DESERT TORTOISE COUNCIL
NEWSLETTER

Inside this issue:

*Goode's Thornscrub Tortoise (*Gopherus evgoodei*): New Tortoise Species Discovered and Named After Conservationist, Naturalist, and Entrepreneur Eric Goode*

By Nicholas Goode/Turtle Conservancy and Taylor Edwards

A team of scientists from Mexico, the U.S. and Canada have recently described a new species of desert tortoise found in Sonora and Sinaloa, Mexico. But instead of following the standard describing and naming process, the researchers behind this effort decided to try an innovative approach that would support their science with tangible conservation actions. They reached out to Eric Goode, founder and president of the Turtle Conservancy, with the idea of auctioning off the naming rights for the new species at the annual Turtle Ball .

The Turtle Conservancy is now working with partners to secure approximately 1,000 acres of Tropical Deciduous Forest in southern Sonora, Mexico, for the protection of this newly described species. The property targeted for this land acquisition has been identified for its excellent tortoise habitat, and for its ideal location adjoining a nature reserve, the Reserva Monte Mojino. This project will not only contribute to the survival of a unique tortoise but also the rich biodiversity associated with this ecosystem. This protected area will safeguard the globally endangered Tropical Deciduous Forest

continued on Page 5

*Depiction of the newly described species in the desert tortoise trichotomy: Goode's thornscrub tortoise (*Gopherus evgoodei*). Painting by Hector Sanchez .*

Letter from the Editor

The first 2016 issue of the DTC Newsletter is finally here, with summaries of our 41st Symposium and an Advanced Health Assessment Training the DTC provided this past spring, and announcements for future DTC workshops, the David J. Morafka Memorial Research Award, and the newly established, first annual Glenn R. Stewart Student Travel Fund.

We also highlight several DTC-funded projects and successes, including a Bren School thesis project, an annotated bibliography for *Gopherus agassizii* research, and a new publication on enhancing and restoring habitat for Agassiz's desert tortoise.

This issue also features a piece on the newly described Goode's thornscrub tortoise, and a reprint of the Washington Post story on the planned translocation of desert tortoises from the Marine Corps Air Ground Combat Center at Twentynine Palms, and a list of recent publications.

Enjoy!

- Michael Tuma
mtuma@west-inc.com

Photo by Heather Parks

Desert Tortoise Council's 41st Annual Symposium

By Michael Tuma

The 41st Symposium of the Desert Tortoise Council was held in Las Vegas between February 19 and 21, 2016. By all accounts, this meeting was one of the most successful and enjoyable symposia in recent memory. The Symposium, held at Sam's Town, kicked off with the 2nd annual special event Welcome Mixer on Thursday night hosted by Southern Nevada Environmental, Inc. On Friday morning following the business meeting, welcoming address by DTC Chairperson Ken MacDonald, and opening announcements, our first session on tortoise evolution kicked off with presentations offering a description of the new species in the desert tortoise trichotomy – *Gopherus evgoodei*, a draft genome for Agassiz's desert tortoise, and evolution of sexually dimorphic traits in *Gopherus* tortoises. The second session featured presentations from conservation groups, including an introduction to a new group (Coalition for a Balanced Environment) that focuses on management of the common raven. The afternoon session featured papers by federal and state agencies, with presenters discussing the desert tortoise management efforts their agencies conducted over the past year. One of the more interesting management techniques offered during this session was presented by Scott Cambrin from the Clark County Desert Conservation Program, who reported on the use of lidar to detect drops in elevation in wash banks as a method of modeling or finding caliche cave sites. The final afternoon presentation was by featured speaker Kim Stringfellow from the San Diego State University School of Art and Design, who discussed The Mojave Project (mojaveproject.org), a documentation of the physical, geological, and cultural landscape of the Mojave Desert. The evening included a book signing with Ms. Stringfellow, a mixer and buffet dinner, and posters by Anjana Parandhaman and Andrea Villamizar Gomez from Texas State University in San Marcos, Texas, who were invited to present their research on habitat modeling and population genetic analyses in Texas tortoises.

The Saturday morning session features talks on desert bighorn sheep, led by Vernon Bleich from the University of Nevada, Reno. This session included ten presentations on desert bighorn sheep, with topics including disease and epidemiology, habitat selection, fragmentation and connectivity, predation, horn size, and translocation, among others. [Editor's note: see Vernon Bleich's story about the Desert Bighorn Sheep session on page 3] Saturday's afternoon sessions included four presentations on health and disease in desert tortoises, and four presentations on current research on Morafka's desert tortoise in Arizona. Saturday night's festivities included a mixer and dinner, presentation of awards, and a presentation on desert parks by David Lanfrom of the National Parks and Conservation Association. Our honored guests included Eric Goode from the Turtle Conservancy and Jennifer MacKay, Director of the Reserva Monte Mojino in Sonora, Mexico.

Sunday's sessions included one on fire effects and management in the Mojave Desert, another on head-starting and translocation of desert tortoises, and a third on research on monitoring desert tortoise populations, movements, and predators. Prior to resuming the afternoon sessions, Dr. Glenn R. Stewart presented the Best Student Paper Award to Christina Aiello for her paper "Upper Respiratory Disease Dynamics: Insights from Transmission Studies."

To view the abstracts from the 2016 Symposium, visit the Text-searchable Proceedings page on the Desert Tortoise Council web site.

Summary of the Special Bighorn Sheep Session

41st Annual Symposium of the Desert Tortoise Council

By Vernon C. Bleich

Last August I received a call from Kristin Berry, whom I hadn't seen in many, many years. Early in our careers we had worked cooperatively on desert conservation issues as they related to completion of the 1980 California Desert Conservation Area Management Plan. Kristin asked if I would be willing to assemble a group of scientists familiar with the ecology of desert bighorn sheep to present a special session on that topic at the 41st Annual Meeting and Symposium of The Desert Tortoise Council. As she explained it, the Council includes a special session on a taxon that is sympatric with desert tortoise(s) and for the upcoming meeting the special taxon would be desert bighorn sheep. I became convinced this would be an opportunity to assemble an astute group of scientists—including some young but very talented individuals that in the future will have a substantial influence on conservation—as well as a few old timers that have spent their careers making meaningful contributions to that worthy cause. I considered Kristin's request to be in the interest of sharing a vast amount of knowledge and current thought about bighorn sheep and their habitat, and agreed to organize the special session.

