2007 ANNUAL REPORT

for the period 1 January 2007 – 31 December 2007
from the Committee for Wild Basin Wilderness, Inc.

presented to

TRAVIS COUNTY COMMISSIONERS COURT AND TRANSPORTATION and NATURAL RESOURCES

This annual report on the management and environmental education activities conducted for Wild Basin Wilderness Preserve is submitted in compliance with the contract between The Committee for Wild Basin Wilderness, Inc. and Travis County.

TABLE OF CONTENTS

PRESERVE MANAGEMENT…3

EDUCATIONAL & EDUCATIONAL OUTREACH PROGRAMS…4-5

Environmental Education and Interpretation & Summer Programs…4
Public and Group Tours…4
Training Programs…5
Public Outreach…5
Affiliations & Publications…5

LAND MANAGEMENT PROGRAMS…6-11

Land Management Vision and Charges…6
Habitat Mosaic Assessment…6
Biological and other Surveys…7
Public Outreach…7-8
Affiliations & Publications…8-9
Visitation…9
Maintenance & Restoration…9-10
Security…10
Building Infrastructure…11

THE COMMITTEE FOR WILD BASIN WILDERNESS, INC….12-13

Structure…12
Board Members…12
Staff…12
Aerial View of Wild Basin Wilderness Preserve…13

APPENDIX…14

Golden-cheeked Warbler (GCWA) Survey Results 2007
Wild Basin Species and Items of Interest 2006
Wild Basin Plant List "The Vegetation of Wild Basin"
Wild Basin Animal List "The Vertebrates of Wild Basin"
Wild Basin Bird Checklist 2006
Wild Basin Deer Census 2007
Wild Basin Self-Guided Visitors 2007

PRESERVE MANAGEMENT

The Wild Basin staff implements the policies and priorities as set forth by the Committee for Wild Basin Wilderness, Inc. in accordance with BCP and Travis County rules and regulations. The Committee's mission is stewardship of the urban wilderness of Wild Basin, and to promote land preservation and environmental education. Wild Basin's vision is to become Austin's urban wilderness education treasure, serving as the gateway to the Balcones Canyonlands.

In 2007, staff devoted their time to the day-to-day management of the preserve, including scheduling and supervising all educational programs, land management activities and programs and other work performed within its boundaries. They also supervised, coordinated and trained all volunteers and tour guides. All staff renewed their CPR and First Aid training and certifications in 2007.

Wild Basin's education and land management programs offered to schools and to the community are designed to promote awareness of environmental preservation, and encourage wise stewardship of the land. Through guided hikes, specialized study and volunteer opportunities, visitors to Wild Basin discover the many pressures on the natural quality of the preserve. From outside the preserve, residential and commercial development brings invasive, non-native plants and soil and watershed pollution. In addition, domestic animals, air, sound and light pollution can impact the preserve as well. Through outdoor study, experimentation, and hands-on opportunities, Wild Basin continues to bring awareness and an appreciation of the natural environment to the Central Texas community.

EDUCATIONAL & EDUCATIONAL OUTREACH PROGRAMS

Volunteers donated approximately 900 hours of their time to the preserve's Educational and Educational Outreach Programs, which were supported by grants from the Moody Foundation and the Tuktawa Foundation. The following summarizes these programs:

1. *Environmental Education & Interpretation –*
    a. School Tours – Over 2,200 students from public, private and parochial schools, as well as a small number of home-school groups in Bastrop, Hays, Travis and Williamson counties attended education programs at the preserve in 2006. Group size limits are restricted and held to maximums of 64 per visit. Over 440 volunteer hours were donated in assisting in these education programs.
    b. Family & Public Programs –599 adults and children attended public programs at the preserve; programs offered in 2007 again including Moonlighting, Stargazing, Flintknapping, Indian Lore, and Weekend Hikes. Over 195 volunteer hours were donated to enable Wild Basin to host these programs.
    c. Maplewood Elementary – This AISD elementary school has an after-school science club called Caterpillars & Tadpoles which is in its fifth year with Wild Basin staff as volunteer educator. This year, 15 students learned about the life cycle through this interactive program led by Wild Basin educator, Sally Scott.
    d. Wild Afternoons – Thanks to a generous grant from the Moody Foundation, the Wild Afternoons program enabled 380 children to visit the preserve, enjoy guided hikes, and achieve youth group-specific goals. The participants included 95 students whose hikes were sponsored by grant-funded scholarships. Groups participating in the program included Girl Scouts, Boy Scouts, Communities in Schools, Big Brothers Big Sisters, Camp Fire USA and Spiral Scouts. 168 volunteer hours were donated to this program.
    e. Tiny Footprints – In 2007, this program enabled more than 250 young children, ages 3-5, to experience high quality, small-group guided hikes designed specifically for early learning. Over 85 volunteer hours were donated to assist with these tours for very young children.

2. *Family & Public Programs and Group Tours –*
    a. Moonlighting and Stargazing – In its 19th year, the Moonlighting and Stargazing program again provided 2 public tours each month, guided by volunteers from the Austin Astronomical Society. Despite the inclement weather that was common in 2007, 247 visitors learned how to use telescopes and interpret the night sky.
    b. Other Tours - Other public tours led by Wild Basin volunteers and staff included Wild Basin Walks, Indian Lore, Flintknapping, Fossilology, and Owl Prowl.
    c. BCP Hike & Lecture Series – On April 14th, Wild Basin hosted 2 public hikes as part of the BCP Hike & Lecture Series. Approximately 15 visitors, guided by volunteers, were introduced to Wild Basin and the BCP, and one group even spotted a Golden-cheeked Warbler.

3. *Training Programs* -
    a. Guide Training – In 2007, Wild Basin once again offered 2 sessions of Weekday & Weekend Guide Training for 14 new volunteer trail guides. 40 hours were donated by key preserve volunteers in assisting staff with training.
    b. Tiny Footprints Training – In 2007, 2 sessions of Tiny Footprints Training were offered for 5 new volunteer Tiny Footprints guides. 16 hours were donated for training.
    c. Other – Community Service Restitution volunteers continued to receive educational training in 2007 as part of their orientation to the preserve before proceeding with work assignments.

4. *Public Outreach* –
    a. Austin Museum Day – Wild Basin participated in the city-wide free museum day with a Wild About Insects-themed exhibit and hike. Over 450 people participated in this program, which was a success due to almost 100 volunteer hours donated to the program.
    b. Discover Nature – Wild Basin had a native plants exhibit at this new University of Texas program wherein Austin families explored the natural world.
    c. Wee Trails – Wild Basin staff held the Wee Trails program at the Lucy Read School, where approximately 400 children discovered nature in their own schoolyard.
    d. Dia De Los Ninos – In 2007, Wild Basin once again had an exhibit at Dia de los Ninos. This bilingual event gave an estimated 2,000 children the opportunity to discover Wild Basin.

5. *Affiliations & Publications* –

Association of Nature Centers of America (ANCA)
Austin Astronomical Society
Austin Independent School District
Austin Museum Partnership
Bastrop Independent School District
Big Brothers Big Sisters
Camp Fire USA Balcones Council
Capital Area Council, Boy Scouts of America
Communities in Schools
Lake Travis Independent School District
Lone Star Girl Scouts
Maplewood Elementary
Moody Foundation
Spiral Scouts
University of Texas at Austin
Tuktawa Foundation

The preserve staff continued writing Wild Basin's column in our local weekly newspaper, the Westlake *Picayune's* "Distinct" section.

Each quarter, Wild Basin staff produced the *Wild Ways Newsletter*.

LAND MANAGEMENT ACTIVITIES & PROGRAMS

Wild Basin Wilderness Preserve board member Peggy Corkran donated 72 hours of her time to the preserve's land management and Board activities in 2007. She stepped down as a member of the Board of Directors and as a member and chair of the Land Management Committee at year's end. We are most grateful for her service.

Among the highlights of our Land Management Activities and Programs in 2007 were the following:

Land Management Vision and Charges (a restatement for overview purposes)

Here is that Vision:

> Our vision is to preserve a piece of the Texas Hill Country in its native condition and to educate school children and the general public in the natural laboratory of Wild Basin Preserve by:
>
> - Managing and, where necessary, restoring a mosaic of habitats that are indigenous to Wild Basin, including (but not limited to) oak-juniper woodlands, riparian areas, semi-open grasslands and cedar breaks (please note that "juniper" and "cedar" refer to the same plant species: *Juniperus ashei*)
> - Protecting native biodiversity
> - Protecting habitat for the federally endangered Golden-cheeked warbler
> - Protecting habitats to support threatened and rare plant and animal species
> - Controlling non-native and invasive species
> - Protecting soil profiles and unique geologic features
> - Monitoring water quality relative to watershed inputs, runoff, and erosion
> - Protecting prehistoric and historic cultural sites
> - Managing a trail system that presents to visitors a variety of habitats while leaving a majority of the preserve undisturbed
>
> <u>Charges to the Land Management Committee</u>:
>
> - Provide expert advice to the land management program. Review plans for and recommend actions regarding proposed changes or projects that would result in alteration or possible adverse impacts to the preserve.
> - Ensure that in all our planning and decision-making processes, the health of Wild Basin Preserve is the highest priority. Above all, do no damage.

Land Management volunteers donated 587 hours of their time to the preserve's land management efforts in 2007. The following summarizes these efforts as performed both by staff and by volunteers:

Habitat – Mosaic Assessment
From January and throughout the year, he Land Management Committee has assessed various of our habitat components to develop an overall preserve management plan for the future. So far, we have analyzed the following components: riparian zones/features; GCWA; Texas Madrone, invasive plants, and plant species of interest/concern.

Biological and other Surveys

1. Golden-cheeked warbler (GCWA – *Dendroica chrysoparia*)
   Our program manager Joe Beach performed presence/absence surveys for this federally endangered songbird in the preserve. Between 8 March and 8 June 2007, he recorded sightings of six (6) to seven (7) mating pairs of GCWA during nine (9) survey days, totaling 51.25 hours. One fledgling/juvenile GCWA was sighted together with each of the mating pairs. This data represents a record high number of GCWA sighted in the preserve:
   a. slightly more than twice the total number of observed individuals in 2006.
   b. a potential increase of two (2) breeding territories since 2005.

   For the full GCWA report, see Appendix.
2. Bee Creek Watershed
   a. Khabele school students assisted with a native plant survey in North Hollow;
   b. TCEQ and LCRA personnel assisted with water-quality testing in North Hollow.
   c. Preserve staff and volunteers pursued information related to (1) commercial development in our contributing watershed west of Loop 360, namely projects by Brandywine Reality and the Munson Park Management, and (2) home sites on our southern perimeter.
3. White-tailed deer (O*docoileus virginianus*)
   For the first time in recent memory, Wild Basin staff successfully performed a census of the preserve's deer population. Data analysis reveals approximately one (1) deer/acre. Normal regional population density is considered one (1) deer/20 acres. TPW requires a second year's data for a removal permit.

   We appreciate the technical assistance from TPW and Travis County Wildlife biologists. For raw data spreadsheet, see Appendix.
4. Texas Madrone (*Arbutus xalapensis*)
   With the assistance of Dr. Bob Harms, the UT-Austin Herbarium has recognized our population of eighteen (18) trees as the easternmost of the species within the U.S. (It represents the only Madrone species in Texas.) We have documented individual trees by GIS.
5. Shooting Star (*Dodecatheon meadia*)
   In April, a graduate student from Washington University in St. Louis, MO performed research on our Shooting Star population. He collected data and tissue samples under a BCP permit and preserve staff supervision.
6. Plant Inventory
   Two (2) newly observed plant species were added to our plant inventory:
   a. Water primrose (*Ludwigia octovalvis/Onagraceae*)
   b. Dwarf palmetto (*Sabal minor/Arecaceae*)

   For complete inventory, see Appendix
7. Amphibian Watch
   Volunteer Roger Myers provided data from his nocturnal surveys, recording four (4) frog species, March – September.
8. Photo Points – Photographs were taken seasonally by preserve interns at each of the ten (10) photo points in the preserve. This project began in 2005.

