Texas Society for Ecological Restoration
12TH ANNUAL CONFERENCE
June 8-10, 2007
Texas Tech University
Lubbock, Texas

Program Notes

Plenary Speaker

Loren M. Smith, Ph.D.
Kleberg Professor of Wildlife Ecology
Texas Tech University

Smith's research is focused on various aspects of wetland ecology and principles of biodiversity while his personal research is focused on biogeography of playa wetlands and biotic diversity in Great Plains ecosystems.

A Special Thank You to Our

Local Host Committee

Perry Gad, Ph.D.
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Texas SER 2007 Conference Schedule

Time	Friday, June 8
5:00-6:00 PM	Conference Registration at the Matador Room in the Student Union Building, Texas Tech University
6:00	Social and Dinner in the Matador Room with Welcome Address by Provost Bill Marcy, Ph.D. and Plenary by Loren M. Smith, Ph.D.

Time	Saturday, June 9
7:30-8:15 AM	Conference Registration at Goddard 101, Texas Tech University
	Restoration Partnerships and Educational Outreach Session – Goddard 101
8:20 AM	Gulf of Mexico Community-based Restoration Partnership: Six Years of Coastal Habitat Restoration. Quenton Dokken and Kathryn Tunnell
8:40	Lewisville Lake Environmental Learning Area: Preservation, Restoration, Education and Research: a Non-Profit Consortium's Role in Environmental Science. Kenneth Steigman
9:00	Developing Volunteer Leadership: Increasing Land Management and Beneficial Public Access in Austin, Texas. Daniel Dietz, Gail McGlamery and Kevin Thuesen, Ph.D
9:20	Urban Prairies, Going, Going… Kenneth Steigman and Richard Freiheit
9:40	Environmental Restoration, Conservation, Education and Civic Engagement; Liberty Nature Trail, Lubbock. Charles Klein and Oscar Reyes
10:10-10:30	Break
	Restoration Research Session – Goddard 101
10:30	Assessing Relative Soil Depth Using Non-Invasive Electromagnetic Induction. Cheryl Mannel, Dr. Cristine Morgan and Dr. Fred Smeins
10:50	Evaluating Tree Seeding Survival and Growth in a Bottomland Old-field Site: Implications for Ecological Restoration. Brian Boe
11:10	Home Range, Life History, and Activity Patterns of Texas Horned Lizards in the High Plains Region of Texas. Juan Diaz, Jacob Goldfarb, Sandra Rideout-Hanzak, and Gad Perry

Time	Saturday, June 9
	Restoration Research Session Continues
11:30	Impacts of Management Methods and Invasive Plants on Biodiversity, Ecosystem Function, and Successional Trajectories in a Texas Freshwater Marsh Restoration After One Year. Christopher Gabler
11:50-1:00	Lunch on your own
	Restoration Planning and Implementation Session – Goddard 101
1:00 PM	Restoration of a Hill Country Ranch. Richard Taylor
1:20	9 Years of Ecosystem Restoration on the City of Austin Water Quality Protection Lands. Kevin Thuesen, Ph.D. and Matt McCaw
1:50	Controlling Oak Wilt in Oak-Juniper Woodlands: Does it Work and is it Necessary? Charlotte Reemts, Thomas Greene and David Appel
2:10	Effective Control of Tamarisk in a Highly Sensitive Environmental Area: Results of 4 Years of Management. Kevin Thuesen, Ph.D., Matt McCaw, and Willy Conrad
2:30	Break
2:50	Estero Llano Grande State Park: From Farmland to Wetlands. Jennifer Owen
3:10	Effects of Warm Season Prescribed Fire on Fallow Upland. Brian Boe, Ken Steigman, and Richard Freiheit
3:30	Development of a Golden-Cheeked Warbler Habitat Restoration Plan along a portion of Bull Creek, Austin, Texas. Kelly Nesvacil, John Chenoweth, Daniel Dietz, Dan Lakey, Bill Reiner, Mark Sanders, and Kevin Theusen, Ph.D.
4:30-6:00 PM	Texas SER Board of Directors Meeting – Plant & Soil Sciences 115
7:00-10:00 PM	Social and Dinner at the home of Mark and Janet Wallace, 4508 8th St., Lubbock, Texas. Van shuttles from Staybridge Suites start at 6:45 PM and return shuttles start at 9:00 PM

