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Gopherus Agassizii: A Cultural History of Tortoises

By Kim Stringfellow

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A juvenile desert tortoise. | Photo: **Wbrice83186**/Wikipedia/Crerative Commons.

The Mojave Project *is an experimental transmedia documentary by* ***Kim Stringfellow*** *exploring the physical, geological and cultural landscape of the Mojave Desert. The Mojave Project reconsiders and establishes multiple ways in which to interpret this unique and complex landscape, through association and connection of seemingly unrelated sites, themes, and subjects thus creating a speculative and immersive experience for its audience.*

The desert tortoise has been under siege by humans long before the Mojave Desert's militarized and suburbanized landscape began to take shape here. It is known that several ancestral tribes in the Southwest consumed them, and even if they chose not to they managed to use their various parts -- the *carapace* or upper shell, the *plastron* or lower shell for bowls, scrapers and other household effects. All of the Mojave tribal groups transformed tortoise shells into rattles and drums for ceremonial use. Other tribes, such as the Chemehuevi, kept them as pets while at the same time venerating tortoises as a **mythological symbol** of "patience, stamina for survival, and courage in hopeless situations."[1] In many world cultures, including several indigenous tribes of North America, **the universe is depicted on the back of a turtle or "cosmic" tortoise**. Even while sacrificed for sustenance, utilitarian or ritualistic purposes, none of these indigenous uses come anywhere close to modern anthropogenic attacks on this environmentally vulnerable indicator species.

Though not so popular as a menu item today as in the past, tortoises remain a culturally significant symbol. In Jessica Speart's 1998 fictional "eco-mystery" "**Tortoise Soup**," the story's main protagonist, a female U.S. Fish and Wildlife officer, is transferred out to the Mojave to unravel why 350 endangered desert tortoises have suddenly disappeared from a federal research site in Nevada. Earlier popular representations of the tortoise (not necessarily the *desert* tortoise) include Disney's 1934 animated fable "**The Tortoise and the Hare**." The moody instrumental band **Tortoise** states on their Twitter page: "the **Thrill Jockey** band from Chicago, not the land-dwelling reptile." In neighboring Twentynine Palms we even have a **new Indian casino** named after them.

Cal Guo-Qiang's "Moving Ghost Town," a controversial site-specific artwork involving live African spurred tortoises at the Aspen Art Museum in 2014. | Photo: Tony Prikryl (from the museum's website).

Turtles and tortoises are also frequently featured in art. When Robert Rauschenberg and Lucinda Childs staged "Spring Training" in 1965, the performance involved 30 roving desert tortoises with flashlights taped to their backs. In August 2014, outraged **online petitioners** called on the Aspen Art Museum to shut down a site-specific installation by artist Cal Guo-Qiang titled "Moving Ghost Town," involving three rescued African spurred tortoises (*Centrochelys sulcata*) -- each with video-displaying iPads temporarily mounted on their backs with silicon. The conceptual artwork displayed film footage of three nearby ghost towns captured previously by the roaming tortoises named Big Bertha, Gracie Pink Star, and Whale Wanderer. Although the **museum's website** states that the project was conducted in close consultation with the **Turtle Conservancy** and a local veterinarian who monitored the tortoises on a weekly basis, animal rights activists and others expressed outrage that the tortoises were being used as "artist supplies." (Disclosure: I signed the petition.) The website goes on to mention that "In Chinese symbolism, tortoises represent creation, time, longevity, and wisdom; they are associated with the North direction -- that of death and rebirth... [and] are seen as supernatural spirits." The Aspen exhibit closed earlier than expected when acting veterinarian Dr. Elizabeth Kremzier decided that unseasonable inclement weather would harm them. The museum insisted in a press release that the decision was not due to outside pressure. The concerns expressed by the public for these tortoises illustrate how deeply humans often react to the welfare of these ancient and venerated creatures.

Adult desert tortoise. | Photo: Courtesy David Lamfrom.

Found slightly above sea level on an elevation of about 4,200 feet in several vegetation types of the Mojave, Colorado and Sonoran deserts, desert tortoises of the American Southwest are now determined to be of two distinct species with *Gopherus agassizii* residing north and west of the Colorado River, whereas *Gopherus morafkai* is located east and south of it. As a flagship species, the current status of their populations tells us a lot about the health of the arid ecosystems. During the 1970s, hundreds of desert tortoises could be found within a square mile in some Mojave and Colorado desert habitats -- today one may find only a few dozen individuals in the same areas. Understandably, the desert tortoise has been listed as a federally threatened species since 1990.

