

Las Vegas Army Air Field Horned Toads (World War II Heros)

By Dr. Wade Sherbrooke

Yes, they did their part to win the Second World War – our horned toads, that is!

The Las Vegas Army Air Field Horned Toads played baseball at Las Vegas Army Gunnery School in Las Vegas, Nevada. Teams of players in uniform took to baseball fields during

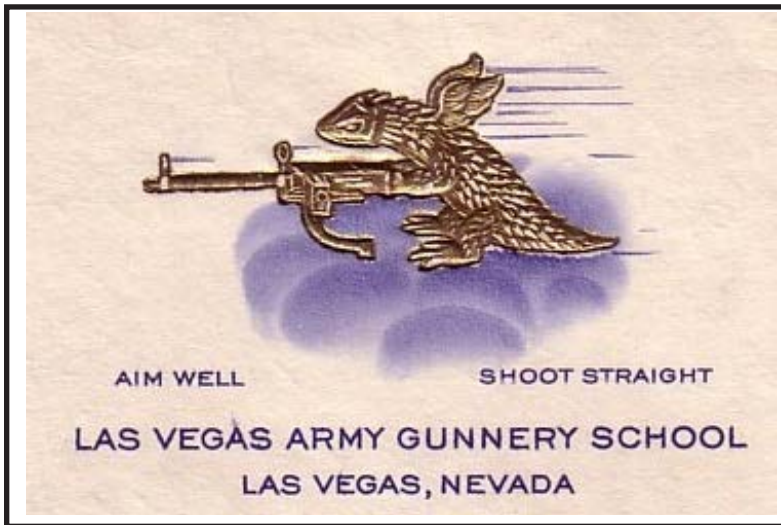


Fig. 1. Las Vegas Army Air Force (LVAAF) Gunnery School Logo, "Aim Well - Shoot Straight"

1943, 1944, 1945, to keep American spirits high.

I'm wondering if their motto, "Aim Well, Shoot Straight," came from observing the lizard's abilities to pickoff ants with precision while eating or defensively squirting streams of blood at predators? Or, did the need to camouflage their hidden gunnery

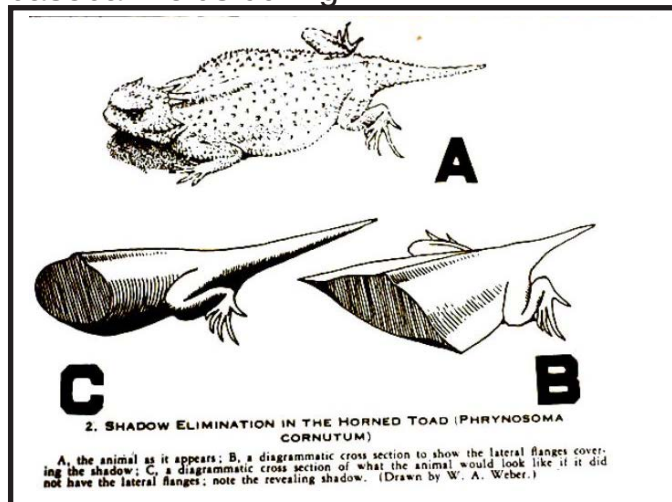


Fig. 2. Teaching troops to avoid shadows in the field was aided by presenting an understanding a horned lizard survival technique – jam enemy ability of visual detection through camouflage.

positions suggest the horned lizard logo? Shadow avoidance from body shape and fringe scales was incorporated into shadow elimination training manuals featuring the Texas Horned Lizard (*Phrynosoma cornutum*).

For more on World War II baseball and camouflage checkout:

http://www.baseballinwartime.com/player_biographies/dugan_red.htm

<http://en.wikipedia.org/wiki/Camouflage>



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HLCS Rescued and Transported a Horned Lizard to San Antonio Zoo

By Leslie Nossaman

On May 4, HLCS was contacted through Facebook by a family who had a Texas Horned Lizard in need of finding a home. This family had been given the horned lizard by another family who had taken it from its habitat near Del Rio, Texas. I asked if the horned lizard could be returned to its habitat and the other family said they could not take it back. They realized it was illegal to have one and also realized they could not take care of it. They gave it to the family who contacted us. Hyatt Kirkland who is with the family who contacted us had taken very good care of it.



