



Field Notes

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Current Research: Using Fire to Overcome the Resilience of Undesirable Shrublands

By Dirac Twidwell, Ph.D Candidate

I am a PhD student in the Department of Ecosystem Science and Management (ESSM) at Texas A&M University. My current research focuses on the behavior and effects of prescribed extreme fire in restoration activities and how it relates to resilience theory.

Texas landowners are confronted with difficult decisions regarding the management of their properties, particularly the challenge of maximizing production of livestock forage in grassland ecosystems severely degraded by woody plant encroachment. Although prescribed fire is well-regarded as an effective management tool for maintaining productive grassland and savanna ecosystems, its use is only marginally effective at restoring grassland after conversion to shrubland or woodland. However, recent research has shown that prescribed extreme fire may have the potential to overcome the resilience of woodland to allow restoration to a grassland complex. Although such a transition may not produce a system identical to the original grassland, the aim is to promote a grassland similar enough in structure and function to provide many of the ecological services that were lost following transition to a woodland.

A key part of my research aspires to link prescribed extreme



fire and restoration to leading ecological theories such as resilience. Resilience is the amount of disturbance an ecological state, or ecosystem, can withstand and continue to persist. To restore a desired ecological system, such as a grassland, the resilience of the undesirable woodland ecosystem must be overcome. However, returning a degraded state to its previous state, referred to as collapsing the degraded state, is often difficult. Sufficient changes in biotic and abiotic factors from the previous state can reinforce the resilience of a degraded state, making it resistant to restoration efforts. For restoration to occur, the mechanisms that maintain the degraded state must be overcome in order to promote a new set of stabilizing feedbacks that allow the restored state to persist. Yet

in most restoration efforts, the driving feedbacks are reintroduced in a manner consistent with how they stabilized the previous, more productive state and are typically incapable of collapsing the current, degraded state.

The loss of grassland to woodland is often cited as an example of an undesirable state transition that is difficult to restore. Even non-resprouting, fire-sensitive woody plants, such as Ashe juniper (*Juniperus ashei*) and Eastern red cedar (*Juniperus virginiana*) form ecosystems that are cited as potentially irreversible to the processes (e.g., fire) that maintained the previous phase. Our recent research shows the resilience of a non-resprouting juniper-dominated state can be

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Dirac Twidwell

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overcome, but there continues to be little to no evidence that supports the use of fire, even extreme fire, as a restoration tool that can overcome the resilience of resprouting woodlands or shrublands. Our current research at the Welder Wildlife Refuge and elsewhere will provide such information.

This research has led to the development of a simple, yet novel, quantitative framework that enables ecologically derived estimates of resilience to be coupled with forecasting

models and social dynamics. Such an approach represents a point of departure from the majority of works in science and management that use resilience as a more general “buzz word,” leading to multiple interpretations and applications. Natural resource managers, educators, and policy makers are particularly puzzled by the resilience concept. A quantitative resilience framework should lead to more consistent application of resilience and increase a manager’s ability to manage and restore desirable environmental services.

My future work will utilize our understanding of resilience, spatial ecology, and interactions among fire and other disturbances to determine if a universal restoration strategy can be developed for plant communities with various invasive problems.

I am involved in a number of other research projects and recently initiated the Undergraduate Research Program in ESSM. Check-out my webpage (<http://essm.tamu.edu/people/wer/dirac.htm>) for more information, including a list of publications and presentations.

A New Foundation – The Rob and Bessie Welder Wildlife Conservation Foundation

In 2009 the Rob & Bessie Welder Wildlife Foundation Trustees formed a new, non-profit foundation - The Rob & Bessie Welder Wildlife Conservation Foundation (WWCF), a 501(c)3 charitable foundation. You might ask why a new non-profit, and how are the two different? The original Rob & Bessie Welder Wildlife Foundation was founded in 1954 as a 501(c)3 *operating* foundation. Since that time we have funded research and operated the Foundation and Refuge on a

daily basis through this original foundation. Rarely have we sought outside funding for education or research projects and never for operations. However, since 2008 we have been seeking funding to build a significant new educational facility to be located on the Welder Wildlife Refuge that will allow us to expand our conservation activities in the years ahead. Development of the new non-profit organization will ensure charitable donations made to this building project or for other

research or educational projects will be used only for those purposes. This is in keeping with recent changes in federal laws regarding non-profits.

WWCF accepts and appreciates charitable donations. Your cash gift enables the Foundation to provide exceptional, hands-on conservation education to people of all ages. Gifts of stock and securities are welcome. Your donation may be made in honor of, or in memory of, someone special. We are

pleased to inform that person or family, as you direct.

Please mail your contribution to the Rob & Bessie Welder Wildlife Conservation Foundation, P.O. Box 1400, Sinton, Texas 78387. For additional information, including information about donating stocks and securities, contact Dr. Terry Blankenship, or Dr. Selma Glasscock: tblankenship@welderwildlife.org sglasscock@welderwildlife.org or call 361-364-2643. **Thank you!**



Proposed new Educational Facility at the Welder Wildlife Foundation

Help us find a Welder Fellow:

- ◆ Larry Eugene Brown
- ◆ Susan Davis
- ◆ Ted Bachman Doerr
- ◆ Darrell Lee Ellsworth
- ◆ Stephen G.H. Kohlman

Contact Liz Burke at 361-364-2643 or lburke@welderwildlife.org

Spotlight on a Welder Fellow

By Dr. William A. Low

I graduated with my B.Sc.(Hons) in Wildlife, Zoology and Botany (1962) and PhD in Ecology and Wildlife Management (1970) from the University of British Columbia (UBC). My PhD thesis was on reproductive ecology of collared peccaries. Canadian NRC scholarships provided living, travel, and research costs and a Welder Fellowship provided living accommodation on the Welder Wildlife Refuge (WWR) from 1963-1967, where I did field work on javelinas. I spent another 3 years doing lab work and reproductive studies on penned javelina at UBC. In 1969 I completed the first draft of my thesis before moving to Australia.

