



# **PROGRAM**

48<sup>th</sup> Annual Meeting and Symposium

**Hybrid**

February 22, 23, 24, and 25, 2023

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**PROGRAM CHAIR:** *Kristin H. Berry*

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**AWARDS:** *Kristin H. Berry*

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## **REQUIREMENTS FOR SPEAKERS AND PRESENTATIONS**

The Desert Tortoise Council **does not permit inappropriate images** as part of presentations in the program or as any part of symposia. Inappropriate photos include, but are not limited to: vulgar, lewd, or suggestive images of people; people in awkward positions or scanty attire; and people engaged in personal and private activities. The Desert Tortoise Council expects all participants and speakers to maintain a high level of professionalism.

### **Guidelines for Asking and Answering Questions at the Symposium**

Several years ago, several attendees approached members of the Board of Directors with concerns about the tone of questions to speakers. The concerned parties included members of the audience as well as speakers. Some members of the audience noted that some questioners appeared to be vitriolic and angry; some questioners used the opportunities at the microphone to present their views in long winded soliloquies rather than to ask questions. Furthermore, some speakers were irritated with the questions asked of them. To avoid a similar occurrence at future meetings, the Board of Directors developed guidelines for asking and answering questions at Symposia. These guidelines offer an opportunity to review the purpose for holding annual symposia and to reiterate our long-standing policy of professionalism and civility to all participants.

The Desert Tortoise Council promotes conservation of the desert tortoise in a variety of ways, including annual symposia. One purpose of the Symposia is to bring together scientists, wildlife biologists, managers, representatives of non-government organizations, and other interested parties to share the latest information on tortoises and their management. The speakers vary in their interests and areas of expertise, as well as in experience in giving presentations. Some speakers are giving their very first public presentations; others have presented hundreds of lectures and power point programs. All are welcome. The symposium is a learning experience and learning is facilitated by respect and courtesy. All speakers should receive courteous and professional treatment and, in turn, all speakers should treat the audience with respect. By following the simple guidelines outlined above, the Board hopes to have a collegial atmosphere and productive meeting.

To assist with the policy of professional and civil behavior, the Board requests that questioners follow the guidelines listed below:

1. Ask one question at a time. If you have two questions, do not ask both at once. Allow the speaker to answer the first question before proceeding to the second question.

2. If more than one person is waiting to ask, then ask only one question.

3. All questions are legitimate. However, the way the question is framed is usually the issue. Each question can be framed in a professional and courteous manner. Speakers, too, can draw on the following guidelines when answering questions.

4. Speakers should consider that all questions are legitimate and fair. However, some may be poorly worded because the questioner may not fully understand the subject or may need some assistance in framing the question in a professional manner. The speaker may need to clarify the question and should then repeat the question to the audience so that the audience will hear it clearly.

5. Some questions are not easily answered for a variety of reasons: no data, insufficient data, topic cannot be discussed because court proceedings are underway, etc. The speakers should state why the question cannot be answered or can only be addressed in part. The speaker may need to think at length about an appropriate answer and, in such cases, may need to say just that. The speaker may refer the questioner to the email in the Abstracts.



## PROGRAM

### 48<sup>th</sup> ANNUAL DESERT TORTOISE COUNCIL SYMPOSIUM (Hybrid)

Held February 23<sup>rd</sup>, 24<sup>th</sup>, and 25<sup>th</sup>, 2023

Dixie Convention Center, St. George, Utah

All sessions and presentations are in Mountain 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 and day**

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#### FEBRUARY 22, WEDNESDAY EVENING

6:00 p.m.     **Pre-Conference Mixer with food, beer, and wine**  
*Sponsored by Southern Nevada Environmental, Inc.*

#### FEBRUARY 23, THURSDAY MORNING

8:00 a.m.     **Annual Meeting of the Desert Tortoise Council**  
*Mari Quillman, Chair, Desert Tortoise Council, and ECORP Consulting, CA*

