

The Black Range Naturalist



**Volume 3, Number 3
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Dr. Karl Malcolm's interest in nature, conservation, wildlife, and protected area management led him to study the role of nature reserves in harboring large carnivores in southwestern China for his PhD in Wildlife Ecology, which he completed in 2011 through a joint appointment with the University of Wisconsin - Madison and Smithsonian Conservation Biology Institute. These experiences fostered a deeper and more informed appreciation for America's public lands system and inspired him to pursue a career with the United States Forest Service.

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In this article, Harley Shaw shares a study of a Kangaroo Rat burrow mound near Hillsboro. A graduate of the University of Arizona and the University of Idaho, Harley Shaw spent his professional career with the Arizona Department of Game and Fish. His primary research topics included Wild Turkey and Mountain Lion, although Desert Big Horn Sheep were thrown in for good measure. He is the author of several books, including *Soul Among Lions* and *Twelve Hundred Miles by Horse and Burro*. Shaw is the associate editor of this magazine.

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Dr. John Hubbard received his Ph. D. In Zoology from the University of Michigan in 1967. He now holds or has held positions with the Smithsonian Institution and the Museum of Southwestern Biology at the University of New Mexico. He has published extensively on zoological topics with an emphasis on the southwest of the United States.

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When [Taylor Streit](#) was inducted into the Freshwater Fishing Hall of Fame in 2001 it was noted that he is "[considered the authority on fly fishing in New Mexico](#)". His life as a professional fishing guide has supported his love of the natural world. He is the author of four books on fly fishing and the fly fishing experience, as well as, numerous articles in various magazines and newspapers. Taylor spends a great deal of his time on Caballo Reservoir these days.

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Dr. Kells is an associate professor of rhetoric and writing at the University of New Mexico. She is the author of [Héctor P. Garcia: Everyday Rhetoric and Mexican American Civil Rights](#) and [Vicente Ximenes, LBJ's Great Society, and Mexican American Civil Rights Rhetoric](#). She recently initiated the [Black Range Environmental Writers consortium](#).

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Hannah Cantrell is an undergraduate student at University of New Mexico studying Evolutionary Anthropology and GIS. She works at New Mexico Museum of Natural History and Science as a Paleontology Digitization Intern. She hopes to conduct research as a professor or curator later on in her career. She lives in Sandia Park, New Mexico.

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From Wolves to Dogs by Karl Malcolm

We need wild places now more than ever—to fish, to hunt, to be human.

Those of us who grew up in Michigan's Lower Peninsula inevitably and justifiably rely on our hands as map surrogates when referencing hometowns. I'm a product of the beech and maple woods demarcated by my left pinky fingernail—Leelanau County. My parents raised my brother and me to recognize what luck this personal geography was for us. It was easy to be thankful. I spent high school summers as first mate on a salmon boat fishing East Grand Traverse Bay on Lake Michigan. On land, I saw more wildlife than traffic jams.

Around home we had trout streams within hiking distance, reliable morel mushroom hunting grounds, and camping spots with custom-built forts strewn from the back door to the horizon. Among my favorite features on that landscape was an old, rust-tinged, 12-inch cast iron skillet we kept wrapped in a black plastic garbage bag hidden in a log pile near a secluded stream. The skillet and nearby fire ring were as much a destination as the cold, clear water. With sleeping bags, a book of matches, a pocket knife, and a small bottle of cooking oil, my brother, our friends, and I felt prepared for the lives of mountain men, never mind faint peach fuzz mustaches or crack-prone voices trying to drop an octave or two.

In spring the camp menu would always include trout. We'd usually keep the browns that met the state's 8-inch minimum, while returning native brookies to their plunge pools and undercut banks. For measuring purposes, Dad cut us a length of shoelace at 8 ¼ inches, just to be sure. Leeks, the pungent wild onion-like roots filling the spring woods, were a perfect addition, especially if morels or beefsteak mushrooms were in supply. In early autumn the menu might include black raspberries, crab apples, squirrels, rabbits or, when we were really lucky, a ruffed grouse. We hunted small game with bows and arrows or

22 caliber rifles that we added to our gear list starting in mid-September. The ability to gather, catch, hunt, clean, cook, and eat over self-built campfires without adult contribution or interference was an impactful rite of passage for us. It was one we relished.

By current standards it may sound counterintuitive that a roving band of kids starting fires and toting knives, bows, arrows and guns were staying out of trouble rather than getting into it, but I can easily imagine the less desirable alternatives we might have otherwise pursued.

My mother had a real stroke of genius when I was in ninth grade. We made a deal that if I kept my grades up she would give me the discretion to choose one school day each

semester when she would call the front office at Glen Lake Community Schools and excuse my absence from the fluorescently lit hallways of formal learning. A brilliant move by a brilliant lady.

To wander the hills toward my stream and skillet on a weekday morning, knowing classmates were sitting in homeroom starting another day of schoolwork, was

pure magic. Those woods provided lessons that have stuck with me ever since. I found newborn whitetail fawns, saw a red-tail snag a screeching rabbit, installed a maple sap line, and had a flying squirrel land in my lap while I sat motionless in predawn darkness.

I can trace my path over the past 20 years directly back to those unsupervised trips to my wild spots. They inspired me to earn a natural resources degree. Later, as a graduate student, I studied wildlife and protected natural areas in China's Sichuan, Shaanxi and Yunnan Provinces. Those experiences put me on course to my current position as a wildlife ecologist, working for the U.S. Forest Service in New Mexico.

Wildlife ecologists are trained to pay attention to interactions of animals with their surroundings. We try to understand where they find refuge, what they eat, how they move, how they interact with each other and with other species - their predators, their prey. Ultimately, it's these



Mexican Wolf, *Canis lupus baileyi*, reintroduction program at Sevilleta National Wildlife Refuge, NM. Photograph by Jim Clark, U.S. Fish and Wildlife Service (Photo placement by the editor)

behaviors and interactions that help define a species. These same traits give our species a unique identity, and in part define each of us individually. To illustrate this point, consider one of the most impressive predators on this continent: the mountain lion.

Here in New Mexico mountain lions commonly hunt, among other prey, white-tailed and mule deer, elk, and bighorn sheep. These species are on constant lookout for trouble, and elk can easily weigh four times as much as the feline hunter. So pound for pound, mountain lions are sleek and strong—built to stalk in stealth, to pounce and to overpower. They cover a huge amount of ground, with territories covering up to 500 square miles.

Now consider a mountain lion in captivity, housed under the highest care standards in a world-class zoo. No enclosure will ever approach the animal's natural home range. No captive zoo diet will serve as a true proxy for the menu or behavior of a wild counterpart. So my question is this: is the captive mountain lion less of a mountain lion than her wild sister?

I believe the answer is yes.

By removing an animal from its natural context and ecology, I believe we fundamentally alter that individual's identity. We take away an important element of what it would otherwise be.

Perhaps the most obvious example is our collective best friend, *Canis familiaris*, the domestic pooch. With roots tracing back some 30,000 years to the first known domestication of the wolf, the diverse world of dog breeds today epitomizes how a wild species identity—that of the wolf—can transform over time in a world of conditioning and oftentimes coddling. Contrast the life and ecology of the wild predecessor, *Canis lupus*, to that of some popular breeds today. Compare loping untold miles in search of wary prey to riding through the concrete jungle in a designer purse. Contrast a diet of moose, deer, beaver, or elk to an entrée offered by "Chef K9's Doggy Bistro and Bakery," a website I found when curiously investigating the current state of our ever-evolving relationship with the dogs we adore.

One of their popular options consists of, and I quote directly, "Ground Shoulder of Nebraska Angus Beef and Hormone-Free Oven Baked Chicken Breast served over Pearl Barley and Oven-Roasted Idaho Russet Potatoes with a large Sautéed Assortment of Yellow Squash, California Carrots, Broccoli, Green Beans, & Garlic. Topped off with our Fresh Baked Toasted Whole-Wheat Croutons, Organic Safflower Oil, and Freshly Shredded Cheddar Cheese."

Contrast a wolf's honed set of physical and mental traits—eyes, ears, nose, and instinct—attuned to its wild world, against the litany of physical and mental ailments that have resulted from dog breed specialization. Some products of canine domestication are basically unrecognizable as

relatives of their wild wolf forebears. Take, for example, the fact that the vast majority of bulldogs are born, out of necessity, by Caesarean section because their oversized heads too often prevent a more traditional entrance into the world. Or consider the higher frequency of ocular trauma resulting from a pug's flat face and bulging eyes. Their wild identity and ability to survive independently are, in those cases, essentially gone.

Subverting Domestication

Just as humankind domesticated the wolf over the past 30,000 years, so too have we domesticated ourselves. As a species, we've lost much of our own wildness. The lives of people around the world today, for the most part, bear little resemblance to those of our Pleistocene predecessors.

I'm not saying that's entirely a bad thing. I harbor no illusions regarding the difficulties of attempting, in any era, to live off the land. I'm not discounting the societal progress we've made on many fronts. My bed is comfortable, my shower runs hot, and I appreciate a good roof during the Southwestern monsoon season. We live longer and, in some inarguable ways, our lives are much better. Modern medicine presents one clear example.

But even current medical trends can be used to examine unintended consequences of increasingly tame lifestyles. What proportion of medical interventions today relate to insufficient physicality or unmet needs to mentally unwind, de-stress, and restore? With bodies and brains shaped by the natural world, is it any surprise that some of us suffer in the absence of its challenges and opportunities?

Domestication has also cost many of us our environmental awareness. For our ancestors, a deep familiarity, passed down through generations, with plants, animals, water sources, shelters, weather, seasons, and all other specific intricacies of a place were the cornerstone of survival and success. Today, with each added step in the supply chains that provide food, energy, homes, and overall comfort comes a widening gap between our day-to-day lives and the natural world upon which we all still depend. The wild wolf knows exactly where dinner was sourced. The pug in the high rise knows only the master, the bowl, and the tin can of gourmet ingredients.

Without keen cognizance of our own personal reliance on natural systems, we lose sight of our most basic motivations for environmental stewardship: our own self-interest and the commendable desire to leave a habitable place for those who will follow in our steps.

There are many ways for us to remind ourselves of our linkage to the natural world. One option is to be directly involved in the production or procurement of our own food—the way I was at my boyhood stream. The booming interest in backyard gardens, gathering and foraging, urban and suburban chicken coops, and community-supported agriculture are testaments to people's appetite for this sort

of connection. Knowing the source and investing our own time and sweat to grow food for our table are rewarding reminders for my family and me.

This same desire for a direct link to natural processes and an awareness of my dependence on the land is also a core motivator for me as a hunter.

The ebb and flow of wild meat from our freezer remind my family of favorite wild places, celebrated animals, and cherished memories made together. The time we spend hoping and working hard to refill that freezer each year roots us to our places, to each other, and to fundamental segments of our own wild genetic barcodes that are still far from being lost or obsolete. A combination of physically demanding outdoor pursuits and a steady source of real, honest food keeps us fit and happy - an ounce of preventive physical and mental healthcare that must be worth at least a pound of cure.

Most hunters can quickly conjure a mental list of favorite wild places. We revisit our known and cherished hunting grounds year after year. I'm no different. It should come as no surprise, then, that I planned an overnight camping trip back to my hidden skillet and stream when I visited home from graduate school 10 springs ago. I planned on looking for trout and a wild turkey during a three-day weekend in late April. But I was surprised to find an unfamiliar winding driveway on my way back into my old haunts.

A new house had popped up where morel mushrooms had previously done the popping. My fire ring had grown over, nearly imperceptible, and within sight of a manicured backyard. They must have had kids because they had installed a trampoline almost exactly where I had shot at and cleanly missed a big whitetail doe with a shaking, open-beaded shotgun when I was still too young to drive a car. The log pile where my skillet had been stashed was long gone.

I studied the land ownership plat book to make sense of what had happened during my time away at college. My childhood landscape is a patchwork of public land and privately held woodlots. As a kid I spent long summer days helping bale hay, mill lumber, repair barns, and look after livestock for surrounding landowners. As a result, I never had to pay much attention to where one parcel ended and the next began. It was rare for our neighbors to post property lines or build any kind of a fence. In studying the updated plat it became clear that my special spot now belonged to somebody I did not know. Claims of eminent domain related to formative childhood expeditions seemed unlikely to prevail in grown-up court. Rather than mounting a case, I was left instead to host and attend a one-man mental funeral for a place privately worshiped and unexpectedly erased. I thought my way through a silent eulogy of wild trout, sautéed mushrooms, cut feet, leaky tents, childhood friendships, adventures with my brother, and a permanently lost skillet.

To feel personally impacted by the loss of a place for the first time was a rough revelation. But that feeling was accompanied by an awareness that the public acres of of my childhood home range still felt wild, and seemed relatively immune to sprouting houses. It occurred to me then that keeping such places in public hands maintains crucial habitat for more than the fish, wildlife, and plants residing there. It conserves habitat for human wildness—places where a kid could learn to love the land through personal immersion, regardless of family means.

People like me require natural landscapes offering solitude, places where we can escape. The bigger the better. We have a low tolerance for development in our playgrounds and holy places. To us, fragmented parcels, "No Trespassing" signs, and fences feel like the zoo walls holding the mountain lion captive. A city park does not fully meet our needs. And when wild places we know well unexpectedly gain cul-de-sacs and houses, it hurts with the pain of losing something loved.

Chances are that most of us can recall a wild place that has been tamed during our lifetime. Each of these places represents something sacred now gone that almost certainly will not be regained. These continuous losses of a dwindling resource warrant our mourning—our mental funerals. But, by the simple laws of supply and demand, they also underscore the rising value found in those places that remain. As a hunter, fisherman, and grateful heir of America's public lands I do not take for granted that we have these acres in our shared domain, our nation's greatest natural assets, belonging equally to each of us. These wild, public places are, after all, my own critical habitat. In their presence I become more completely who and what I am. They contain foundational elements of my identity. My life is richer because they exist. And I know well that I am not alone.

Author's Bio: Karl Malcolm works as the Southwestern Regional Wildlife Ecologist for the USDA Forest Service, based in Albuquerque, New Mexico. He spends his free time hunting, fishing, camping, and backpacking on public land with his wife, daughter, and their two bird dogs. The Gila Wilderness is one of their favorite places on the planet. Karl can be reached at karl.malcolm@usda.gov.

The Gila vs. The Black Range: This magazine is about the natural history of the Black Range of New Mexico. The Black Range comes in second to the Gila when it comes to study and published material on natural history. Since the natural history of the two areas is basically the same, they abut after all, we gain from the attention given to the Gila. We strive at every point, however, to make this a magazine about the Black Range - even if that means referencing materials from our more famous neighbor to the west.

The Black Range - Gila Connection

I don't speak here of the original wilderness area or how it was split in two. The North Star road has yet to separate the natural history of the Aldo Leopold Wilderness and the Gila Wilderness. Rather, I speak of the linkage of people; the people of the Black Range may sometimes be thought to hold dual-citizenship with the people of the Gila. That linkage is natural since like the Mimbres River, the East Fork of the Gila River flows (in part) from the northwestern slopes of the Black Range.

Excellent examples of this point are Hillsboro residents Jan Haley and Stephen Siegfried - and their relationship with M. H. Salmon ("Dutch" Salmon). Salmon was a leading advocate for a free flowing Gila River. When a "Dutch Salmon Panel" was included in the 8th Natural History of the Gila Symposium, Stephen Siegfried was invited to be one of the presenters based on his long business/personal relationship with Salmon. Jan Haley worked on numerous projects with Salmon, including the subject of this article - *Free Flow - the Gila River in New Mexico*. The story of how she came to complete this project is best told by the Introduction to the book, written by "Dutch" Salmon, and her preface to the book. Both are presented below.

Free Flow by Jan Haley

From the book:

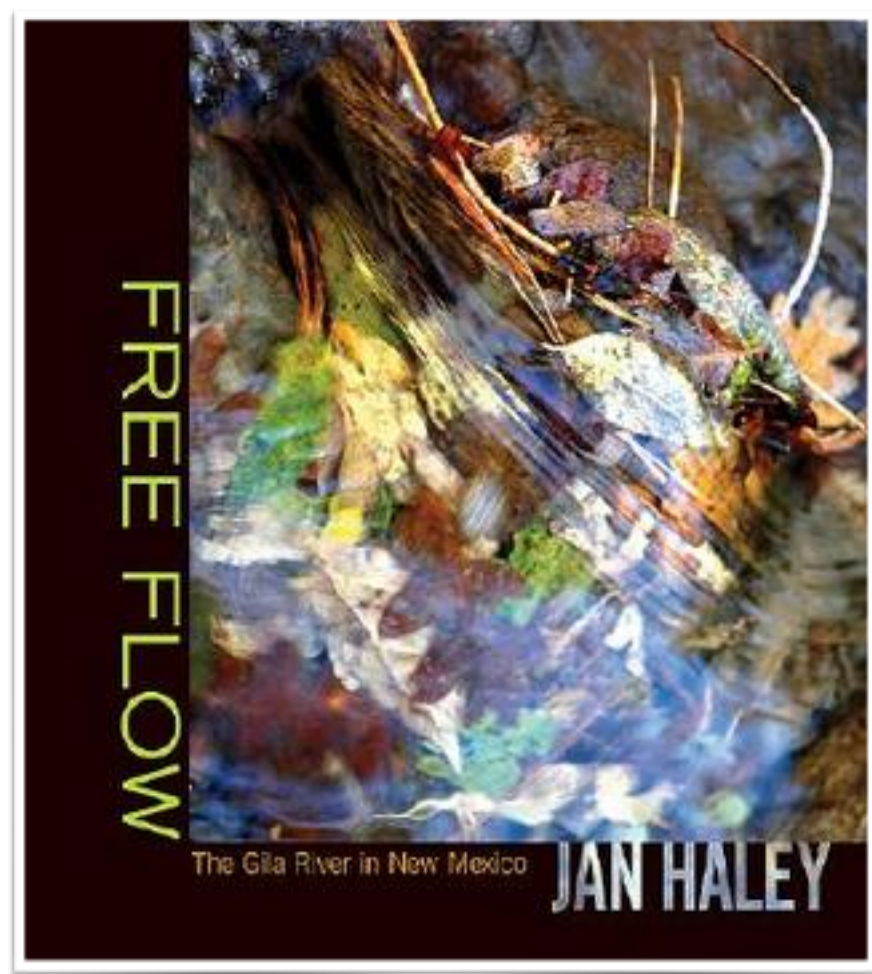
Introduction

The artist's heart is grounded in aesthetics. Images matter greatly, getting and spending hardly at all. And so, to the heart grounded in aesthetics, a stark change of scene would necessarily be something of a jolt. And yet, unavoidably, if you give the new geography its chance, there can come a gradual change of heart. Jan Haley, photographer, succeeded admirably with images of northeastern New Mexico in Max Evans' [Hi Lo Country: Under the One-Eyed Sky](#) (also published by UNM Press). (Link provided by editor of BRN, not included in original.) But that project was no jolt because she was born and reared where the waters do not flow but waves of High Plains make a sea of grass. She loves that country because it is her own. Learning to love an improbable flow of water emanating from a rough range of mountains rising from the desert at the far corner of the same state would indeed be a challenge for the photographer. But in the end an acquired taste for the Gila River would flourish. Photographers, as much as writers, must get involved with their subjects should the interest wane or become casual, or worse, the relation never quite jells. To do her work well she would have to fall in love with a whole new country.