Gulf of Mexico Community-based Restoration Partnership: Six Years of Coastal Habitat Restoration

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The Gulf of Mexico Community-based Restoration Partnership (GCRP) is a regional partnership between the EPA Gulf of Mexico Program's Gulf Ecological Management Sites Initiative, the NOAA Restoration Center's Community-based Restoration Program, the Gulf-States natural resource agencies, and the Gulf of Mexico Foundation. The GCRP was established to bring together state and federal governmental entities, non-profit organizations, citizens, and businesses in a collaborative effort to provide funding and technical support for coastal restoration projects. The GCRP funds citizen-driven, on-the-ground projects which restore aquatic marine habitats, benefit living marine resources, and foster community-involvement and environmental stewardship. Since its inception, the GCRP has assisted various organizations in funding 43 restoration projects throughout the Gulf of Mexico and the Caribbean Sea. To date, the GCRP has distributed over $967,000 in funds, completed 25 projects, and supported the restoration of almost 12,000 acres. The 43 projects will generate over $4.17 million in matching contributions, over 30,000 hours of volunteer time, and improve 15,000 acres of marine habitat. Beginning in September 2007, the restoration partnership begins a new three year funding cycle. In addition to the GCRP program, the partnership is working to implement the goals of the Governors' Action Plan of the Gulf of Mexico Alliance. Through the Alliance Habitat group issues of policy, permitting regulations, and operating procedures within funding and permitting agencies affecting habitat restoration efforts are being evaluated in order to formulate

recommendations to facilitate restoration efforts in the most cost effective and efficient manner. These programs, the GCRP and Gulf of Mexico Alliance, are providing the foundation for establishing comparable habitat restoration efforts in the Gulf States of Mexico.

Development of a golden-cheeked warbler (*Dendroica chrysoparia*) habitat restoration plan along a portion of Bull Creek, Austin, Texas

Nesvacil, Kelly; Chenoweth, John; Dietz, Daniel; Lakey, Dan; Reiner, Bill; Sanders, Mark; Thuesen, Kevin, Ph.D.
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The City of Austin, Balcones Canyonlands Preserve is planning to create golden-cheeked warbler (*Dendroica chrysoparia*) habitat and increase woody plant diversity on approximately 31 acres along a portion of Bull Creek, Austin, Texas. This project will take place on the Water Treatment Plant #4 (WTP4) tract outside the area to be utilized by the proposed water plant proper. The project is currently in the planning stages. The WTP4 tract was historically used for ranching and part of the area adjacent to Bull Creek was cleared; much of the area is currently dominated by KR bluestem (*Bothriochloa ischaemum*) and Ashe juniper (*Juniperus ashei*), with some areas of diverse riparian and upland habitat. Two hundred stems/acre of woody plants will be planted in areas with low tree cover and in other project areas, where golden-cheeked warbler habitat currently exists, woody plant diversity will be increased by planting at a rate of 50 stems/acre. All trees used in this project will be locally collected from the Bull Creek watershed or in close proximity thereto. Planting considerations based on the hydrology of the area and other site conditions taken into account during this planning stage will be discussed. Other considerations, such as management of white-tailed deer (*Odocoileus virginianus*) and feral hogs (*Sus scrofa*), as well as planning with sensitivity to presence of the Jollyville Plateau salamander (*Eurycea tonkawae*) in the project area will also be discussed. Field work will commence fall/winter 2007 and active planting is proposed to occur until 2012.