9:30 a.m.     **Introduction of Meeting Chairs and Opening Remarks**  
*Mari Quillman, Chair, Ed LaRue, Bruce Palmer, and Michael Vamstad, Meeting Chairs: Members, Board of Directors of the Desert Tortoise Council, Palmdale, CA, and Chairs of the Meeting*

9:40 a.m.     **Passings in 2022–2023**  
*Kristin H. Berry and Maggie Fusari, Desert Tortoise Council, Palmdale, CA*

9:55 a.m.     **The year—2022—in review for the Desert Tortoise Council**  
*Mari Quillman, Chair, Desert Tortoise Council, and ECORP Consulting, Redlands, CA*

#### Session 1. Celebrating Advances in Genetic Research on Southwestern *Gopherus* Species

10:10 a.m.     **Winners of the 2023 Robert C. Stebbins Research Award**

**Genomic approaches for chelonian conservation in a changing world**  
*Kenro Kusumi<sup>1</sup> and Greer Dolby<sup>2</sup>: <sup>1</sup>Arizona State University, Tempe, AZ; and <sup>2</sup>University of Alabama at Birmingham, AL*

10:30 a.m.     Questions for the speaker and discussion

- 10:45 a.m.     **Genome comparison of Sonoran and Mojave desert tortoises (*Gopherus morafkai* and *G. agassizii*) and analysis of immunological gene evolution Student Paper**  
*Sarah Baty<sup>1</sup>, Avery Paulsen<sup>1</sup>, Kenro Kusumi<sup>1</sup>, and Greer A. Dolby<sup>2</sup>*  
<sup>1</sup>Arizona State University, Tempe, AZ; and <sup>2</sup>University of Alabama at Birmingham, AL
- 11:00 a.m.     **Isolating an ecotone: Landscape genetics of Mojave desert tortoises near the transition zone of the Mojave and Sonoran deserts. Student Paper**  
*Kirsten E. Dutcher<sup>1</sup>, Nathan W. Byer<sup>2</sup>, Anjana Parandhaman<sup>1</sup>, Marjorie D. Matocq<sup>2</sup>, and Ken E. Nussear<sup>1</sup>: <sup>1</sup>University of Nevada-Reno, NV; and <sup>2</sup>Cleveland Metroparks, OH*
- 11:15 a.m.     Panel Discussion

Session 2. Progress and Thoughts on Managing Predation by the Common Raven on Desert Tortoises.

- 11:25 a.m.     **2020-2022 Common raven density trends throughout California's Tortoise Conservation Areas: Signs of initial success in five of six intensively treated areas**  
*Kerry L. Holcomb, U.S. Fish and Wildlife Service, Palm Springs, CA*
- 11:40 a.m.     **Restaurants helping ravens return to natural population sizes: Gold Star restaurants**  
*James Danoff-Burg and Katie Shaw: The Living Desert Zoo and Gardens, Palm Desert, CA*
- 11:55 a.m.     Panel: Questions and Discussion
- 12:05 p.m.     Lunch

**FEBRUARY 23, THURSDAY AFTERNOON**

Session 3. Restoration of Habitat

- 1:15 p.m.     **A system-wide habitat restoration approach to benefit desert tortoises**  
*Luis Ramirez, James Danoff-Burg, Emily Thomas, Lexi Beaty, and Cassandra Strizak: The Living Desert Zoo and Gardens, Palm Desert, CA*



1:30 p.m.      **Effects of herbicide and drought on desert tortoise habitat restoration  
Student Paper**  
*Ranae Zauner<sup>1</sup>, Beth Newingham<sup>2</sup>: <sup>1</sup>University of Nevada, Reno, NV; and  
<sup>2</sup>USDA - Agricultural Research Service, Great Basin Rangelands  
Research, Reno, NV*

1:45 p.m.      Panel: Questions and Discussion

Session 4. The Power of Persistence: 2023 Award Winners

2:00 p.m.      **50 Years of Desert Tortoise Conservation at the Desert Tortoise  
Research Natural Area**  
*Jun Y. Lee, Esq.: Desert Tortoise Preserve Committee, Ridgecrest, CA*

