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International Wolf Center

VOLUME 35, NO. 3 THE QUARTERLY PUBLICATION OF THE INTERNATIONAL WOLF CENTER FALL 2025

Colorado's plan to compensate ranchers for depredations comes under scrutiny

Colorado's wolf compensation plan has raised concerns about sustainability and effectiveness, says retired U.S. Fish and Wildlife wolf recovery coordinator Carter Niemeyer. Citing a recent $340,000 payout for two wolves' alleged predation, Niemeyer argues for improved communication, prevention measures and realistic compensation standards to balance rancher needs, taxpayer funds and wolf recovery.

By Chad Richardson

Foraging in coastal regions gives wolves a leg up

Coastal Alaska wolves, typically deer-dependent, are adapting their diets. Researchers found wolves on Pleasant Island shifted from scarce deer to abundant sea otters after deer extirpation. This marine diet sustains wolf populations and is becoming more widespread as sea otter numbers rebound, demonstrating wolf dietary flexibility.

By Gretchen Roffler

In the company of wolves: Domestication of wolves to dogs

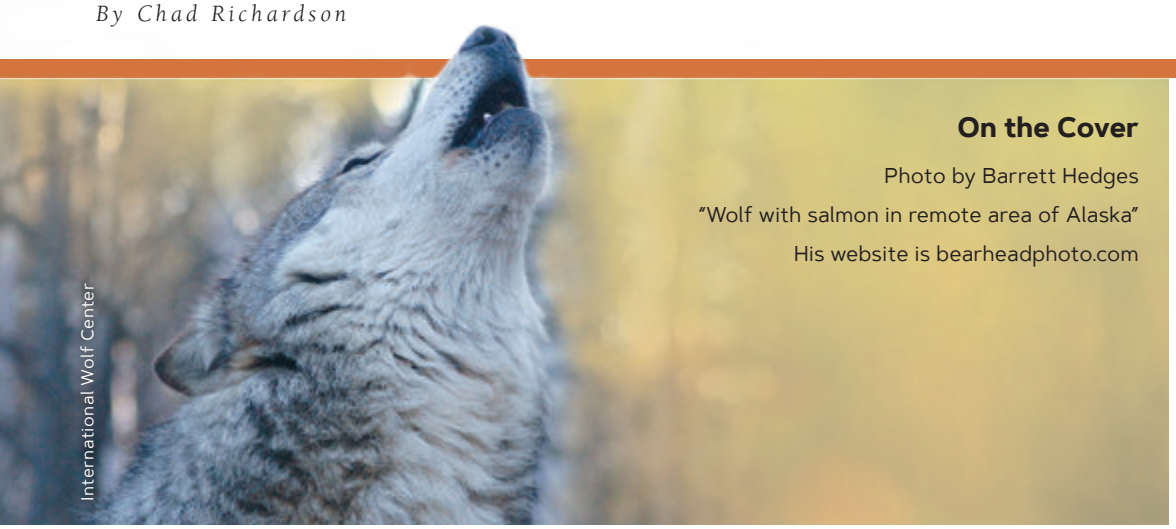
Wolves, ancestors of dogs, were first domesticated 15,000-30,000 years ago, possibly in Asia. Two main theories explain this process: pup adoption by humans or wolves self-domesticating near human settlements. A revised theory emphasizes humans feeding and bonding with young pups, fostering dependency and selective breeding. Food, social interaction, and selective care were pivotal in transforming wolves into dogs.

By Debra Mitts-Smith

Do more wolves equal more predation?

More wolves don't always mean more conflicts, as Peter David considers in Wisconsin. While early recolonizing wolves face challenges and may initially cause depredations, evidence from Wisconsin shows established populations can stabilize conflict levels. David highlights the importance of adaptation by wolves and humans, suggesting that coexistence is possible through understanding, non-lethal methods, and shared landscapes.

By Peter David



On the Cover

Photo by Barrett Hedges

"Wolf with salmon in remote area of Alaska"

His website is bearheadphoto.com

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From the Executive Director

‘Dire’ straits

In late spring 2025, the media exploded with news that a Texas company had claimed to have successfully produced two “dire wolf” pups. The story, which is examined in more detail later this issue, immediately sparked strong reactions from the wolf community. Some were skeptical, others intrigued and many outraged. Debates quickly arose about the ethics of re-creating an extinct species as well as discussions on the technology’s conservation benefits. The media hype far outpaced the actual scientific achievement, with much of the controversy focused on whether the sensational headlines were accurate or exaggerated. And of course, politicians unsurprisingly seized the opportunity to offer their own views on what this should mean for endangered species management and policies.

The International Wolf Center’s role in this conversation, as always, has been educational. We began by posting an announcement about the breakthrough and later shared stories that provided a more nuanced, detailed explanation of the science behind the achievement. We also featured an older journal article that clarified why “dire wolves” would not even qualify as true wolves today. Looking ahead, we started considering how to cover this story in our magazine and at the 2026 symposium.

Notably, we chose not to engage in the online furor. We refrained from debating the ethics of this research or commenting on whether it would ultimately aid or harm wolf conservation. I know some were disappointed that we did not make any public statements, but our commitment to science-based education does not allow for this work to be done at the pace of a 24-hour news cycle. Science takes time and so does effectively understanding the ramifications of a new piece of research. We know there are credible scientists on all sides of this issue, and our goal is to foster thoughtful conversation and analysis without judgement.

So regardless of whether these pups represent a new era of Ice Age mammals or are just a couple of genetically engineered hybrids, the International Wolf Center will remain focused on sharing accurate information about the research and what it can teach us about wolves. Thank you for your continued support of this important work! ■

Grant Spickelmier
Executive Director

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Colorado's plan to compensate ranchers for depredations comes under scrutiny

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"For a single verified loss, the rancher could also be paid for seven missing animals. Veterinary bills also would be covered. If the state is trying to drain its bank account this is a great way to do it. I believe this is untenable."

— Carter Niemeyer

By CHAD RICHARDSON

When voters in Colorado passed proposition 114 in 2020 to reintroduce wolves to the state, a key part of the measure was compensation for ranchers whose livestock were killed by the predator. Similar arrangements are in place throughout the country as a way for wolves to be more tolerable to ranchers. It's quickly becoming clear, though, that the system in Colorado may need some adjustments.

Colorado has approved more than $340,000 in compensation to two ranching operations for livestock losses attributed to wolves during the 2024 grazing season, nearly exhausting the state's annual depredation fund and prompting scrutiny of the compensation structure. The state's compensation fund currently has a budget of $350,000. For comparison's sake, Minnesota's wolf population is estimated to be about 2,900, and the state has paid out an average of $135,000 per year for the past five years.

Colorado's wolf population, meanwhile, is estimated to be under 30.

"What we're seeing is, 'Wow, these claims are really big.' They're bigger than we've seen before, but we're also trying to iron out the system so it's fair and balanced to people and wolves," Samantha Miller, a senior carnivore campaigner with the Center for Biological Diversity, told the Colorado-based publication *Westword*. Miller stated that if ranchers, wolf advocates and state departments continue to collaborate, the fluctuation in claims can be evened out.

Soon, though, that estimated Colorado wolf population could grow by another 15 animals as another round of reintroductions could happen this winter. "To me, that $350,000 is a drop in the bucket to what is going to happen when wolves get established and start covering the state of Colorado and having more depredations at scale," Andy Spann, president of the Gunnison County Stockgrowers Association, told *Westword*. "That fund is underfunded, gigantically underfunded. It's hard to put a number on what that should be when depredations start happening" across the western portion of the state.

Why is the fund already nearly exhausted? Colorado reimburses producers for more than just livestock that are killed by wolves. The state also pays for reduced weaning rates, veterinary costs, decreased conception rates, missing animals and more, which is a model most other states do not follow.

The math

On March 5, the Colorado Parks and Wildlife Commission unanimously approved two claims originating from Grand County. The first claim totaled $287,407, covering 15 confirmed livestock deaths as well as secondary losses including missing animals, reduced weaning weights and decreased conception rates. The second was $56,007, compensating 15 cattle losses blamed on wolves. The rancher whose claim accounts for the lion's share of the payout told *The Coloradoan* that he could "get a half million dollars out of this deal and it wouldn't touch the losses we actually had to sustain." Continued claims are on the table, including a $112,000 compensation request for missing cattle. Pending claims could raise total payments to nearly $550,000 before fall.

Hitting the number

CPW Northwest Regional Director Travis Black broke down how the funds were allocated: The greater claim included $178,000 for 1,470 calves with reduced weaning weights, $90,000 for lower conception rates and $15,000 tied to 15 verified depredation incidents. An additional $3,500 was issued for missing sheep. Following a second wolf

"CPW needs to take a deep breath and rethink how it wants to proceed, how it administers its program and how it wants to spend its (taxpayer) money, because they are going to be in the wolf business for the foreseeable future."

— Carter Niemeyer

reintroduction phase in January—15 wolves from Canada—wildlife officials confirmed 27 depredations in 2024, resulting in 29 livestock deaths or serious injuries. This large payout nearly emptied the fund for the year.

Balancing wolves and livestock

Proposition 114 mandated establishing a self-sustaining gray wolf population west of the Continental Divide and compensating full-market-value for livestock killed or damaged by wolves, with a cap at $15,000 per animal.

However, the financial burden now strains CPW's budget, raising questions over sustainability. The Colorado General Assembly Joint Budget Committee is reportedly considering reducing future allocations. In response, Colorado's legislature recently passed Senate Bill 25-038, shielding claimant names from public records to protect ranchers from potential harassment.

USDA / Pamela Manns

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Current system seems 'untenable'

Carter Niemeyer, a retired U.S. Fish and Wildlife Service wolf recovery coordinator with more than three decades of dealing with predator-livestock conflicts in Idaho, Montana and Wyoming, called the Colorado system "untenable." He was initially "dubious" when he learned that just two wolves could generate more than $340,000 in payouts. "I've examined hundreds of head of livestock to determine whether predation was their cause of death," Niemeyer said. "What is in question is the manner in which these situations are addressed and whether any of it is furthering wolf tolerance and recovery in Colorado."