Effects of Warm Season Prescribed Fire on Fallow Upland

Brian Boe, Ken Steigman, and Richard Freiheit
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A prescribed fire was conducted on 125 acres in April, 2006 on U.S. Army Corps of Engineers property at the Lewisville Lake Environmental Learning Area (LLELA). LLELA is an 1800-acre Wildlife Management Area in Lewisville, Texas. The ecological goals of the burn were to control both deciduous and evergreen woody species, control KR bluestem (*Bothriochloa ischaemum* L.) and reduce the thatch layer that had accumulated for many years. Much of this degraded upland was disturbed during the construction of the dam in the early 1950's but a few remnant pockets of tallgrass prairie remain. The fire was conducted at ambient temperatures that topped out at 99 degrees Fahrenheit and humidity as low as 20 %. Winds were south at 9 mph. For at least a week previous to the burn we experienced hot dry weather with highs in the low 90's and high 80's with extremely low day time humidity and south winds. Casual observations reveal that post-fire response by vegetation has generally been positive, and further research is planned.

Effective Control of Tamarisk in a Highly Sensitive Environmental Area; Results of 4 Years of Management

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Tamarisk was discovered on a tract of land set aside for the protection of water quality and quantity (City of Austin Water Quality Protection Lands) in March 2003. This was the first confirmed tamarisk infestation in Hays County, Texas. The location is a former rock quarry near Buda, Texas. At some point in the past, the quarrying operation intersected a portion of the Barton Springs segment of the Edwards Aquifer, leaving the aquifer exposed at the surface. This combination of such a highly sensitive environmental feature, a notoriously invasive species such as tamarisk and the nature of being the first known infestation in the county required an approach that would maximize the effectiveness of treatment while minimizing the risk to the exposed aquifer. To further complicate matters, the tamarisk had become established over 30 ft off the ground on the steep quarry walls, as well as in direct contact with the exposed aquifer. Treatment approach and results of 4 years of management will be discussed.

Estero Llano Grande State Park: From farmland to wetlands

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In 2001 Texas Parks and Wildlife Department (TPWD) purchased 46 acres of farmland on the outskirts of the city of Weslaco (in the Lower Rio Grande Valley) from a private landowner. This land became part of a 200-acre state park designed to showcase recreational activities such as birding, butterflying and wildlife watching. Because of the need to attract wildlife, habitat restoration and conservation were of utmost importance and this project restored former onion and cotton fields to thriving wetlands. Four ponds were built and one former wetland area was restored. After five years, over $220,000, and the combined efforts of TPWD, Ducks Unlimited, The World Birding Center, and The City of Weslaco; Estero Llano Grande State Park opened in June of 2006. Two months after opening the new wetlands attracted a bird rarely documented in Texas, the Northern Jacana. The Jacana attracted birders from all over the United States, Canada, Europe, and Mexico, establishing the park's place as a must visit birding destination in the Rio Grande Valley.

Lewisville Lake Environmental Learning Area: Preservation, Restoration, Education and Research; a non-profit consortium's role in environmental science

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Lewisville Lake Environmental Learning Area (LLELA) consists of approximately 2000 acres of U.S. Army Corps of Engineers property leased to and managed by a non-profit consortium (LLELA) on the north side of the Dallas metroplex. Consortium members currently include University of North Texas, Texas A&M University, University of Texas at Arlington, City of Lewisville, Lewisville Independent School District and the U.S. Army Corps of Engineers. The consortium's management goals are to preserve and protect native biodiversity and to restore degraded ecosystems, communities, and native biodiversity while providing compatible educational and scientific use of LLELA lands. A portion of the property is open to the public for camping, hiking, and kayaking as well as visiting an authentic restored 1850's Denton County homestead. Programming is being developed and implemented that invites the community at large to participate in the development, restoration, and research projects being conducted.

Developing Volunteer Leadership: Increasing Land Management and Beneficial Public Access in Austin, Texas

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In 1998, voters in the city of Austin passed a bond that led to the purchase of the Water Quality Protection Lands (WQPL). These properties were purchased to help protect the contributing and recharge zones for the Barton Springs segment of the Edwards aquifer, which ultimately feed Barton Springs. One of the secondary goals is to also provide some level of public participation and access that does not negatively impact the water quality and quantity management goals for these lands. The WQPL engages volunteers to partially fulfill both of these goals. They contribute to the active management of these sensitive lands while also enjoying experiences that can only be found on wildlands. In 2007, the Hill Country Foundation, on behalf of the City of Austin, trained citizens to be volunteer land stewards who would then lead and organize volunteer work days and take on higher levels of responsibility. Although only 5 months old, the volunteer land steward program has already had a considerable impact by conducting numerous volunteer workdays and freeing up staff for other projects. It has presented the WQPL with an opportunity to expand land management activities and increased public participation in the management and appreciation of these properties held in the public trust.

