



PROGRAM

46th Annual Meeting and Symposium

Virtual

February 9, 11, 16, 18, 23, and 25, 2021

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PROGRAM

46th ANNUAL DESERT TORTOISE COUNCIL SYMPOSIUM (Virtual)

Held the mornings of February 9, 11, 16, 18, 23, and 25, 2021

All sessions and presentations are in Pacific Standard Time

Note: Speakers are the first person noted for each presentation unless * denotes otherwise
Raffles and announcements shall be held at the end of each break

FEBRUARY 9, 2021, TUESDAY

- 8:00 a.m. Business Meeting of the Desert Tortoise Council
- 8:45 a.m. Opening Remarks and Introductions of Meeting Chairs: Ed LaRue and Cristina Jones, Members, Board of Directors of the Desert Tortoise Council
Ken MacDonald, Chair, Desert Tortoise Council, and NewFields, Las Vegas, NV

Session 1. We Stand on the Shoulders of Giants: A Tribute to a Giant in Turtle and Tortoise Research, Conservation, and Education

- 9:00 a.m. **A personal remembrance and memorial tribute to Peter C.H. Prichard: Friend, colleague, mentor, and kindred turtle spirit**
Anders G.J. Rhodin, M.D., Chairman of the Board, Turtle Conservancy; Founder and Director, Chelonian Research Foundation

Session 2. High Priority Conservation and Recovery Actions for Agassiz's and Sonoran Desert Tortoises Invited and Honored guests:

Plenary Address: Sarah Thomas

- 9:20 a.m. **Building community around desert tortoise conservation in Southwest Utah: Advocacy, outreach and stewardship with Conserve Southwest Utah**
Sarah Thomas, Public Lands Program Director, Conserve Southwest Utah
- 10:00 a.m. Break
- 10:30 a.m. **The Sonoran desert tortoise's long slow journey to Endangered Species Act protection**
Cindi Tuell, Director, Arizona and New Mexico, Western Watersheds Project, Tucson, AZ
- 10:50 a.m. **Advancing desert tortoise protection and recovery**
Ileene Anderson¹, Public Lands Desert Director/Senior Scientist; Lisa Belenky², Senior Attorney, and Patrick Donnelly³, Nevada Director:¹ Los Angeles, CA; ²San Francisco, CA; and ³Las Vegas, NV
- 11:10 a.m. Panel with presenters and participants at the meeting

Session 3. A Tribute to Philip A. Medica, a Tortoise Biologist

- 11:35 a.m. **A Tribute to Philip A. Medica: Herpetologist, Conservationist, Mentor, and Friend**
Todd C. Esque¹, Kenneth E. Nussear², K. Kristina Drake¹, and R. Bruce Bury³:
¹U.S. Geological Survey, Henderson, NV; ²University of Nevada, Reno; and ³Herpetological Conservation and Biology, OR
- 11:55 a.m. Closing remarks for the end of February 9 Sessions
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FEBRUARY 11, 2021, THURSDAY

Session 4. Tribute to Dr. Margaretha Hofmyer, A Significant Tortoise Scientist and Conservationist in South Africa

- 8:00 a.m. **Margaretha Delina Hofmeyr, In Memoriam, 1950-2020**
Brian T. Henen

Session 5. Attributes of Tortoise Populations and their Habitats: Genetics, Demography, and Connectivity

- 8:15 a.m. **Historical effective population size and geographic population structure in Mojave and Sonoran desert tortoises**
Greer A. Dolby^{1}, Timothy H. Webster², Hazel Byrne², Dale F. DeNardo¹, Kenro Kusumi¹: ¹Arizona State University; and ²University of Utah*
- 8:30 a.m. **Comparative analysis of immune gene family evolution and sex-biased expression based on a de novo genome for the Sonoran desert tortoise, *Gopherus morafkai* (Student Paper)**
Joseph P. Orton, Dale F. DeNardo, Kenro Kusumi*, and Greer A. Dolby:*
Arizona State University, Tempe, AZ
- 8.45 a.m. ***Range-wide Occupancy Trends for Mojave Desert Tortoises***
Amanda M. Kissel¹, Bryan Wallace¹, Jesse Anderson, ¹Brett G. Dickson¹, Roy Averill-Murray², Linda Allison², and Amy Fesnock³: ¹Conservation Science Partners, Truckee, CA; ²U.S. Fish and Wildlife Service, Reno, NV; and ³Bureau of Land Management, CA.
- 9:00 a.m. **“Unscrambling” the drivers of egg production in Agassiz’s desert tortoise: Climate and individual attributes predict reproductive output (Student Paper)**
Corey I. Mitchell¹, Derek A. Friend¹, Lauren T. Phillips¹, Elizabeth A. Hunter², Jeffrey E. Lovich³, Mickey Agha⁴, Shellie R. Puffer³, Kristy L. Cummings³, Philip A. Medica⁵, Todd C. Esque⁵, Kenneth E. Nussear¹, and Kevin T. Shoemaker¹:
¹University of Nevada, Reno, NV; ²Georgia Southern University, GA; ³U.S. Geological Survey, Flagstaff, AZ; ⁴Washington Department of Fish and Wildlife, WA; and ⁵U.S. Geological Survey, NV

