Proposal for Vascular Plant Survey of the Canyonlands Unit of the Big Thicket National Preserve, Tyler County, Texas

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INTRODUCTION

Background – The Big Thicket National Preserve is located in the Gulf Coast Plain of southeastern Texas. The preserve was established in 1974, and was America's first National Preserve with 86,000 acres. In 1981 the preserve was designated a UNESCO Biosphere Reserve by the United Nations and in 2001, the American Bird Conservancy designated the preserve as a Globally Important Bird Area. Today the preserve consists nearly 100,000 acres that make up a total of 14 units that spread over parts of seven different Texas counties.

The Big Thicket National Preserve acquired the Canyonlands Unit in 1993. It consists of approximately 1,476 acres and is located on the eastern boundary of Tyler County along 3.5 miles of the Neches River paralleling the western boundary. The elevation ranges from 60 feet to 200 feet above sea level with steep bluffs and deep erosional gullies. There are four distinctive communities within the unit (upland plateau, hill, floodplain and riparian) and was chosen for its unique canyons which create a distinctive habitat unlike any of the other units within the preserve. This unit is thought to be the most diverse unit within the Big Thicket National Preserve and may be instrumental in better understanding the diversity and complexity of the Big Thicket. Since its acquisition, a floristic study has not been prepared. A study of flora for this unit, as with the other units, is necessary to establish the plant community within the unit. The study is also useful as a baseline for management of invasive species and threatened and endangered species studies.

Floristic studies have been conducted on several of the units in the Big Thicket. The study of the Hickory Creek Unit found 401 different taxa in 79 different families (B.R. MacRoberts, et al. 2002). At the Turkey Creek Unit, study found 691 native taxa and 47 exotic taxa in 124 different families within the unit boundary (Brown, et al. 2005). The Big Sandy Creek Unit floristic study revealed within 126 families a total of 693 taxa, 45 of which were exotic (Brown, et al. 2006). Within the Lance Rosier Unit 113 families with 694 total taxa were found, 71 (11%) of the total taxa were exotic species (Brown, et al. 2006). The recently published survey of the Beech Creek Unit discovered 103 families, totaling in 418 native taxa and 52 exotic taxa (Brown, et al. 2008). And in the most recent published checklist of vascular plant species for the Loblolly Unit they found 89 families with a total of 305 taxa, 34 of which were exotic (Brown, et al. 2008).

The S.M. Tracy Herbarium (TAES), the 3rd largest herbarium in Texas, currently houses approximately 250,000 vascular plant specimens and 5,500 non-vascular plant specimens with increasing numbers annually. The herbarium serves as the National Park Service repository for the following national parks and preserves: the Natchez Trace Parkway, Mississippi; Hubbell Trading Post, Arizona; the Palo Alto Battlefield, Padre Island National Seashore, and Big Thicket National Preserve, Texas. The Tracy Herbarium acquires new specimens through the annual collection endeavors of the faculty, staff and students, associated with research and educational pursuits. It also has an on-going specimen exchange program with about 35 herbaria throughout the world. The majority of specimens housed in the herbarium are geographically from the United States and

Canada, Mexico, Central and South America. With an emphasis on education, extension and research, the herbarium activities have been based on basic taxonomic research related to vascular plants in Texas, the southern United States and northern Mexico. Recent projects have broadened this focus to include plants of wetland habitats, bioinformatics, invasive species, etc. The herbarium has also received grant support from the Texas Higher Education Coordinating Board – Advanced Research Program to establish an on-line searchable database of the specimens housed at the herbarium, along with various other on-line education related tools to aid in plant identification.

There are currently, five (5) Ph.D. level faculty and three (3) graduate students that are associated with the herbarium. Of these, one (1) Ph.D. level faculty member, one (1) graduate student/Curator, one (1) graduate student and two (2) undergraduate student workers will be associated with this project. All faculty, staff and students are highly skilled in the identification of a broad variety of plant taxa using modern research methods, technologies and equipment. The herbarium houses a library of publications including, taxonomic keys and descriptions, identification manuals, professional journals, etc. which are immediately available for use. Research quality equipment such as microscopes, scanners, computers, along with other scientific apparatus and tools are readily available for research projects on a daily basis.

METHODOLOGY

The goal of this floristic study is to gather records, collect and identify plants for over 90% of the current vascular plant flora occurring within the boundary of the Canyonlands Unit.

1. Habitat types will be determined using soil and elevation maps. These habitat types will determine the collection sites visited within the unit.

2. Each site will be visited multiple times throughout an eighteen (18) month period due to seasonal variability and different flowering time for the plant species. Multiple trips will increase the accuracy of gathering representative flora within the unit.

3. Only fertile specimens with fruiting bodies and/or flowering parts will be collected and processed. These collections will be used to accurately identify specimens.