Controlling Oak Wilt in Oak-Juniper Woodlands: Does It Work and Is It Necessary?

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Oak wilt is a fungal disease (caused by *Ceratocystis fagacearum*) that infects trees in the white and red oak groups. The disease is spread through root grafts and through insect transmission of sporangia (fungal mats), which form only on red oaks. Texas red oak (*Quercus buckleyi*), an important component of breeding habitat for the endangered golden-cheeked warbler (*Dendroica chrysoparia*), is highly susceptible to the disease and dies rapidly after infection. In three pairs of plots (all > 60 ha), we tested whether two years (2004 and 2005) of basal debarking, a recommended treatment for infected red oaks, would reduce fungal mat formation and slow disease spread. Control trees were 4.6 times as likely as treated trees to form fungal mats. Furthermore, basal debarking reduced the number of fungal mats on trees with at least one fungal mat (4.8±0.2 vs. 2.8±0.3; p=0.03). However, these reductions did not influence landscape-level infection rates. In 2005, infection rates increased in four of six plots (two control and two treatment). In 2006, preliminary data indicate that the number of infected trees decreased in two study areas (both control and treatment plots). We suspect that weather may control the appearance of symptoms: hot, dry summers stress the fungus, which is at the southern edge of its range in Texas. Furthermore, disease spread through root grafts, which is not affected by our treatment, may be more prevalent than insect-mediated spread. Basal debarking alone is not an effective treatment for oak wilt in the Edwards Plateau. On Fort Hood, where deer herbivory is relatively low, Texas red oaks are regenerating successfully in woodlands infected with oak wilt, suggesting that treatment of oak wilt may not be necessary.

9 Years of Ecosystem Restoration on the City of Austin Water Quality Protection Lands

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The City of Austin protects 20,010 acres in the recharge and contributing zones of the Barton Springs segment of the Edwards Aquifer for the purpose of protecting both the quality and quantity of water recharging to this sensitive water source. About 12,471 acres are protected and managed through conservation easements held with private landowners and the remaining 7,539 acres are protected and managed through fee simple ownership by the City of Austin. Since 1998, the program has sought to improve ecosystem function by restoring invaded prairie and transitioning woodland back to native savanna and by enhancing and restoring riparian systems. Background will be provided on the Water Quality Protection Lands (WQPL) program, as well as a review of some examples of savanna and riparian restoration projects, lessons learned from various restoration methods, and preliminary estimates of the effects of restoration on the hydrologic cycle. Discussion will also summarize a method currently being used to monitor landscape change on the WQPL using GIS analysis of satellite imagery. This analysis technique allows the calculation, for example, of the change in acreage of prairie, savanna, transitioning woodland, and woodland between years when aerial photos are available.

Urban Prairies, Going, Going…

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The significance of urban prairies has been debated as to their ecological value and level of function in relation to their size. This presentation argues the importance of preserving these relatively small parcels that exist within a 15 minute drive from several million Texans. The authors report on their strategy to raise awareness and to work with landowners and municipalities in salvaging what can not be preserved *in situ*.

Environmental Restoration, Conservation, Education and Civic Engagement: Liberty Nature Trail, Lubbock

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Oscar Reyes, Administrator, Juvenile Justice Alternative Education Program, Lubbock Independent School District

For two groups of very different students in Lubbock, Texas, the opportunity to come together and participate in a service-learning project proved to be an excellent way to promote civic responsibility through environmental conservation.

In the fall of 2003, a school for juvenile delinquents known as JJAEP (Juvenile Justice Alternative Education Program) teamed with landscape architecture (LA students from Texas Tech University to design the Liberty Nature Trail on land at the edge of Yellow House Canyon in Lubbock, Texas. The LA students worked with the JJAEP students to develop a

layout, program, construction details, materials lists and cost estimates.