Tortoises are commonly confused with the turtle but unlike their reptilian cousin they are a terrestrial being tied to land rather than water. When fully mature desert tortoises weigh 7 to 15 pounds and are 7 to 15 inches in length. Although it is difficult for an untrained eye to tell the gender of a particular tortoise, males are typically larger, their tale is slightly longer, and their plastrons are concave in shape compared to that of females. Breeding males also sport pronounced chin glands that secrete a sticky substance and large adult males have substantially larger and curved *gular horns* below their chins. Coloration ranges from greenish-tan to dark brown, and their high-dome shells are covered with a pattern of seemingly impenetrably nested plates or "scutes" that seem to suggest infinity in their repetitive design. This, along with ancient leathery skin and a pointy curved beak, suggests their prehistoric origins -- the turtle form dating back some 200 to 220 million years in the late Triassic Period. Wild desert tortoises that reach maturity may live between 25 to 50 years of age and even longer. Some captive individuals have been said to reach 100.

Detail of a desert tortoise's carapace scutes. | Photo: Courtesy David Lamfrom.

Typical individual home ranges cover between 25 to 130 acres, although some desert tortoises have been known to travel up to a mile away from their primary living area. Desert tortoises will dig their burrows, formed by the shape of their body, in a variety of stable, penetrable but undisturbed soils located in sandy washes to rocky foothills, using their powerful forelimbs and toenails to excavate. Known for thriving within extreme environments -- including those with recorded ground temperatures from below zero to 130 degrees Fahrenheit -- desert tortoises understandably spend up to 98 percent of their lives underground. Their robust burrows may in turn support a communal community of up to 30 species, including snakes, lizards, insects, birds, rats, mice, rabbits and foxes and, of course, other fellow tortoises -- up to 20 or more in some areas. Tortoises additionally rely on a number of temporary shallow holdouts and desert ground cover such as **creosote bushes** to escape the heat of the sun and to hide from numerous predators. Tortoises know their home turf intimately, having memorized various landmarks, food and water sources and other tortoise burrows, especially those of the opposite sex and often will attempt to travel back to their home territory -- no matter how far away it lies if *translocated* or moved.

Desert tortoises are most active from March through September, spending spring and early summer months foraging on a herbaceous diet of native annual grasses, seasonal wildflowers, forbs, various succulents and cacti flowers spotted through their perfect color eyesight. From late fall into winter they retreat and *brumate* deep within their winter dens. To survive through the hotter summer months with no supplemental water other than what is provided from vegetation or sporadic summer rains, the desert tortoise has remarkably evolved to concentrate and store urine for months on end in a large bladder. Additionally, it copes with the oppressive heat by entering into a state of *aestivation* or dormancy after the moisture-laden springtime bloom has long dried up. Sensing an impending thunderstorm, a dormant tortoise will awaken and emerge from its den and commence to dig or revisit a shallow rain catchment where it can simultaneously drink up water and eliminate its stockpiled viscous and concentrated urine in an act that strikes me as rather liberating. This necessary procedure allows the tortoise to flush toxins from the blood and eliminate concentrated salts and nitrogenous wastes from the bladder, while gaining up to 40 percent of fresh water through drinking. Because their overall survival is directly tied to their propensity to store urine during the dry summer months, a startled tortoise may void its bladder as a defensive mechanism, succumb to dehydration and die, so it is advised not to pick them up and move them if encountered in the wild.

aggressive behaviors, including head bobbing, biting or striking at a competing suitor's up-curved *gular horn*, which is an extension of its plastron. Courting males will similarly try to impress or simply bully a female by continually circling her and blocking her path, snapping at and biting her before attempting to mount her. Regardless of his aggressive advances, it has been observed that some female desert tortoises do exhibit choice during selection of a mate and it seems size does matter. Interestingly, the testosterone level of the male desert tortoise during mating season is higher than any vertebrate species, including humans. During coupling, tortoises **have been observed vocalizing through extended grunts and "moaning,"** and the slapping movements of shell upon shell have been described as sounding like a beating drum. The sound designer for "Jurassic Park" (1993) revealed that the **grunts of the clever velociraptors** were created from recordings of tortoises having sex at a well-known marine park.

