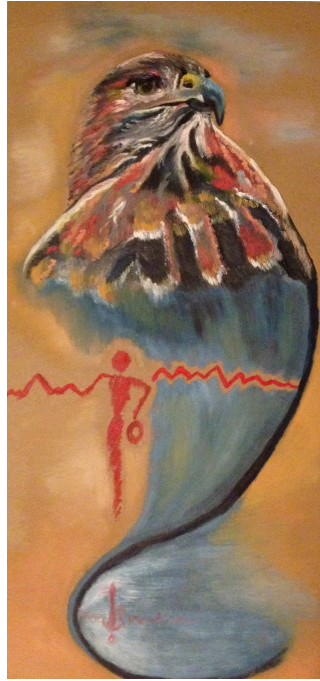


CHIRICAHUA

THE LAND OF WILD TURKEY



The Waterprotector, original oil painting by author

Summary

This Chiricahua Field Report is a combination of collected data and field observations that began in November 2021 and continued on until May 2023. The Report is about ecology and connections of life. It contains information on 400+ trees in 10 diverse ecosystems including the Madrean Sky Islands and the Riparian zones of ancient sea valleys in SE Arizona. Recent season changes, warming, fires, drought, and in contrast one of the wettest years in history including more than 90 inches of snow are noted. These stories include magnificent details of a living forest in a remnant of a super-volcano, including mushrooms that change color with rainfall, endangered orchids that bloom for only one day, flowers of cacti that open for only one morning, coati that have unique tail patterns and the chance discovery of jaguar prints to give hope again. One year, as a Park Ranger at Chiricahua National Monument has added insight into daily observations, we are the stewards of the past, present and future of wildness. Wildness in the animal world is reserved to only 4% of the planets millions of animals, Wildness is why people come to the National Parks and Forest, for they are the last stronghold of beauty that bears presence in each of our souls. As a Field Scientist it is all about observation over time, and if one is lucky, at the right time, in the right place, a story makes itself known. Nature is working together as allies to adapt and regrow the changing forests regenerating an ancient landscape and surviving climate change.

Intro

In the following field report you will find details of my adventures as a hiker and park ranger, and as one who has spent years in the Chiricahua Mountains in Arizona and is always amazed and amused at its voracity of life. I am French Indian from the bayous of Louisiana and it is there where I truly learned about the connections of life and the vital adaptations every living thing goes through adapting to their environments. It is always a joke that the mosquitoes in the bayous are big enough to carry you away, and alligators live in your front yards, mudbugs make mounds to breathe when the rainfall saturates the water table which is inches below the horizon. It is the old cypress trees that I watched grow their knee roots up out of the flood waters to breathe, and the mosses in the canopy providing a new ecosystem and habitat for canopy dwellers. Pelicans scooping fish and herons squawking their guttural jurassic calls. The diversity of life is incredible because of the warm rich muddy waters. And so when I moved to the desert southwest in 1990, it was winter, cold and snowing! It wasn't the hot dry desert I was expecting, at least not yet. We crossed mountains and rivers and forests on the drive and like most had limited my view to what was told of this place, one of parched death, and baked hard sand with a huge city in the middle. Needless to say I fell in love with the desert, its diversity of life and the rock. Becoming a rock climber I ventured to Cochise Stronghold first.

- **Daily Report: The Lightning danced all over the night sky, seemed to press right down on the earth!**

The geology of SE Arizona is quite diverse. The Dragoons and Cochise Stronghold make up the western mountain range of Cochise County and the Chiricahuas are the eastern boundary before crossing into New Mexico with its parallel mountain range called the Peloncillos. Between them, an ancient sea bed, which today has been reduced to salt flats and small dunes as you travel north to Willcox. To the south is the great Sonoran desert in Mexico. Millions of years ago the volume of this geographic was taken up by a super-volcano, and although we call these places mountains, they are remnants of the decaying lava rock known as hoodoos, being weathered by rain and wind all these years. In the long term climate profile of this place it has been wet and swampy, dry and bitter cold, and moving towards hot again. It has seen the Clovis people and ancient agriculturalists building amazing water canals, and more recently the Chiricahua Apache. In more recent days and the last of free roaming there were bison, mammoth, ancient horse, dire wolf, and North American camels. To the west the San Pedro River runs north and has never been dammed, a rarity in this country. When all of the waters receded, what was left in the making are what we call Sky Islands and there are approximately 52 named in the Alliance of Sky Islands. Each one, in isolation, has developed and sustains unique life and diversity. My adventure in collecting

information about this place began with the trees. Using the Globe Observer App created by NASA I have been using this tool in the Pacific Northwest to train people how to collect information on trees and the forest. I continue to use this tool wherever I go as it is easy to collect the height, and circumference of trees which then goes into a universal data bank to share. I am a big proponent on free and equal access to information. So it began I hiked the San Pedro from Bisbee to St. David and collected info, and then to the Ironwood forest and found these trees to be the only ones on this planet in a forest of Saguaros. I travelled north to the Apache Forest to the land of the reintroduced grey wolves and found a unique Blue Forest of ancient trees. Returning south to the Dragoons and Cochise Stronghold, and Cave Creek Canyon and the Chiricahua Wilderness, a fortunate turn of events brought me to work as park ranger for Chiricahua National Monument for a year and with those daily observations completes this field report.

■ **Daily Report: The turkeys came around the Visitor Center and pecked on the door! "Open Up!"**

The information gathered and shared here is as an independent scholar and field scientist curious about life and in love with nature. All of the tree data was collected from public trails where anyone could see and experience what I write about here. The daily observations are a privilege of living and working in a National Park who I am eternally grateful for every place I land. This report is not meant to be an exhaustive report but rather a snapshot of a time period between 2021 and 2023 and I encourage everyone to read more and visit and explore. The Daily Report lines are from my daily notes that I have dropped into the report in random orders. Enjoy!

Landscape

As stated previously, the Chiricahua Mountains are remnants of a super-volcano know as the Turkey Creek Caldera. One cannot fathom the explosion that occurred roughly 27 million years ago, but there are places on the trails that one can view an old and existing rim of the caldera to the south looking towards Chiricahua Peak. The Caldera is so large it spans 12 miles. Most of the rock we see is Rhyolite and in some places like on Sugarloaf a final flow of Dacite created the cap.



- **Daily Report: A praying mantis was on the info table and sat around all day turning green, then wandered off! Walking sticks are all over the front door, skinny little brown insects feeding on the tiny bugs!**

Turkey Creek Caldera is one of three super-volcanoes in the United States and one of only 7 in the world. The other noted super volcanoes in North America are in California: Long Valley Caldera, New Mexico: Valles Caldera, and Yellowstone in Wyoming. The only active one is Yellowstone.

- **Daily Report: Today, walking to Silver Spur Meadow, there were 50 coats! So many babies, cuteness!**

Visiting the west and east side of the mountains are quite different. Visitors liken the flattened pillars of the east to a Little Yosemite. In the little town of Portal, Az on the east there is a photo of the gateway with the name "Yosemite of Arizona". On the west side in Chiricahua National Monument the rock seems stacked like the hoodoos of Bryce Canyon people say, but these stacked hoodoos are volcanic columns created from cracks in a once solidified flow that has now looks like columns of individually stacked rocks. They are indeed fused together even though some of the rocks look like duck in a rock, or big balanced rocks. The Conservation Civilian Corp during 1933-1942 created the beautiful trails we hike on today and bring one on a majestic view of and in the rocks with the favorite being the grotto of Echo Canyon, and the Heart of Rocks.

- **Daily Report: A deer, dead behind the visitor center found first thing in morning. Found the fawn around the corner of the LE house. Watching me the whole time was a Bobcat who politely growled to let me know!**

There are 5 biomes beginning with the desert landscape changing into grasslands with riparian ecosystems changing in elevation into Chaparral, deciduous and coniferous forests, in the Chiricahua National park alone with great diversity of flora and fauna. The park as a small part of the Chiricahua Mountains as a small part of Turkey Creek Caldera is at the convergence of the Rocky Mountains, the Sonoran Desert, the Chihuahua Desert and the Sierra Madre. There is a unique adaptation constantly happening in these mountains where trees become hybrids, unexpected allies pop up, and each has a unique characteristic that defines it as a Chiricahua creature. The Chiricahuas are also pathways for migratory animals like monarch butterflies, sandhill cranes and jaguars.

- **Daily Report: The woodpecker at 7 am on the dot, every day, drills his beak into the wood above my bed! Outside of course!**

However nothing exists in isolation, and the boundaries of a national park or a national forest are still connected to the outlying areas, the transition areas. What I found during 2022-2023 is the rate of destruction to the mesquite landscape in the lowlands surrounding the mountains. Particularly on the lands leading up to the monument on the west side have been cleared one owner at a time of all the old growth mesquite trees, placing them in burn piles to leave barren land sitting with a For Sale sign. Without water regulations in Cochise County, private ownership of land is beginning to change and being sold to foreign prospects to grow corn and cotton. The waters which shed from the Chiricahuas feed the valley and aquifers below and when these waters become deplete it affects the draws and shallow ponds that draw birds and animals as refuge. Mesquite is a valuable food source and an excellent protein for humans and animals alike. It was quite sad to see ravens and hawks and vultures sitting upon the burn piles whereas before there were mesquite trees and native grasses. These changes on the outside will eventually be felt on the inside of these protected places, it's just a matter of time. Ecology is the understanding of the connections of life and it is vital that we all understand these connections.

■ Daily Report: Halo is born! He has a white ring around his tail and it stands straight above his head!

The Rock is what makes the main attraction to visiting the CNM. Geologically speaking its Rhyolite created from lava flows of Turkey Creek Caldera 27 million years ago. Technically, Rhyolite is an extrusive igneous rock, formed from magma rich in silica that is extruded from a volcanic vent that cools quickly and hardens on the surface leaving a softer subsurface making it very moldable in time. It is generally light in color due to its low content of *mafic* minerals, and it is typically very fine-grained (*aphanitic*) or glassy. Upon looking at the Rhyolite at CNM, you will find pinks and oranges and gradients of red. When the light shines on the surface there are tiny reflections of quartz embedded in the rock that look like glass that also make the powdery dust on the trails sparkle. One can find pockets of ash and layers of pumice and fumaroles telling stories of a very active ancient past where now hiking trails run through grottos and canyons. Because this Rhyolite has 10% porosity, it can absorb and hold large volumes of water, lending to another ecosystem living in and on the vertical rock known as lichen. One will see on the north facing and shady sides of the rock yellow, green and grey colored lichen which are all different species. Lichens have a symbiotic relationship as they are fungi structurally while inside the cells are green algae. Sometimes you may find a rust colored lichen sticking tight and flat to the rock which is know as crustose lichen. All of these lichen too are like the trees, respirating and cleaning the air in the forest. In the Chiricahuas the air quality measured is Class One, the best it can be. The blooming of new lichen are always bright yellow like new leaves and as they age, which is slowly,



they will darken. Alongside in the wet patches of rock are also mosses, liverworts and bryophytes. Some of my favorites are the tiny fern mosses (*Fissidens bryoides*) and the ceratodon moss (*Ceratodon purpureus*) which always tend to have little droplets of water after a rain and where one can find the very fun collared lizards and the Yarrow spiny lizards who always seem to strike a pose and pumping muscles!

As for the rock, don't miss the famously named Duck on a Rock, Big Balanced Rock, Pinnacle Rock and even Groot Rock! Yes, there is even a sentient tree boy rock. In my opinion, the 17 miles of trails in CNM are some of the best that I have ever traveled over. They are not just trails, it is an adventure with stories and life to learn about.

Cultural

There is a very long ethnographic description written in many reports and books about the historical time period of the Chiricahua Apaches, the Buffalo Soldiers and the United States, Spanish, French, Mexican Governments and the missionaries who all crossed this landscape. I encourage you if you are interested in the cultural stories to find some of the books included in the WNPA located in many of the western national parks that do a great job at including the regional stories of the parks you visit including the Chiricahuas.

- **Daily Report: The storms are pouring over the cliffs, and the creek now has shut down the campground. Nobody In, and Nobody Out! They are Stuck and quite unhappy about it!**

For my report I want to share some unknown and uncommon cultural stories starting with the water protector. The cover page image is an oil painting I created out of my research as an archaeologist on the pictograph/petroglyphs of the Chiricahuas. Early in the 1990s when I visited the east side of the mountains, I was part of a survey of a large finding of ancient agricultural deposits that were found. At least 3000 years BP (before present) the nomadic travelers who were crossing in, around and through the Chiricahuas settled and began growing corn, and grasslike wheat, also including squash and beans we know as the three sisters. These early agriculturalists built canals

like the Hohokam that lifted and moved water around the valleys and slopes of the Chiricahuas. The things that are left behind to tell the stories are the stone tools, the metates and manos used to grind plants, the rock foundations of old structures and the daily tools like spear points, sandals and bowls. Water was abundant during this time and flooding of the valley with rainfall was common. As things changed, people then moved on. Perhaps they returned seasonally, or stayed for certain amounts of time, we can only speculate on the context left behind. Under these layers are Clovis points and mammoth bones on the east side of the Chiricahuas too.

