

APPENDIX 1

CONSERVATION EASEMENT

STATE OF TEXAS

COUNTY OF KENDALL

This Grant of Conservation Easement ("Easement") is made on this day of December 7, 2012, by David and Patricia Davidson, with an address of 117 Elm Spring Lane, San Antonio, Texas 78231-1412 ("Grantor"), and Cibolo Conservancy Land Trust, a non-profit corporation organized and existing under the laws of the State of Texas, with an address of 25 Spring Creek Road, Boerne, Kendall County, Texas 78006 ("Grantee").

RECITALS:

A. Grantor is the sole owner in fee simple of certain real property legally described in Exhibit A, attached hereto and incorporated by this reference, which consists of approximately 138 acres located in Kendall County, State of Texas, hereinafter referred to as the "Property"; which has significant ecological value in its present state as natural habitat.

B. Grantee is a "qualified organization" as that term is defined in Treas. Reg. § 1.170A14(c)(1).

C. The Property is a significant natural area that qualifies as a "...relatively natural habitat of fish, wildlife, or plants, or similar ecosystem," as that phrase is used in P.L. 96-541, 26 USC 170(h)(4)(A)(ii), as amended, and meets the requirements of Treasury Regulation § 1.170A14(d)(3). Specifically, the Property contains high-quality examples of biodiverse habitats: riparian, native grassland (savanna), and forested areas, which support native wildlife typical of the Edwards Plateau region of Texas. Other indicators of the high quality biodiversity of the Property are the largest population known of Hill Country Wild Mercury (*Argythamnia aphoroides*), at least 175 tree, vascular plant, and grass species, and eighty species of butterflies, all identified within boundaries of the Property. Extensive study of the biotics of the Property soils indicate a high level of species diversity. The existence of these habitats and species of plants, animals, and soil biota are detailed in the **Baseline Report, Exhibit B**, and are hereinafter referred to as the "Conservation Values" of the Property).

D. The characteristics of the Property, and the current uses and state of the structures, roads, and other man-made alterations, are described, and the baseline biological assessment, as of the date of the easement establishment, are found in **Exhibit A**. This complete and accurate description of the state of the property will be used by Grantor and Grantee to assure that any future changes in the use of the Property will be consistent with the terms of this Easement. However, the data and descriptions in Exhibit A are not intended to preclude the use of other evidence to establish the present condition of the Property if there is a controversy over its use.

E. Grantor and Grantee have the common purpose of conserving, preserving and enhancing the above-described Conservation Values of the Property in perpetuity, and the State of Texas has authorized the creation of Conservation Easements pursuant to The Texas Natural Resource Code Chapter 183 and Grantor and Grantee wish to avail themselves of the provisions of that law.

NOW, THEREFORE, Grantor (landowner), for and in consideration of the facts recited above and of the mutual covenants, terms, conditions and restrictions contained herein and as an absolute and unconditional gift, hereby gives, grants, and conveys unto Grantee (Cibolo Conservancy Land Trust) a Conservation Easement in perpetuity over the Property, of the nature and character as follows:

1. **PURPOSE.** The purpose of this Easement is to ensure that the Property will be retained forever predominantly in a natural condition, which means that the Conservation Values of the Property and the Wildlife Exemption are maintained and enhanced, to wit: the native plants, animals, and plant communities on the Property. Any use of the Property that will impair or interfere with the Conservation Values of the Property described herein or the Wildlife Exemption will be prohibited, while allowing for conservation, and noncommercial uses of the Property, such as game and wildlife management, hiking, hunting, nature observation and nature study and research, provided that said activities are conducted in a manner that is compatible with, and not destructive of, the Conservation Values of the Property.

Grantor will not perform, nor knowingly allow others to perform, any act on or affecting the Property that is inconsistent with the purposes of this Easement. However, unless otherwise specified below, nothing in this Easement shall require Grantor to take any action to restore the condition of the Property after any event over which Grantor had no control (e.g., wildfires, wind, hail, and ice storms). Grantor understands that nothing in this Easement relieves them of any obligation or restriction on uses of the Property imposed by law.

2. **PROPERTY USES.** Any activity on or use of the Property inconsistent with the purposes of this Easement is prohibited. Without limiting the generality of the foregoing, the following is a listing of activities and uses which are expressly prohibited or which are expressly allowed. Grantor and Grantee have determined that any allowed activities shall be performed in a manner that does not impair the biodiversity and Conservation Values of the Property. Additional retained rights of Grantor are set forth in Paragraph 3 below.

2.1 Subdivision. The Property may not be further divided, subdivided or partitioned.

2.2 Commercial Development. Any commercial or industrial use of, or activity on, the Property is prohibited.

2.3 Construction of residential structures and outbuildings. Grantor shall have the right to construct up to 1 new, or additional, residence and associated outbuildings. A new residence shall be located within a building envelope of 2 acres or less. The total footprint within this envelope, including primary residence, guesthouses, outbuildings, greenhouses, landscaped areas, swimming pools, and any other associated construction, shall not exceed 10,000 square feet, nor be taller than 40 feet. Location and site plan shall be agreed to by Easement Grantee.

The location of the existing large house provides one of the best building sites on this property because of elevation, view, orientation to prevailing winds, and proximity to the well, and the grantor is encouraged to reuse all or part of the existing structure in the process of constructing a new residence. Subsurface water drainage patterns have adversely affected the present structure, caused mainly by the existence of the broad, impervious front porch, which holds in groundwater. This has limited the renovation potential of the current structure. Part of the structure may have historic value, as suggested by "1907" inscribed on an interior door lintel. Efforts to validate and link this date to the structure were not successful.