The Heat is On: Desert Tortoises and Survival (Full video)

Once a female tortoise has mated she may rather conveniently store her donor's sperm over multiple years -- up to 15 in one instance -- and reproduce up to four years after initially mating.

assailable hatchlings are susceptible to predation in that their shells take about five years to harden, making them a fairly easy target and quick meal -- a very low number will be lucky enough to reach that age if at all. Those who do reach maturity continue to be prey to an array of seemingly "natural" predators like ravens, eagles, coyotes, dogs, kit foxes, badgers, bobcats, gila monsters, roadrunners and other threats. However, mortality due to direct or indirect human-related activities remains at the top of the list.

Since 1939, it has been illegal to purchase or sell *Gopherus agassizii* in California. In the years leading up to the law being enacted, scores of desert tortoises were collected throughout the Mojave and shipped live to restaurants for human consumption or to the pet trade. Highway travelers could purchase tortoises as souvenirs from roadside attractions and gas stations. With the awareness that wild desert tortoises were becoming increasingly scarce, the earlier law was expanded in 1961 to protect them from "needlessly harming, taking, or shooting any projectile."

A 1950s homesteading family with three of their "pet" tortoises in Twentynine Palms. | Photo: Courtesy Joanne Anderson.

species is illegal.[2] Because desert tortoises breed very well in captivity (to the detriment of the wild population) the Nevada Wildlife Commission enacted a law in 2013 allowing the adoption of only a single tortoise per household.

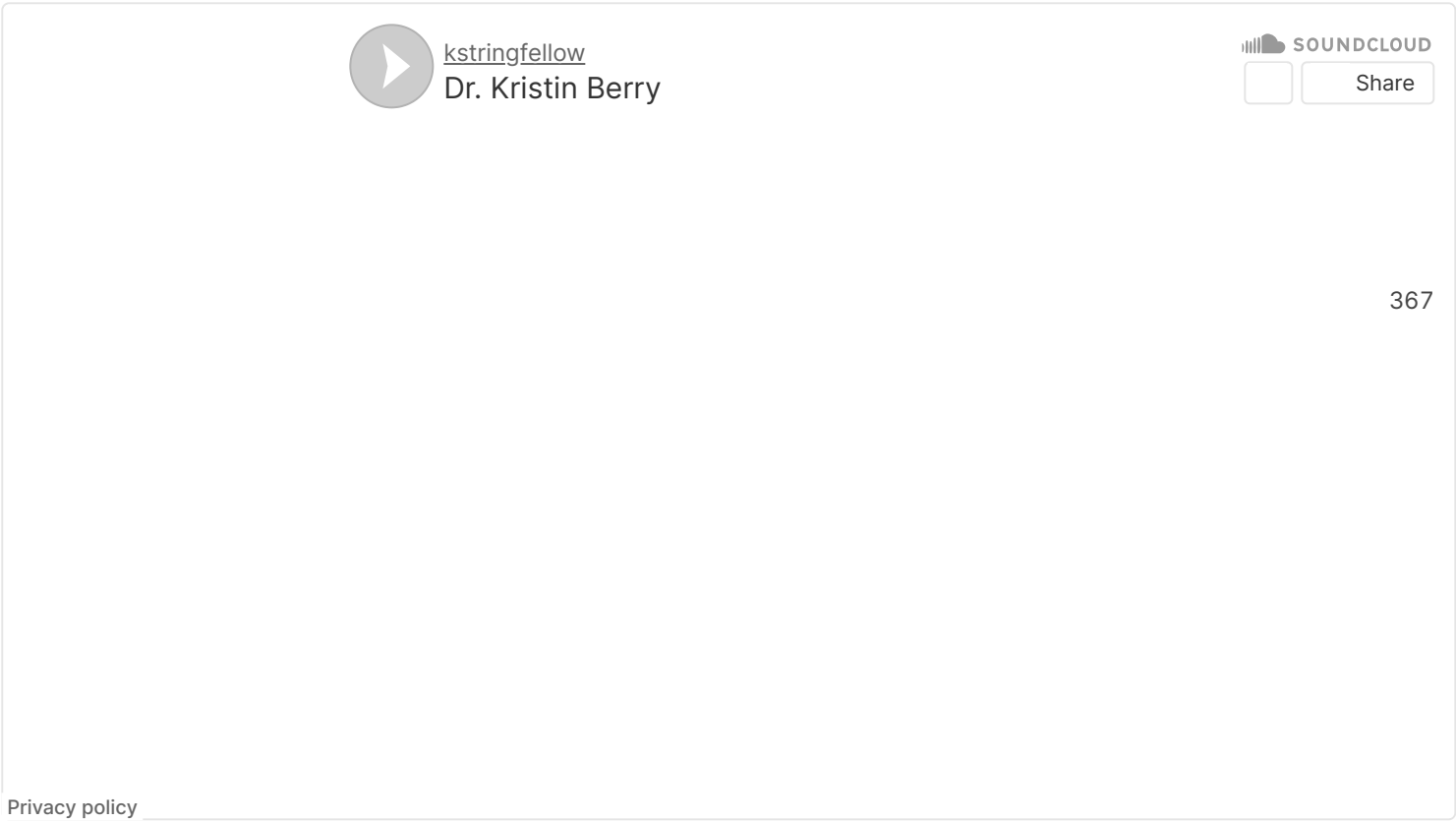
Indeed, by the 1980s many areas of the Mojave showed a 90 percent decline in overall wild populations. Hardest hit is the Western Mojave where human development and its associated activities of urbanization, mining, agriculture, livestock grazing, tract home subdivisions, military land use, industrial solar/wind installations and recreational spillover from greater Los Angeles is rampant. Today, *Gopherus agassizii* is considered to be completely absent from the Victorville, Palmdale and Lancaster areas, other than those that are pets living captive in somebody's backyard. Notably some of the most prized habitat for desert tortoises lies in military controlled areas of the Mojave, lands within Edwards Air Force Base, the Twentynine Palms Marine Corps Air Ground Combat Center and the Army's National Training Center at Fort Irwin where extensive ground maneuvers have most likely obliterated much of the shrub cover. One study found "of sixty-two tortoises found on survey transects at Fort Irwin in 1989, forty-four were dead, and half the carcasses were found in tank tracks."[3] Today, all of these military installations currently sponsor onsite desert tortoise conservation programs, due to their federally protected listing.