- **Daily Report: Driving the shuttle van this morning, a golden eagle flew right into the windshield wrapping its wings around the front and side! What an amazing creature. She was ok, whew!**

Pictographs are not very common in the Chiricahuas but they are there in sacred places. They have meaning and tell stories to and for their creators. Sometimes there are stories with multiple images and others are single images. Time, looting and environmental pressure changes these pictographs that are made with natural pigments found in the rocks and sediments nearby. Water makes cracks in rocks and sometimes whole panels are lost all at once. We need to honor and respect the context in remembering again that often these sacred places are shrines, markers or burials. The pictograph in the cover image called the water protector is a single humanoid image carrying something in one hand with curvy lines in the background which often symbolizes water and/or mountains. In the piece of art there are 3 images, the pictograph, the reflection and a red-tailed hawk which are common in the Chiricahuas. Red-tailed hawks, to many native people symbolize power and determination, signify courage, and are often linked to protection, acting as messengers and guardians. Having located the same symbol in three locations in the Chiricahuas on both sides of the mountain tell of a unity and integrated belief in the symbol. Im glad to place the art here in this field report.

- **Daily Report: I found another water protector pictograph today! That makes 3!**

The names that you hear when you visit Chiricahua National Monument are mostly from the earlier European settlers that came to this place. Trail names, House names, even Massai Point were given names. We do know however that before the name Chiricahua, the Land of the Standing Up Rocks existed. These pillars are part of an origin story of the Apache but existed long before they arrived here too. These Standing Up Rocks are the spirits of the ancestors. For the Chokonen, one of the bands of the Chiricahua Apaches who made a settlement near the Standing Up Rocks, they would come to the interior of the pillars as a sacred moment, to visit, to collect medicine and food, but would not stay here but lived nearby. As the ancestors spirits already had a

home inside the Standing Up Rocks. There was 15 million acres for all of the Apache tribes that expanded into southwestern New Mexico, Chihuahua Mexico and Northern Sonora as in Arizona. The name Chiricahua as written *Chiricagui*, was given by the Spanish. The Coyotero Apache from the White Mountain called the land *Ha'i'aha* which says they are the People from the Rising Sun in the East. The Mescalero who are in New Mexico called the same land *Sha'i'aode*, the People of the Sunset (as they had a view to this place in the West). Everything is relative to the Mountains and directions.

- Daily Report: Crossing the creeks, water rushing across the highway, are now too high! So much rain!

There is a story about the Mountains speaking to each other. It is said the mountains are the caretakers of the two-legged, and it is the wind that carries the voices of the mountains of all four directions to each other in order to take care of the two-legged within them. The people that lived in the remnants of the Turkey Creek Caldera we now call Chiricahua called themselves the Nde, meaning the People of. Just the people.

- Daily Report: Pack rats trying to get in the truck's air filter again, I think they don't like the electronic beep

There were many similar language speaking tribes and bands, that came through the mountains, interacted, stayed and moved on. What we call the Chiricahua Apache today pales in understanding the great diversity of the People, the Nde, in the Land of the Standing Up Rock.

- Daily Report: Found bones in the creek today, sawed femur of a sheep perhaps, big enough to be human

The Ancient Fire

The landscape of the Chiricahuas rests upon a dormant fire forged by the heat of a super volcano which blasted ash more than 50 miles surrounding the caldera and poured out molten lava. "The resulting volcanic plume rose tens of miles high before collapsing into ground-hugging, pyroclastic flows that covered large parts of southeastern Arizona and western New Mexico. It is estimated that more than 120 cubic miles of molten rock was erupted." (Guide to the Volcanic Geology of Chiricahua National Monument and Vicinity, Cochise County, Arizona.) Throughout the millions of years that followed rain and wind with intermittent wildfires shaped what we see today. There is evidence of fires that have ushered in multiple ecological successions. The endemic plants and animals that have survived the fires, that have adapted to the dry and droughts as a result of the loss of forests again were adapting to periodic

change in weather and climate, and to species that were taking advantage of the change. Who and what survive shows a resistance leaning toward fire resilient species.

■ **Daily Report: The bears have awakened, they are in the sunny patches of the manzanita eating berries**

Through the Laboratory of Tree-ring Research at the University of Arizona, a report from 2020 talks about the Fire History of Chiricahua National Monument. Noted historical fires include one or two major (canyon-wide) fires each century from the 1600s. Those fires tended to follow the canyons entering from the west where human occupation and low valley occupation was situated. Previous to the colonization of the European wave of humans, there were low-intensity cyclic fires in the grasslands frequently. These fires occurred when it was periodically dry and would be replaced with monsoons and rainy years that grew more grasses. These cycles can be seen with the innate cycles of the acorns in the oak trees that bloom every 3-5 years. Each oak species taking its turn to produce the acorns that always ensures there is food every year. In 1905 the United States Forest Service was established and fire suppression was not a practice until the early 1930s. A new policy called the 10am rule was set in motion to protect trees as timber resources. The 10am rule stated that if a fire was sighted it had to be put out by 10 am the next morning. There were large fire crews and equipment in the CNM and National Forest protecting the Chiricahuas from the 1930s until 1978. It was then that the word ecology was acknowledged in the health of forests, and there were allowances with certain fires to burn.



■ **Daily Report: Did a pinky swear with a new Jr. Ranger. I love pinky swears!**

The recent historic fires in the Chiricahuas include the Rattlesnake Fire in June 1994 that quickly burned 28,000 acres in the high-elevation forests of the mountains. Six hundred of these acres burned as a crown fire destroying the largest and oldest Ponderosa pines and Douglas firs. In September just a few months later a landmark conference on the Biodiversity and Management of the Madrean Archipelago: the Sky Islands of the Southwestern United States and Northwestern Mexico was held in Tucson.

■ **Daily Report: Hearing owls at dusk now in Bonita Creek Sycamores**

Following cycles of drought in the 1990s, the wildfires increased with intensity leading into the Horseshoe Fire and eventually the Horseshoe2 Fire in 2011 which was the fifth largest fire in Arizona history. This fire consumed entire slopes of the mountains leaving no trees alive, burning fragile soils leaving huge barren swaths. The Horseshoe 2 Fire was not like the low intensity fires of the grasslands to the west, this fire burned through the tops of the largest and oldest Ponderosa and Apache Pines as a crown fire, coming from the south and sweeping over the Monument consuming 80% of the park burning for over a month. Everyone's first thought was about the devastation and loss of trees, birds and animals endemic to the Chiricahuas. The second was when the rains began to come and flooding occurred bringing soil and burned trees along with it.

■ **Daily Report: Woke up this morning, looked out my window and a very large bobcat walked right by**

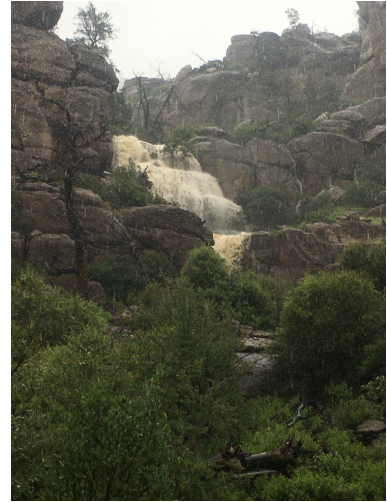
The questions that followed were about what species had survived? What would the ecological succession look like? How to prepare for the next fire? How to maintain a healthy ecosystem and did that look like intervention or leaving it to nature to maintain? In the upcoming section on Trees I will share with you my questions about where the new trees are growing since the fire, including collected data on 400 trees, looking at what the average age of the forests are, what grandmother trees have survived and their importance and some insight as to the latest sightings of what wildlife and plants are still around. The Chiricahua fox squirrel is a native adaptation of the Mexican fox squirrel, and its habitat is in the Ponderosa Pine forests. With the 1994 Rattlesnake Fire, it was first noted that the Fox squirrel population had diminished by 35% and by 2003 there were only 50 Chiricahua Fox squirrels remaining in the Chiricahuas (Merrick). The one correlation with the disappearance of the fox squirrels is the loss of pine forest canopy and old growth trees due to fires, Since 2011 there have been no nest sightings or appearance of any Fox squirrels in the Chiricahuas. But we should not lose hope there is always places that we have not seen that may still have species that we think no longer exist, actually existing. However according to Arizona Game and Fish, hunting squirrels is a year round allowable thing, even if they are endangered, "imperiled" as noted by the USFS, they are still on the legally huntable list.

■ **Daily Report: First helicopter rescue for the season, long line, 80 year old lady said it was the best day ever!**

Water Brings Life

Temperature and moisture are the triggers for the highly adaptive life in the Chiricahuas. With daily observations over the seasons and years, patterns appear in the

small details. For the year 2022, the spring was very dry and there was not a lot of food. There was concern for the birds and wildlife that this would be a year with paucity. Temperatures were normal with an inch of rain in January, with only a trace in February when usually most of the snow falls. March was a little more than half an inch and April and May there was no rain and creeks were dry. When I arrived to the park on May 22 the trees seemed to be still and cracking from the dryness. The hiking paths were hard and sun baked. Lower Rhyolite trail remained soft with the cover of the trees. Then dry lightening began in its splendor. Big lightening bolts lighting up the clouds never made their way down, but the big rumbles carried a lot of energy. In June things changed. The lightning shows cracked the skies and brought the rain. June was full of big storms. The rain fell heavy and the total of rainfall was 2.75 inches for June. The trees began to bloom new leaves, the earth softened. One day in early July I watched the dry creek and wondered if all of the rain would make its way to flow soon or if at all. There are springs in the Chiricahuas which are fed by groundwater seepage, and most tend to slow down but will still offer small pools of water in the direst of times. These springs however never make the creek flow, if water runs it is purely from rainfall. One day a very isolated downpour contained itself at the



entry to the park. Things like this happen in the park, where there is rain there may not be any a mile away up the road, or if there is snow at the top there is none below in lower elevations. There are 5 biomes on the west side of the Chiricahuas, all changing with elevation which then dictates temperature and moisture.

- **Daily Report: Tracks in the snow, a really big bear and a cougar walking up and down Sugarloaf!**

The storms that stalled a few times at the entry of the park seemed to be triggered by temperature changes. And upon a hike about I heard a water falling on the south side of the rocks. As I hiked up following the sounds, indeed there were pools of water and making its way down from the mountain plateau. It was beautiful. I hiked to find the source and after arriving at the top there was nothing more than wet rock. Flat rhyolite

rock, remnants of decaying rock faces left from volcanic lumps that weathered in the sun and rainfall. There was no point source for the waterfall that made its way through the rock below, but alas it was a rain drop that merged with another and another and another to begin to roll downhill. Pooling around trees and cracks in rocks until the sheer gravity of it plunged down continuing its way all the way down 300 meters to the roadside. I was mesmerized and visited it daily until the rain came no more in that place and Candace's waterfall withered, and the rain moved its way up the canyon. This rain couldn't have been more auspicious as a gift to all of the creatures in the grasslands like the javelina who eat the wild squash that grow along the grasslands when it rains, and the coati, deer, hawks, owls, mice, pack rats and insects thrilled with the rain and food.

■ **Daily Report: Listening to the roar of water from Echo Canyon across the way, so loud and amazing**

It was in this place called Candace's Waterfall that I later discovered was Paul Fugate's sunset spot. The sunsets here are gorgeous, big and wild with colors of pink, orange and red. Paul I called silently, where are you, where did you go? In case you do not know the story of Paul, he was a botanist and park ranger at CNM. He left the visitor center one January day to walk a trail and he disappeared. He is the unsolved mystery, the longest open case of a missing person, missing ranger in the NPS. This was January 13, 1980, and today was May 30, 2022, more than 40 years later and we were still searching for answers. Paul still has friends that volunteer in the park and they share his love of plants and of being a protector of this place. When I climbed up the waterfall and arrived at that flat rock that looked over the valley and towards the sunset I sent out a message to Paul that he is not forgotten.

■ **Daily Report: I heard singing at the top of Candace's waterfall, deep low voices, flowing with the wind**

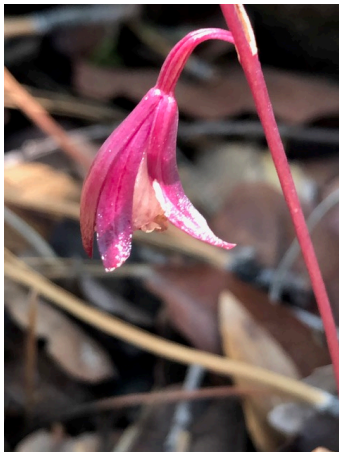
Back at the Visitor Center I walked up the dry creek until I could hear water. And just like a very slow spilling cup filled to the brim, water moved along the rocks, first soaking the earth below then spilling downward, down the creek bed. The water had arrived and in early July Rhyolite Creek was flowing. It reach reached the Visitor Center and continued under the road, down through Silver Spur Meadow, ran alongside the trails to Bonita Creek and stopped again going underground.

■ **Daily Report: The cicadas are so loud! So loud you can't talk normally. They are screaming for rain!**

The monsoon storms from the southwest, continued to come and the big heavy storms totaled 6.62 inches for July. By August the ground was drenched and heaving, the creek was roaring, and the trails were becoming creeks. In each storm the water then began to fall off of the rock cliffs in amazing displays of waterfalls leaking all alone Bonita Creek Canyon. In August the rainfall measured 9.61 inches! At times the creek was so full it nearly flowed over its edges at the visitor center parking lot and certainly was now crossing the highways and roads into the park.

- Daily Report: The orchids popped up today about a week late for the German man who was angry he was too early!