For JJAEP students it was a unique opportunity to learn from the LA students. It helped them develop a greater sense of civic responsibility and that notion that a natural setting is a community asset. As one sixteen year old who wrote:

"*I would be extremely mad if somebody messed up our trail on purpose. Now I know what it feels like, so I'll be more careful about not messing up other people's stuff."*

For the LA students, it was an opportunity to work outside of the traditional classroom on a real project with real clients. It helped them make a stronger connection between their profession, their community, and the natural environment. One student wrote:

> *"The ability to see what a client wants and what a client thinks they want. Sometimes this is very different. JJAEP was a great example because the kids just wanted to have typical activities until they were introduced to what a nature walk consists of and this triggered areas in their lives that had never been touched."*

The Liberty Nature Trail project shows that environmental conservation can be used to promote civic responsibility in at least two very diverse groups of students.

Restoration of a Hill Country Ranch

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In 2001 we purchased an 830 acre ranch in Mason, Texas. It wasn't until later that we realized that many types of oaks and other trees were buried in the ash juniper thicket and that the area was originally named for being covered with grasslands made up of a lot of Blue Stem. Our goals for restoring the site became increasing species diversity and water into the aquifer.

Having had bad experiences with government agencies elsewhere, we were leery of interacting with Texas authorities. Initially we asked locals for advice on how to achieve our goals. They gave us lots of advice, most of which turned out to be wrong. We also sought advice from consultants, state agencies, and federal agencies, and have been impressed with their knowledge, helpfulness and attitudes. We learned that the ranch had been badly overgrazed in the 50's, and how bad the cedar is for the native ecosystem.

Our first 5 year goal was to mechanically cut the ash juniper and begin a Prescription Burn program for all 830 acres, while avoiding erosion. The 5th year ends this August and we have less than 75 acres to go! The change and recovery of the land is amazing and rewarding. The seed inventory of grasses and forbs that lay dormant under the cedar has come to life. Springs and running water are everywhere, in spite of a two year drought. Riparian plants are exploding in once dry ravines and birds, mammals, insects, and reptiles are everywhere. We are controlling fire ants and feral hogs and reducing the deer population by harvesting older does and inferior bucks. It has cost about $350/acre for this program but the improvement in ranch value has made it an excellent investment.

Impacts of Management Methods and Invasive Plants on Biodiversity, Ecosystem Function, and Successional Trajectories in a Texas Freshwater Marsh Restoration after One Year

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Habitat loss and invasive species are the two greatest threats to global biodiversity and ecosystem services facing the world today. Unfortunately, these two phenomena are largely connected and one often facilitates the other. Ecological restoration is an essential tool in combating habitat loss but it can

be difficult, expensive, and prone to invasion. To improve current restoration and invasive management practices we must better understand not only the mechanisms driving community assembly and plant invasions in restored ecosystems, but also how these processes are related and are impacted by particular management regimes. In April 2006, restoration of a former seasonally flooded freshwater wetland was undertaken in Peach Point WMA, TX. The site had been overrun by a dense monoculture of highly invasive Chinese Tallow trees and native vegetation was virtually absent. Tallow trees were removed by mulching them to the ground with a low-pressure rubber tracked "skidsteer" mounted with a mulching head, which prevented any soil disturbance. The resulting 5-10 cm layer of mulch was left on the ground due to a demonstrated capacity for mulch of this depth to significantly reduce tallow germination by dampening soil temperature fluctuations needed to cue germination without inhibiting growth of native species. In May 2006, a full-factorial field experiment was initiated using 4m x 4m plots with treatments for initial seed input, cattle grazing, mowing, and point invasive removal with target herbicide in order to test the impacts of initial conditions and management regime on biodiversity, ecosystem function, invasive prevalence, and successional trajectory. Regrowth from Tallow stumps was sprayed with Garlon 4 herbicide in June 2006. Preliminary results after one growing are discussed. Long-term results will improve our understanding of restoration and invasion biology, and may lead to more effective and efficient management methods based on modern ecological theory.