2:30 p.m.      **Where are we now? 32 years of desert tortoise recovery in southwest  
Utah**  
*Ann M. McLuckie and Richard A. Fridell: Utah Division of Wildlife  
Resources, Hurricane, UT*

3:00 p.m.      Break

3:20 p.m.      **Collaborative partnerships: The key to conservation planning  
in the nation's fastest growing and Utah's most biologically diverse  
county**  
*Richard A. Fridell and Ann M. McLuckie: Utah Division of Wildlife  
Resources, Hurricane, UT*

3:35 p.m.      **Highways and desert tortoise habitat in Mojave National Preserve:  
Recommendations for barrier fencing**  
*Debra Hughson: Mojave National Preserve, National Park Service,  
Barstow, CA*

4:05 p.m.      Panel: Questions and Discussion

Session 5. The Implicit and Explicit Values of Nonprofits and Legal Challenges in Protection

4:20 p.m.      **Desert tortoise protection and recovery in a changing  
climate**  
*Ileene Anderson,<sup>1</sup> Lisa Belenky,<sup>2</sup> and Patrick Donnelly<sup>3</sup>:  
Center for Biological Diversity, Oakland, <sup>1</sup>CA and <sup>2</sup>Las Vegas,  
NV*

Session 6. Formation of a New Non-profit for an Inhabitant of the Western Mojave Desert

- 4:40 p.m.      **Formation of a New Nonprofit for Mohave ground squirrel conservation**  
*Kathryn Simon<sup>1</sup>, Phillip Leitner<sup>2</sup>, and Ed LaRue<sup>3\*</sup>: <sup>1</sup>Sunrise Consulting, Redlands, CA; <sup>2</sup>St.Mary's College, Moraga, CA; and <sup>3</sup>Circle Mountain Biological Consultants, Inc., Wrightwood, CA*
- 4:55 p.m.      Questions and Discussion

**FEBRUARY 23, THURSDAY EVENING**

- 6:00-9:00 p.m. **Social Networking Event: food and no-host bar**  
*Sponsored by the Desert Tortoise Council*
- 7:30 p.m.      **The Good, The Bad and The Slow**  
*A film directed by Hans Glasmann, MFAP Professor at Utah Tech University*

**February 24, Friday Morning**

Session 7. Behavior and Movements of Texas, Sonoran, and Mojave Desert Tortoises

- 8:00 a.m.      **Comparative thermal ecology and activity patterns of three species of *Gopherus* tortoises. Student Paper**  
*Julia Joos and Donald B. Miles: Ohio University, Athens, OH*
- 8:15 a.m.      **Selection on the move: Landscape characteristics influence resource selection and movement behavior of Sonoran desert tortoises. Student Paper**  
*Sean Sutor, Nancy E. McIntyre, and Kerry Griffis-Kyle: Texas Tech University, Lubbock, TX*
- 8:30 a.m.      **Examining variation in environmental variables within Texas tortoise (*Gopherus berlandieri*) utilization distributions in Cameron County, Texas. Student Paper**  
*Daniel A. Guerra<sup>1</sup>, Joseph A. Veech<sup>1</sup>, and Todd C. Esque<sup>2</sup>: <sup>1</sup>Texas State University, San Marcos, TX; and <sup>2</sup>U.S. Geological Survey, Henderson, NV*
- 8:45 a.m.      Panel: Questions and Discussion

Session 8. Plenary Address: Further Challenges to the Mojave Desert

- 9:00 a.m.      Introduction to Dr. Christopher Smith

- 9:05 a.m.     **Dust storms ahead: Climate change, green energy development and endangered species in the Mojave Desert**  
*Christopher I. Smith: Willamette University, Salem, OR*
- 9:45 a.m.     Discussion and Questions
- 10:00 a.m.    Break