Left to right: Hyatt Kirkland and Leslie Nossaman who is holding Fred.

Since the horned lizard had come from the southern population of Texas Horned Lizards in Texas, I knew that San Antonio Zoo might be interested in having it for their breeding and reintroduction program. The San Antonio Zoo works with the southern populations while Fort Worth Zoo and Dallas Zoo work with the northern populations with their breeding and reintroduction programs. I contacted Andy Gluesenkamp with the horned lizard program at San Antonio Zoo to see what could be done with the horned lizard. Andy was very interested in having this Texas Horned Lizard from this location to help with their genetic diversity for their breeding program. I was granted a permit to transport the horned lizard as it is required since it is a threatened species in Texas.

So I contacted the family who had the horned lizard and set up a time and place to

transfer the horned lizard. We selected an empty mall parking lot on the north side of Houston. Since the malls had closed due to the pandemic, it was easy to find them. We also maintained our six-foot distance. And since it was during mandatory face mask orders in Harris County, we all had on face masks. I had on gloves to also protect the horned lizard.

The horned lizard was a young male and appeared healthy. I asked Hyatt if he would like to name the horned lizard as it was going to need a name at the zoo. He selected "Fred" so the little guy's name became Fred. I placed Fred in an ice chest to maintain his temperature at a consistent level and then drove away with him. But not after thanking Hyatt and his family for helping find this little horned lizard a new home.

Then I drove it to San Antonio Zoo. There was a vet alerted that the horned lizard was coming so he was there when I arrived. He thoroughly checked Fred over and determined that he was a healthy horned lizard. He was also weighed to check his health. And he made a big poop on the way to the Zoo so they analyzed it too. The San Antonio Zoo's videographer also showed up and videotaped the whole event and posted it live on their Facebook page. The Zoo asks for donations with their live videos and this one received one of the higher donation amounts.

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Leslie Nossaman (on right) is handing over Fred in his transport container to Ariana Duffy (on left) with San Antonio Zoo. *Photo by Bekky Muscher-Hodges.*



Fred is being examined by San Antonio Zoo veterinarian. *Photo by Leslie Nossaman.*



Close-up photo of Fred. *Photo by Leslie Nossaman.*



Fred in his quarantined temporary home. *Photo by Leslie Nossaman.*

After getting his exam, Fred was put into a quarantine area to keep him separated from the other horned lizards to make sure he does not bring in any diseases to the other horned lizards. He will stay there for about 30-60 days depending on what is found. The Zoo needs to collect three consecutive fecals (poop) to check their health to make sure the horned lizard is healthy enough to leave quarantine. San Antonio Zoo has a fabulous set up for caring for horned lizards and has spent a great deal of money creating this set up.

I checked on Fred at the zoo recently and they said he was doing great, eating well, and growing. Fred is certainly in capable hands and I wish him well.



HLCS Newsletter Access

As part of HLCS's strategy to save money to better focus what we have, we are asking our members who are receiving the newsletter by paper and post mail to move to having it delivered by email instead. This will save on printing and mailing costs. Digital newsletters are sent by a link to all members who have given us an email address. The link will take you to a version that is in color and if you prefer paper, you can print it out and read it. The post mailed paper newsletter is black and white. Please consider making the move to a digital copy. To make the change, contact Lynn Seman, the HLCS Membership Services Officer at rlynnseman@gmail.com



HLCS Research Grant Report for “Background Color-Matching in the Texas Horned Lizard”

By Dusty Rhoads, Master of Science thesis (TCU, graduate. Dec. 2019)



Figure 1. Where does the stripe begin and the stem litter end? An adult *P. cornutum* from Rolling Plains Quail Research Ranch, showing apparent plant-stem litter mimicry with its dorsal stripe, as hypothesized by Sherbrooke 2002.