Niemeyer points to established practices in other states: "During my tenure, most of the dead livestock were discovered quickly, reported, and the wolves were dealt with—hazed, captured, moved or killed. Seldom were large numbers of livestock reported missing at the end of the grazing season." He emphasizes that while he does not dispute wolves kill livestock, he takes issue with the multiplier-based compensation that can amplify payments. "If a rancher reasonably believes he has missing animals after confirmed depredation he can be reimbursed for an additional three," Niemeyer said. "But if he has been employing measures to keep wolves away, he is eligible for 7:1 compensation. For a single verified loss, the rancher could also be paid for seven missing animals."

The system, Niemeyer says, may inadvertently encourage large claims and deplete funds: "If the state is trying to drain its bank account (actually, the taxpayers' money) this is a great way to do it. I believe this is untenable." Further, Niemeyer notes that surveys and scientific studies do not show compensation alone boosts tolerance for wolves. He argues that "no amount of money can address the trau-

matic experience of losing livestock or the worry of future wolf-livestock conflicts. But other things need to be part of Colorado's plan."

Shifting priorities

Niemeyer calls for CPW to revise the recovery plan. "The state's wolf plan needs to include conflict minimization techniques as a requirement for damage compensation," he said. Otherwise, what steps will be taken to prevent the same problems from happening again?" He adds that CPW must actively monitor wolf activity and communicate with ranchers in real time—even nights, weekends and holidays. "If you're not talking to each other … you're bound for disaster—and bankruptcy of a state compensation coffer."

While compensation helped ranchers with short-term losses, Niemeyer urges CPW to shift toward prevention. "An ounce of prevention is worth a pound of gold … these are your animals, and unattended domestic animals are easy prey," he said. He asserts that living alongside wolves is possible only through active management: support for range riders, rapid response teams, carcass removal, fladry (consisting of a line of red flags suspended from a wire to create a visual barrier for wolves) and regular communication. "Resources should be directed toward better communications and sharing with the ranching community. Prevention of wolf predation on livestock is key."

To that end, CPW has been hard at work with conflict minimization strategies. According to the state's recently released annual report, CPW had installed 28 miles of fladry and more than 370 scare devices, including motion-activated alarms, propane cannons and airhorns. The fladry has already proven to be effective, judging by the results of projects in Pitkin, Grand and Jackson counties. There, 11.5 miles of fladry were installed to protect cattle for between 45 and 73 days.

"For the five locations where fladry was deployed during the 2024 calving season, no livestock were lost to wolf depredation while the fladry was deployed," the report reads.

CPW partnered with the Colorado Department of Agriculture to launch a new range rider program. The riders are placed throughout northwest Colorado and will work up to 22 days per month throughout the five-month on-range season, from April to October.

The state is funding these and other, nonlethal tools through a variety of sources, including Colorado's new Born-to-Be-Wild license plate. The plate has already generated more than $900,000 for the effort. Residents can opt for the plate at an initial cost of $118, then pay $50 annually thereafter.

An additional $2.5 million was made available to Colorado producers through a National Resources Conservation Service award called "Stewarding the Working Wild." This funding was awarded to Colorado in an effort to incentivize management practices, such as fladry, carcass management, range riding and monitoring.

Looking ahead

Colorado faces an important test: maintaining both wolf recovery mandates and rancher viability. With the depredation fund nearly depleted and future budgets in flux, questions persist: Will structural reforms help? Will preventive measures reduce depredations and bolster coexistence?

For now, the two ranches in Grand County have received the largest state payouts to date. However, the real challenge lies in establishing a balanced system of compensation, deterrence and trust—guarding both livestock and wolves for the long haul. ■

Chad Richardson is the publications director at the International Wolf Center.

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Bjorn Dihle

Foraging in coastal regions gives wolves a leg up

By GRETCHEN ROFFLER

Landon Bazeley

In coastal Southeast Alaska, the fates of wolves and Sitka black-tailed deer are intertwined. Populations of this small subspecies of mule deer are known to fluctuate dramatically in response to a combination of factors: the deep snows of severe winters, loss of prime habitat from logging and wolf predation.

Wolves in this region are largely dependent upon deer as their main prey, a pattern that is consistent throughout North America where the available biomass of ungulates such as deer drives wolf abundance. This strong and predictable dynamic was likely molded by thousands of years of coevolution since the Pleistocene glaciers receded and cleared a path for deer to disperse north into the Alexander Archipelago rainforests.

Previous research in coastal Southeast Alaska demonstrated the inability of wolves to endure in the absence of deer, most notably in the classic Coronation Island experiment. In 1960 four wolves were transplanted to this island 30 square miles (78 square km) in size in the southern Alexander Archipelago in a bold attempt to understand the effects of wolf predation on deer populations.

The wolves initially thrived in this secluded system, but after a wolf generation (approximately four years) the deer had become scarce and the wolves hungrier as they turned to other prey and eventually began eating each other. By 1971 only one wolf remained and ultimately disappeared, cementing the concept that wolves cannot be sustained with limited deer on small and isolated islands where predator-prey interactions are less stable than larger areas with more diverse prey.

The Alexander Archipelago consists of thousands of islands, and wolves capably swim between them for temporary residence or to establish territories. About 180 miles (290 km) to the north and 54 years after the Coronation Island transplant, wolves colonized the similarly sized Pleasant Island (19 square miles or 49 square km), just a mile (1.6 km) from the shores of the small community of Gustavus, on the northern southeast Alaska panhandle. When wolves swam to Pleasant Island in 2013, they found an abundant deer population (estimated at between 63 and 206 individuals) that had existed largely wolf-free for possibly hundreds of years.

This development evoked dismay from the locals who used the island as a reliable and accessible supply of venison to fill their freezers, an important source of protein in a rural part of Alaska not connected to the road system. It was from some of the locals that I learned of this development, and as a wildlife biologist recently hired to work for the Alaska Department of Fish and Game researching predator-prey dynamics, I was looking for a project. This natural experiment was an opportunity to observe the effects of wolf predation on the resident deer population, echoing the Coronation Island study and possibly providing another replicate for understanding island trophic dynamics.

I was egged on by Greg Streveler, the renowned godfather of natural history (Streveler, 1996) who had instigated and supported many scientific investigations in the greater Glacier Bay National Park ecosystem. To help me jump start the project, he drove me to the island in late-October 2017 in his 16-foot skiff and deposited me on a gravelly beach. Before he departed, leaving me alone for a few days with my backpack and bear spray, he provided encouragement to "just look around and take copious notes."

As the rumble of Greg's skiff motor faded, I tuned in to the intricate

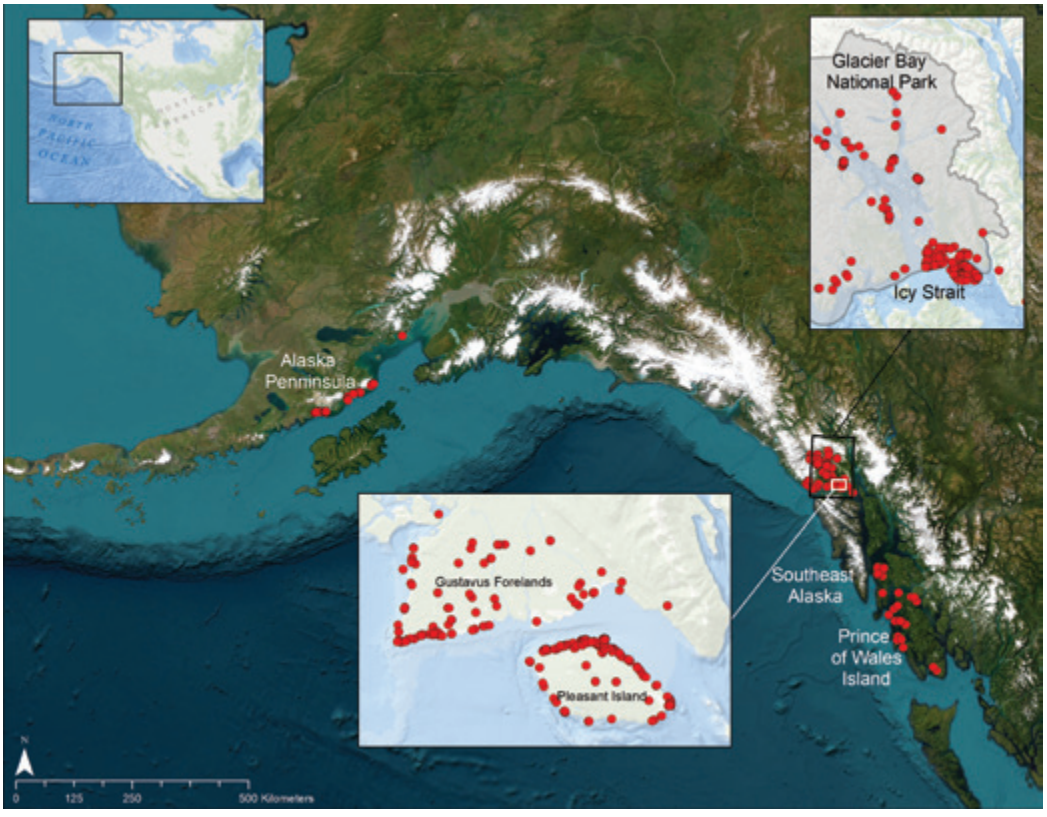
As the rumble of Greg Steveler's skiff motor faded, I tuned in to the intricate patterns of this island wilderness, becoming acutely focused on finding any evidence of wolves traveling the shoreline. I walked many miles in those first few days, which over the years would turn into a thousand miles of searching along the intertidal zone and on game trails through the deep rain forest.

Alaska Department of Fish and Game

Investigation of sea otter kill site on Pleasant Island Alaska, identified by GPS-collared wolf clusters.

patterns of this island wilderness, becoming acutely focused on finding any evidence of wolves traveling the shoreline. I walked many miles in those first few days, which over the years would turn into a thousand miles of searching along the intertidal zone and on game trails through the deep rain forest. That October, I found many sets of wolf tracks and scat, which I collected in resealable plastic bags. Also evident were the scattered piles of deer hair and bone shards, evincing that a wolf pack had become established and was preying on the island deer.