One paved or unpaved access road not to exceed 20 feet in width plus associated culverts and drainage features may be built for the purpose of accessing a residence and associated outbuildings. Access roads are not included in the building envelope area allotment. Siting of Homesite Area must avoid riparian areas and other area of high biodiversity, as identified in the Baseline Environmental Report, Exhibit B, and destruction of trees should be a consideration. The location and boundaries of the building envelope shall be subject to the approval of the Grantee. Grantee's approval or denial shall be secured within 120 days of receipt of the request for permission to construct living quarters and outbuildings.

There shall be no further construction on the Property except as permitted above, or otherwise expressly permitted in other provisions of the Easement. Perimeter fencing and cross-fencing may be built and maintained. Areas fenced for the exclusion of herbivores (exclosures) are encouraged to prevent loss of both diversity of plants and their succession. Grantor shall notify Grantee prior to beginning construction on any structure, fence, or road permitted under this Easement. Artificial nesting or roosting structures designed for native species such as bats and birds (e.g. Chimney Swifts) are expressly permitted.

2.4 Existing Improvements. Grantor shall have the right to maintain, remodel, remove, and repair existing buildings, structures, fences, wells, dams, ponds, reservoirs, utilities, soft-surface roads, and other improvements, and in the event of their destruction, to reconstruct or replace said improvements with another of similar function, capacity, location and material, consistent with section 2.3 limitations on size and location.

2.5 Mineral Extraction. The extraction, mining, or removal of soil, sand, gravel, rock, stone, peat, sod, or other minerals on the surface by any mining method is prohibited, except for purposes of maintaining existing roads and facilities on the Property, when it is allowed to the extent permitted, if at all, by Internal Revenue Code § 170(h)(5)(B) and applicable Treasury Regulations and judicial decisions. Extraction of subsurface minerals may be accomplished only by extraction methods that are limited in time and will have a limited and localized impact on, and not significantly impair or interfere with, the Conservation Values of the Property and the purposes of this easement. The extractor shall use best efforts and practices to prevent damage or impairment of natural values and to repair any damages caused by the extraction.

2.6 Excavation. Except as necessary to accommodate the activities expressly permitted under this Easement, there shall be no, excavating, dredging, removal of topsoil, sand, gravel, rock, minerals or other materials, mining, drilling or removal of minerals. Soil, rock and stone may be moved to protect houses and associated buildings and enhance their potential for water and energy conservation, and for construction of wetlands and structures to be used for water and wildlife and native plants, if agreed to by Grantee.

2.7 Recreational and Research Uses. Grantor shall have the right to engage in and permit others to engage in recreational uses of the Property that require no surface alteration or destructive activities on the land. Hunting of herbivores (White-tailed deer, other species of deer, and other invasive species, and feral hogs) is allowed and encouraged. Research related to the enhancement of biodiversity and animal behavior is expressly allowed.

2.8 Destruction of Plants and Disturbance of Natural Habitat. Grantor has the right to cut and remove diseased, invasive, and non-native trees, shrubs, or plants, and to establish firebreaks. Grantor is encouraged to remove some Ashe juniper (cedar) trees, especially secondary (recent) growth and especially other invasive plants (e.g., Chinaberry, Johnson grass, KR and other Old World bluestems, and other species found on the Texas Invasives list) for purposes of habitat and natural range management and to maintain allowed structures and roads such as residences, outbuildings, and fences. Grantor shall also have the right to cut and remove trees, shrubs, or plants to accommodate uses expressly permitted in this Easement. There shall be no additional removal, harvesting, destruction or cutting of native trees, shrubs, or plants except to accommodate activities expressly permitted under this Easement, and there shall be no use of plowing or other disturbance that would significantly lessen biological diversity, which also includes soil biodiversity. Soil disturbance may be used in the restoration of native species and for erosion control. Prescribed burning is allowed, and encouraged, when used to enhance biodiversity. Mowing may also be used for the same purpose. There shall be no further planting of invasive, or potentially invasive, non-native plant species anywhere on the Property, including within the Homesite Areas. Grantor must consult a list of potentially invasive species as provided by the University of Texas Wildflower Center, Austin, Texas, or from an approved list provided by the grantee.

2.9 Agricultural Use. Management of herbivory is key to the maintenance of biodiversity. Limiting herbivory to carrying capacity requires that the numbers of domesticated herbivores (e.g., cows, horses, goats, sheep, etc.) and the numbers of native and exotic deer and other exotic and invasive herbivores be considered in sum, together with climatic conditions and the abundance of native plant species being consumed by all the herbivores. Carrying capacity may be determined with assistance from NRCS (Natural Resources Conservation Service, U.S. Government) and other specialists, leading to determinations of carrying capacity such as shown in **Exhibit C** (Management Plan). The use of exclosures is encouraged as a best practices method for comparative plant assemblage and forage assessment levels that are available for herbivory.

IN CONNECTION WITH THE ABOVE, Herbivory (grazing) by domesticated livestock may be conducted on the Property provided that said grazing is part of a comprehensive management plan designed to maintain or improve biodiversity, which includes maintaining the Wildlife Exemption, and does not adversely affect biodiversity through damage of native plants, animals, and habitats. Said grazing shall be appropriate to current climatic and range conditions, and shall NOT be conducted in riparian areas or other areas of high-quality native vegetation as partially identified in the Baseline Assessment, Exhibit B. Livestock MAY NOT reside year-round on the Property and shall not exceed sustainable levels of herbivory during their limited time on the property. Grantor may not establish or maintain any commercial or concentrated animal feeding facility or area on the Property. No plants modified by genetic engineering technology can be grown in any agricultural effort.