The person perhaps most credited with gaining protection of *Gopherus agassizii* under the federal Endangered Species Act is Dr. Kristin Berry, a research biologist/ecologist specializing in the species, formerly employed by the Bureau of Land Management (BLM) and currently with the U.S. Geological Survey (USGS) since 1997. Dr. Berry has been studying and championing desert tortoises since the beginning of her career in 1971. Two years into her research, Dr. Berry along with a group of concerned scientists helped designate public land in the northwestern Mojave for the Desert Tortoise Natural Area in 1973.

Dr. Berry holding a Bolson tortoise in the Chihuahuan Desert of Mexico during a 1970s research trip. | Photo: Courtesy Dr. Berry.

Dr. Berry is a slight, pretty woman with a fair-complexion. On first impression it is hard to imagine

1980s to use for long-term monitoring. These study areas have been invaluable in determining how tortoise populations, habitats and human uses have changed over time.



She is the author and co-author of numerous short and long-term research field studies and reports, including a largely ignored 1994 Recovery Plan which many environmentalists contend would have stopped *Gopherus agassizii*'s current population decline if its recommendations had been followed and implemented 20 years ago. Many in the conservation community consider Dr. Berry to be the authority on *Gopherus agassizii*. She is arguably its most persistent advocate as her efforts have kept the plight of desert tortoises in the public eye for over 40 years now.

A young Dr. Berry with a captive pet desert tortoise. | Photo: Ivar Highberg, Berry's father.

Raised in the Western Mojave as the daughter of a physicist/mathematics expert employed at the Navy base at China Lake she developed a love for the desert at an early age, especially the reptiles of the region. After completing her master's degree at UCLA and a Ph.D. from UC Berkeley she began her long career in conservation biology. Her contributions to the California Desert Plan completed in 1980 helped lay the groundwork for an emergency California state listing of *Gopherus agassizii* as threatened in 1989 and its consequent federal listing in 1990 -- a contested move that temporarily shut down a glut of proposed suburban housing projects along the fringes of Las Vegas as well as the infamous 150-mile open desert Barstow-to-Vegas motorcycle race that same year.

Dr. Berry's career has not been without controversy: David Darlington's 1996 book "The Mojave" asserted that during her tenure with the BLM she tightly controlled data pertaining to *Gopherus agassizii* to protect the desert tortoise. Reading through several pages of unflattering comments from unidentified former colleagues I was struck by the fact that many, if not all, of these disgruntled voices were male, and I'm guessing not particularly happy that a highly focused and forceful woman was in charge. Perhaps Dr. Berry was simply granted study and monitoring funds that her detractors thought they should receive? Indeed, it was largely unheard of for the BLM to hire female wildlife biologists in this formally male-dominated agency during the 1970s and Dr. Berry was its first. The BLM's often conflicted multi-use agenda of satisfying all desert stakeholders at once further complicates many desert conservation issues.