In recent years, several universities, zoos, and state wildlife agencies have been meeting together to share knowledge concerning Texas Horned Lizards (TXHL; *Phrynosoma cornutum*) in hopes of improving their current trajectory of generally disappearing and dwindling in number across their native landscape. One of the stated goals of these meetings—called the Texas Horned Lizard Conservation Coalition—is the collaborative management of captive populations of TXHLs for purposes of reintroduction throughout their former range. These reintroduction efforts are still very much in a trial phase, but so far most of the reintroduced horned lizards are getting eaten by predators (Nathan Rains, pers. comm.)

The vast majority of literature concerning horned lizards emphasizes that, perhaps more than any other North American lizard group, their number one line of defense against visual predators is crypsis—a two-pronged line of defense in which innate traits of color camouflage are coupled with one or more complimentary behaviors—for starters, usually staying motionless at the approach of a predator until being nearly stepped on. One striking example of such crypsis in this group is the rock mimic, the Roundtail Horned Lizard (*Phrynosoma modestum*), which color-matches local pebbles better than soil or other nearby objects (Dusty Rhoads and Kristen Larson, unpublished data) and behaviorally tries to look like a rock to fool predators (Cooper and Sherbrooke 2012; Sherbrooke and Montanucci 1988).

Texas Horned Lizards are likewise known to vary in dorsal color across their range and at least anecdotally appear to background color-match with their immediate soils (Price 1990). And because TXHLs likely split off early from a northern arid-adapted ancestral group of horned lizards due to the uplift of the Rocky Mountains, whose eastward rain shadow eventually formed the grasslands known as the Great Plains (where they ended up), TXHLs became more adapted to grasslands than any other extant horned lizard species. Some of this is perhaps evidenced in their preference of eating grass seed-harvesting ants while other species of horned lizards in the same habitat prefer small tree or bush honeydew-harvesting ants (Sherbrooke 2003). But even more discrete possible evidence of their grassland adaptation is their ubiquitous blached dorsal stripe (FIG. 1), which, also anecdotally, appeared to blend in with the wind-blown, sun-bleached grass stem litter that accumulates underneath the skirts of brush and bunchgrasses—TXHLs’ preferred haunt in their southern Great Plains habitat (Sherbrooke 2002). However, neither of the assertions concerning background soil color-matching or the vertebral stripe grass stem litter mimicry had been empirically tested.

Historically, colorimetry of animals and their habitat backgrounds has employed the use of an expensive device called a reflectometer which captures the full spectrum of light including UV, but it is unwieldy outside of a laboratory and only takes point measurements. There are several drawbacks to this method: measuring the color of an animal’s whole body without touching the animal (which also invokes color change in TXHLs), capturing the natural behaviors and postures that are coupled with the camouflage, capturing the color of soil and other

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background without disturbing it, and capturing the natural in-habitat lighting are all virtually rendered impossible using a reflectometer. For my master's thesis at TCU, I came across a newer method that allows researchers to use digital photographs of animals to measure color and color-matching (Samia et al. 2015). While we humans don't have the UV-catching cones in our eyes let alone the neurological hardware to interpret UV-lighting and its associated blend of all colors that some predacious birds have—and therefore cannot even imagine what those colors might look like to a UV-sensory able bird (Hill 2010)—there is still apparent relative overlap in color-matching that we humans can see in the three-dimensional RGB visual model that also eludes birds in the four-dimensional RGB-UV model. In fact, birds (perhaps some with UV-vision capability) have been shown to overlook color-matched foam models of TXHLs over non-color matched models (Mirkin 2019).

Methods and Results

For my thesis, I photographed over 100 TXHLs, as found without touching them, in the field at three different sites in North Texas and in South Texas during summer 2018. I used a color standard that I placed next to the



Figure 2. In situ photo of unmanipulated lizard with typical ColorChecker placement and freehand selection of lizard and adjacent substrate with ImageJ photo-editing software.

lizard in each photograph that allowed the photographs to be calibrated to their true colors in post-production, irrespective of lighting conditions in the field (FIG. 2). I also had collaborators send me photos of untouched lizards from other parts of their range in Far West Texas near Alpine and Fort Davis. The first task was to see if color-calibration made a significant difference in color-matching versus uncalibrated versions of the same selections of the same photos. There was no difference, and this allowed me to also use vetted photographs without color-calibration from citizen scientists (i.e. iNaturalist).