Session 9. Cannabis Invasion: What We Need to Know and Do About It

- 10:15 a.m.    **Introduction to the Session and Moderator: Heidi Brannon**  
*Solutions Strategies*
- 10:20 a.m.    **Tiffany Devitt, Director Regulatory Affairs**  
*March and Ash/CannaCraft*
- 10:35 a.m.    **Deputy Kyle Schuler**  
*San Bernardino County Sheriff's Department, Gangs/Narcotic Division, Marijuana Enforcement*
- 10:50 a.m.    **Eric Weiss, Senior Environmental Scientist**  
*California Department of Fish and Wildlife, Habitat Conservation-Cannabis*
- 11:05 a.m.    **Breton Peace, Attorney**  
*Peace & Shea LLP*
- 11:20 a.m.    **The Honorable Fiona Ma, Treasurer**  
*State of California*
- 11:35 a.m.    Panel: Questions and Discussion
- 12:00 Noon    Lunch

February 24, Friday Afternoon

Session 10. Augmentation of Tortoise Populations: Head-starting and Translocation

- 1:30 p.m.     **Desert tortoise translocation of the Marine Corps Air Ground Combat Center (Combat Center) in 2022**  
*Brian T. Henen: Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, CA*

- 1:45 p.m.      **Limits of burrows to buffer against climate extremes—insight for headstarting as a tool to bolster Mojave desert tortoise populations**  
*Melissa Merrick, Talisin Hammond, Tom Radzio, Daniel Essary, Reed Newman, and Ron Swaisgood: San Diego Zoo Wildlife Alliance, Escondido, CA*
- 2:00 p.m.      **Settling, movements, sizes of use areas, and growth of small head-started tortoises after release during the megadrought**  
*Kristin H. Berry<sup>1</sup>, Jeremy S. Mack<sup>2</sup>, and Kemp Anderson<sup>3</sup>: <sup>1</sup>U.S. Geological Survey, Reno, NV; <sup>2</sup>Lehigh University, Bethlehem, PA; and <sup>3</sup>Bajada Ecology, Seal Beach, CA*
- 2:15 p.m.      **Application of thermography and time-lapse thermal imaging in studies of juvenile desert tortoise ecology**  
*Thomas A. Radzio<sup>1</sup>, Talisin T. Hammond<sup>1</sup>, Daniel Essary<sup>1</sup>, Reed Q. Newman<sup>1</sup>, Emily Thomas<sup>2</sup>, Lexi Beaty<sup>2</sup>, Melissa J. Merrick<sup>1</sup>, and Ronald R. Swaisgood<sup>1</sup>: <sup>1</sup>San Diego Zoo Wildlife Alliance, Escondido, CA; and <sup>2</sup>The Living Desert Zoo and Gardens, Palm Desert, CA*
- 2:30 p.m.      **Synthesis of efforts to optimize desert tortoise head-starting in Mojave National Preserve: 2011 – 2022 results and future directions**  
*Tracey D. Tuberville<sup>1</sup>, Brian D. Todd<sup>2</sup>, and Kurt A. Buhlmann<sup>1</sup>: <sup>1</sup>Savannah River Ecology Laboratory, University of Georgia, Aiken, SC; and <sup>2</sup>University of California, Davis, CA*
- 2:45 p.m.      Panel: Questions and Discussion
- 3:00 p.m.      Break

Session 11. Demography and Connectivity and Effects of Climate Change

- 3:15 p.m.      **Climatic variables drive past and future Mojave desert tortoise dispersal: implications for connectivity**  
*Steven J. Hromada<sup>1,2</sup>, Derek Friend<sup>2</sup>, Kirsten Dutcher<sup>2</sup>, Anjana Parandhaman<sup>2</sup>, Scott Bassett<sup>2</sup>, Doug Boyle<sup>2</sup>, Amy G. Vandergast<sup>3</sup>, Todd C. Esque<sup>3</sup> and Kenneth E. Nussear<sup>2</sup>: <sup>1</sup>Conservation Science Partners, Truckee, CA, <sup>2</sup>University of Nevada, Reno, NV; <sup>3</sup>U.S. Geological Survey, Boulder City, NV, and San Diego, CA*
- 3:30 p.m.      **Understanding the regional adaptive potential for the Mojave desert tortoise using an integrated approach. Student Paper**  
*Anjana Parandhaman<sup>1</sup>, Nathan Byer<sup>1,2</sup>, Kirsten Dutcher<sup>1</sup>, Thomas Dilts<sup>1</sup>, Alexander Audet<sup>1</sup>, Derek Friend<sup>1</sup>, Doug P. Boyle<sup>1</sup>, Scott D. Bassett<sup>1</sup>, Amy G. Vandergast<sup>3</sup>, Todd C. Esque<sup>4</sup>, Jill S. Heaton<sup>1</sup>, Marjorie D. Matocq<sup>1</sup>, and Kenneth E. Nussear<sup>1</sup>: <sup>1</sup>University of Nevada, Reno, NV; <sup>2</sup>Cleveland Metroparks, OH; and U.S. Geological Survey, <sup>3</sup>San Diego, CA and <sup>4</sup>Henderson, NV*