She did. And she learned.

She learned that from a source water like Bead Spring to the state line was less than two hundred miles but a long journey of natural history where five life zones come and go as the topography descends. She would travel afoot—always there were wet feet for these were river miles—and she would "click," "click," "click" to capture elements of all five biomes. She learned that there were three forks, each of long mileage, each different and laying a claim to the "Heartland of the Gila." She would visit each of these tributaries and "click" their attributes for all time before finally taking images. The Forks where the Middle, East and West Gila resolve peacefully into one main-stem river.

She found that the desert Gila is alive, if not as lush, as the flow five thousand feet higher up. She "clicked" images that show that deserts thrive when nourished by a perennial flow, and why ancient people chose to live there once upon a time.



Free Flow is available from [Alibris](#), [AbeBooks](#), [IndieBound](#), and Amazon.

She saw that the stark beauty of the river in winter is as captivating as the verdant beauty of the same flow through a hot monsoon summer. She figured out that, though a river book, every photo in *Free Flow*, need not carry water, even as it is apparent in the photo that water somewhere somehow nourished the image. She saw that no mud flat is mundane, that some are sensual, and she had the eye and artistic panache to capture and print a simple, watery tree root whose natural configuration of the female form will give either gender pause and cause to look again.

She photographed the Gila as a high-water torrent, low-water disappointment suffering from drought, and, in places, a quiet wetland pool so cryptic that it could be missed easily. Even at low water the many crossings could

be tricky, but during the high flows, when you could feel the current creeping up your thighs and a dunking perhaps coming with the next slippery rock, she knew to hold that camera high and keep an eye on the desired shore. She didn't always come home dry, but her camera did.

The Gila drainage in New Mexico is perhaps a thousand miles of running water in all, from still unnamed tributaries to its main flows. Unique to the Southwest, its New Mexico section remains large as nature would have it. Its beauties are myriad and ubiquitous, its floods are sometimes scary—expensive if you have property in the floodplain but nonetheless restorative of riparian life and habitats that attract both birds and birders on the respective annual migrations. River runners know its challenges and dangers. Anglers know the Gila as an unusual array of game (where else can you catch a wild trout and a flathead catfish out of the same pool?). The Gila retains its own prerogatives; in one recent year it went from twenty thousand cubic feet per second (cfs), which rearranged the furniture for miles around, to an all-time low of six (cfs) at the same United States Geological Survey (USGS) gauge station. With all these natural attributes and extremes every hacker can go there on a bright sunny day and take a pretty picture. I've taken a few myself (give a monkey a typewriter and now and again he'll spell a word)! But Jan Haley's photo essay *Free Flow* is a series of constant surprises, its images as unpredictable as the river itself, each turn of page a wondering look around the next bend. So this is not the usual selection of carefully pretty landscapes but more the river in life, her often overlooked minutiae as well as her considerable scope telling us who she is. The High Plains artist fell in love with a different New Mexico; there has been talent at work along the Gila and the volume takes you in like a slow hike to newly favored places.

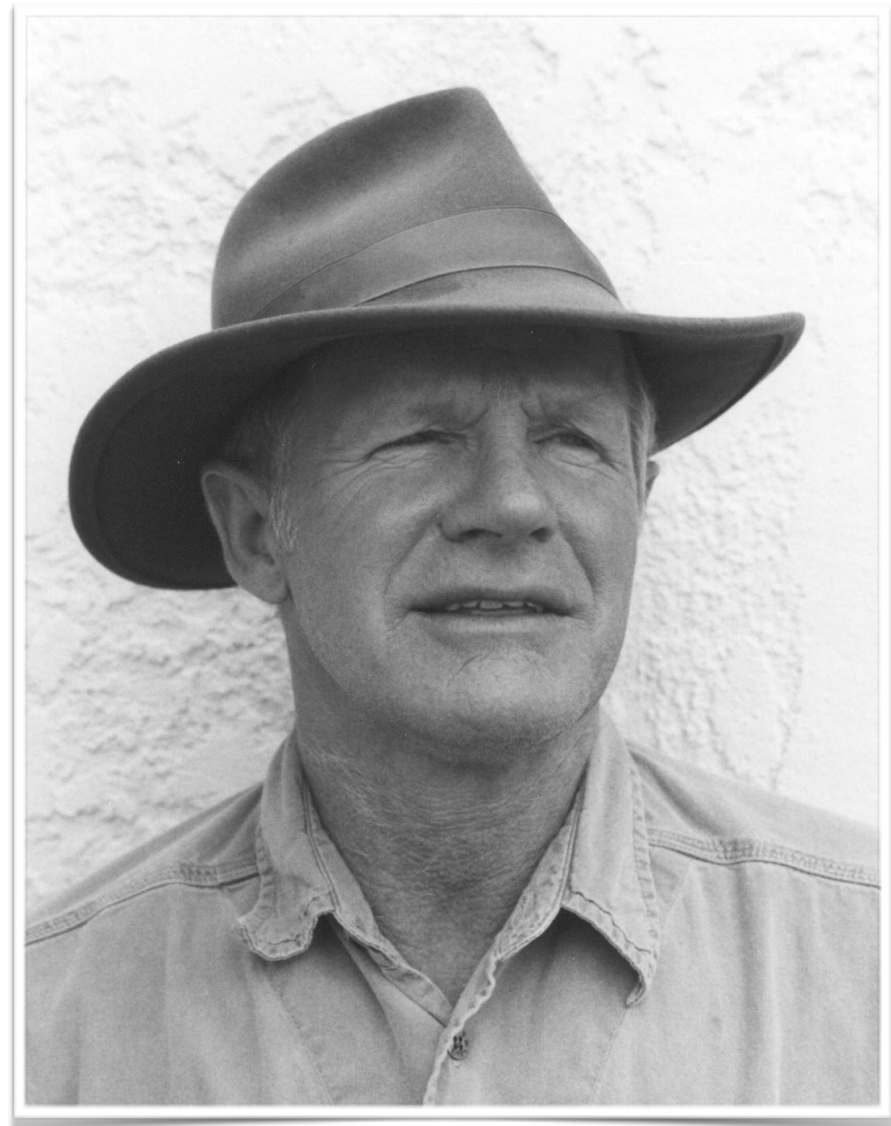
Most pertinent, these images—without so intending—will be a weapon in the war. The Arizona Water Settlements Act, signed by the president in 2004, contemplates the yearly consumption of fourteen thousand acre-feet (af) from New Mexico's Gila River via a diversion project complete with pumping station, power station, pipeline, or canal to carry the water to an off-stream dam and reservoir, the final hope of project proponents being new subsidized growth within the Silver City area. And a determination to keep Arizona, and the river itself from keeping its in-stream flow. In a companion volume, [Gila Libre!: The Story of New Mexico's Last Wild River](#), I detailed the whole battle. (Link provided by editor of BRN.) It won't be easy; *Free Flow* as a title, may be wishful thinking today, and little more than nostalgia within a half dozen years.

But three even more ambitious water projects for the Gila have been defeated within the past twenty-five years. The opposition is well funded, organized, and includes water development interests we aren't even aware of. To the boomers and boosters of our time, getting and spending is their art. Yet endangered species, cost/benefit analysis, other nondiverison alternatives, ample groundwater and

public opposition all militate against the project. Plus a book: *Free Flow* by Jan Haley.

Anyone who studies these images and still comes away wanting a major new water consumption and industrial infrastructure along the Gila has a harder heart than I. And a very different aesthetic. But I think this book can hold its own; indeed, *Free Flow* may not be wishful thinking at all but rather prove a call to action. It may take an artist with a camera to save a wild river under the gun.

M.H. Salmon
Silver City, NM



M. H. "Dutch" Salmon, a photograph by his wife, Cherie Salmon. Provided under a [Creative Commons Attribution-Share Alike 4.0 International](#) license.

Preface

It seemed fitting that my last photo trip for this book should be back here to the Gila Headwaters, observing the perpetual birth of a river. I find myself, as always, overwhelmed by this cool damp forest. There is a fairy-tale quality here, an intensity of color here that isn't often seen in New Mexico. Not the sage green of the desert, nor the cottonwood green of the bosque, and not even the green of the lower-elevation juniper and piñon forests. This is the emerald green of an animated movie. The scene is saved from the monochromatic by touches of color. Soft-hued wildflowers stand together and alone in beams of light that filter down to the forest floor. Ruby-red berries hanging from bushes look deliciously poisonous. A ghost-white

mushroom hides in the shade of a fallen tree. It's foreign territory for me and I'm enchanted.

The only river I knew as a child in the high plains of Eastern New Mexico was called the Dry Cimmaron. Then, I didn't necessarily think of water when I heard the word river. Now, after all the time I've spent up and down the Gila, I still find it remarkable that rivers can form from so little.

The modest trickle from the spring has a lofty goal: a rendezvous with the Colorado River in the Arizona desert. From the crest of the continental divide, the flow makes its way down to Willow Creek, then to Gilita Creek, and down, down to become the Middle Fork. The Middle Fork joins the West Fork before hooking up with the East Fork to become the true Gila River. On the way to the confluence, the water weaves through ponderosa and piñon forests and high rock canyons. It gently meanders or rages in swift-flowing torrents depending on summer rains and winter snowpack. Once the forks have merged, the river flows down to the light of the rugged Middle Gila through cottonwood- and sycamore lined canyons. Finally, as it heads for the state line, the Gila snakes around the bottom of high desert canyons, carving its place in the earth, slowly, surely.

On the way from its inception to its dry end, the Gila passes through and contributes to a vast array of landforms and vistas. It joins creeks with lyrical or image-driven names: Sapillo, Whitewater, Rain, Little Dry, Big Dry, Mogollon. In places, the river can be easily observed from the side of the highway. It can be reached from well-maintained, short trails, and with more difficulty on long hikes or backpacking treks. There are parts of the river, though, that discourage human intrusion. This river has its secrets.

My time on the Gila has made me understand what makes a river a river. Its identity is more than the water it holds, the possibility of water, or even the promise of water. What we see from the perspective of the river is what defines it: the forest, the canyon walls, the desert, the wildlife, the ancient dwellings. And it is the omnipresent art of the river. A tiny orange leaf causes a current of water to part around it, creating an ethereal image. An impish face beams from the bark of an aspen. Winter willows are mirrored in the sky-colored water. An ancient tree trunk seems to be walking along a dry creek bed. Native dwellers have left their art on rock faces, records of life lived along the river, but everything else was created by that quirky artist herself, Mother Nature.

On this August morning, I know I'm in the best possible place to consider the Gila's free-flow journey through New Mexico. I'm grateful for what I got to see of this river but I regret that I couldn't have explored every last inch. My photographs may provide a glimpse of what there is to see, but this moody river can only be followed. It cannot be framed.

- Jan Haley



North American porcupine, photographed in the Black Range by a trailcam as part of research in the area being led by Dr. Travis Perry, Furman University. "There is a shocking paucity of porcupine photos from our camera traps. I believe we might have one, possibly two photos from literally tens of thousands of camera nights." - Travis Perry, February 2020



These were taken October 20, 1993, about 3 miles east of Puro, Chino Valley, AZ. Porcupine was in the den and lots of sign indicating long usage. - Harley Shaw



Porkies Get No Respect

by Harley Shaw

My first serious experience with porcupines came during the summer of 1956. I was employed as a summer student by Arizona Game and Fish Department. I had finished a year of college in the biology department of Arizona State College (now ASU); this was my second summer working as a laborer on development crews for the department. We spent most of the summer building an 8-foot high fence designed to prevent elk and cattle from grazing a large bottomland meadow in Fairchild Draw, west of Chevelon Ranger Station on the Sitgreaves National Forest (now Apache-Sitgreaves National Forest). A crew of four young men supervised by an aged cowhand, we camped out in the forest above the meadow, using a 25 foot trailer as a cook shack and bunkhouse for the crew leader. The rest of us slept outside or, in rainy weather, in tents. It was a dry summer, so we hardly ever had to run for cover.

Our campsite was at about 7500 feet elevation in the midst of the ponderosa pine forest of Arizona's Mogollon Rim. In addition to a mixed-age stand of ponderosa pine, Douglas fir and white pine were common, as was Gambel Oak. It was prime summer range for wild turkey, elk, and mule deer, and we frequently saw these species during our daily trips to and from the worksite, a distance of perhaps a mile from camp. Elk were especially visible, because they frequently grazed in the meadow that we were slowly surrounding with a fence. The idea was to protect such meadows for broods of turkey poults.

Two other species that were super abundant that summer were striped skunks and porcupines. The skunks were memorable in their presence, but we did little other than chase them out of camp, a near-nightly chore. The porcupines received more of our attention; it's a story I'm now not proud to tell.

As lads new to working in the woods, we had no basis for assessing conditions we experienced that summer—no perspective on history of the land or the wildlife. Our ethic, if we had one, was provided by our crew leader and the U. S. Forest Service personnel we met when we visited the ranger station. All of these considered porcupines as destructive vermin, to be eliminated using any means. Any means included shooting them from the tops of trees or clubbing them to death on the ground. In the words of Aldo Leopold, we were "full of trigger itch," and porcupines were so abundant that they were easy targets. And we were commended for killing them.



North American porcupine, *Erethizon dorsatum*. Not photographed in the Black Range for obvious reasons - rather in the Yukon by Bob Barnes.



In fact, the Chevelon Ranger Station had a contest going to see who could kill the most porcupines in a year. The prize was to be a steak dinner at a fancy hotel in Winslow. We knew we wouldn't be present to accept any prize, so we donated our "kills" to the secretary at Chevelon. My belated memory is that we contributed 41 dead porcupines to her record by the end of the summer. We never heard who won the steak, but you can see why I'm not proud to tell the tale. Now, 64 years later, I rarely see a porcupine in my rambles around Arizona or New Mexico. During the 20 years I've lived in Hillsboro, I've yet to see one at all, in spite of covering a lot of ground by vehicle, horseback, and on foot in and around the Black Range. A recent presentation on The Wildlife Society's website by Pairsa Balmaric of Humboldt State University set me to wondering about the status and history of porkies in our area.¹

To get a historic perspective, I pulled down my copy of *Mammals of New Mexico*.² To my surprise, as late as 1975, when the book was published, no "official" records of porcupines existed for Sierra County, although scattered records existed for all of the surrounding counties all the way south to the Mexican border. I've worked as a field biologist in the SW long enough to understand that lack of "official" records of a species often reflects lack of presence of early biologists in the area,

rather than lack of presence of a particular species. While the Apaches made nature study in the southern Black Range uncomfortable until about 1890, the area had ample interested scientists through the early 20th century. Worthies such as Vernon Bailey, E. A. Goldman, Stokley Ligon, and Aldo Leopold all spent time within Sierra County. By 1975, the county had been wandered by innumerable state and federal wildlife personnel plus an unknown number of academics. Were porcupines so scarce through that time that these early naturalists failed to see them? Or were they considered to be so mundane as to not merit a nod from any professional? The south end of the Black Range, the grasslands surrounding it, and the riparian drainages running down its hillsides all look like good porcupine habitat. I couldn't accept the notion that they weren't or aren't here. So I began to ask folks who should know.

Lonnie Rubio is my age and grew up in Hillsboro. His father was the highway maintenance man on the state highway (now NM-152) across the Black Range for over 20 years. Lonnie spent a lot of time riding back and forth along that road with his dad, then took over the same job when his father retired. Between the two of them, they represent some 40 years cruising that highway almost daily. And Lonnie can add another 25 or so since he retired. In addition, Lonnie covered the highways east and south of Hillsboro. When asked about porcupines, he said that he didn't remember ever seeing one west of Hillsboro, which would be the stretch of road through the forest habitats, the area one would most expect to see porcupines. He remembered seeing them occasionally along Highway 27 near Jaralosa Creek. So, at least we've got them moved into Sierra County.

I also queried Steve Dobrott, who managed the Ladder Ranch for 27 years and Tom Waddell, who managed the Armendaris Ranch for some 25 years. Neither of them ever saw a porcupine on those extensive ranch properties. Randy Gray, a retired wildlife biologist who has lived south of Hillsboro for some 20 years, said he's seen only one, and that was a road kill on Highway 26 west of Hatch—not in Sierra County, but at least nearby.

Next, I contacted Mike Root, a houndsman and lion hunter who lives near Cuchillo. If anyone will find evidence of porcupines, it will be a lion hunter. Mountain lions are known to kill and eat porkies, given the chance, and hounds are notorious for attacking porcupines, at least until they learn better. A lion hunter should find occasional kills and almost inevitably will find himself extracting quills from the noses of young hounds. Also, he'll find quills in lions he skins for his clients. Mike said that in the years he has hunted out of Cuchillo, he has had only one dog come in with quills, and he's never trailed a lion to a porcupine kill. However, about five years ago, he experienced a brief surge of porcupines near his home property on Cuchillo Creek.

Over a short period, 5 porkies showed up around his place. He's not seen any since. So, it seems that porcupines have been scarce in this part of the Black Range and the remainder of Sierra County for a long time.

Fast forwarding through my own experience subsequent to that summer in 1956. I spent the years between 1957 and 1969 living and working in Sonoran Desert habitats. Porcupines would have been an extreme rarity, and I remember seeing none. From 1960-1963, I was doing white-tailed deer research in the forests near Moscow, Idaho. Porcupines were common and seeing them was not worth comment. As a wildlife research biologist for Arizona Game and Fish Department (1963-1990), I never saw anything

approaching the density of porcupines that we, as unknowing students, had observed in 1956. Later, in 1990, I spent a couple weeks in New Brunswick searching for Puma sign. I found no sign of the cats, but quickly realized that porcupines were ubiquitous. All of my subsequent work occurred in the northern half of Arizona, mostly in forest or chaparral habitats suitable for porkies. For 8 years, I trailed mountain lions with hounds, all in potential porcupine habitat. The times our dogs came in with quills can be counted on one hand. We never trailed in to a porcupine kill. Between 1991 and 2001, I lived in a riparian/grassland habitat north of Prescott, Arizona, after retiring from the department; porcupines showed up perhaps three times. I once found a den in a rocky outcrop in grasslands. I vaguely remember seeing perhaps a half dozen road kills during the past 60 odd years of driving around the Southwest. The species isn't abundant.