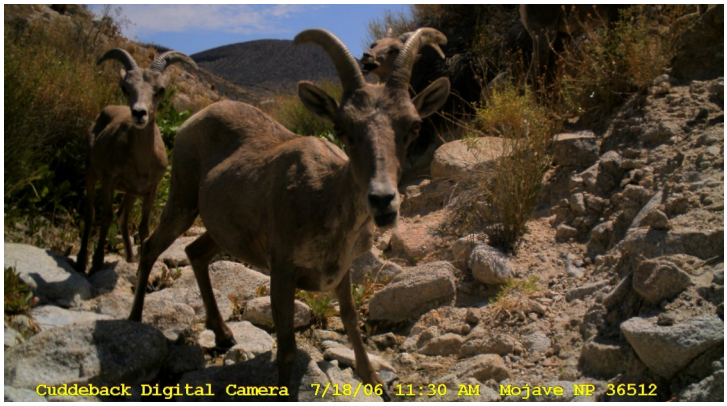
I recruited 10 individuals to participate in the special session. Tortoises and bighorn sheep both are subject to upper respiratory disease that can have population-level impacts. Tom Besser (Washington State University) who is recognized as a leading authority on Mycoplasma and its impacts to bighorn sheep, opened the session. He was followed by Vern Bleich (University of Nevada Reno), who explored the conflicts and inadequacies of wilderness designation alone as a means of conserving populations of bighorn sheep. James Cain (New Mexico Cooperative Fish and Wildlife Research Unit), a leading authority on issues of habitat selection provided a very informative discussion of the technologies currently available, and future directions for habitat selection investigations in bighorn sheep and other species. Clint Epps (Oregon State University) focused squarely on connectivity, gene flow, and conservation genetics at the level of the landscape, all in the context of bighorn sheep conservation.

Randy Larson (Brigham Young University), an authority on rangeland management, discussed the implications of habitat management for the conservation of bighorn sheep. Kathleen Longshore (U.S. Geological Survey) then shared her expertise on bighorn sheep that occupy the urban-wildland interface, and the conservation challenges associated therewith. Kevin Monteith (University of Wyoming) next explored the impacts of harvest on bighorn sheep, sharing his conclusion that intensive harvest rates most likely explain an observed decline in horn size of bighorn sheep in the United States and Canada.

Eric Rominger (New Mexico Department of Game and Fish) is a leading authority on predation and its effects on bighorn sheep populations, and drew several parallels between ravens as subsidized predators of tortoises and mountain lions as subsidized predators of bighorn sheep. Raul Valdez (New Mexico State University), an internationally known and highly respected authority on conservation issues, next explored bighorn sheep conservation in Mexico, and touched on the conservation of wild sheep and tortoises that occur in Iran. Finally, Jericho Whiting (Brigham Young University Idaho) explored translocation strategies and the implications of translocation for the conservation of bighorn sheep, a topic that was of special interest to the group.

Photo by Gary M. Stolz, U.S. Fish and Wildlife Service

A short panel discussion followed the presentations, and the audience was able to pose a number of questions to the various presenters, and some interesting interactions occurred. Following the discussion, and throughout the remainder of the Symposium, numerous attendees commented on how much they appreciated the presentations. Similarly, each of the participants mentioned that they had appreciated the opportunity to interact with the attendees, all of whom shared an interest in the conservation of the desert ecosystems upon which both tortoises and bighorn sheep are dependent.



In the Battle of Desert Tortoise vs. Marines, the Tortoise Wins — for Now

By Tony Perry

TWENTYNINE PALMS, CALIF. — Troops sent to the Marine Corps's sprawling base in the Mojave Desert near here for advanced combat training are warned sternly about an unbreakable rule: no harming the desert tortoises or leaving behind food crumbs that are likely to attract ravens, the arch-predator of tortoises.

To further protect the creatures with the high-domed shells on their backs, certain areas of the base are off-limits. And to prop up the tortoise population on base, the Marines have teamed with UCLA for the past decade to run an on-base hatchery.

Yet a battle is brewing between the Marines and the tortoises — or, really, their environmental advocates — that shows how even a fast-moving fighting force must sometimes give way to some of the slowest creatures on Earth.

The issue is a live-fire exercise set for August to train troops in assaulting an enemy from numerous locations. Similar exercises have been done in the past, but this year's event was to have included recently annexed property that is home to numerous desert tortoises.

To protect the tortoises from becoming collateral damage as bombs, mortars and artillery are fired and Humvees rumble around, the Marines were planning to airlift more than 1,100 of them away from the area.

But just weeks before the relocation was to begin, the Center for Biological Diversity in Tucson protested that the effort would mean certain death for large numbers of the tortoises, in violation of the Endangered Species Act. The group warned that it would go to court to stop the operation.

As a result, the airlift is on hold, the training exercise has been downsized and federal officials not aligned with the Marine Corps are reviewing the tortoise relocation to judge its impact on the creatures.

"This proposed translocation is a disaster for the already at-risk desert tortoises in the west Mojave Desert," said Ileene Anderson, a senior scientist with the diversity center.

The desert tortoise is found in the Mojave and Sonoran deserts of California, Nevada, Utah and Arizona. An adult tortoise can reach six inches in height, weigh up to 15 pounds, and live as long as 100 years. The tortoise population in the western Mojave, which includes the Marine base, has declined by 90 percent since the early 1980s, according to the advocacy group Defenders of Wildlife.

"This proposed translocation is a disaster for the already at-risk desert tortoises in the west Mojave Desert," said Ileene Anderson.

Among the causes cited by the group and others for the decline are drought, respiratory disease, a population explosion among ravens, suburban development and increased use of the desert by off-roaders and other recreationalists.