- 3:45 p.m.     **Fill in the blanks: Modelling juvenile Mojave desert tortoise rates past and future. Student Paper**  
*Jacqueline L. Dougherty<sup>1</sup>, Kenneth E. Nussear<sup>1</sup>, Steven J. Hromada<sup>2</sup>, and Amy Collins<sup>2</sup>: <sup>1</sup>University of Nevada, Reno, NV; and <sup>2</sup>Conservation Science Partners, Truckee, CA*
- 4:00 p.m.     **West Mojave desert tortoise hotspots: Management options and implications**  
*Timothy A. Shields<sup>1</sup>, Kathryn Holmes<sup>2</sup> and Samuel Easley<sup>3</sup>: <sup>1</sup>Hardshell Labs, Inc., Joshua Tree, CA; <sup>2</sup>Calliandra Biological, CA; and <sup>3</sup>Transition Habitat Conservancy, Pinyon Hills, CA*
- 4:15 p.m.     **Applications of near remote sensing imagery obtained with unmanned aerial vehicles on evaluating desert tortoise densities at local scales. Student Paper**  
*Justice R. Best<sup>1</sup>, <sup>1</sup>Kenneth E. Nussear<sup>1</sup>, K. Kristina Drake<sup>3</sup>, Todd C. Esque<sup>2</sup>: <sup>1</sup>University of Nevada, Reno, NV; and <sup>2</sup>U.S. Geological Survey, Henderson, NV; and <sup>3</sup>U.S. Fish and Wildlife Service, Las Vegas, NV*
- 4:30 p.m.     **A full-scale test of AI-assisted drone surveys for the Mojave desert tortoise (*Gopherus agassizii*)**  
*Matthew S. Bandy<sup>1</sup> and Cameron Rognan<sup>2</sup>: <sup>1</sup>Resi Solutions, Albuquerque, NM; <sup>2</sup>Washington County HCP, St. George, UT*
- 4:45 p.m.     **Evaluating barriers to connectivity among desert tortoise populations using agent based modeling**  
*Ken Nussear, Kirsten Dutcher, Scott Bassett, and Derek Friend: University of Nevada, Reno, NV*
- 5:00 p.m.     Panel: Questions and Discussion
- 5:05 p.m.     Posters with Authors

**FEBRUARY 24, FRIDAY EVENING**

- 6:00 p.m.     Dinner with no-host bar
- 7:00 p.m.     Winners: Photography Contest
- 7:30 p.m.     Student Award for Best Paper
- 7:40 p.m.     Winners of Grants, presented by the Desert Tortoise Council
- 8:00 p.m.     Winners of Desert Tortoise Council Awards

**Banquet Address:** **Through the lens – A closer look at reptile behavior in southwest Utah**  
*Cameron Rognan: Washington County Habitat Conservation Plan, St. George, UT*