Public Outreach

1. Balcones Canyonlands Preserve (BCP) Land Managers - Again in 2007, preserve staff attended and participated in all meetings of the BCP Land Managers informal group.
2. Facilities Exchange Consultation – Our staff traded visits and facilities/trail tours with the staff of the LCRA's McKinney Roughs Park.

3. Community Groups
    a. Central Texas Trail Tamers (CTTT) – CTTT again hosted bi-monthly meetings open to the public at the preserve. Their volunteers contributed 25.5 hours to trail maintenance projects.
    b. Austin Geological Society (AGS) – 2007 marked the second year that Wild Basin had a staff representative attend AGS meetings and the AGS Annual Field Trip. Staff member Joe Beach, a geologist and member of AGS, represented the preserve to AGS.
    c. Bright Leaf Preserve – Staff members Sally Scott and Joe Beach continued their terms on the Board of the Friends of Bright Leaf Preserve.
    d. Capital Area Master Naturalists (CAMN) – 2007 marked the second year that Wild Basin has had a staff member, Sally Scott, on the Board of Directors of CAMN. Their volunteers donated 81.5 hours of their time to the preserve.
    e. Native Plant Society of Texas, Austin chapter (NPSOT) – Again in 2007, Wild Basin hosted the regular monthly meetings of the Austin chapter of this statewide group. NPSOT volunteers donated approximately 16 hours of time to the preserve.
    f. Texas Ornithological Society (TOS)/ Christmas Bird Counts – 2007 marked the first year that Wild Basin staff, Sally Scott, participated in the Austin Christmas Bird Count and recorded a rare/unusual species (Tufted Titmouse – *Parus bicolor*).
    g. Balcones Canyonlands National Wildlife Refuge – Again in 2007, preserve staff, Sally Scott, coordinated the children's activities for the refuge's Bridges-to-Birding program and Spring Songbird Festival, which is sponsored by Travis Audubon Society.

Affiliations and Publications

The preserve in 2007 continued development of relationships and partnerships with like-minded groups and selected individuals in the community. These relationships and partnerships were pursued to strengthen the preserve's land management and educational activities. They include the following:

Ann Molineux, PhD
Austin Astronomical Society
Austin Gem & Mineral Society
Austin Geological Society
BCP Land Managers
Balcones Canyonlands National Wildlife Refuge
Bob Harms, PhD
Capital Area Council, Boy Scouts of America
Capital Area Master Naturalists
Central Texas Trail Tamers
City of Austin Water Utility Wildland Conservation Division
Lower Colorado River Authority
Marshall Johnston, PhD
Meritage Homes
Native Plant Society of Texas, Austin chapter
PBS & J
REI
Rob Roy on the Canyon Neighborhood Association
Stock Lumber
Texas Commission on Environmental Quality
Texas Forest Service

Texas Ornithological Society
Texas Parks & Wildlife
Travis Audubon Society
Travis County Transportation & Natural Resources
University of Texas Archeological Research Laboratory
University of Texas Bureau of Economic Geology
University of Texas Nonvertebrate Paleontology Laboratory
Westlake Chamber of Commerce
Westlake Hills City Inspector
Westlake Hills Fire Department
Westlake Picayune newspaper

Preserve staff wrote a column for the local weekly newspaper, the Westlake *Picayune.* Originals and copies of these articles are on file in the main offices in the EEC. Land management staff members also wrote articles for the preserve's *Wild Ways* newsletter.

Visitation
In 2007, preserve staff tracked the number of self-guided visitors, using the two (2) trailhead sign-in boxes located near the Environmental Education Center (EEC). While this is by no means a perfect record of every visitor on a self-guided hike, it at least provides us baseline data of 3127 recorded this year (1367 children and 1760 adults). See Appendix for breakdown of visitors by month.

Habitat Maintenance and Restoration
Please note that land management activities use only native Ashe juniper for trail/water bars and native limestone for boulders, steps and gravel where needed on or off the preserve's trails. No old-growth junipers or other native hardwoods are cut down in the preserve for such use. All trail maintenance and land management activities avoid impact or disturbance of the preserve's cultural/archeological resources.
Total volunteer time: 587 hours.

1. <u>Trail Maintenance</u>
    a. General - all 3.2 miles of trails in the preserve received maintenance. (No trail maintenance was performed during GCWA breeding season (15 March – 15 July) in/on those sections of the trails where the warblers were sighted.) This work included maintaining, replacing and/or installing thirteen (13) new water bars, building six (6) steps in steep areas, building and maintaining various diversion channels to carry water off the trails, replacing/repairing several creek-crossing step stones following flashflood events, clearing downed trees and fallen limbs from trails, rebuilding/repairing trail surfaces, pruning trees and brush from trail corridors and resetting forty (40) step stones in muddy portions. Volunteers from the community and area high schools donated 250 hours of their time. Under staff supervision, selected CSR volunteers also performed trail maintenance.
    Pond Trail remained closed for the second year due to silting problems at the retention pond.
    b. Specialized
        i. Eagle Scout candidates continued to perform valuable land management projects on a volunteer basis for the preserve. They were supervised by staff in consultation with their scout leaders and parents:
            (a) a 75-yard fence-rail barrier
            (b) Twenty-seven (27) new trail signs.

ii. College interns Kate Krueger (UT-Austin), Kate Wilkins (UT-Austin), and Liz Huster (Concordia University) volunteered 196.75 hours of their time assisting preserve staff in various land management activities.

2. Restoration
    a. General - Preserve staff and volunteers continued to aggressively remove invasive, non-native species such as Japanese honeysuckle, Chinese tallow, chinaberry, pyrocantha, ligustrum, nandina, King Ranch bluestem, Johnson grass, vitex, Georgia Cane and others. With herbicidal-treatment assistance from Travis County biologists Paul Fushille and Amber Gosselin, preserve staff and volunteers removed nearly all remaining Georgia cane (*Arundo donax*). The Native Plant Society of Texas also assisted in this effort and donated native plants, seed and labor for revegetating this, and other affected, areas. Overall, volunteers donated 337 hours of their time performing habitat restoration in 2007. For excessive woody-plant debris due to cutting for restoration or fire-defense purposes, Travis County Road and Bridge supplied an industrial chipper. Most resulting mulch is used for preserve projects.
    b. Cultural resources – Carolyn Spock of UT's Archeological Research Laboratory consulted with preserve staff on best practices and methods for ensuring the protection and integrity of cultural/archeological resources in the preserve.
    c. Deer exclosures – in consultation with Texas Parks & Wildlife and Travis County biologists, preserve staff continued emplacing "deer exclosures" of hog wire/wire cages around stands of native trees and shrubs (such as Shin oaks and Texas red oaks, escarpment black cherries, Texas persimmon, coralroot orchids and twisted-leaf yucca, among others) to prohibit excessive browse by deer and other animals.
    d. Fire ants – only one (1) nest of these invasive, non-native insects was found and treated on the preserve this year.
    e. Wildfire Defense – In consultation with Texas Forest Service Urban-Wild Lands Interface specialists, preserve staff continued performing recommended measures related to creating a defensible-space around the EEC and along the driveway perimeter. Retired Austin Fire Department officer Steve Baker volunteered 18 hours assisting preserve staff and directing volunteers in these endeavors.
    f. Conservation Easement – ending a four year management contract, the Wild Basin Board transferred the 8.51 acres Dell conservation easement to the Hill Country Alliance.

Security

1. Emergency Procedures – preserve staff compiled an emergency policies and procedures manual to be followed in case of emergency on/adjacent to/threatening the preserve. This manual covers staff, volunteers and visitors at the preserve. Please see Appendix for the complete manual.
2. Fence construction – in cooperation with Travis County staff and their subcontractor for fence construction, preserve staff coordinated the completion of a secure fence in January 2007 along the entire southern boundary of the preserve.
3. General – preserve caretaker continued to provide overnight security by patrolling the grounds and discouraging overnight illegal entry into the preserve by locking the gate overnight. Sonitrol was once again contracted to provide silent alarm services and notification to staff in event of attempted break-ins to the EEC.
4. Visitors – signage and interpretive media warned about
    a. fire danger
    b. personal safety in extreme heat
    c. potential encounters with wildlife and related precautions.

Building Infrastructure

1. Environmental Education Center (EEC)
    a. General - under the direction of preserve staff, community service restitution (CSR) volunteers regularly cleaned and maintained the EEC's interior and performed exterior maintenance work on an as-needed basis. When required, other maintenance was performed by qualified maintenance professionals/technicians.
    b. Specialized – the EEC library was renamed the Founders Room in recognition of their extraordinary and continued services and efforts for the preserve.
2. Information Technology (IT) – staff enlisted the volunteer services of Mark Czigan, to stabilize and upgrade the EEC's IT and telephone infrastructure. Mr. Czigan donated 174.25 hours of his time in 2007.

THE COMMITTEE FOR WILD BASIN WILDERNESS, INC.

The Committee for Wild Basin Wilderness, Inc., is a registered, non-profit organization dedicated to promoting responsible environmental stewardship through education. The mission of The Committee for Wild Basin Wilderness, Inc., is stewardship of the urban wilderness of Wild Basin, and to promote land preservation and environmental education. Wild Basin's vision is to become Austin's urban wilderness education treasure, serving as the gateway to the Balcones Canyonlands.

Structure

The Board of Directors of the Committee for Wild Basin Wilderness, Inc., is comprised of nine members. Under the direction of Board members are three standing committees: Executive, Education and Land Management.

Board Members

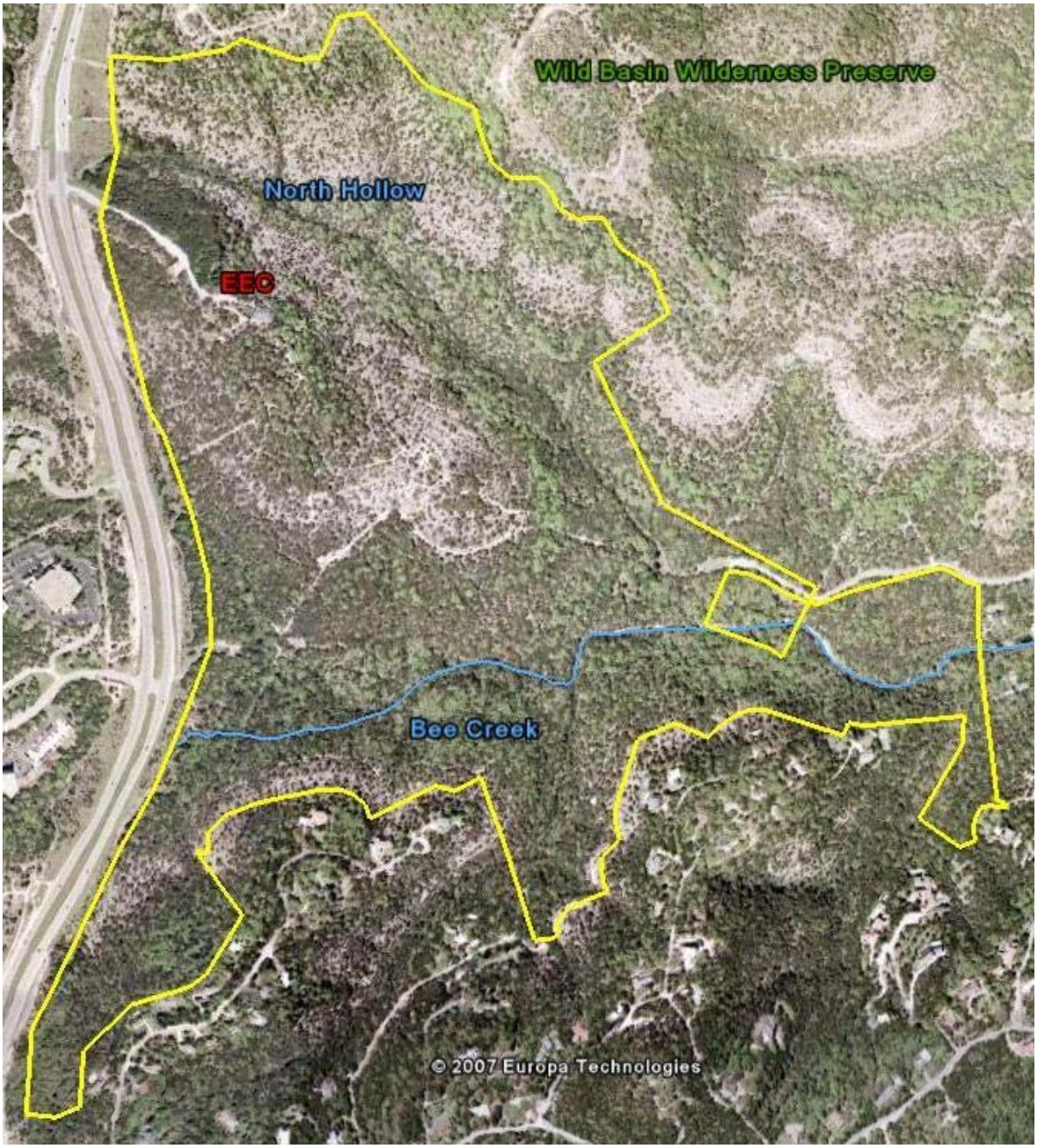
President – Roy Keithley
Vice President – Jo Ann Merica, J.D.
Secretary – Peggy Corkran
John Abbott, Ph.D.
Carol Dwyer
Linda Edwards
Helene Engler-Chaouat, Ph.D.
Allan Hook, Ph.D.
Constance Mullen