The Marines initially intended to airlift more than 1,100 desert tortoises away from a combat training site. After protests arose, that plan has been put on hold. Photo by Lauren Kurkimili/U.S. Marine Corps.

In response to the environmentalists' concerns, the Marines say they have carefully monitored the health of tortoises set to be relocated and will continue to do so through small transmitters on the animals' backs. The Corps has allocated $50 million for the airlift, environmental assessments, fencing, research and health monitoring of the tortoises through the year 2045.

"We're not just going to throw them over a fence," said Walter Christensen, natural and cultural resources branch manager at the base. Six spots adjacent to the base have been assigned for the relocation, he said. All have sufficient water and food and are far enough away from the tortoises' current homes that they will not try to walk back, he said.

At 1,190 square miles, the Marine base is nearly the size of Rhode Island. Most Marines sent to Iraq and Afghanistan come here for training, under a program known as Mojave Viper.

Faced with the possible lawsuit over the tortoise airlift, the U.S. Fish and Wildlife Service announced that it was reviewing its tentative approval of the relocation plan. Since the desert tortoise is listed as a threatened species — a notch below endangered — the service's approval is needed for any such move.

The Marines have reconfigured and downscaled the August training away from tortoise-heavy areas, with fewer tanks and armored vehicles. In addition, no live-firing will be done in Johnson Valley, an area of the base that is central to the dispute.

Training is an everyday event at the base, located 140 miles east of Los Angeles. But the August

continued on Page 6

Goode's Thornscrub Tortoise (continued)

ecosystem supporting 36 families of tropical trees, 48 species of orchids, the highest diversity of birds in Sonora, 5 species of wild cats, and 79 species of amphibians and reptiles. The entire area will be owned and managed by Nature and Culture International, the organization that currently manages the Reserva Monte Mojino.

Dr. Taylor Edwards of the University of Arizona and lead author on the scientific paper published in ZooKeys describing the new species explains his motivation: "I figure if we are introducing a new species to the world and we already know that it and its habitat is imperiled, why not start it out with a trust fund?"

On September 28, 2015, the Turtle Conservancy held its third annual Turtle Ball at The Bowery Hotel in New York City. The highlight of the evening was a bid for the right to name the new tortoise, which raised $100,000 solely for the purchase of land in Mexico to protect this new species. With only a little over 50 living species of tortoises currently known to science, this was a unique opportunity to be a part of this unprecedented naming auction. However, instead of a single bidder winning the auction, four organizations came together to contribute funds toward this project: The Andrew Sabin Family Foundation, Global Wildlife Conservation, Rainforest Trust, and the Turtle Conservancy were motivated to pool together this donation in the name of Eric Goode for his work preserving turtles and tortoises around the world.

For more information on the research leading up to this project, see the article published in The Tortoise magazine: The Mexican Tortoise Project.

*Goode's thornscrub tortoise (*Gopherus evgoodei*) in tropical deciduous forest habitat. Photo by Taylor Edwards.*

Master's Thesis Work Aims to Promote Desert Tortoise Recovery

By Dannique Aalbu

Students from the Bren School of Environmental Science & Management at the University of California, Santa Barbara (Bren school) will spend the next year working to promote recovery for the Agassiz's desert tortoise, through first prioritizing restoration sites and activities in the Mojave Desert and then identifying and summarizing the long-term management actions necessary to ensure success. Much of this work will be summarized in a site-specific restoration plan, which will focus on the recovery of a location that contains degraded priority habitat. The project was proposed by Chris Noddings, a Desert Tortoise Council board member and alumni of the Bren school, and funded in part through the DTC grants program. It was picked up by 4 graduate students who have chosen conservation planning as their academic specialization.

During their spring quarter, the students began sifting through research related to the Agassiz's desert tortoise. To this end, the annotated bibliography recently compiled by the DTC was a tremendous help, allowing them to distill an extensive amount of literature related to desert tortoises down to information that pertains solely to the Agassiz's species. Additionally, the annotated bibliography helped provide the necessary background and context for restoration activities as they relate to the Agassiz's desert tortoise.

Two of the students were able to spend a weekend in the Mojave Desert, attending the DTC's Board of Directors meeting on Saturday, June 4th and visiting the Desert Tortoise Research Natural Area (DTRNA) on Sunday, June

continued on Page 7

Masters students (from left): Amber Reedy, Devin Rothman, Erik Martinez, and Dannique Aalbu.

Desert Tortoise vs. Marines (continued)

exercise was meant to be special: It was to be the first time that the Marines used the Johnson Valley property, Marine brass hoped to find out whether the valley would be good not just for large-scale exercises such as this summer's but also for even larger exercises in coming years.

For a decade, the Marines fought environmental groups, local landowners and off-road enthusiasts over annexing Johnson Valley, which was controlled by the federal Bureau of Land Management.

In 2013, after intervention by Sen. Dianne Feinstein (D-Calif.), a deal was cut by Congress: 107,000 acres of Johnson Valley will be designated exclusively for use by the Marine Corps, another 50,000 will be shared between the Marines and civilians. The August exercise is to include sections of both, as well other areas of the base.

The Marines insist they need to use the property to devise a training exercise in which three large infantry groups can practice assaulting a common target, each using artillery, mortars and air power. Without the Johnson Valley area, the corps has no base large enough for such an exercise, officials said.

At the crux of environmentalists' concerns was a tortoise relocation done in 2008 at the Army's Fort Irwin, which is east of Twentynine Palms. That program was suspended after only a year when it was learned that about 30 percent of the relocated tortoises had died.

"It was a debacle," Anderson said of the Fort Irwin program.

To the Center for Biological Diversity, that experience shows that relocation is a dreadful strategy and that the Marines' plan, which would involve many more tortoises, needs further scrutiny.