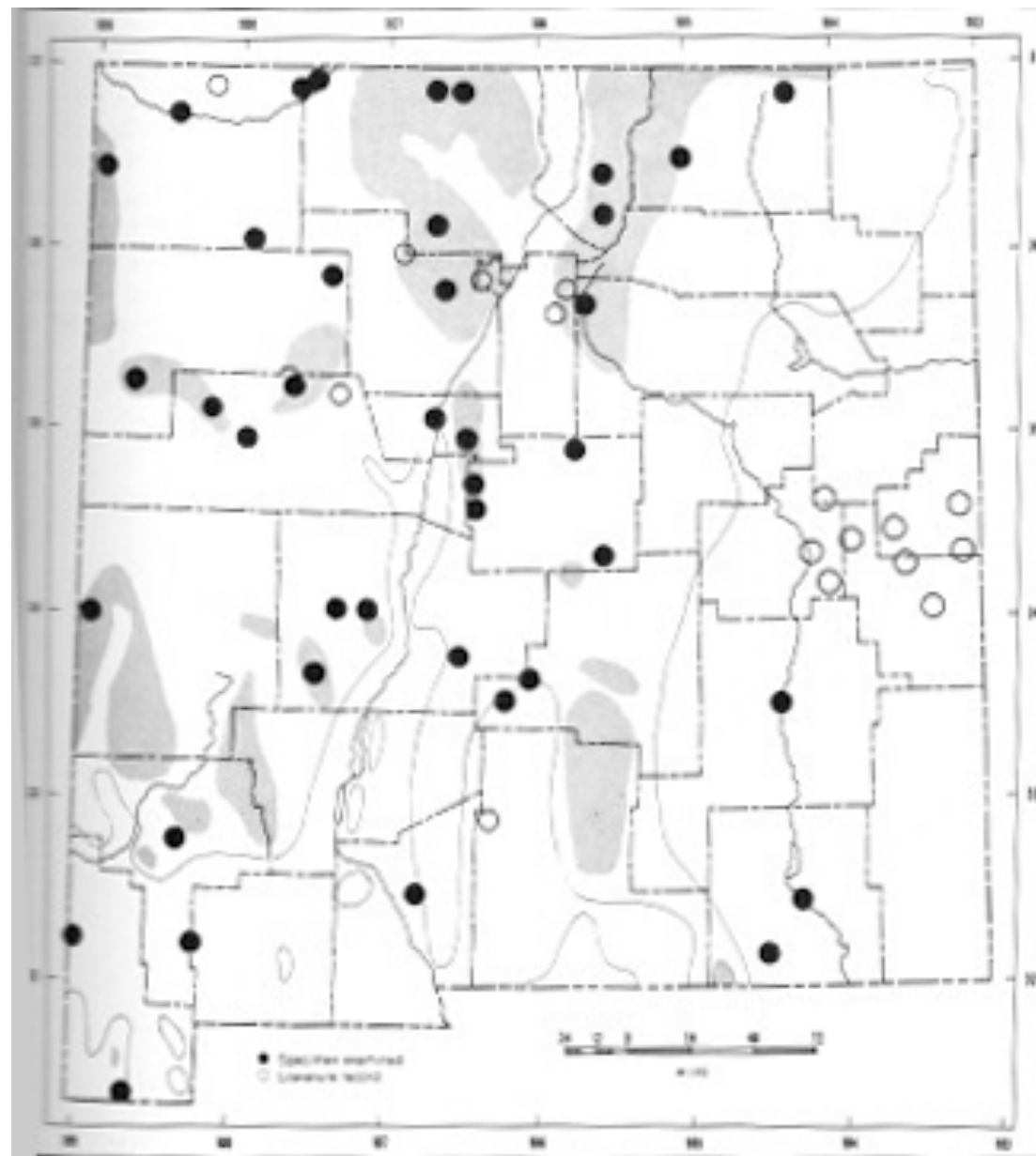


Figure 1. Porcupine records for New Mexico (Findley et al. 1975)

The only serious field study of southwestern porcupines was carried out by Dr. Walter P. Taylor in the early 1930s.³ Taylor did his studies on the Fort Valley Experimental Forest northwest of Flagstaff, Arizona. His report is too long to summarize here, but I think it is safe to conclude that porcupines were common. Concurrent with Taylor's research were ongoing efforts to control porcupine numbers. We have no estimate of how many porcupines were killed in the forested areas of northern Arizona during the first half of the 20th century. However, if control efforts started in or before the 1930s and were still going strong when we encountered large numbers in the 1950s, we might conclude that they weren't all that effective. The next significant summary of information on porcupines was published in 1989 by Uldis Roze of Queen's College.⁴ An updated distribution map, dated 1982 and compiled by W. E. Dodge, expands the range of the porcupine southward into northern Mexico. Finally, a 1999 paper by Rurik List, Gerardo Ceballos and Jesús Pacheco⁵ documents records of porcupines as far south as Ceballos, Durango, Mexico (26°31'N, 104°03'W) and includes Pleistocene occurrence as far south as Arroyo Cedazo in Aguas Calientes (21°52'N, 102°17'W). This series of maps might be construed as documenting an expanding porcupine range, but this most certainly is not the case. They represent increased awareness of the species and more accurate documentation of existing populations. In fact, List et al. postulate that porcupines were more abundant at the southern extent of their range during the Pleistocene and that current scattered occurrences are Pleistocene relicts.

More recently, mountain lions and black bears have been implicated in reduction of porcupine numbers.^{6,7} Taylor, in his early study, also considered pumas as a significant factor in controlling porcupines. Without solid, on the ground studies, these papers provide only hypotheses. Additional sources of mortality might be owners of working dogs: ranchers with stock dogs, lion and bear hunters with packs, and game bird hunters. Valuable dogs with faces full of quills do not contribute to the popularity of porkies.

One aspect of porcupine decline in their southern ranges that hasn't been considered is the effects of climate change. If the small clusters of porcupines at the south end of their range are truly Pleistocene relicts, then we might expect a continuing decline in porcupine numbers with warming and drying trends.

In retrospect, thinking about the high densities of porcupines we saw on the Mogollon Rim in 1956, I realized that the Southwest was at the tail end of one of the most severe droughts in recorded history. Were we, perhaps, seeing a concentration of porcupines in the wetter meadows, along with more severe usage of tree bark as a result of drought-caused food shortage? We'll never know.

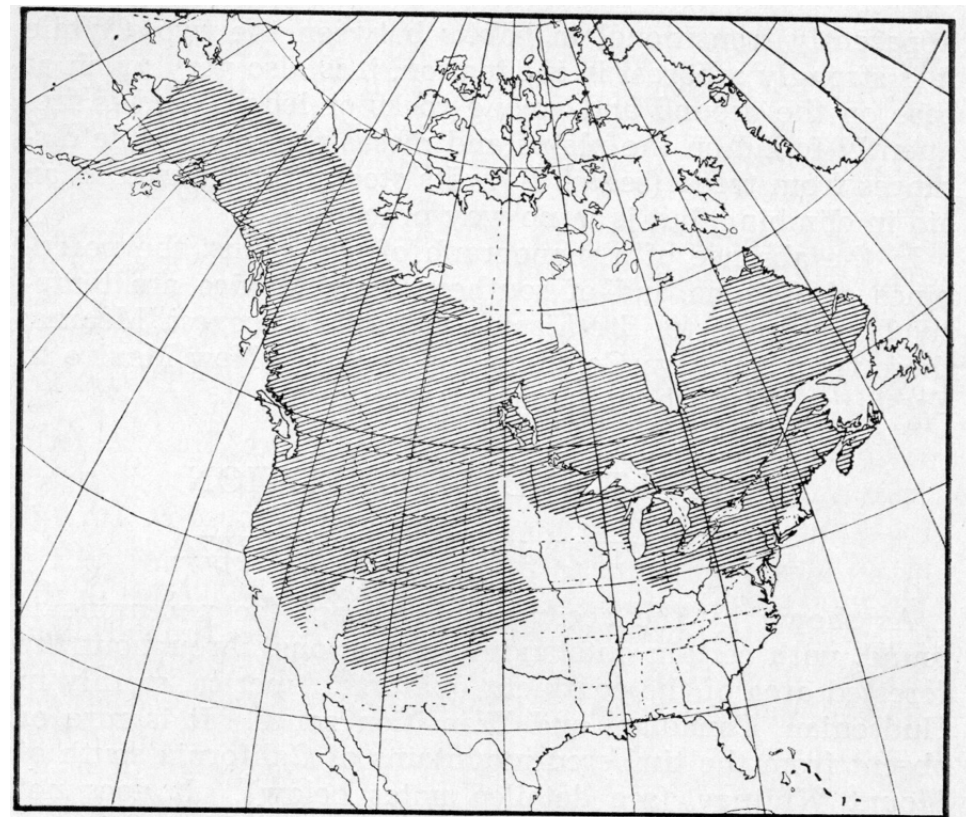
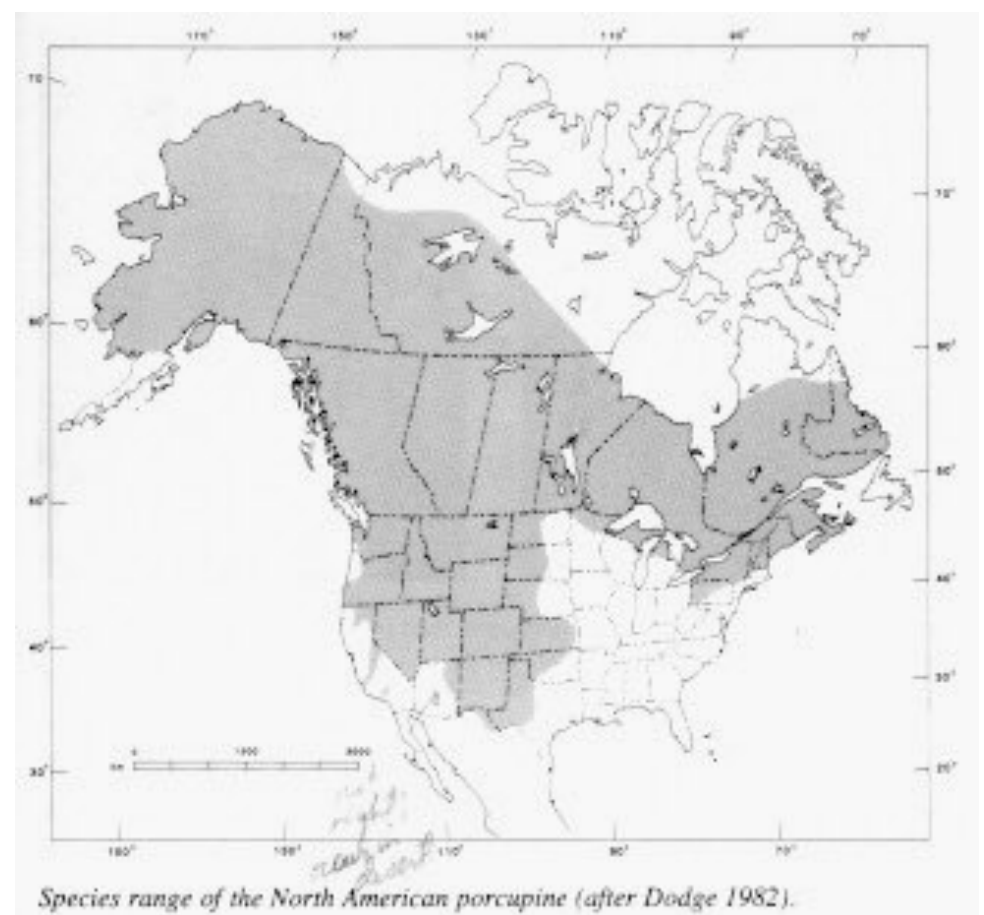


Figure 2. Approximate 1935 distribution of porcupines. U. S. Biological Survey. Taylor, 1935.



Species range of the North American porcupine (after Dodge 1982).

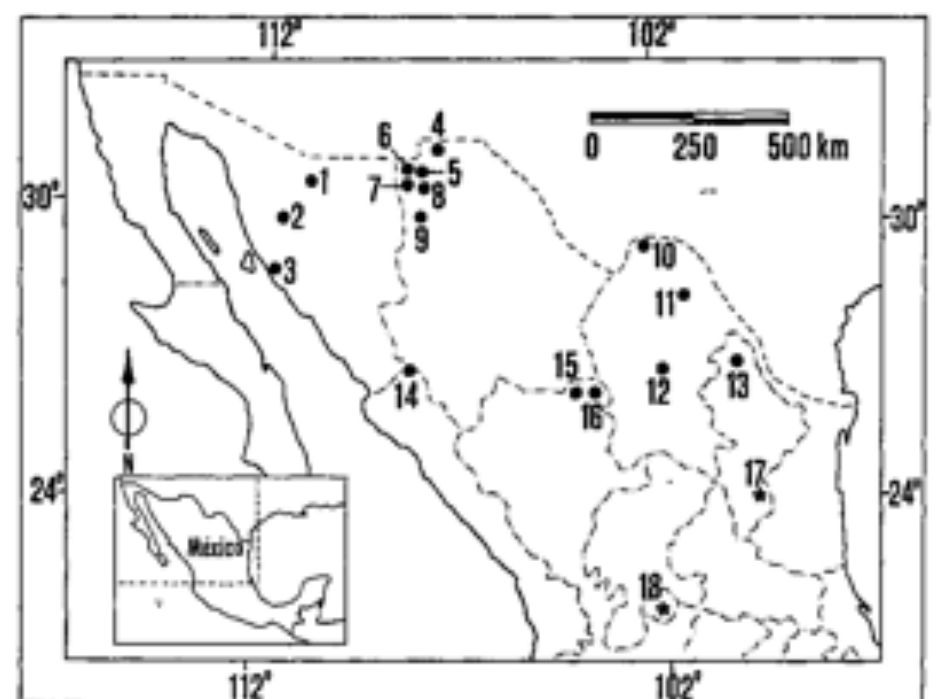


FIG. 1—Distributional records of the North American porcupine (*Erthizon dorsatum*) in Mexico. Pleistocene records are marked with a star.

The take home message here, I guess, is that sighting a porcupine in our area is a noteworthy event and should be recorded. Perhaps the Black Range Naturalist can become an unofficial repository of records for southwest New Mexico, creating at least an anecdotal history of the occurrence (or lack) of the species. Ergo, if you see a porkie, let us know (email [Harley Shaw](mailto:Harley.Shaw)).

1. <https://tw.sclivelearningcenter.com/MVSite/MVVideo.aspx?SessionID=244937&presentationID=130206>
2. Findley, J. S, A. H. Harris, D. E. Wilson, and C. Jones. 1975. Mammals of New Mexico. University of New Mexico Press.
3. Taylor, W. P. 1935. Ecology and Life History of the Porcupine as Related to the Forests of Arizona and the South-western United States. University of Arizona Biological Science Bulletin No. 3. University of Arizona, Tucson.
4. Roze, Uldis. 1985. The North American Porcupine. Smithsonian Institute Press.
5. Rurik List, Gerardo Ceballos and Jesús Pacheco. 1999. Status of the North American Porcupine (*Erethizon dorsatum*) in Mexico. The Southwestern Naturalist, Vol. 44, No. 3 (Sep., 1999), pp. 400-404.
6. Brown, D. E. and R. D. Babb. 2009. Status of the Porcupine (*Erethizon dorsatum*) in Arizona, 2000-2007. Journal of the Arizona-Nevada Academy of Science, 41(2):36-41.
7. Sweitzer, R. A., S. H. Jenkins, and J. Berger. 1997. Near-extinction of porcupines by mountain lions and consequences of ecosystem change in the Great Basin Desert. Conservation Biology 11(6):1407-1417.

To Kill a Bumblebee

by Bob Barnes

Most people would describe human-induced climate change as global warming, meaning that the mean temperature is rising. That is certainly one aspect of the phenomenon. One that I have observed first-hand. Watching a favorite glacier melt away is not something that is normal, it most certainly is not supposed to happen in one's life. But it has.

But human-induced climate change has myriad ramifications, not just the rise in mean temperature. Take for instance the increase in ocean wind and ocean current speed which has been documented over the last three decades.^a These findings will have to be affirmed, a process which may take a decade, but are likely a causal factor in the

increase in weather variability we are experiencing worldwide. Humans have a lifespan which under normal circumstances is not sufficient for them to experience fundamental changes (geologic, climate, etc.). In the case of exploding mountains, I was lucky enough to experience the Mt. St. Helens event, as to receding glaciers, I have been unlucky enough to see this as well. The changes can be dramatic and impossible to ignore unless you are incredibly obtuse.

My assessment on the rate and degree of extinction that we are creating has been driven by an assumption that mass extinction will be a matter of geography. Plants and animals are forced up the mountains and northward as the habitat they are matched to shrinks in size; and they are not able to evolve at a fast enough rate to use other habitat types.

It appears that I have been too optimistic. I had been waiting for the results of a study on bumblebee population declines for quite awhile. The rumors about the study were discouraging, and when the results were finally published^b the discouragement was oppressive. So easy to write off a bee, not so easy when the evidence increasingly points to cataclysm.

Jon Bridle and Alexandra van Rensburg's summary^c of the study starts with:

"In 1949, environmentalist Aldo Leopold wrote that 'one of the penalties of an ecological education is that one lives alone in a world of wounds'¹. Seventy years later, biologists no longer witness such wounds in solitude. Instead, there is evidence every day of how the behavior of a wealthy minority² has created unsustainable rates of biodiversity loss and climate transformation³. Now . . . Soroye et al. demonstrate widespread declines in bumble bee species that are better explained by the frequency of climate extremes than by changes in average temperature . . . (underline added)"

1. A. Leopold, *A Sand County Almanac*, Oxford Univ. Press, 1949
2. I. M. Otto, K. M. Kim, N. Dubrovsky, W. Lucht, *Nat. Clim. Change* 9, 82 (2019)
3. S. Diaz et al., *Science* 366, 1327, (2019)"

It was the underlined portion of the introductory paragraph of the summary which took me aback. We are clearly seeing more dramatic weather and greater variability in our weather. And now there is increasing evidence that changes in the oceans are going to make that variability even more extreme. And, there are many species which will not be able to deal with the variability of that weather - in the case of bumblebees, variability in temperature - much less the increase in temperature.

The study, by Peter Soroye, Tim Newbold, and Jeremy Kerr^b

appears to be well constructed and well controlled. A basic assumption of the study is that *"variation in species' extinction risk or chances of colonizing a new area determine whether species' ranges expand or decline as new climatic conditions emerge"*.

The study controlled for *"non-detection bias (difficulty distinguishing among true and false absences due to imperfect detection)"*, variability created by geographic zones, land utilization, and variability of regional/local temperature and precipitation changes.