Advisors to Board Members

Pat Barnes, J.D.
Martha Hudson, Founder
Flo Macklin, Founder
Flora McCormick, Founder

Staff

Karen Jager – Interim Director
Genevieve Lung – Volunteer Coordinator, Office Manager
Liz Huster – Ranger (part-time)
Echo Machuca – Ranger (part-time)
Joe Machuca – Ranger (part-time)
Elizabeth Pardue – Education Assistant
Mike Powers – Caretaker, Land Manager
Sally Scott – Ranger (part-time)



AERIAL VIEW OF WILD BASIN WILDERNESS PRESERVE

APPENDIX

Golden-cheeked Warbler (GCWA) Survey Results 2007
Wild Basin Species and Items of Interest 2006
Wild Basin Plant List "The Vegetation of Wild Basin"
Wild Basin Animal List "The Vertebrates of Wild Basin"
Wild Basin Bird Checklist 2006
Wild Basin Deer Census 2007
Wild Basin Self-Guided Visitors 2007

WILD BASIN WILDERNESS PRESERVE
GOLDEN-CHEEKED WARBLER SURVEY – SPRING 2007
TRAVIS COUNTY, TEXAS

Prepared for:
Travis County Natural Resources
1010 Lavaca
Austin, Texas 78701

Prepared by:
Joe Beach,
Program Manager
Wild Basin Wilderness Preserve/Committee for Wild Basin Wilderness, Inc.
Austin, Texas 78746

1.0 INTRODUCTION

In accordance with Travis County's 10[a] Permit, the Committee for Wild Basin Wilderness, Inc. conducted surveys for the federally listed endangered golden-cheeked warbler *(Dendroica chrysoparia*), on the 227-acre Wild Basin Wilderness Preserve located in West Lake Hills and Austin, Texas, in the spring of 2007. Wild Basin employed Joe Beach, Program Manager, to conduct the surveys in order to determine the presence or absence of golden-cheeked warblers on the Preserve. Mr. Beach previously surveyed for golden-cheeked warblers in Wild Basin in 2006. The study area is located approximately 6 miles northwest of downtown Austin and features 2.5 miles of hiking trails, which meander through woodlands, grasslands, and streamside habitats. The preserve is bordered by single-family residential development to the south, east and north, and by Capital of Texas Highway (Loop 360) to the west.

2.0 BIOLOGICAL BACKGROUND

2.1 GOLDEN-CHEEKED WARBLER *(Dendroica chrysoparia*)

Description: The golden-cheeked warbler (GCWA) is a medium-sized (length ca. 12–13 centimeters) insectivorous songbird. Breeding adult males have black on the forehead, crown, nape, and back. The cheeks are a bright golden yellow and are interrupted by a black eyeline. The throat and upper breast are black, which continues as streaking along the sides and flanks. The remaining underparts are white. The wings are black with two distinct white wing-bars. Adult females are similar in coloration, but are comparatively duller; the crown and back are olive-green with some black streaking (Oberholser, 1974; Pulich, 1976; Ladd and Gass, 1999).

Habitat: In Texas, the GCWA inhabits mature oak-juniper woodlands in the Edwards Plateau, Lampasas Cut-Plain, and Llano Uplift regions, and to a lesser extent on portions of the Comanche Plateau, Western Cross Timbers, and North-Central Prairies (Ladd and Gass, 1999; Lockwood and Freeman, 2004). Various oak species *(Quercus* spp.) and Ashe juniper *(Juniperus ashe*i) are the dominant tree species throughout the GCWA's breeding range. Texas red oak *(Quercus buckley*i), plateau live oak *(Quercus virginiana* var. *fusiformis*), post oak *(Quercus stellat*a), cedar elm *(Ulmus crassifoli*a), walnut *(Juglans* spp.), hackberry *(Celtis* spp.), and Texas ash *(Fraxinus texensis*) are common components, particularly in the central part of the species' range (Ladd, 1985; Ladd and Gass, 1999). GCWAs use the shredding bark of mature Ashe junipers for constructing nests and, therefore, require some mature junipers in their nesting habitat, but may occur in areas with very little juniper provided that other key components of their habitat are present. GCWAs typically occur in areas of steep slopes, canyon heads, draws, and adjacent ridgetops, but may occur elsewhere provided suitable habitat is present (Pulich, 1976; Ladd and Gass, 1999).

Range: The GCWA is the only bird species that nests exclusively within the state's boundaries. The species historically nested in 41 of Texas' 254 counties; however, current confirmed breeding records exist from 27 Texas counties (Pulich, 1976; U.S. Fish and Wildlife Service [FWS], 1995; Texas Ornithological Society [TOS], 1995; Lasley et al., 1997; Ladd and Gass, 1999; Lockwood and Freeman, 2004).

Currently, the species is a rare to locally common summer resident from Young and Palo Pinto counties, south through the eastern and south central parts of the Edwards Plateau to Real and Uvalde counties (Lockwood and Freeman, 2004). GCWAs winter in pine and pine-oak woodlands in the highlands of southern Mexico, Guatemala, Honduras, and Nicaragua (Ladd and Gass, 1999).

Status: On 4 May 1990, FWS published an emergency listing of the GCWA as endangered (55 FR 18844) as well as a proposed rule to formally list the GCWA as endangered. On 27 December 1990, FWS published the final rule for listing as endangered (55 FR 53153). The Texas Parks and Wildlife Department (TPWD) also lists the species as endangered.

Most researchers conclude that the population decline of the GCWA is a result of various factors related to habitat reduction and fragmentation (Wahl *et al*., 1990; FWS, 1992; Ladd and Gass, 1999). Oberholser (1974) discussed three main causes for the decline in the amount of suitable habitat: (1) land clearing for agricultural use; (2) land development; and (3) reservoir construction. In addition, nest parasitism by the brown-headed cowbird *(Molothrus ate*r) has likely contributed to the GCWA's population decline (Pulich, 1976; FWS, 1992; Ladd and Gass, 1999).

2.2 PREVIOUS SURVEYS

PBS&J conducted presence/absence surveys within the 227-acre tract during the spring 2003, 2004, 2005 amd 2006 survey seasons, during which time GCWAs were detected.

In the 2006 Annual Report from the Committee for Wild Basin Wilderness, Inc., presented to and approved by Travis County Commissioner's Court in 2007, Mr. Beach documented the presence of GCWAs at Wild Basin as far back as 1997. This was determined from surveys conducted by PBS&J and prior surveyors.

3.0 STUDY AREA AND METHODS

The dominant vegetation communities on the property are juniper-oak woodland and mixed shrubland. The dominant species occurring within the juniper-oak woodland include Ashe juniper, Texas red oak, plateau live oak, and Texas mountain laurel *(Sophora secundiflora*). Other associated species include elbowbush *(Forestiera pubescens*), Texas persimmon *(Diospyros texana*), Texas redbud *(Cercis canadensis* var. *texensis*), agarita *(Berberis trifoliolata*), silktassel *(Garya ovata*), escarpment black cherry *(Prunus serotina*), cedar elm *(Ulmus crassifolia*), hackberry *(Celtis* sp.), black willow *(Salix nigra*), eastern cottonwood *(Populus deltoides*), American sycamore *(Platanus occidentalis*), and twist-leaf yucca *(Yucca rupicola*). The mixed shrubland community occurs primarily on the canyon side slopes where selective cutting has occurred in the past or in natural openings within the woodlands. This shrubland community is dominated by evergreen sumac *(Rhus virens*), Texas mountain laurel, plateau oak, and young Ashe juniper. Other associated species within this habitat include agarita, curly mesquite grass *(Hilaria belangeri*), and Texas persimmon.

Mr. Beach performed the presence/absence surveys in accordance with the procedures outlined by FWS. Current FWS survey protocol establishes the GCW survey season as 15 March to 15 May. Furthermore, Mr. Beach adhered to guidelines set by Travis County, which stipulate that eight surveys be conducted in a.study area during the survey season. Mr. Beach conducted the initial survey on the property on 8 March 2007 as he heard a singing male that day while performing the North Hollow watershed survey. Mr. Beach surveyed the entire study area on eight separate visits from 8 March to 8 June 2007 (due to spring rains and other inclement weather conditions, he finished as soon after 15 May as he could). Mr. Beach did not use tapes or playback recordings to elicit responses from the target species. Mr. Beach conducted these surveys. Attached as an Excel spreadsheet, *2007 Observed GCWA populations for Wild Basin* presents data including survey dates, weather conditions, general comments, and time spent per survey visit. Mr. Beach performed surveys using the spot-mapping method, as described by the International Bird Census Committee (IBCC, 1970). Mr. Beach recorded field observations on a U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Austin West, Texas

quadrangle). Table 1 presents additional bird species that Mr. Beach recorded within the study area during the 2007 survey period.