It is unlawful to touch, harm, harass or collect a wild desert tortoise, and doing so will cost you up to $50,000 and up to one year in jail if caught. This hasn't deterred a few pathetic individuals from using tortoises for target practice. A study published in 1986 by Dr. Berry reported that between 1976 and 1982, 14 percent of 635 carcasses found at 11 long-term monitoring plots were killed intentionally from gunshot wounds. In fact, it was not unusual for a defiant off-highway vehicle driver to purposely strike and kill them out of spite while riding. Dr. Berry shared in a 2015 interview how during those early years, one off-roader relished in telling her that "he liked to hear them pop as he ran over them." In contrast, another confided that after accidentally riding over one and killing it, he had decided afterwards to never participate in the activity again. Considering the tortoise's benign character it is difficult to grasp why someone could purposely direct so much anger towards these unthreatening and stoic creatures.

More often than not, tortoises are unintentionally run over or crushed after seeking shade under a parked car by drivers who forget to look under before driving off. Even if a desert tortoise is not harmed directly, the devastation that off-roading activities reap on tortoise habitats is proven to be overwhelmingly destructive -- burrows cave in trapping them inside, native plant food sources are crushed and shrub cover providing shade and protection is destroyed.

Regardless, if one empathizes with the plight of the desert tortoise or not, most can agree that degradation, destruction and fragmentation of habitat resulting from development, agriculture practices, wildfire and off-roading activities directly impacts them. Still, less obvious are the cumulative threats that humans support indirectly. These, along with the desert tortoise's slow rate of reproduction have contributed to *Gopherus agassizii*'s rapid decline over the last 40 years. Indirect threats include well-intended releases of captive pet tortoises into wild areas, which appear to have been responsible for introducing various catastrophic infectious ailments, including an upper respiratory tract disease (URTD), to wild tortoise populations. Livestock, where present, trample and denude habitat while inadvertently introducing invasive plants, thereby overwhelming native vegetation. These non-native species do not provide the nutritional value of the indigenous plants they have replaced.

Consequently, a good portion of prime tortoise habitat throughout the Mojave has been damaged through domesticated ruminant introduction. The issue ignited the **2014 Cliven Bundy standoff** in Bunkerville, Nevada when rancher Bundy -- who stopped paying grazing fees to the federal government in 1993, while continuing to illegally graze his cattle on public land -- refused to remove them from the Gold Butte area of southern Nevada. The BLM's planned roundup of his livestock backfired when armed militia groups and individuals showed up in support of Bundy, eventually forcing authorities to release 300 of his confiscated cattle back onto public land on April 12, 2014.[4]

Other threats include those human "subsidized" such as the common raven (*Corvus corax*) -- considered by many to be highly invasive due to their alarming growth rate -- up to 1,000 percent within the Mojave since the 1970s. Ravens thrive here because they make use of our water features, landfills, illegal dumps, trash, pet food left outdoors, and even road kill for reliable sources of sustenance. As we spread further across the desert, so do the raven's numbers. During the 1980s, Dr. Berry and her colleagues documented how ravens may methodically prey on young tortoises and contribute to high juvenile tortoise mortality rates. In one study alone, one single mated pair was found, over a four-year period, to have fed on about 250 juvenile tortoises whose pecked out shells were discovered at the base of the ravens' nest and roost -- a Joshua tree. Raven perches typically are fence or utility poles common throughout the desert. Current and recent government policy on raven predation of tortoises was developed as the result of a legal settlement with the Human Society of the U.S. more than 20 years ago. Evidence that a particular raven has recently killed more than one juvenile tortoise is necessary before the raven can be removed from the location.

A raven carried this juvenile tortoise up onto a Joshua Tree and ate it. A few weeks before this photo was taken the tortoise had been alive. | Photo: Courtesy Dr. Berry.

As Las Vegas and other desert cities spread their suburban tentacles out into the undisturbed desert so disappears valued tortoise habitat. *Gopherus agassizii*'s threatened status has ensured that any entity wishing to legally remove desert tortoises within an area slated for development must, in exchange, finance a costly mitigation effort to offset their displacement and loss of habitat. For example, **developers wishing to build in Clark County**, Nevada must pay a "disturbance fee" of $550 per acre (up to 145,000 acres) for private land and $836 per acre for public land development. The collected fees are used to offset costs of slated and active conservation projects. Other developers opt for *translocation* under professional supervision to "complimentary" sites purchased by them for this purpose.