They note that *"temperature and precipitation can affect bumble bee mortality and fecundity directly and indirectly through changes to floral resources . . . (they found that) evidence of precipitation influencing site occupancy was mixed, but declines were more likely in sites that became drier."*

They found that bumble bee populations declined by 46% in North America and 17% in Europe (comparing populations measured between 1901 - 1974 and those measured between 2000 - 2014). See the graphic, from the supplementary information associated with the article, below right.

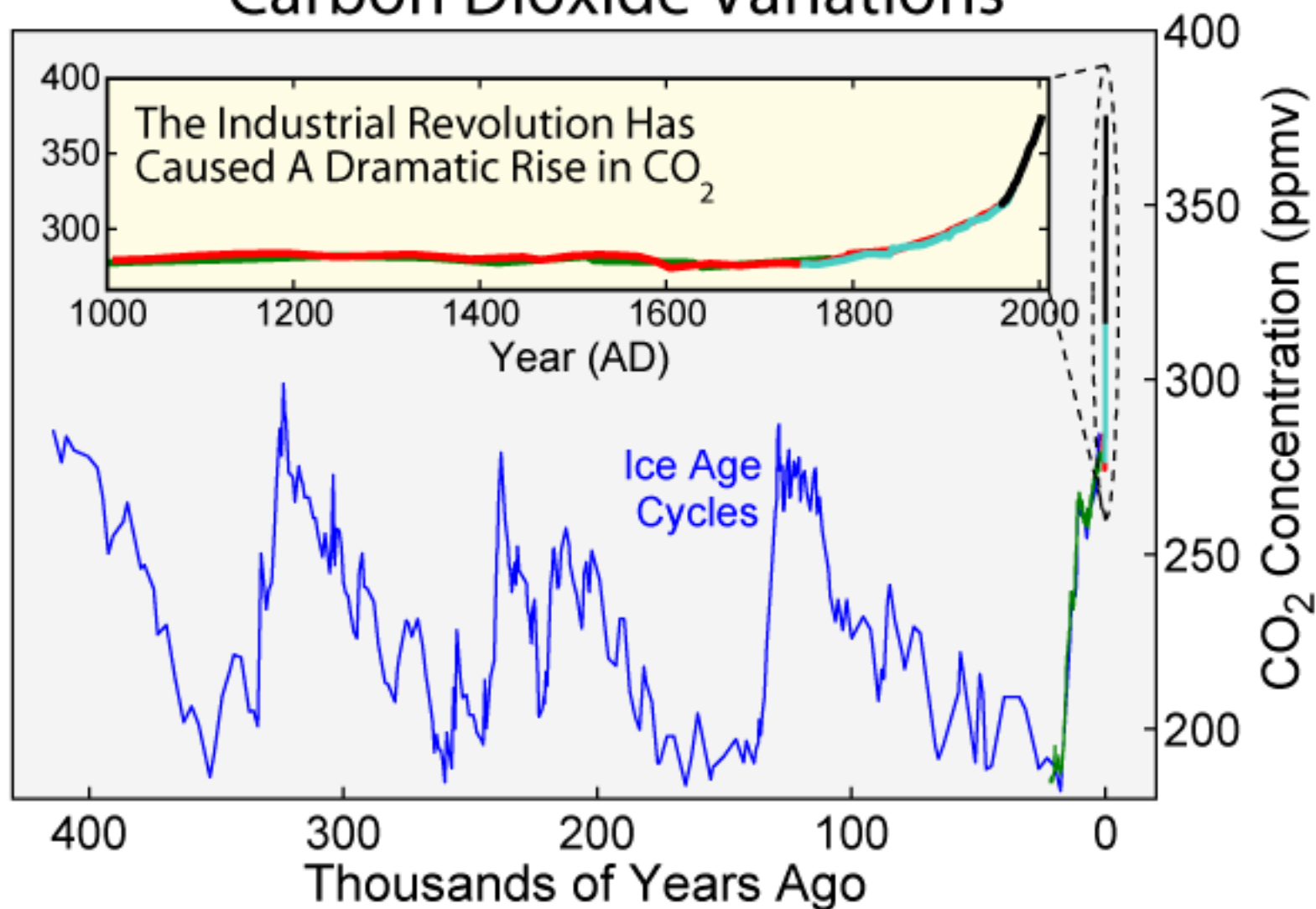
Furthermore, they found that *"declines among bumble bee species relate to the frequency and extent to which climatic conditions approach or exceed species' historically observed climatic limits, particularly for temperature."*

The study noted that *"agricultural intensification, pesticide use, and pathogens, can also affect"* bumble bee populations and that *"interactions between these factors are expected to accelerate biodiversity loss for bumble bees and other taxa over broad areas"*.

In regard to land use, the study indicated a *"significant negative effect but did not influence results for climatic position variables."*

Changes in the level of CO₂ in the atmosphere that we have created have caused extinctions and will result in massive extinctions of life on earth.

Carbon Dioxide Variations



This figure shows the variations in concentration of carbon dioxide (CO₂) in the atmosphere during the last 400 thousand years. Throughout most of the record, the largest changes can be related to glacial/interglacial cycles within the current ice age. Although the glacial cycles are most directly caused by changes in the Earth's orbit (i.e. Milankovitch cycles), these changes also influence the carbon cycle, which in turn feeds back into the glacial system.

Since the Industrial Revolution, circa 1900, the burning of fossil fuels has caused a dramatic increase of CO₂ in the atmosphere, reaching levels unprecedented in the last 400 thousand years. This increase has been implicated as a primary cause of global warming. Wikipedia

And lastly, perhaps forever, *"overall rates of climate change-related extirpation among species greatly exceed those of colonization, contributing to pronounced bumble bee species declines"*. Bumble bees are not able to evolve or inhabit new territory fast enough to escape the quickly escalating changes in temperature variability.

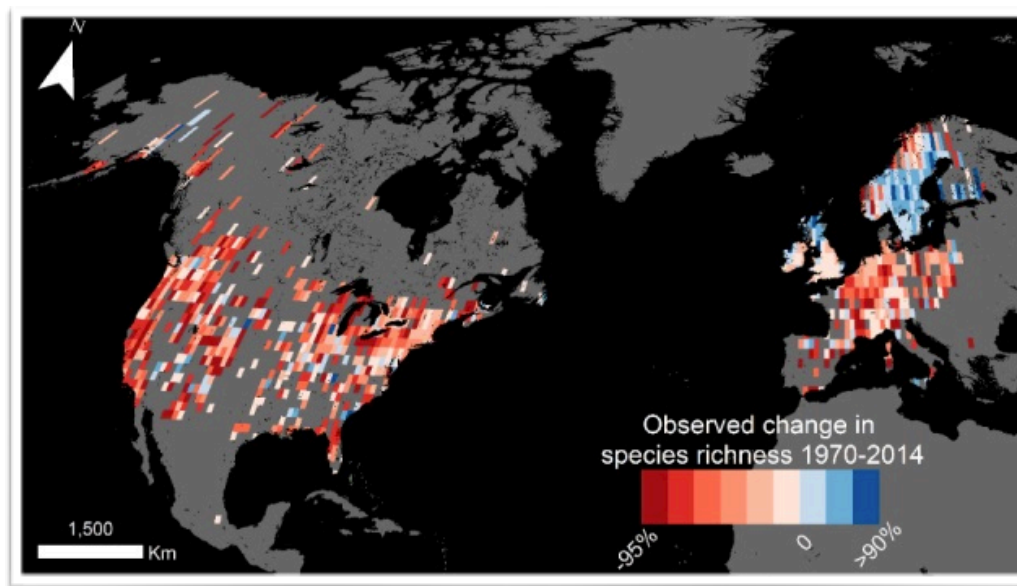


Figure S10. Percent change in observed bumble bee species richness across North America from the 529 baseline (1901-1974) to recent period (2000-2014). Grid cells shown are 100 km by 100 km, in an equal 530 area projection.

The Sonoran Bumble Bee, *Bombus sonorus*, pictured on the back cover of this issue - and found in our area - was not a species included in this study, as such. *Bombus sonorus* is considered by some authorities, including the authors of this study, to be included within *B. pensylvanicus* - which was included in the study. Other species from our area include, but are not limited to, *B. centralis*, *B. fervidus*, *B. appositus*, *B. auricomus*, *B. insularis*, *B. morrisoni*, *B. occidentalis*, *B. flavifrons* . . .

- a. "Climate Change Spurs Global Speedup of Ocean Currents - Rising winds boost flows in tropics and Southern Ocean" by Paul Voosen, *Science*, 7 February 2020, pp 612-613, Volume 367, Issue 6478.
- b. "Climate Change Contributes to Widespread Declines Among Bumble Bees Across Continents" by Peter Soroye, Tim Newbold, and Jeremy Kerr, *Science*, 7 February 2020, pp. 685-688, Vol. 367, Issue 6478.
- c. "Discovering the Limits of Ecological Resilience - Bumble Bee Declines Reveal Species Pushed to the Edge of Their Environmental Tolerances" by Jon Bridle and Alexandra van Rensburg, *Science*, 7 February 2020, pp 626-627, Vol. 367, Issue 6478

Never Kiss a Walapai Tiger by Harley Shaw

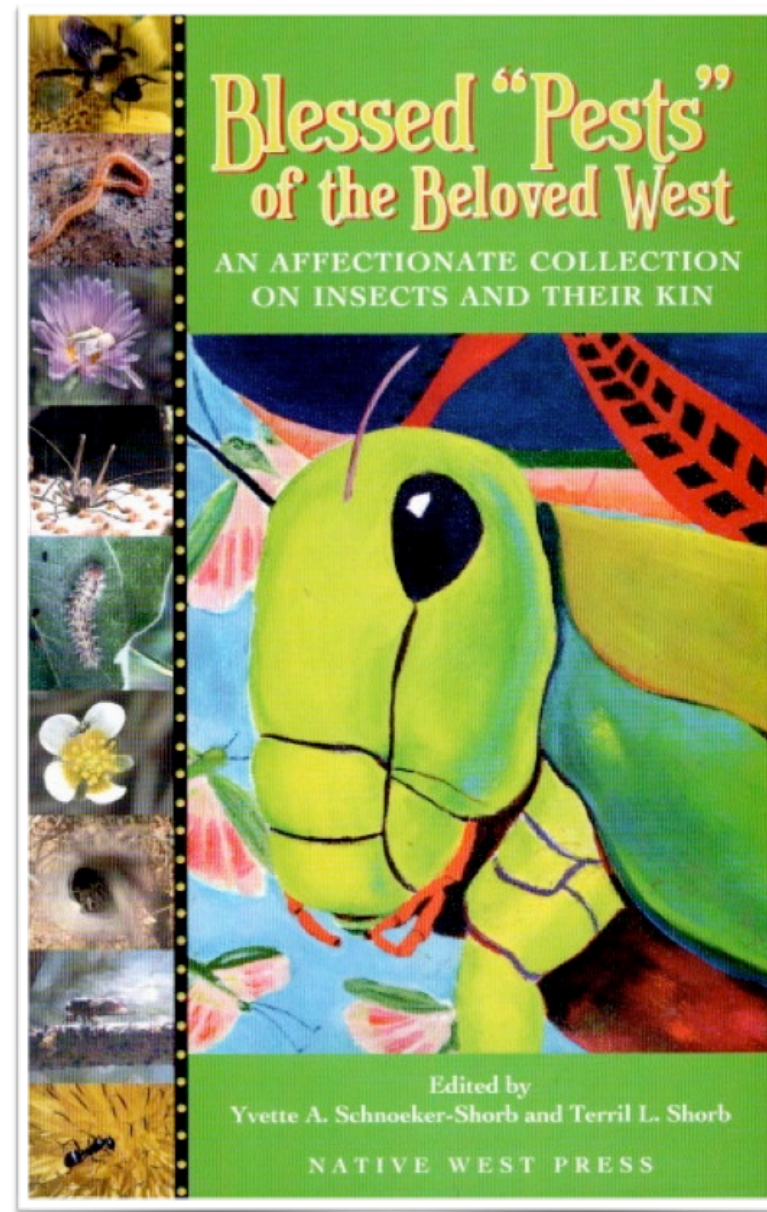
I was sleeping deeply, lusciously, without dreams. The kind of sleep we all wish for when we retire each night. Suddenly the bedroom light came on and the quilt was jerked violently from my body. My heart was instantly pounding, even before I was full awake. Was this the KGB, the CIA, or the FBI bursting into my room so rudely? What could possibly bring about such an intrusion in the wee hours?

In truth, by the time I was half awake, I knew who had perpetrated the attack. And I knew the culprit being pursued wasn't me. The "agent" worked for no government enforcement bureau. In fact, seconds earlier, she had been snuggled alongside of me, deep in her own slumber. Yes, the person who had mounted such a violent attack was my wife, Patty. The villain she pursued was a creature, plain and simple, that was less than one inch in length and looked something like the harmless "squash bug" that lives in most folks' gardens.

But this bug was not quite so harmless, and at least one of its local names, Walapai tiger, betrayed its true nature. I had heard of this secretive insect during most of my youth, usually under the name of kissing bug. This name apparently derives from the fact that it often bites people when they are covered up in bed, hence many bites occur

on the face. The lips appear to be particularly tasty. I would say that it is a long reach, however, to call its bite a kiss.

Later, when I took an entomology course in college, I heard



This article originally appeared in "[Blessed 'Pests' of the Beloved West](#)" (available at [this link](#)).

the insect called a cone-nosed bug. Some people call it a cone-nosed beetle, but beetle it is not. It belongs to the order of true bugs and is classified more narrowly within the group called assassin bugs. Insofar as humans are concerned, it may be the only member of this group that earns its name.

Only after Patty and I met did I develop the habit of calling it a Walapai tiger. That was its most common name around Oracle, Arizona, where Patty had spent her teen years. Even though I had spent much of my life camped out in desert habitats where this insect lives, my experience with it was nil. Outside of the entomology class collections, I had never knowingly seen one. I had never, as far as I knew, experienced its "bite", which is actually a swollen and elongated bump that raises around the point where the creature inserts its proboscis to suck the blood of its selected prey. Said prey can be most any mammal including packrats, raccoons, dogs, and humans.

Once Patty and I camped in the desert, and Walapai tigers regularly visited our camp, usually with the goal of joining us in bed. Patty, not given to such a *menage a trois*, had an uncanny ability to sense their presence and always reacted

instantly. She said she could smell them. I'm convinced she did. I'm also convinced that she could have a light shining and covers ripped from the bed before she bothered to become awake. She was infallible. When she irrupted in such a manner at midnight, we always had a "Wally" in the fold of our sheet or under a pillow.

Such violent late-night behavior was not irrational. Patty has ample reason to dislike "Wallies" inhabiting our bed. Any time she fails to detect one quickly enough, it sinks its proboscis into her and leaves a stinging, itching bump that lasts for days. Fortunately, Patty seldom reacts more strongly, but her mother once had a reaction that provided ample reason to fear the Wally's kiss. She went into shock and passed out. Her blood pressure dropped to near zero. A dose of Benadryl counteracted the symptoms long enough to get her under medical care. Even so, she suffered for months from a variety of physiological responses to the bite.

The University of Arizona Agricultural Extension Service provides the following description of our southwestern species of Wally:

Adults are 1/2 to 1 inch long, brownish black, broad, flat but stout bodied, with 6 reddish-orange spots on each side of the abdomen, above and below. It has an elongated, cone-shaped head. The beak is slender and tapered and almost bare. It is folded back under the chest when not in use. Its wings are normally folded across the back while resting or crawling.

Wallies require a blood meal in order to lay eggs. They "nest" in dens of warm-blooded mammals, such as packrats and raccoons. They can fly and are attracted to light when searching for a victim. One of the best ways to attract Wallies is to read in bed during warm months. Their flattened body allows them to squeeze through small openings; therefore, only the tightest of houses will keep them out. They often hole up in debris, hence can inadvertently be carried inside with firewood.

When I was growing up, I heard a lot about "kissing bugs" being carriers of encephalitis. I find nothing about such a thing in the literature now, but the Latin-American version of the Wally carries an equally dreaded malady known as Chagas disease. Named after the man who described it, this disease is introduced into the bloodstream of a Wally's victim as a result of the insect's habit of defecating near the site of the bite. Irritation caused by the bite brings the victim to scratch the site, thereby rubbing the fecal material into the wound or transmitting it to the eyes or mouth. Chagas is considered to be one of the most serious human diseases in the American tropics and subtropics. Its initial symptoms are high fever, edema, and nervous disorders. If the victim survives the first attack, the disease enters a chronic phase, which may last 10-20 years. The trypanosome disease organism invades and destroys cardiac, integumentary, and nervous tissue. Victims may ultimately die due to cardiac failure resulting from such

damage. Some historians have speculated that Charles Darwin contracted Chagas disease when he intentionally allowed a cone-nosed bug to bite him during his Beagle voyage. His symptoms in later life apparently fit within those described for Chagas. This disease does not occur in Arizona, but it has been documented in Texas.

As I said, insofar as I know, I've never been bitten by a Wally. This makes me suspect that some people just don't smell or taste good to them.

From a purely anthropocentric viewpoint, it's not easy to find anything nice to say about Wallies. If we could shed our anthropocentricity, we might say that Wallies have value in that they give us value. That is, we are useful because we provide an occasional meal for another species, I wouldn't try to sell that argument at the local Chamber of Commerce.

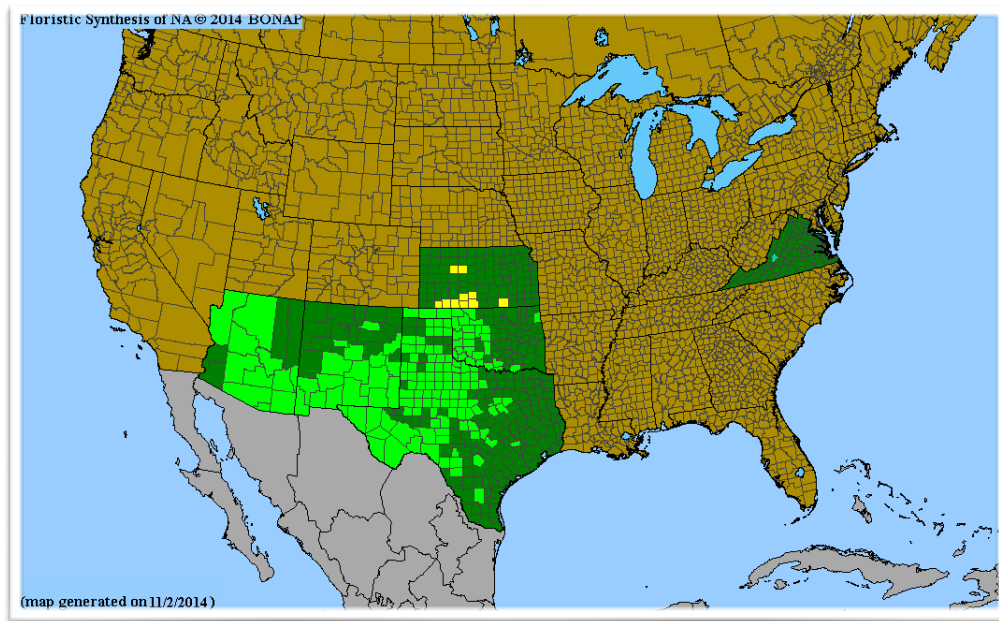
There are a few things you can do to avoid being bitten by Wallies. First, don't build a house in good woodrat habitat. Wallies may be happy to have you in the neighborhood, but many other creatures would just as soon have their habitat left intact. Second, keep a bright light shining away from your home during the warm months and minimize night lighting in your house. Avoid reading in bed. Finally, keep a close watch on bedding used by pets. Wallies are known for spending their days under dog beds, for instance, and then traveling the short distance to the sleeping dog at night for a meal. If humans are sleeping nearby, Wallies may seek an occasional diversified diet.