The area designated as the "Hay field, approximately 12 acres on the east side of the creek, may continue to be used in its historic context for the growth and harvesting of grasses to be used off the property as cattle feed. This use if this field may be terminated if the area, or parts of it, are restored to native habitat consistent with the community of plants and grasses found elsewhere on the property. The area used for the growth and harvesting of grasses may not be expanded in size and may not be converted to the growth of plants to be used as "biofuels" or feed stock for conversion to commercial chemicals. Pesticides may not be used on the Hay Field. The use of herbicides is allowed, but in only very limited conditions and should be applied only after discussion with the Cibolo Conservancy (Grantee).

2.10 Hydrology. Except as necessary to accommodate allowed activities, there shall be no alteration, depletion or extraction of surface or subsurface water on the Property. Grantor shall not sell or otherwise transfer surface or subsurface water rights associated with the Property. The three tanks in their current locations may be maintained, altered to better serve the Conservation Values, or demolished; any proposed new tank size and location should be jointly approved by Grantor and Grantee prior to the start of construction.

2.11 Signage. No signs or billboards or other commercial advertising displays are allowed on the Property. Signage for internal use, such as designations of points of interest, areas, or species, is permitted. Signage such as "Posted" "No Trespassing" and "For Sale" are also permitted.

2.12 Biocides. There shall be no use of pesticides or biocides on the Property, except as approved by Grantor and Grantee, to control non-native problem animals or invasive species detrimental to the biodiversity and Conservation Values of the Property.

2.13 Dumping. There shall be no storage or dumping of trash, garbage, or other unsightly or offensive material, hazardous substance, or toxic waste, nor any placement of underground storage tanks in, on, or under the Property, except for the storage of locally collected rainwater or heat as used in energy conservation, nor significant movement of soil or other substance or material such as land fill.

2.14 Pollution. There shall be no pollution by Grantor of surface water, natural watercourses, lakes, ponds, wetlands, subsurface water or any other water bodies, nor shall activities be conducted by Grantor on the Property that would be detrimental to water purity.

2.15 Predator Control. Grantor shall have the right to control, destroy, or trap predatory or any problem animals, such as feral hogs and exotic deer, that pose a material threat to the maintenance of habitat and biodiversity, and residences. Expressly excluded from any control are native large and meso-carnivores and birds of prey that help to hold in balance species that would be overly abundant without predation. Some invasive species that are detrimental to native species (e.g. non-native Fireants, Raspberry ants, Formosa termites) are expressly defined as predators and should be controlled.

3. ADDITIONAL RIGHTS OF GRANTOR. Grantor has the following rights:

3.1 Existing Uses. The right to pursue any activity or use of the Property not prohibited by this Easement, so long as such activity is not inconsistent with the purposes of this Conservation Easement. Prior to making any significant change in use of the Property, Grantor shall discuss the contemplated changes and notify Grantee in writing as delivered by Certified mail at least 30 days prior to the beginning of the change, to allow Grantee a reasonable opportunity to determine whether such change would violate the terms of this Easement.

3.2 Transfer. The right to sell, give, mortgage, lease, or otherwise convey the Property, but such action must be accomplished within the terms of this Easement.

3.3 Restoration. Activities related to increasing the biodiversity of the Property may be undertaken. Examples of these activities include the replacement of non-native and invasive grasses and plants (e.g., KR and other Old World Bluestems, and Johnson Grass), and conversion of the Bermuda Grass in the Hay Field to native species. Native species that have a historic range that includes the Property, but may not have been found yet, may imported and established to increase biodiversity.

4. GRANTEE'S RIGHTS. To accomplish the purpose of this Easement, the following rights are granted to Grantee:

4.1 Right to Enforce. The right to preserve and protect the Conservation Values of the Property and enforce the terms of this Easement.

4.2 Right of Entry. The right of Grantee's staff, contractors and associated natural resource management professionals to enter the Property one or more times a year after reasonable notice to Grantor, for the purposes of inspecting the Property to determine if Grantor is complying with the covenants and purposes of this Easement including monitoring of plant and wildlife populations. Immediate inspection of the property by the Grantee is allowed if there is reason to believe that activities are planned or underway that violate the terms of the Conservation Easement.

5. RESPONSIBILITIES OF GRANTOR AND GRANTEE NOT AFFECTED. Other than as specified herein, this Easement is not intended to impose any legal or other responsibility on Grantor, or in any way to affect any existing obligation of Grantor as owners of the Property. Among other things, this shall apply to:

5.1 Taxes. Grantor shall be solely responsible for payment of all taxes and assessments levied against the Property.

5.2 Management. Upkeep and Maintenance. Grantor shall be solely responsible for the upkeep and maintenance of the Property, to the extent it may be required by law. Maintenance and management of the Property must use the Management Plan and the Wildlife Exemption as the basis for all activities. Grantee is obligated only to ensure that the upkeep or maintenance of the Property is performed as set out in this Conservation Easement and Management Plan. Management Plan is to

be developed each 4 years by the Grantor in conjunction with, and with the final approval of, the Grantee. Grantor shall provide written copies of the Management Plan and the annual Wildlife Exemption Report to Taxing Authorities to the Grantee.

6. **ACCESS.** No right of access by the general public to any portion of the Property is conveyed by this Conservation Easement. However, if used for educational purposes for a small group of persons that is related to conservation or research, limited access is expressly allowed.