TABLE 1
AVIAN SPECIES RECORDED DURING THE SPRING 2007 SURVEY SEASON
WILD BASIN WILDERNESS PRESERVE

Common Name followed by Scientific Name [1]
Double-crested Cormorant *Phalacrocorax auritus*
Great Blue Heron *Ardea herodias*
Green Heron *Butorides virescens*
Black Vulture *Coragyps atratus*
Turkey Vulture *Cathartes aura*
Sharp-shinned Hawk *Accipiter striatus*
Red-shouldered Hawk *Buteo lineatus*
Red-tailed Hawk *Buteo jamaicensis*
Northern Bobwhite *Colinus virginianus*
Franklin's Gull *Larus pipixcan*
Mourning Dove *Zenaida macroura*
White-winged Dove *Zenaida asiatica*
Common Ground-dove *Columbina passerina*
Rock Dove (Feral Pigeon) *Columbia livia*
Yellow-billed Cuckoo *Coccyzus americanus*
Greater Roadrunner *Geococcyx californianus*
Chuck-will's-widow *Caprimulgus carolinensis*
Chimney Swift *Chaetura pelagica*
Black-chinned Hummingbird *Archilochus alexandri*
Ruby-throated Hummingbird *Archilochus colubris*
Belted Kingfisher *Ceryle alcyon*
Red-bellied Woodpecker *Melanerpes carolinus*
Ladder-backed Woodpecker *Picoides scalaris*
Eastern Phoebe *Sayornis phoebe*
Olive-sided Flycatcher *Contopus cooperi*
Eastern Wood-Pewee *Contopus virens*
Great Crested Flycatcher *Myiarchus crinitus*
White-eyed Vireo *Vireo griseus*
Yellow-throated Vireo *Vireo flavifrons*
Blue Jay *Cyannocitta cristata*
Western Scrub-Jay *Aphelocoma californica*
Common Raven *Corvus corax*
American Crow *Corvus brachyrhynchos*
Purple Martin *Progne subis*
Cliff Swallow *Petrochelidon pyrrhonota*
Barn Swallow *Hirundo rustica*
Carolina Chickadee *Poecile carolinensis*
Black-crested Titmouse *Baeolophus atricristatus*
Carolina Wren *Thryothorus ludovicianus*
Bewick's Wren *Thryomanes bewickii*
Golden-crowned Kinglet *Regulus satrapa*
Ruby-crowned Kinglet *Regulus calendula*
Blue-gray Gnatcatcher *Polioptila caerulea*
Swainson's Thrush *Catharus ustulatus*
Hermit Thrush *Catharus guttatus*
American Robin *Turdus migratorius*
Gray Catbird *Dumetella carolinensis*
Northern Mockingbird *Mimus polyglottos*
Cedar Waxwing *Bombycilla cedrorum*
Tennessee Warbler *Vermivora peregrina*
Orange-crowned Warbler *Vermivora celata*
Nashville Warbler *Vermivora ruficapilla*

Northern Parula *Parula americana*
Yellow-rumped Warbler *Dendroica coronata*
Golden-cheeked Warbler *Dendroica chrysoparia*
Black-throated Green Warbler *Dendroica virens*
Yellow-throated Warbler *Dendroica dominica*
Black-and-white Warbler *Mniotilta varia*
American Redstart *Setophaga ruticilla*
Common Yellowthroat *Geothlypis trichas*
Spotted Towhee *Pipilo maculatus*
Rufous-crowned Sparrow *Aimophila ruficeps*
Field Sparrow *Spizella pusilla*
Chipping Sparrow *Spizella passerina*
Summer Tanager *Piranga rubra*
Northern Cardinal *Cardinalis cardinalis*
Indigo Bunting *Passerina cyanea*
Painted Bunting *Passerina ciris*
Common Grackle *Quiscalus quiscula*
Orchard Oriole *Icterus spurius*
House Finch *Carpodacus mexicanus*
Lesser Goldfinch *Carduelis psaltria*

[1] Nomenclature follows the American Ornithologist's Union's *Check-list of North American Birds* (1998, 2000, 2002, 2003, and 2004).

4.0 RESULTS

Mr. Beach conducted GCWA surveys on the project site between 8 March and 8 June 2007, which included eight visits totaling approximately 51.25 survey hours. Mr. Beach recorded GCWAs on eight of eight survey days, representing six to seven possible territories. Territory maps provided to Travis County present the locations and direction of movement of the GCWA sightings on the property, with individual observations represented by the appropriate IBCC symbol.

On the initial survey (8 March), Mr. Beach detected one male GCWA by vocalization only ("A-Song"). This occurred as Mr. Beach was performing the North Hollow watershed survey, hence the lateness of the starting hour.

On 10 March, Mr. Beach observed three adult males. Mr. Beach visually verified all three of the males. Male vocalizations were limited to the "A-Song" (*i.e.*, unmated).

On 31 March, Mr. Beach observed six adult male GCWAs. All six males were visually verified. Male vocalizations observed during this visit were all "A-Song."

On 6 April, Mr. Beach documented five adult male GCWAs and two adult female GCWAs, representing two to three possible territories. Two of these individual males could not be precisely located, and were detected by song alone. Both females were visually verified. All male vocalizations were both "A-Song" and "B-Song." Females were observed chipping.

On 14 April, Mr. Beach observed four adult male GCWAs and two adult female GCWAs. Two of the males which were detected by sound. Male vocalizations observed during this visit were both "A-Song" and "B-Song." Females were observed chipping.

On 20 April, Mr. Beach observed ten adult GCWAs (six male, four female), including adult pairs along North Hollow, Brown's Hollow, near "the Pond" and along Bee Creek nearWild Basin Ledge. The male/female pairs were visually verified, and appeared to be breeding pairs, although nests were not located. These pairs were observed chipping (female) and singing "B-Song" (male), and were located by movement in the tree canopy. Two other male GCWAs were visually verified.

On 5 May, Mr. Beach observed eight adult GCWAs (five male, three female), representing three possible territories. The males were singing the "A-Song" and "B-Song" and moving around

quite a bit. Females were observed chipping. All three females were visually verified. Three males were visually verified; the other two males could not be precisely located and were detected by song alone. No nests were found.
On the final surveys (4 and 8 June), a total of thirteen (13) GCWAs were observed. This includes four (4) males visually verified, four (4) females visually verified, and five (5) fledglings visually verified. The fledglings may have been from three different territories and were all chipping and begging food from the adults accompanying them. Females were observed chipping. Adult males were observed chipping or buzzing.

5.0 SUMMARY

Mr. Beach recorded 49 GCWAs of which 34 were adult males, and 15 were adult females representing 6 to 7 possible territories. This represents an increase from 2006's 24 observed GCWAs. This represents a potential increase of two (2) breeding territories since 2005. These increases occurred despite our Easter ice and sleet storm, which occurred 7-8 April 2007.
Forty-two (42) of the 49 recorded GCWAs were visually verified. Individual GCWAs were likely recorded on multiple occasions during repeated visits; therefore, the total number of GCWAs within Wild Basin is likely less than the number recorded. Five (5) fledgling GCWAs were observed and visually verified during the spring 2007 survey period. Territory maps provided to Travis County present the locations and direction of movement of the GCW sightings on the property.
The survey results indicate that one to two of the potential territories may be totally encompassed within the subject property. The property contains at least 125 acres of suitable GCWA habitat. Table 1 presents additional bird species that were recorded within the study area during the 2007 survey period.

6.0 LITERATURE CITED

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Observed GCW Populations at Wild Basin, 2007

as recorded by Joe Beach, observer

Date	Male	Female	Fledgling	Time (CT)
3/8/2007	1	0	0	9:30A-12:30A
3/10/2007	3	0	0	7:45AM-1:45PM
3/31/2007	6	0	0	7:20AM-1:50PM
4/6/2007	5	2	0	8:45AM-2:45PM
4/14/2007	4	2	0	7:45AM-1:45PM
4/20/2007	6	4	0	7:00AM-2:15PM
5/5/2007	5	3	0	7:00AM-3:00PM
6/4&8/2007	4	4	5	6:45AM-3:15PM

Temperature	Wind Direction & Speed (mph)	Cloud Cover	Song	Notes
66-71	None	0	"A"	Performing watershed survey when GCWA heard, hence late start
62-78	E/NE/0-5	30-0	"A"	
51-65	N/NW/5-20	100-0	"A"	
52-66	N/5-10	80-30	"A," "B," female chipping	Late start to allow temp to go above 50 degrees
54-60	N/20-30	70-20	"A," "B," female chipping	Cold front moved through during survey; winds died down
56-77	S/SE/0-15	90-0	"A," "B," female chipping	
71-83	S/15-20	100-100	"A," "B," female chipping	Occasional light showers and misting; winds started ~11AM
64-85/76-86	S/5-10	0-20/100-40	Fledglings chipping and begging food from adults.	Had to split this survey into 2 days. No wind 6/8.

2006 List of Wild Basin Species & Items of Interest

We should all note when and where we see any of these species/items of interest and take measures to preserve them (*e.g.*, exclosures, labeling them or the closest "common" plant/tree to them, rerouting trails, etc.). This list includes species currently found in or historically found in Wild Basin. This list is a dynamic document and is updated as necessary/required by reliable observations by staff and/or experts and/or Travis County Natural Resources.

- * = Hypothetical listing (no current or historical records of this species being found in Wild Basin)
- [h] = Historical listing of (no current or recent records of this species being found in Wild Basin)

Bird Species (from Joe Beach and Rose Farmer; and from *Annotated County List of Rare Species for travis.doc* from Texas Parks & Wildlife, 2005 edition. Hereinafter referred to as TPWD 2005 document)

- *Primary Species of Interest* (these 3 species are currently on Endangered Species List)
  1. [h] Black-capped Vireo (*Vireo atricapilla*)
  2. Golden-cheeked Warbler (*Dendroica chrysoparia*)
  3. *Bald Eagle (*Haliaeetus leucocephalus*)
- *Secondary Species of Interest* (none of these is on Endangered Species List)
  1. Golden-fronted Woodpecker (*Centurus aurifrons)*
  2. Common Raven (*Corvus corax;* first recorded in 2006 at Wild Basin as this bird expands its range east and south)
  3. *Henslow's Sparrow (*Ammodramus henslowii*)
  4. Belted Kingfisher (*Megaceryle alcyon;* an indicator of stream health)
  5. *Green Kingfisher (*Chloroceryle americana;* no sightings yet in Wild Basin but recorded elsewhere in Travis County as this bird expands its range)

Insect and Arachnid Species

All BCP endangered insect species are cave-dwellers, and though we all know the dangers of never saying "never," those species are not listed here since we are not aware of nor are we trying to find or preserve caves on Wild Basin property. The following **Insect** species are listed as indicators of stream health, and are taken from TCEQ's *Water Education Field Guide* (TCEQ: Austin, TX, 6/2003 edition; publication number GI-026) and the national Save Our Streams group of the Izaak Walton League of America (http://www.ikes.org/)

Group One Taxa (most sensitive to any pollution or increase in sedimentation &/or turbidity in water quality. Only found in good quality water)

1. Mayfly (Order: *Ephemeroptera*)
2. Stonefly (Order: *Plecoptera*)
3. Caddisfly (Order: *Trichoptera*)
4. Water Penny (Order: *Coleoptera*)
5. Riffle Beetle (Order: *Coleoptera*)
6. Whirligig Beetle (Order: *Coleoptera*)
7. Dobsonfly (*Hellgrammite*; Family: *Corydalidae*)

Group Two Taxa (somewhat pollution tolerant organisms; can be found in good or fair quality water)

1. Sowbug (Order: *Isopoda*)
2. *Alderfly (Family: *Sialidae*)
3. Fishfly (Family: *Corydalidae*)
4. Damselfly (Suborder: *Zygoptera*)
5. *Watersnipe Fly (Family: *Athericidae [Atherix]*)
6. Crane Fly (Suborder: *Nematocera*)
7. Dragonfly (Suborder: *Anisoptera*)
8. Beetle Larva (Order: *Coleoptera*)
9. Diving Beetle (Order: *Coleoptera*)
10. Water Boatman

Mammal Species

1. ***Plains Spotted Skunk (*Spilogale putorius interrupta*)
2. Bobcat (*Lynx rufus*)

Mollusks, Crustaceans, Worms, Leeches and Fishes – After consulting with Elisabeth Welsh of Austin Youth RiverWatch and TCEQ about how best to monitor, identify, preserve and learn from species of interest here, the following species are listed in order of their sensitivity to pollution. For example, Group One taxa are the most sensitive to any pollution and/or sudden increase in sediment load in streams; Group Two taxa are somewhat sensitive and Group Three taxa are considered "pollution tolerant" according to TCEQ's *Water Education Field Guide* and the national Save Our Streams group of the Izaak Walton League of America (http://www.ikes.org/)

Group One Taxa (most sensitive to any pollution or increase in sedimentation &/or turbidity in water quality. Only found in good quality water)