An entomologist friend searched hard for kind words about Wallies, but after considerable thought, could only be positive about the fact that they eventually die. Obviously, one could make a case for their ecological role in preventing overpopulation of woodrats and, perhaps, other wild mammals. As an ecologist, I buy such arguments in principle, and feel that Wallies should be left alone in their native wilds. Unfortunately, we humans keep redefining the boundaries of the wilds as we build our homes more and more in the habitats of woodrats, hence Wallies and other predacious creatures. A truly positive role for Wallies would be to dissuade humans from contributing to urban sprawl. If you don't want Wallies, stay in town. Maybe the best thing about Wallies is that they help to keep humans humble. Based on this argument, we should wish for a boom in Wally populations.

Gordon's Bladderpod

From mid-March into April of this year, Gordon's Bladderpod blanketed large areas of the Nutt Grasslands along the southeastern edge of the Black Range. *Physaria gordonii* (A. Gray) O'Kane & Al-Shehbaz var. *gordonii* will often cover the lowland hills when there is ample spring rain, something that does not occur very often. In some sources it is still known as *Lesquerella gordonii*.

[The Biota of North America Program \(BONAP\) - North American Vascular Flora](#) and our "parent" website, [The Black Range](#), have an arrangement in which the Biota program can utilize the images of Bob Barnes which are shown on the website; in exchange we are allowed to use the range maps of BONAP without copyright concern.



The range maps, like the one shown above for *Physaria gordonii*, come in many flavors and are extremely useful if you have an interest in botany. The map above shows the range of this species to the county level; in this case the green shading indicates that the species is native to the county indicated.

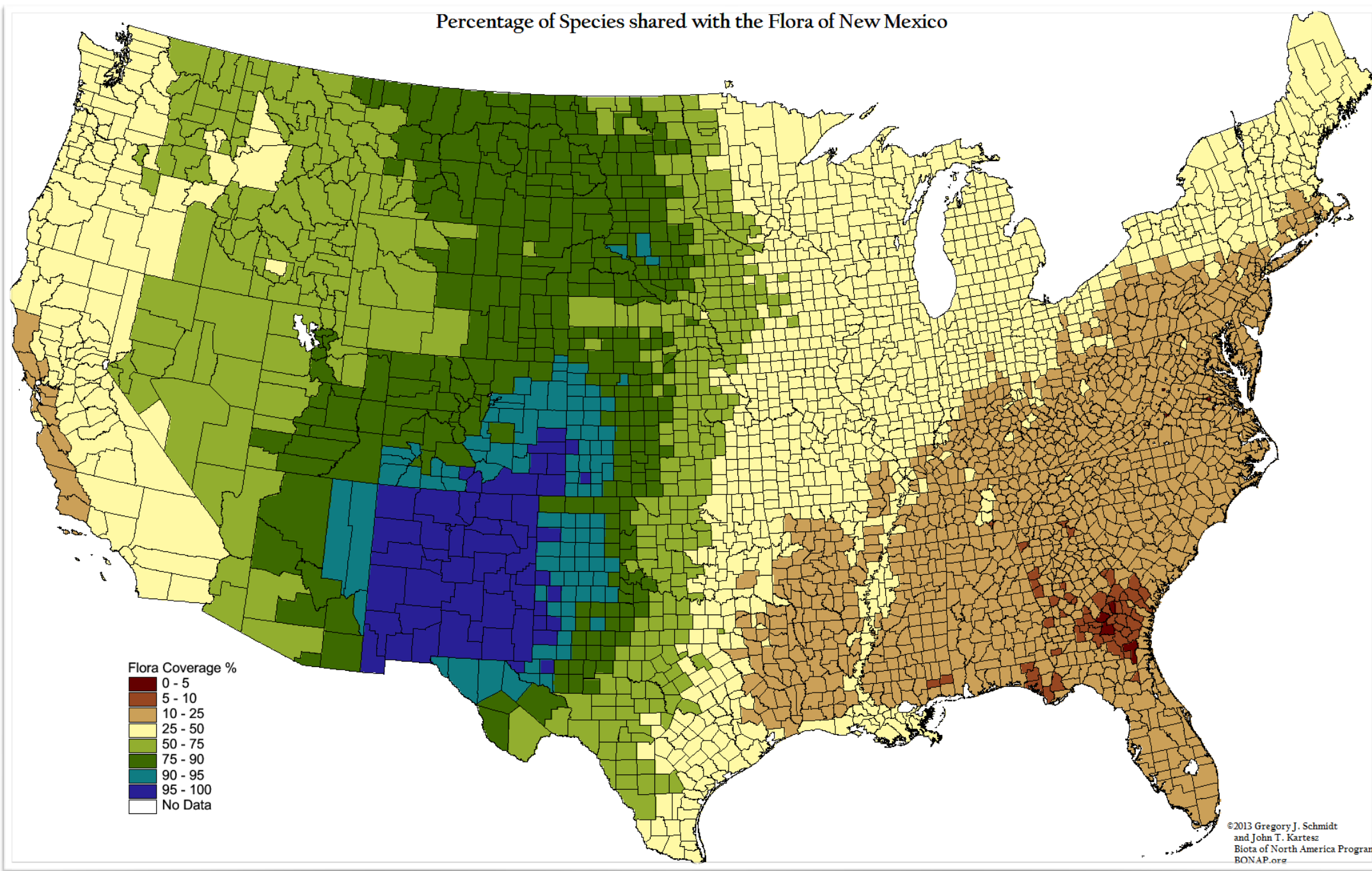
The [Floristic Similarity Maps of Native Species](#) is a new series of maps presented by BONAP. To say that it is informative is an incredible understatement. In technical

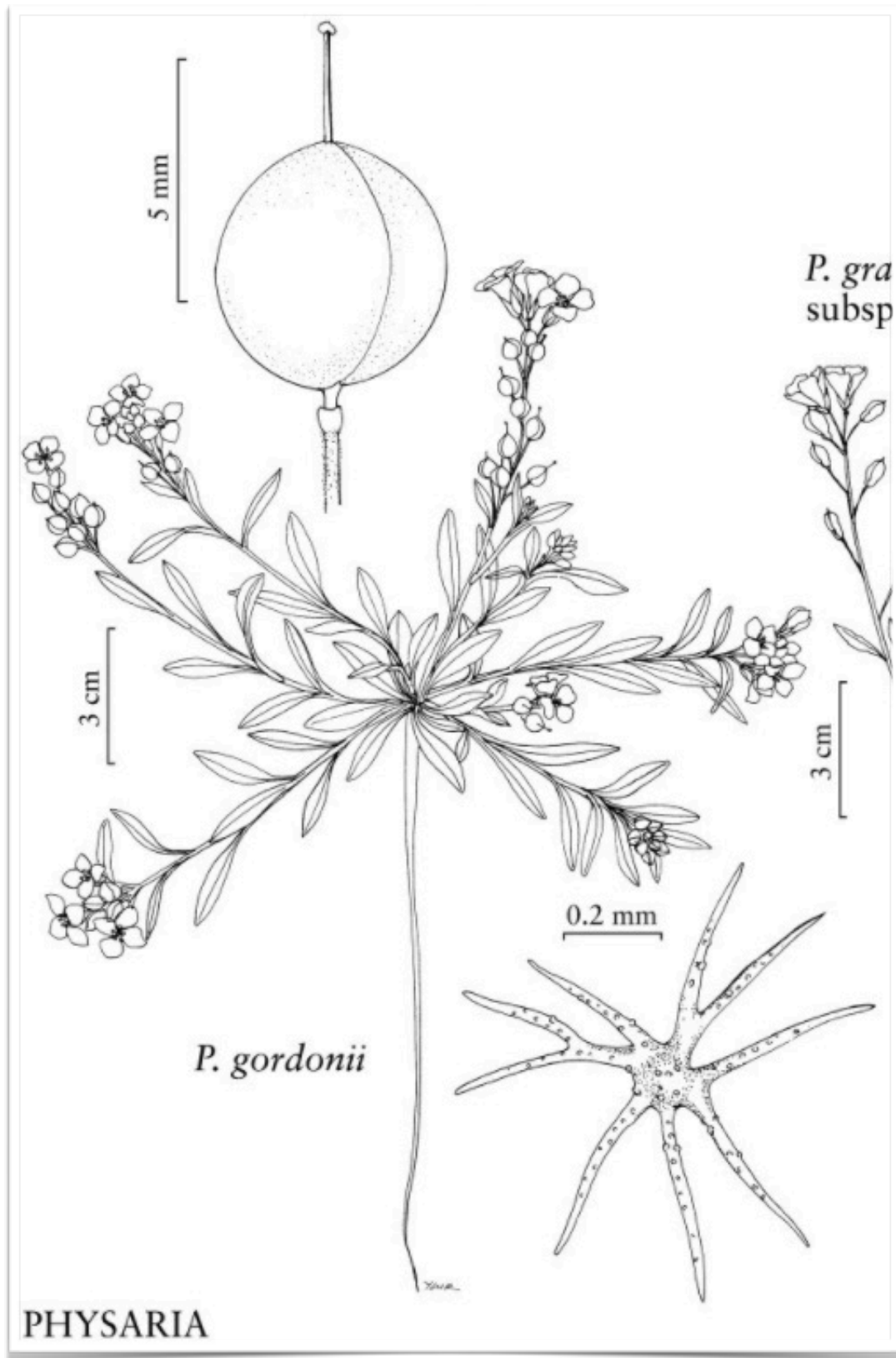
terms it "blows my mind" (or at least what is left of it). The map below shows the similarity of the flora of New Mexico to all counties in the United States. The lower percentage of similarity that is depicted as you move away from the state is anticipated, but the pattern of that variability is "way cool", as cool as the Hillsboro Quadrangle Geologic Map which hangs on my wall. Want to see a set of flora as different from where we live as possible (in the US)? Go to Georgia. Maps showing these distributions are available for regions and states - see the link.

Perhaps the iconic source of information about the flora of the Black Range is found at the [Vascular Plants of the Gila Wilderness](#). Its page on Gordon's Bladderpod is linked to [here](#).

[SEINet's site on the flora of Arizona and New Mexico](#) is full of information from many sources and is definitive. Its page on the subject species is linked to [here](#).

And, although there are many other sources of information, there is the [Flora of North America](#). Among other things, it notes that the range of *Physaria gordonii* extends into Chihuahua and Sonora. Flora of North America is rich in resource, including a [comparison of this and other Physaria species](#). A detail from a comparison graphic is shown at the top of the following page. Their page on the genus includes [a key to species](#).





Photographs above and below, *Physaria gordonii*, Gordon's Bladderpod, Nutt Grasslands east of Cooke's Peak, New Mexico, March 22, 2020.



House Sparrows Constructing Nests in Active Red-Tailed Hawk Nest

by John Hubbard

On 10 April 1982, I watched as at least one male and two female House Sparrows (*Passer domesticus*) carried nest materials into the underside of an active Red-tailed Hawk (*Buteo jamaicensis*) nest. The latter was located near Alma, Catron County, New Mexico, about 15 m (49.5 ft) up in a leafless Arizona sycamore (*Platanus wrightii*). The observations were made at a distance of 200-300 m between 0840 and 0900, during which time an adult Red-tail sat apparently incubating.

The hawk nest was supported on its sides by several main branches of the sycamore, but it was largely exposed on the underside. I estimated it to have been about 78 cm (30 in) in diameter and 52 cm (20 in) high. It was constructed of large sticks, probably mainly from the sycamore and adjacent oaks (*Quercus griseus*). The nest was at least two years old, and it appeared somewhat larger than typical nests of Red-tails in the area.

During some 15 min under my observation, the sparrows made numerous flights into the bottom of the hawk nest. These forays typically were from the lower parts of the sycamore, and the sparrows were seen to glean twigs and leaf petioles from that tree for their nest construction; it was my impression that at least two sparrow nests were being constructed, but at the time of my observations the sparrow nests were not visible as entities separate from the hawk nest. However, a closer approach might well have revealed them. The male sparrow occasionally perched near the top level of the hawk nest, but the females mainly remained lower. The incubating Red-tail appeared to ignore the smaller birds.

The advantage to the sparrows of nesting in an active Buteo nest appears obvious: the presence of the hawks would likely discourage or negate attacks by predators, such as accipiters (*Accipiter* spp.). By selecting the bottom of the nest, the sparrows probably would have been safe from the Red-tails themselves, had the latter shown any interest in preying on the smaller birds.

That such protection is assured might be questionable, not only in regards to the Red-tails--which might find fledgling sparrows easier prey than nest contents or adults--but for other birds as well. For example, as I watched the events described above, I saw a Scrub Jay (*Aphelocoma coerulescens*) land in the sycamore and approach the hawk nest. It is possible that a jay might be ignored by the Red-tail(s) to the extent that it could successfully attack and rob the sparrow nests. Thus, small predaceous birds, especially non-raptors such as the Scrub Jay, may circumvent the sparrow-hawk nest system. Nonetheless, one can see the

benefit to the sparrows from the association as far as other raptorial species may be concerned.

This article originally appeared in the *New Mexico Ornithological Bulletin* 10(3):51-52, 1982.

On Pestering Elk by Taylor Streit

Much of my guiding career was working out of Chama town. I would often retreat to the roadless area, just a few miles to the north in Colorado, to escape the stress of guiding and get back into the real wilds.

I could carry on about any of a dozen tall tales from that magical place: like the broken ankle/bear/posse incident; the 18-inch cut caught two times in the same day by la goucha Sandra; the 24-inch brown wrestled bare-armed in nettles; the grouse of a thousand rocks; the lone elk that led Nick and me down a cliff face. But no, I will put those all in another book and give you readers the story of the frightened elk.

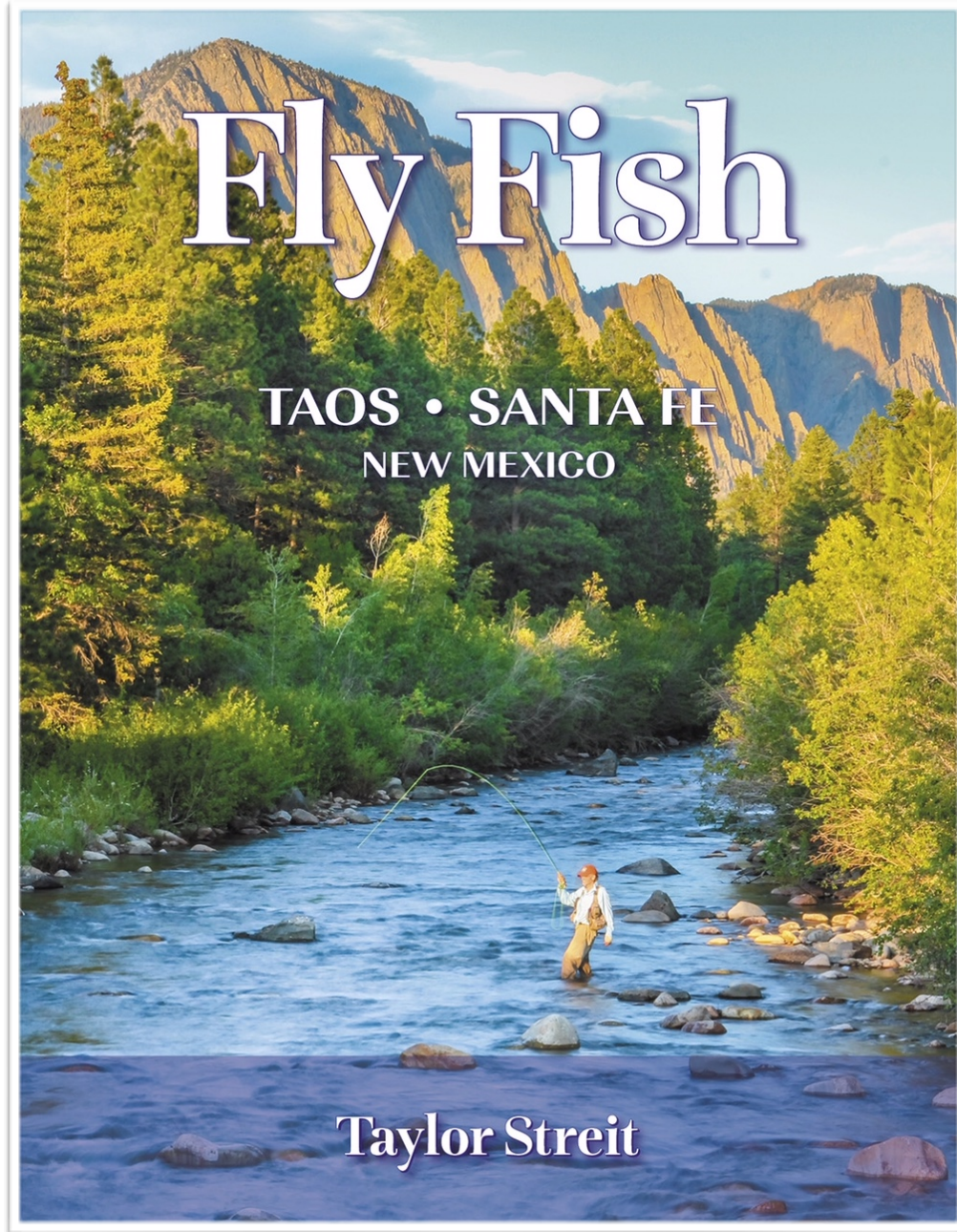
Seems my pal Jim Crowl and I were hiking up the Chama in Colorado one bright morning. So as to avoid beating brush and making river crossings, we were on the steep--but barren--side slope of the river. A mature cow elk was feeding below us. She was already close with her big butt facing us. We thought we would see how close we could get, and crept to within twenty feet or so. (This was long before I had ever been charged by an elk and didn't know how dangerous cows are in calving season. Or before I felt it wasn't right to pester critters you weren't planning to eat.)