7. **ENFORCEMENT.** Grantee shall have the right to prevent and correct violations of the terms of this Easement and Management Plan. Grantee or Grantee's representatives (e.g., a volunteer stewardship committee) may enter the Property for the purpose of inspecting for violations. If Grantee determines that a violation has occurred, is occurring, or is threatened, it may at its discretion, take appropriate legal action. Grantee shall give Grantor written notice as delivered by Certified Mail of the violation and sixty (60) days to correct it (or to begin good faith efforts to correct it, in the event the violation is something which cannot be reasonably corrected in sixty days), before filing any legal action, except when Grantee believes that an ongoing or imminent violation could substantially diminish or impair the Conservation Values of the Property. If a court with jurisdiction determines that a violation may exist or has occurred, Grantee may obtain an injunction to stop it, temporarily or permanently. A court may also issue an injunction requiring Grantor to restore the Property to its condition prior to the violation. The failure of Grantee to discover a violation or to take immediate legal action shall not bar it from doing so at a later time.

8. **TRANSFER OF EASEMENT.** The parties recognize and agree that the benefits of this easement are in gross and assignable. Subject to the approval of the Grantor, such approval will not be unreasonably withheld. Grantee shall have the right to transfer or assign this Easement to any private non-profit organization that, at the time of transfer, is a "qualified organization" under Section 170(h) of the U.S. Internal Revenue Code, and the organization expressly agrees to assume the responsibility imposed on Grantee by this Easement. If Grantee ever ceases to exist or no longer qualifies under Sec. 170(h), or applicable state law, a court with jurisdiction shall transfer this easement to another qualified organization having similar purposes that agrees to assume the responsibility. Any transfer shall comply with Treas. Reg. § 1.170A-14(c)(2).

9. **TRANSFER OF PROPERTY.** Any time the Property, or any interest therein, is transferred by Grantor to any third party, Grantor shall notify Grantee in writing, as delivered by Certified Mail, at least 30 days prior to the transfer of the Property, and the document of conveyance shall expressly refer to this Easement.

10. **AMENDMENT OF EASEMENT.** This Easement may be amended only with the written consent of Grantor and Grantee. Any such amendment shall be consistent with the intent and purposes of this Easement and shall comply with Sec. 170(h) of the Internal Revenue Code, or any regulations promulgated in accordance with that section. Any such amendment shall also be consistent with Texas Natural Resources Code § 183.001 et seq., or any regulations promulgated pursuant to that law. Grantor and Grantee have no right or power to agree to any amendment that would adversely affect the enforceability of this Easement.

11. **TERMINATION OF EASEMENT.** If it is determined that conditions on or surrounding the Property have changed so much that it is impossible to fulfill the conservation purposes set forth above, this Easement may be terminated only by a court with jurisdiction at the joint request of both Grantor and Grantee, and in a manner that complies with Treas. Reg. § 1.170A-14(c)(2). If condemnation of a part of the Property or of the entire Property by public authority renders it impossible to fulfill the conservation purposes, the Easement can be terminated as part of condemnation proceedings.

At the time of the conveyance of this Easement to Grantee, this Easement gives rise to a real property right, immediately vested in Grantee. If the easement is terminated and the Property is sold or taken for public use, then, as required by Treas. Reg. § 1.170A-14(g)(6), Grantee shall be entitled to a percentage of the gross sale proceeds or condemnation award (minus any amount attributable to new improvements made after the date of this conveyance, which amount shall be reserved to Grantor) equal to the ratio of the appraised value of this easement to the unrestricted fair market value of the Property, as these values are determined on the date of this Easement. Grantee shall use the proceeds consistently with the conservation purposes of this Easement.

12. INTERPRETATION. This Easement shall be interpreted under the laws of Texas, resolving any ambiguities and questions of the validity of specific provisions so as to give maximum effect to its conservation purposes.

13. INDEMNIFICATION. Each party hereby releases and agrees to hold harmless, indemnify, and defend the other and its representatives, successors and assigns (collectively, "Indemnified Parties") from and against all liabilities, claims, and losses arising from or connected with:

a) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter relating to or occurring on or about the Property, regardless of cause, unless due to the negligence of any of the Indemnified Parties;

b) the violation or alleged violation of any federal, state, or local law, including environmental laws, relating to the Property, by any person other than any of the Indemnified Parties;

c) the presence on, or release from the Property, at any time, of any substance defined as hazardous, toxic, polluting, or otherwise contaminating the air, water, or soil, or in any way harmful or threatening to human health or the environment, unless caused solely by any of the Indemnified Parties. Smoke from a prescribed burn on the property shall not be considered a pollutant. Exhaust from internal combustion engines, such as tractors, being used to maintain or enhance the Conservation Values of the Property or related to harvesting and bailing grasses from the area designated as the "Hay Field" shall not be considered a pollutant.

14. TITLE. Grantor covenants and represents that Grantor is the sole owner and is seized of the Property in fee simple and has good right to grant and convey this Easement; that the Property is free and clear of any and all encumbrances, including but not limited to, any mortgages not subordinated to this Easement, and that Grantee shall have the use of and enjoy all of the benefits derived from and arising out of this Easement.

15. NOTICES. Any notices required by this Easement shall be in writing and shall be personally delivered or sent by first class mail, to Grantor and Grantee, respectively, at the following addresses, unless a party has been notified by the other of a change of address.

To Grantor:

David & Patricia L. Davidson
117 Elm Spring Lane
San Antonio, TX 78231-1412

To Grantee:

Cibolo Conservancy Land Trust
25 Spring Creek Road
Boerne, Texas 78006

16. ENVIRONMENTAL CONDITION. Grantor warrants that they have no actual

knowledge of a release or threatened release of hazardous substances or wastes on the Property.

