

Eric Keith
Botanist/Plant Ecologist
24 Summer Place
Huntsville, TX 77340
Tel. (936) 438-6328
Email: ek7275@suddenlink.net

June 20, 2014

George Russell
1401 19th Street
Huntsville, Texas 77340

Dear Mr. Russell:

This letter includes the results of a plant survey and recommendations for management along the section of Waterwood Parkway from FM 980 to the end of the road at the former location of the clubhouse. This right-of-way (ROW) easement is referred to as “the Russell leased Parkway” in the “Agreement to Lease and Maintain Waterwood Parkway” document signed by you and Mrs. Suzanne Russell with the Waterwood Improvement Association Inc. (WIA) president, Jack Zimmerman. The effective date of this document is June 1, 2012.

On June 20, 2014, I met with you and two of your employees to record all identifiable vascular plant species along “the Russell leased Parkway”, hereafter referred to as ROW. We walked approximately ¼ mile along the ROW recording all identifiable species. Once most of the obvious species had been recorded, we then drove the remaining sections of the ROW recording any new species not previously identified. The soils along the ROW are predominantly sandy loam uplands with scattered small marshy areas. The two dominant species along the ROW are the non-native exotic species (NNIS) bahia grass (*Paspalum notatum*) and native perennial species Texas wintergrass (*Nassella leucotricha*). Other perennial native grasses are also beginning to colonize the ROW, particularly in areas that haven’t been mowed as frequently. These species include little bluestem (*Schizachyrium scoparium*), bushy bluestem (*Andropogon glomeratus*), switchgrass (*Panicum virgatum*), and Eastern gammagrass (*Tripasacum dactyloides*). In addition, fall blooming forbs such as three species of aster (*Symphotrichum* spp) and two species of goldenrod (*Solidago* spp) are also colonizing many areas that afford some protection from frequent mowing. Of particular interest was Sampson’s snakeroot (*Orbexilum pedunculatum*), which is uncommon and rarely encountered, except in relatively undisturbed habitats. This species was only observed under existing overstory trees where mowing has occurred much less frequently. A total of 131 native species were observed along the ROW including many species that bloom in late summer and fall. A total of 14 NNIS were also observed, primarily in areas immediately adjacent to the road that are frequently mowed. In my experience, frequently mowed areas and other highly disturbed areas are more susceptible to NNIS encroachment while less frequently mowed areas allow native species to propagate and thrive.

According to the lease agreement on page 6, mowing shall be done subject to the Texas Department of Transportation (TXDOT) Roadside Vegetation Manual. According to this

manual and along “Developed Urban Highways” (defined as rights of way within smaller cities, towns and villages), TXDOT is directed to “Establish non-mow or natural areas at appropriate locations within the right of way, to provide for wildflower preservation, regeneration of native plant species and establishment of nesting habitat for wildlife”. These areas should be “clearly marked to prevent accidental mowing during modified full-width mowing.” Given that this stipulation is the directive of TXDOT in its manual and WIA agreed to follow this manual in the lease agreement, it is my recommendation to set aside areas for regeneration of native plant species that are currently present and rapidly colonizing in less frequently mowed areas. In my professional opinion, in order for this agreement to follow the guidelines outlined the TXDOT manual, a native plant regeneration area should be established since numerous native species are currently present and colonizing the ROW. Perhaps, a suitable compromise for the lease agreement would be to mow one mower width immediately along the roadside once in the growing season and again mow the entire ROW in late fall or winter when all native species have gone to seed.

My qualifications to complete this survey are as follows. I received my Bachelor of Science degree in Environmental Science from Stephen F. Austin State University in 1995 and have worked for more than nineteen years as a botanist and plant ecologist including three years at the Environmental Division of Fort Polk Military Installation in Louisiana and the last sixteen years at Raven Environmental Services, Inc in Huntsville, TX. I have conducted plant inventories, rare plant surveys, and ecological classifications on over 20,000 acres for Texas Parks and Wildlife, U.S. Department of Defense, City of Austin, and over a dozen large and small private landowners in Texas and the Southeastern U.S. Please see attached resume.

Please let me know if you have any questions or concerns or need any additional information. Thank you for the opportunity of completing this survey, and please let me know if you need any assistance on future projects.

Sincerely,



Eric L. Keith
Botanist/Plant Ecologist

Attachments:

- Keith Resume**
- List of Plants Recorded During Survey**

Eric Keith – Ecologist
24 Summer Place
Huntsville, TX 77340
Email: ek7275@suddenlink.net

B.S., Environmental Science, Stephen F. Austin State University. Nineteen years experience in management of endangered species and sensitive plant communities, specializing in plant identification, rare plant surveys, plant community delineation and management, and wetlands delineation.