We had drawn very close and right above her on the steep slope, and I picked up a pebble and tossed it on her back. She then lifted her head and sheepishly looked at us out of the corner of her eye. Her rear legs bent as if to spring. But, as all you woodsmen know, elk don't "spring," and the motion simply continued until she was flat down on the ground! Jim and I looked at each other in amazement, and instead of doing the right thing and walking away, human grandiosity took over. Instantly feeling guilty, we sat down beside her and soothed her with a heartfelt apology. (Although Jim and I had killed some great bulls the fall before, this kinder, Bambi-hugging side of us had arisen from some place inside us.) So we sat there at arm's length while she sat with her head up and pissed-her-self. It would be like three people taking lunch--at a small table.

After a half hour or so, we gave up on coaxing her to her feet (we did at least never touch her) and went on our way. After a day of stressing out many other poor critters--the trout--and exploring the wonderland of the upper Chama, we headed back to camp. Jim veered off and went back to the elk place and was happy to report that she was up and

and gone. No doubt, further back in the wilds to avoid meeting her worst nightmare—at least till hunting season.

My buddy Ray Milligan, who is a Chama elk outfitter and has had run-ins with thousands of elk, had never seen such a thing and believed the elk went into shock at the sight of two top predators ready to pounce on it—“despite your benevolent intentions,” he added.



Taylor Streit's new book will be published at about the same time that you receive this issue. He spends most of his time on the Caballo Reservoir these days.

Access - New Road Video

Gaining access to the Black Range is critical to its study. Typically, much of the enjoyment and study in the Black Range is done on foot. Getting to a good place to put on the boots is important. The Black Range Website includes [twenty-seven road videos](#) recorded in the Black Range. The latest addition to the listing is a journey along [Tierra Blanca Road](#), from NM-27 west and north for 12 miles to the trailhead of Forest Trail 134. Access to many areas of natural history interest is provided by the road.

B R E W
BLACK RANGE ENVIRONMENTAL WRITERS

Shelter in Place: Celebrating the 50th Anniversary of Earth Day

by Michelle Hall Kells

At the beginning of each semester, I tell my students that there are two guiding principles of environmental writing: we are always in nature and we are always in language. We cannot extricate ourselves from either nature or language. The verb “to environ” means to contain, to envelop. As human beings we embody and are embodied in both. Attunements to our environmental (natural and built-spaces) and awareness of our capacity for language (written as well as spoken) are critical to acquiring eco-literacy and becoming ethical stewards of this planet.

My goal in teaching environmental writing is to cultivate students’ consciousness of these two principles as they coalesce their own understandings of their relationships to place and belonging. Because of these key principles, I have strongly resisted the growing trend in higher education toward online teaching platforms with the abiding belief that education and environmental citizenship must be an embodied experience. As such, I have designed my environmental writing courses to include field exercises and regular participation with UNM Lobo Gardens.

Both of my paternal grandparents, Earl and Elma Hall, worked for the U.S. Forest Service during the 1930s throughout the Depression era building the national parks in California including Yosemite and Sequoia National Parks. Eco-literacy and environmental citizenship as a child was not so much taught as it was cultivated by lived experience wandering the redwood trails that surrounded my grandparents’ home in Oakland, California. I had the freedom to explore and to play alone in natural spaces along the creek bed watching the Steller’s Jays, raccoons, the wild berries and ferns along the stream.

This opportunity to just “loaf” in nature, as poet Walt Whitman once described his own wanderings, I have since learned is not part of the childhood experience of many of my college students. Recent research on nature deficit disorder along with the rise of food insecurity, poverty, depression, school violence, and homelessness among youth is telling us that our children are missing deep and vital engagement with the natural world. Children no longer can freely wander alone in the woods. Few college students I repeatedly discover have ever heard of Rachel Carson (even fewer have read *Silent Spring*). Most have never heard of John Muir or Aldo Leopold. Surprisingly, the writings of internationally-recognized indigenous ecologists Greg Cajete and Robin Wall Kimmerer are not part of the standard core curriculum at UNM even though we are the “flagship” institution of the state and New Mexico is home to nineteen pueblos as well as the Navajo and Apache nations. Very few of my students ever go hiking across the ridge into the Sandia Mountains, only twenty-five miles away from the UNM campus. As I recently argued in a

letter to Governor Michelle Lujan Grisham, eco-literacy and environmental citizenship across the curriculum should be the primary learning outcomes of New Mexico public education K-16.

Toward extending this vision of cultivating eco-literacy and environmental citizenship across communities, friend and co-founder Jan Haley (a Hillsboro artist, writer, and activist) and I stirred up the idea for BREW (Black Range Environmental Writers) together in October 2019. We hosted Native scholar and professor Dr. Rachel Jackson to mark the formation of BREW with a community lecture on "Story as Medicine" at the Hillsboro Community Center. What we imagined with the creation of BREW was a community space for sharing our writing together and mentoring young people into environmental awareness. Following up on that vision, Sarah Kotchian, a Hillsboro poet, artist, and teacher, facilitated a multi-generational Food Memoir workshop in January 2020. It was also our hope to host a 50th Anniversary Celebration of Earth Day in Hillsboro with a community fire circle and poetry reading to include the students in my UNM environmental writing classes.

My hope was to offer a field trip to immerse my students in nature, language, and community in honor of Earth Day and the rich history of the Mimbres ancestral lands of the Black Range. All of those plans were suspended with the COVID-19 pandemic and the stay-at-home orders that have sheltered us all in our homes. Ironically, I found myself as a teacher (an ardent proponent of protecting the face-to-face classroom) pushed into the digital sphere as the primary educational environment to teach my classes. The challenge became how to try to cultivate eco-literacy and environmental citizenship within my students in a virtual universe. Like all educators impacted by the COVID-19 epidemic, I had to learn to pivot and turn to distance learning technologies to teach my classes. Rather than turn my classes over to the standard online remote learning platforms like Blackboard, Learn, Google Classroom or Zoom video conferencing.

I decided to build a digital space for my students to share and showcase their work and to construct a virtual vision for BREW. I asked students to create YouTube videos of their class presentations on their readings of Robin Wall Kimmerer's *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants* and Paul Auerback and Jay Lemery's *Enviromedics: The Impact of Climate Change on Human Health*. I also created what I called a "pedagogy of small circles," breaking up my classes into writing groups of three to four students who could use the regularly scheduled class session time as a support system to communicate and collaborate with one another. Meanwhile, I conducted one-to-one phone conferences. Students were allowed to call, text, and email me directly between 9:00 a.m. and 6:00 p.m. throughout the rest of the semester.

With the cancellation of the BREW Earth Day Celebration in Hillsboro, I proposed the idea of writing and publishing "Shelter in Place Earth Day Haikus" with my classes and within and beyond the Hillsboro community. What evolved out of this online innovation is something like a virtual quilt or a kind of digital tapestry of words and images by students and community members with cross-links between my UNM courses and the larger Black Range region which includes Eric Magrane, New Mexico State University ecologist and editor of the digital journal *The Spiral Orb*.

Taking the first principles of environmental writing to the digital universe has taught my students and me a number of lessons. We cannot replicate the human touch of education electronically. In phone conferences with each of my students, I listened to them describe their sense of isolation, alienation, and loneliness. Everyone complained of eye fatigue, exhaustion, and feelings of being "burned out." The playful banter and "A-ha moments" of discovery sitting around the table with each other, going to the greenhouse, or digging in the Lobo gardens were missed by all of us. Many admitted to feeling depressed and trapped by their iPhones, iPads, and laptops. It was strange to hear these digital nomads, these electronically adept millennials feeling the same way I felt after spending six to eight hours per day on the computer. Electronic communication can feel like a black hole devouring our energy. The emotional reciprocity of direct face-to-face communication is lost in the digital universe.

The joy and discovery of living in nature and being in kinship with each other was the original impetus for the establishment of Earth Day in April 1970. Fifty years later, sheltered in place, I think the joy and discovery of living in nature and being in kinship with each other is still the vision of Earth Day. My students and I built a digital memory of our journey through the COVID-19 pandemic using writing as a conduit of expression with the community members of Hillsboro and the Black Range Environmental Writers. The tapestry of images woven across my teaching webpages and the BREW website include representations of what we love and long for most: open spaces, water, trees, plants, and companionship with our animal kin (birds, reptiles, dogs, cats, horses), and the beauty of wilderness. The digital universe helped us to share and stay connected across the public health divide that has devastated communities across the globe. The vision of nature is what sustained us.

Acknowledgments: A special thanks to friend and BREW co-founder, Jan Haley, to our web designer, Hallee Nguyen for her expertise and artistry and to Bob Barnes, editor of the *Black Range Naturalist*, for the generous invitation to tell our story.

Kells Environmental Writing Teaching website is available at: <https://www.michelle-kells.org/>

Black Range Environmental Writers website is available at: <https://blackrangewriters.org/>

I attended a presentation by Hannah Cantrell at the "8th Natural History of the Gila Symposium". She discussed the Arctos database and her efforts to increase its efficiency and effectiveness. I was intrigued with the use of Arctos as a tool with which researchers, and those with a more casual interest, could improve their understanding of the ancient natural history of the Black Range. I am pleased that she agreed to write the following article about Arctos and what it can tell us about the early natural history of the Black Range.

One of the goals of the Black Range Naturalist has been to bring new information sources to the attention of those interested in the natural history of the Black Range. Cantrell's article is another step in that journey.

Bob Barnes
Editor

Three Oreodonts From the Black Range Show the Importance of Shared and Accessible Data by Hannah Cantrell

I first became interested in museum collections after I interviewed a Paleontology Curator at the New Mexico Museum of Natural History and Science (NMMNHS) for a writing project for school in the spring of 2019. I showed so much interest in seeing the collection, fieldwork, and learning about what curators do that it was suggested I volunteer for the Geoscience Collection. I began volunteering just a couple of months later. The first time I saw the collection, I was in awe. I had never seen that many fossils, and never really imagined all of the past life that has existed on Earth. As I walked down the open shelves holding the massive fossils, it all came to life.

I started the position I currently hold at NMMNHS, Paleontology Digitization Intern, in the fall of 2019 with a few months of volunteer experience in the collection, a strong interest in the ancient past (that was satisfied by just sitting there entering in data - so imagine how excited I was to get to do more), and several seasons of experience working with natural resources for the National Park Service and the Forest Service. I remember as a volunteer thinking about how neat it must be to study these specimens, to learn about them, and to take pictures of them. This position was perfect for me because I would get to do just that. I would also get to learn about a new database that would be the focus of my position. Arctos was chosen by NMMNHS staff in 2018 to be the collections database for both the geoscience and bioscience collections. Together with data migration, I was assigned the task of imaging

specimens. The images (photographs and 3-D images) will eventually be added to Arctos and associated with the corresponding specimen records. The task was somewhat daunting, with about 80,000 paleontology specimen records from over 12,000 localities to be cleaned up and bulk-loaded into Arctos.

I have been exposed to countless ideas, processes, and information while working at NMMNHS. However, the one idea that has stuck with me most is how important natural history collections are and how to take care of them in a way that helps keep their significance and their stories alive. Having a place like the publicly accessible database Arctos to store those stories is a great step in the right direction because it preserves and shares all the information the specimens have to offer. All we have to do is get them out of their dark drawers in the rows of cabinets and study them! Let them tell us their stories, and we can then put those stories in a place where we all can read them.

A Story from the Black Range

During the Oligocene, about 34-27 million years ago (Ma), the landscape of New Mexico, and more specifically, the Black Range, was dominated by stratovolcanoes. Stratovolcanoes that exist today would be: Mt. Hood, Mt. Adams, and Mt. Rainier. They are built up by layers of hardened lava, ash, and pumice into the sharp peak at the top. At this time there was a mammal commonly called the oreodont roaming the high elevation mountains and eating deciduous leaves, twigs, and fruit. Oreodonts were even-toed ungulates that lived from the Middle Eocene through the Miocene (40 Ma-5.3 Ma) (Polly, 2019). "Oreo" is Greek for mountain, and "dont" refers to tooth so "oreodont" means "mountain tooth." The first use of this name was in 1869 by a paleontologist named Joseph Leidy who thought the ridges on the side of the oreodont teeth resembled



Figure 1: Oreodont teeth of a specimen collected from Bosque del Apache National Wildlife Refuge. Image by Dave Love, New Mexico Bureau of Geology and Mineral Resources.

steep mountain peaks. The climate in the Oligocene Black Range was warm and subtropical, which was the perfect environment for oreodonts to thrive. Their habitat extended up to the northern Great Plains, where the landscape had more rolling topography and savanna-like grasslands. Oreodonts were living there too, eating the same deciduous leaves, twigs, and fruit, and once again, thriving.

In 1974, Clarence Watson discovered three unusual oreodont specimens in the Taylor Creek drainage at a site called Seventy-four Draw in the Black Range of New Mexico. They were unusual because Oligocene fossils are rare in New Mexico. The stratovolcano-dominated landscape didn't allow many fossils to be preserved. As I was working in the collections, these oreodonts caught my eye as I looked for specimens, mainly because Oligocene Black Range fossils are so rare. These fossils were also a perfect fit because oreodonts often seem to have interesting stories. They have become one of my favorite extinct mammals to learn about. Information about these three specimens in the NMMNHS database was fairly sparse, but I knew they came from the Black Range, so I decided to look into them further. I was given a paper titled "[Radioisotopically-calibrated oreodonts \(Mammalia: Artiodactyla\) from the Late Oligocene of southwestern New Mexico](#)" by Museum Curators Gary S. Morgan and Spencer G. Lucas. Morgan and Lucas had new information about the geology of the rocks in which these specimens were found, so they analyzed the available data in light of the new information and were able to draw a new conclusion as to the species identification of the oreodont specimens. The paper also included exact measurements of parts of the specimens, and descriptions like "highly weathered." I thought, wait a second, this seems like important information, right? Where could this information live so that others could find it? In the NMMNHS database of course! It should already be there....but it wasn't!



Figure 2: Illustration of an oreodont from Bosque del Apache National Wildlife Refuge. Image by Mary Sundstrom, NMMNHS contract artist.

Storing a Story

We input the new information from the paper into the Arctos database, and, as a result, the specimen record page now tells the full story of this specimen!

The chart ("Before") at the top of the next page shows the Arctos data base (identifications and parts sections of the specimen record page for specimen [NMMNH:Paleo:31593](#)) before data from the paper mentioned above was entered. The chart ("After") at the bottom of the next page shows the identifications and parts section of the specimen record page after the addition of the new information.

What you see in the second set of images ("After") are the exact measurements that Morgan and Lucas made from the specimen with all of those parts broken down in the parts section. Also in the second set of images there is the identifications box. This shows the identification that Morgan and Lucas concluded with, and below that is the original identification by Tedford. One last piece of information that I would like to point out is that Morgan and Lucas determined that this specimen came from a juvenile oreodont, because some of its teeth are deciduous, the scientific way of saying "baby teeth". You can see that in the first line under the attributes section. We wouldn't have known this information without reading the paper, and if we had not added the information to the Arctos record, it is quite possible that others might not know it existed.

Another way the paper improved a specimen record is found in [NMMNH:Paleo:31592](#), which previously had a part condition of "unchecked". In the publication, it was described as "highly weathered" and "lacks crowns of all teeth, roots p1-m3 are preserved." Those two descriptions were entered into Arctos and can help those who wish to study the specimen in the future decide whether or not it might be appropriate for their research. They might need the tooth crowns to complete their study. Also, examination of the preserved roots indicated that the specimen was an adult.

This is just one example. The observations and data from all the specimens we collect and publish can help to fill many other blanks to complete the specimen story. By conducting research and publishing papers, researchers are all contributing to the greater story of past, present, and future life. The way that we store these data can help us link it all together. Reading the paper by Morgan and Lucas and entering in the new data to Arctos record pages has helped further the stories these three oreodonts have to share and has enhanced the knowledge of specimens stored in the NMMNHS Geoscience Collection.

An Aside on The Process of Science

While reading the Morgan and Lucas publication, I noticed something. This paper nicely demonstrates the process of science!

The publication shows not only who identified the specimens, but also the whole process of coming to a conclusion on those identifications, a nice demonstration of the scientific process at work. It walks the readers through

what Morgan and Lucas did to analyze the measurements, how the specimens were compared to others of the same species (such as how the tibias compared), how they interpreted the geological age of the fossils by analyzing the ages of the formations above and below, and what they

concluded from their findings. Reading a publication like this not only informs the readers about the findings from the research, but could also be used to very simply teach how science is conducted as well as how to ask new research questions.

Identifications

Desmatochoerus megalodon
 Animalia; Chordata; Mammalia; Artiodactyla; Merycoidodontidae; Desmatochoerus Desmatochoerus megalodon (Peterson, 1907)
 Identified by unknown
 Nature of ID: unknown

Parts [expand]

Part Name	Condition	Disposition	Qty	Remarks	
maxilla	unchecked	in collection	1	connected parts "right maxilla w/ dP3-dP4, M1-M2"	
Attribute		Value	Date	Dtr.	Rmk.
anatomical direction reference		right			
tooth, molar	unchecked	in collection	1	connected parts "right maxilla w/ dP3-dP4, M1-M2"	
Attribute		Value	Date	Dtr.	Rmk.
anatomical direction reference		right			
anatomical direction reference		upper			
numeric order		1			
tooth abbreviation		RM1			
tooth, molar	unchecked	in collection	1	connected parts "right maxilla w/ dP3-dP4, M1-M2"	
Attribute		Value	Date	Dtr.	Rmk.

Before

Identifications

Desmatochoerus megalodon
 Animalia; Chordata; Mammalia; Artiodactyla; Merycoidodontidae;
 Desmatochoerus Desmatochoerus megalodon (Peterson, 1907)
 Identified by Gary S. Morgan, Spencer G. Lucas on 2003
 Nature of ID: features

Promerycochoerus carrikeri
 Identified by Dr. Richard H. Tedford on 1981
 Nature of ID: unknown
 Remarks: Stated in Morgan and Lucas 2003

Parts [expand]

Part Name	Condition	Disposition	Qty	Remarks	
maxilla	highly weathered	in collection	1	connected parts "right maxilla w/ dP3-dP4, M1-M2"	
Attribute		Value	Date	Dtr.	Rmk.
anatomical direction reference		right			
tooth, molar	highly weathered, lacks crown	in collection	1	connected parts "right maxilla w/ dP3-dP4, M1-M2"	
Attribute		Value	Date	Dtr.	Rmk.
anatomical direction reference		right			
anatomical direction reference		upper			
numeric order		1			
tooth abbreviation		RM1			
tooth, molar	highly weathered, lacks crown	in collection	1	connected parts "right maxilla w/ dP3-dP4, M1-M2"	
Attribute		Value	Date	Dtr.	Rmk.