17. SEVERABILITY. If any provision of this Easement is found to be invalid, the remaining provisions shall not be altered thereby.

18. PARTIES. Every provision of this Easement that applies to Grantor or Grantee shall also apply to their respective heirs, executors, administrators, assigns, and all other successors as their interest may appear.

19. PERPETUAL DURATION. This Easement runs with the land and binds all successive owners of the Property.

20. RE-RECORDING. In order to ensure the perpetual enforceability of the Easement, Grantee is authorized to re-record this instrument or any other appropriate notice or instrument.

21. MERGER. The parties agree that the terms of this Easement shall survive any merger of the fee and easement interest in the Property.

22. SUBSEQUENT LIENS ON PROPERTY. No provisions of this Easement should be construed as impairing the ability of Grantor to use this Property as collateral for subsequent borrowing, provided that any mortgage or lien arising from such a borrowing would be subordinate to this Easement.

23. EXHIBITS. The following Exhibits are incorporated within this Easement:

Exhibit A - Description of Protected Property. The legal description is that prescribed in the deed of ownership registered in Kendall County Courthouse. Fieldnotes by the surveyor is included in this exhibit. From the Warranty Deed, Reservations and Exceptions Section, a statement regarding the ownership of mineral rights is given.

Exhibit B -Baseline Physical and Environmental Assessment. A detailed description of the physical and environmental attributes of this property is given in Tables, Maps, and Lists.

Exhibit C -Management Plan. Management of Ash Juniper, KR Bluestem invasive grass, invasive insects (e.g. fireants) and the population of exotic and native deer are addressed in this document. An estimate of the carrying capacity for herbivory that incorporates the impact of native and exotic deer and estimates the impact of the use of domesticated cows is also included in this management plan.

24. ACCEPTANCE & EFFECTIVE DATE. As attested by the signature of its authorized representative affixed hereto, Cibolo Conservancy (Grantee) hereby accepts without reservation the rights and responsibilities conveyed by this Easement. This Easement is to be effective on the date when executed by all parties.

MANAGEMENT PLAN - 2012

This 138 ac. has been managed since 1996 to increase biodiversity. Biodiversity results from healthy soils that produce a high diversity of healthy plants that support a high diversity of pollinating insects, birds, invertebrates, and mammals. Generally, there is a symbiosis between a high diversity of plant species and healthy soils. Thus, management of plants becomes the focus of most management efforts.

Surveys of all plant species by botanists has indicated a reasonable diversity of plants, approximately 180 species. Most of the plants and grasses are common, with some being endemic to the Texas Hill Country. In addition, one rare species, Hill Country Wild Mercury (*Argythamnia aphoroides*) has been found in great abundance (366 plants, 2011 census estimate).

Threats to current levels of plant diversity, as well as likely future increases in plant diversity, are invasive species and herbivory. Ashe Juniper (Cedar) is a native invasive species that has been managed since 1996 to prevent the development of areas of dense cedar growth. This management requirement is partially the result of reduced wildfire frequency, related to increased population density, but it may also be due to a warming climate and increased active nitrogen deposition from fossil fuel burning. Management of cedar presents an on-going challenge, requiring constant effort to counter its invasive behavior.

The foreign invasive grass, KR Bluestem (*Bothriochloa ischaemum*), widely prevalent in Texas, is also very abundant on this property. The estimate is 40 to 50% of all grassy areas. Native wildlife, including grassland bird, butterflies, and white tail deer do not use KR bluestem as they do native grasses, but the main problem is that KR Bluestem forms mats that decreases the number of forbs, the main food for White-tailed deer.

Domesticated livestock eat KR Bluestem as a last resort after native grass species have been consumed. Axis deer, an exotic species that is also invasive, compete with White-tailed deer for forbs, but their use of KR Bluestem is unknown.

Since 2000, grassland management has focussed on replacing KR bluestem with a mix of native grasses that are found in Hill Country areas not invaded by KR Bluestem. Research has shown that KR Bluestem is very difficult to kill and will re-invade areas where grasses have been killed, such as where piles of brush were burned, or a high level of soil disturbance has occurred. However, research has also shown that reseeding with a mix of native grasses, at a high density, in areas where KR Bluestem has been killed can result in restoration of native grasses that resist re-invasion by KR Bluestem. Our experience with a prescribed burn indicates that initially, KR Bluestem regrowth is suppressed, but not killed, and subsequent growth is similar to that before the burn.

Research on the biology of our soils began in 2008 is on-going. Analysis of results to date indicates that soils with organisms favorable to the support of native grasses adjust to the replanted native grasses reasonably quickly, depending on rainfall. Reseeding that results in a high density of grass plants is necessary to establish a root system that resists re-invasion by KR Bluestem and provides the necessary nutrients to soil biota that support native grasses. At this time, there are unanswered questions about the optimal mix of native grass species and

whether or not soil amendments are required as part of the restoration process. The essence of the process for converting KR Bluestem dominated areas to sustainable native grasslands is to accelerate the succession of the grass-soil symbiosis to that of a biodiverse prairie with high root density that can resist invasion by non-native species.

There are other invasive species that may require management, such as Johnson Grass (*Sorghum halepense*). Seeds and plants have been carried onto the property by flooding, and Johnson grass has established itself in pockets at various locations. Wildlife do not use Johnson grass as they would native grasses, and Johnson grass is capable of invading some areas where there is a high density of native grasses; thus, it must be managed. Currently, Johnson grass is being killed by selective application of herbicides early in the growing season.