That trip marked the beginning of a long-term effort to collect data on wolf diet trends, estimate pack size and quantify the impacts of wolf predation on the island deer. Serendipitously, I had recently begun working with Dr. Taal Levi at Oregon State University where he had established a lab to apply innovative genetic methods to fish and wildlife research. Together we were conducting a large-scale biogeographic survey of wolves in southeast Alaska to better understand variation in wolf diets across the archipelago. We thus began a cycle that continues to the present of circumnavigating Pleasant Island multiple times a year to collect wolf scat, then shipping the smelly cargo in large, insulated boxes to Taal's lab.



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Alaska coastline and wolf scats containing sea otter (n = 712), 2016 – 2024.

There, a dedicated team of students and technicians turns this "brown gold" into valuable data by using fecal metabarcoding—a technique that reveals a high-resolution snapshot of the taxonomy of wolf diets by identifying the DNA of consumed prey. This method is beneficial because it identifies a higher diversity of prey than traditional methods relying on visual identification, especially of species rarely consumed or when hard, undigested remains of prey are lacking. Through our work we learned that fecal metabarcoding was highly effective even in the wet rainforest, a

generally hostile environment for DNA preservation.

Our intensive monitoring efforts on Pleasant Island and the adjacent Gustavus Forelands combined capturing and GPS collaring wolves, investigating kill sites, genotyping individual wolves from scat DNA and a parallel wolf-diet analysis using carbon and nitrogen stable isotope ratios of wolf hair. These integrated methods revealed that wolf diets on the island were initially dominated by deer, which comprised 75% of the prey identified in scats. However, in 2017, we observed an abrupt dietary shift: sea otters replaced deer as the primary prey, increasing from 25% to 57% of scat contents, while deer dropped sharply to just 7%.

Although wolves use marine prey throughout their coastal distribution, and even in interior continental systems, this complete substitution of a marine mammal for deer meat was unexpected. Additional marine resources, such as fish (including gunnels, sculpin, and salmon) and aquatic birds (including ducks and loons), were also present in the diet, but sea otters emerged as the dominant food source sustaining the pack on this small island.

Sea otters, once locally extirpated by the fur trade, have rebounded after reintroduction in 1965 and have since expanded rapidly. They are especially abundant in Glacier Bay National Park and the adjacent waters of Icy Strait surrounding Pleasant Island, and large rafts of otters frequently bob and dive in the shallow waters off the shorelines. We learned from following GPS-collared wolves to their location clusters that wolves delve into the intertidal zone to nab sea otters and drag and consume them above the tideline.

Fresh blood, hemorrhaging and bite wounds on the sea otters, and drag marks on the beach leading to the kill all point to wolf predation as the cause of death for the 38 sea otters we found during four month-long investigation periods. Based on this evidence, in combination with the frequency of occurrence of sea otters in wolf scat revealed by metabarcoding, we estimated that each


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Kayla Fratt

Gretchen Roffler, investigating an old sea otter skeleton on Prince of Wales Island.

Pleasant Island wolf (of which there are an estimated two to 13 individuals) eats between five to 13 sea otters per year.

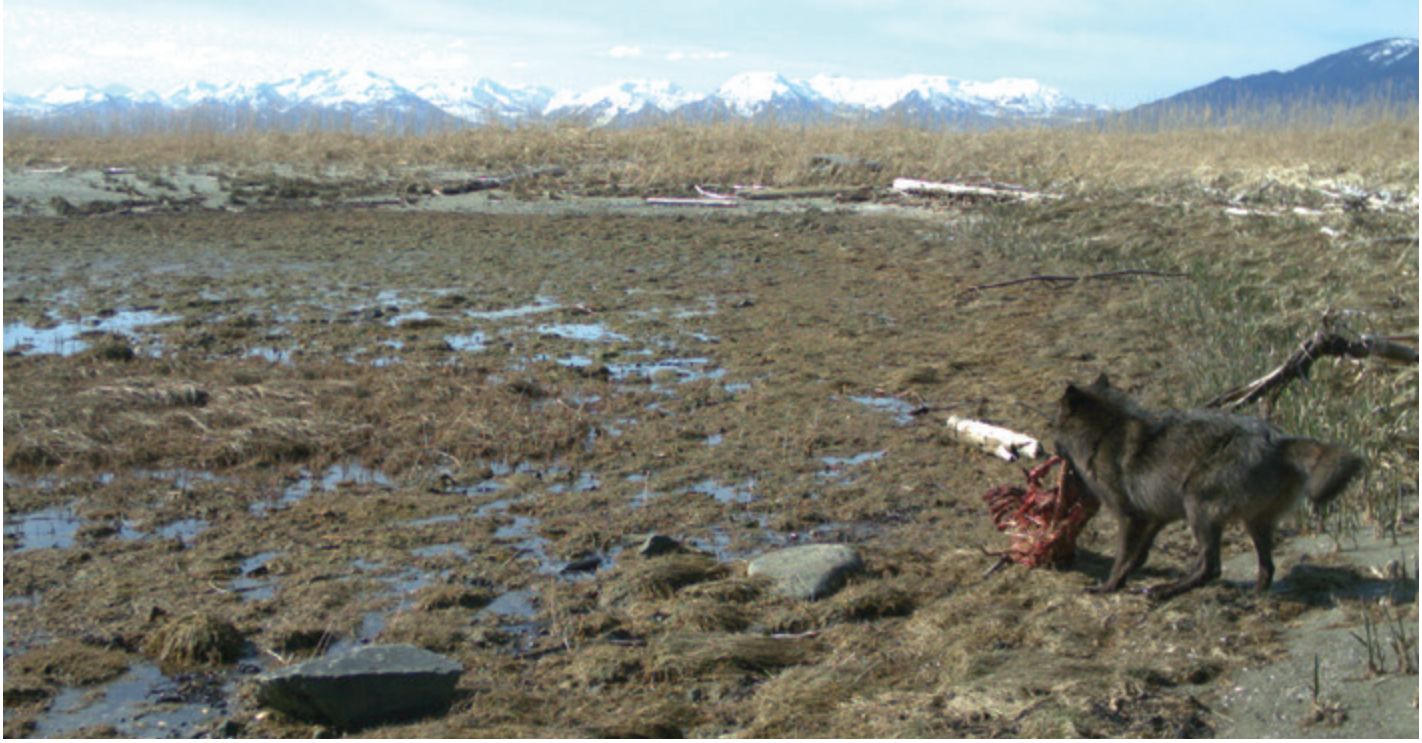
This dramatic dietary shift in wolves coincided with an abrupt decline in deer abundance. Although deer had once been plentiful on this island, all evidence of deer had disappeared by 2018, five years after the wolves arrived and when the pack reached its largest size at 13 wolves. Being cautious not to blame the wolves for the demise of Pleasant Island deer, we considered the effects of other factors including hunter harvest and winter severity.

Weather records showed that the winter of 2006–2007 was an extreme outlier with deep, persistent snow, and the deer population correspondingly declined by about 50%. However, in the years that followed, the population appeared to stabilize at a lower level until the wolves arrived in 2013. After that, hunter success declined while our estimates, based on wolf consumption rates, the proportions of deer in wolf diets, and the pack size, suggested that wolves ate an average of 18 deer per year and surpassed hunter harvest levels.

We concluded that although the severe winters in 2006–2007 triggered an initial decline in deer abundance, sustained wolf predation was the ultimate cause of their extirpation. The availability of sea otters as an abundant alternate prey supported the wolf pack and enabled members to hunt deer even as they became more scarce and finally disappeared. Wolves have remained on Pleasant Island seven years since deer were last seen, and sea otters have shifted from marine subsidy to primary prey for these wolves. To date, the deer population has not shown signs of recovery.

We initially thought that this sea otter-feeding behavior might be unique to the Pleasant Island population. Instead, we have learned that where sea otters have recovered, wolves are able to learn how to kill and eat them. This suggests that as recovering populations of sea otters colonize new areas and become abundant, wolf predation of sea otters may become more widespread.

For example, in our complimentary investigation of the nine-member Gustavus wolf pack on the mainland adjacent to Pleasant Island, we found that wolves have recently also shifted their diets to favor sea otters despite the availability of moose. During eight month-long periods investigating wolf GPS clusters from 2019–2024, we documented 31 wolf-killed sea otters and a



Alaska Department of Fish and Game

decline in moose predation. The switch occurred during the summer of 2022, when we recorded 26 sea otters killed and eaten by the Gustavus wolf pack in just 30 days. This focused predation suggests that the Gustavus wolf pack may have found an advantage in targeting the smaller, but more abundant sea otters instead of the more formidable and potentially dangerous moose.

In collaboration with the National Park Service and wildlife biologist Tania Lewis, we expanded our scat collection efforts into neighboring Glacier Bay National Park, where protected sea otter populations have multiplied and serve as a continuous source for the waves of sea otters colonizing Icy Strait and beyond. In three years of intensive sampling we found that sea otters made up 19% of wolf prey in their scats, and that these fjord-dwelling wolves also favor small nearshore fish such as gunnels.

Meanwhile, our research has also expanded 700 miles west across the Gulf of Alaska to include sampling areas in Katmai and Lake Clark National Parks and Preserves. This effort, led by Ellen Dymit, a doctoral student in Levi's lab, has uncovered that sea otters comprise 18% of the prey in wolves' diets in the coastal region of Katmai, an area where sea otters are well-established. Excitingly, this site was also the scene of a first-hand observation of three wolves killing a sea otter near the shore. In contrast, the Lake Clark wolves relied less on sea otters as food (only 1% of the prey found in their scats) reflecting the lower densities of sea otters along this leading edge of recolonization on the Alaska Peninsula coast.

Our work continues in the island complex of Prince of Wales Island with a new project, led by Kayla Fratt, also a doctoral student in Levi's lab, and assisted by the outstanding olfactory skills of a cadre of scat detection dogs. Initial results of the first summer of field sampling indicate that wolves have been eating sea otters particularly in the northern islands of the complex where sea otter densities are highest. Yet, key questions remain: how does this recently recovered marine mammal fit into the predator-prey dynamics of these small islands, where the interface between the marine and terrestrial world is narrow and permeable?

Will this marine subsidy tip the scales to maintain wolves at high densities, decoupling them from the abundance of their ungulate prey and altering wolf-deer interactions? To explore this possibility, we will continue to investigate the coastal wolves of Alaska using molecular methods including linking unique wolves identified from genotyping to individual diet profiles and apply our bushwhacking skills to collect a steady stream of samples.