- 9:15 a.m. **Mojave Desert grasslands: 40 years of collecting historical ecological evidence of past and present native plant community diversity**
Laura Cunningham: California Director, Western Watersheds Project, Beatty, NV
- 9:30 a.m. **Habitat characteristics of contact zones using network modeling on desert tortoise populations**
Kenneth E. Nussear¹, T. C. Esque², A. Modlin^{2,3}, and B. Todd³: ¹University of Nevada Reno, NV; ²U.S. Geological Survey, Henderson, NV; and ³University of California, Davis, Davis CA
- 9:45 a.m. **Determining current and future drivers of habitat differentiation for the Mojave Desert Tortoise, *Gopherus agassizii*, across its range in the Mojave Desert (Student Paper)**
Anjana Parandhaman^{1}, Nathan Byer¹, Thomas Dilts¹, Marjorie D. Matocq¹, Doug P. Boyle¹, Scott D. Bassett¹, Amy G. Vandergas², Todd C. Esque³, Jill S. Heaton¹, and Kenneth E. Nussear¹: ¹University of Nevada, Reno, NV; ²U.S. Geological Survey, San Diego, CA; and ³U. S. Geological Survey, Henderson, NV*
- 10:00 a.m. Break
- 10:30 a.m. **Intrinsic and extrinsic factors regulate dispersal in Mojave desert tortoise (Student Paper)**
*Steven J. Hromada^{*1}, Todd C. Esque², Amy G. Vandergast³, Kirsten E. Dutcher¹, Kenneth E. Nussear¹: ¹University of Nevada, Reno; ²U.S. Geological Survey, Henderson, NV; ³U.S. Geological Survey, San Diego, CA*
- 10:45 a.m. **POSTER: Estimating reductions in landscape connectivity for Sonoran desert tortoises (*Gopherus morafkai*) in the United States-Mexico Border Region**
Sean Sutor, Nancy E. McIntyre, Kerry Griffis-Kyle: Texas Tech University, TX
- 11:00 a.m. Panel discussion with presenters and audience

Session 5. Ecology and Behavior of Texas and Bolson Tortoises

- 11:20 a.m. **Characterization of Texas tortoise (*Gopherus berlandieri*) home ranges and habitat use in Cameron County, Texas (Student Paper)**
Daniel A. Guerra¹, Joseph A. Veech¹, and Todd C. Esque²: ¹Texas State University, San Marcos; and ²U.S. Geological Survey, Henderson, NV
- 11:35 a.m. **Thermal ecology and activity patterns of adult and juvenile bolson tortoises (Student Paper)**
Julia Joos¹, Christiane Wiese², Scott Hillard^{2,3}, and Donald B. Miles¹: ¹Ohio University, Athens, OH; ²Turner Endangered Species Fund, Caballo, NM; ³University of California, Los Angeles, CA
- 11:50 a.m. Panel discussion with presenters and audience
- 12:05 p.m. Closing remarks for the end of the February 11 sessions

FEBRUARY 16, 2021, TUESDAY

Session 6: Health and Disease in Turtles and Tortoise and the Potential for Spillover to Naïve Species