**FEBRUARY 25, SATURDAY MORNING**

**Session 12. Government Activities and Management Actions to Enhance Tortoise Recovery**

- 8:00 a.m.      **Citizen science and indigenous partners expand tortoise outreach in southern Utah**  
*Ammon Teare<sup>1</sup>, Cameron Rognan<sup>1</sup>, Mike Schijf<sup>d</sup>, \*Carmen Clark<sup>2</sup>, Tina Gonzales<sup>2</sup>, Sabrina Redfoot<sup>2</sup>, Sarah Thomas-Clayburn<sup>3</sup>, Patrick Barickman<sup>3</sup> and Ann McLuckie<sup>4</sup>: <sup>1</sup>Washington County HCP, St. George, UT; <sup>2</sup>Shivwits Band of Paiutes, Ivins, UT; <sup>3</sup>Conserve Southwest Utah, St. George, UT; and <sup>4</sup>Utah Division of Wildlife Resources, Hurricane, UT*
- 8:20 a.m.      **Mojave desert tortoise week 2022: Making outreach count**  
*Kent M. Kowalski: U.S. Fish and Wildlife Service, Palm Springs, CA*
- 8:35 a.m.      **Management of desert tortoise habitat on Bureau of Land Management lands in California**  
*Mark Massar; Bureau of Land Management, California Desert District Palm Springs, CA*
- 8:50 a.m.      **Clark County Connectivity Management Plan**  
*Scott Cambrin: Clark County Desert Conservation Program Las Vegas, NV*
- 9:05 a.m.      **Recovery progress at Mojave National Preserve**  
*Michael Burchett, Neal Darby, Debra Hughson, and Mike Gauthier: Mojave National Preserve, Barstow, CA*
- 9:20 a.m.      **Clark County Multiple Species Habitat Conservation Plan update**  
*Scott Cambrin: Clark County Desert Conservation Program, Las Vegas, NV*
- 9:35 a.m.      **Updates on the Desert Tortoise Recovery Office staffing and range-wide monitoring program for Mojave desert tortoises**  
*Kristina Drake and Kimberleigh Field: U.S. Fish and Wildlife Service, Desert Tortoise Recovery Office, Las Vegas, NV*
- 9: 45 a.m.      **Status review of the Mojave desert tortoise 2012–2022**  
*Roy C. Averill-Murray (retired) and \*Kimberleigh J. Field: Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, NV*
- 10:00 a.m.      Break

- 10:15 a.m.     **U.S. Fish and Wildlife Service update on desert tortoise recovery activities**  
*Stephanie Menjivar: U.S. Fish and Wildlife Service, Palm Springs, CA*
- 10:30 a.m.     **Desert tortoise management and research in Joshua Tree National Park**  
*Michael S. Vamstad: Joshua Tree National Park, Twentynine Palms, CA*
- 10:45 a.m.     Panel: Questions and Discussion

Session 13. Roads, Culverts, Camera Traps, and Remote Evaluations of Off-Highway Vehicle Routes

- 11:05 a.m.     **Living along unfenced, moderately trafficked roads on the Nevada National Security Site**  
*Jeanette A. Perry<sup>1</sup>, Derek B. Hall<sup>1</sup>, W. Kent Ostler<sup>1</sup>, Jonathan Drescher-Lehman<sup>2</sup>, and Tom S.B. Akre<sup>2</sup>: <sup>1</sup>Mission Support and Test Services, LLC, contractor for DOE, Mercury, NV; and <sup>2</sup>Smithsonian's National Zoo and Conservation Biology Institute, Front Royal, VA*
- 11:20 a.m.     **Camera traps at road crossing structures and other updates from the Upper Virgin River Recovery Unit**  
*Mike Schiif and Cameron Rognan: Washington County HCP, St. George, UT*
- 11:35 a.m.     **Application of computer vision for OHV route detection in Mojave desert tortoise habitat**  
*Alexander Robillard, Mark Spangler, Amy Collins, Brett Dickson: Conservation Science Partners, Inc., Truckee, CA*
- 11:50 a.m.     **The "Road Warriors" project: Partnering with non-governmental organizations to implement citizen scientist monitoring of road effects on the Mojave desert tortoise (*Gopherus agassizii*)**  
*Sarah Mortimer<sup>1</sup> and Florence M. Deffner<sup>2</sup>: <sup>1</sup>Tortoise Group, Las Vegas, NV; and <sup>2</sup>Gulf Shores, AL (USFWS, Retired)*
- 12:05 p.m.     Panel: Questions and Discussion