The Marines assert that the Fort Irwin deaths are misleading. Brian Henen, a civilian ecologist at the Twentynine Palms base, said the mortality rate of the tortoises that were moved was the same as that of tortoises that were not relocated, suggesting the main cause was a drought that decreased water and forage. Federal officials, who did an investigation of the Fort Irwin deaths, also

continued on Page 9

Col. James F. Harp releases tortoise 2-4 from the Combat Center's Desert Tortoise Headstart Program. The Natural Resources and Environmental Affairs released 35 tortoises from the program after they spent approximately 9 years at the Tortoise Research and Captive Rearing Site. Photo by Lauren Kurkimili/U.S. Marine Corps.

Thesis Work (continued)

5th. During their visit, they were guided around by Jillian Estrada, the site manager for the DTRNA, and were given the opportunity to brainstorm possible restoration activities with council members and desert tortoise experts Dr. Kristin Berry and Maggie Fusari. Several potential restoration sites that have been recently acquired by the Desert Tortoise Preserve Committee (and added to the DTRNA) were visited. While at these sites, discussion centered on the how one might best initiate restoration activities on degraded priority habitat.

This exciting project is just getting started- so stay tuned for more updates as the project continues to evolve. When school resumes late September, the students will begin their work on the technical analysis portion of the project. They envision using a combination of spatial data and existing literature to create a hierarchy of priority locations at which to initiate restoration activities. This analysis will be just one piece of the puzzle in the restoration plan that the students will be developing with factors such as costs, potential local and regional partners, and other feasibility issues weighing in. You can follow the students' progress by visiting their website at operationdeserttortoise.weebly.com as well as by watching them present their work at both the DTC's annual symposium in Las Vegas, scheduled for February of 2017, and at a public presentation at the Fess Parker Doubletree Resort in Santa Barbara, in April of 2017.

Potential Bren School of Environmental Science & Management restoration site adjacent to DTRNA. Photo by Robert Wood.

Council Offers Training in Desert Tortoise Health Assessment Procedures

By Cristina Jones

The 9th Health Assessment Procedures for Translocations of the Mojave Desert Tortoise course was held at the Arizona Game & Fish Department in Phoenix on March 22-25, with an optional field trip to Sonoran desert tortoise study site on March 26, 2016. The purpose of this course was to teach participants to conduct standardized health assessments and collect biological samples that are required by the U.S. Fish and Wildlife Service prior to and following the translocation of Mojave desert tortoises from project sites. This course was open to 16 advanced students who have been permitted by U.S. Fish and Wildlife Service to handle desert tortoises on at least one project within the last 5 years as an Authorized Biologist or Authorized Individual; registration filled within 27 minutes. The Arizona Game and Fish Department provided access to 89 captive desert tortoise through their adoption program.

Instructors included Jay Johnson, DVM (AZ Exotic Animal Hospital), Peregrine Wolff, DVM (NDOW), Nadine Lamberski, DVM (San Diego Zoo Safari Park), Kristina Drake (USGS), Roy Averill-Murray (FWS). Scott Cambrin (Clark County), Amada Scheib, Bruce Weise and Rachel Woodard, who provided assistance throughout the course. Registration is provided through the Desert Tortoise Council's Wild Apricot portal. Other participants included organizers: Cristina Jones (AGFD) and Kim Field (FWS), as well as volunteers: Jenny Work (Maricopa County Parks and Recreation), Katrina Lee and Sarah Mortimer (Tortoise Group), and David Defner. To ensure FWS permitting biologists are familiar with this course, Vincent James (CA), Michael Burroughs (NV), and Brian

continued on Page 8

Rachel Woodard and Kristina Drake demonstrate health assessment techniques during the training course. Photo by Katrina Lee.

Health Assessment Training (continued)

Wooldridge (AZ) attended the course as observers.

Since not all participants of the HAT course pass all skills required for certification from FWS, the HAT crew provided a Supervised Practice of Desert Tortoise Health Assessment Procedures at the Large Scale Translocation Site, Jean, NV on May 24-25. The purpose of this field assessment was to provide supervised practice in conducting full health assessments with sample collection in a field setting. This course was open to 10 advanced students who previously passed the Tortoise Handling portion of the practical exam (i.e., received a letter indicating proficiency to handle without supervision) and who need supervised practice in any of the remaining six testing categories (Biosecurity/Disinfection, Physical Exam/Body Condition Scoring, Oral Swab, Subcarapacial Venipuncture, Epicoelomic Fluid Administration, Sample Processing).

During the field course, each student was able to process a minimum of 5 wild tortoises; 57 wild desert tortoises were processed. Tremendous improvement was observed in all participants over the 2-days. Participants provided positive feedback; they appreciated the opportunity – and agreed that this was a perfect extension to the classroom setting for those seeking additional supervision.

Field skills were evaluated by Peregrine Wolff, DVM, Nadine Lamberski, DVM, Jay Johnson, DVM, Kristina Drake, Scott Cambrin, Bruce Weise, and Jason Jones (NDOW); Roy Averill-Murray, Kim Fields, and Cristina Jones organized the course; Great Basin Institute (GBI) provided assistance with logistics and both GBI and NDOW provided staff to radio-track tortoises for this course.

Through this partnership between AGFD, Arizona Exotic Animal Hospital, Clark County, DTC, FWS, NDOW, San Diego Zoo Global, USGS and biologists from private companies, 76 participants have been certified to conduct full health assessments with sample collection from wild Mojave desert tortoises.

Future courses will be announced on the DTC website and FaceBook page.

Students honing their comprehensive health assessment skills during the Supervised Practice of Desert Tortoise Health Assessment Procedures at the Large Scale Translocation Site, Jean, NV. Photo by Roy Averill-Murray.