I then tested (a) whether TXHLs color-match their own soils better than the soils of other populations (FIG. 3)—they do! (b) what is the overall soil color-matching percentage for TXHLs across their range—turns out it's an average of ~61% for within-photo and ~45% for within entire habitat comparisons, and (c) whether TXHLs' vertebral stripes color-matches grass stem litter better than other nearby objects in their habitat—they do! These results are not only the first to confirm but also the first to quantify the various camouflage hypotheses concerning TXHLs. There were a few other tests, but those are some of the main findings.

Applications for reintroduction biologists and landowners

There are some applications of my research that could be used by both professional conservation biologists who work with TXHL reintroductions and landowners who wish to one day have TXHLs reintroduced on their lands. First, biologists can measure the colors of their captive TXHLs, then measure the colors of soils of various potential reintroduction sites, and all else being equal choose sites that have the highest percent color match, or at least as high as the 45% average for the species mentioned previously.

I then tested (a) whether TXHLs color-

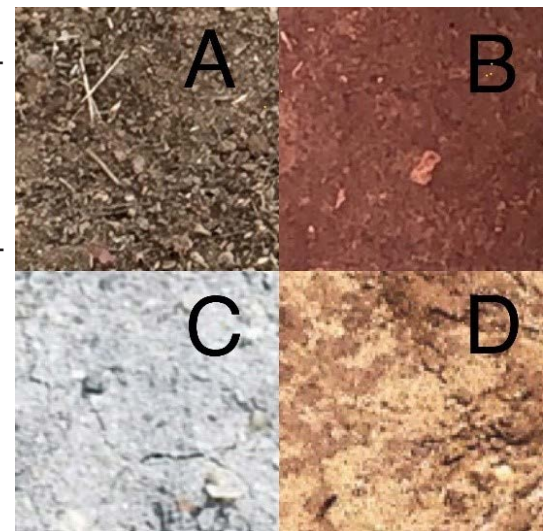


Figure 3. Soil samples representing different colored substrate habitats in (A) Alpine, TX (brown), (B) Rolling Plains Quail Research Ranch, TX (red), (C) Karnes City, TX (gray), and (D) Freer, TX (tan). (TXHLs were in all of these photos but cropped out.)

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Second, landowners can easily gather their soil color data to have this information ready for reintroduction biologists—they can, for instance, photograph a wide variety of spots within their land and randomly choose, say, at least ten photos to measure. All the soil in the randomly selected photos can then be freehand selected in the 3D Color Inspector plugin of ImageJ, all of which is freely available software. The selections can then be binned into a histogram and the color data copied and pasted from the lookup table (i.e. LUT or color table) into a spreadsheet (FIG. 4).