PAST PERFORMANCE AND EXPERIENCE

1. Since 1998, I have completed Federal and State listed Threatened, Endangered and Sensitive (TES) species surveys and reports required for dozens of Biological Assessments and Evaluations and have performed for a variety of clients and projects on private and federal lands. I have recorded numerous undocumented endangered species locations throughout public and private properties and addressed a wide range of TES species issues associated with these projects. Some of the clients I have worked for include:
 - Environmental Division, Fort Polk Military Reservation, LA
 - Temple-Inland Forest Products Corporation Inc.
 - U.S. Forest Service
 - Texas Parks and Wildlife Department
 - The Nature Conservancy
 - Cooks Branch Conservancy
 - City of Austin
2. Since 2000, I have worked with Texas Parks and Wildlife Department installing and sampling over 200 permanent vegetation plots and identifying any and all rare plant associations and associated rare species on 65 state parks. I have used Global Position Systems (Trimble Geo Explorer 3, Trimble GeoXT, several Garmin devices) and ArcView© software to develop these vegetative cover maps and record and map all rare plant species and rare plant community locations in the parks.
3. From 2001 to present, I have conducted rare species and plant association surveys on over 20,000 acres of private property owned by Temple-Inland Forest Products Corporation (Temple) for the purpose of compliance with forest certifications. I identified and mapped using GPS technology and ARCVIEW software over 100 new rare plant locations and over 100 new rare plant association locations. Twelve of these rare plant associations were undescribed according to Nature Serve. I provided the data to Nature Serve and the data has been incorporated into their website database.
4. I have published sixteen peer reviewed articles in eight different journals that included distributional data for rare, threatened, and endangered plant species and one previously undescribed species, *Yucca cernua* Keith.
5. In June of 2004 I surveyed nearly 700 acres in the Sabine National Forest for any undocumented TES animal and plant species in preparation for a timber sale. I documented three unknown red-cockaded woodpecker (RCW) (*Picoides borealis*) trees and one unique blackland prairie plant community in the survey area. I collected GIS data for each and provided the USFS with a map of the survey results and the raw GIS data.
6. From March 2005 – November 2011, I installed and sampled 38 long-term monitoring plots on Fort Polk Military Reservation in Vernon Parish, LA. These monitoring plots recorded changes in vegetation occurring from military training, forest management, climate change, etc. Survey locations for small mammals, Bachman's and Henslow's sparrows, and pocket gophers were also tied into the vegetation monitoring plots to determine the effects of these species to changes in vegetation.
7. Currently, I am working with City of Austin installing long-term monitoring plots and mapping vegetation and fuel models on four city parks. This project was the first ecological project initiated by the City of Austin and was designed following my recommendations.
8. Currently, I am coordinating and managing a cooperative project between Cook's Branch Conservancy (Montgomery County, Texas) and US Fish and Wildlife Service (Partners for Fish and Wildlife) to restore native grasses and forbs on approximately 140 acres of presently improved pasture. Restoration will be accomplished with a combination of herbicide application, planting with a mix of native grass and forb seeds, and controlled burning. I also installed forty-two permanent vegetation monitoring plots to quantify changes in vegetation from management activities.

REFERENCES

1. Kathy Hutson – Ranch Manager
Cook's Branch Conservancy
8280 FM 149
Montgomery, Texas 77316

Ph: (281) 723-6812
Fx: (936) 597-5006
Email: cooksbranch@earthlink.net
2. Jeff Sparks – Natural Resources Coordinator
Texas Parks and Wildlife Department
11942 FM 848
Tyler, TX 75707

Ph: (903) 566-5698
Fx: (903) 566-7853
Email: jeff.sparks@tpwd.state.gov

List of Species Recorded along “the Russell leased Parkway”