Plenary Address: Elliott Jacobson

- 8:00 a.m. **Health issues of chelonians: Past, present, and future**
Elliott Jacobson: University of Florida, Gainesville
- 8:40 a.m. **A novel herpesvirus detected in three different species of chelonians**
**John M. Winter^{1,8}, James F. X. Wellehan², Kathleen Apakupakul³, Jamie Palmer³, Maris Brenn-White³, Kali Standorf⁴, Kristin H. Berry⁵, April Childress², Pete Koplos⁶, Michael M. Garner⁷, and Sharon L. Deem³: ¹University of Illinois Urbana, IL; ²University of Florida, Gainesville, FL; ³Saint Louis Zoo, Saint Louis, MO; ⁴THRIVE Affordable Vet Care, Jacksonville, FL; ⁵U.S. Geological Survey, Reno, NV; ⁶El Paso Veterinary Specialty Center, El Paso, TX; ⁷Northwest ZooPath, Monroe, WA; ⁸Veterinary Specialty Center of Seattle, WA*
- 8:55 a.m. **Facing the pathogen cold-blooded**
Francesco Origgi: Vetsuisse Faculty, University of Bern, Bern, Switzerland
- 9:20 a.m. **Tracing the legacy of anthropogenic radionuclides from 20th Century nuclear testing in desert tortoises (*Gopherus agassizii*) at the Nevada Test Site**
Cyler Conrad^{1,2}, Allison Wende¹, Jeremy Inglis¹, Travis Tenner¹, Kimberly Wurth¹, Benjamin Naes⁷, Jeanne Fair¹, Shannon Gaukler¹, Jeffery Whicker¹, Washington Tapia Aguilera³, James Gibbs^{3,4} and Blair Wolf²: ¹Los Alamos National Laboratory, Los Alamos, NM; ²University of New Mexico, Albuquerque, NM; ³Giant Tortoise Restoration Initiative, Galapagos Conservancy, Fairfax, VA; and ⁴State University of New York, Syracuse, NY
- 9:35 a.m. **Comprehensive evaluation of immune and physiological dysregulation in Mojave desert tortoises using altered diet as a natural stressor**
Kristina Drake^{1}, Michael Treat², Todd Esque¹, and Frank van Breukelen²: ¹U.S. Geological Survey, Henderson, NV; and ²University of Nevada, Las Vegas*
- 9:50 a.m. **Diet influences survival, growth, and microbiome composition in the Mojave desert tortoise**
Nathan W. Byer, Anjana Parandhaman, Kristina Drake, Todd Esque, Kenneth E. Nussear, Jill S. Heaton, and Marjorie D. Maocq: University of Nevada, Reno; and U.S. Geological Survey, Henderson, NV
- 10:05 a.m. **Break**

- 10:30 a.m. **Borreliosis transmission from ticks to humans associated with desert tortoise burrows – examples of tick-borne relapsing fever in the Mojave Desert (Student Paper)**
Molly J. Bechtel¹, K. Kristina Drake², Todd C. Esque², Mike B. Teglas³, Jeff T. Foster¹ and Nathan C. Nieto¹: ¹Northern Arizona University, Flagstaff, AZ; ²US Geological Survey, Western Ecological Research Center, Henderson, NV; and ³University of Nevada-Reno, NV
- 10:45 a.m. **Analysis of captive desert tortoise health data**
Florence M. Deffner¹ and Sarah Mortimer²: ¹U.S. Fish and Wildlife Service, Las Vegas, NV; and ² Tortoise Group, Las Vegas, NV
- 11:05 a.m. Panel discussion with presenters and attendees

Session 7. A View of the History of Desert Tortoise Research and Conservation

- 11:30 a.m. **Historical perspective on the desert tortoise: Field and conservation efforts in the Late Holocene up to its listing**
R. Bruce Bury: Herpetological Conservation and Biology, Corvallis, OR
- 11:45 a.m. Questions to the speaker, followed by Closing of the February 16 sessions

FEBRUARY 18, 2021, THURSDAY

Session 8: Roads, Fires, and Other Anthropogenic Effects on Tortoise

Plenary Address: Craig Stanford

- 8:00 a.m. **Turtles in Trouble: Tortoise and Freshwater Turtle Conservation Priorities in the 21st Century**
Craig Stanford, Chair: Tortoise and Freshwater Turtle Specialist Group, IUCN Species Survival Commission, and University of Southern California, Los Angeles, CA
- 8:30 a.m. **Desert Tortoise Transportation Ecology Workshop**
**Florence M. Deffner¹, Elizabeth Fairbank², Marcel Huijser³, Rob Ament³, Nicholas Maya^{2,4}, and Kerry Holcomb⁵: ¹U.S. Fish and Wildlife Service, Las Vegas, NV; ²Center for Large Landscape Conservation, Bozeman, MT; ³Montana State University, Bozeman, MT; ⁴University of Montana, MT; and U.S. Fish and Wildlife Service, Palm Springs, CA*
- 8:50 a.m. **Use of survey data to identify key issues and insights regarding implementation of conservation actions to address effects of roads on Mojave desert tortoise (*Gopherus agassizii*) recovery (Student Paper)**
**Nicholas Maya^{1,2}, Angelina L. Gonzalez-Aller², Elizabeth Fairbank², and Florence M. Deffner³: ¹University of Montana, MT; ²Center for Large Landscape Conservation, MT; ³U.S. Fish and Wildlife Service, Las Vegas, NV*