What we have learned from this research so far is that using marine resources is a strategy that allows the wolves greater ecological flexibility, enabling them to adapt to changes in the environment or the abundance of primary terrestrial prey, highlighting the remarkable resilience of this species. ■

Gretchen Roffler is a wildlife research biologist with the Alaska Department of Fish and Game.

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In the company of wolves:

Domestication of wolves to dogs

Adobe Stock / byrdyak

By DEBRA MITTS-SMITH

Do you have a dog? Then you probably know that wolves are the ancestors of dogs. Around 15,000 to 30,000 years ago, the wolf was the first animal to be domesticated. It is also the only large predator to have ever been domesticated.

When, where, why and how were wolves domesticated?

Wolf domestication is an important, current area of research that draws experts (and research money) from around the world. Researchers use an array of techniques such as comparing prehistoric and current canine remains, studying archeological artifacts and performing genetic testing. They come from many disciplines such as sociology, human evolution, archaeology, paleontology and genetics to attempt to answer the questions of when (15,000-30,000 years ago), where (most likely Asia), why and how the wolf became the dog. Archeological artifacts and canine skeletal remains uncovered at human settlements provide clues to the benefits humans got from feeding, raising and living with wolves. These included wolves guarding 'their' humans' settlements, being social and hunting companions, helping transport carcasses of large prey animals and, at times, even being a source of food and hides. Yet, a full understanding of how the wolf became domesticated remains elusive.

Currently two main theories seek to explain how the wolf became domesticated. The pup collection, adoption and artificial selection hypothesis imagines a scenario where humans collected pups from the den and brought them back to their settlement. There, the humans fed, raised and socialized them with human pack members. Over time, humans found the wolves to be useful and so kept them, allowing those wolves that were the most docile to breed while driving away or killing those that were too aggressive. By allowing socialized and mellow wolves to mature and have offspring, humans began to selectively, if inadvertently, breed the more docile wolves and, within generations, transform wolves into dogs.

A more recent theory posits that humans did not domesticate wolves. Instead, wolves self-domesticated. In this scenario, human garbage heaps—an easy source of food—attracted wolves to human settlements. Wolves that were less fearful and that could tolerate being near humans stayed close to this easy food source, following the human groups as they migrated from one area to another. Less fearful and less aggressive wolves bred with the other 'friendly' wolves they encountered at the waste heaps. Humans would have driven off or killed aggressive wolves, leaving more docile ones to breed and pass on their more amenable social traits.

Most research approaches wolf domestication from anthropological or sociological viewpoints which seek to understand how wolf domestication benefitted and changed humans. But humans are only part of the equation. A recent article by wolf biologist L. David Mech and veterinarian-archaeologist Luc A.A. Janssens assesses the plausibility of these two theories of wolf domestication by considering research on wild wolves, wolf biology and archaeology as they relate to domestication. Mech and Janssens also include insights from their own experiences and observations.

Using the behavior of modern wolves to explain that of wolves from the time of their domestication during the Upper Pleistocene (roughly 15,000 years ago) might be considered problematic. But as Mech and Janssens explain, the behavior of present-day North American and Eurasian wolf populations—two wolf populations that have been separated for 15,000 years—exhibit the same behaviors, diet, hunting methods and interactions with people. This suggests that wolf behavior has been stable over thousands of years and that prehistoric wolves and modern wolves share similar traits and behaviors.

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Wolfish traits, behaviors and way of life

In assessing the plausibility of these two theories, Mech and Janssens considered traits and behaviors that help ren-

der wolves conducive to domestication. These include the wolf's social nature and way of life such as the reliance of pups on older pack members for nourishment; the deep social bonds formed between pack members; the varied personalities of wolves; the wolf's diet; the wolf's memory (i.e., where food is cached); the wolf's tolerance for inbreeding; for establishing and protecting territories, and the wolf's ability to adapt.

Mech and Janssens also addressed potential barriers to domestication of the wolf. One is the wolf's inherent fear of humans. For thousands of years, humans and wolves have pursued the same prey species, which renders them not only competitors but also adversaries who potentially pose a threat to each other. On the part of humans, this has led to the persecution of wolves across time and cultures. Except for the wolves in the High Arctic of North America, a region where there are few humans and little hunting of wolves by people, wolves fear humans. Mech and Janssens argue that this innate "fear of humans must have resulted from selection acting on wolves' negative interactions with humans, who had weapons to kill wolves." And even though wolves have the ability to kill humans, they, in general, do not seem to regard humans as prey animals.

This inherent fear of humans undermines the self-domesticating theory in particular. In it, human garbage sites attracted wolves to human settlements. Since pups stay inside or near their den or rendezvous sites until they are six months old, those wolves scavenging at human waste sites would have been older, perhaps dispersing wolves, that were already fearful of humans. In contrast, in the pup collection and adoption theory, humans collected pups from or near dens when pups were 10 days to three weeks old–too young to be fearful of the humans who adopted and raised them. Further, the act of feeding the pups provided an opportunity for humans and pups to bond with each other.

Friendliness and a lack of fearfulness are the basis for the self-domestication theory. Those wolves that were friendly and brave could tolerate the presence of humans better than wolves which displayed aggressive or fearful behavior. Yet, as Mech and Janssens point out, wolf behavior can vary and change towards both people and wolves depending on the situation. For instance, they can become more protective and aggressive when pups are present. This suggests that different contexts, not genetic traits, trigger certain behaviors.

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Keeping wolves raised by humans reproductively separate from wild wolves is requisite for successful domestication. Mech and Janssens point out that neither theory adequately explains how this was done. Instead, they propose that one way to keep human-raised wolves separate from wild wolves is for humans to feed them: "The key is humans regularly feeding the wolves and keeping only those able to live harmoniously with humans." For wolves to associate food with humans requires more than wolves scavenging garbage heaps; it requires humans feeding them directly by hand as put forth by the pup adoption scenario. Feeding wolves directly creates an association (and memory) of humans with food. It fosters the wolves' dependency on humans while developing strong bonds between the two species and encouraging wolves to stay near humans. They will even generalize this behavior towards other humans.

Revised theory of wolf domestication

Mech and Janssens' review of the research and observations on modern wolves concludes that the self-domesticating hypothesis fails to align with wolf traits and behaviors. Instead, the pup collection, adoption and artificial selection theory aligns better with what is known about the lives, traits and behaviors of wolves and their interactions with humans. The authors also propose a revised and expanded understanding of how pup adoption and collection occurred and led to the domestication of the wolf.

In this proposed scenario humans ideally removed pups from the den site by the age of three weeks. Adopting the pups meant feeding them, and if the pups were especially young this could include breastfeeding by human females. Feeding them from such a young age not only made the pups dependent on humans for food but also helped to develop deep social bonds between the pups and the humans caring for them.

As the pups aged, the humans kept only those that were docile and could live peacefully with humans. To keep them near, humans continued to feed them while driving away or killing wolves that were too aggressive.

Mature female wolves living with humans bred with either a male sibling (although wolves in general do not inbreed, they can withstand some inbreeding) or a male from another litter of wolves raised by humans. Breeding with wild wolves would have been possible but probably a rare occurrence, since the mature wolves raised by humans would probably have scent marked the borders of the humans' settlement to keep wild wolves away.

Over generations humans continued to feed and raise wolves, keeping and allowing only the most mellow ones to breed (and hence selectively breeding for temperament). With time, the wolves' characters and appearance changed from that of a wolf into a dog.

Food: the way to a wolf's heart

According to Mech and Janssens, the most important factor in taming and domesticating the wolf was food. Feeding and nurturing pups made wolves dependent on humans for food while fostering attachments between the two species. Regular and adequate sources of food kept not only pups but also older wolves close to humans and their settlements. Further, hunting large hooved and horned prey is a dangerous and uncertain proposition that often requires traveling long distances. Mech and Janssens point out that if there is an easier food source available wolves tend to use it: "If humans provide the wolves with enough food on a regular basis…they would have little reason to kill their own prey, the main reason wild wolves roam so much." In the company of humans, prehistoric wolves (and later, the dogs they became) found a reliable source of food. ■

About the author: Debra Mitts-Smith researches and writes about the wolf in literature and art. She is currently working on a cultural history of the wolf.

According to Drs. L. David Mech and Luc A. A. Janssens, the most important factor in taming and domesticating the wolf was food. Feeding and nurturing pups made wolves dependent on humans for food while fostering attachments between the two species. Regular and adequate sources of food kept not only pups but also older wolves close to humans and their settlements.

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Do more wolves equal more predation?

By PETER DAVID

When wolves recolonize historic range—either through human intervention or natural range expansion—controversy seems to come with them. Often the first and strongest concern to arise revolves around depredations of livestock and, to a lesser degree, of hunting dogs or pets. Livestock depredations can be both costly and emotionally taxing to those who experience them, and state wolf recovery plans typically place great emphasis on developing and prescribing depredation responses. People unaccustomed to sharing the landscape with wolves also often feel threatened by their presence, despite the minimal threat wolves actually present. This spring, five northern California counties declared local states of emergency following dozens of livestock depredations by the state's fledging wolf population, and concerns about public safety.

Wolves are relatively new on the scene in California. The first wolf known to venture into the state in nearly 90 years arrived in 2011, and it was only a decade ago that the first pack was confirmed. The population has slowly increased to an estimated 70 animals.