Acanthaceae	<i>Ruellia humilis</i>	Native
Anacardiaceae	<i>Toxicodendron radicans</i>	Native
Apiaceae	<i>Hydrocotyle verticillata</i>	Native
Apiaceae	<i>Polytaenia texana</i>	Native
Apiaceae	<i>Ptilimnium capillaceum</i>	Native
Apiaceae	<i>Ptilimnium nuttallii</i>	Native
Apocynaceae	<i>Trachelospermum difforme</i>	Native
Aquifoliaceae	<i>Ilex vomitoria</i>	Native
Asclepiadaceae	<i>Asclepias tuberosa</i>	Native
Asclepiadaceae	<i>Asclepias verticillata</i>	Native
Asclepiadaceae	<i>Asclepias viridis</i>	Native
Asteraceae	<i>Ambrosia psilostachya</i>	Native
Asteraceae	<i>Boltonia diffusa</i>	Native
Asteraceae	<i>Chrysopsis pilosa</i>	Native
Asteraceae	<i>Chrysopsis texana</i>	Native
Asteraceae	<i>Cirsium horridulum</i>	Native
Asteraceae	<i>Coreopsis lanceolata</i>	Native
Asteraceae	<i>Echinacea sanguinea</i>	Native
Asteraceae	<i>Englemannia peristenia</i>	Native
Asteraceae	<i>Erigeron strigosus</i>	Native
Asteraceae	<i>Eupatorium coelestinum</i>	Native
Asteraceae	<i>Eurybia paludosa</i>	Native
Asteraceae	<i>Gaillardia pulchella</i>	Native
Asteraceae	<i>Helenium amarum</i>	Native
Asteraceae	<i>Helenium flexuosum</i>	Native
Asteraceae	<i>Hymenopappus artemisiifolius</i>	Native
Asteraceae	<i>Liatris aspera</i>	Native
Asteraceae	<i>Liatris pycnostachya</i>	Native
Asteraceae	<i>Pityopsis graminifolia</i>	Native
Asteraceae	<i>Pseudognaphium obtusifolium</i>	Native
Asteraceae	<i>Pyrrhopappus carolinianus</i>	Native
Asteraceae	<i>Rudbeckia hirta</i>	Native
Asteraceae	<i>Rudbeckia grandiflora</i>	Native
Asteraceae	<i>Solidago radula</i>	Native
Asteraceae	<i>Solidago ulmifolia</i>	Native
Asteraceae	<i>Symphyotrichum dumosum</i>	Native
Asteraceae	<i>Symphyotrichum patens</i>	Native
Asteraceae	<i>Symphyotrichum subulatum</i>	Native
Bignoniaceae	<i>Campsis radicans</i>	Native
Campanulaceae	<i>Triodanis biflora</i>	Native
Caprifoliaceae	<i>Symphiocarpos orbiculatus</i>	Native
Cistaceae	<i>Lechea mucronata</i>	Native
Cistaceae	<i>Lechea tenuifolia</i>	Native
Clusiaceae	<i>Hypericum hypericoides</i>	Native
Commelinaceae	<i>Commelina erecta</i>	Native
Convolvulaceae	<i>Dichondra carolinense</i>	Native

Convolvulaceae	<i>Ipomoea cordatotriloba</i>	Native
Convolvulaceae	<i>Stylisma humistrata</i>	Native
Cyperaceae	<i>Carex bushii</i>	Native
Cyperaceae	<i>Carex cherokeensis</i>	Native
Cyperaceae	<i>Carex flaccosperma</i>	Native
Cyperaceae	<i>Eleocharis montevidensis</i>	Native
Cyperaceae	<i>Rhynchospora caduca</i>	Native
Cyperaceae	<i>Rhynchospora globularis</i>	Native
Ebenaceae	<i>Diospyros virginiana</i>	Native
Ericaceae	<i>Vaccinium arboreum</i>	Native
Euphorbiaceae	<i>Acalypha gracilens</i>	Native
Euphorbiaceae	<i>Chamaesyce maculata</i>	Native
Euphorbiaceae	<i>Croton glandulosus</i>	Native
Euphorbiaceae	<i>Croton monathogynus</i>	Native
Fabaceae	<i>Baptisia nuttaliana</i>	Native
Fabaceae	<i>Cassia fasciculata</i>	Native
Fabaceae	<i>Galactia volubilis</i>	Native
Fabaceae	<i>Gleditsia triacanthos</i>	Native
Fabaceae	<i>Indigofera miniata</i>	Native
Fabaceae	<i>Lespedeza repens</i>	Native
Fabaceae	<i>Mimosa nuttallii</i>	Native
Fabaceae	<i>Neptunia lutea</i>	Native
Fabaceae	<i>Orbexilum pedunculatum</i>	Native
Fabaceae	<i>Strophostyles umbellata</i>	Native
Fabaceae	<i>Stylosanthes biflora</i>	Native
Fagaceae	<i>Quercus marilandica</i>	Native
Fagaceae	<i>Quercus nigra</i>	Native
Fagaceae	<i>Quercus stellata</i>	Native
Juncaceae	<i>Juncus brachycarpus</i>	Native
Juncaceae	<i>Juncus validus</i>	Native
Lamiaceae	<i>Monarda citriodora</i>	Native
Lamiaceae	<i>Physostegia digitalis</i>	Native
Lamiaceae	<i>Prunella vulgaris</i>	Native
Liliaceae	<i>Nothoscordum bivalve</i>	Native
Linaceae	<i>Linum medium</i>	Native
Loganiaceae	<i>Gelsemium sempervirens</i>	Native
Malvaceae	<i>Callirhoe papaver</i>	Native
Melastomataceae	<i>Rhexia mariana</i>	Native
Menispermaceae	<i>Cocculus caroliniana</i>	Native
Nyssaceae	<i>Nyssa sylvatica</i>	Native
Onagraceae	<i>Oenothera laciniata</i>	Native
Onagraceae	<i>Oenothera speciosa</i>	Native
Oxalidaceae	<i>Oxalis dilleni</i>	Native
Passifloraceae	<i>Passiflora lutea</i>	Native
Pinaceae	<i>Pinus echinata</i>	Native
Pinaceae	<i>Pinus palustris</i>	Native
Pinaceae	<i>Pinus taeda</i>	Native
Plantaginaceae	<i>Plantago aristata</i>	Native