4. The GPS location, soil type, associated species, longevity, growing season and habitat information will be collected and recorded. The nativity will also be recorded for each species. Once the specimen has been identified, verified and mounted on herbarium paper this information will be used on the labels that will accompany each plant.

5. The information recorded on the label for each plant specimen will also be provided to the All Taxa Biodiversity Inventory (ATBI) in a compatible format which can be downloaded and entered into the ATBI database.

6. During each collection trip, voucher specimens will collected of each new species not previously collected in flower. The voucher specimens will be housed at TAES.

Undergraduate Student Workers – Throughout the duration of this project student workers will be hired to help with the collection and databasing processes. During each site visit 1 to 2 student workers will be employed to assist with collecting plants, data and photographs from the site. Upon identification and verification of the plant species, budgeted hours will also fund the hiring of student workers to mount, database and file plants collected from the Canyonlands Unit area of the Big Thicket. The salary for the Primary Investigator and the Co-Investigator will come from alternate sources and therefore are treated as in-kind for this proposal.

Literature and herbaria search – Preceding field collections, a search of available literature and local and national herbaria will be conducted in order to document existing plant taxa records for the Canyonlands Unit area of the Big Thicket.

A search of available commercial and public reports and other associated materials will be conducted to retrieve documents and records of any collections within the preserve and/or unit boundaries in an attempt not to duplicate collection efforts. Record inquiries will also be sent to local, regional and state herbaria seeking available collection records. This search will include, but is not limited to, contacting the following herbaria: Botanical Research Institute of Texas (BRIT), University of Texas (TEX), Robert A. Vines Environmental Science Center (SBSC) and Stephen F. Austin State University (ASTC). We will also request the assistance of several individuals associated with various organizations including: Jackie Poole, Bill Carr, and Jason Singhurst with the Texas Parks and Wildlife Department; Guy Nesom, editorial committee for *The Flora of North America*; Barney L. Lipscomb, Leonhardt Chair of Texas Botany, Head of Publications; George Diggs, author of Shinners & Mahler's Illustrated Flora of North Central Texas. Efforts will be made to obtain such records and materials within appropriate time and financial constraints.

Vouchers – Identification and processing of collections will be completed utilizing resources, facilities, and staff associated with both the herbarium and the project. Actual vouchers will consist of either a physical specimen or an appropriate digital image. Vouchers for the survey will be processed, accessioned, deposited and maintained as part of the S.M. Tracy Herbarium (TAES) in College Station, Texas.

TIME-LINE

Anticipated field schedule – Approximately eighteen (18) months will be dedicated to making field collections, identification of collection and documentation of locations of collection sites. The remaining six (6) months will be used to confirm identifications, re-collect at any sites where problems or data gaps occur, synthesize data and prepare a final report. A total of seventy (70) man days of fieldwork are proposed for completion of this project. Trip durations will vary by time of year and flowering season. Depending on weather conditions, scheduling conflicts and any other circumstances beyond the control of the researchers, the following is the tentative field collection schedule details.

Year 1 (18 man days of field time)

Late Fall 2008 *– Defining unit boundaries, plant communities, collection sites and initial field collections.* This trip was completed in October 2008 with a total of 107 collection numbers for specimens collected. The primary goal of this trip was to determine the unit boundaries and collect seasonally dominant species within the entire Canyonlands Unit. The team consisted of two (2) people and lasted two (2) days. The participants familiarized themselves with the project site, collected and processed specimens. Identification for these taxa is currently underway.

Early Spring 2009 *– Collection of early spring flora.* This collecting trip will be used to extensively collect species. There will be four (4) participants operating in pairs as two (2) teams. Within each team both members will select plants to be collected, one member will collect habitat data (GPS, habitat and abundance, etc.) and record plants collected by number, the other member will process (press, number, etc.) the specimens at each site. The anticipated time for this trip will be three (3) days.

Late Spring 2009 *- Collection of late spring flora.* Participants will again operate in two (2) teams and function as above. It is anticipated this trip will last four (4) days.

Summer 2009 *– Collection of summer flora.* Participants will again operate in two (2) teams and function in the same manner as above. It is anticipated this trip will last three (3) days.

Year 2 (14 man days of field time)

Fall 2009 *– Collection of late summer and early fall flora.* Participants will again operate in two (2) teams and function in the same manner as above. It is anticipated this trip will last three (3) days.

Spring 2010 *- Collection of spring flora.* Participants will operate as one (1) team of two (2) people and function as above. It is anticipated this trip will last four (4) days.

Early Summer 2010 *- Collection of summer flora.* Participants will again operate as one (1) team of two (2) people and function in the same manner as above. It is anticipated this trip will last three (3) days.

Reporting Deadlines

Annual Report	Final Report	Database Entries
• September 30, 2009 • September 30, 2010	• December 2011	• December 2011

REFERENCES

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