Assessing Relative Soil Depth Using Non-Invasive Electromagnetic Induction

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Grassland restoration of the Edwards Plateau is restricted due to rocky, shallow and heterogeneous soils that overlay limestone bedrock. A rapid, non-intrusive method of soil depth measurement is needed to assess prospective sites for restoration. Soil electrical conductivity is a function of salinity, clay content, and water-filled pore space. Research plots for this experiment have minimal variation in salinity and clay content, and bedrock has negligible pore space and is non-conductive. Therefore, electrical conduction should reflect the volume of soil present within a given area. Electromagnetic induction has proven an effective means of determining depth to clay pans. We propose that soil bulk electrical conductivity is strongly correlated with depth to bedrock. The EM38-DD ground conductivity meter measures soil conductivity over an area of $1m^2$ to a depth of 1.5m, which represents the approximate zone of influence for plant roots. When connected to a GPS unit and a data logger, it collects continuous georeferenced data. An EM38-DD connected to a Trimble GPS unit and an Allegro data logger was used to measure soil bulk electrical conductivity along four transects in each of twelve one-acre plots within a 300 acre ranch in Coryell County, Texas. Field measurements showed that conductance is heterogeneous within and among all research plots. To provide a more direct measure of soil depth and variability an incremental metal probe was used. Locations for soil depth measurements for comparison to EM38-DD readings were selected by stratified random design. Nine strata

determined from the EM38-DD measurements that represented categories from low to high soil conductivity were established. Five measurement locations were chosen from each stratum and at each location four soil depths were taken. The depth data will be correlated to the bulk electrical conductivity at the same location to determine the relationship between soil depth and electrical conductivity.

Evaluating Tree Seedling Survival and Growth in a Bottomland Old-Field Site: Implications for Ecological Restoration

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In order to assess the enhancement of seedling survival and growth during drought conditions, five-hundred bare-root seedlings each of Shumard oak (*Quercus shumardii* Buckl.) and green ash (*Fraxinus pennsylvanica* Marsh.) were planted each with four soil amendments at the Lewisville Lake Environmental Learning Area (LLELA). LLELA is an 1800-acre Wildlife Management Area owned by the U.S. Army Corps of Engineers in Lewisville, Texas. The treatments were a mycorrhizal inoculant, a polyethylene mulch fabric, and two super absorbent gels (TerraSorb® and DRiWATER®). Survival and growth measurements were assessed periodically for two years. Research was conducted on vegetation, soil, and site history for baseline data. Both super absorbent gels gave significant results for Shumard oak survival, and one increased green ash diameter. For overall growth, significant results were found among DRiWATER®, mycorrhizae, and mulch treatments. If a particular amendment yielded successful results in the tree survival study, then it may have value for the old-field restoration project at LLELA as well as other revegetation and restoration projects in drought-prone areas.

Home Range, Life History, and Activity Patterns of Texas Horned Lizards (*Phrynosoma cornutum)* in the High Plains Region of Texas

Juan C. Diaz, Jacob Goldfarb, Sandra Rideout-Hanzak, and Gad Perry
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The Texas horned lizard is suffering ongoing declines throughout much of Texas. The main causes are anthropogenic pressures, including habitat loss, use of pesticides, and the arrival of the red imported fire ant. Data on many aspects of the biology of the lizard are limited, only a few locations within the broad distribution have been studied in any detail, and causes of local declines or survival are often unclear. In 2005 and 2006 we studied home range (HR), life history, and activity patterns of this species in the high plains region of Texas. The study was conducted in Garza County, in the Texas Panhandle, on a private ranch engaged in ongoing habitat restoration efforts. As previously reported, female Texas horned lizards (mean SVL = 90 mm) are bigger than males (SVL = 73 mm). Adult females also grow faster. Radiotracking shows that the average HR at this location is 17,600m^2, and male and female HRs were not statistically different. Habitats used tend to be relatively open, but lizards are also found in un-restored areas showing heavy woody encroachment. In areas with dense vegetation, lizards often use open microhabitats such as cattle trails and roads. Both sexes are most likely to be active at ambient temperatures between 29 - 36 °C, making for a surprisingly short activity season, and are more active during the morning and afternoon, especially during the heat of the summer. As in other populations, natural mortality is high. Also of concern is the frequent use of roads, exposing lizards to increased risk.