New Publication on Enhancing and Restoring Habitat for Agassiz's Desert Tortoise

By Kristin Berry

Scott Abella and Kristin Berry have published a paper in June on how to enhance and restore habitat for the tortoise in the Journal of Fish and Wildlife Management. This is a U.S. Fish and Wildlife Service journal publication, available free-of-charge and online. The paper summarizes desert tortoise requirements for forage, cover, and soil, how habitat has deteriorated during the last 150 years, and thus has contributed to decline of populations. The authors discuss results of published research experiments to restore habitats with different histories of disturbances, emphasizing what works and what is less effective. The publication provides a comprehensive summary of the existing and latest literature on the topic of restoration—all of substantial value for projects in the planning phases and underway by government agencies, corporations, and research scientists. In addition, guidelines are offered for actions that can be taken, stepwise, in the restoration process. This publication has arrived at an important juncture, because several Recovery Implementation Teams, organized by the U.S. Fish and Wildlife Service for Agassiz's desert tortoise, rank restoration as a very high priority for critical habitats. The Desert Tortoise Council provided funding to Dr. Abella to support development of this publication.

Desert tortoise at Joshua Tree National Park. Photo by Stacy Manson.

Desert Tortoise vs. Marines (continued)

concluded the deaths most likely were attributable to the drought. Environmental groups disputed the finding.

Brian Croft, a wildlife biologist and division chief with the Fish and Wildlife Service, has sympathy for both sides in this dispute. His agency has dealt with numerous problems related to the moving of tortoises, including ones caused by solar projects and a community college expansion next to the Twentynine Palms base.

"From everything we know from studying translocation, as long as it's planned properly, it can be done without increasing the mortality rate of the animals," Croft said.

The Fish and Wildlife Service expects to decide in September whether the Marines can go ahead with the airlift, Croft said.

Jennifer Loda, the Center for Biological Diversity's attorney for amphibian and reptile issues, said she hopes the final decision will leave the desert tortoises undisturbed. The tortoise's ancestors lived in the Mojave Desert thousands of years before the Army and Marine Corps arrived, she noted.

"They have an inherent right to be here. They have the same right as we do."

This story was first published in the Washington Post.

The tortoises were required to grow at least 4 inches in length before being released, in order to ensure they could fend off predators. Photo by Lauren Kurkimili/U.S. Marine Corps.

Annotated Bibliography on the Desert Tortoise, 1991 to 2015—Now Available Online to the Public

By Kristin Berry

At the request of the U.S. Fish and Wildlife Service and Bureau of Land Management and as part of recovery efforts for the species, scientists from the U.S. Geological Survey (USGS) prepared and published an annotated bibliography for the federally- and state-threatened desert tortoise (*Gopherus agassizii*) covering the years from January 1991 through 2015. The Bibliography became available online as a USGS Open File Report March 1, 2016, and can be accessed at http://dx.doi.org/10.3133/ofr20161023. The 312-page bibliography contains annotations of >400 peer-reviewed journal articles on a wide variety of subjects (paleontology, paleoecology, taxonomy, and genetics, distribution, habitats, shelters, home range, foraging behavior, digestion, and nutrition, reproduction, endocrinology, physiology, health and disease, population attributes, human-related impacts, and managing desert tortoises and habitats). It does not contain references to or annotations for reports, theses, or doctoral dissertations. Paramount and amounting to 35% of the bibliography are annotations on health, infectious and other diseases, and on invasive plant species and their effects to tortoise health and habitat. The annotated bibliography provides federal and state agencies with up-to-date information for use in management plans, environmental assessments and impact statements, and biological opinions pertinent to the species. The Desert Tortoise Council provided funding to support completion and publication of this important work.

Recent Publications

Abella, Scott R., and Kristin H. Berry. 2016. Enhancing and restoring habitat for the desert tortoise. Journal of Fish and Wildlife Management 7(1):255–279. doi: 10.3996/052015-JFWM-046

Abella, Scott R., Lindsay P. Chiquoine, E. Cayenne Engel, Katherine E. Kleinick, and Fred S. Edwards. Enhancing quality of desert tortoise habitat: augmenting native forage and cover plants. Journal of Fish and Wildlife Management 6(2):278–289. doi: http://dx.doi.org/10.3996/022015-JFWM-013

Agha, Mickey, Benjamin Augustine, Jeffrey E. Lovich, David Delaney, Barry Sinervo, Mason O. Murphy, Joshua R. Ennen, Jessica R. Briggs, Robert Cooper, and Steven J. Price. 2015. Using motion-sensor camera technology to infer seasonal activity and thermal niche of the desert tortoise (*Gopherus agassizii*). Journal of Thermal Biology 49-50:119–126. doi:10.1016/j.jtherbio.2015.02.009

Agha, Mickey, David Delaney, Jeffrey E. Lovich, Jessica Briggs, Meaghan Austin and Steven J. Price. 2015. Nelson's big horn sheep (*Ovis canadensis nelsoni*) trample Agassiz's desert tortoise (*Gopherus agassizii*) burrow at a California wind energy facility. Bulletin of the Southern California Academy of Sciences 114(1):58 – 62. doi: http://dx.doi.org/10.3160/0038-3872-114.1.58

Agha, Mickey, Jeffrey E. Lovich, Joshua R. Ennen, Benjamin Augustine, Terence R. Arundel, Mason O. Murphy, Kathie Meyer-Wilkins, Curtis Bjurlin, David Delaney, Jessica Briggs, Meaghan Austin, Sheila V. Madrak, and Steven J. Price. 2015. Turbines and terrestrial vertebrates: variation in tortoise survivorship between a wind energy facility and an adjacent undisturbed wildland area in the desert Southwest (USA). Environmental Management 56(2):332–341. doi: 10.1007/s00267-015-0498-9

Aiello, Christina M., Kenneth E. Nussear, Todd C. Esque, Patrick G. Emblidge, Pratha Sah, Shweta Bansal, and Peter J. Hudson. 2016. Host contact and shedding patterns clarify variation in pathogen exposure and transmission in threatened tortoise *Gopherus agassizii*: implications for disease modelling and management. Journal of Animal Ecology 85:829–842. doi: 10.1111/1365-2656.12511

Barrows, Cameron W., Brian T. Henen, and Alice E. Karl. 2016. Identifying climate refugia: a framework to inform conservation strategies for Agassiz's desert tortoise in a warmer future. Chelonian Conservation and Biology 15(1):2–11. doi: 10.2744/CCB-1157.1