Herbivory is the other big threat to maintaining biodiversity. Plants are eaten by insects, rodents, White-tailed deer, and exotic ungulates imported into Texas from other parts of the world. Insect populations are controlled principally by birds and small mammals. Rodent populations are controlled by hawks and mammals such as coyotes and foxes. There are no natural controls on the ungulate population except hunting. Plant destruction by feral hogs is not a problem, at this time.

Herbivory by Axis deer (from India) has been the principal threat from exotic ungulates. It has proven to be impossible to exclude them from this property by high fencing because they are capable of breaking holes in the fences using their large horns and they have been observed jumping over the fence. Axis (160 lbs. ave.) are much larger than White-tailed deer (100 lbs. ave.) and eat a greater diversity of grasses and forbs.

Control of White-tailed and Axis deer by hunting is essential to the promotion of biodiversity. Experience has shown that it is not just the number of animals killed that is important in controlling herbivory from these ungulates, the pressure of hunting alters their behavior, which decreases the level of herbivory. Hunting of White-tailed deer is controlled by state law, but Axis deer can be hunted at any time. However, Axis deer are more difficult to hunt than White-tailed deer, and seem to be best hunted at night.

Accounting for the magnitude of herbivory by native and exotic ungulates, as well as an inventory of native grass resources, is a necessary requirement before any plan is made for the introduction of domestic livestock. Development of a grazing plan using cows has been made by the Natural Resources Conservation Service (NRDC) of the US Dept. of Agriculture and is appended to this Management Plan. Attached is a more detailed analysis of herbivory that is based on the same approach used by NRDC, but includes herbivory by Axis and White-tailed deer.

Based on an estimate of the resource available, which is the abundance of native grasses, forbs, and brows, together with an estimate of the numbers of White-tailed and Axis deer, it is doubtful that this property can support ANY introduced domestic livestock until the numbers of deer are reduced, without damaging the levels of biodiversity that have been attained through our restoration efforts. If restoration of KR Bluestem to a diverse native prairie grassland is successful, then the resource base might be capable of supporting limited herbivory by domesticated livestock. The level of forbs is critical to supporting deer herds, but cows also eat forbs, so there is competition between deer and cows for the limited supply of forbs.

Workshops at the Kerr Wildlife Management Site, Texas Parks and Wildlife Department, have stressed the importance of dividing an area into paddocks and rotating live stock between paddocks, thus limiting the access to any one of these areas, based on how rapidly the grass, forb, and browse resources are eaten by the livestock. Continuous access to a given area should always be avoided. Note the importance of using exclosures within each paddock as an aid in determining when domestic livestock must be removed as part of any grazing plan. The NRDC plan envisioned one cross-fence as a way to divide this property into 2 management areas, but it does not include fencing the riparian area. Allowing animals into the riparian area should be prohibited, but this would necessitate providing water to live stock by other means.

Attachments: (1) Map of property showing areas divided into field, juniper, and savanna and boundaries of NRDC soil types.

(2) Spreadsheet for NRDC Soil Type 8 "Normal Year"

(3) Spreadsheet for NRDC Soil Type 8 "Unfavorable Year"

(4) Notes on Carrying Capacity Calculation

APPENDIX 2

SOIL TYPE 8 - "Normal year"

	Grass %	Forbs %	Browse %	Estimated from species listed for soil 8 and a gu
Field	74%	20%	6%	
Savanna	60%	20%	20%	
Juniper	20%	10%	70%	

Productivity	0.55	0.175	0.275	Estimated from Handbook
3000	1650	525	825	From NRCS website

	Grass	Forbs	Browse	Production(no KR)
Field	0.74	0.20	0.06	1650
Savanna	0.60	0.20	0.20	525
Juniper	<u>0.20</u>	<u>0.10</u>	<u>0.70</u>	<u>825</u>
	1071	1050	859	2981

	Grass	Forbs	Browse	Production(40%KR)
Field	0.74	0.20	0.06	1000
Savanna	0.60	0.20	0.20	350
Juniper	<u>0.20</u>	<u>0.10</u>	<u>0.70</u>	<u>800</u>
	649	700	833	2183

----- No KR -----

----- 40% KR -----

	Size (ac)	Grass	Forbs	Browse	Grass	Forbs
Field	24	19029	5040	1238	11532	3360
Savanna	36	23143	7560	6188	14026	5040
Juniper	34	7286	3570	20453	4416	2380
Totals	94	49457	16170	<u>27878</u>	29974	10780
Total Productivity (lbs.)				93505	lbs. of forage available	

	Intake factor	Ave. body Wt.	Consump/day	Grass	Forbs	Browse
White-tailed Deer	0.035	100	3.500	10%	60%	30%
Axis	0.035	160	5.600	60%	25%	15%
Cow	0.030	900	27.000	90%	5%	5%

	Consump/day	No. Days	Grass/yr.	Forbs/yr.	Browse/yr.
White-tailed Deer	3.50	365	127.75	766.50	383.25
Axis	5.60	365	1226.40	511.00	306.60
Cow	27.00	365	8869.50	492.75	492.75

	Number of animals (no KR) based on ---			Number of animals (40% KR) based on ---		
	Grass	Forbs	Browse	Grass	Forbs	Browse
White-tailed Deer	387	21	73	235	14	71
Axis	40	32	91	24	21	98
Cow	6	33	57	3	22	61

White-tailed/Axis ratio =	2	1	2	1
Number of White-tailed Deer =	15.82	12.66	10.55	8.44
Number of Axis =	7.91	12.66	5.27	8.44