9:10 a.m. **Fire Mortality within the Red Cliffs Desert Reserve**
*Ann M. McLuckie¹, Richard A. Fridell¹, John O. Kellam², Michael J. Schijf³ and
Cameron B. Rognan³: ¹Utah Division of Wildlife Resources, Hurricane, UT;
²Bureau of Land Management, St. George, UT; and ³Habitat Conservation
Administration, Washington County, St. George, UT*

9:25 a.m. **POSTER: Activity patterns of the spur-thighed tortoise in the central
Mediterranean**
Claudia Corti and Marta Biaggini: University of Florence, Italy

9:45 a.m. Break

Session 9. Predators on Turtles and Tortoises

Invited Speaker: Patrick D. Moldowan

10:15 a.m. **Hyperpredation of tortoises and freshwater turtles by subsidized corvids:
Global case studies of a conservation conundrum (Student Paper)**
*Patrick D. Moldowan: Algonquin Wildlife Research Station and University of
Toronto, Ontario, Canada*

10:45 a.m. **Three-tiered management of common raven density within California's
Tortoise Conservation Areas**
Kerry Holcomb, U.S. Fish and Wildlife Service, Palm Springs, CA

11:05 a.m. **Three-D printed tortoise models used to measure predation risk by Common
ravens**
**William I. Boarman^{1,2}, Ryan D. Boarman², Tim Shields¹, Kerry Holcomb³:
¹Hardshell Labs, Inc., Haines, AK; ²Conservation Science Research and
Consulting, Spring Valley, CA; and U.S. Fish and Wildlife Service, Palm
Springs, CA*

11:20 a.m. **Modeling and mapping predation risk to desert tortoise populations**
*William I. Boarman¹, Ryan D. Boarman², and William B. Kristan, III³:
¹Conservation Science Research & Consulting, Spring Valley, ²University of
Cologne, Cologne, Germany; and ³California State University, San Marcos, CA*

11:35 a.m. **Non-invasive genetics reveals higher frequencies of canid predation on the
Mojave desert tortoise (*Gopherus agassizii*) than estimates based on
morphological analysis**
Lillian D. Parker^{1,2}, Jessica D. Quinta¹, Isabel Rivera¹, Brian L. Cypher³, Erica
C. Kelly³, Robert C. Fleischer¹, William I. Boarman⁴, Ryan D. Boarman⁴, and
Jesús E. Maldonado¹: ¹Smithsonian Conservation Biology Institute, National
Zoological Park, Washington, DC; ²George Mason University, Fairfax, VA;
³Endangered Species Recovery Program, California State University, Stanislaus;
and ⁴Conservation Science Research and Consultation, Spring Valley, CA*

11:50 a.m. Panel with presenters and audience

12:05 p.m. Closing Remarks and end of the February 18 sessions

FEBRUARY 23, 2021, TUESDAY

Session 10. Mitigation and Recovery of Desert Tortoise Populations Using Augmentation

Plenary Address: Bryan Wallace

- 8:00 a.m. **Multi-year, comprehensive monitoring of tortoise translocations in the Ivanpah Valley: Lessons learned for research, management, and conservation**
Bryan P. Wallace¹, Brett G. Dickson¹, Rick Scherer¹, Miranda Gray¹, Amanda Kissel¹, Jesse Anderson¹, Brian Cohn², Amanda Scheib³, Bruce Weise⁴:
¹Conservation Science Partners, Truckee, CA; ²Upwelling, Inc., Ventura, CA; ³Scheib Biological LLC, Henderson, NV; and ⁴Southwestern Ecological Research Company, Tucson, AZ
- 8:30 a.m. **Factors affecting survival of adult desert tortoises during the 10 years following long-distance translocation**
Kristin H. Berry^{1,2} and Jeremy S. Mack^{1,2,3}: U.S. Geological Survey, Riverside¹, CA, and Reno², NV; ³Lehigh University, Bethlehem, PA
- 8:50 a.m. **Translocation and headstart advances of the Marine Corps Air Ground Combat Center (Combat Center)**
Brian T. Henen; Marine Air Ground Task Force Training Command Marine Corps Air Ground Combat Center, Twentynine Palms, CA