Attributes

age class: juvenile
 Gary S. Morgan, 2003
 Remark: presence of deciduous dentition (Morgan and Lucas, 2003)
 unformatted measurements: DP2 posterior width = 8.7 mm
 Gary S. Morgan, 2003
 unformatted measurements: DP3 anteroposterior length = 17.6 mm; anterior width = 7.8 mm; posterior (maximum) width = 15.6 mm
 Gary S. Morgan, 2003
 unformatted measurements: DP4 anteroposterior length = 17.8 mm; maximum width = 18.7 mm
 Gary S. Morgan, 2003

After

The scientific process is ongoing and relies heavily on interactions of researchers within the community. Arctos helps to enable the scientific process by keeping track of progress and the history of data. It gives you a visual of what has already been done, what can be re-analyzed, and what else could be done. To publish a scientific paper, the writers need to read many other published papers written by many other researchers. This helps to build a foundation of knowledge before they get started on their scientific process. The process of experimentation can be time-consuming and repetitive in order to be exact and conclusive. What Morgan and Lucas did was collect evidence to be re-analyzed, which is something that can lead to the question, "Do we need to look into this more?" The scientific process is dynamic; it is always changing the ways and directions of scientific thinking. One question or experiment can lead to many other questions and experiments: so the cycle of science continues.



An illustration of the scientific method. Image is public domain.

The question that Morgan and Lucas had when beginning to take another look at these oreodonts was something like, "Could these oreodonts be more accurately identified?" Previously, the specimens were thought to belong to *Promerycochoerus carrikeri* (Tedford, 1981). Morgan and Lucas had to begin by collecting their own data as evidence to answer their initial question. This involved measuring parts of the specimen, such as the teeth and various bones from the remains of the skeleton. What they found was: the oreodont specimens didn't compare as closely to *P. carrikeri* as they did to a northern Great Plains oreodont of the Oligocene, identified as *D. megalodon*, from the Gering and Monroe formations in western Nebraska and southeastern Wyoming. The length of the adult dentary (without teeth) of NMMNH:Paleo: 31592 from the Black Range is estimated to be about 135mm long, whereas the specimens from the northern Great Plains range from 125 to 137mm (Morgan, 2003). [NMMNH:Paleo:31594](#) from the Black Range has a well-preserved and complete tibia that was measured. Those measurements were then compared to tibias of oreodonts collected in the Monroe Formation of the Great Plains. The tibia from the Black Range measured 212mm, whereas the tibias from the north came out to be 215mm and 216mm in length (Morgan, 2003). *Promerycochoerus*, the genus these species were thought to have belonged to, have much longer and more massive tibia.

The final conclusion that Morgan and Lucas reached was that these specimens belong to a different taxon than previously thought. The new information about the geology of the area led to a question about the identification of these oreodonts. Measurements were taken and comparisons made to other specimens, and a

new conclusion was reached about the identifications. Is that the final word? Of course not. As new information comes to light (more fossils collected, new methods of dating rocks, etc.) this may need to all be reconsidered. But the fact that we have information from previous studies right there in Arctos will help future researchers synthesize what has already been done.

Who Has Access to Science?

Without reading Morgan and Lucas's paper, I wouldn't have known as much about the three oreodonts. I had a PDF version of this paper sent to me by the authors themselves. I would not have been able to read the publication otherwise because it is behind a paywall. Many scientific journal publishers do not allow access to their published journals without first collecting a subscription fee. Even if that article is new science that would benefit their research

or career, a reader must first pay a commercial publisher. Researchers and students rely on their institution's library holding a subscription. If the institution doesn't have a subscription, it can be challenging to find papers through an interlibrary loan or by contacting the author themselves. FAIR data are: Findable, Accessible, Interoperable, and Reusable. In the ability to access FAIR science, researchers and interested parties could maximize the knowledge and innovation that exists within these publications (Wilkinson, 2016).

I would also like to note that this is one example from one paper. At the time I wrote this article, this paper had 19 views in the online Journal of Vertebrate Paleontology, where it was published. All that can be accessed through that online journal is an abstract and one illustration, so most of the information added to Arctos is not available there. Imagine the possibilities if all the data from every publication that referenced a specimen in the NMMNH collections could be publicly accessible through Arctos!

Alongside the principles of FAIR science, institutions are beginning to encourage a culture of shared data, which tells a more interesting and rich story than the individual stories told by each institution, and this is what allows for advances in research. Managing and obtaining a well-rounded set of data grants the chance to ponder new concepts, such as "exploring life in all its forms, interactions, and functions, across evolutionary, temporal and spatial scales." (Lendemer, 2020) In using Arctos, institutions and researchers will be able to "fully define and understand certain traits that make up organisms, their relationships

DID YOU KNOW?

When writing scientific names, they should ALWAYS be italicized. Also, after a name is introduced in a paper, it is acceptable to shorten it with the initial of the first term (the genus), a period, and the complete second term (specific epithet).

Example: *Desmatochoerus megalodon* and *D. megalodon*

with each other, and the ecosystems they inhabit” (Lendemer, 2020).

Sifting through publications can make our data better. We acknowledge the purpose of, and need for, FAIR data. But we also know that there may be issues with accessing these data when scientific research sits behind a paywall. Even if a publication is open access, it can be difficult to connect information. For example, while looking at a specimen record page in Arctos, you can see the history of publications on that specimen, history of identifications, who has worked on the specimen, etc. This allows the viewer to get a bigger picture of the work done on the specimen and how it is connected to other specimens. We need time and attention in order to understand and transform scientific research into language that non-specialists can understand. We also need time to add specific information to collection objects when it is appropriate.

Information like that I obtained from Morgan and Lucas’s publication is available, waiting to enrich museum collections with new stories and advance science with thought-provoking ideas, but it’s sitting behind paywalls, in the far away corners of the internet, on university library shelves, or in museum curator’s offices. Scientific publications can contain very technical vocabulary, methods, conclusions, and data. No wonder people think scientific papers could put you to sleep. But that is the exact reason why we (museum curators, collection managers, professors, technicians, and interns) are putting the information into accessible databases and writing articles like this. We want to tell the stories of the specimens in our collection as well as our personal stories of observation, discovery, experimentation, and contribution to the exciting, dynamic, and creative process of science.

Please remember, you can help in this process! If you read anything that refers to specimens in the NMMNHS collections, let us know! Add a comment to the specimen record in Arctos or send an email to Nicole.Volden@state.nm.us, the Geoscience Collections Manager at NMMNHS. In the future, there will be a generic NMMNHS Geoscience Collections contact email you may use as well. Everyone has a part to play in the process of science, and we welcome the help in getting our stories told.

More About Arctos

“Arctos is more than a data management system for museum collections; we are a community of curators and researchers dedicated to responsible curation and education” (Arctos, 2018).

Access the website: <https://arctosdb.org/>

Access the database: <https://arctos.database.museum/>

Access the handbook for the “how-to’s” of documentation and resources: <http://handbook.arctosdb.org/>



Acknowledgements

I would like to thank Gary Morgan and Spencer Lucas for their help in accessing publication material and photographs and Teresa Mayfield-Meyer for help with edits to Arctos and reviewing drafts of this article.

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Mating Gopher Snakes Photographs by J. R. Absher

J. R. Absher, at the natural wonderland which is the A-Spear Ranch, was able to photograph mating Sonoran Gopher Snakes on April 21 of this year. Something often heard about but rarely seen.



**Changes to the Middle Fork of
Percha Creek, West of Kingston
Photographs by Véronique De Jaegher**

The three photographs shown here capture the changing "creek-scape" of the Middle Percha (east central Black Range, west of Kingston) dramatically. An excellent study by an accomplished observer.



August 30, 2013. Two months after the Silver Fire and shortly after the first major flood.



September 30, 2013. Following additional flooding.



A photograph of the same spot, taken on April 29, 2020.

Elf Owl at the A-Spear - Photograph by Dave Cleary - Text by J. R. Absher

With the assistance of expert Sierra County birder Dave Cleary, we have been conducting an owl survey here at the A-Spear for the past three years, specifically targeting the Elf Owl through aural identification of individual territories

here on Las Palomas Creek. Though there have been some incidental visuals (like in truck headlights before dawn), this week marked the first opportunity for a quality photograph (once again, pre-dawn). For us, it is quite exciting—especially considering we are located on the extreme edge of what is generally considered the range of the tiniest owl on the planet—and we have averaged six distinct nesting territories for three years running!





American Black Bear, *Ursus americanus*, recorded at South Percha Creek, Black Range, New Mexico on May 26, 2021. [Video](#).

Repurposed drug to the rescue of snakebite victims

Cho Yeow Koh, Rohan Bendre, and R. Manjunatha Kini recently announced the results of their experiments with the use of heavy metal poisoning medicine to mitigate the effects of snakebite venom. The findings appeared in *Science Translational Medicine*, 06 May 2020: Vol. 12, Issue 542.

In the same issue, Laura-Oana Albuлесcu, Nicholas R. Casewell, et al. published "Preclinical validation of a repurposed metal chelator as an early-intervention therapeutic for hemotoxic snakebite". The abstract for that article reads: "Snakebite envenoming causes 138,000 deaths annually, and ~400,000 victims are left with permanent disabilities. Envenoming by saw-scaled vipers (Viperidae: Echis) leads to systemic hemorrhage and coagulopathy and represents a major cause of snakebite mortality and morbidity in Africa and Asia. The only specific treatment for snakebite, antivenom, has poor specificity and low affordability and must be administered in clinical settings because of its intravenous delivery and high rates of adverse reactions. This requirement results in major treatment delays in resource-poor regions and substantially affects patient outcomes after envenoming. Here, we investigated the value of metal ion chelators as prehospital therapeutics for snakebite. Among the tested chelators, dimercaprol (British anti-Lewisite) and its derivative 2,3-dimercapto-1-propanesulfonic acid (DMPS) were found to potently antagonize the activity of Zn²⁺-dependent snake

venom metalloproteinases in vitro. Moreover, DMPS prolonged or conferred complete survival in murine preclinical models of envenoming against a variety of saw-scaled viper venoms. DMPS also considerably extended survival in a "challenge and treat" model, where drug administration was delayed after venom injection and the oral administration of this chelator provided partial protection against envenoming. Last, the potential clinical scenario of early oral DMPS therapy combined with a delayed, intravenous dose of conventional antivenom provided prolonged protection against the lethal effects of envenoming in vivo. Our findings demonstrate that the safe and affordable repurposed metal chelator DMPS can effectively neutralize saw-scaled viper venoms in vitro and in vivo and highlight the promise of this drug as an early, prehospital, therapeutic intervention for hemotoxic snakebite envenoming."

These two articles reference early studies into treatment methodologies which may have significant benefits for those who work and play in the natural history of the Black Range. These studies indicated positive results when used to treat hemotoxic venom, which is the type of venom found in most rattlesnakes in our area. Note, however, that baby rattlesnakes and some rattlesnake species (Mojave Rattlesnake, for instance) have venom which has neurotoxic properties. The studies referenced above have focused on mitigating the effect of hemotoxic venom. And, of course, these are early stage trials.

Forest Trail 796 - Kingston Cemetery to Emory Pass

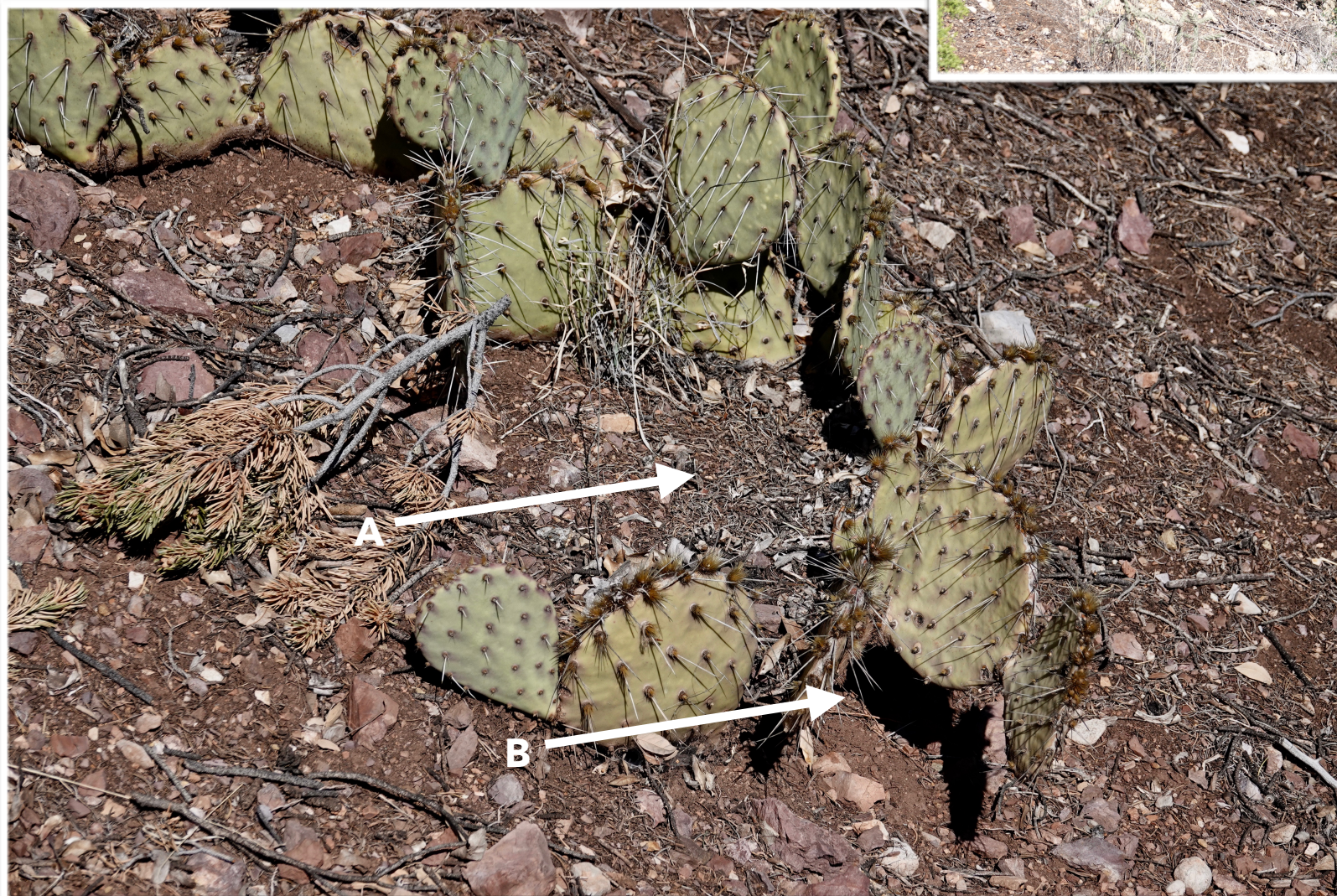
It is 4.4 miles from the Kingston Cemetery to Emory Pass via Forest Service Trail 796. The elevation gain is just short of 2,000 feet. Although there are some fairly flat sections along the trail, most of it progresses up the mountain at a steady incline. (See elevation profile below.) The 8.8 mile round-trip can be easily done in a day or it may be done as a one-way walk with a car shuttle. It is best done during winter - snow is possible - or during the shoulder months, because sections of the trail (especially some of the lower sections) have very little shade since the Silver Fire.

See the map on the inside back cover for a location key to the items referenced below.

1. A simple but effective idea, a concept used extensively by the indigenous peoples of the southwest and shown here by a prickly pear cactus. Check dams were used by the indigenous peoples of the southwest for a variety of purposes: To capture sediment above the dam so that areas

Agricultural Lands in the Prehistoric Southwest: A Contextual Analysis, William E. Doolittle, *Journal of Anthropological Research*, Vol. 41, No. 3 [Autumn, 1985], pp. 279-305).

In late March we found this cactus clump demonstrating the concept naturally. The captured soil in the middle of the photograph ("A") is 6 to 8 inches higher than that immediately to the right of the cactus pads ("B"). The captured soil slows erosion and serves as a storage area for water.



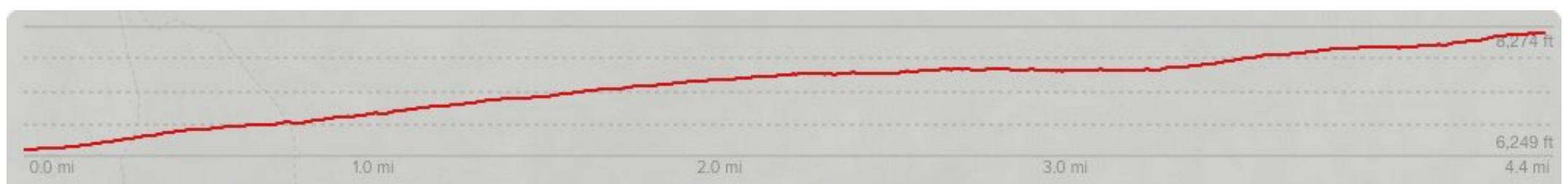
2. (Late March) In the same general area as the cactus, a pine had been bent over and the trunk shattered by the heavy (wet) snow of the past winter - not as we often imagine in this area, by the high winds that sweep down the east slope of the Black Range.

3. Thistle, possibly *Cirsium ochrocentrum* Gray var. *martinii* (Martin's Thistle) was just emerging at the end of March (photo at the top left of the following page).

4. Cane Cholla (aka Walking Stick Cholla), *Cylindropuntia spinosior*, is rarely found at elevations greater than 8,500 feet, so those found along the trail (and there are many) are near the "top" of their range. The upper right photograph on the following page shows a purplish tint to the stems. This is a response to winter conditions. (Photos were taken

for agricultural plantings could be established; to inhibit the rate of runoff (during the monsoons for instance) so that areas below the dam would not be washed away; and to keep unwanted sediments from washing onto agricultural fields ([The Use of Check Dams for Protecting Downstream](#)

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in late March.) Cane Cholla, like many other cactus, will reproduce from a segment of stem which is separated from the main plant as well as from seed. *Cylindropuntia leptocaulis*, looks like a miniature version of the Cane Cholla; the two species hybridize.