APPENDIX 2

SOIL TYPE 8 - "Unfavorable year"(NRDC designation)

	Grass %	Forbs %	Browse %	Estimated from species listed for soil 8 and a g
Field	74%	20%	6%	
Savanna	60%	20%	20%	
Juniper	20%	10%	70%	

Productivity	0.55	0.175	0.275	Estimated from Handbook
1800	990	315	495	

	Grass	Forbs	Browse	Production(no KR)
Field	0.74	0.20	0.06	990
Savanna	0.60	0.20	0.20	315
Juniper	0.20	0.10	0.70	495
	643	630	516	1788

	Grass	Forbs	Browse	Product.(50%KR)
Field	0.74	0.20	0.06	600
Savanna	0.60	0.20	0.20	200
Juniper	0.20	0.10	0.70	600
	390	400	625	1415

	Size (ac)	Grass	Forbs	Browse	Grass	Forbs
Field	24	11417	3024	742	6919	1920
Savanna	36	13886	4536	3712	8416	2880
Juniper	34	4371	2142	12272	2649	1360
Totals	94	29674	9702	16727	17984	6160
Total Productivity				56103	lbs of forage available	

	Intake factor	Ave. body Wt.	Consump/day	Grass	Forbs	Browse
White-tailed De	0.035	100	3.500	0.100	0.600	0.300
Axis	0.035	160	5.600	0.600	0.250	0.150
Cow	0.030	900	27.000	0.900	0.050	0.050

	Consump/day	No. Days	Grass/yr.	Forbs/yr.	Browse/yr.
White-tailed De	3.50	365	127.75	766.50	383.25
Axis	5.60	365	1226.40	511.00	306.60
Cow	27.00	365	8869.50	492.75	492.75

Number of animals (no KR) based on ---				Number of animals (40% KR) based on ---			
	Grass	Forbs	Browse	Grass	Forbs	Browse	
White-tailed De	232	13	44	141	8	53	
Axis	24	19	55	15	12	59	
Cow	3	20	34	2	13	36	
White-tailed/Axis ratio =		2	1		2	1	
Number of White-tailed Deer =		9.49	7.59		6.03	4.82	

Appendix 3

Paper presented at the Native Plant Society of Texas
Annual Symposium, Kerrville, November 2012

Accelerated Succession: KR Bluestem to Native Grass Restoration

David L. Davidson
Landowner, Kendall Co., Scientist, retired

ABSTRACT

The invasive grass, KR Bluestem (*Bothriochloa ischaemum*), has covered much of the Hill Country due to overgrazing, drought, and this grass being spread by many sources. Wildlife do not want to use KR, particularly grassland bird species. To increase biodiversity, we have been seeking methods to restore native grasses to areas dominated by KR. A protocol has been developed that does, in fact, replace KR with native grasses that we call "Accelerated Succession." Measurement of soil biotics (the numbers of bacteria, fungi, and genera of nematodes) indicates that the soil conditions present in areas where KR was killed and restored by this process are rapidly (a year or so) transformed much closer to those conditions characteristic of a mature prairie, and this has prevented the reinvasion of those areas by KR. We only have data for several years, and long-term results are necessary to determine if the trends seen will continue. Despite the drought of 2011, results are encouraging.

Appendix 4-1
Applying the diversity-invasion hypothesis to test restoration as biocontrol
Kelly G. Lyons, Department of Biology, Trinity University, klyons@trinity.edu

Evidence from small-scale experimental investigations suggests that A 2-1 species diversity and introduced species success are negatively correlated and that resident species identity can determine the strength of this interaction. In this study, we assess the applicability of the diversity-invasion hypothesis to restoration. We hypothesize that, following management efforts, richness of restored plots are a determinant of invasive species re-establishment and, furthermore, that some restored species and species combinations will be more effective than others. We employed a two-way factorial experiment in a randomized complete block design where richness and native species composition were manipulated in 1 x 1 m plots. Richness levels include 1, 2, 3, and 4 species with all possible species combinations at richness levels 2 and 3. Each block was replicated four times. Restored species were native, perennial grasses widely used in restoration projects in Central Texas. They included: big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), sideoats grama (*Bouteloua curtipendula*), and little bluestem (*Schizachyrium scoparium*). These species were plug planted in January 2010 following removal of the target invasive KR bluestem (*Bothriochloa ischaemum*; hereafter referred to as KR) using a prescribed burn in fall 2009.

Restored species established at an overall rate of 60%. Nonetheless, rates of establishment varied greatly among species. Re-establishment of KR was negatively correlated with restored species cover and establishment success as well as the average and total restored species ellipsoid plug area. We also found significant differences among species as determinants of KR re-establishment. We found no significant relationship between assigned or actual richness and KR re-establishment. KR establishment was negatively correlated with plot over-yielding, suggesting that species combinations that perform better than the highest performing species grown in monoculture were effective in invasion control. We aim to utilize this study to inform local land management efforts in restoration regarding the suppressive effects of native species combinations.

Appendix 4-2

The influence of mycorrhizal fungi and nitrogen addition on competition between a native and invasive perennial grass species.

Afflerbach, C., Banick, K., Rabat, R., and Lyons, K.G.,

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The C4 grass King Ranch Bluestem (*Bothriochloa ischaemum*) was originally planted throughout much of Texas to restore degraded rangeland; however the species has since become an invasive pest. Invasion theory suggests that species coexistence is enhanced through niche partitioning and that species with overlapping use for limiting resources (such as nitrogen) will be in competition. These competitive effects may, however, be mediated by mutualist symbionts, such as mycorrhizal fungi, that increase a species' ability to acquire resources.