1. *Grass Shrimp
2. Gilled Snail (Class: *Gastropoda*)

Group Two Taxa(somewhat pollution tolerant organisms; can be found in good or fair quality water)

1. Scud (Order: *Amphipoda*)
2. Crayfish (Order: *Decapoda*)
3. Coiled Snail (Class: *Gastropoda*)

Group Three Taxa (pollution tolerant organisms that can be found in any quality of water)

1. Freshwater Clam (Class: *Bivalvia*)
2. Grilled Snail, Pouch Snail and Pond Snail (Class: *Gastropoda*)
3. *Aquatic Worm (Class: *Oligochaeta*)
4. Leeches (Order: *Hirudinea*)

Plant Species of Interest for Wild Basin:

- *Primary Species of Interest*
  1. Sycamore-leafed Snowbell (*Styrax platanifolius*)
  2. Bracted Twistflower (*Streptanthus bracteatus*)
  3. Naked broom-rape (*Orobanche uniflora*)
  4. Shooting-star (*Dodecatheon meadia*)
  5. Texas Madrone (*Arbutus xalapensis*)

- *Secondary Species of Interest*
    1. Two-flower Anemone (*Anemone edwardsiana*)
    2. Texabama croton (*Croton alabamensis* var. *texensis*)
    3. Canyon mock-orange (*Philadelphus ernestii*)
    4. Texas amorpha (*Amorpha roemerana*)
- *Tertiary Species of Interest*
    1. Glass Mountains coral-root (*Hexalectris nitida*)
    2. Crested coral-root (*Hexalectris spicata*)
    3. Heller's marbleseed (*Onosmodium helleri*)
    4. Buckley tridens (*Tridens buckleyanus*)
    5. *Correll's false dragon-head (*Physostegia correllii)*
    6. Louisiana broom-rape (*Orobanche ludoviciana*)

Reptile and Amphibian Species

- *Primary Species of Interest* (these two species are listed as "threatened" in TPWD 2005 document)
    1. [h] Texas Horned Lizard (*Phrynosoma cornutum;* introduced into the Preserve ~1990 but unable to establish permanent residency. No recent confirmed reports or sightings)
    2. *Timber/Canebrake Rattlesnake (*Crotalus horridus*)
- *Secondary Species of Interest* (again, this is taken from TPWD 2005 document)
    1. *Spot-tailed Earless Lizard (*Holbrookia lacerate*)
    2. *Texas Garter Snake (*Thamnophis sirtalis annectens*)

Rocks/Mineral Resources of Interest

- This includes archeological, anthropological and geological resources of interest. As Wild Basin contains two sites are of archeological value, we do not make their locations known to the general public. Please contact preserve staff for more information on these resources.

THE VEGETATION OF WILD BASIN

By John E. Williams

The vegetation along the eastern escarpment of the Edwards Plateau has been likened unto a coastline whereat a “sea” of vegetation from the Gulf coastal plain to the east, dominated by tall grasses and primarily eastern species of trees, crashes up against the higher plateau which is dominated by shorter grasses and scrub (Tharp, 1926). While the analogy may not be entirely accurate, the Balcones Fault zone does represent a broad belt of transition between two distinct floristic regions.

A large proportion of the species that grow on the coastal plain do disappear from the scene as one moves from east to west across the faulted belt, but then again, some “eastern” species are able to grow well onto the plateau or even all the way across it, especially along river valleys and streams. Conversely, a large proportion of the “desert” and “great plains” species occur all the way up to the escarpment but no further east, while some of these species range considerably further eastward.

There are many pairs of closely related species, one member of which occurs on the coastal plain while the other member occurs on the Edwards Plateau. And, as with any transition or tension zone between major regions or vegetation types, there are species adapted to existence in the transition zone and no where else.

The Wild Basin of Bee Creek is located on the eastern edge of the Edwards Plateau along this zone of transition. The dominant arborescent vegetation consists mostly of Edwards Plateau species related to, and probably derived from, nearby species of the coastal plain, while the frutescent and herbaceous strata reflect a considerable intermixing of

“eastern,” “western,” “broadly distributed,” as well as endemic species.

On the upper slopes of the hills at Wild Basin there exists a cedar (= juniper) grassland in which the tree canopy is not continuous, the shrub layer is sparse, and grasses dominate the open spaces. On the lower, less dolomitic slopes, there is a denser cedar-oak woodland with an almost continuous overstory, a dense understory, and a sparse ground cover. The latter plant association is represented by a more mesic variation along the stream bottoms while the former association is represented by a wide-open successional grassland along slopes recently subjected to fire. (NOTE: Throughout this report the common name “cedar” will be used in preference to the common name “juniper.” Both names are locally used to refer to the same plant, Juniperus ashei.)

METHODS

Collections of plants were made only when field identifications were uncertain. The complete list of species observed and collected was then combined with the list compiled by Dr. Marshall C. Johnston and others in 1974 and 1975. The combined list is Table VI of this report.

The arborescent, overstory vegetation was analyzed statistically using the plotless sampling technique developed and modified by Cottam and Curtis (1949, 1955: see also Rice and Penfound, 1955). This technique was judged superior considering the time available for the study.

Information was collected at 100 sampling points along seven transects (see map). These transects were (1) roughly parallel to the low road, (2) roughly parallel to a portion of Wild Basin Ledge Road, (3) roughly parallel to the south fenceline of the old Robinson Ranch, (4) roughly parallel to the

west fenceline of the old Robinson Ranch, (5) along the northwest trail (not shown on map), (6) along the Noack Hill trail, and (7) along Bee Creek.

At each sampling point, two poles were laid down roughly parallel and perpendicular to the line of travel. The distance (d) to the closest tree in each of the four quadrants marked by the poles was recorded, along with their species and crown radius (r). In addition, the number of individuals of each species of shrub, woody vine, and seedling tree occurring in a four-by-four meter area centered on the sampling point was recorded.

For the purposes of this investigation, any woody plant greater than 3 meters in height (9 feet 10 inches, or about twice shoulder-height of the investigator) and emergent (i.e., not overshaded by any adjacent tree) was eligible for inclusion in the overstory data. Only woody plants less than 3 meters in height were included in the shrub counts.

The raw information collected in the field was then combined to show the information presented in Tables I through V. The combined data from the 19 sampling points along the Bee Creek transect are presented in Table II. The criterion for classifying the remaining 81 sampling points into communities with closed (Table I), semi-open (Table III), or wide-open (Table IV) canopies was the mean distance($\bar{D}$)measured at each point. Since the mean distance for all the 100 points measured could be subject to bias (i.e., by the number of points taken in areas with a closed canopy versus the number in areas with an open canopy, etc.), it was decided to base cutoff values for $\bar{D}$ on some factor of the mean tree size of all trees measured($\bar{R}$) (i.e., at all 100 points).

If all trees were of exactly mean size and were perfectly evenly distributed in an area (on a hexagonal rather than a square grid) such that no additional mean-sized trees could be inserted in the open areas between the existing trees without the crowns overlapping, then the maximum mean distance measured by the Cottam and Curtis method would be less than $2.37\bar{R}$. At measured distances of greater than $3.61\bar{R}$ the existing trees are more than two tangential tree diameters apart (measuring from edge of crown to edge of crown). These two values, arrived at theoretically, were then taken as the cutoff values for $\bar{D}$, but only after all the raw data were collected were the sampling points sorted accordingly.

For each of the four areas represented by Tables I through IV, the raw data were manipulated in the following manner.

N = the number of sampling points in each of the four areas
- = 42 for Table I
- = 19 for Table II
- = 24 for Table III
- = 15 for Table IV

$\bar{d}$ = mean distance measured to all trees in each area (i.e., in each table, not to be confused with $\bar{D}$ which is the mean distance to all trees at each point)

(NOTE: $(\bar{d})^2 \neq \overline{d^2}$)

$\bar{r}$ = mean radius of crown of each species in each area (i.e., in each table, not to be confused with $\bar{R}$ which is the mean radius of all trees at all 100 points)

(NOTE: $\overline{r^2} \neq (\bar{r})^2$)

Raw frequency = number of points at which a species occurs

Raw density = number of individuals of each species encountered

$$\text{Frequency} = \frac{\text{raw frequency}}{N} \times 100\%$$

$$\text{Relative frequency} = \frac{\text{raw frequency}}{\text{sum of the raw frequencies}} \times 100\%$$

$$\text{Density of trees} = \text{total density} \times \frac{\text{relative density}}{100\%}$$

$$\text{Total density of trees} = (10{,}000\ m^2/ha)/(\bar{d})^2 \text{ for distance measured in meters}$$

$$= (43{,}560\ ft^2/A)/(\bar{d})^2 \text{ for distance measured in feet}$$

$$\text{Relative density of trees} = \frac{\text{raw density}}{4N} \times 100\%$$

$$\text{Density of shrubs} = \frac{\text{raw density}}{16N} \times 100$$

NOTE: this is not a percentage calculation

$$\text{Relative density of shrubs} = \frac{\text{raw density}}{\text{total raw density}} \times 100\%$$

$$\text{Cover} = \text{pi} \times \overline{r^2} \times \text{density}$$

$$\text{Relative cover} = \frac{\text{cover}}{\text{total cover}} \times 100\%$$

$$\text{Importance value of trees} = \frac{\text{relative frequency} + \text{relative density} + \text{relative cover}}{3}$$

$$\text{Importance value of shrubs} = \frac{\text{relative frequency} + \text{relative density}}{2}$$

NOTE: The ecological literature usually refers to what is here called cover as “dominance.” While it is generally correct to assume that species with more cover will be more important in the community, this theoretically need not be the case. Yet, because of its widespread, utilitarian, and almost habitual usage, the term “dominance” and its derivatives will, in this report, refer either to cover or to the importance value. The context of each usage will hopefully clarify the intended meaning.

RESULTS AND DISCUSSION

Cedar-Oak Woodland

The lower slopes of Wild Basin support a woodland dominated by *Juniperus ashei* and *Quercus texana* (Table I). *Quercus fusiformis* is a significant secondary element not only of this woodland, but of all the vegetation areas sampled in the basin. The wide difference in density between *J. ashei* and *Q. texana* is not reflected in an equally wide difference in amount of cover since the crown of the average Texas oak is over 50% larger than that of the average cedar tree. Also, cedars tend to be more clumped together as shown by the lower frequency relative to density. The overstory is virtually continuous and, with overlapping of adjacent trees, total cover is over 60% more than total land area. In such cases, relative cover is a more realistic representation of the amount of actual dominance of each species.

In the shrub layer, no equally small number of species dominated the woodland. Four species account for just over half the importance value, seven species a total of two-thirds, and ten species just over three-fourths. Nearly half of the shrub layer consists of tree seedlings, vines, or cacti and agavaceous plants (roughly 30%, 15%, and 4% respectively).

The ground level is sparsely populated compared to the grasslands and underneath the cedar brakes (pure stands of mature cedars) ground cover is almost non-existent. The shrub layer in the cedar brakes is also considerably less dense.

Cedar-Hardwood Bottomland

Along the major streamsides and in the southern hollows a major variation of the cedar-oak woodland occurs (Table II). The average *Juniperus ashei* is some 60% larger here than in the

normal woodland and so the species dominates a larger relative area with some 15% fewer trees per unit area. Quercus fusiformis still occupies a position of comparable importance as in the woodland, but the average individual is over twice as large. The niche occupied by Q. texana in the woodland is apparently almost completely preempted along the streamsides, and its relative importance in the community is replaced by Fraxinus texensis, Platanus occidentalis, and Juglans microcarpa. Trees are on the whole one-third larger along the streams than in the woodland and thus, though their density is only three-fourths that of the woodland, their total cover is 6% greater (but again, due to overlapping, relative cover is a better estimate of dominance).