Ever-expanding military bases, mining operations, and more recent massive renewable solar and wind projects sited in remote desert locations including **BrightSource's Ivanpah Valley** facility -- considered by biologists to be prized desert tortoise habitat -- have opted to relocate large numbers of desert tortoises **at a huge cost**. Many earlier attempts to translocate wild desert tortoises, including a poorly designed effort at Fort Irwin in 2008, resulted in deaths of hundreds of tortoises. Although **techniques for translocating wild tortoises may have improved**, those managing to survive live with the possibility that they may be moved again and again if the mitigation site is not properly protected well into the future.

In another twist of fate, the former 220-acre Desert Tortoise Conservation Center located in south Las Vegas shuttered its doors in 2014 because of dwindling local and federal funding. In operation for 23 years, this "tortoise gulag" was opened and funded through mitigation developer money with the intention to house displaced *wild* desert tortoises, but became overcrowded with surrendered pet tortoises early on, which do remarkably well in captivity but are often carriers of infectious diseases, making them unfit to release into the wild. Taking in nearly 1,000 animals annually, the facility's operational funding dropped to a trickle after the housing bubble burst in 2008. To complicate matters, many of the interned tortoises had developed the chronic and potentially fatal URTD, and thousands were consequently euthanized according to protocol. In later years, it was determined that tortoises could recover from and still carry the disease, so the mass killings were ended. By the time the facility closed its doors, it was estimated that more than 10,000 tortoises had been released into the wild at various federal land holdings, namely Nevada

This desert tortoise has found a temporary resting place in a fallen Joshua Tree stump. | Photo: Courtesy David Lamfrom.

Dr. Berry and many other desert tortoise experts are understandably skeptical on whether tortoises should be uprooted from within pristine, undeveloped lands, at least until long-term scientific studies indicate that a substantial portion of translocated tortoises can survive and become established in their new homes. She and other scientists were Independent Science Advisors for California's **Desert Renewable Energy Conservation Plan** in 2010. The Independent Science Advisors recommended that energy site development occur on previously disturbed lands, thereby avoiding new losses of desert lands. Unfortunately, that recommendation has not been followed. Justly, the concerned public backlash against the repeated proposals to site massive "green" solar energy projects in remote, undisturbed areas of the Mojave has gained momentum, especially with the public's awareness of **numerous environmental impacts** caused by these types of large-scale projects. It seems that a few of the **corporations bankrolling these installations are looking for alternatives**.

Ideally, intact habitat solely dedicated to the desert tortoise and the ecological web it is part of is the best management strategy for *Gopherus agassizii*. An example of one such sanctuary is the 25,000-acre **Desert Tortoise Research Natural Area** (DTNA) located within the western Mojave near California City and managed by the BLM -- the area established between 1973 and 1980 with the help of Dr. Berry and her colleagues. This "Area of Critical Environmental Concern" had one of the highest densities of *Gopherus agassizii* per square mile with up 200 to 300 individual tortoises in some areas of the DTNA, until URTD spread across the western Mojave, taking many adults. Ravens have been responsible for inhibiting recovery by killing juveniles. However, although this site suffered catastrophic losses, a recent survey showed that tortoise densities are several-fold higher here than on adjacent federal land, designated as critical habitat for the tortoise. The fence around the DTNA has protected both tortoises and habitat from sheep grazing and off-highway vehicle recreation since 1980. The site is a two-hour drive from Los Angeles or Bakersfield. When planning a visit keep in mind that you are more likely to see active tortoises early in the day during the spring months. An array of other rich flora and fauna may be additionally viewed **here** too.

*The author thanks Dr. Berry for providing her valued insights and fact checking for this dispatch. Special thanks to **NPCA**'s David Lamfrom for providing his photographs of desert tortoises. Be sure to check out "**Tortoises Through the Lens: A Visual Exploration of a Mojave Desert Icon**," a*

Desert Tortoise Preserve Committee

Tortoise Group *(desert tortoise adoptions)*

Notes:

[1] Laird, C. "The Chemehuevis." Banning, California: Malki Museum Press, 1976.

[2] Henry Brean, "New rule limits tortoises to one per home," Las Vegas-Review Journal, April 26, 2013.

[3] Darlington, David. "The Mojave." New York: Henry Holt and Company, Inc., 1996. 230. Print.

[4] Although a number of conservative politicians rallied to support Bundy, initially most withdrew after a video from a news conference was widely distributed in 2014 showing Bundy's racist side.

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