Berry, Kristin H., Ashley A. Coble, Julie L. Yee, Jeremy S. Mack, William M. Perry, Kemp M. Anderson, and Mary B. Brown. 2015. Distance to human populations influences epidemiology of respiratory disease in desert tortoises. Journal of Wildlife Management 79(1):122–136. doi: 10.1002/jwmg.816

Bowen, Lizabeth, A. Keith Miles, K. Kristina Drake, Shannon C. Waters, Todd C. Esque, and Kenneth E. Nussear. 2015. Integrating gene transcription-based biomarkers to understand desert tortoise and ecosystem health. EcoHealth 12(3):501–512. doi:10.1007/s10393-014-0998-8

Brand, L. Arriana, Matthew L. Farnsworth, Jay Meyers, Brett G. Dickson, Christopher Grouios, Amanda F. Scheib, and Rick D. Scherer. 2016. Mitigation-driven translocation effects on temperature, condition, growth, and mortality of Mojave desert tortoise (*Gopherus agassizii*) in the face of solar energy development. Biological Conservation 200:104–111. doi:10.1016/j.biocon.2016.05.032

Castellon, Traci D., Betsie B. Rothermel, and Saif Z. Nomani. 2015. A comparison of line-transect distance sampling methods for estimating gopher tortoise population densities. Wildlife Society Bulletin 39(4):804–812. doi: 10.1002/wsb.605

Drake, K. Kristina, Todd C. Esque, Kenneth E. Nussear, Lesley A. DeFalco, Sara J. Scoles-Sciulla, Andrew T. Moldin, and Philip A. Medica. Desert tortoise use of burned habitat in the eastern Mojave Desert. Journal of Wildlife Management 79(4):618–629. doi: 10.1002/jwmg.874

Dziadzio, Michelina C., Andrea K. Long, Lora L. Smith, Richard B. Chandler, and Steven B. Castleberry. 2016. Presence of the red imported fire and at gopher tortoise nests. Wildlife Society Bulletin 40(1):202–206. doi: 10.1002/wsb.628

Edwards, Taylor., Kristin H. Berry, R. D. Inman, T. C. Esque, K. E., Nussear, C. A. Jones, and M. Culver. 2015. Testing taxon tenacity of tortoises: evidence for a geographical-selection gradient at a secondary contact zone. Ecology and Evolution 5(10):2095–2114. doi: 10.1002/ece3.1500

Edwards, T., M. Vaughn, P. C. Rosen, C. Meléndez-Torres, A. E. Karl, M. Culver, and R. W. Murphy. 2015. Shaping species with ephemeral boundaries: The distribution and genetic structure of the desert tortoise (*Gopherus morafkai*) in the Sonoran Desert. Journal of Biogeography 43(3):484–497. doi: 10.1111/jbi.12664

Edwards, Taylor, Alice E. Karl, Mercy Vaughn, Philip C. Rosen, Cristina Meléndez Torres, and Robert W. Murphy. 2016. The desert tortoise trichotomy: Mexico hosts a third, new sister-species of tortoise in the Gopherus morafkai– G. agassizii group. Zookeys 562:131–158. doi: 10.3897/zookeys.562.6124

Emblidge, Patrick G., Ken E. Nussear, Todd C. Esque, Christina M. Aiello, and Andrew D. Walde. 2015. Severe mortality of a popula-

Recent Publications (continued)

tion of threatened Agassiz's desert tortoises: the American badger as a potential predator. Endangered Species Research 28(2):109–116. doi:10.3354/esr00680

Farnsworth, Matthew L., Brett G. Dickson, Luke J. Zachmann, Ericka E. Hegeman, Amanda R. Cangelosi, Thomas G. Jackson, Jr., and Amanda F. Scheib. 2015. Short-term space-use patterns of translocated Mojave desert tortoise in southern California. PLoS ONE 10(9): e0134250. doi: 10.1371/journal.pone.0134250

García–Feria, L. M., C. A. Ureña–Aranda, and A. Espinosa de los Monteros. 2015. Minimally invasive blood sampling method for genetic studies on *Gopherus* tortoises. Animal Biodiversity and Conservation 38(1):31–35.

Hnida, John A. 2015. A new species of *Isospora* Schneider, 1881 (Apicomplexa: Eimeriidae) from Morafka's desert tortoise *Gopherus morafkai* (Testudines: Testudinidae). Systematic Parasitology 92(3):219–222. doi: 10.1007/s11230-015-9595-7

Jennings, W. Bryan, and Kristin H. Berry. 2015. Desert tortoises (*Gopherus agassizii*) are selective herbivores that track the flowering phenology of their preferred food plants. PLoS ONE 10(1): e0116716 doi: 10.1371/journal.pone.0116716

Lovich, Jeffrey E., Joshua R. Ennen, Charles B. Yackulic, Kathie Meyer-Wilkins, Mickey Agha, Caleb Loughran, Curtin Bjurlin, Meaghan Austin, and Shelia Madrak. 2015. Not putting all their eggs in one basket: bet-hedging despite extraordinary annual reproductive output of desert tortoises. Biological Journal of the Linnean Society 115:399–410. doi: 10.1111/bij.12505

Mack, Jeremy S. Kristin H. Berry, David M. Miller, and Andrea S. Carlson. 2015. Factors affecting the thermal environment of Agassiz's desert tortoise (*Gopherus agassizii*) cover sites in the central Mojave Desert during periods of temperature extremes. Journal of Herpetology 49(3):405–414. doi: http://dx.doi.org/10.1670/13-080

Nafus, Melia G. 2015. Indeterminate growth in desert tortoises Copeia 2015(3):520–524. doi: 10.1643/CH-14-192

Nafus, Melia G., Brian D. Todd, Kurt A. Buhlmann, and Tracey D. Tuberville. 2015. Consequences of maternal effects on offspring size, growth and survival in the desert tortoise. 297(2):108–114. doi: 10.1111/jzo.12250