Shrub densities are only about 10% less along the streamsides than in the woodland, but the streamsides are more diverse; six species account for just over half the importance value, nine just under two-thirds, and twelve nearly three-fourths. Over half of the shrub layer consists of tree seedlings, vines, or agavaceous plants (roughly 28%, 22%, and 3% respectively) with vines more important here than in the woodland.

The ground layer is equally as sparse as in the woodland except right at streamside or in the streambed itself at even the slightest of openings there is usually found dense stands of switchgrass, big muhly, teosinte, and Johnson grass. In the deeper, denser, moister localities along the creeks can be found maidenhair fern, Mexican-fern, and often other ferns, and nearly everywhere along the streams are the ever-present sedges and rushes.

Cedar Grassland

On the upper slopes, the dominant trees are the same and in the same relative order as in the woodland, but total cover, even ignoring the possibility of overlap between trees in a clump, is less than 50% of the land area. Overall tree densities are markedly less, less than a quarter that of the lower slopes. Trees on the whole are some 30% larger here, and this is almost entirely due to one species, Juniperus ashei, which is over 55% larger here than in the woodland. Texas oaks are roughly equal in size in the two areas. Again, cedar trees exhibit a tendency to be clumped, i.e., have a lower frequency relative to their density.

Shrub densities are just over half of what they are in the woodlands. Four species account for over half the importance value, six for two-thirds, and eight for three-fourths, but generally the most important species are the same as in the woodlands but with more persimmons. Less than half of the shrub layer is made up of tree seedlings, vines, or succulents (roughly 25%, 12%, and 8% respectively).

Grasses (the bluestems, the gramas, buffalo grass, and lovegrass) are the dominant ground cover. Where this cover has been disturbed or removed, channelization of water runoff follows. Owing to the shallowness of the soil, this could become a serious erosional problem, but under natural conditions a minor disturbance would allow for the growth of either of the muhlys or switchgrass, thus stabilizing the erosion. However, under continuous disturbance, not even these can survive and the soil is completely removed aggravating the condition even more. This latter situation has occurred along many of the trails and roadways on the upper slopes and especially in the area indicated on the map as the “Washouts.”

Subclimax Grassland

A fire burned parts of the basin some eleven years ago according to local residents. This fire is still evident by the large, charred cedar stumps, by the blackened and partly destroyed fence posts, and by the structure of the vegetation in the area involved. The burned areas should be cedar grassland as per their position on the upper slopes but tree densities are only a quarter what they should be and total cover less than one-fifth. The wide discrepancy in importance between Juniperus ashei and Quercus texana in the cedar grassland (19.6%) is not in evidence here (only 2.1%). Although the data and tables do not show it, the Texas oaks nearly all grow in tight clusters of five or more main trunks approximately in a circle. This latter observation bears out reports by local residents that Texas oaks grow back quickly after a fire from the root crowns of former trees.

The shrub layer is also markedly sparse (less than 40% that of the unburned slopes) and less diverse. Only three species account for half the importance value, four species almost two-thirds, and five species almost three-fourths. Tree seedlings, vines, and succulents comprise over half of what is there (roughly 25%, 9%, and 18% respectively). Texas oak seedlings are noticeably lacking and succulents are most numerous here.

Ground cover in the areas affected by fire is similar, if not identical, to that of the cedar grassland.

General Observations

In all, 317 species of vascular plants are reported from Wild Basin. Only 18 species, 5.7% of the total, are not native, and of these all but one are restricted either to a few individuals or to a small locality within the basin. The one

exception is Johnson grass which is common but not obnoxious along streams.

Two species at Wild Basin are on the list of rare and endangered plants native to Texas. On a scale of 1 to 7 ranging from abundance to extinction, both are rated as "5" i.e., "scarce, endangered in Texas." Onosmodium helleri, Heller's marbleseed, is known only from Bexar, Kendall, Kerr, and Travis counties in Texas. In Wild Basin this herb is found on the alluvial bottoms, near, but not immediately alongside, the streams, underneath thick growths of shrubs. Pavonia lasiopetala, the Texas or rose mallow, is known from only the eastern and southern edges of the Edwards Plateau in Texas, but is apparently considerably more broadly distributed, if not common, in Mexico. This species was observed by Dr. Johnston as occurring in Wild Basin but not during this study owing to the time of year and the severity of the drought (June and July, 1977).

One well-known species not on the rare and endangered list since it is common and widespread elsewhere in Texas but is nevertheless uncommon on the eastern plateau is Arbutus xalapensis, the Texas madrone. Three mature individuals are known from upper, but sheltered, north-facing slopes below the Noack home. They are doing about as well as can be expected for madrone trees, but there is no evidence of successful reproduction.

Since essentially the same three species of cedar and oaks dominate the basin in all areas except the streamsides, the question can be raised as to the validity of distinguishing the cedar grasslands from the cedar-oak woodlands. The two community types are not sharply or dramatically delineated in the field but gradually blend, one into the other, over a topographic gradient. Could not the extreme regimes, one drier

and the other more mesic, be classified as preclimactic and postclimactic respectively and the true, singular climax community be sought in some intermediate position?

In mapping these two major vegetational types it was observed that the distinction between the more open cedar grassland and the closed-canopy cedar-oak woodland is much more dramatically pronounced in aerial photographs than on the ground. Those areas designated as cedar grassland are light with uniformly scattered, dark, roundish blotches, relatively equal in size. Those areas of cedar-oak woodland are continuously a mottled dark gray with only small, widely scattered light patches corresponding to areas cut by cedar choppers. The boundary between the two as seen from the air (i.e., the zone of transition or ecocline), although still arbitrary (as are all ecological boundaries) is remarkably abrupt and narrow in most places.

Furthermore, the boundary so drawn between the two communities corresponds very closely with the mapped division between the second and third members of the Glen Rose Formation. Now it can be argued that since geologic maps are oftentimes constructed from distinguishing different vegetation types observed in aerial photographs, then this argument has little validity. But it should be emphasized that the initial distinction between the two communities was made in the field on the ground, the statistical differentiation between the two and the mapping of the two were all made without any prior knowledge of the geology of the area. The cedar-oak woodland occurs on north- and south-facing slopes with little variation in general composition between the two directional slopes, and it occurs on tops of lower hills to the east from which the third member of the Glen Rose has been eroded. The cedar grassland occurs on north- and south-facing slopes with little change in tree

density down to approximately the contact between the two rock members.

It is concluded, therefore, that the cedar-oak woodland and the cedar grassland are each edaphic climaxes in their own right, and that the streamside cedar-hardwood woodland represents a postclimax of the former (although it too might be considered as an edaphic climax, being partly restricted by the alluvial flood-prone areas) and the burned-over grassland represents a subclimax of the latter.

There still remains the question of the cedar brakes, of which there are two types, the few, small, widely-scattered brakes hidden among the cedar-oak woodland, and the few, larger brakes on the upper slopes among the cedar grassland. Having presented the argument that the woodland and grassland are climax communities in their own right, the possibility (but only that) will now be argued that the cedar brakes represent the true, ultimate climax situation. The evidence however is indirect and not conclusive and therefore the argument is suspect.

In both types of brakes the cedar trees are very large and hence presumably very old. In both, other woody species, whether shrubs, small trees, or other tree species are generally scarce or even totally lacking. The brakes on the lower slopes and streamsides exhibit a closed canopy with considerable overlapping of adjacent crowns, and extreme paucity of even an herbaceous ground cover, and death of the lower branches of the cedar trees probably due to intense shading. The upper-slope brakes are more open (but tree densities are markedly higher than the surrounding cedar grassland), the branches of the cedars are nearly all living even near ground level, and the small spaces between trees, where they exist, are covered with grasses.

As already noted, Texas oaks germinate from root crowns following a fire. Without the ability to do so, this species would be at a great disadvantage in the race to repopulate the burned-over areas. Cedar trees are much more effective at seedling repopulation; the seedling ratio of cedars to Texas oaks on the burned slopes is nearly 40 to 1, while on the unburned upper slopes the seedling ratio is only 2.9 to 1. In the cedar-oak woodland the seedling ratio is more nearly even, 1.15 to 1, still slightly in favor of the cedars.

While there are large/old Texas oaks that rival the largest/oldest cedar trees, there are, nonetheless, considerably more large/old cedars than Texas oaks in the basin. It is then altogether possible that cedars have a longer statistical life expectancy than do Texas oaks.

This, coupled with the seedling ratios just mentioned, plus the fact that no two trees can occupy exactly the same space, plus the probability that an older tree can out-compete a younger tree (especially seedlings) would indicate that over time and barring disturbance there should be a statistical increase in the mean density, cover, and importance value of Juniperus ashei and a corresponding decrease in those of Quercus texana until some sort of equilibrium is reached. Such a change would proceed faster on the drier slopes than on the lower slopes.

This argument is, however, purely speculative. Until further research indicates otherwise, the basin should be treated as consisting of four major plant communities, two climax, one postclimax, and one subclimax.

TABLE I

Cedar-Oak Woodland

Trees

Species	Frequency	Density[1]	Cover[2]
Juniperus ashei (mountain cedar)	78.6	419.0/ha (169.8/A)	8173
Quercus texana (Texas oak)	57.1	225.6/ha (91.4/A)	6128
Quercus fusiformis (plateau live oak)	21.4	55.2/ha (22.4/A)	905
Ulmus crassifolia (cedar elm)	7.1	23.0/ha (9.3/A)	294
Ilex vomitoria (yaupon)	7.1	13.8/ha (5.6/A)	136
Diospyros texana (Texas persimmon)	2.4	9.2/ha (3.7/A)	147
Miscellaneous 6 species	14.3	27.6/ha (11.2/A)	401
Total	(3)	773.4/ha (313.4/A)	16184[4]

Miscellaneous species:
Arbutus xalapensis, Texas madrone
Bumelia lanuginosa, gum elastic
Celtis reticulata, netleaf hackberry
Cercis canadensis, redbud
Garrya lindheimeri, Lindheimer silktassel
Rhus lanceolata, lance-leaf sumac

(1) ha = hectare, A = acre (1 ha = 2.471 A).
(2) Cover is presented as square meters per hectare (1 ha = 10,000 sq m).
(3) The sum of the frequencies is meaningless.
(4) Values in excess of 10,000 sq m/ha are due to overlapping crowns of adjacent trees.

TABLE I (continued)

Cedar-Oak Woodland

Trees

Species	Relative Frequency	Relative Density	Relative Cover	Importance Value
J. ashei	41.8	54.2	50.5	48.8
Q. texana	30.4	29.2	37.9	32.5
Q. fusiformis	11.4	7.1	5.6	8.0
U. crassifolia	3.8	3.0	1.8	2.9
I. vomitoria	3.8	1.8	.8	2.1
D. texana	1.3	1.2	.9	1.1
Misc. 6 spp.	7.6	3.6	2.5	4.6
Total	100.1(5)	100.1(5)	100.0	100.0

(5) Whenever values are rounded off, a cumulative discrepancy occurs which becomes apparent in the sum of those values.