Plenary Address: Brian Todd

- 9:10 a.m. **The value of head-starting in desert tortoise conservation and recovery**
Brian D. Todd¹, Tracey D. Tuberville², Kurt A. Buhlman², and J. Mark Peaden³:¹University of California Davis, Davis, CA; ²University of Georgia's Savannah River Ecology Lab, PO Aiken, SC; and ³Rogers State University, Claremore, OK
- 9:40 a.m. **The role of physiological stress in head-starting success for Mojave desert tortoises (Student Paper)**
**Carmen M. Candal^{1,2}, Kurt A. Buhlmann², Brian D. Todd³, Kristen J. Navara¹, Clinton T. Moore⁴, Pearson A. McGovern^{1,2,6}, Nicole I. Stacy (tentative)⁵, and Tracey D. Tuberville²: ¹University of Georgia, Athens, GA; ²Savannah River Ecology Lab, University of Georgia, Aiken, SC; ³University of California, Davis, Davis, CA; ⁴U.S. Geological Survey, Georgia Cooperative Fish and Wildlife Research Unit, University of Georgia; ⁵Current affiliation: African Chelonian Institute, Ngazobil, Senegal; ⁶University of Florida, Gainesville, FL*
- 9:55 a.m. Break
- 10:25 a.m. **Developing a population augmentation strategy for the Mojave desert tortoise**
Linda J. Allison and Roy Averill-Murray: U.S. Fish and Wildlife Service, Reno, NV

- 10:40 a.m. Panel of presenters and participants
- 11:00 a.m. **Honoring the Life of Phillip C. Rosen (1955-2020)**
Mercy Vaughn
- 11:15 a.m. Closing Remarks and end of the February 23 Sessions
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FEBRUARY 25, 2021, THURSDAY

Session 11. Government and Non-profit Actions to Address Recovery of the Desert Tortoise

- 8:00 a.m. **U.S. Fish and Wildlife Service update on the desert tortoise recovery activities**
Roy C. Averill-Murray: U.S. Fish and Wildlife Service, Reno, NV
- 8:15 a.m. **Management of desert tortoise habitat on Bureau of Land Management lands in California**
Mark Massar; U.S. Bureau of Land Management, Desert District, Palm Springs, CA
- 8:30 a.m. **Clark County Multiple Species Habitat Conservation Plan update**
Scott Cambrin: Clark County Desert Conservation Program, Las Vegas, NV
- 8:45 a.m. **Desert tortoise public outreach: Desert Tortoise Week 2019-2020**
Vincent P. James, U.S. Fish and Wildlife Service, Palm Springs, CA
- 9:00 a.m. **Desert tortoise management and research in Joshua Tree National Park**
Michael Vamstad, Wildlife Ecologist: Joshua Tree National Park, Twentynine Palms, CA
- 9:15 a.m. **Recovery progress at Mojave National Preserve**
Neal Darby, Debra Hughson, and Mike Gauthier: Mojave National Preserve, Barstow, CA
- 9:30 a.m. **Innovative partnerships & stakeholder outreach opportunities facilitating desert tortoise conservation during COVID-19**
Alejandrina R. Ocañas, James Danoff-Burg, and Sarah Greely: The Living Desert Zoo and Gardens, Palm Desert, CA
- 9:45 a.m. Panel of presenters and questions from the audience
- 10:00 a.m. Break
- 10:15 a.m. **Film: Desert tortoises: Protecting a threatened species**
Katerina Koytcheva, Student, University of Nevada, Las Vegas

Session 12. The Egyptian Tortoise: An Invited Presentation

Invited Speaker: Omar Attum

- 10:45 a.m. **Lessons learned from twenty years of Egyptian tortoise conservation and research in Egypt**
Omar Attum¹, Basem Rabia², Sherif Baha El Din³:¹Indiana University Southeast, IN; ²Zaranik Protected Area, North Sinai, Egypt; and ³Nature Conservation Egypt, Cairo, Egypt

Announcements of Awards

- 11:15 a.m. **Winners of the Photographic Contest**
- 11:30 a.m. **Best Student Paper Award**
- 11:40 a.m. **Winner of the David J. Morafka Memorial Research Award**
- 11:50 a.m. **Desert Tortoise Council Awards**
- 12:10 p.m. Closing Remarks and end of the 46th Annual Symposium
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Nonprofit Partner Organizations

Center for Biological Diversity. *Ileene Anderson, 660 S Figueroa St, Suite 1000, Los Angeles CA 90017, Phone: (323) 490-0223. Website: www.biologicaldiversity.org. Email: ianderson@biologicaldiversity.org*

Desert Tortoise Preserve Committee. *Sophia Osho, Executive Administrator, P.O. Box 940, Ridgecrest, CA 93556. Phone (442)294-4258. Website: www.tortoise-tracks.org, Email: dtpc@tortoise-tracks.org*

The Living Desert Zoo and Gardens. *Sarah Greely, 47900 Portola AV, Palm Desert CA 92260, Phone: (760) 346-5694, Website www.LivingDesert.org. Email: sgreely@livingdesert.org, aocanas@livingdesert.org*

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