Nagy, Kenneth A., Gerald Kuchling, L. Scott Hillard, and Brian T. Henen. 2016. Weather and sex ratios of head-started Agassiz's desert tortoise *Gopherus agassizii* juveniles hatched in natural habitat enclosures. Endangered Species Research 30:145–155. doi: 10.3354/esr00737

Sandmeier, Franziska C., Kelly Rachelle Horn, and C. Richard Tracy. 2016. Temperature-independent, seasonal fluctuations in immune-function in a reptile, the Mojave desert tortoise (*Gopherus agassizii*). Canadian Journal of Zoology doi: 10.1139/cjz-2016-0010

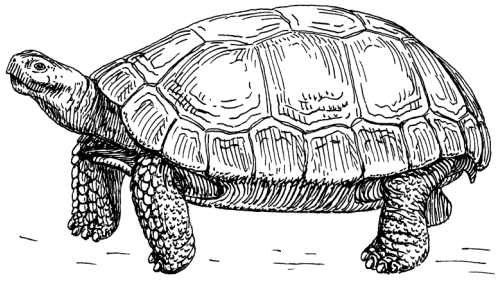
Sieg, Annette E., Megan M. Gambone, Bryan P. Wallace, Susana Clusella-Trullas, James R. Spotila, and Harold W. Avery. 2015. Mojave desert tortoise (Gopherus agassizii) thermal ecology and reproductive success along a rainfall cline. Integrative Zoology 10(3):282–294. doi: 10.1111/1749-4877.12132

Todd, Brian D., Brian J. Halstead, Lindsay P. Chiquoine, J. Mark Peaden, Kurt A. Buhlmann, Tracey D. Tuberville, and Melia G. Nafus. 2016. Habitat selection by juvenile Mojave desert tortoises. Journal of Wildlife Management 80(4):720 – 728. doi: 10.1002/jwmg.1054

Tuma, Michael W., Chris Millington, Nathan Schumaker, and Paul Burnett. 2016. Modeling Agassiz's desert tortoise population response to anthropogenic stressors. Journal of Wildlife Management 80(3):414 – 429. doi: 10.1002/jwmg.1044

Ureña-Aranda, Cinthya A., Octavio Rojas-Soto, Enrique Martínez-Meyer, Carlos Yáñez-Arenas, Rosario Landgrave Ramírez, and Alejandro Espinosa de los Monteros. 2015. Using range-wide abundance modeling to identify key conservation areas for the micro-endemic bolson tortoise (*Gopherus flavomarginatus*). PLoS ONE 10(6): e0131452. doi: 10.1371/journal.pone.0131452

Yuan, Michael L., Samantha H. Dean, Ana V. Longo, Bet5sie B. Rothermel, Tracey D. Tuberville, and Kelly R. Zamudio. 2015. Kinship, inbreeding and fine-scale spatial structure influence gut microbiota in a hindgut-fermenting tortoise. Molecular Ecology 24:2521–2536. doi: 10.1111/mec.13169



Announcements

David J. Morafka 2017 Memorial Research Award

In honor and memory of Dr. David J. Morafka, distinguished herpetologist and authority on North American gopher tortoises, the Desert Tortoise Council, with the aid of several donors, has established a monetary award to help support research that contributes to the understanding, management and conservation of tortoises of the genus *Gopherus* in the southwestern United States and Mexico: *G. agassizii*, *G. morafkai*, *G. evgoodei*, *G. berlandieri*, and *G. flavomarginatus*.

Award Amount: $2,000 to be awarded at the Desert Tortoise Council's Annual Symposium, depending on the availability of funding and an appropriate recipient.

Eligibility: Applicants must be associated with a recognized institution (e.g., university, museum, government agency, non-governmental organization) and may be graduate students, post-doctoral students, or other researchers. They must agree to present a report on the results of the research in which award funds were used at a future symposium of the Desert Tortoise Council.

Evaluation Criteria: Applications will be evaluated on the basis of the potential of the research to contribute to the biological knowledge of one or more of the above gopher tortoise species, and to their management and conservation. Important considerations are the significance and originality of the research problem, design of sampling and analysis, preliminary data supporting the feasibility of the research, and the likelihood of successful completion and publication.

Application Procedure:

1. Download and open an application form from the Desert Tortoise Council's website www.deserttortoise.org. The form is electronically interactive.

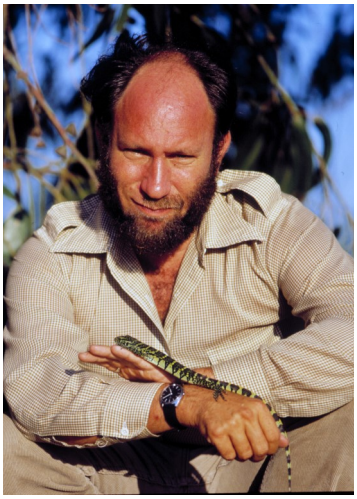
2. Provide all information requested on the application, including a description of the research project in no more than 1,200 words.

3. Submit the completed application to grstewart@cpp.edu as a pdf document.

4. Applications must be supported by the applicant's CV and three letters of recommendation, one of which must be from the applicant's research advisor, supervisor, or a knowledgeable colleague. Instruct the recommenders to submit their letters to grstewart@cpp.edu as pdf documents.

5. All application materials and letters of recommendation must be received by December 1, 2016. They will be evaluated by a committee of gopher tortoise biologists appointed by the Desert Tortoise Council Board of Directors.

6. The research award recipient will be notified of his/her selection by January 20, 2017 and the award will be presented at the 2017 Desert Tortoise Council Symposium, February 24-26, 2017.