With all of this water things began to change. The trees bloomed leaves, the coatis had a huge brood of babies, bobcats were plentiful as were the deer they were chasing. Rockfall was happening on the 6 mile road up to Massai Pt. And we were rolling rocks off continuously. The trails were acting as secondary creeks funneling downhill all of the rain that could not saturate the earth any longer. Creeks became impassable to hikers. Mushrooms began to pop up, literally you could see them mostly in the Lower Rhyolite area, unfolding and popping up the mornings after a storm. The various species of fungi was so diverse (see mycology for more details) and just as one could see the thrusting and unfolding of the fungi, you could also see the fungi grow and change. Most exciting were the Boletes who changed color with raindrops hitting them, oxidation in its finest changing from yellow to blue. And there were the snakes, the beautiful black-tailed rattlesnakes were commonly found on the roads during the monsoon as things warmed up . There are 5 rattlesnake species in the grand total of 30+ snake types in the Chiricahuas, as well as an ornamental box turtle and canyon tree frogs all native to the desert southwest in Arizona. People please drive slow as during the rainy seasons you will see all of these crossing the roads and cars crush them as they cannot move quick enough to get out of the way. Even though they are pretty and



interesting never collect, touch or move anything inside of a national park, forest or wilderness. Believe me, they know where they are going we just need to stay out of their way.

Sometime in June or July, and not every year, and only sometimes after rains begin to saturate the soil, did I imply sporadic? Yes, it is! A little famous but wildly endangered orchid pops up from its special places near the roots of some old oak trees. I think it has a special relationship with the mycelium here, and they do tend to return to these same places as seasoned observers note but its all in cycles just as their host oak trees only produce acorns every 3-5 years. The USFS calls it the Texas crested coralroot (*Hexalectris warnockii*)

is a rare orchid that grows in oak-pine forests. It grows in the Sky Island mountain ranges between Arizona and Mexico. There is also noted the *Hexalectris arizonica*, described as a spiked crested coralroot or called the Arizona crested coralroot. All of these coralroots are dependent on soil, being myco-heterotrophic lacking chlorophyll and subsisting entirely on nutrients obtained from mycorrhizal fungi in the soil. Watching the unfolding, just like the mushrooms, is a daily event. One can find a tiny burgundy sprout shooting up about an inch from the soil. Each day the stalk grows and then the bud appears. This bud then flowers into a single drooping flower of sepals and petals only mm long. I saw less than 6 during the rains of 2022, and their moments were less than a week between the first sprout, budding, flowering and dying. They are very fragile and testament to staying in the trails, as they are so tiny they are easily crushable. Orchid hunters do arrive on a written schedule from a book or website expecting that by this date these orchids will be found! Locals are hired to search them out for tourists seeking from around the world. These tiny orchids are part of the micro world of the Chiricahuas and completely dependent on the whole ecosystem that thrives on rainfall.

■ **Daily Report: Rangers Campground Programs have begun in November! It's still brutal cold at night!**

In September, the general end of the monsoon season that runs from June to September dumped another 2.63 inches to total 21.61 inches for the season. The rains didn't stop as October had 2.74 inches and in October with changing temperatures there was a first snowfall at Sugarloaf! My favorite part of water changing to snow is the tracking that follows. Sugarloaf trail, the highest point in the park did not disappoint, as there were bear, and cougar and what suspiciously looked like jaguar tracks. There were rabbit tracks, and pack rat tracks, birds hopping across the snow and icicles hanging from the rock faces, beautiful and magical silence.

■ **Daily Report: Rainfall totals for the year 2022 were measured in at 29.12 inches, but oh 90 inches of Snow!**

Snowfall in the park continued from October into the spring. All of the snow events were measured both at the visitor center and at sugarloaf. The measurements were consistently about half snowfall at the 4200' elevation level to double at the roughly 7000' elevation. The snowy season totals were approximately 38" at the visitor center and over 90" at Massai Pt. January 2023 rains continued with 3.02 inches and more snow. February and March brought 1.7 and 1.76 inches and another foot and a half of snow. When the creeks stalled there was plenty of snow melt and the creeks continued to roar. Sometime in April the water was searching deep into the soil to replenish

groundwater and the creeks shrank and retreated to pools in the upper part of the park, until it ran no more.

- **Daily Report: The cactus near the Weather Station have bloomed!**

May brought 1.38" of rain and then it fizzled. Things became dry again. Monsoon season from June to September barely brought any rain in comparison to the previous overwhelming rainfall season. 2023 monsoon season totaled 4.48" and it felt eerily like 2020 that brought only 13 inches for the whole year with no snow and 7 inches of monsoon rain totals. Ranger friends tell me that the grass never got green in the valley between Willcox and the park, the creeks didn't run during monsoon season, no mushrooms bloomed and wildflowers were silent.

- **Daily Report: You can literally see the unfolding of the mushrooms popping out of the earth!**

Mycology of the Forest

Speaking of rain, the whole world of fungi is completely dependent on it, but who isn't?

There is an amazing world of spores just waiting to appear above the soil when it begins to rain in them Chiricahuas. During the 2022 monsoon season it was a wonderland of mushrooms that one minute were not there and then would appear moving while you watched as they popped their heads up through the soil, or growing on decaying bark. Lower Rhyolite trail and Silver spur Meadow Trail in CNM were my favorites for finding mushrooms.



Not being a mycologist identifying these mushroom were difficult, even living in Oregon which is famous for its wet duff and truffles and morels, didn't make me all the wiser to these fungi that looked and acted very strangely. One that I knew was in the family of Boletes. When these flat topped mushrooms began to grow I watched the deer ear them. However hiking in the rain one day I watched the yellow color of the mushroom change with every raindrop. The rain and percussion on the tops triggered an oxidation and they turned cornflower blue, to dark blue and sometimes purple. Within days these mushrooms would turn green, losing their blueness and then return to yellow. Amazing!

With more rain coming, the forest detritus gave way to red candy tops, conks on trees, large oyster mushrooms that were 18" - 24" wide, beautiful southern jack o' lanterns, amanita, polypores, jelly mushrooms, russulas, powder caps and earthstars. There are exhaustive lists in iNaturalist which I encourage anyone interested in the mycology of the Chiricahuas to read more, just check the references at the end of this report. My experience over the months of rain in the CNM is that I was always amazed and loved exploring these colorful and artistic architecturally strong fungi that were laying dormant waiting for an opportunity to fruit and then become food for the forest. Everything has its time in the forests, it is the time when cones appear, berries arrive, and the abundance of life that follows.

- **Daily Report:** The coati squeak as they cross the road, so happy to get to the other side and all are safe!

Wildlife, the essence

Coati in August coati showed up with their babies, 50 of them at Silver Spur Meadow. The females will stay together and the babies will stay in the communities until they make wander off solo at maturity usually in a year. The matriarchs of the families are usually more of an orange color



and larger. The males are a darker brown and also larger than most of the coati. They will return to the female community usually to mate. The coati families stayed in the meadows, the rock caves and around the visitor center for the delight of the visitors. They are the number request after the rock formations. During monsoon season the coati will wander throughout the park staying near the flowing creeks. It is a tell-tale sign to find digging holes everywhere around boulders as they are grubbers. Their favorite meals are worms and cicada nymphs that have burrowed beneath tree roots in varying cycles from 1 year to 13 depending on the species.

- **Daily Report:** Rocks on the road! Impassable, had to roll them off myself, no maintenance today!

In the summer of 2022 a unique coati was born. I named him Halo and the name stuck. Halo was born in the Silver Spur Meadow and as all coatis have unique tail patterns, his or hers had a distinct white ring about half way on the tail. When lifted, which is the distinct feature of the thin-ringed tails, to be high in the grass while the bodies are

concealed below. For Halo this white ring reminded me of a Halo. Halo grew up with the other coati and we often saw him around the visitor center.



The distinct voice of the coati are their high pitched squeaks, although they have a broad vocabulary in the sounds they make to each other, to intruders and when isolated and finding each other. Chuffing is what you will commonly hear while the group is eating, always with a lookout that is squeaking giving information. One of the cuteness factors

of watching the coati is how they cross the roads. Remaining in a group on one side until one brave coati runs across, then they all follow sometimes 20 or 30 at a time. The lookout is always last and gives a signal that they are all safe and then they begin rolling and huddling together while chattering almost like saying “whew we all made it across the road, let’s celebrate.”

■ **Daily Report: Looking for prints today, I thought they were Bobcat, But I’m certain, THEY ARE JAGUAR!**

Jaguar

Long before there were human boundaries, border walls and countries, the natural world of the Americas had a contiguous ecology supporting an abundance of wildlife. Extirpated north of the Mexican border with the USA in the mid 1900s, the Jaguar is one of most prominent and watched species that is still trying to maintain some existence in the north including the Chiricahuas. There are many groups including Az Game and Fish and the Center for Biological Diversity that maintain cameras and have caught glimpses of various male jaguars moving through the nearby Huachucas, and Peloncillos as well. Eight jaguars identified by their unique rosette patterns have been noted in these mountains since 1996 and in 1997 jaguars were added back to the endangered list. These well known jaguars even have names like *El Jefe* famous for roaming from the Santa Rita Mountains and back to Mexico, *Yo’ko* who roamed in the Huachucas and killed there and *Sombra* who is thought to be wandering in the Chiricahuas. As of January 2024 there is a new jaguar that has made his/her way through the border walls to the desert southwest. The problem is that the last female north of the border was shot and killed in the 1960s. The females stay close to where they were born, which means all of these roaming males will not find a mate north of

the border unless that changes. And the dangers to these majestic felines is always the gun.

- **Daily Report: Acorns are out on the White Oak. They are the only ones this year!**

Coati just like the jaguar, are part of the northern range of the Sonoran desert and ecological system that supports them. Coati, so loved in the Chiricahua National Monument, are part of the diet of the jaguar and according to the US Fish and Wildlife report jaguar have a broad range of diet including 85 species. These include coati, javelina, pacas, deer, opossum, rabbits, armadillos, turtles, frogs, birds, fish and in the desert southwest the endangered Mexican prairie dog or black-tailed prairie dog.

- **Daily Report: Found an old mine road today and some secret buildings from a hundred years ago**

During the late summer I began to notice a lot of red mounds popping up on the 4 mile grassland road to the entry to Chiricahua National Monument (CNM). No one knew exactly what animal was making the mounds some said prairie dog, some said pack rat, but they were all over the grasslands. After work I would head west to the entry of the park, to the grasslands to see hawks and golden eagles, coati and javelina which liked the grasslands and the mice there. Sunsets are gorgeous too and moonrises spectacular. I would sit next to the mounds hoping to catch a glimpse of who was entering the very distinct and large holes in these mounds, The makers however were very elusive and days and days brought nothing. These mounds were not old and abandoned they had popped up recently, but like me the hawks that sat above and eyed the holes never seemed to catch movement. I began looking for mounds close to the road that were not beyond fenced land, and I picked a spot to walk the fence and check for tracks. This was one of my favorite things to do after rainfall, looking in the washes and dirt for muddy tracks. I found a long track that I thought at first was a Bobcat. At CNM there are very large bobcats that I have seen stalking deer weighing approximately 50 lbs. The tracks I found fit a good sized bobcat and it was walking the fence line for at least 1000 feet. I took photos and went back to work. Soon thereafter I found in the snow very large tracks up at Sugarloaf of what looked like a cougar but had that distinctive pad of a jaguar paw. Looking more careful at the muddy tracks near the prairie dog mounds I noticed the web again, it was not a bobcat but with almost certainty I knew it was a jaguar track.

- **Daily Report: Coati fell into the water today crossing the creek. They can swim!**

The jaguar has a special foot print, like all felines the nails retract and you will never see claw marks in the track, unlike their canine friends whose nails are always visible on a dog, wolf or coyote. The digit pads are wide just as the whole footprint is large and larger than most large cats. The unique metacarpal pad has an indentation at the base of the pad separating the two sides and appearing more pyramidal in shape in contrast to the large bulbous rounded pad of a puma. Finding the tracks on sugarloaf in the snow immediately after a snow kept the print wellformed and I could follow the path in the direction it was going either up or down the trail. Quite a busy trail I found as there were many tracks crossing of



bears and bobcats, birds, small mammals and the large prints of the puma and possibly jaguar. I had enough info that I contacted the jaguar expert with Fish and Wildlife and there was a confirmation that indeed there had been a jaguar caught in a border patrol camera near the time I found the prints just outside the boundary of the east side of the park in the Chiricahua Wilderness. The tracks on the fence line on west side entry road into the park were confirmed as being completely valid and plausible. This gave great excitement and hope.

- **Daily Report: The Mexican Jays are great beggars. They beg from all the visitors in the parking lots**

Just recently in January 2024 news releases stated a jaguar, not confirmed male or female was captured on camera as a new jaguar that had crossed into the Huachucas Mountains. Safe travels to our feline friends.

- **Daily Report: Today a mammoth donkey hiked the trails**

Tracks

Besides the jaguar prints more often found are bear prints. These are Black Bear that abound in the Chiricahuas, however they have a great diversity of hair colors including red, blonde, brown and black. Because the monument is very small (12k acres) in comparison to the Wilderness boundaries (87k acres) and the Coronado National Forest (1.78 million



acres), the bear have abundant plant and animal food outside of the park. Sometimes they wander through and are often seen when the manzanita berries bloom first in springtime and when creeks are still running in summer. It is always nice to be hiking a trail and find the bear prints or scat in the mud or snow.

■ **Daily Report: Found a spotted skunk in the bottom of the trash bin up at Echo Canyon Parking Lot**

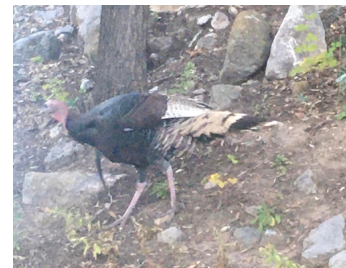
Along with the bear tracks found during the wet months, an interesting phenomenon happened on the wet trails. First were the burrow holes that appeared on the trail edges at Lower Rhyolite. Again without seeing the creators, we were not sure if these were badger holes or skunks. There are four species of skunk noted in the Chiricahuas including the Hooded (*Mephitis macroura*) Striped (*Mephitis mephitis*), Hog-nosed (*Conepatus mesoleucus*) and Spotted (*Spilogale gracilis*) skunks. A few times spotted skunks were found burrowing inside of the trash bins when it was cold having slinked up the backside of the bin and crawled in. What a surprise for maintenance to open the bin and find a skunk!