My time at WWR allowed me to gain experience in a broader area of ecology and understanding of the workings of nature. The Refuge is near the northern edge of javelina distribution and the stresses of drought and cold provided insight into javelina ecology. Coming from the north end of the continent where I had done all my training in cold, white winters and hot, dry summers, the hot, humid summers and mild, drier winters at WWR offered a

sharp contrast. Even the name 'javelina' opened up a new world of different cultures and ways of thinking!

In my time at WWR, Dr. Clarence Cottam, Caleb Glazener, Thad Box, Dr. Ian McTaggart Cowan (my UBC professor), Jim Teer, and Val Lehman from the King Ranch provided outstanding mentoring, stimulation, and examples of tremendous dedication to their goals, biology, students, and life. Living on WWR allowed me to associate with a mob of really great field people with a raft of new ideas. Bob Watts, Jeff Powell, Marshall White, Dean Chamrad, Lynn Drawe, Eric Bolen, Bobbi Stiers Low, Bill Samson, and Koos Bothma were all residents while I was at WWR; some with whom I have maintained or regained contact.

In 1969, I headed straight to central Australia to a research position at CSIRO Rangelands Research Unit leading a program on the reproductive ecology and behaviour of presumed-to-be wild cattle on the 13,500-sq-km pastoral properties of central Australia, making the King Ranch look small! We studied the ecology of free-

ranging cattle and kangaroos as part of investigating ecosystem dynamics in arid rangelands.

Following completion of the project and 11 years research with some great mentors, including Ray Perry, Thad Box, Bill Prior, and Alan Newsome; and after a major series of papers—and finding that writing scientific papers was not my forte—I left CSIRO in 1980 to undertake a project on feral rabbits in the Northern Territory; the beginning of my own ecological consulting business. This undertaking allowed me to put into practice many things I had learned about land and animal management and forced me to learn about business management.

During a successful 30 years of business we have worked in iconic places such as Uluru (Ayers Rock) National Park. We employ 8 people and do everything from flora and fauna research, mine-site impact assessment, eco-tourism, advisory service for conservation on private lands, and a growing amount of industrial ecology. My most interesting research findings have focused on the variability of response of flora and fauna to their environment. My 40 years of observation,



Dr. Bill Low at home in Australia

measurement, and examination of historic records indicates that differences in rainfall, temperature, wild fire, and grazing patterns rarely produce the same response from year to year; fluctuations are the norm. Current research interests are in minimizing impact of mining, development, and people on the environment.

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From the WWF Scrapbooks

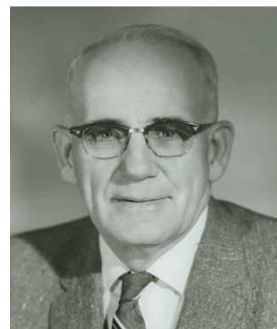
Dr. Clarence Cottam, first director of the Welder Wildlife Refuge from 1955 until 1973, was known for speaking his mind.

In September 1956, according to a *Corpus Christi Caller* article: "Dr. Cottam informed Secretary of Agriculture Ezra Benson that [The Department of Agriculture] is providing money for farmers to drain ponds on one hand and then paying subsidies to keep land out of cultivation. He de-

scribed the conflicting programs as the height of stupidity. Dr. Cottam pointed out ponds are most important as nesting places for ducks and as ponds disappear, duck nesting habitat is fast going out of the picture."

A Houston Chronicle article on October 1958: quoted Cottam: "...It's like scalping to cure dandruff. I told the Secretary of Agriculture that none of his top entomologists would agree with

methods now used. The hydrocarbon and phosphate poisons are actually killing more wildlife and doing more harm than fire ants."



Dr. Clarence Cottam

*"It's like scalping
to cure dandruff"*

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Wildlife Research and Education

From the Foundation

A year of trial for wildlife and habitats on the Welder Wildlife Refuge

We had been in a persistent drought since 2007, and did not see mentionable rain until September of this year. All of our wetland lakes were completely dry and we suffered numerous wildlife losses. The rains did come, albeit slowly at first. However, on November 20-21 we had 6-7 inches of rain that turned our dry lake beds into wetlands once again! On November 22 we saw four gadwalls on Big Lake - proof that life will return to our lakes in the form of thousands of birds, frogs, and other wildlife. And proof again that everything in nature is cyclic.

Welder photographers win Coastal Bend photo contest

More good news—our friends

Bill and Sharon Draker took first place in the 2009 Coastal Bend Photo Contest! Bill and Sharon photographed on the Welder Wildlife Refuge during the last two photo contests and have placed in the top 3rd each time. Bill also photographed here in two previous contests. The javelina photo on this page is one of their winning entries. Look for more of their photos in upcoming newsletters, reports, and on our new website which should be up by early 2010.

We are thankful to each and every one of you who have given to the Welder Wildlife Foundation either of your time

or donations. Our wishes to you for a blessed holiday season. *Merry Christmas and Happy New Year!*

Terry Blankenship, Director
Selma Glasscock, Assistant Director

 Welder Wildlife Foundation