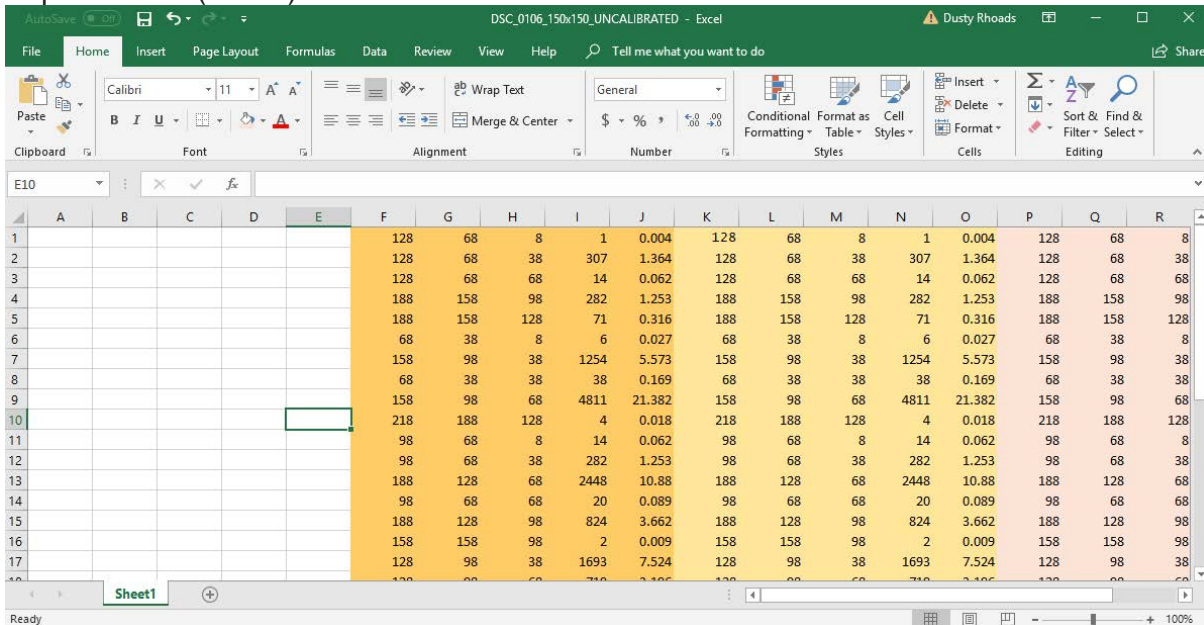


Figure 4. Biologists and landowners can copy and paste the LUT color data for individual photographs of soil samples (i.e. the five-column wide sections differentiated by different colors) at potential TXHL reintroduction sites or their lands, respectively. The first five columns should be left blank for a single lizard's color data to compare with the soil samples. The instructions and code for calculating color-matching between them is found in Samia et al. 2015.

Thirdly and lastly, both biologists and landowners can use a small part of this method to survey vegetation type cover percentages and bare ground percentages—both highly important for TXHL habitat management. Using the same abovementioned software including the 3D Color Inspector plugin, simply freehand select either a plant type (e.g. bunchgrasses) or all the bare ground in a sample of photographs and compare the percent of selected pixels to the pixels of the entire image. Of course, some methodological standards will have to be set and communicated between all parties, but I hope this serves as a rough if not tantalizing index with which to start. I once again thank the Horned Lizard Conservation Society and welcome inquiries from any biologist or landowner who have questions or would like help with these methods at subocs@gmail.com.

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Become a Horned Lizard Conservation Leader!

HLCS is currently seeking nominations for a 2-year term for the 2021-2022 Board of Directors.

The following positions will be available: President-Elect, Secretary, Treasurer, and Director-at-Large. Members who are interested can nominate themselves – if you nominate someone else please get their permission before nominating them.

Please provide a brief (up to 7 sentences) biography describing any interest/expertise in leadership and/or horned lizard conservation efforts. No prior experience is required. Board members are expected to be available for correspondence via e-mail, occasional conference calls or in-person meetings. In addition to the specific duties mentioned above, board members are expected to participate in at least two board meetings per year. HLCS can opt to provide travel funds to board members to attend meetings.

This slate of officers should take office in January 2021 and will serve for two years. The President-Elect then shall hold the office of president for two additional years.

Feel free to contact the current officer if you have any questions. Nominations/volunteers must be received by September 21, 2020.

Please submit nominations (with biographies) to Ryan Zach at razzoomnp@yahoo.com

President-elect - The President-Elect shall serve in the absence of the President or in the event or the incapacity or resignation of the President, and when so acting, shall have all the powers of and be subject to all the restrictions upon the President. The President-Elect shall plan and recruit committees and plan and execute the biennial national meeting. The President-Elect becomes the President at the end of a two-year term.

Secretary - The Secretary shall be responsible for Corporate records, keep the minutes of all general membership and BOD meetings, and in general perform all duties incident to the office of Secretary and such other duties as from time to time may be assigned by the President or the BOD. The Secretary shall also be responsible for cataloguing and maintaining the supply of all publications of the Corporation and responding to requests for information from the membership and general public.