The soft wet ground provided easy burrowing on the south facing side trails providing heat and water on the trails. The sunny slopes then created the best places to find wild grasses and flowers that in turn brought an abundance of insects and butterflies.

The visible remnants of coati rock turning was always present. With their long claws and strong paws they turned over rocks with amazing strength looking for grubs. Often times I would find that the rocks dug around were where the cicadas had emerged.

■ **Daily Report: Lightning hit a tall Pine at Massai Pt at the parking lot, it split right down the bark!**

And let us not forget the daily presence of the Goulds turkeys, after all Chiricahua means the land of wild turkey. In the early mornings, being first on trail was a gift. It was there I would see all of the turkey tracks and smile. These large birds did roost in the trees at night and their calls to each other was like a song. And like the coati troops the turkey would travel sometimes with 20 of them together, watching their newly hatched chicks turn into these majestic birds. Often times we would get a treat around the visitor center and they would come to knock on the door to the delight of everyone!



■ **Daily Report: The Sandhill cranes flew right over the park today, could hear them so well**



Cicadas

Cicadas have always been a fascination to me. I have been in the land of the Brood X when the 17 year emergence happens in huge geographic regions, and in places when smaller broods emergence every few years or annual cicadas that emerge every year. They are a fascinating group of insects in that we can hear and see them as the sounds of summer! Growing up in the bayous of Louisiana the tree frogs were the chorus of summer, and the insects were always the callers of the rain during the dry months as if their vibrations could pull the water from the clouds!

■ Daily Report: The Aspens are Yellow and bright and can see them across the peaks

A couple of the noted cicadas that I found during 2022 were the first emergers, the periodic broods that tend to have longer times underground more like 13-17 years. The ones we call annuals are really 2-3 year cycle cicadas, that alternate their emergence so that there is always some cicadas emerging every year. Two well know cicadas in the Chiricahuas are the Apache Cicada and an annual cicada in the Hadoa family known as *Hadoa chiricahua* which is endemic to Arizona and New Mexico. These cicadas both burrow as nymphs and as they are triggered by the emerging monsoon season, seem to sense the change in atmospheric pressure, or feel the warmth of the soil change, or are triggered by the trees roots that send signals down as a time to emerge from the soil grow their wings and mate. Cicadas are not dormant when they live underground, however because we cannot see or hear them until they emerge, we forget about them. However with their strong claws they move among the plant and tree roots sucking sap, building tunnels and chambers. When their time comes to emerge the nymphs develop a hard exoskeleton and climb up rocks and tree trunks. Cracking open one can find these exoskeletons still clinging to the trees and find the newly emerged and winged cicada high up in the branches. It is the males that work like tiny little violins, exuding their abdomen and vibrating the recognizable buzzing that we hear. They are the loudest insect in the desert southwest can be heard for 500 yards or more and even more present in the desert canyons. It has been said that the females are silent, however I have found that indeed they also click. There are certain cicadas that click and some that buzz, some females click and some males buzz, it changes from species and gender. They are all in echo communication with each other, looking to mate to then lay eggs and return to the soil below. The season of cicadas, as the sound of summer begins when the heat turns up usually in June, a call, prior to the rains of the monsoon. The life of the cicada is 3-4 weeks and when the rains start the cycle continues.

■ **Daily Report: Found a Canyon Tree Frog in the rocks at Echo Canyon Today**

Upon my observations I asked questions like “do the cicadas prefer certain trees? Do they burrow under rocks or only trees? Do they chose creeks over hillsides? Shade over sun?” What I found through my observations were first finding the emergent holes. The holes remain in the places that the nymph has burrowed out from and I found them often in red dirt and around rocks. The exoskeletons were more often found on pine trees than oaks, and also upon rocks. Some exoskeletons were in the ground, others were still clinging to the bark. All crack open at the back where the wings expand. The living cicadas once they are winged will begin to fly and I found them more often on bushes than on trees. A common amusement is hearing a cicada as you walk by on a trail and then it goes silent while you pass. If you stop to find then you will see the cicada slowly moving around the branch to hide from your shadow, perhaps a survival mechanism as a hiding from birds and their shadows cast as they land in the trees to eat them. These tiny 2inch insects are great evaporative coolers as they continue to suck sap from the trees and their winged motions blow air over their fluid filled bodies. Natures design.

■ **Daily Report: There was a raven dancing all by himself, talking, propounding for a long while to himself**

The cicadas however have predators of their own. As nymphs in the soil, fungi search them out, feed on them and eventually kill their host. Once as winged cicadas on trees the female cicada killer wasp searches out the insect, stings it and paralyzes it, then carries it to a burrow, lays one egg on it, and then closes the burrow up. The cicada remains alive underground while the wasp larva slowly feeds on it until the cicada eventually dies.

■ **Daily Report: Hiked 3 miles in 45 min today for a rescue up to Inspiration Pt.**

Coati are also a predator, finding the nymphs underground, all those coati turning over rocks, digging holes are feasting. One would think that the cicada population would be decimated with all these vicious predators, however the desert southwest has one of the largest populations of cicadas in the country with approximately 30-40 species. The endemic species in the Chiricahuas are there however because of the trees, the water and the just right ecosystems that have been created over thousands of years. With adaptation and survival in mind each of the tiny and large creatures have all found a niche here, but not in isolation, but rather each and every living being depends on another to make these biomes work.

- Daily Report: A big black bear jumped over the rail onto the road, ran down, then jumped back over!

Birds

Before we talk about the forest themselves, we will take a visual and sensual imaginary walk with the birds of the Chiricahuas. Imagine the tall canopies of the Apache Pine and the Ponderosas with their pineapple and vanilla smelling bark and the long needles hanging and cones scattering the forest floor. These conifers respire, breathing in carbon dioxide and exhale out carrying terpenes from the resin in their sappy trunks and leaves (needles). As you are walking under the canopy of trees, quite diverse indeed, you smell the breath of the trees too in that dappled light. It smells like pine and it feels refreshing. You continue to hike an hour and once you return to the end of the trail, your body, mind and spirit feel better. You feel happier and stronger. The Japanese have coined this as 'forest bathing'. In actuality this is medicine, a healing. Inhaling these phytochemicals as the trees respire, increases the bodies Natural Killer Cells, which are white blood cells. They increase immunity making you feel stronger and healthier, and happier as a consequence. What a great thing. To some, walking in a silent forest does feel eerie and so it is the songs of the birds, the wind blowing leaves, the trickle of water in the creeks that bring the magic. The flitting movement of the birds bring people to the forests of the Chiricahuas to search for some very special ones that call these mountains and creeks and forests home.

The Elegant trogon with its "bark-like call" has its origins in Mexico and prefer the wet tropics. These birds however have made the Chiricahuas home. They are insect and fruit eaters and are now mostly found on the eastern slope and remaining nearer to Cave Creek and the water that runs mostly year round on this side of the mountain. It is here where cicadas, and katydids, praying mantis and lizards abound, all desired food for the trogon. Hiking in cave creek I too have had my glimpse of the trogon nestled in the canyons of the standing up rocks. I remember looking for the Resplendent trogon (*Pharomachrus mocinno*), also known as the Quetzal bird, in the cloud forests of Guatemala. During archaeological fieldwork in the Upper Peten we were in search of these creatures just like the visitors in the Chiricahuas come to catch a glimpse of these mythological birds. With the increase of fires, the sightings of the trogons have diminished in certain places where trees have been decimated. With regrowth it will be a gradual return one will hope.

- Daily Report: Saw a group of about 15 javelina crossing at the entry in the grass today

Other more common bird species noted in the Chiricahuas include: the brave and raucous Mexican Jay, the Arizona and Acorn Woodpeckers, Canyon Wren, White-breasted Nuthatch, and Yellow-eyed Junco and many species of hummingbirds. During migration one can catch a glimpse and hear the jurassic sounds of the Sandhill Cranes as they migrate over. There are more than 100 species of birds in varying abundance that call CNM and the Chiricahua biomes home. As elevation changes so do the plants, animals and birds found. For instance driving into the grasslands one can find red-tailed hawks, Apache goshawks, peregrine falcons, golden eagles, owls, vultures, and quail as there is an abundance of mice and small mammals for these predator birds. Then as the landscape changes to include Alligator Juniper, Oaks and Black Walnut trees one will find warblers, finches and tanagers. Continuing up the riparian corridors sightings of woodpeckers, vireo, junco, and Mexican chickadees can be found in the sycamore trees that line the creeks. In the upper elevations in the Fir and Spruce forests and the Rhyolite canyons, the world of wrens, especially the wonderful song of the canyon wrens can be heard.

■ **Daily Report: Hawk nest in the big sycamore at the entry to the park, they may be goldens**

One morning after picking up a couple of hikers in the shuttle we were heading back toward the campground. Recently bobcats had been on a kill of the new fawns recently born, and there was one close to the road that a golden eagle had found. Unbeknown to us the eagle decided to lift off from the side of the road and flew right into the windshield of the van. Her wings wrapped both the front and side windows lifted and flew onward. She was ok as I went back several times to check and make sure. What an experience to actually connect with a golden eagle in that way and to feel and see how really large they are. Later while driving out of the park I notice there were two, a mating pair in the large sycamores off in the distance.

■ **Daily Report: Driving at night into the park, beware big owls hunting mice, into my headlights**

Night time is also very active in the grasslands. It is there where the great horned owls are waiting for the mice to cross the roads. The owls will be sitting on the road and when a vehicle comes down the road it can be sudden lift off with these great majestic birds too. The hoots and the howls can be heard in this great wildness when the moonlight is all you see when the shadows move. In the spring of 2022 a nesting pair Long-eared owls were near to Silver Spur Trail near the creek. They did not return in 2023, and likely found a new spot not so close to the trail. There are many other owl species including the tiny Flammulated and Elf owls that make their homes in the holes made by the woodpeckers in the Sycamore trees on the creeks. Screech owls can also be

heard along the creek corridors in the forest and these smaller pygmy owls can be and are sometimes food of choice for the Mexican Spotted Owls which I have heard their distinct call when hiking on the trails as dusk.

■ **Daily Report: Waterfalls everywhere! They are pouring off the rocks in the canyon**

The evolution of change is the constant and with monsoon storms there is the chance of lightening strikes in the forests. Reports and observations of strikes at the higher elevations in CNM and on the Wilderness peaks have a long history. On Sugarloaf Mountain there is a historic Fire Lookout that at one time was manned for months every year. There was a time in NFS history where the 10 o'clock rule was used. It stated that if a fire was sighted it had to be out by 10 am the next morning. There were large fire crews and equipment in the CNM and National Forest protecting the Chiricahuas from the 1930s until the 1970s. And in the 70s thinking changed and fire suppression was only to save the architecture and buildings near the park and forests. What followed with droughts and a growing forest were large and devastating wildfires that have changed the forests of the Chiricahuas. These wildfires however have mainly been caused by humans including the 2011 Horseshoe 2 Fire which decimated more than 200k acres of the forestland and 80% of CNM. With the loss of trees, rain and snowfall have decreased leaving some bird and animal species silent and disappearing.

Some still hope for the Thick-billed wild parrots to return as once they were part of the Chiricahuas high in the conifers at the top of the mountains. One of two native wild parrots of North America, hunted out by 1938, those that remain live just over the border in the forests of the Sonora. These wild parrots are well adapted to snow and altitude where they search out their food of choice, the pine seeds and nuts. Just like the jaguar, there are those hoping that the parrots will also return to the north. This all depends in the health of the forests that remain.

■ **Daily Report: The Ranger Led Hikes are a hit! Talking about Tree Medicine**

Trees & Forests

The forests of the Chiricahua Mountains are diverse, changeable by temperature and moisture which is defined by elevation. They are however dependent on each other and are part of a contiguous ecosystem that is defined by the mountains but stretches beyond the valleys to other Sky Islands and geographic similar regions. Approaching this study from curiosity as to a long term adaptable ecosystem in a momentary snapshot, the info collected on the trees was as a Citizen Scientist hiking the trails of the

Chiricahuas. Hiking through burned sections of the mountain I was curious as to where the new trees were growing back, or if they were at all. Like my time at Mesa Verde in search of where the new trees were growing, I found that there it was a deliberate group of allies that were working together to protect the new sprouts. For instance, if a burned juniper no longer has leaves, it cannot produce new seed, so how does the juniper forest continue on after a fire. Seeds are kept in storage by land mammals and it is they and the birds who transport these seeds who are laying dormant waiting for the right opportunity to sprout. In the case of Mesa Verde it was the Yucca, the pack rats, and the horses working together to grow a new forest. In the Chiricahuas, who were the players, the allies, working together to regrow the forest? I searched out the grandmother trees, those older than the average age of the forest, usually the tallest or biggest circumference trees that have long withstood the cyclic climate changes of drought, fire, flooding and severe cold.