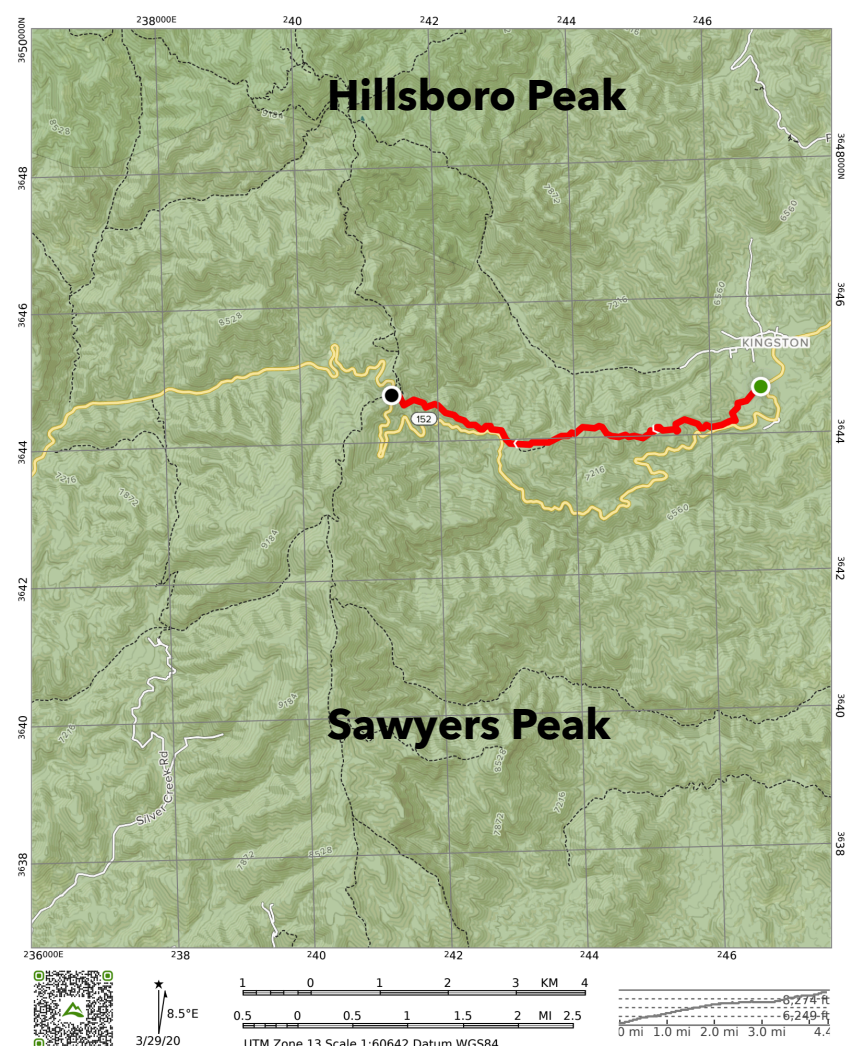


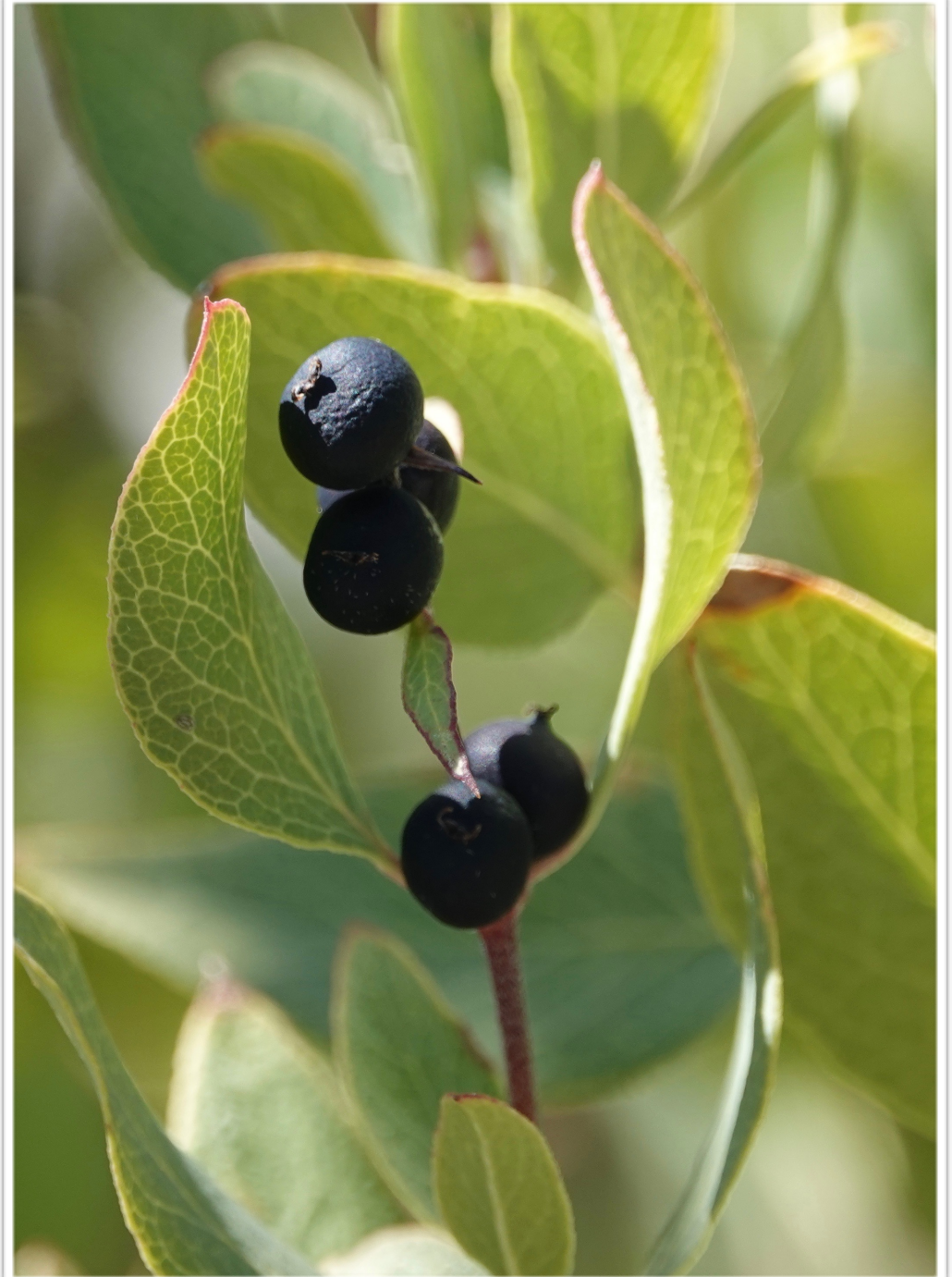
5. Earthstars (genera *Astraeus* and/or *Geastrum*) litter the ground in places. Some interesting fungi for a dry place.

This trail is east-west in orientation and is just north of



NM-152. Its western terminus is along the crest of the Black Range. From this point the Black Range Crest Trail may be taken north to Hillsboro Peak or south to Sawyers Peak. (See the October 2019 issue of this magazine for an article on the natural history of the trail to [Sawyers Peak.](#))





6. During the last week of March, Fendler Bladderpod, *Physaria fendleri*, begin to bloom in the middle portion of the trail.

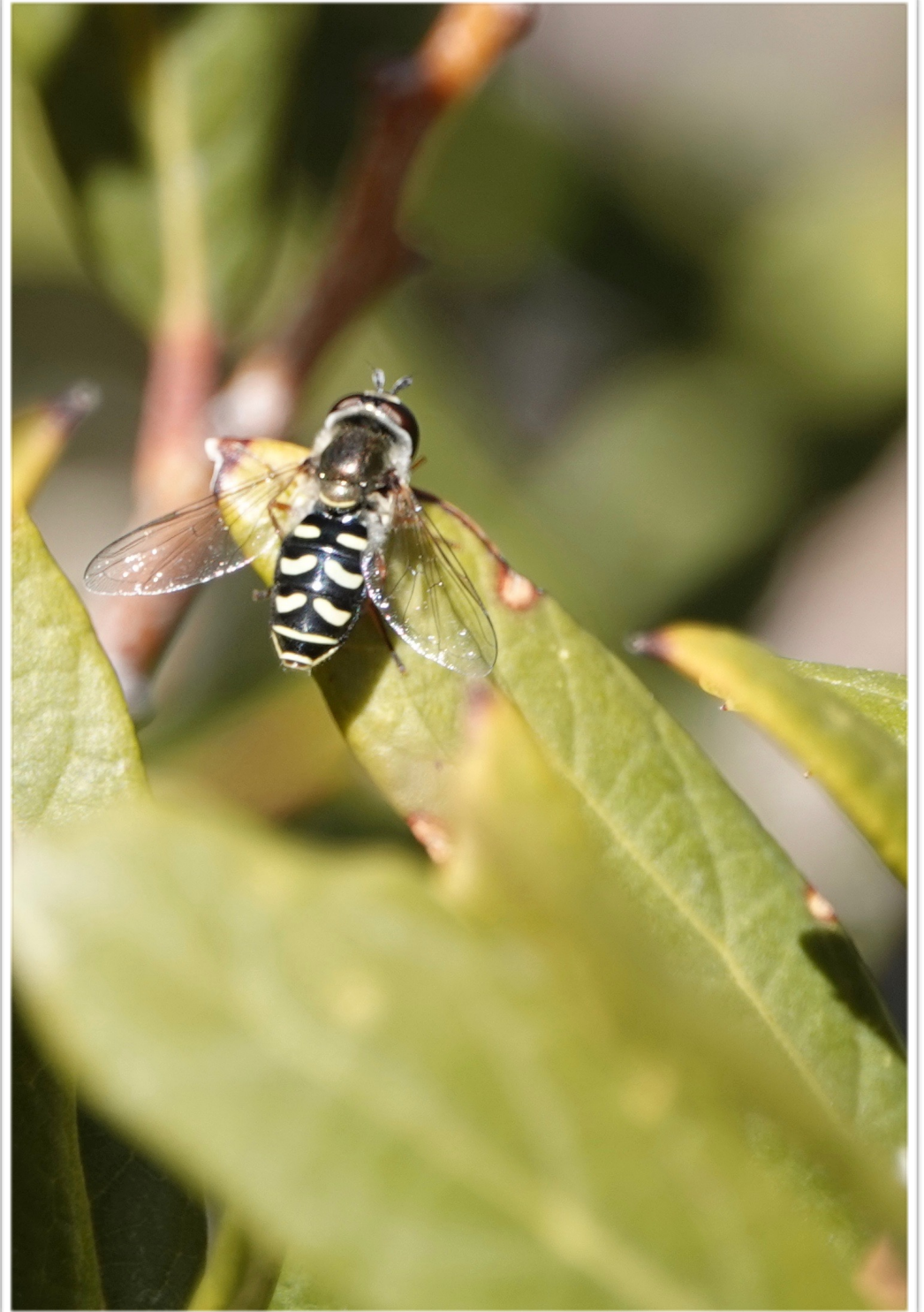
7. Wright's Silktassel, *Garrya wrightii*, is found alongside the trail about half way up the trail (photo top right). In early March they had not begun to bloom, but the fruit from the previous year was still apparent. The fruit starts out green and turns to purple before becoming black.

8. Wright's Silktassel is often found in association with Alligator Juniper, *Juniperus deppeana*, pictured to the right. We found the two species together at our lunch spot, on our way down the mountain.

9. Wild Candytuft (aka Fendler's Penny-cress) - *Noccaea fendleri* subsp. *glauca* - was blooming along the trail on March 28, at the higher elevations. (See left column of next page.) The individuals shown here are young; in older specimens the "**clasping cauline leaves are evenly spaced all the way up to the inflorescence**".

10. At the spot where I photographed the Wild Candytuft there were at least two Western Bluebirds and two other (smaller) flying critters. Elsewhere in this issue we discuss



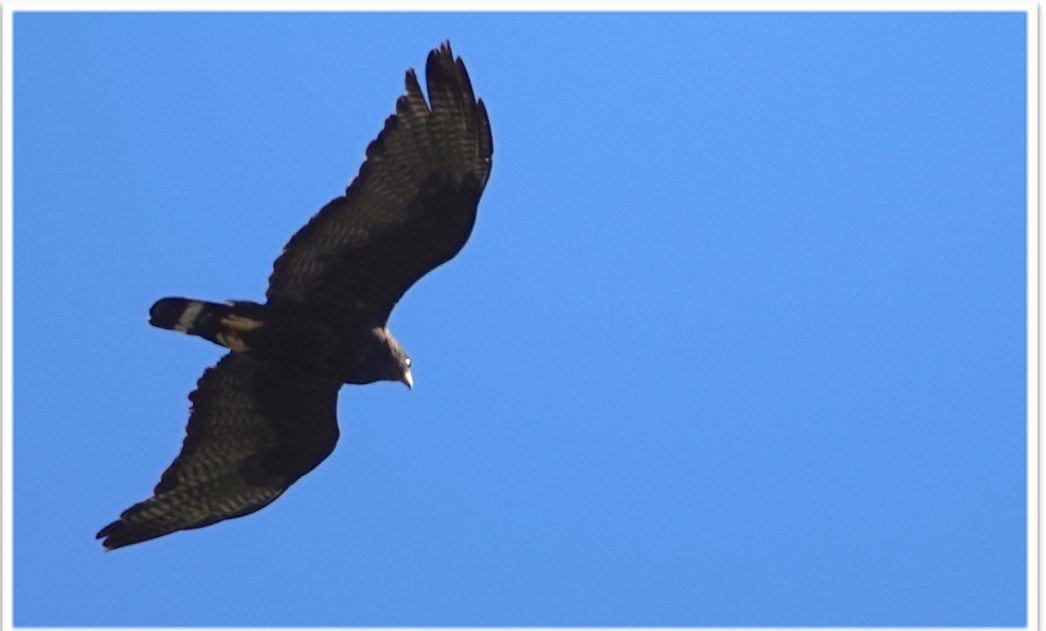


the decline of Bumblebee populations. Bumblebees are large insects and often lumbering in their flight, so they get noticed. At this spot, I was able to photograph two other flying insects, much smaller. The Syrphid Fly (Genus Syrphini) pictured at the top is of a tribe with more than 140 species in 30 genera in North America. The systematics of the group are in "flux", so it is probably good that I am not able to name this individual to species - 'cause it might change next week. That said, it is quite possibly *Eupeodes volucris*, the Bird Hover Fly. That species is found in western North America, from the far north well into Mexico.



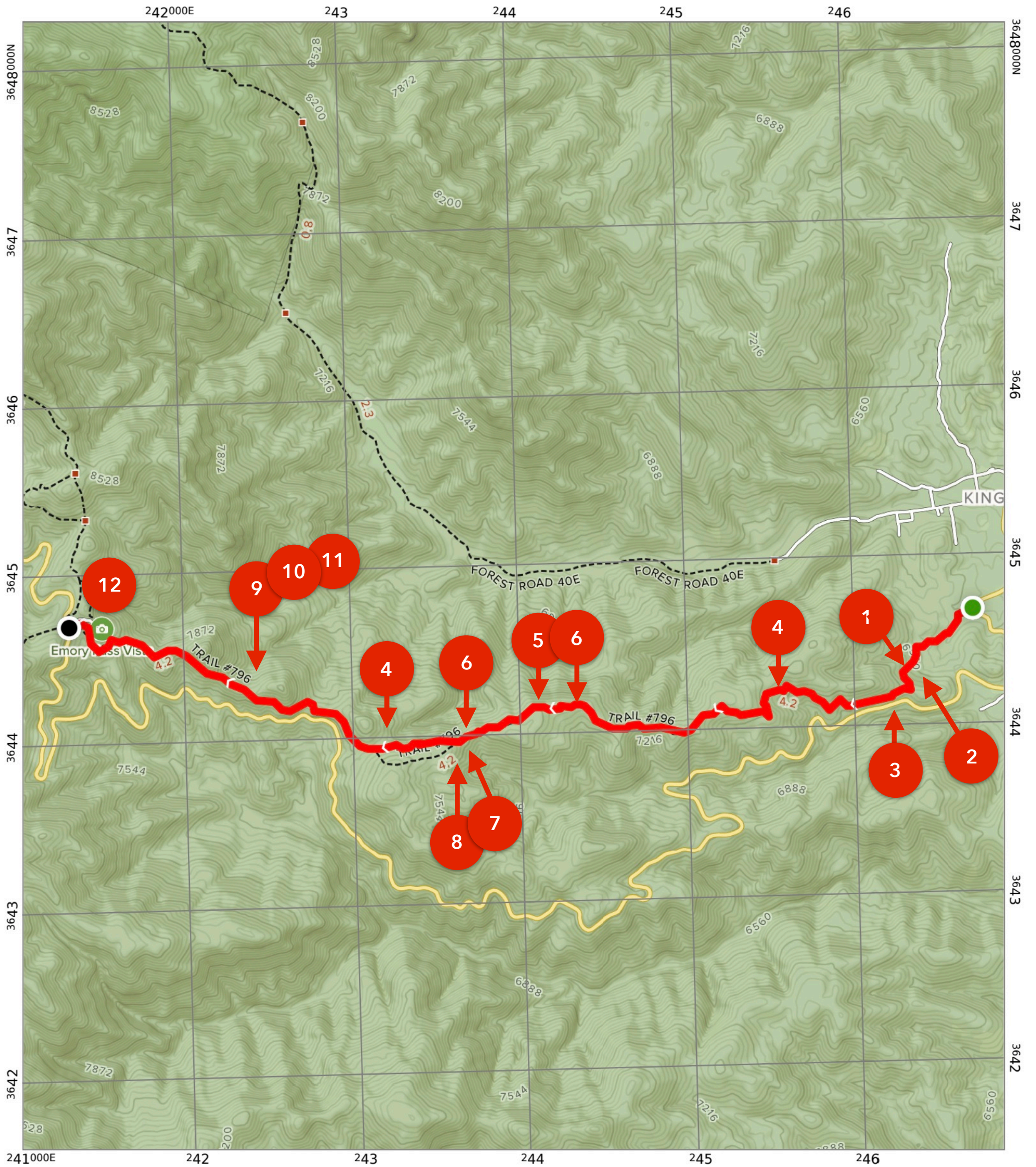
11. The species shown here (middle of right column) and on the following page is probably in the same tribe as the previous fly, in this case possibly the subgenus *Eoseristalis*.

12. Near the crest of the trail there are often many Turkey Vultures flying about and it is not uncommon for a Zone-tailed Hawk, *Buteo albonotatus*, to also be in the area, photo right taken on July 10.



Photograph - Back Cover: Sonoran Bumble Bee, *Bombus sonorus*, photographed in Hillsboro, New Mexico. If you have a particular interest in the natural history and identification of Bumble Bees you may wish to invest in [Bumble Bees of North America](#) by Paul Williams, Robbin Thorp, Leif Richardson, & Sheila Colla.



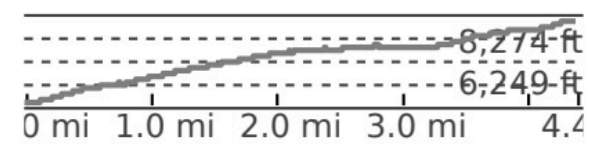


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