-year period and recorded somewhere in the ballpark of 3½ million bites taken by those elk.”

It turns out that one of the most telling measures of forage value in summer is the level of digestible energy (DE) contained in the plants that elk have available to eat. Research has shown cow elk need forage with at least 2.75 kilocalories per gram to support the level of milk production growing calves

need in summer. It’s kind of like the essential vitamins and minerals listed on every package of food we buy. Elk that consume lots of high-quality forage tend to thrive. But drop forage DE levels below that 2.75 kcals/g threshold and things get ugly. Milk dries up, cows lose fat and may fail to breed come fall. Undernourished calves may enter winter as light as 165 pounds when they ought to be double that weight. Then, if a big snowstorm hits, or a cold snap freezes the snow into armor plating over forage, winterkills surge.

The research team in the Clearwater found that vast swaths of the watershed are covered in lousy forage. That includes not only the obvious noxious

CAPTIVE INTEL: Summer Forage = Winter Survival

In 1990, John Cook began raising a tame herd of elk at the U.S. Forest Service’s Starkey Experimental Station, which spans 28,000 acres in the Blue Mountains of northeast Oregon. Surrounded entirely by a high fence, Starkey allows for controlled research scenarios that would be next to impossible anywhere else.

“The decision to create a captive elk herd at Starkey stemmed from the considerable foresight and perseverance of Jack Ward Thomas and Larry Bryant of the U.S. Forest Service’s Pacific Northwest Research Station, Larry Irwin at NCASI, Robert Riggs of Boise Cascade Corporation, with collaborative support from Bruce Johnson of the Oregon Department of Fish and Wildlife and funding support from RMEF,” says Cook. “The herd numbered up to 150 elk in the 1990s, and the effort represented a truly unique federal-state-private partnership that is producing new research findings even now.”

That laid the groundwork for field research across the northwestern U.S. Beginning in the late 1990s, John and Rachel took the project on the road, trucking elk to habitat test pens in the coastal ranges of western Oregon and Washington to directly measure elk nutrition in the

different habitats there. They also launched studies to measure body fat, pregnancy status and other key performance indicators in wild elk across the region, allowing them to combine data from tame elk in highly controlled experiments with data from wild elk herds to better understand how nutrition influences elk populations.

“We dropped them into native habitats and measured in great detail the nutrition that these animals were able to get from different plant communities,” Rachel says. “Everything from near-alpine areas to dry rangelands to clear cuts and old-growth rainforests.”

Since then, the Cooks have sampled body condition and pregnancy status in more than 5,000 wild elk from the Olympic Peninsula to the Black Hills of South Dakota to the San Juan Mountains of southern Colorado. As data have flooded in, so have the revelations.

“We found their nutritional requirements in summer are two to three times higher than they are in winter,” John says. “If they get hit with nutritional deficiencies, their performance falls off a cliff. But with good summer nutrition they can put on nice levels of body fat. Their calves are big, breeding comes early and so does birthing. It really makes a big difference.”

The Cooks found that female elk with at least 11 to 12 percent body fat in autumn probably found good levels of nutrition all summer, and will get pregnant and raise hefty calves ready to survive the long winter. Cows with less than 6 to 7 percent body fat in autumn likely had poor summer nutrition while raising an underweight calf and are far less likely to breed. They may also be more susceptible to predation, disease, parasites and overwinter starvation.

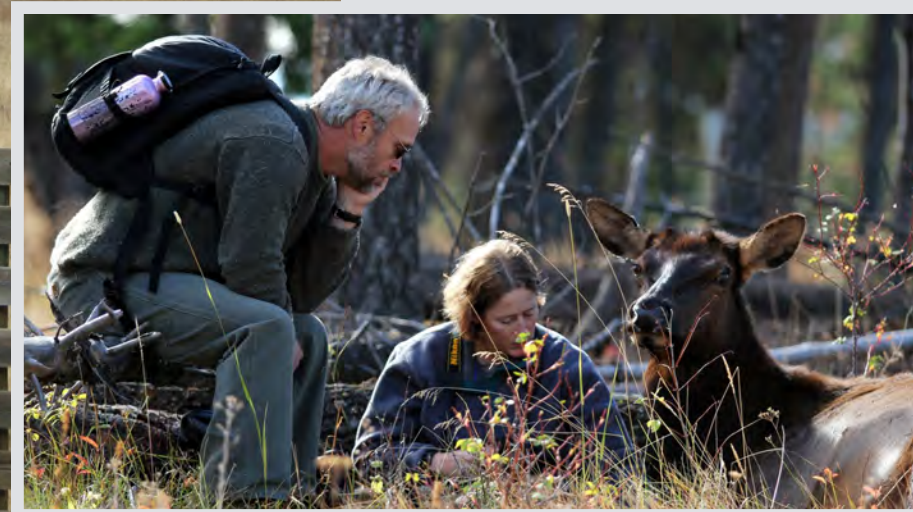
“All in all, the work showed from a regional perspective that the old assumption that summer forage routinely satisfies the nutritional needs of elk and their calves was simply not true,” John says.