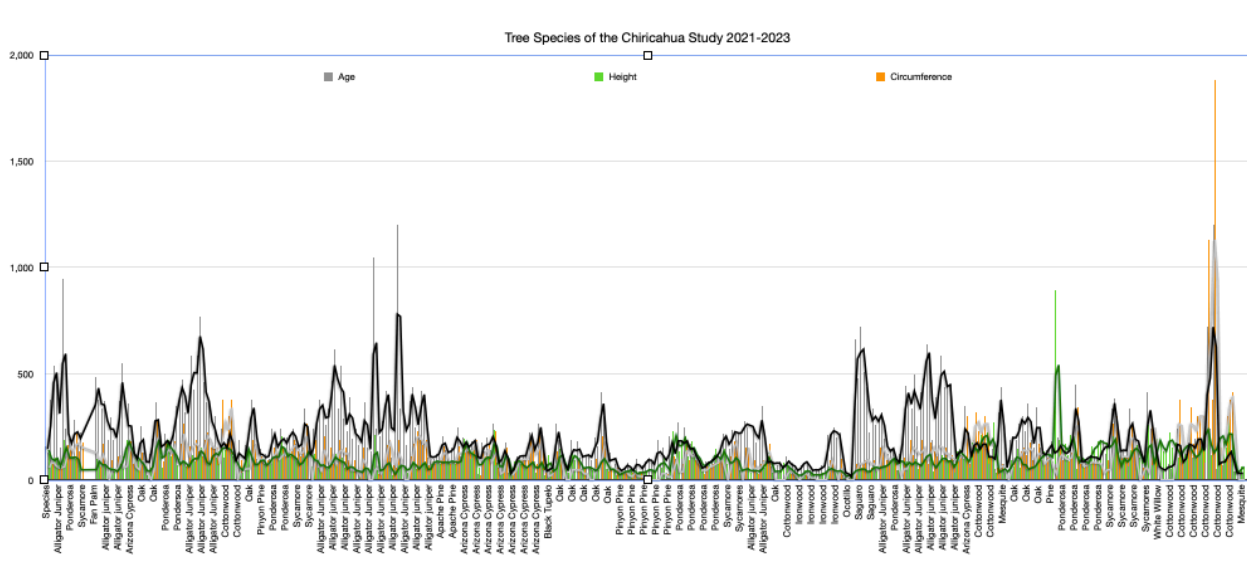
■ **Daily Report: Sunsets are gorgeous. Full of Pinks and Oranges and Reds!**

Being a field scientist with NASA using the Globe Observer App on my phone I had a handy tool to collect information on the trees without touching them. This is important as coring trees creates and leaves injured places where insects can invade. Trampling near the roots of trees is also sometimes a hazard for both humans and trees. Cryptobiotic soils are important in regenerating burn areas. These living organisms are vital and in fragile environments can take thousands of years to regenerate soil. One footprint kills and so staying on trails is vital.

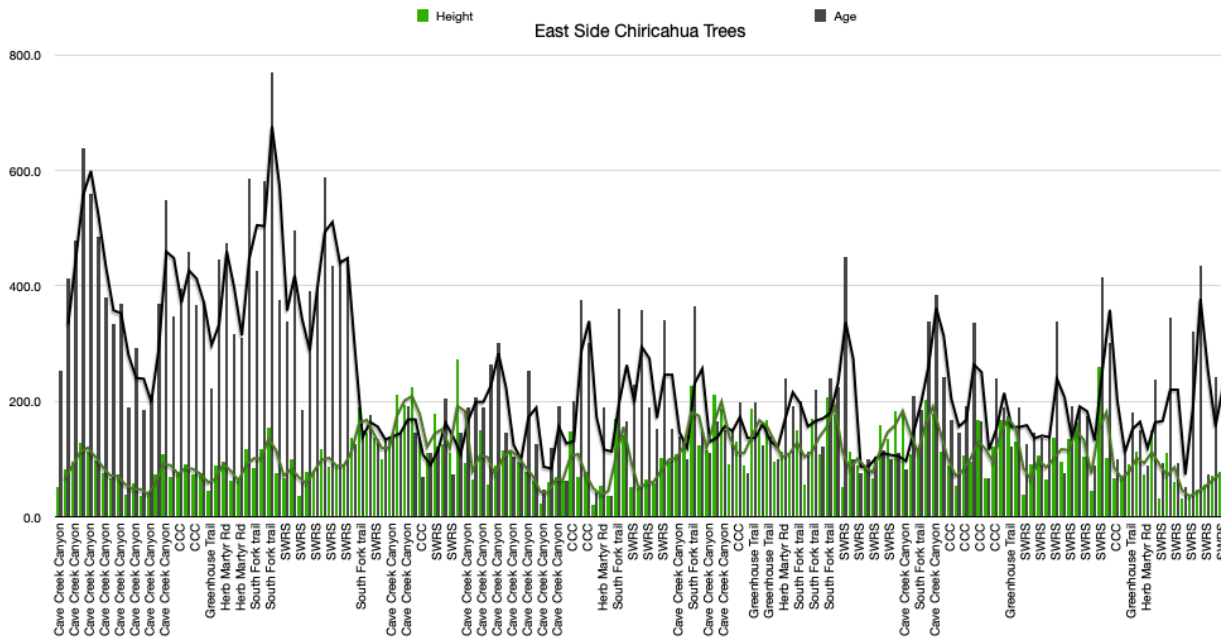
■ **Daily Report: Found the new trees growing on Natural Bridge Trail, they are under the snags**

I will share with you some of the tree species found in the diversity of the ecosystems of the Chiricahuas and some outlying areas also visited between 2021 and 2023. For a detailed list of trees that were collected with the Globe Observe App, you can find all 400+ trees in their global database made and created to be shared with everyone around the planet. All trees are located according to latitude and longitude and noted by regional location by name. Information collected on the trees include Height (estimated by triangulation in the app) calculated by distance of stride and height of collector using the photo option of the phone. Circumference is an option and can be estimated using diameter. Detailed notes were added into each tree information collected and nothing besides observational notes was collected. Leaving No Trace!

■ **Daily Report: All the flats, on all the tires, happen to all the visitors that come across Pinery Road**



I will use both the geographic map of the mountain to explain the trees and the ecosystem they live in which is also defined by the biome. Boundaries between biomes are not always sharply defined. For instance, there are transition zones between grassland and forest biomes. Biomes adjust as the climate changes. These transition zones as I spoke earlier are dynamic and change much more often than an old growth ecosystem and short and long-term information needs to be considered.



- **Daily Report: Post holed up to my thighs at Sugarloaf, had to turn around! That was a big dump last night!**

The East Side

From the east side of the Chiricahuas via Portal, Arizona one enters Cave Creek Canyon. Hiking trails abound beyond a volunteer operated visitor center with a huge dry erase board with updated bird sightings! The road follows Cave Creek which is rainfall fed from the upper peaks. This side of the mountain is known as The Yosemite of Arizona where the rock faces are flat, sheer and rise up hundreds of feet. To a climber there is an appeal, but the rock is brittle and flaky rhyolite full of lichen testament to the weathering process as scree piles flow below. The minerals from this old lava rock are fertile however and the trees are here for the nutrients and the water. The creek supports a broad forest of very large sycamore trees and cottonwoods. Mixed in are Alligator Junipers, oaks, Pinyon and Ponderosa pines, willows, black walnuts, and poplar. Of course the plant and tree list is much more robust.

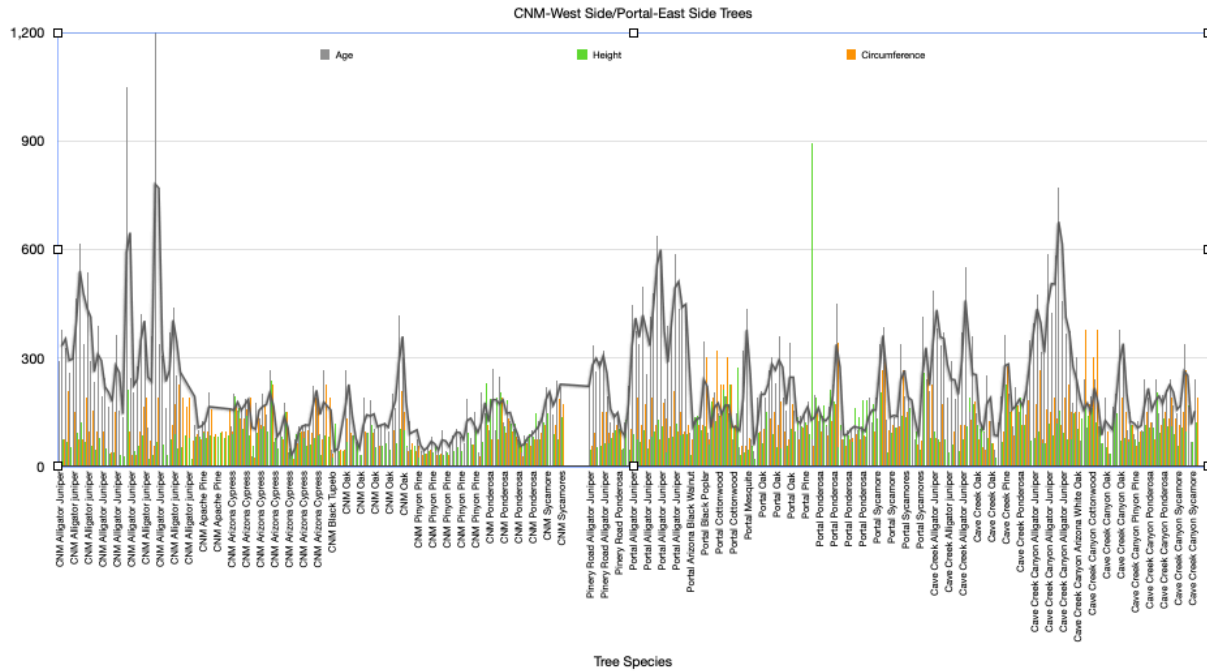
- **Daily Report: Saw a trogon today! South Fork Trail**

The Canyon Road continues for another 5 more miles as asphalt, then turns to dirt and gravel as you approach the Southwestern Research Station of the American Museum of Natural History. It is a biological field station providing scientists, educators and students from around the world the opportunity to participate in research, workshops and classes in one of the most biologically rich environments in the United States. Over the years I have stayed at the research station with many Earthwatch groups and schools who are gathering information on endemic Leopard frogs, bats and elf owls. Effects of habitat loss and drought diminishing the creeks are affecting these populations native to the Chiricahuas and the east side of the mountains.

- **Daily Report: The canyon tree frogs swim in the pool at the SWRS**

From the SWRS the dirt road called Pinery Road continues its upward winding climb through oak-pine forests into for another 18 miles across the high peak conifer forests and then down to the western side of the mountain to the grasslands and entry to Chiricahua National Monument. hiking trails abound from Portal and the Research Station that connect with trails up to the peak. Some named trails are: Cave Creek Trail, Greenhouse, Silver Peak, South Fork, and Winn Falls which has a spectacular waterfall that becomes an ice fall during winter. Along the road in USFS there are numerous primitive camping areas and trails.

■ Daily Report: There are decaying rocks n the creek made of minerals that make really nice paints!



Between Portal, Cave Creek Canyon and Pinery Road I collected data on 170 trees including Ponderosa, Sycamores, Alligator Junipers and Oaks. The average circumference 118-123" with average height 120'. The youngest tree in the collection was 36 years old and the oldest 770 years old. The average age of this study is 244 years. In the Chart a running average shows the average age of the forest that is a collective of all of the species of trees that live on the east side and across Pinery Road. On both sides of the Chiricahuas, the oldest trees are the Alligator Junipers.

West Side

Arriving on the west side entry road either from Pinery Road or the highway, if you head further west you are amongst old frontier family cattle grazing lands, if you head east you are now entering the Chiricahua National Monument (CNM) established in 1924. Currently the Monument is hopeful in working toward becoming a National Park. While I am writing this report the NPS is fully into centennial mode to celebrate 100 years under the protection of the NPS.

■ Daily Report: So many birds, the long list grows!

Grasslands abound as the low elevation biome at the entry that within a mile gradually populates with black walnut, alligator juniper, oak and more than 50 species of grasses. As the canyon begins to narrow, one becomes closer to Bonita Creek which is similar to the east side Cave Creek with large Sycamores, Cottonwoods and Arizona Cypress mixed with Chihuahua Pine, Ponderosa and Apache Pine.