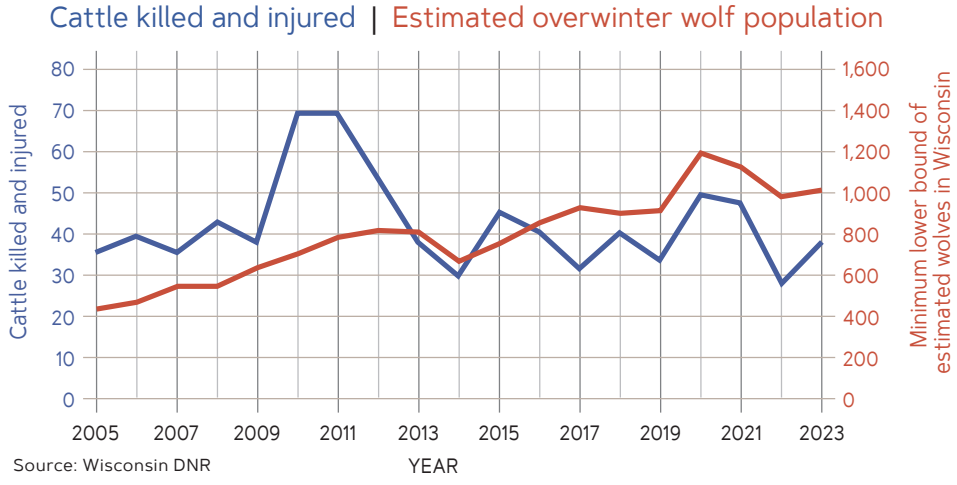
Since the population is expected to continue to increase, the natural concern

in places like northern California is that more wolves will mean more depredations. It seems a reasonable assumption, and early in recovery periods, when wolves are colonizing a landscape new to them, this relationship often seems to hold true. But is it necessarily the case? And might that relationship change as wolves become an established part of the local ecosystem?

Much like the early European colonists to North America who found starting a new life from scratch on an unfamiliar landscape more difficult than the generations that followed them, recolonizing wolves face more challenges than their descendants. Those descendants benefit from two fundamental qualities of wolves: they are intelligent, and they are highly social. Their ability to learn–and to pass that knowledge on to their young–is a unique and fundamental component of their ecology.

It suggests the possibility that over time wolves can learn and adjust to their new landscape, for example by determining the areas with the highest prey density or the most secure and suitable areas to den. After adults pass that knowledge on to their pups, subsequent generations may find survival somewhat easier. This in turn may reduce the grown pups' likelihood of taking the risks associated with livestock depredations. Wolves that learn to avoid people and their livestock are likely to have higher survival rates and more progeny. Perhaps the behavior and impact of early wolf colonists is not indicative of what may follow, and perhaps the idea that more wolves mean more depredations deserves a closer look. A place one might look is Wisconsin.

Over the last 20 years the Wisconsin wolf population has continued to grow. Recent estimates suggest the population may be plateauing at about 1,100 animals, or about 2.5 times as many as in 2005. So have depredations also increased by about 2.5 times over these 20 years? Data indicates this was not the case.



Source: Wisconsin DNR

Wisconsin was naturally recolonized circa 1974 by wolves that struck out from the Minnesota population, which was expanding under the protections of the Endangered Species Act. The animals in this front line did not find Wisconsin particularly welcoming; human-induced mortality was high, and two decades passed before the estimated wolf population in the state passed the modest mark of 50. However, at that point the population began a marked upward trajectory, following a fairly classic population growth curve. Over the next 11 years–by 2005–the population climbed to 435.

Since an early population model suggested the biological carrying capacity for wolves in the state might be in the range of 500 animals, many people expected to see population growth start to slow. But it turns out the early model markedly underestimated carrying capacity. Either the model was not very good, or something had changed since it was developed. Two of the things that might have been most likely to change are related to behavior: wolves may have adapted their behavior to be more accepted by people, or people may have changed their thinking to be more tolerant of wolves. We will likely never know for certain, but likely both changes occurred to some degree.

Over the last 20 years the Wisconsin wolf population has continued to grow. Recent estimates suggest the population may be plateauing (in the absence of hunting) at about 1100 animals, or about 2.5 times as many as in 2005. So have depredations also increased by about 2.5 times over these 20 years?

Data compiled by USDA Aphis Wildlife Services–the folks who track and respond to depredations in the state–indicates this was not the case. Their data shows that while the number of verified wolf complaints in the state can vary significantly from year to year (the highest level of verified complaints during this period was double that of the lowest), there has been no upward (or downward) trend in the

number of verified depredation events over this period. Also, no upward trend has been seen in the number of farms with verified depredations, the number of cattle or pet dogs killed or injured, or the number of human health and safety incidents.

These data are consistent with the idea that as wolves move beyond the colonization period, they may be finding ways to co-exist more successfully with humans. In short, more wolves may not mean more depredations. This finding may be all the more surprising given that likely more wolves are using suboptimal habitat today than 20 years ago. (See Theresa Simpson's article in the winter 2022 edition of *International Wolf*.)

One depredation metric has ticked upward in Wisconsin as the wolf population increased, though at less than half the rate of the population growth: the number of hunting dogs injured or killed. Why might this anomaly exist? One likely explanation may come from changes in human behavior.

Wisconsin has a significant tradition of hunting with hounds, including the hunting of black bears, whose population is currently about 23 times higher than the wolf population. As a result, the state has relatively liberal hunting, baiting and dog training regulations. While the increase in dog depredations could be related to the increase in the wolf population, it seems at least equally plausible that it is due to a change in the vulnerability of hunting dogs.

In 2016 the state eliminated its Class B bear license. This change made it possible for anyone to train dogs to hunt free-roaming wild bears statewide from July 1 through Aug. 31 without a license. Most dog depredations occur during the training period (rather than during the bear hunting season) when wolves are very protective of their pups. During this period of time, pups cannot defend themselves or easily escape when coming in contact with a pack of up to six hound dogs. Since no license is required, it is impossible to document the increase in training activity that resulted from this change. It is thought that because of its abundant bear population, large blocks of public land, and relatively cooler summer weather, Wisconsin became a popular destination for hounders from southern states to train their animals.

If the 20-year trend in dog depredations is divided into two 10-year periods, the more recent period—which aligns with the licensing change—shows a level of depredations that is about 50% higher than the previous 10-year period, but neither period displays an

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More wolves may not mean more depredations. This finding may be all the more surprising given that likely more wolves are using suboptimal habitat today than 20 years ago.

upward trend. Thus, the increase in hound depredations may not be due to more wolves, but more hound training taking place.

This data–and the idea that wolves may learn and adapt–may hold some other interesting implications. For example, it suggests that over time, non-lethal approaches to depredation reduction may yield benefits that lethal control may not provide. When a depredating wolf is killed, it may simply create a void for another unknowledgeable wolf to fill. However, if it is possible to successfully teach a wolf to avoid livestock, that void is not created, and that learning might be passed on. Unfortunately, the large and lengthy research effort necessary to support or contradict this idea is probably not politically possible.

The natural world tends to be complex, and often behaves in ways that are not straightforward. Likely the relationship between wolf population levels and livestock or pet depredation levels is influenced by many factors not explored in this article, including such things as prey abundance and vulnerability, habitat quality, weather impacts on prey species, animal husbandry practices, the impacts of lethal or non-lethal depredation control, the existence and design of wolf harvest seasons and more. But the Wisconsin experience clearly shows that more wolves do not necessarily mean more depredations. Given all the times and ways wolves have surprised us in the past, perhaps that should not come as a shock. ■

About the author: Peter David is a wildlife biologist who retired in 2022 from a career working for the Great Lakes Indian Fish and Wildlife Commission, where his focus was primarily on the stewardship of wild rice, waterfowl and wolves. He serves on the board of directors of the International Wolf Center.

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Introducing a new generation

By Giselle Narváez Rivera

International Wolf Center

Cedar resting his head on Rowan as six-week-old pups.

Observing wolves in the wild is a rare privilege that involves a lot of patience, but mostly being in the right place at the right time. However, thanks to our Exhibit Pack of ambassador wolves, visitors can see daily wolf activity, get to know individuals' personalities as they grow and mature, and observe their fascinating social dynamics. To maintain a cohesive pack, we aim to adopt two wolf pups and introduce them into the Exhibit Pack about every four years. Last May, we adopted Cedar and Rowan from a USDA-licensed educational organization in Wisconsin.

Housing wolves of different ages not only helps simulate the composition of a wolf pack in the wild, but it also helps pups learn from the older wolves and ease them into becoming an ambassador wolf. While our wolf care team is responsible for socializing the pups to their new home and caretakers, the pups will learn the most from the adults on how to live within a social unit and how to thrive in their new habitat. Integrating a younger generation of wolves will provide continuity to our pack and sustain its legacy.

Cedar and Rowan have already been learning from the adults, Rieka, Blackstone, Caz and Grayson, through careful observation and interactions through a fence. Pup introduction is a long process that started shortly after their arrival. First, we allowed the adults to smell blankets that the pups had slept on and familiarize themselves with their scent. After a couple of days, we brought Cedar and Rowan to a main fence for adults and pups to see and smell each other. Meetings through the fence become more common as the pups grow more active and mobile. Once they reach over four weeks of age, they begin spending their days in the pup yard where they share a fence with the adult ambassadors. These meetings also provide the care team the opportunity to observe the reactions and interactions of adults and pups to prepare for the day that pups join the adults in the main exhibit.

How are the adults reacting? They have been displaying nurturing behaviors towards the unrelated pups, in part thanks to the secretion of a seasonal hormone known as prolactin. Rieka has been regurgitating food and Blackstone has been offering them deer legs. The pups have already joined the adults in chorus howls, and every morning they eagerly greet each other through the fence. It is not uncommon to hear Caz whining loudly to get the pups' attention or to see Grayson watching over the pup yard from a higher vantage point. Cedar and Rowan joined the Exhibit Pack on July 27 to continue the legacy of our ambassador wolves. ■

Giselle Narváez Rivera is the wolf curator at the International Wolf Center.

International Wolf Center

Cedar and Rowan join Grayson in a chorus howl.

INTERNATIONAL WOLF CENTER

Quarterly tributes and memorials

Gifts between March - May 2025

We make every effort to ensure the accuracy of our tribute/memorial list each quarter. If we have omitted your name in error, please accept our apologies and contact Manisha Nordine at 763-233-7137 or membership@wolf.org.