Treasurer - The Treasurer shall be responsible for all funds and securities of the Corporation; receive and give receipts for moneys due and payable to the Corporation from any source; and deposit all such moneys in the name of the Corporation in such banks, trust companies, or other depositories as shall be elected by the BOD. The Treasurer shall advise the BOD in preparation of an annual budget, be responsible for all financial records, and provide the BOD and the membership with written financial reports, including an annual report, sit on the Fund-Raising Committee, and in general perform all duties incident to the office of Treasurer and such other duties as from time to time may be assigned by the President or the Board of Directors.

Director-at-large - The Director-at-Large shall be responsible for development of special projects as assigned by the Board, particularly related to integration of scientific knowledge and conservation issues.



Horned Lizard Conservation Conference Update

By Mason Lee

The rescheduled Horned Lizard Conservation Conference will be on May 15, 2021! We hope you will join us in good health at the Phoenix Zoo to celebrate the amazing accomplishments of horned lizard researchers from the past few years.

We are excited to announce that our keynote speaker will be the illustrious Dr. Wade Sherbrooke. Dr. Sherbrooke has published over 60 papers and notes on horned lizard biology, in addition to publishing a wonderful book, "Introduction to Horned Lizards of North America."

Registration information will be made available at www.hornedlizards.org in early 2021. Abstract submissions will also reopen in January 2021. In the meantime, we are accepting donated horned lizard items for our silent auction to help raise funds for horned lizard conservation grants.

Contact Mason Lee at masonmlee3@gmail.com for questions and submissions.



Zooming for Horned Lizards!

By Lynn Seman

We were all so disappointed in the postponement of the conference that was to be held on June 6, 2020, at the Phoenix Zoo due to the spread of COVID-19. After realizing what a great list of speakers that we had lined up and the current trend of "zooming", we decided to attempt recording a series of videos of some horned lizard experts and research scientists to help with our desire to learn more about horned lizards and conservation efforts.

The first video, released on June 6, the intended date of the conference, was Wade C. Sherbrooke, Ph.D., speaking on his discoveries about the interesting adaptation of blood squirting in some species of horned lizards. What an excellent speaker to kick off our video series!

After Dr. Sherbrooke's talk, we planned a video release about every two weeks ranging from answering commonly asked horned lizard questions, to the recent activities of the horned lizard re-introduction projects, as well as cultural aspects that horned lizards bring to our world. All of these videos will be available on our website at the conclusion of the series for people to watch in the future. Thank you to all the speakers who gave their time and were willing to "zoom" for horned lizard conservation education! Also, please excuse any video and sound glitches in the production of these videos.

You can see these videos in a variety of HLCS social media: Facebook private member page, Facebook public group page, Instagram, and HLCS YouTube channel.



Contribute through AmazonSmile

If you are an online Amazon shopper, please consider shopping via www.smile.amazon.com. The AmazonSmile Foundation helps you support a charity of your choice while doing your regular shopping on Amazon!

Once you select the Horned Lizard Conservation Society as your charity to support, our society will receive 0.5% of the price of eligible purchases. And from then on, every purchase made through AmazonSmile will benefit the Horned Lizard Conservation Society. Every little bit helps!



New HLCS Brochure Announcement!

By Leslie Nossaman

HLCS is proud to announce we have a new brochure! It has been in the making for a very long time by the Board and some other volunteers. It has lots of photos of horned lizard species, a map of their total native range, and lots of important information about the horned lizards. It has sections describing what a horned lizard is, their defenses, what they eat, what do you do if you find one in the wild, their population numbers, and why they don't make a good pet. And there is a section on Native American culture regarding the horned lizard. It also has a beautiful presentation.

The HLCS Board of Directors would like to recognize Michael Deleon with the digital media program at the University of Houston for all of his advice and amazing graphic design talents. This brochure would not have been as wonderful without his impressive skills.

You can request printed copies by sending a request to the HLCS email hornedlizardinfo@gmail.com or you can download the file and print it yourself by going to our website and looking under the "Horned Lizards" tab for the "Education materials" selection. There are instructions on how to print the brochure on the website.