- **Daily Report: Today met a German couple who have ridden from Canada to CNM, their last ride after 16 years and taking the wild mustangs home with them on a plane!**

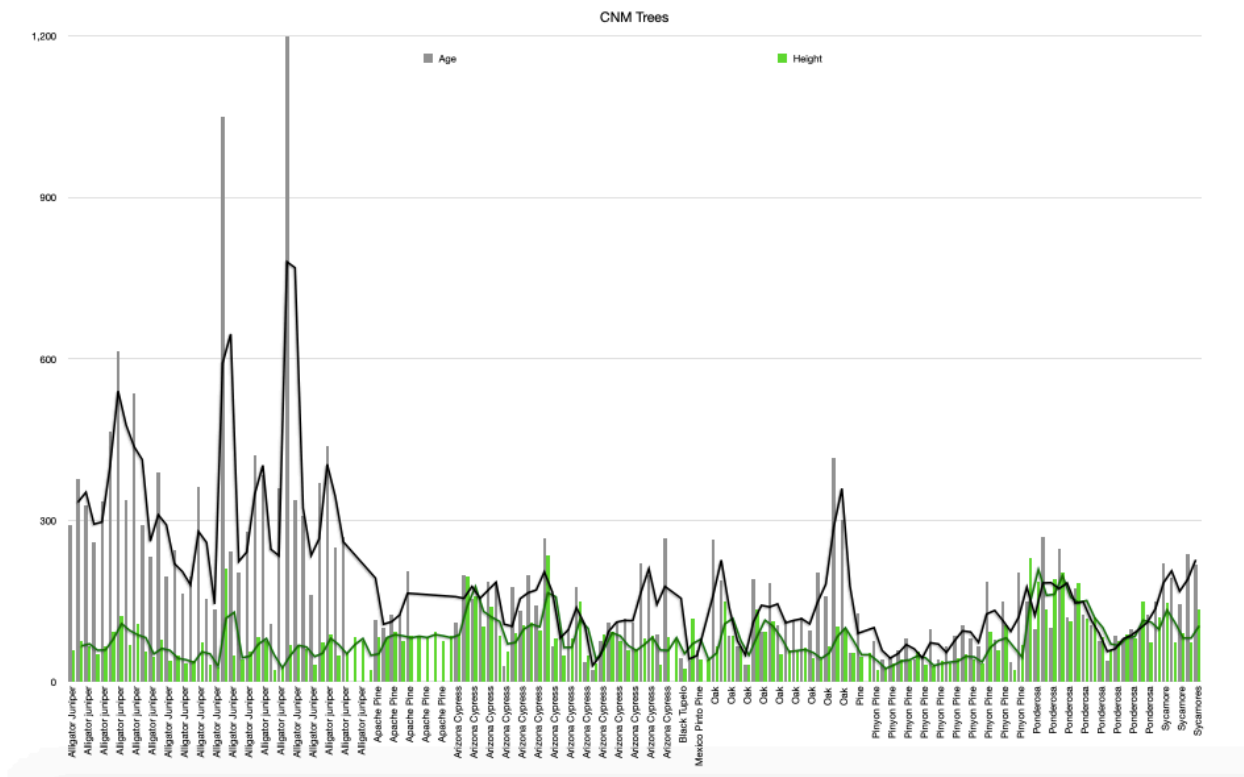
The road is one way in and one way out for a total of 8 miles from roughly 4000' to 7000' at Massai Pt. along the Bonita Canyon Road. At Organ Pipe formation the canyon is narrow and overarching deciduous sycamores and periodic Madrone trees are the magic of season changes with their yellow and orange leaves in autumn and first buds in spring. Climbing in elevation the rock faces are sheer and during rainy seasons are brought to life as waterfalls along the drive. Many of these rock pillars begin to take form and are so aptly named Captain, and China Boy. Climbing into higher elevation one begins to see Douglas Firs, Pines and hug panoramic views overlooking a rock formation called Cochise Head to the North. In the high country there are more sightings of bear and large cats along this winding road that forks off to Sugarloaf, Echo Canyon and Massai Pt. Due to exposure at the top of the peaks winds are fierce, snows are heavy and lightning strikes trees sometimes. Stunted due to the elements, trees are short and carrying the bending of the wind. With more sunshine manzanita and berry bushes abound and are food to the wildlife here. It is the Mexican Jay who entertains here in the peaks, the beggars of food, the brave ones. Often I have seen and watched solo ravens dancing and singing their very diverse songs to an invisible wind on top of the pillars at Echo Canyon. Perhaps they too like to hear their echos.

- **Daily Report: Question of the Day: Is the road open?**

Near the top of the road turning into the parking lot one day after a storm, there was a very tall Pine that had been struck by lightning. The bolt trapped down the inner back layer, through the sticky sap and down to the base. The vertical cut was visible, but the tree was and is still healthy. Testament to lightning safety protocols, do not stand under solo or the tallest trees in a storm.

- **Daily Report: Found a Rowan today**

The high point in the park however is not Massai Pt. It is Sugarloaf. Looking southwest one can spy the historic fire lookout at the top of a dacite cap. The trail is 1.2 miles through amazing geologic features in the pine forests that remain and junipers on the sunny side of the trail to the top. Climbing Sugarloaf which by the way is named from a historical analogy to buying a loaf of sugar! Arriving at 7,310 feet the view is spectacular. One has arrived above tree line and in the manzanita bush. Looking south the highest point in the Chiricahuas at Chiricahua can be seen at 9,773' along the rim of ancient Turkey Creek Caldera. It is here one can witness the burned swaths of the recent crown fires of the old growth Ponderosa Pine Forests.

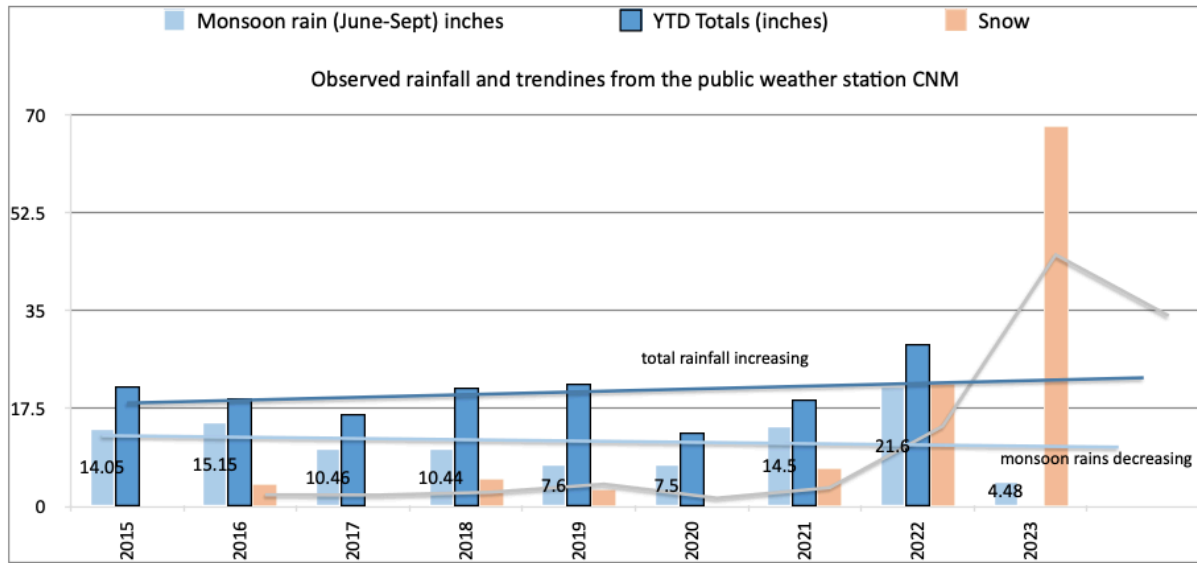


- Daily Report: Red Dirt is an old river bottom that was pushed up to the top of the Chiricahuas, how cool!

Between the entry road and along the trails within the National Monument, I collected data on 141 trees including Ponderosa, Sycamores, Alligator Junipers and Oaks. The average circumference 79" with average height 80'. The youngest tree in the collection was 23 years old and the oldest 1200 years old. The average age of trees in this study is 189 years. In the Chart a running average shows the average age of the forest, a collective of diverse tree species living on the west side of the mountain. On both sides of the Chiricahuas, the oldest trees are the Alligator Junipers and for the CNM the

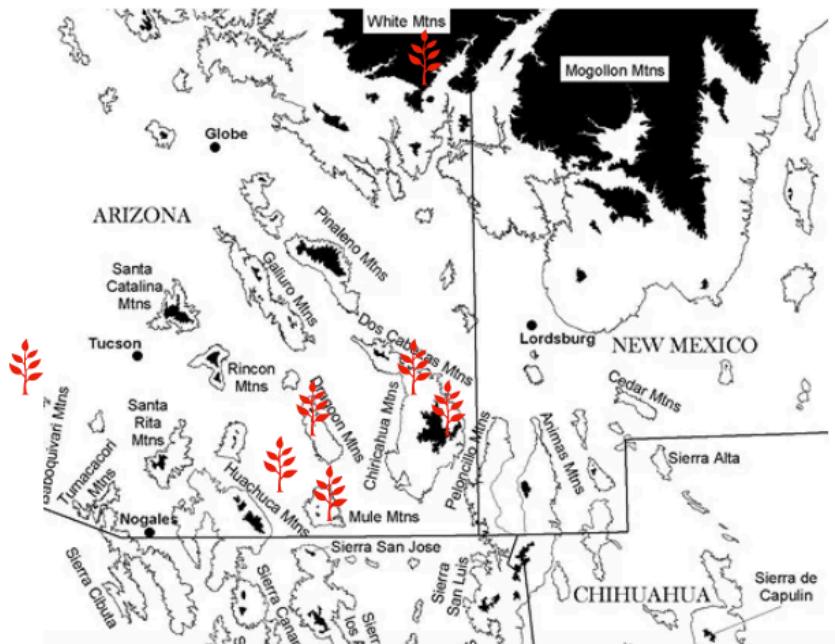
oldest Alligator Juniper and Ponderosa/ Apache Pine are near to Silver Spur Meadow. Natural Bridge Trail had some of the tallest and oldest Pines and succumbed to the 2011 and previous fires leaving the valley within mostly burned.

■ Daily Report: The nymphs are coming up out of the ground under the rocks at Red Dirt



Other Areas Included

1. Ironwood Forest National Monument managed by the BLM, was created in 2000 by President Bill Clinton. It protects 129,000 acres (almost 300 sq. mi) of Sonoran Desert habitat from just west of Saguaro National Park on the west side of Tucson almost to Casa Grande, Arizona. A significant concentration of Ironwood trees (*Olneya*



tesota) are found in the monument. More than 200 Hohokam archaeological sites have been identified in the monument, dated between 600 and 1450 with various cultural artifacts dating more than 5,000 years old. Several endangered and threatened species live here, including the Nichols turk's head cactus and the lesser long-nosed bat. The monument also contains habitat for the cactus ferruginous pygmy owl. The desert bighorn sheep dwelling in the region are the last viable population indigenous to the Tucson basin.



The desert ironwood (*Olneya tesota*) is a very long-lived tree. The Ironwood tree only grows in the Southwest's Sonoran desert. It is one of the biggest and oldest plants, growing to heights of 45 feet and persisting in the desert heat for as long as 1,200 years. Desert ironwood is a keystone species because it provides a nursery environment of shade and protection that enables young seedlings of other species to become established despite the harsh desert climate, where daytime high temperatures can exceed 105 °F (41 °C). The ironwood also provides shade and roosting area habitats for birds. Its smoky lavender-colored blossoms provide nectar for bees and other insects, as well as forage for animals. The blossoms produce bean pods which also provide food for desert animals.

As I visited this monument in the autumn of 2021, it is a beautifully serene place that is full of large Saguaro and green Palo Verde trees amongst the Ironwoods. Within sight however are large mining operations.

On the monument trails I measured 26 trees with an average circumference of 32" and average height of 36' some as young as 12 years old and the oldest at 720 years old. The average age of the 26 trees came out to be 182 years. All of these trees were randomly chosen for this field report.

- **Daily Report:** The Saguaro has a skeleton that is as strong as bones, they are the trees of the desert

2. San Pedro River at the San Pedro House

An old historic ranch house operated by the Friends of San Pedro stands protecting a section of the San Pedro Riparian Conservation Area managed by the BLM. The San Pedro riparian area, contains about 40 miles of the upper San Pedro River, was designated by Congress as a National Conservation Area (NCA) on November 18, 1988.

The primary purpose for the designation is to protect and enhance the desert riparian ecosystem, a rare remnant of what was once an extensive network of similar riparian systems throughout the Southwest. Within its boundaries contain several Clovis Archaeological Sites including Murray Springs a significant archaeological site dating 12-13k BP that contains an undisturbed stratigraphic record of the past 40,000 years. Containing Clovis artifacts and mammoth, horse and



bison bones. The river itself is one of only two rivers that run north from Mexico into Arizona. The Nature conservancy has dedicated a sustainable innovative land and water management plan to ensure abundant life on the San Pedro River. The trees that remain on this riparian corridor are mostly Cottonwood trees that shade the river and provide a migration pathway for hummingbirds. There are also Willow trees, Chihuahua desert scrub, mesquite, many species of grass along perennial waterways, that provide abundant small mammals and predator birds. Nearby in the mountains that flank the San Pedro, jaguar and black bear move. The tropical Gray hawk and yellow-billed cuckoo nest along the vital river. The basin in which the San Pedro lies is home to 84 species of mammals, 14 species of fish and 41 species of reptiles and amphibians. The SPRNCA represents a fragile and rare ecosystem that is threatened by increasing demands on the regional aquifer and loss of groundwater.

In this area I collected information on 28 Cottonwood trees who grow really fast, tall and depend entirely on the water from the river. The average circumference for this set of trees is 255" with an average height of 156' ranging in age from 29 years to 1200 years of age. The average age of the 26 trees is 170 years.

- **Daily Report: A beaver dam, remnants of an old one**

3. Apache National Forest, Blue Range Primitive Area

I visited the Apache Forest near Alpine, Arizona driving through New Mexico arriving in Alpine on a cold spring morning in 2022. The snow was still too dense to travel into the Blue Forest where I had wanted to visit the grey wolf territory. The Blue Range Primitive Area is the last designated primitive area in the National Forest System. The Blue Range and the presidential recommendation additions together total 199,505 acres and are designated wilderness. Located on the edge of the Mogollon Rim and the breaks of the Blue River, this is a land of rugged mountains, steep canyons, and stark ridges that is remote and accessible only through an extensive trail system. Elevations range from 4,500 feet in the southern portion to 9,100 feet along the rim. This rapid change in elevation results a diverse and unique ecology. The northwest portion of the Blue Range Primitive Area has been severely affected by the Wallow Fire of June 2011.