Honorariums

In honor of Breanna Joy Seng
Daniel Joseph Seng

In honor of Animal Chats for Charity
Sienna Brooks

In honor of Judy Hunter
Risa Brandon
Ron Sternal and Nancy Gibson

In honor of Justina Cyprian
Pam Allison

In honor of Lisa Radtke
Mark Radtke

In honor of Lori Schmidt's birthday
Shirley Miller

In honor of Marina Moon
Denise Evert

In honor of Marissa Smith
Mike Smith

In honor of MO's Queen Bey Intro Song
Anonymous

In honor of Rosie Kovens
Linda Durey

Memorials

In memory of Anita Morris
Jane Green and Kristene Kastens

In memory of Axel
Linda Young

In memory of Barbara Sabel
Sherry LaMarche
Linda Pfiefer
Wintrust Bank
Sandra Fredenburg

In memory of Barbra Hanson
Nicole A Gulsvig

In memory of Cathy Bandy
Matt Watson

In memory of Cipher
Jason Grinnell

In memory of Debra Harrison
Leonard Larson
Amanda Jepson
Anonymous
Rosemary Sundin

In memory of Diane
April Woods

In memory of Diane J Rees
Ron and Sue Rees

In memory of Douglas Virkler
Lisa Niewind

In memory of Gloria Lak
Tom Merigan

In memory of Gretel
Marcia Mitchell

In memory of Grizzer
Michelle Wagner

In memory of Kyle Peach
Jorja McEwen

In memory of Maureen Watson
Ronald Perry

In memory of Michael "Mike" John Krause
Francine LaFayette

In memory of Mika, beloved dog
Kyra Evers

In memory of our "Gone But Not Forgotten" wolves, Kiwi, Roo and Rowdy
Maeva Picard

In memory of Queen Kealiah, Mr. Patches, Shiloh, Magoo, Harley, Riley
Noel and Kimberly Nevshehir

In memory of Reese Burnette
Kelsey Alvarado

In memory of Steve Wallack
Stephen Chase

International Wolf Center

WOLVES OF THE WORLD

By Denise Hughett

EUROPE

Europe's wolf population has rebounded significantly, with a recent study estimating approximately 21,500 wolves across the continent. This healthy comeback marks a notable increase from roughly 12,000 wolves a decade ago.

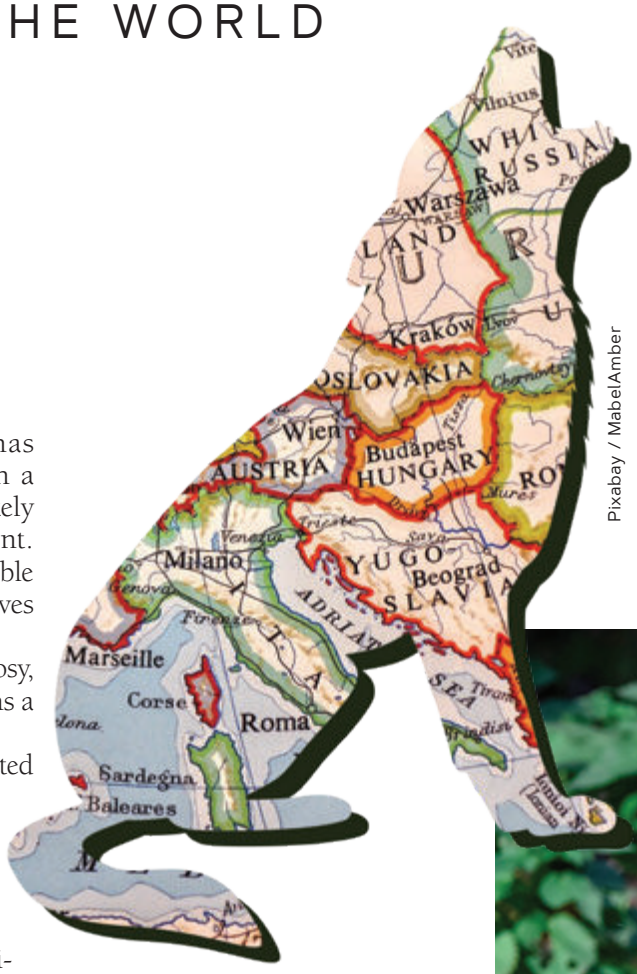
However, the story isn't entirely rosy, as coexistence with humans remains a challenge.

Wolf populations have been counted in many European countries, with some exceeding 100 wolves. Germany has seen the most noteworthy population growth. In 2000, only one wolf pack was believed to exist in Germany; by 2022, an estimated 184 packs were present.

Researchers involved in the study highlighted wolves' ability to recover in "highly altered landscapes" with multiple uses. This indicates the species' remarkable adaptability and capacity to survive in areas with high human densities.

Amidst diverse social and political views on wolf recovery, coexistence is a challenge, particularly in light of changing European wolf management policies that have lowered protection levels for the animals.

Additionally, researchers believe more insight is needed into the positive impacts of wolves in human-dense regions. For instance, further study could explore how wolf tourism affects local economies or how their predation on hoofed animals might reduce deer-vehicle collisions.



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ITALY

With the reduction of protection levels for wolves in Europe, scientists and environmentalists worry that vigilantes will feel more empowered to take matters into their own hands. This concern was realized in 2023 when an entire wolf pack was poisoned.

Wolves in Italy were on the brink of extinction in the 1970s. Thanks to strict protection measures from then until recently, Italy's wolf population grew to more than 3,000. This meant farmers largely had to learn how to coexist with wolves on their own. Many felt abandoned by their government and, as a result, sometimes resorted to illegal actions.

The poisoning of predators is a global issue, and Europe is no exception. Identifying the full scope of poisoning activities is difficult because the animals usually die out of sight.

Italian farmer Cristian Guido said, "I find wolves beautiful, but I keep asking for help. It is just not possible to keep them away." He believes protection levels should not have been reduced, but added that farmers need more support, such as wolf-proof fencing.

Many farmers in Italy do not believe in coexistence, according to Virginia Sciore, a farmer in the Morrone Mountains. She noted that many hear negative stories, and whether true or not, the result is that anger is projected onto the wolf.

FRANCE

A gray wolf may have recently been spotted in northern France. If the picture captured is confirmed to be a wolf, it would be the first sighting in the Normandy region in more than a century.

The image, captured on a surveillance camera, was sent to the French Office for Biodiversity (OFB), an agency that tracks wolf populations for analysis. According to the OFB, more footage is needed to confirm the species in the grainy image. The agency also noted that several wolf identification experts were unable to be 100% sure of the animal's identity.

According to Jean-Marc Moriceau, a professor and historian at the University of Caen, the wolf was eradicated from the region in the 19th century. "It is as if instinctively the wolf returned to where it had settled before being hunted by man," he added.

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PAKISTAN

A call for conservation is being heard in Pakistan, where wolf populations have seen a dramatic decline in recent decades. An already endangered species, the Indian wolf and Tibetan wolf populations are dwindling at an alarming rate, risking extinction if action is not taken. Human factors, including habitat destruction, retaliatory killings and diminishing prey populations, are the main causes of the decline.

Gaps in understanding the Indian wolf's population size and distribution make conservation efforts a challenge. Notably, recent genetic studies indicate they are among the most evolutionarily distinct wolf populations, found only in India and Pakistan. Their populations are decreasing faster than that of the Tibetan wolf.

The Tibetan wolf is more widely distributed than the Indian wolf, found in parts of China, Russia, Manchuria, Tibet and the Himalayan regions of India, Nepal and Bhutan. It is listed as "vulnerable" on the International Union for Conservation of Nature (IUCN) Red List.

Saeedul Islam, a wildlife expert, is calling for population assessments, identification of population clusters, and the establishment of sanctuaries and habitat restoration to protect the remaining Indian wolf population.

Mohammad Kabir, who heads the Wildlife Ecology Lab at the University of Haripur, states that to mitigate conflict, conservation management programs should include livestock insurance, awareness campaigns and more. Doing so would decrease livestock mortalities and help prevent retaliatory killings of wolves by farmers whose primary livelihood is livestock.

According to Kabir, Pakistan consists of more than 23,000 square kilometers of suitable wolf habitat spread across remote areas connected by natural corridors.

While the Indian wolf has a protected species designation in Pakistan, conservation efforts have not yielded expected results, primarily due to the human-related factors previously listed. Sharifuddin Baloch, Chief Conservator of Balochistan's Wildlife Department, stated that to conserve the Indian wolf population, the government has declared several game reserves and

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national parks as protected areas for the wolf. Conservation efforts have been more successful in these areas compared to other regions due to conflicts with humans.

Wolves have been the least studied carnivore in Pakistan. Kabir has emphasized the important role wolves play in regulating prey populations. Doing so helps maintain balance in the ecosystem. Without them, prey populations could grow dramatically and lead to issues such as habitat degradation and overgrazing, eventually causing the collapse of prey populations. Lastly, by targeting sick, old and weak prey, wolves can help minimize the spread of diseases within prey populations.

SCOTLAND

Researchers in Scotland are examining the potential impacts of wolf reintroduction for the environment. Wolves were eradicated in Scotland about 250 years ago. One result of their removal was the unchecked growth of red deer populations, which now number around 400,000. Their over browsing of woodland growth, combined with human clearing of forests, means native tree populations now cover less than 4% of Scotland, one of Europe's lowest levels.

Simulations run by researchers indicate that restoring wolves in four key areas of the country could help revive the ecosystem. These simulations suggest that reintroducing wolves could result in a population of approximately 167 animals. This size of a population has the potential to reduce deer density to four per square kilometer within two decades of reintroduction.

Researchers estimate each wolf could help restore enough woodland to absorb 6,702 tons of carbon dioxide annually. Furthermore, they believe the resulting expansion of woodlands would be sufficient to make a material contribution to national climate targets.

Dominick Spracklen, an environmental scientist from the University of Leeds, noted, "We need to look at the potential role of natural processes such as the reintroduction of species to recover our degraded ecosystems." He added, "There is an increasing acknowledgment that the climate and biodiversity crisis cannot be managed in isolation." ■

Denise Hughett is on the board of directors at the International Wolf Center.

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Elllesmere Island, revisited

By Dean Cluff

Psychologists tell us that we often return to places where we feel a sense of connection.

I have a connection to Ellesmere Island that began in 1984. I was a summer student with the Canadian Wildlife Service then. Although that summer I only saw the southern coast of Ellesmere and Grise Fiord, Canada's most northern community, I was awe-struck seeing the land starkly rise 300m (985 feet) up from the ocean, with barely a skirting of walkable coastline, itself composed of fractured layers of rock. Rugged and barren, for sure, but beautiful in its grandeur.