Plantaginaceae	<i>Plantago virginica</i>	Native
Poaceae	<i>Andropogon glomeratus</i>	Native
Poaceae	<i>Aristida oligantha</i>	Native
Poaceae	<i>Dichantherium aciculare</i>	Native
Poaceae	<i>Dichantherium acuminatum</i>	Native
Poaceae	<i>Dichantherium depauperatum</i>	Native
Poaceae	<i>Dichantherium ravenelii</i>	Native
Poaceae	<i>Dichantherium sphaerocarpon</i>	Native
Poaceae	<i>Elymus virginicus</i>	Native
Poaceae	<i>Nassella leucotricha</i>	Native
Poaceae	<i>Panicum virgatum</i>	Native
Poaceae	<i>Paspalum setaceum</i>	Native
Poaceae	<i>Schizachyrium scoparium</i>	Native
Poaceae	<i>Sorghastrum nutans</i>	Native
Poaceae	<i>Tridens flavus</i>	Native
Poaceae	<i>Tripasacum dactyloides</i>	Native
Portulacaceae	<i>Portulaca pilosa</i>	Native
Rosaceae	<i>Crataegus marshallii</i>	Native
Rosaceae	<i>Crataegus spathulata</i>	Native
Rosaceae	<i>Rubus louisianus</i>	Native
Rosaceae	<i>Rubus trivialis</i>	Native
Rubiaceae	<i>Diodia teres</i>	Native
Rubiaceae	<i>Diodia virginiana</i>	Native
Saxifragaceae	<i>Lepuropetalon spathulatum</i>	Native
Smilacaceae	<i>Smilax bona-nox</i>	Native
Smilacaceae	<i>Smilax glauca</i>	Native
Smilacaceae	<i>Smilax smallii</i>	Native
Ulmaceae	<i>Ulmus alata</i>	Native
Verbenaceae	<i>Callicarpa americana</i>	Native
Verbenaceae	<i>Phyla nodiflora</i>	Native
Violaceae	<i>Viola sororia</i>	Native
Vitaceae	<i>Parthenocissus quinquefolia</i>	Native
Vitaceae	<i>Vitis cinerea</i>	Native
Vitaceae	<i>Vitis rotundifolia</i>	Native
Poaceae	<i>Bothriochloa laguroides</i>	Native
Poaceae	<i>Paspalum plicatulum</i>	Native
Verbenaceae	<i>Verbena halei</i>	Native
Apocynaceae	<i>Nerium oleander</i>	Non-native
Asteraceae	<i>Facelis retusa</i>	Non-native
Fabaceae	<i>Kummerowia striata</i>	Non-native
Fabaceae	<i>Trifolium lappaceum</i>	Non-native
Poaceae	<i>Aira elegans</i>	Non-native
Poaceae	<i>Bothriochloa ischaemum</i>	Non-native
Poaceae	<i>Briza minor</i>	Non-native
Poaceae	<i>Bromus japonicus</i>	Non-native
Poaceae	<i>Paspalum dilatatum</i>	Non-native
Poaceae	<i>Paspalum notatum</i>	Non-native
Poaceae	<i>Paspalum urvillei</i>	Non-native

Poaceae	Sorghum halapense	Non-native
Poaceae	Stenotaphrum secundatum	Non-native
Verbenaceae	Verbena rigida	Non-native