Shrubs

Species	Type(6)	Frequency	Density(7)
Garrya lindheimeri (Lindheimer silktassel)	LS	73.8	104.5
Juniperus ashei (mountain cedar)	T	85.7	57.3
Quercus texana (Texas oak)	T	69.0	49.7
Rhus toxicondendron (poison ivy)	V	38.1	46.0
Rhus aromatica (fragrant sumac)	S	40.5	25.6
Rhus virens (evergreen sumac)	S	47.6	9.4
Ilex vomitoria (yaupon)	LS	35.7	12.9
Forestiera pubescens (elbowbush)	S	23.8	19.5
Smilax bona-nox (saw greenbriar)	V	31.0	9.5

TABLE I (continued)

Cedar-Oak Woodland

Shrubs

Species	Type[6]	Frequency	Density[7]
Yucca rupicola (Texas yucca)	A	28.6	6.2
Bumelia lanuginosa (gum elastic)	ST	23.8	9.2
Quercus fusiformis (plateau live oak)	T	23.8	8.3
Eysenhardtia texana (Texas kidneywood)	S	16.7	5.7
Ptelea trifoliata (hoptree)	ST	19.0	3.3
Vitis berlandieri (Spanish grape)	V	14.3	5.4
Ulmus crassifolia (cedar elm)	T	16.7	3.6
Eupatorium havanense (shrubby boneset)	SS	16.7	3.3
Cercis canadensis (redbud)	ST	11.9	4.2
Diospyros texana (Texas persimmon)	ST	11.9	2.1
Miscellaneous 18 species		64.3	11.8
Total		(3)	397.5

Miscellaneous species:

Berberis trifoliolata, agarito (S)
Celtis reticulata, netleaf hackberry (T)
Cocculus carolinus, Carolina snailseed (V)
Croton fruticulosus, bush croton (SS)
Fraxinus texensis, Texas ash (T)
Ilex decidua, possumhaw (S)
Mimosa borealis, fragrant mimosa (SS)
Nolina lindheimeriana, devil’s-shoestring (A)
Opuntia lindheimeri, Texas pricklypear (C)
Opuntia macrorhiza, grassland pricklypear (C)
Parthenocissus heptaphylla, sevenleaf creeper (V)
Parthenocissus quinquefolia, Virginia creeper (V)
Quercus sinuata var. breviloba, white shin oak (T)

TABLE I (continued)

Cedar-Oak Woodland

Shrubs

Rhamnus caroliniana, Carolina buckthorn (S)
Sophora secundiflora, Texas mountain laurel (S)
Ungnadia speciosa, Mexican buckeye (ST)
Vitis mustangensis, mustang grape (V)
Zanthoxylum hirsutum, tickle-tongue (LS)

(6) Types T = normally a tree species, but only seedlings or individuals under 3 meters tall were included in the shrub counts
ST = small trees with a single trunk, occasional individuals will be included in the overstory date
LS = large shrubs without a single trunk or with many trunks clustered together at ground level
S = shrubs
SS = small shrubs, or larger weakly woody plants
V = woody vines
C = cacti
A = agavaceous plants

(7) Shrub densities are expressed as number of individuals per are (1 are = 100 square meters = 0.01 hectare). To compare tree seedlings in the shrub tables with density of mature trees, multiply the seedling densities by 100.

TABLE I (continued)

Cedar-Oak Woodland

Shrubs

Species	Relative Frequency	Relative Density	Importance Value
G. lindheimeri	10.7	26.3	18.5
J. ashei	12.4	14.4	13.4
Q. texana	10.0	12.5	11.2
R. toxicodendron	5.5	11.8	8.6
R. aromatica	5.8	6.4	6.1
R. virens	6.9	2.4	4.6
I. vomitoria	5.2	3.3	4.2
F. pubescens	3.4	4.9	4.2
S. bona-nox	4.5	2.4	3.4
Y. rupicola	4.1	1.6	2.8
B. lanuginosa	3.4	2.3	2.8
Q. fusiformis	3.4	2.1	2.8
Ey. texana	2.4	1.4	1.9
P. trifoliata	2.7	.8	1.8
V. berlandieri	2.1	1.3	1.7
U. crassifolia	2.4	.9	1.6
Eu. havanense	2.4	.8	1.6
C. canadensis	1.7	1.0	1.4
D. texana	1.7	.5	1.1
Misc. 18 spp.	9.3	3.0	6.2
Total	100.0	100.1(5)	99.9(5)

TABLE II

Cedar-Hardwood Bottomland

See Table I for explanation of footnotes.

Trees

Species	Frequency	Density[1]	Cover[2]
Juniperus ashei (mountain cedar)	100.0	359.9/ha (145.9/A)	10655[4]
Fraxinus texensis (Texas ash)	42.1	76.6/ha (31.0/A)	2626
Quercus fusiformis (plateau live oak)	31.6	45.9/ha (18.6/A)	1687
Platanus occidentalis (American sycamore)	15.8	23.0/ha (9.3/A)	1117
Juglans microcarpa (little walnut)	15.8	23.0/ha (9.3/A)	493
Ulmus crassifolia (cedar elm)	15.8	23.0/ha (9.3/A)	315
Quercus texana (Texas oak)	10.5	15.3/ha (6.2/A)	115
Rhus lanceolata (lance-leaf sumac)	5.3	15.3/ha (6.2/A)	158
Total	(3)	582.0/ha (235.8/A)	17166[4]

Species	Relative Frequency	Relative Density	Relative Cover	Importance Value
Jun. ashei	42.2	61.8	62.1	55.4
F. texensis	17.8	13.2	15.3	15.4
Q. fusiformis	13.3	7.9	9.8	10.3
P. occidentalis	6.7	3.9	6.5	5.7
Jug. microcarpa	6.7	3.9	2.9	4.5
U. crassifolia	6.7	3.9	1.8	4.1
Q. texana	4.4	2.6	.7	2.6
R. lanceolata	2.2	2.6	.9	1.9
Total	100.0	99.8[5]	100.0	99.9[5]

TABLE II (continued)

Cedar-Hardwood Bottomland

Shrubs

Species	Type[6]	Frequency	Density[7]
Garrya lindheimeri (Lindheimer silktassel)	LS	73.7	59.5
Smilax bona-nox (saw greenbriar)	V	84.2	43.4
Juniperus ashei (mountain cedar)	T	78.9	29.6
Fraxinus texensis (Texas ash)	T	57.9	31.2
Forestiera pubescens (elbowbush)	S	42.1	28.0
Ulmus crassifolia (cedar elm)	T	63.2	18.4
Ilex vomitoria (yaupon)	LS	57.9	20.1
Rhus aromatica (fragrant sumac)	S	42.1	17.1
Rhamnus caroliniana (Carolina buckthorn)	S	52.6	9.5
Rhus toxicodendron (poison ivy)	V	31.6	11.8
Vitis berlandieri (Spanish grape)	V	31.6	10.9
Bumelia lanuginosa (gum elastic)	ST	31.6	7.6
Quercus texana (Texas oak)	T	36.8	4.6
Eupatorium havanense (shrubby boneset)	SS	21.1	7.2
Parthenocissus quinquefolia (Virginia creeper)	V	15.8	4.9
Ptelea trifoliata (hoptree)	ST	21.1	2.3
Quercus fusiformis (plateau live oak)	T	15.8	4.6
Rubus trivialis (southern dewberry)	V	10.5	6.6
Eysenhardtia texana (Texas kidneywood)	S	21.1	2.0

TABLE II (continued)

Cedar-Hardwood Bottomland

Shrubs

Species	Type[6]	Frequency	Density[7]
Diospyros texana (Texas persimmon)	ST	15.8	3.9
Callicarpa americana (American beautyberry)	S	5.3	6.9
Nolina lindheimeriana (devil's-shoestring)	A	5.3	6.6
Yucca rupicola (Texas yucca)	A	10.5	4.3
Ilex decidua (possumhaw)	S	10.5	3.6
Miscellaneous 9 species		84.2	9.2
Total		(3)	353.8

Miscellaneous species:

Carya illinoinensis, pecan (T)
Celtis reticulata, netleaf hackberry (T)
Cocculus carolinus, Carolina snailseed (V)
Croton fruticulosus, bush croton (SS)
Juglans microcarpa, little walnut (T)
Lonicera japonica, Japanese honeysuckle (V)
Nolina texana, sacahuista (A)
Rhus virens, evergreen sumac (S)
Vitis mustangensis, mustang grape (V)

Species	Relative Frequency	Relative Density	Importance Value
G. lindheimeri	8.0	16.8	12.4
S. bona-nox	9.1	12.3	10.7
J. ashei	8.6	8.4	8.5
Fr. texensis	6.3	8.8	7.6
Fo. pubescens	4.6	7.9	6.2
U. crassifolia	6.9	5.2	6.0

TABLE II (continued)

Cedar-Hardwood Bottomland

Shrubs

Species	Relative Frequency	Relative Density	Importance Value
I. vomitoria	6.3	5.7	6.0
Rhus aromatica	4.6	4.8	4.7
Rha. caroliniana	5.7	2.7	4.2
Rhus toxicodendron	3.4	3.3	3.4
V. berlandieri	3.4	3.1	3.2
B. lanuginosa	3.4	2.1	2.8
Q. texana	4.0	1.3	2.6
Eu. havanense	2.3	2.0	2.2
Pa. quinquefolia	1.7	1.4	1.6
Pt. trifoliata	2.3	.7	1.5
Q. fusiformis	1.7	1.3	1.5
Ru. trivialis	1.1	1.9	1.5
Ev. texana	2.3	.6	1.5
D. texana	1.7	1.1	1.4
C. americana	.6	2.0	1.3
N. lindheimeriana	.6	1.9	1.2
Y. rupicola	1.1	1.2	1.2
I. decidua	1.1	1.0	1.0
Misc. 9 spp.	9.1	2.6	5.8
Total	99.9(5)	100.1(5)	100.0

TABLE III

Cedar Grassland

See Table I for explanation of footnotes.

Trees

Species	Frequency	Density[1]	Cover[2]
Juniperus ashei (mountain cedar)	79.2	94.9/ha (38.5/A)	2707
Quercus texana (Texas oak)	58.3	55.8/ha (22.6/A)	1507
Quercus fusiformis (plateau live oak)	29.2	18.6/ha (7.5/A)	376
Diospyros texana (Texas persimmon)	8.3	3.7/ha (1.5/A)	16
Miscellaneous 3 species	12.5	5.6/ha (2.3/A)	30
Total	(3)	178.6/ha (72.4/A)	4636

Miscellaneous species:
Bumelia lanuginosa, gum elastic
Ilex vomitoria, yaupon
Ulmus crassifolia, cedar elm

Species	Relative Frequency	Relative Density	Relative Cover	Importance Value
J. ashei	42.2	53.1	58.4	51.2
Q. texana	31.1	31.2	32.5	31.6
Q. fusiformis	15.6	10.4	8.1	11.4
D. texana	4.3	2.1	.3	2.2
Misc. 3 spp.	6.7	3.1	.6	3.5
Total	99.9[5]	99.9[5]	99.9[5]	99.9[5]

TABLE III (continued)

Cedar Grassland

Shrubs

Species	Type[6]	Frequency	Density[7]
Garrya lindheimeri (Lindheimer silktassel)	LS	54.2	57.3
Juniperus ashei (mountain cedar)	T	79.2	30.7
Rhus virens (evergreen sumac)	S	75.0	21.9
Rhus toxicodendron (poison ivy)	V	33.3	28.4
Quercus texana (Texas oak)	T	33.3	10.7
Yucca rupicola (Texas yucca)	A	41.7	7.3
Ilex vomitoria (yaupon)	LS	29.2	10.7
Diospyros texana (Texas persimmon)	ST	29.2	6.0
Rhus aromatica (fragrant sumac)	S	20.8	8.3
Bumelia lanuginosa (gum elastic)	ST	20.8	5.5
Quercus fusiformis (plateau live oak)	T	20.8	3.6
Forestiera pubescens (elbowbush)	S	16.7	2.3
Eysenhardtia texana (Texas kidneywood)	S	16.7	1.6
Smilax bona-nox (saw greenbriar)	V	8.3	3.1
Nolina lindheimeriana (devil’s-shoestring)	A	8.3	1.6
Ulmus crassifolia (cedar elm)	T	4.2	2.6
Miscellaneous 9 species		45.8	5.7
Total		(3)	207.3

TABLE III (continued)

Cedar Grassland

Shrubs

Miscellaneous species:
Baccharis neglecta, Roosevelt weed (S)
Berberis trifoliolata, agarito (S)
Cercis canadensis, redbud (ST)
Colubrina texensis, Texas snakewood (S)
Opuntia lindheimeri, Texas pricklypear (C)
Opuntia macrorhiza, grassland pricklypear (C)
Ungnadia speciosa, Mexican buckeye (ST)
Vitis berlandieri, Spanish grape (V)
Zanthoxylum hirsutum, tickle-tongue (LS)

Species	Relative Frequency	Relative Density	Importance Value
G. lindheimeri	10.1	27.6	18.8
J. ashei	14.7	14.8	14.8
R. virens	14.0	10.6	12.3
R. toxicodendron	6.2	13.7	10.0
Q. texana	6.2	5.2	5.7
Y. rupicola	7.8	3.5	5.6
I. vomitoria	5.4	5.2	5.3
D. texana	5.4	2.9	4.2
R. aromatica	3.9	4.0	4.0
B. lanuginosa	3.9	2.6	3.2
Q. fusiformis	3.9	1.8	2.8
F. pubescens	3.1	1.1	2.1
E. texana	3.1	.7	1.9
S. bona-nox	1.6	1.5	1.6
N. lindheimeriana	1.6	.7	1.2
U. crassifolia	.8	1.3	1.0
Misc. 9 spp.	8.5	2.8	5.6
Total	100.2[5]	100.0	100.1[5]

TABLE IV

Subclimax Grassland

See Table I for explanation of footnotes.