I didn't have to wait long to get back to Ellesmere. In 1986, I got to Grise Fiord again, this time with Canada's Department of Fisheries and Oceans to sample beluga whales for population monitoring. Seven years later, in 1994, I returned to Grise Fiord and northwards up along the eastern coast of Ellesmere Island to radio-collar polar bears for the territorial government. Wolves came next in 2004, and I visited again four more times to study wolves with Dr. David L. Mech near Eureka, a weather station along the west coast. The BBC brought me up to Eureka in 2014, and I worked with it, Dan MacNulty from Utah State University and Morgan Anderson with the government of Nunavut to radio-collar wolves for a collaborative study on wolves, muskoxen, and Peary caribou. I was hooked.

So, when I got a call in February 2024 from Dr. Susan Kutz at the University of Calgary in Alberta to accompany her and her crew at Eureka later in the summer, I jumped at the chance. Ten years had passed since my last visit, and I had just retired as a biologist for the Government of the Northwest Territories. I yearned to return. Dr. Kutz is a veterinary parasitologist conducting an intriguing study of a bacterial parasite that can kill muskoxen. That was my ticket back north!

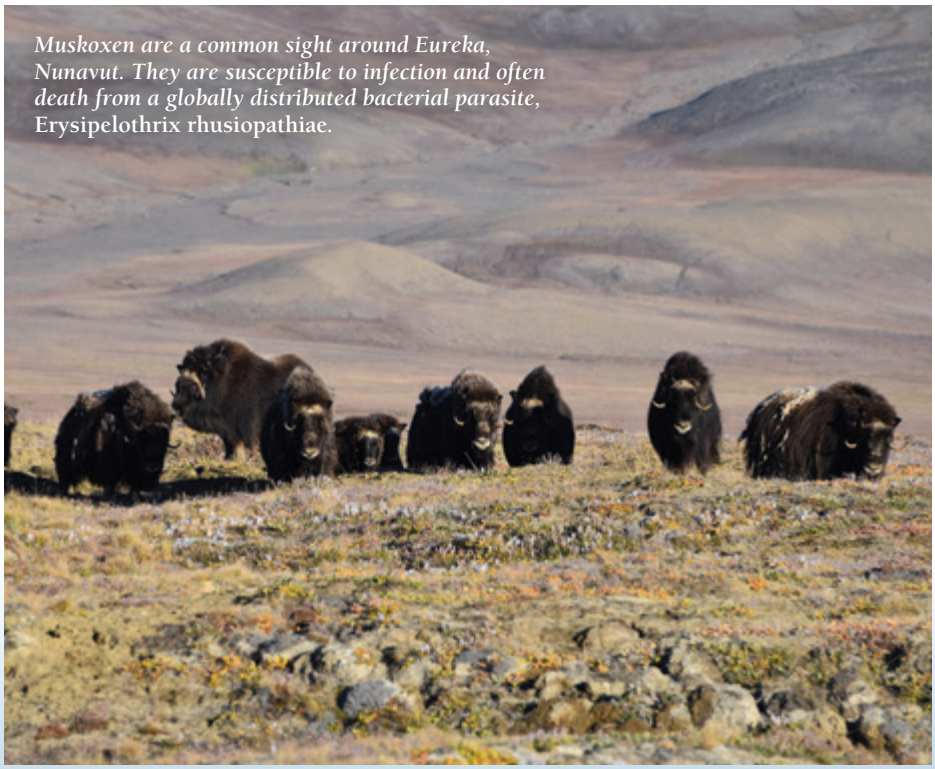
The Arctic has experienced periodic die-offs of muskoxen over the years. I became aware of a recent one in 2021 from Ronan Donovan, a colleague and wildlife cinematographer working with the BBC Nature History Unit for its series Planet Earth 3 on wolves on Ellesmere Island. Ronan called me about seeing dead muskoxen in the Eureka area, not killed or eaten by wolves. It was very strange. I put Ronan in contact with Dr. Kutz, and she flew up to Eureka in seemingly record time, especially during the COVID-19 pandemic.

Dr. Kutz sampled the dead muskoxen and determined that *Erysipelothrix rhusiopathiae*, a bacterial parasite, was involved in these die-offs. This was not new to Kutz, who documented multiple die-offs of muskoxen in the Arctic since 2009 (Kutz et al. 2015). Still, the discovery of *E. rhusiopathiae* as a significant cause of mortality of muskoxen in another location in the Arctic had potential implications for wildlife conservation, and food safety and security for northerners.

E. rhusiopathiae has a global distribution, but is more commonly involved with domestic swine and poultry, where it causes "diamond skin disease" (rhomboid shaped skin lesions) and, in chronic situations, leads to arthritis and vegetative endocarditis. Exposure to *E. rhusiopathiae* comes from infected animals or parts, often from feces, but oral, transdermal and vector transmission play a role. Infection in humans is typically a localized, cutaneous lesion easily treated by antibiotics. In muskoxen, medical attention is not available of course, and death may result from septicemia (blood poisoning) that can also trigger other complications. Those with weakened immune systems are the most vulnerable to succumb to the infection.

So, I was newly primed for another adventure near Eureka. However, Eureka is hard to get to. Although it is a jumping-off point to areas still further north, such as Quttinirpaaq National Park or Canadian Forces Station Alert (a military establishment), one cannot simply go online or contact a travel agency and get there in one fell swoop. Nope. Commercially, the best one can do is fly to Resolute, on Cornwallis Island, some 625 km (388 miles) south of Eureka. That takes at least a day from southern Canada, if you are lucky with flight connections, schedules, and of course, weather.

Getting out of Resolute and up to Eureka requires taking a chartered aircraft, often a Twin Otter, which itself can be an adventure. Depending on the time of year, weather can play havoc on a timely arrival to the small, isolated settlement. More recently, companies working in the Eureka area have set up



Muskoxen are a common sight around Eureka, Nunavut. They are susceptible to infection and often death from a globally distributed bacterial parasite, **Erysipelothrix rhusiopathiae.**

Dean Cluff

Wolves frequent the Eureka, Nunavut area and are unafraid of people, often investigating campsites.

Dean Cluff

their own regular charters, and even fly direct from Yellowknife, Northwest Territories to Eureka in about 4.5 hours. They don't fly very often, but if one plays their cards right, they might be able to wrangle a seat on one of those charters.

Getting off the plane in Eureka felt familiar. We were greeted by the super-friendly staff from the Eureka Weather Station. Once we unloaded our gear, we assembled the trailers for our quads (all-terrain vehicles), loaded them up and began our 2.5-hour journey to the camp site. Arriving there wasn't the end though. After unloading, we needed to erect our main tent for cooking and supplies, and then our individual sleeping tents. It sure was great to have 24-hour sunlight—but we were exhausted when all was done.

Time to get some sleep, for tomorrow, the real work would begin!

The bulk of the field work involved sampling previously known muskox carcasses. Since 2021, muskox carcasses have been mapped with GPS coordinates. Some of these muskoxen were killed by wolves, but many others were not, given the latter were not overtly injured or even scavenged. Sampling hair and muscle tissues from the dead muskox determined if *E. rhusiopathiae* was present and a possible cause of death. We also sampled vegetation and water to better understand the bacterium's ecology and persistence.

How the bacterium is transmitted is not well known, so we collected feces from lemmings near the carcasses and at control sites and tested them for the presence of the bacterium. Lemmings feed on vegetation and could potentially serve as a vector for subsequent transmission of the bacterium. Feces from potential scavengers (e.g., foxes, wolves, raptors) were collected opportunistically. These carcass sites would be revisited each subsequent year to resample the carcass, surrounding vegetation, and water sources to evaluate the persistence of the bacterium. As we sampled, we occasionally discovered old and new muskox carcasses, and we recorded locations of both. Unlike areas in the south, muskox carcasses in the High Arctic can persist for many years.

I also have a connection with wolves, given I have studied them at several places for over 30 years. The wolves on Ellesmere Island and, in particular, the Eureka area, are unique. They are unafraid of people and that gives us special opportunities for watching them and even studying them (Mech et al. 2025). So, returning to Eureka was extra special to me in that I could likely see wolves there again, not only interacting with us, but possibly witnessing an encounter with muskoxen—maybe even the wolves taking one down. Just being at the right place at the right time would be all it would take. Of course, that is much easier said than done.

And see wolves we did! A single wolf here, and single wolf there. However,

Caide Wooten

Five wolves confront two muskoxen near Eureka, Nunavut in August 2024. While many muskoxen die from predation by wolves, the bacterium Erysipelothrix rhusiopathiae *can also kill individuals.*

seeing the pack of all eight wolves at a rendezvous site (RS) with three pups after a couple of weeks of our field work was the highlight. A film crew from Silverback Films had been monitoring the wolves daily since June and were there watching the wolves when our crew arrived at the RS. Some wolves were bold and approached us very closely. So close in fact, we had to be alert that they didn't run off with any of our gear! One wolf came up to my quad and pack that I had left unattended and defecated nearby. Caide Wooten, a Ph.D. student of Dr. Kutz's, was right there to sample it. He was beaming at the freshest possible scat he could obtain from a wolf.

Another opportunity arose seeing the wolves confront a small herd of about 20 muskoxen. Unfortunately for me, I missed it. Our work was done, and I left to go back home. Caide and his assistant remained on site for a few more days to wrap up a few loose ends at camp while waiting for their scheduled flight back. One of those days they saw eight wolves encounter and attack some muskoxen. It didn't end well for the muskoxen, as the wolves successfully killed a cow and calf. I tore myself up inside for missing such an event. Arrgh!

My only recourse now is to go back. And go back I shall. Dr. Kutz is pursuing adding another dimension to her research on *E. rhusiopathiae*. Finding muskox carcasses is critical to learning about this bacterium and how it affects muskox mortality. Wolves likely visit every muskox carcass in the area at some point, even if they didn't kill it. We think that by intensely tracking the movements of several collared wolves, we just might create a detailed map of muskox carcasses. Once they have all been tested for *E. rhusiopathiae*, we should get a better understanding of the impact this bacterium has had on local muskox population dynamics. Eureka, see you again soon. ■

Dean Cluff

Muskoxen are the main prey of wolves on Ellesmere Island, Nunavut, and wolves often revisit previous carcass sites when fresher ones are scarce.