## POSTERS

**Keep the wild wild, and pets as pets: A history of collaborating to keep pet tortoises as pets**  
*Emily Thomas, Lexi Beaty, Cassandra Strizak, Luis Ramirez, James Danoff-Burg: The Living Desert Zoo and Gardens, Palm Desert, CA*

**Texas Tortoise Task Force: Collaborative networks to increase surveillance of disease in tortoises. Student Poster**

*Jacquelyn Tleimat<sup>1</sup>, Paul Crump<sup>2</sup>, Greer Dolby<sup>3</sup>, Kenro Kusumi<sup>4</sup>, and Shawn F. McCracken<sup>1</sup>:  
<sup>1</sup>Texas A&M University – Corpus Christi, TX; <sup>2</sup>Texas Parks and Wildlife Department, Austin, TX; <sup>3</sup>University of Alabama at Birmingham, AL; and <sup>4</sup>Arizona State University, Tempe, AZ*

## NON-PROFIT PARTNERS AND VENDORS

**Conserve Southern Utah.** *Holly Snow Canada, 321 N Mall Dr. B202 St George UT 84790. Phone: (702) 739-7113. Website: <https://conserveswu.org>. Email: [holly@conserveswu.org](mailto:holly@conserveswu.org)*

**Desert Tortoise Preserve Committee, Inc.** *Jun Y. Lee, Interim Executive Director, Director of Land Acquisition, PO Box 940, Ridgecrest CA 93556, Phone: (213) 300-5220, Website: [www.tortoise-tracks.org](http://www.tortoise-tracks.org), Email: [dtpc@tortoise-tracks.org](mailto:dtpc@tortoise-tracks.org), and [junylee@gmail.com](mailto:junylee@gmail.com)*

**ECORP Consulting, Inc.** *Mari Quillman, 2861 Pullman Street, Santa Ana, CA 92705. Phone: (714) 648-0630. Website: [www.ecorpconsulting.com](http://www.ecorpconsulting.com). Email: [mquillman@ecorpconsulting.com](mailto:mquillman@ecorpconsulting.com)*

**Hardshell Labs, Inc.** *Tim Shields, PO Box 963, Joshua Tree, CA 92252. Phone: (909) 556-4264, Website: [www.HardshellLabs.com](http://www.HardshellLabs.com), Email: [t.shields@hardshelllabs.co](mailto:t.shields@hardshelllabs.co)*

**Holohill.** *John Edwards, 112 John Cavanaugh Dr, CARP, Ontario, K0A1L0, Canada, Phone: (613) 839-0676, Website: [www.holohil.com](http://www.holohil.com), Email: [info@holohil.com](mailto:info@holohil.com)*

**SWCA Environmental Consultants.** *Par Singhaseni, 320 N. Halstead Street, Suite 120, Pasadena, CA 91110. Phone: (626) 479-3526. Website: <https://www.swca.com>. Email: [par.singhaseni@swca.com](mailto:par.singhaseni@swca.com)*

**Pangea Biological.** *Amy Rowland, 6790 Embarcadero Lane, Ste. 100, Carlsbad, CA 92011. Phone: (760) 468-7065. Website: [www.pangeabiological.com](http://www.pangeabiological.com). Email: [amy@pangeabiological.com](mailto:amy@pangeabiological.com)*

**Tortoise Group.** *Sarah Mortimer, 2000 East Flamingo, Las Vegas NV 89119. Phone: (702) 739-7113. Website: [tortoisegroup.org](http://tortoisegroup.org). Email: [sarahmortimer@tortoisegroup.org](mailto:sarahmortimer@tortoisegroup.org)*

Possible attendance if they find a person to attend:

**Cornerstone Research Group, Inc.** *Trang Young, 510 Earl Blvd, Ste 250, Miamisburg OH 45342, Phone: (937) 320-1877 ext. 1385, Website: <http://www.crgroup.com/>, Email: [youngtt@crgroup.com](mailto:youngtt@crgroup.com)*