This research produced what are now household names to many elk biologists: the West Side Model, named for the moist and heavily forested region west of the Cascades; and the Blue Mountains Model, for the drier range of eastern Washington and Oregon dominated by ponderosas, sagebrush, lodgepoles, aspens and grasslands—similar habitat to much of the interior West. Developed by Wisdom, Rowland, the Cooks and many additional collaborators, these models were the first to integrate the essential components of summer nutrition



PHOTOS FROM LEFT: RMEF / COURTESY OF NCASI

JOHN AND RACHEL COOK work with a tame elk while evaluating forage nutrition at the Starkey Experimental Station in eastern Oregon (above). Their ground-breaking research has shaped elk and habitat management across much of the West.



(and how it benefits cow elk vitality) with other factors to accurately evaluate and predict how elk use a wide variety of landscapes. They’ve become important tools for habitat managers across the West.

Since Idaho’s Clearwater runs the gamut from temperate rainforest to high desert, the Cooks and Wisdom are combing elements of both models with field data gathered across the basin to help assess forage health. The goal is to harness those findings to pinpoint the places where habitat stewardship projects can deliver the greatest benefit for elk and other big game.

GOT MILK? Research has shown lactating cow elk need ample forage above a certain nutritional quality to produce enough milk to send a calf into its first winter healthy and also begin a successful pregnancy that fall.



invasive weeds like yellowstar thistle, but widespread natives such as beargrass and ferns. Meanwhile, true protein shake species like redstem ceanothus, willow, fireweed and chokecherry can be much harder to find.

“There are plants that they simply don’t eat, and in many plant communities, those are the dominant vegetation,” John says. “These species get in the way. They’re like cardboard boxes spread around the landscape.”

Researchers tested hundreds of vegetation plots across the Clearwater and took thousands of plant samples looking for which spots and which plants offered up adequate DE. Low elevation, drier sites dominated by species like ponderosa pine proved poor, especially later in the summer. Higher altitudes that received ample moisture where spruces, firs or western red cedar tend to grow can create a nutritional jackpot—but only if they’ve seen a major disturbance like a fire or forest thinning in the past 20 years. Ecologists refer to this starter-stage of forest regeneration as “early seral.”

Once trees regrow and the canopy closes, research has shown that the quantity and quality of elk food plummets. Within 50 years after a major disturbance, even uber-productive moist forests become a nutritional desert for elk, deer, moose and a wide range of other wildlife.

“It eventually gets to the point as forest canopies close and forage disappears that animals can’t possibly eat fast enough to satisfy their daily requirements,” says John Cook. “The data shows

just how awful most of the forest zones in the Clearwater in the mid- and late-seral stages are for elk come summertime.”

With hundreds of thousands of location-points from cow elk wearing GPS collars across the basin, there is no question they focus their summers on early seral stands with abundant, high-quality forage, regardless of what predators they encounter.

“We’ve seen no evidence whatsoever in the Clearwater of the so-called “Landscape of Fear,” the idea that animals avoid prime forage areas to steer clear of predators,” Wisdom says. “Cow elk with a calf at heel work really hard to find the best nutrition and produce milk. They don’t mess around. They find the best foraging spots and they stay put.”

Researchers used all this information to create a list of recommendations for the forthcoming revised Clearwater Forest Plan, which is due out later this year. Karie Decker, RMEF’s director of wildlife and habitat, says the Elk Foundation worked closely with the Forest Service to help ensure all this newfound knowledge is put into action on the ground.

“We worked with them throughout the plan’s development to help make sure managers understood the research results and how they might be incorporated,” Decker says. “Forest Plans guide forest management for many years to come, so this is a very important step.”

In a stroke of fortune, a recent announcement by the U.S. Forest Service may provide a huge injection of cash right at the perfect time.

The Next Step

Wisdom has worked for the Forest Service for more than 30 years, most of it spent researching how habitat impacts the lives of elk. So he was elated this January when the Forest Service announced plans to invest \$2.4 billion over the next five years in wildfire fuels-reduction projects. Those funds were authorized by the bipartisan infrastructure bill signed into law last November, and Wisdom is optimistic this cash infusion could fast-track habitat work to boost early seral habitat in the Clearwater Basin.

"This is a big deal," he says. "That funding will dramatically accelerate noncommercial fuels reductions at landscape scales. Our data from the Clearwater shows that extensive use of tree thinning, prescribed burns and wildfire to reduce the forest canopy will dramatically increase nutrition if it's focused in the most productive vegetation types we've worked so hard to pinpoint."

Meanwhile, the Clearwater Basin Collaborative continues working to bring parties together for conservation. RMEF has been a key supporter since the collaborative's inception and has provided almost \$2 million in research grants and forest stewardship projects to improve habitat on

140,000 acres in the Clearwater. These funds have helped leverage almost \$8 million in crucial funding from partners that include the U.S. Forest Service, IDFG and NCASI.

After the CBC's rocky start, Decker says it's amazing to see how much stronger those partnerships have grown over time. Orville Daniels agrees and doesn't have to look far for inspiration. When he started as supervisor of the Bitterroot National Forest in 1972, the Clearwater was a far more palatable landscape for elk. He's optimistic that efforts to create more early-seral landscapes will pay huge dividends once more.

"Just think about the total value of having those forest openings. There were 16,000 elk in the Lochsa. Now there's 1,000," Daniels says. "Imagine what that load of protein once provided for all kinds of things in the ecosystem, not to mention hunters. The ecological implications of that are huge! Now that we know what elk really need, we can start to move the energy stored up within the landscape back in their direction."



PHOTO: STEVEN AKRE

ENTRY TO THE
PROMISELAND: The
Lochsa River just
above its confluence
with the Selway.