HLCS Sales Update

The HLCS sales is doing very well and thank you to all who have been purchasing items. We made significant changes to the online store webpage in October 2019 and to our processes. The store is more streamlined and has some better photos and descriptions. Some of the processes included doing a major inventory count and a budget for restocking. We are happy to report we doubled our sales almost immediately after the website changes and have not had to refund anyone due to lack of inventory since these new processes were implemented. We have also made many updates to sales items we provide such as lowered prices, updated information on the masks, new logo on the hat, and more. We also added one new sales product and are looking into more.

We unfortunately had to temporarily close down the online store which currently includes our online donation section during the pandemic to keep our sales staff safe but it is operational and going strong again.

HLCS is looking into bringing you some new and exciting choices for sales items. In the meantime, check out the HLCS online store through our website and stay tuned for the new products!



Membership Numbers Reach a Milestone!

HLCS has some exciting news! On June 3, 2020 HLCS reached a milestone in having the largest number of members in its history at 326. Back in 2000 the number was 325 and then decreased starting around 2001 and decreased down to 175 members in 2017. HLCS member numbers are now back up and are still growing and as of this publication, we have 335 members. Thank you to all the members who have joined! We hope you are enjoying your membership, the newsletter, and what your dues are doing to support horned lizard conservation!



Horned Lizard Research Grant 2021 Applications

The Horned Lizard Conservation Society is dedicated to protecting horned lizards by documenting and publicizing the values and conservation needs of horned lizards, promoting horned lizard conservation projects, and assisting with horned lizard management initiatives. Towards those ends, the HLCS annually sponsors research and educational projects that have direct conservation applications. To learn more about the society and past grants, go to <http://www.hornedlizards.org/>.

We will be offering grants again in 2021. In the past, priority has been given to projects that have direct conservation implications, including public education.

To apply, send a proposal detailing the goal of the study, the rationale for it including relevance to conservation of horned lizards, and how your work would benefit from this opportunity. The proposal may not exceed 1000 words. Also include a preliminary budget with any other funding sources available or received for your project. In addition, send a short resume or CV (up to 3 pages) for the lead applicant and have a single letter of reference sent to George Perry: Gbperry10101@gmail.com. The deadline is January 1, 2021. The decision will be announced by January 31, 2021.



President's Message *by Leslie Nossaman*

So many wonderful things are happening with horned lizard conservation and HLCS right now. And so many new ideas being worked on that you will hear about later. We have a brand-new brochure that looks very professionally designed. I was interviewed by the Texas Coop Power magazine for an update on horned lizard conservation and what HLCS is doing which was recently published. I was also interviewed by the Los Angeles Times newspaper about horned lizard conservation and why people are so interested in the horned lizard. And was asked by the New Mexico Herpetological Society to write an article.

HLCS is receiving so many communications regarding landowners wanting to reintroduce the horned lizard on their land. Although there has been great progress made on making the process successful, we are letting them know that it has not been mastered yet and may be a long time before it is.

We are also having more people contact us about making donations. You can donate through our online store or through a check to our P.O. Box. You might also consider making a donation through your estate planning.

HLCS has a fantastic video series on our two Facebook pages and the Instagram page. Lynn Seman, the Member Services officer, came up with this wonderful idea and is making the videos with people who have volunteered to present various aspects of horned lizards. Check out the article on this series by Lynn.

We have a new YouTube channel where we have been placing some of our videos. Check out page 2 in the newsletter on how to find the channel.

We also have two new regional contacts! They are Nick Cairns in Canada and Raymond Moody in Oklahoma. Welcome to Nick and Raymond!

Also, the HLCS Board has really stepped up to do their part to help with the HLCS mission. I am so grateful to their incredible ideas, participation, and volunteerism. Their accomplishments have strengthened the organization so much and have inspired me also.





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PLEASE JOIN US! Students/Seniors: \$10; Regular: \$25; Contributing: \$50; Lifetime: \$300
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