Here we use niche theory to assess the mechanism of competition between a native and non-indigenous grass at the seedling stage and the potential for restoration of native plant species as biocontrol to reduce KR Bluestem establishment and spread. Using our two focal species, KR Bluestem and Sideoats Grama (*Bouteloua curtipendula*), we employ a three-way factorial greenhouse experiment with species composition (3 levels – 100:0, 50:50, 0:100), nitrogen (5 levels), and mycorrhizal fungi (with and without) as factors. Sideoats Grama is a perennial native Texas grass commonly used in restoration. Small pots (7 x 24.5 cm) were filled with sand and topped with 2 cm of Jiffy Organic Seedling mix to encourage germination of the seeds. Once germinated and established the seedlings were thinned to the assigned species ratios with 16 individuals per pot (8 of each species in the composition pots). Using Hoagland's solution, nitrogen was manipulated to create a nitrogen gradient ranging from 0 to 0.0769 g nitrogen per pot in 0.0192 gram intervals.

Beginning 4 weeks post-planting, weekly harvests were conducted over the course of four weeks. We standardized the data to account for the initial concentration differences between the monoculture and competition pots, and used R to run a repeated measures analysis of variance (MANOVA) across the 4 time points. The results suggest that KR is more positively responsive to increases in N and the presence of fungi than SOG, while SOG is more negatively affected by competition than KR. The presence of fungi positively influences height and root length in both species. Root mass ratio in both species is strongly influenced by species composition, suggesting that these two species do in fact niche partition when grown in competition. If KR and SOG aren't sharing the same niche, then theory suggests that the fact that KR outcompetes SOG in the field is due to differences in overall fitness, which is supported by KR's greater response to nutrient level increase. In this way, farming practices like burning and agriculture, which create high-N environments, may be facilitating the invasion of KR.

Appendix 5

Troy Murphy

You already have it

APPENDIX 6

BIRD NESTING BOX & NEST LOCATIONS S Feb 2, 2013

Woodpecker nesting boxes:

#1 Northwest of small house on Juniper:S

#2 Riparian area near Exclosure: 29 58 42.3N, 98 32 26.8 W 1372 ft.

#3 Riparian area near crossing to spring: 29 58 39.9N, 98 32 32.0 W 1307 ft.
IMG_0056 of 2 2 13

#4 Riparian area near creek dam: 29 58 49.6N, 98 32 27.2 W 1404 ft.

March 9: Crow's Nest (?) tree: 29 58 40.1N, 98 32 30.0 W 1370 ft.

APPENDIX 7 2012 BIRDS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Mo S	SUM
Cardinal		I	III	III	II	II			I	I	I	II	9	9
Titmouse				II	II	II							3	3
TV			II	I	(I							4	4
BV			II	III					I	I		I	5	5
E. Phoebe		I	III							I		II	4	4
Cyn. Wren			II	III	I	II							4	4
Downy WP						I						I	1	1
Carolina W													1	1
Bluebird			II	II									2	2
GFWP	II		I	III	I								4	4
Ladebk WP			I	II								I	3	3
Red Tail Hk	I	I											1	1
Sh. Shin Hk	I		I										1	1
Crow	I	I	II	III	II					I			6	6
Chipping Sp		II	II	II	II								4	4
Mockingbird		I		II									2	2
Red sh. Hk		I	II	I									3	3
Golden checked Warbler			I		I								2	2
Am Gold finch			I									II	1	1
Ruby Crowned Kinglet			I			I						I	4	4
Mourning Dr.											I		1	1
Chikaadee				III								I	2	2
WEVERio			III	III	I	II							4	4
Bl. Gr. Nat Catth			I										1	1
YB Cuckoo					I								1	1
Turkey			I	II									2	2
Cliff Swallow			I										1	1
B.C. Hummer			I	II	I								3	3
Inca Dove			I										1	1
Lesser GF				II									1	1
Summer Tanager				I	I								2	2
Barn Swallow				II									1	1
Painted Bunting				I	I								2	2
Wilson's Warbler				I									1	1
Ground Dove					I								1	1
White Winged Dove										I			1	1

36 species

APPENDIX 8
2012 Butterflies

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
Red Adm.			50								10's		8
Dainty Sulph.				100's		1						10's	9
So. Dog Face		1							1				5
Clouded Sulph.									1			1	2
Sleepy or Budeye	1		1						1			10's	8
Noregate's Fot			1								1	1	5
C. Check. Skipper	1				1								2
Sulphurs	1		10's		1				1				9
Am. Lady	1					1				1	10's 1		7
Painted Lady			1	1								1	3
Gr. Hairstreak			1	1	10's								4
Henry's Elf			1										1
Juniper HS													1
Pipavine Swallowtail			1		1								5
Monarch			10's	10's	10's 1				1				4
Duskwings				1									5
Spotted Roadside Skipper		1								1	1		1
Forester Moth				10's									1
Comma				1		1							2
Strecker's Giant Skipper				1									1
Mourning Cloak				1	1	1							3
Chickadee White				1		1							3
Hackberry Emperor				1		1				1			3
Tawny Emperor					1								1
Red Sailer					1								1
Gulf Fritillary					1					1	10's L	1	4
Giant Swallowtail						5			1				3
Am. Snout									1	100's	100's	100's	4
Dun Skipper									1				1
C. Mestra									1	1	50's 1	1	4
Black Swallowtail									1				1
Queen									1		1	1	4
Bordered Patch										1			1
So. Skipperling										1			1
Phoen. Crescent													1
Sailer													1

36 species