For the 13 trees in this study, I chose Ponderosa Pine, Alligator Juniper and Sycamore near the river. The average circumference was 107" with average Height at 100'. Tree ages range from 130 years to 945 years old with an average age at 310 years old. I look forward to visiting again and exploring more into the primitive forest to find more grandmother trees.

- Daily Report: Didn't hear wolves today, but the deafening silence is disturbing

4. The Dragoons and Cochise Stronghold

One of the first places I visited when I arrived in Arizona in 1990, was the Dragoons. As a climber, I have come here often. It is a place where there is much sacredness, and abundance of many species with great diversity much like the Chiricahuas. Being the western mountain edge these two mountain ranges share



the same Sulphur Springs Valley between them. A rock climbers dream, the geological description follows: “The Dragoon Mountains consist largely of post-Cretaceous granite, which cuts across the Pinal schist (Archean), Bolsa quartzite (Cambrian), Abrigo limestone (Cambrian), Martin limestone (Devonian), limestone of Carboniferous age, and sandstone and shale of Lower Cretaceous age.” The Dragoon Mountains are another of Arizona's famous Sky Islands, west of the Chiricahuas in the Coronado National Forest. They are bordered on the east by the Sulphur Springs Valley and on the west by the San Pedro Valley. Cochise Stronghold was the winter home of Chief Cochise and the Chiricahua Apache. The area was termed a “stronghold” as Cochise led his people to the safety of this beautiful mountain fortress during the defense of their homeland from 1852 – 1872.

The Dragoon Mountains are steep and rugged with forests confined to a few north facing slopes at the higher elevations. The mountain slopes at lower elevations support scattered **evergreen oaks**, desert scrub, and grasses along with Schotts’ Mountain Yucca tall with a long flow skirt I like to say. It is the Oak trees that hold this place steady and constant.

For this study I chose 18 trees and another 5 at Zappa Dome 5,332’ elevation, when we were climbing. Inclusive of Cottonwoods, Oak, Alligator Juniper and Oaks with alligator looking bark and one large sycamore on the creek. Average circumference ranged from 29-57” and the average height 65’. The youngest tree was 27years old and the oldest 346 years with an overall average of 174 years.

- **Daily Report: Climbing at Zappa Dome, slabs and more slabs. Big Cut Banks from Rivers no more.**

5. Whitewater Draw

In Sulphur Springs Valley there lives a shallow water draw called White water, and it is managed by Arizona Game and Fish. As a water source beginning with rainfall in the Chiricahua, this draw is part of a long path. The source at an elevation of 8,520 feet Rucker Canyon in the Chiricahua Mountains of Coronado National Forest, flows west downhill through the Sulphur Springs Valley into Whitewater Draw and continuing into Mexico at Douglas, Arizona and into Agua Prieta in Sonora Mexico and eventually to the Gulf of California. The river, originally named Rio de Agua Prieta, meaning the “River of dark water” is a tributary stream of the Rio de Agua Prieta in Cochise County, Arizona. It is here the Sandhill Cranes, who migrated from all over the planet come for winter. With the excess of corn in the fields, the cranes find food and water on wet years. Abundant with Sterlings and ducks and other birds, there are thousands of birds who call this home from November until spring. Unfortunately hunting is allowed in this area but closed for their autumn arrival in November and December. Found along



the walking paths around the water are owl roosts, bats, javelina, deer, tortoises, bobcat and bear move through as well. The viewing of the sandhill cranes at sunrise and sunset is magical. The flocks of cranes are so thick it looks like smoke coming over the hills.

For this study I chose 2 random cottonwoods. Average circumference unmeasured, average height 63' and average age 32 years old.

- **Daily Report:** Sandhills flying home at night, circle and call to each other while the ones in the water dance

Tree Species Included In This Study:

Cottonwood, Mesquite, Sycamore, White Willow, Ponderosa, Oak, Sugar Hackberry, Black Walnut, Black Poplar, Arizona Cypress, Pinyon Pine, Saguaro, Palo Verde, Ocotillo, Ironwood, Ponderosa Pine, Apache Pine, Chihuahua Pine, Mexico Pinto Pine, Black Tupelo, Arizona White Oak, Douglas Fir, Englemann Spruce, SW White Pine, White Fir, Quaking Aspen, Mountain Ash (Rowan).

Stories About Trees

My favorite thing about trees is that they are good teachers. If we watch, if we listen, and if we are patient we will hear the heartbeat of the trees. This last statement is very real, I have used my ear and my stethoscope to listen to the moving rhythm of the life blood of trees-we call it sap. All trees have sap, but not all trees have resin. Only conifers have resin. All trees provide food, all trees breathe, all trees move in the wind, some trees walk, some trees split, some trees osculate (kiss-a term I coined to explain the joining together of Douglas Firs and Big-Leaf Maples in an old growth forest in Oregon). Some trees are monocots, most that we know are dicots. Some trees thrive in fire, some need to be in creeks, others can withstand 130F temperatures. The range of tolerance is how we define the boundaries of life. Humans range of tolerance is very narrow compared to many other species on this planet. We have evolved mostly hairless with very little for self-survival, but with the help of trees for shelter, food,

resources and company we do much better. I am always better with trees and let me share a few of my favorite stories and findings from this study.

■ **Daily Report: The trees seem to walk at night while we sleep**

1. A Rowan tree? sometimes called a Mountain Ash, is not very common in the Chiricahua Mountains. Rowan is also known as the mountain ash due to the fact that it grows well at high altitudes and its leaves are similar to those of ash, *Fraxinus excelsior*. However, the two species are not related. As the Rowan is in the *Sorbus* family, same as the Mountain Ash but the name is just cultural as the tree is not an Ash at all. They have noticeably different bark. Both like wet environments and were at one time more common in the higher elevations that usually have deep snow melts, and shade of the taller Pines and Firs. With wildfires opening the mountainside canopy, the heat of the Sky Island sun can be too much for them. Retreating to shady creeks is where the last of



them are found. On a hike in CNM, that I have done hundreds of times, but have never seen this Mountain Ash near the creek trail, until after all the leaves of autumn had fallen I saw the shiny bark. On the uphill side of the trail near the creek, this Ash sits in the dappled light of the taller trees. In the Chiricahuas the Mountain Ash is known as the Velvet Ash (*Fraxinus velutina*) and in other realms also called the Rowan tree. In this ecosystem they grow 15-30' tall in the canyon bottoms near water. They have a shiny bark with pinnate leaves compounded into 5 leaflets. They are pollinated by the wind and produce a one-winged fruit called a samara. In the past this tree could have been planted for its strength and flexibility

of making weapons and musical instruments. The Ash tree is revered for its sacredness symbolic meaning of life, death and rebirth. The roots of this tree are just as long underground as what you see above ground making them a seeker of water, and very strong. The keys (the winged seeds) have been eaten as a pickle in Europe and Asia. The young shoots are edible and can be added raw to salads. The leaves have been used for tea. The tree sap can be tapped to make ash wine. "It was once an ancient remedy for snake bites and was believed to cure many ailments, from obesity to leprosy! The tree was also used to treat jaundice, kidney and bladder stones, flatulence, warts, ringworm, and earache." (Allen 2004)

If this tree were an actual Rowan and not just a look alike, it would hold a lot of magic and myth as the Rowan in Norse mythology and legend has it that it saved the life of the god Thor by bending over a fast flowing river in the Underworld in which he was being swept away. Thor managed to grab the tree and get back to the shore. And the 5

pointed star on the red berries are representative of protection, the pentagon. Rowans growing out of rock were even more important and used in making runes and symbols in the trees themselves as guides. This tree I found near the rocky creek bottom, has all the characteristic of a strong sturdy tree that would be good protection if needed to cross the creek to as in ancient myth. (Actual location not stated for protection of the tree.)

■ Daily Report: Where have you been hiding all of this time in the bottom of the canyon, said I to the Rowan

2. Chihuahua Pine-This story comes from the Natural Bridge Trail. The Chihuahua Pine is found commonly in the CNM and is one of the three Pines. The Chihuahua grows straight and tall unlike the Pinyon which is generally shorter and more gnarly. The Chihuahua Pine is a symbol of adaptation. It has in a very quick evolution time learned to adapt to fire. When a fire burns a tree it will generally die if it cannot reproduce leaves which in turn produce seeds and continue the regeneration of the forest. Without seeds many forests change succession to those trees that are still producing seed. After the major fires burned the tall pines, there has been an ecological succession and shift to more oaks being successful in growing and replacing the burned pines. We call this Ecological Succession. A new species that is better adapted to environmental changes will become the more dominant. With a warming climate and longer drought seasons leading to wildfires the oak have been growing faster. However these oaks are not as strong as Pines and will tend to break easier in storms and under snow. We saw this in the heavy snows and winds of the monsoon season of 2022.



On the Natural Bridge Trail which most visitors ignore in favor of they wanting to walk through Echo Canyon as allowed a natural adaption to occur. In the burned area I noticed hiking the trails that there were a lot of burned logs and snags that had fallen since the 2011 fire. When I looked more closely I noticed that the new growth was coming from the roots of the downed trees. Unlike cloning that many trees will do with their root systems, the Chihuahua Pine were actually creating new genetic material, new trees from their root systems of the burned trees. Remember a tree is never solo, they are connected to a larger network of the forest. Often times when a tree is in distress it will take the nutrients and genetic material of itself and give it to another tree. We call this many times a mother tree. I have seen this happened with a stump in the

Deschutes River in Oregon. A logger hacked a tree leaving a 3' stump. But the stump remained alive. It had no branches, no leaves, produced nothing but it was still alive through its roots that were connected to another tree, a mother tree nearby that was sending the stump nutrients to survive. What an amazing story. And these amazing Pines have figured out that without new seed there will no longer be Chihuahua Pine trees. To ensure survival they grow new trees through their roots too. What a fantastic find to see this in the park, giving hope, in time that a new Pine forest will cover the burned area.

■ Daily Report: You clever tree, you figured out how to survive without seeds!

3. Alligator Juniper, the grandmother tree

Most of the Alligator Junipers in the Chiricahuas are old trees. As a whole the groups of Alligator junipers on the west are as old as the groups of junipers on the east side, making a unified contiguous flow across the mountains. The oldest tree that I identified in this study is a 1200 year old Alligator Juniper, standing close to a very large and older Apache Pine in the Meadows. Their very presence in size and stature is that of caretakers of the rest of the forest. They have survived a changing climate many times, survived humans of many cultural timelines and have great wisdom. The Alligator Juniper with all that wisdom is why these ancient trees are valuable just as grandmothers are. However the Alligator Junipers are divided into male (pollen cones) and female (berries) throughout the Chiricahuas and gender aside are all called grandmother trees.

This juniper species (*Juiperus depoeana*) has very unique bark in that it appears checkered and thickens with age, an adaptive feature. It received its common name from the thick, checkered, furrowed bark which is divided into scales that resemble the skin on the backs of alligators. This species is very slow growing at a rate of 0.05 cm per year in circumference and about 1' for every 5 years in height. The tree will have a shared trunk with many stems which make finding a circumference challenging. There are so many medicinal uses of the berries, leaves, and bark of the tree besides the medicine they give to the forest. Gin is a favorite human concoction of the berries. The berries are long lived and will stay on a tree 2-3 years as they mature providing valuable food for birds, animals and humans.

The juniper is very tolerant of poor soils, droughts and extreme cold. They need sunshine and will often grow very tall to reach the canopy. With enough surrounding space they will grow more horizontal and stay closer to the ground.

I have found with my work at Mesa Verde NP and at Chiricahua that the burned junipers will remain standing for a very long time. Some at MVNP have stood with only their burned skeletons for 90 years! These inner bark skeletons are very hard. Once the bark burns the hardened inners are the beauty we see in a different way. They stand because they have a single tap root that grows very deep into the earth, staying connected and sharing water. These are vital to the ecology of the forest both as growing and still standing burned trees in so many ways. For me these are the trees of healing and I have many stories shared with these trees for a very very long time.



- Daily Report: I remember, all these years, how I feel when I hug an Alligator Juniper, just like grandma is here

4. Cottonwoods are like beavers

Beavers, once plentiful on the San Pedro River were vital in maintaining the flow and vitality of this river. Once called Beaver River, the early trappers called it until they caused a near extinction of the very essence of this river. Once more than 200 million populated North America. Beavers can be beneficial to natural ecosystems because the dams they build slow the flow of rivers and creeks, curbing erosion and allowing water to spread out and hydrate larger areas. Evidence of the flow and spreading of the river are the locations of the Cottonwood trees in the San Pedro House hiking trails. The very large cottonwoods near the riverbanks are younger than the ones that are more than 100' from the current riverbanks. Why are they so far from the river when they love water? Because, this was once a saturated marshland thanks to the Beavers that spread the waters of the San Pedro River. Benefits? Beavers can be beneficial to these natural ecosystems and grasslands because by slowing the flow of the river, they create marshlands and that invites birds, mammals, grazing animals, plants and trees in a broader wetland. This also curbs fires and response to drought.

How then do the cottonwoods act like beavers? Maybe it is more like they are working together to sustain a vital ecosystem. Beavers gnaw on the cottonwood trees to make their dams; the trees fight back with toxic compounds; and then beetles move in to feast on the toxins. But in this apparent conflict, all three species benefit.

Imagine in your mind's eye of Meriwether Lewis writing about beavers in 1806. He found cottonwood trees large enough to carve out a small canoe and wrote of abundant wildlife: bison and wolves, bear and beaver. The prairie breeze is silent now of the hooves of bison and the howls of wolves. But the cottonwoods and beaver remain, entwined in an interesting web of interactions. The great stands of old cottonwood trees along the prairie rivers are called "gallery" forests.