Dean Cluff

A wolf scent-marks on an old muskox carcass with a raised-leg urination.

Dean Cluff, (retired), was a wildlife biologist with Canada's Government of Northwest Territories, based in Yellowknife. One of his main projects was studying wolves denning on the arctic tundra. Dean accompanied Dr. L. David Mech to Ellesmere Island for several summers to help study the wolves there.

Acknowledgement

Kutz, S. 2015 *Erysipelothrix rhusiopathiae* associated with recent widespread muskox mortalities in the Canadian Arctic. Can Vet J. 56:560-3;Mech, L. D., M. Anderson and D. Cluff. 2025. The *Ellesmere Wolves: Behavior and Ecology in the High Arctic*. U. Chicago Press.

Can a species really be 'de-extincted?'

By Chad Richardson

Anyone who follows news about wolves won't soon forget April 7, 2025.

News broke that day that shocked the wolf community: A Texas-based company had reproduced dire wolves, and two were now running around a top secret enclosure somewhere. Their arrival was heralded as the world's first de-extinction event.

Slowly, though, the varnish has come off the furniture.

The big question at hand is, are they really dire wolves? The short answer to that complicated question is, well, no. They aren't.

Folks have seen the Jurassic Park movie where scientists extract the DNA from a long-extinct dinosaur, then bring the species back to life in a laboratory using that genetic material. That's not what happened here.

In this case, genes of present-day dire wolf relatives (gray wolves) were edited so that scientists could create a "clone" that *looks like* a dire wolf. Of course, we don't have a clear idea what dire wolves look like since they went extinct about 10,000 years ago. The clone's DNA was modified based on genetic analysis of a small set of dire wolf fossils. What we're left with are two white wolves that contain some genetic traits of dire wolves.

It might be a stretch, you could say, to call this a de-extinction event.

But, buried in the startling dire wolf news was something else that caught the attention of many wolf enthusiasts. The team at the same company, Colossal Biosciences, had used "advanced genomics, cloning and gene editing" to "rebuild the lost ancestral red wolf."

This, it seemed, could actually have been the big news of the day.

Not so fast.

While it wasn't clear in many of the stories, a captive breeding program for red wolves already exists. Currently several hundred captive red wolves live at these breeding facilities, and the hope is that some can be released into the wild when the time is right.

Colossal, though, has emphasized the discovery of potential red wolf DNA in coyotes found along the Gulf Coast as a possible new source of genetic diversity.

On its website, Colossal writes: "Once believed extinct in the wild since the 1980s, the ancestral American red wolf may have persisted in an unexpected way—hidden within the genes of Gulf Coast canids. These animals, dubbed ghost wolves, exhibit a blend of physical traits and genetic signatures that reveal deep ancestry with the red wolf, including traits not even present in the current captive population.

"The conservation implications are immense. The 270 American Red Wolves in managed care today are descended from just 14 individuals. Such a shallow gene pool has left the species vulnerable to disease, environmental change and inbreeding. By tapping into the ghost wolf population, conservationists now have access to previously lost red wolf genetics—offering a critical opportunity for genetic rescue."

Not everyone is sold, however, on the need for this "genetic rescue," including Dr. Joseph Hinton, a senior research scientist at the Wolf Conservation Center. In a post online, he writes:

"There are currently 270 red wolves in captivity that are waiting to be released to the wild. They represent the historical red wolf, which resulted from thousands of years of natural selection. They reproduce naturally in captivity and in the wild – we don't need to clone them. It is limited captive space that prevents the population from increasing and improving genetic diversity.

"The 'red wolves' are not red wolves. They were derived from coyotes captured in southwest Louisiana for the Gulf Coast Canid Project."

What's next?

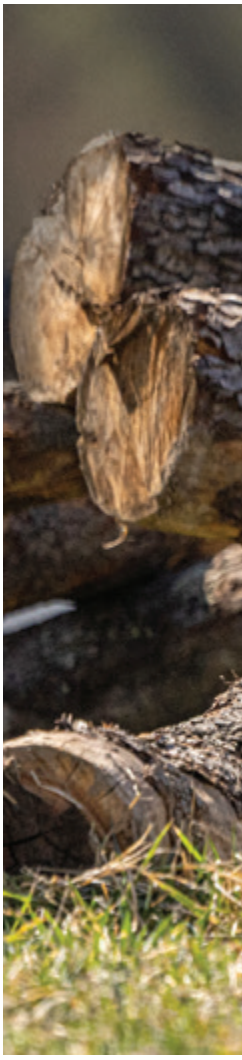
So given that it wasn't quite de-extinction and that a red wolf breeding program is in place, was the whole early-April news cycle entirely inconsequential?

No. It wasn't.

What Colossal has done could have a significant impact for endangered species in the future.

Generally speaking, there could be some conservation value to some of this research, especially for populations that have very low genetic diversity. As for de-extinction, Colossal Biosciences has listed a goal of bringing back wooly mammoths by 2028.

Colossal is using a similar process with wooly mammoth de-extinction as it used with its dire wolves. It is modifying the genes of



Asian elephants but face a massive hurdle as an estimated 1.5 million genetic differences separate wooly mammoths and Asian elephants. Factor in that elephant pregnancies take about two years and that 2028 deadline is just three years away.

So far, the biggest news seems to be that the company has modified some mice so that they grow hair resembling that of the wooly mammoth.

But already, detractors are lining up. Vincent Lynch, an associate professor at the University of Buffalo in New York, was also interviewed by *New Scientist*. "Mammoths are extinct and cannot be de-extincted or resurrected," Lynch said. "All they can do is make an elephant look like a mammoth."

Sound familiar? ■

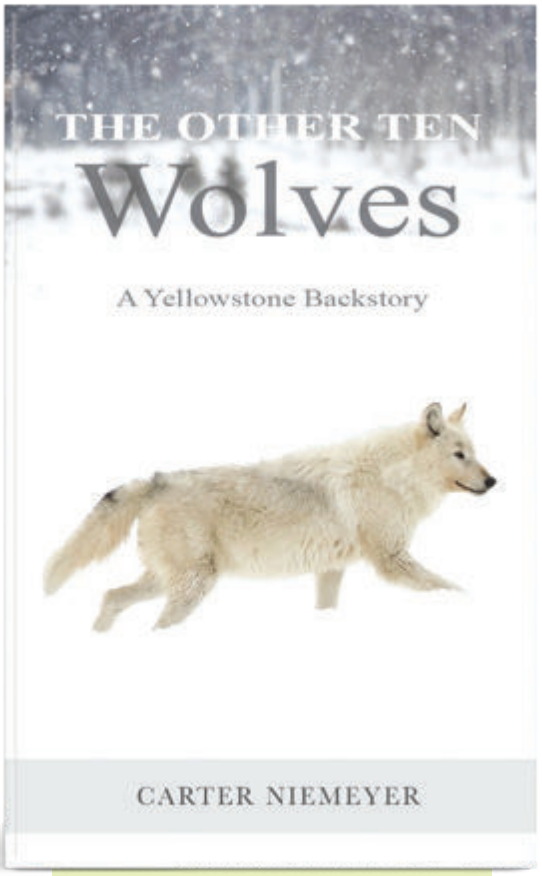
Chad Richardson is the publications director for *International Wolf* magazine.

Colossal Dire Wolf, age five months

Photos: Colossal Laboratories & Biosciences

The Other Ten Wolves: A Yellowstone Backstory

Book review by Nancy jo Tubbs



The Other Ten Wolves: A Yellowstone Backstory

By Carter Niemeyer

Publisher: Bottlefly Press

166 pages

Hang on for a gripping, bumpy, yet successful road to wolf restoration with Carter Niemeyer's 2025 book, *The Other Ten Wolves: A Yellowstone Backstory*.

The project was brash. "Nothing like it had ever been attempted," Niemeyer writes.

"The U.S. Fish and Wildlife Service would bring wolves from Canada to Yellowstone National Park and central Idaho once a year for five years."

"In the end, we got the job done in two."

The project started with lofty vision and goals set over 13 years as the U.S. Fish and Wildlife Service established the plan for wolf reintroduction in the Northern Rocky Mountains, to be started in 1995. Planning meant stacks of research and papers on one hand. Then wolves called that hand as they began wandering south from Canada years before.

By 1987 those wolves, and eventually angry ranchers, created the need for U. S. Department of Agriculture Wildlife Services to find someone to manage wolf-rancher conflict. It turned out to be the author, Carter Niemeyer, who'd been trapping skunks and problem varmints and then working as a supervisor for Animal Damage Control and Wildlife Services.

Niemeyer described the early job as "a combination of dog catcher and coroner," as he investigated dead livestock in Northwest Montana. Was the cause coyote, disease, old age, poison, accident, infirmity or wolf?

He worked alongside an impressive cast of other key wolf experts including Northern Rockies Wolf Recovery Coordinator Ed Bangs. But the stars of this show were two wolves who "caused mayhem wherever they went," Bonnie and Clyde. These first two members of the soon-named Sawtooth Pack had four pups in 1993.

And then they began harassing and killing livestock. Niemeyer, on the learning curve for a maneuver he'd use much in the future, darted two young wolves from a helicopter. Then the youngsters were on the way to Glacier National Park.

The author follows the pack through years of change. In 2002 Doug Smith, by that time Yellowstone's senior wildlife biologist who was directing Yellowstone's research project, invited Niemeyer to help capture Sawtooth wolf, Number 72.

"It was the last time I touched a Sawtooth wolf," he said. "Wolf 72 was a few months shy of his fourth birthday. He was magnificent in his heavy winter coat and tipped the scale at one hundred and twenty pounds."

The book follows the Sawtooth connection to the Nez Perce pack and the significant contribution those wolves, though based miles outside the park, made to genetic diversity in Yellowstone. While this book chronicles the page-turning story of Yellowstone's packs it also offers photos, data and a family tree of the Sawtooth and Nez Perce wolves.

Readers get a view from a front row seat of the complexity of wolf recovery and an authentic narrative with the characters, tastes, textures, plot twists and perspectives. It's a captivating read that makes a vital chapter of wolf recovery visceral. In his dedication, Niemeyer says, "There will never be another time like it." ■

Nancy jo Tubbs is a former member of the board of directors at the International Wolf Center.

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