*David J. Morafka was a graduate of the University of Southern California and a professor at California State University, Dominguez Hills. His research interests included evolutionary biology, biogeography, and herpetology. He was an expert in the biology of the bolsón tortoise (*Gopherus flavomarginatus*) and Agassiz's desert tortoise (*Gopherus agassizii*), as well as the ecogeography of the Chihuahuan Desert and neonatology of tortoises.*

First Annual Glenn R. Stewart Student Travel Fund

In honor of Glenn R. Stewart, co-founder of the Desert Tortoise Council, the DTC Board of Directors is proud to announce the Glenn R. Stewart Student Travel Fund. This fund was recently established at the June 4th Board of Directors meeting, and is intended to honor Dr. Stewart's strong commitment to educating his students over the course of his career as a professor at California State Polytechnic University in Pomona. The fund is intended to support students working with North American *Gopherus* tortoises by assisting with their travel costs to attend and participate at future Desert Tortoise Council Symposia. The Fund will support up to $500 in travel costs for up to two students. Further details on how students may apply to the fund will be announced on the DTC website.

Workshop: Introduction to Desert Tortoises and Field Techniques

Introduction to Desert Tortoises and Field Techniques is a two-day beginners course including information on ecology, habitat preferences, life history, health, physiology, and threats; applicable state and federal laws and required permits, and field sessions on surveys and identification of tortoises and tortoise sign. This two-day course is a comprehensive introduction to Agassizi's or the Mojave desert tortoise (*Gopherus agassizii*) designed for wildlife biologists, zoologists, natural resource specialists, wildlife managers, land managers, recreation specialists, persons dealing with the public, teachers, and the general public.

This course is recommended for entry-level field biologists looking to prepare themselves for the job of locating tortoises and sign in the field, and for seeking authorizations to do tortoise fieldwork. The course does not guarantee any authorization but is recognized by state and federal agencies as providing important information and skills training. An understanding of basic vertebrate biology and ecology is helpful.

The course includes:

- Hands-on exercises in monitoring and surveying techniques for desert tortoises
- Authorized demonstrations of egg handling and burrow construction
- Presentations about the desert tortoise and threats to its survival

To receive a letter affirming completion of this course you must attend the entire course including the field portion, turn in a completed field survey form, and take the on-line test that will be available in the week following the course and due in mid December.

Authorization Facts

Desert Tortoise Council's Introduction to Desert Tortoises and Field Techniques courses are recognized by the U.S. Fish and Wildlife Service, BUT a certificate of attendance does not guarantee any USFWS authorization or permit.

However, completion of the course should help with the authorization/permitting processes.

Details

Watch the DTC website for details and links to registration which will begin by July 11.

Early Registration will be $295 ($195 for a currently registered student) up to September 17.

Thereafter Regular Registration will be $345 ($245 for a currently registered student).

You will be charged regular registration unless you pay by the early registration date.

Special accommodation will be made for agencies wishing to pay for unspecified attendees and for government agencies with budget restrictions.

After you complete the course you will receive a complimentary one-year membership in the Desert Tortoise Council (unless you elect not to accept it).

Speakers will include Kristin Berry, Peter Woodman, Becky Jones, Alice Karl, and Ed Larue of the DTC, Carolyn Woods (BLM), and Ray Bransfield (USFWS).

For questions email: workshopdestort@gmail.com

Dates: Saturday-Sunday November 5-6

Location: Springhill Suites in Ridgecrest, CA.

Maggie Fusari, DTC workshop coordinator

New Workshop Planned

The Desert Tortoise Council is pleased to announce a new workshop that will take place in October 2016. Workshop graduates will be eligible to be permitted as an Authorized Desert Tortoise Biologist by the US Fish and Wildlife Service, California Department of Fish and Wildlife, and likely other federal and state agencies. The class will be a combination of indoor lectures and outdoor field experiences building on the Council's Introductory Desert Tortoise Workshop. Classroom instruction will focus on: the permitting process, permitting regulations, and on-the-job decision making skills. During the field effort participants will work in small groups walking transects with an experienced instructor practicing field techniques and identifying different types of sign. All participants will process (weigh, measure, and inspect) wild desert tortoises. Successful graduates will need to pass a written and practical exam. Attendance will be limited to 20-25 participants and the class will be about four days. Entry requirements and fees are to be determined. Details and fees will be determined by mid-August, the official announcement will be on the DTC website - http://www.deserttortoise.org.

Turtle Survival Alliance 2016 Conference

The 14th Annual Symposium on the Conservation and Biology of Tortoises and Freshwater Turtles will be hosted August 1-4, 2016 in New Orleans, Louisiana at the Astor Crowne Plaza hotel. The meeting, sponsored by Zoo Med Laboratories, Inc., is co-hosted by the Turtle Survival Alliance and the IUCN Tortoise and Freshwater Turtle Specialist Group (TFTSG).

Hosting an average of more than 250 attendees over the past several years, the symposium represents the largest gathering of non-marine turtle biologists in the world and provides an unmatched opportunity for networking and strategizing turtle conservation. By bringing such a diversity of "turtle minds" together, the meeting is a catalyst for the creation of new programs, initiatives and partnerships. In addition, the meeting provides a venue for existing turtle conservation organizations to meet. The annual meetings of the boards of directors of the Turtle Survival Alliance, Turtle Conservation Fund, as well as the TFTSG Steering Committee all coincide with the symposium each year.

A dedicated Program Committee works each year to bring together a wide variety of presentations from around the world, ranging in topic from captive husbandry to field techniques to conservation. This symposium also provides a venue for specialized symposia. During its twelve-year history, symposia have included special sessions covering China, Madagascar, India, Australia, and South America, Long-term Chelonian Studies, Ranavirus in Turtles, and Nesting Ecology, to name a few. Past workshops have dealt with egg incubation, filtration, and translocation.

Follow the Desert Tortoise Council on Social Media

Council Mission

The Desert Tortoise Council was established in 1975 to promote conservation of the desert tortoise in the deserts of the southwestern United States and Mexico. The Council is a private, non-profit organization comprised of hundreds of professionals and laypersons who share a common concern for desert tortoises in the wild and a commitment to advancing the public's understanding of the species. For the purposes of the Council, desert tortoise includes the species complex in the southwestern United States and in Mexico, currently referred to as Gopherus agassizii, Gopherus morafkai, *and* Gopherus evgoodei.

Board of Directors & Staff

Desert Tortoise Council
4654 East Avenue S #257B
Palmdale, CA 93552

www.deserttortoise.org