In spring, cottonwoods release their seeds in a storm of white fluff scattered and wind-pollinated, in perfect timing with spring floods. Since cottonwood seeds need bare, moist soils to germinate, cottonwood regenerates on the fresh, silty deposits left by a flooding river. When beaver fell cottonwood trees, the roots often re-sprout, establishing clones of young trees from the same parent.

Field Notes from Tom Whittam, an ecologist in Arizona, discovered that cutting and foraging by beaver induce young cottonwood sprouts to produce large amounts of salicins and salicortins - toxic compounds that deter many animals and insects from feeding on the sprouts. Though the compounds protect the plants from many herbivores, they actually attract a certain type of beetle, which then feasts on the cottonwood leaves. The beetle in turn is able to take up these compounds and use them as its own defense against ants.

Beaver also accumulate these compounds in their castoreum, a stinky musk beavers use for scent marking and, incidentally, perfumers traditionally used in colognes. The salicin compounds in the castoreum help the beaver attract a mate, like adding a little extra spice to the beaver's own cologne.



Beautiful ecology! For this study, I chose to include trees both in the river, on the river banks and far away from the river. Finding the succession in age as the youngest in the bare river soils and the oldest in the grasslands. The old ones are now brittle and dying however, for a lack of water. Cottonwoods are big and they grow really fast, sometimes 4 or 5' a year" The circumferences of the trees I measured were more than 300" and more than 200' tall. The average age of the trees were 170 years old.

■ Daily Report: Growing so fast, I wonder if your tree knees hurt!



5. Apache and Ponderosa Pines

One of my favorite trees, don't I say that for them all? I tend to find myself in places where there are Ponderosa Forests, not by intention but perhaps by design. I do love a Ponderosa in the sun as they exude their pineapple, or is it vanilla or butterscotch? Why did nature make such a sweet smelling tree? They all are sweet, but this tree being a conifer also has phytochemical releasing from the leaves as it respirates. Their smell is from chemicals in their bark called terpenes. Just as they attract humans to hug and smell, the terpenes attract pollinators. In other plants and trees, the smell they exude perhaps acts as repellent to keep them from being eaten. In ponderosa pines, these terpenes benefit the tree's defense we call immunity.

Birds are attracted to the tree, as are the insects such as ants and aphids that love the sap. The birds eat the insects keeping the tree protected so there is a symbiotic relationship between all. Abert squirrels love the trees both for food and shelter, and they also love mushrooms! In turn the mushrooms love the pine trees. It's the squirrels who are eating the mushrooms and exiting the spores to be spread in forest duff. The mushrooms are only the fruit body of the mycelium and mycorrhizae that are communicating in the entire forest.

In the Chiricahuas there is a bird known as the Northern Goshawk, and these birds love high places including the tops of the Ponderosa and Apache Pine. In the needles they chose to make their nests with are the resins and terpenes acting as defense against insects and other fungi to keep their nests safe and healthy too.

The Apache Pine (*Pinus englemanni*) is an interesting adaptation with the Ponderosa Pine, as a variant that has adapted to its environment. As in the tropics broadleaf plants are able to respire more and capture more water. In the Sky Islands that have long periods of dry or severe dry we call drought and monsoon rainy seasons, the plants have learned to adapt to store water when it is available to prepare for the hot dry that follows. For the Ponderosa which is usually higher in the canopy, it receives most of the sun and heat. The Apache Pine is a Ponderosa that has adapted by growing very long needles. Needle length for the Ponderosa is generally 4-6 inches long. The Apache pine grows needles up to 15' long, more than twice the length of the Ponderosa. They share

the same anatomy, bark, stem, bundles of 3 needles, with the only exception being the needle lengths. Since the leaves (needles) are where the tree respirates, the increased length of the Apache Pine increases its ability to both release heat through a long surface of needle length and to breathe in perhaps to compensate for the high altitudes they enjoy. The Apache pine is very limited to where it exists including the Chiricahua, Huachuca, Dragoon and Santa Rita Mountains. One location just over the border in New Mexico near the Peloncillo and commonly found in the Sierra Occidental to Zacatecas, Mexico.

■ **Daily Report:** I still think pineapple when I smell the Ponderosa

6. Black walnut trees - Nut trees were very important to the native Apache who lived and collected in the Chiricahuas. Today most of the Black Walnuts are found in the grasslands, near to the creeks on both sides of the mountain. *Juglans major* is a native tree to Arizona and can grow tall and wide averaging 50' tall by 4' diameter. They are some of the first trees to flower in early spring and the prize is the bursting of nuts. With a green husk that matures into black, the Apache (Nde) people have used the black shells as dye and paint, and the meat inside for food. Nuts were stored for winter use, and mixed with mesquite, mescal, sotol, and datil. The wood of the tree was used as building material for lodges. Apache, Mescalero Other, Paint; Outer shell coverings soaked in water to make a black paint. Nut juice was a favorite beverage. Arizona Walnut provides important habitat and food for many wildlife species including squirrels, birds and other nut eaters.



■ **Daily Report:** You clever tree, giving so much food so that the animals will come to visit you

7. Quaking Aspen (*Populus tremuloides*) in the Autumn. One of the more beautiful far away sites is to be on Big Balanced Rock Trail in the south of CNM, or on Sugarloaf Mountain and looking towards Chiricahua Peak to the south and see the yellow of Quaking Aspen. They are the last stands of Quaking Aspen left in the most southern boundary of their habitat at the top of the 9-10,000 peaks in the Chiricahuas. As with the rest of the Chiricahua Mountains, the peak was formed as the result of volcanic eruption about 27 million years ago. The peak contains one of the southernmost Engelmann spruce stands in the world along with extensive forests of quaking aspen on the north slope. They are one of the most biologically diverse and ecologically unique forests in Arizona. Aspens are tall and skinny rising 80' with only 18" diameter, they are the wind chimes of the forest. Sun loving trees found at the top of the peaks in gravelly

Rhyolite scree/soil. Aspen do not do well with Pine trees taking up the canopy, they will find a place where fire has cleared out the Pine-Fir forests. Rapidly colonizing burn areas, the tree is a pioneer species that makes soil stable where it could be lost to erosion easily on steep slopes. Birds and animals love these trees. The unique character of aspen is that they will grow from seed and root sprouts, as they join together they become on unified organism. The organism will outlive the individual trees that live up to 200 years, it is the root system that remains viable. A famous aspen organism is known as Pando found on the Fishlake National Forest in southern Utah. The estimated age of Pando is 80,000 years with 10,000 year old clones. However after 80,000 years it is thought Pando is dying by overgrazing. In the Chiricahuas, after the large 2011 Horseshoe 2 Fire, large areas of high elevation landscape are now seeing growth of Quaking Aspens.



■ Daily Report: Hold it all together, there are more trees and plants depending on you

8. Douglas Fir trees in the Chiricahuas symbolize resilience and durability. They are being pushed higher into the very peaks of the Chiricahuas after drought and wildfires have burned many and could be under attack by fir borers as a result of being injured. As a medicine tree, Douglas firs were used by Apache people for structures, basketry, and medicine to aid in stomach aches, headaches, rheumatism, and the common cold. In the Pacific Northwest, they are the old growth trees growing hundreds of feet tall and more than 500 years old, they are the canopy for the smaller trees which keeps the ecosystem strong and moist retaining much of its moisture in the duff below.



9. Sycamore trees known as American Sycamores in the Chiricahuas are the revered tree of the creeks. Very large with white bark, forming leaning artistic shapes with changing leaves for season, they are the beauty of the creek corridors. Acorn woodpeckers love their soft bark and make holes in the trees. Future residents like pygmy owls, other birds, and even small mammals will use the holes for nests. Alongside of the Sycamores the Arizona Cypress, Junipers and Oaks make up the Chaparral forest transitioning along the riparian corridors. The Sycamore has a unique bark



under its exterior hardness is a sappy under bark. The skin of the tree represents the skin on the human body and it is the sappy bark that is then applied to skin wounds to heal. The parts of the tree also treat upper respiratory problems. In Mythology of the sycamore is held in high esteem as a world tree, a sacred tree that connects heaven, earth, and the underworld. Sycamores are often near homes for protection.

- **Daily Report:** So old, so graceful, protector of this place, the Douglas Fir will outlive them all

Dark Sky: Hiking at Midnight

A highlight of the summer of 2022 was being able to escort a dark sky photographer up to Heart of Rocks at CNM in the middle of the night. Starting at Lower Rhyolite, to Sarah Deming Trail, to Heart of Rocks. The mission was for the WNPA and the NPS to take photos of the well known rocks in the newly designated International Dark Sky Park! Hiking up the 3.5 miles to the heart of rocks was fun. Starting just after sunset there was twilight and we were able to see shapes ahead of us, unlike when we finished and came down at 2am it was pitch dark, no moon, and eerily quiet. It felt like we were being watched by everything in the park as it was not a common thing to hike in the night hours in the park. The creek was running during this time and we could hear it off in the distance. The focus of hiking at night is on the feet. During the day one is stopping to take in the vistas and focus is far away instead of close in. Night time hiking becomes a point A to point B destination.

- **Daily Report:** Wow! Speechless!

Arriving at the Heart of Rocks, which after the last turn into the mile loop, is really tricky. People do get lost during the day, and at night landmarks disappear and steps become tricky. Finding the night sky brilliant, we quickly saw the far away city glow to the south. The concerns on this planet is that with the megawatts of the city, the night sky is no longer dark. From a medicine perspective we all, all life, are losing the dark rest time which affects the nocturnal animals the most. From the Heart of Rocks we could see the bright glow of Douglas Arizona and beyond into Aqua Prieta, Mexico. To the Northwest a faint glow of Tombstone and Tucson beyond were fainter. And as the night sky darkened the Milky Way arrived along with clouds. Without filters, with only the eyes, the Milky Way was full of color, Pink, Blue, Green and more brilliant than any photograph could every be. It is completely possible when you find dark sky, to see billions of stars, comets, galaxies and the Milky Way otherwise as the canoe traveling from north to south disappearing into the underworld beyond the horizon.

- **Daily Report:** So Silent you can hear the stars moving and cracking in the cosmos



The photographer was very skilled as we found the landmarks of the rock formations along the mile loop. The clouds did part for a while and the images of Big Balanced Rock aligned with the Milky Way, stars like Venus appeared bright as ever and it got cold very quickly. The desert sky island at 7000' drops in temperature quick as the heat from the sun dips below the horizon, picking up thermal winds. The rocks however stayed warm for a long while. Slots between the rocks walked by in the day lit up with at night with secret telescope views to the horizon giving way to amazing photos. By the time we had finished it was 2 am and time to hike down. As we know hiking down goes much faster than hiking up and when you are tired you have to be careful not to trip. All went well. Still there was nothing hooting, or making a peep on the hike out. Eerie quiet. Coming back into the cover of trees felt warm and comfortable again.

SAR: Search and Rescue - Safety

In the NPS there are many of us that are trained Wilderness First Responders. Hikers travel into remote places and sometimes need the help of the park rangers to get them out safely. I was fortunate to be the ranger that wanted to hike the trails everyday and I took it upon myself to carry my first aid gear with me. One day I got a call from the CRO that someone had called 911 which set in motion a rescue from Cochise Search &

Rescue, a completely volunteer operation from many that come from the county and respond to 911 calls in the remote areas including the National Forests and Monument. This 911 call was able to make a connect from atop a peak 3 miles into the trail and she was in heart distress. Being an immediate need, I put on pack and traveled up to the top of the park and hiked in the 3 miles in less than an hour. Being first to a hiker is key to check vitals, to be of immediate response if there was anything acute happening.



This situation and at least 12 more ended up with a helicopter evacuation. Other medical scenarios for the 2022-23 season included: Multiple trip and falls with broken wrists, dehydration and altitude sickness, irregular heartbeats, tib-fib fracture, amputee on trail in exhaustion, horse and rider fall on ice, twisted ankle, lost hikers, lost hiker with dementia at night, jumping fall from rock, stuck hikers on flooded creek, ice falls, and lots of bandaids and cuts.

The teams work seamlessly together whether that be a hike in, a litter carry out, or a helicopter long rope haul out. Training and experience are key and there is hope that the NPS sees value in having trail rangers and wilderness first responders as a necessary demand. For me, spending hours with hikers waiting for response teams was the time of storytelling, keeping hikers from going into shock, keeping warm while the sun was setting and cold was creeping in. So many have sent cards and notes saying thank you and have been the highlights of being a park ranger. I hope that every ranger feels the value of taking a wilderness first aid course, and continuing to do so for all of their time within the NPS. So valuable whether it be a bandaid for a fallen child, or bleeding control of an accident, or even like in one of the situations on an icy trail, a horse slipped off and fell 60' below. Being prepared and experience are keys to happy hikers.

- Daily Report: I've made some really good friends taking care of others, it is healing for me

Citizen Scientists and Jr. Rangers

The absolutely highlight and the closing paragraph to this long report, is how important Citizen Science is. Having every visitor and every hiker participate in understanding the value of wild places, the importance of taking care of these valuable bits of nature that provide life for the future. The Jr. Rangers are my favorite. Every pink swear ever

made, every swearing in at the Visitor Center, every badge worn and workbook completed steps on step closer to those children and ageless visitors that promise to take care of the National Parks, grow up to sometimes become a ranger themselves, or teachers, or leaders working to conserve and take care of the future of these special places. Thank you! **And Thank you for reading this field report and sharing it forward.**

■ Daily Report: Pinky swears Rule!

Further Reading:

Citizen Science Tools:

iNaturalist <https://www.inaturalist.org/>

NASA Globe Observer <https://observer.globe.gov/>

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