Trees

Species	Frequency	Density[1]	Cover[2]
Juniperus ashei (mountain cedar)	66.7	18.9/ha (7.7/A)	429
Quercus texana (Texas oak)	73.3	18.9/ha (7.7/A)	346
Quercus fusiformis (plateau live oak)	40.0	6.1/ha (2.5/A)	73
Miscellaneous 2 species	13.3	1.5/ha (0.6/A)	26
Total	(3)	45.4/ha (18.5/A)	874

Miscellaneous species:
Quercus sinuata var. breviloba, white shin oak
Rhus lanceolata, lance-leaf sumac

Species	Relative Frequency	Relative Density	Relative Cover	Importance Value
J. ashei	34.5	41.7	49.1	41.8
Q. texana	37.9	41.7	39.5	39.7
Q. fusiformis	20.7	13.3	8.4	14.1
Misc. 2 spp.	6.9	3.3	3.0	4.4
Total	100.0	100.0	100.0	100.0

Shrubs

Species	Type[6]	Frequency	Density[7]
Juniperus ashei (mountain cedar)	T	53.3	15.8
Rhus virens (evergreen sumac)	S	40.0	15.0

TABLE IV (continued)

Subclimax Grassland

Shrubs

Species	Type[6]	Frequency	Density[7]
Yucca rupicola (Texas yucca)	A	40.0	11.2
Garrya lindheimeri (Lindheimer silktassel)	LS	20.0	17.1
Rhus toxicodendron (poison ivy)	V	13.3	7.5
Eysenhardtia texana (Texas kidneywood)	S	26.7	2.1
Ilex vomitoria (yaupon)	LS	6.7	4.6
Nolina lindheimeriana (devil's-shoestring)	A	13.3	2.5
Quercus fusiformis (plateau live oak)	T	13.3	2.1
Rhamnus caroliniana (Carolina buckthorn)	S	6.7	1.2
Vitis berlandieri (Spanish grape)	V	6.7	.8
Miscellaneous 4 species		26.7	1.7
Total		(3)	81.6

Miscellaneous species:
Baccharis neglecta, Roosevelt weed (S)
Quercus texana, Texas oak (T)
Rhus aromatica, fragrant sumac (S)
Rhus lanceolata, lance-leaf sumac (LS)

Species	Relative Frequency	Relative Density	Importance Value
J. ashei	20.0	19.4	19.7
Rhus virens	15.0	18.4	16.7
Y. rupicola	15.0	13.8	14.4
G. lindheimeri	7.5	20.9	14.2

TABLE IV (continued)

Subclimax Grassland

Shrubs

Species	Relative Frequency	Relative Density	Importance Value
Rhus toxicodendron	5.0	9.2	7.1
E. texana	10.0	2.6	6.3
I. vomitoria	2.5	5.6	4.0
N. lindheimeriana	5.0	3.1	4.0
Q. fusiformis	5.0	2.6	3.8
Rha. caroliniana	2.5	1.5	2.0
V. berlandieri	2.5	1.0	1.8
Misc. 4 spp.	10.0	2.0	6.0
Total	100.0	100.1(5)	100.0

TABLE V

Mean Tree Size

Diameters

Species	Woodland	Bottomland	Cedar Grassland	Subclimax Grassland	All areas
Diospyros texana	4.32 m (14′2″)	X	2.31 m (7′7″)	X	3.31 m (10′10″)
Fraxinus texensis	X	5.00 m (16′5″)	X	X	5.00 m (16′5″)
Ilex vomitoria	3.44 m (11′3″)	X	(8)	X	3.26 m[9] (10′8″)
Juglans microcarpa	X	5.00 m (16′5″)	X	X	5.00 m (16′5″)
Juniperus ashei	4.51 m (14′9″)	5.71 m (18′9″)	5.65 m (18′6″)	5.13 m (16′10″)	5.12 m (16′9″)
Platanus occidentalis	X	7.38 m (24′3″)	X	X	7.38 m (24′3″)
Quercus fusiformis	4.01 m (13′2″)	5.91 m (19′5″)	4.79 m (15′8″)	3.75 m (12′4″)	4.48 m (14′8″)
Quercus texana	5.59 m (18′4″)	3.05 m (10′)	5.49 m (18′)	4.56 m (15′)	5.27 m (17′4″)
Rhus lanceolata	(8)	3.33 m (10′11″)	X	(8)	3.63 m[9] (11′11″)
Ulmus crassifolia	3.08 m (10′1″)	3.83 m (12′7″)	(8)	X	3.32 m[9] (10′11″)
Miscellaneous species	3.53 m (11′7″)	X	2.49 m (8′2″)	4.47 m (14′8″)	3.64 m[10] (11′11″)
All species	4.69 m (15′5″)	5.47 m (17′11″)	5.34 m (17′6″)	4.69 m (15′5″)	4.99 m (16′5″)

X = absence of that species from that area.
(8) Included under miscellaneous species for that area.
(9) Including all individuals sampled of that species.
(10) Excluding *Ulmus crassifolia*, *Rhus lanceolata*, and *Ilex vomitoria*.

TABLE VI

Vascular Plants of Wild Basin

Scientific nomenclature, common names of families, and sequence of families follows those found in Correll & Johnston (1970), while common names mostly follow those found in Gould (1975).

i = introduced species
r = species on the official list of rare and endangered plants native to Texas
s = species encountered in the watershed of Bee Creek by M. C. Johnston & collaborators during 1974 and/or 1975 but not encountered on the property under study during 1977

FERNS AND FERN ALLIES

SELAGINELLACEAE	SPIKEMOSS FAMILY
Selaginella wrightii Hieron.	Wright selaginella
SCHIZAEACEAE	CURLY-GRASS FAMILY
Anemia mexicana Kl.	Mexican-fern
POLYPODIACEAE	TRUE FERN FAMILY
Adiantum capillus-veneris L.	Southern maidenhair, culantrillo
Pellaea ovata (Desv.) Weath.	Cliffbrake
Thelypteris kunthii (Desv.) Morton	Southern shield-fern

GYMNOSPERMS

TAXODIACEAE	TAXODIUM FAMILY
s)*Taxodium distichum* (L.) Rich.	Bald cypress
CUPRESSACEAE	CYPRESS FAMILY
Juniperus ashei Buchh.	Mountain cedar, Ashe juniper, post cedar, rock cedar, Mexican juniper

TABLE VI (continued)

Vascular Plants of Wild Basin

FLOWERING PLANTS – MONOCOTS

GRAMINEAE (POACEAE)		GRASS FAMILY
	Andropogon glomeratus (Walt.) B.S.P.	Bushy bluestem, bushy beardgrass
	Aristida glauca (Nees) Walp.	Blue threeawn
	A. purpurea Nutt.	Purple threeawn
	A. wrightii Nash	Wright threeawn
	Bothriochloa hybrida (Gould) Gould	Hybrid bluestem
i)	B. ischaemum (L.) Keng var. songarica (Fisch. & Mey.) Celarier & Harlan	King Ranch bluestem
	B. saccharoides (Sw.) Rydb.	Silver bluestem
	Bouteloua curtipendula (Michx.) Torr.	Side-oats grama
	B. hirsuta Lag.	Hairy grama
	B. pectinata Featherly	Tall grama
	B. rigidiseta (Steud.) Hitchc.	Texas grama
	B. trifida Thurb.	Red grama
i)	Bromus japonicus L.	Japanese brome, Japanese chess
i)	B. unioloides H.B.K.	Rescue grass
	Buchloe dactyloides (Nutt.) Engelm.	Buffalo grass
s)	Cenchrus incertus M. A. Curtis	Common sandbur, grassbur
	Chasmanthium latifolium (Michx.) Yates	Inland sea oats
	Chloris cucullata Bisch.	Hooded windmill grass, hooded fingergrass
i)	Cynodon dactylon (L.) Pers.	Bermuda grass
	Digitaria adscendens (H.B.K.) Henr.	Southern crabgrass
i)	Eleusine indica (L.) Gaertn.	Goosegrass
	Elymus virginicus L.	Virginia wild-rye
	Eragrostis lugens Nees	Mourning lovegrass
	Leptoloma cognatum (Schult.) Chase	Fall witchgrass
	Melica nitens (Scribn.) Piper	Threeflower melic
	Muhlenbergia lindheimeri Hitchc.	Lindheimer muhly
	M. reverchonii Vasey & Scribn.	Seep muhly

TABLE VI (continued)

Vascular Plants of Wild Basin

	Panicum lindheimeri Nash (Dichanthelium l. (Nash) Gould)	Lindheimer panicum (Lindheimer dichanthelium)
	P. oligosanthes Schult. (D. o. (Schult.) Gould)	
	P. pedicellatum Vasey (D. p. (Vasey) Gould)	Cedar panicum (cedar dichanthelium)
	P. virgatum L.	Switchgrass
i)	Paspalum dilatatum Poir.	Dallis grass
	P. pubiflorum Fourn.	Hairy-seed paspalum
i)	P. urvillei Steud.	Vasey grass
	Schizachyrium scoparium (Michx.) Nash var. frequens (F. T. Hubb.) Gould	Little bluestem
	Setaria scheelei (Steud.) Hitchc.	Southwestern bristlegrass
	Sorghastrum avenaceum (Michx.) Nash	Yellow Indian grass
i)	Sorghum halepense (L.) Pers.	Johnson grass
	Sporobolus asper (Michx.) Kunth	Tall dropseed
	S. vaginaeflorus (Torr.) Wood	Poverty dropseed, southern poverty-grass
	Stipa leucotricha Trin. & Rupr.	Texas winter-grass, Texas speargrass
	Tridens flavus (L.) Hitchc.	Purpletop
	Tripsacum dactyloides (L.) L.	Eastern gamagrass
CYPERACEAE		SEDGE FAMILY
	Carex microdonta T. & H.	Littletooth sedge
	C. planostachys Kunze	Cedar sedge
	Cladium jamaicense Crantz.	Jamaica saw-grass
i)	Cyperus rotundus L.	Nut-grass
	Dichromena nivea (Boeck.) Britt.	Snowy whitetop
	Eleocharis montevidensis Kunth	Sand spikesedge
	E. obtusa (Willd.) Schult.	Blunt spikesedge
	Fuirena simplex Vahl.	Western umbrella-sedge
BROMELIACEAE		PINEAPPLE FAMILY
	Tillandsia recurvata L.	Small ballmoss
s)	T. usneoides (L.) L.	Spanish moss

TABLE VI (continued)

Vascular Plants of Wild Basin

COMMELINACEAE	SPIDERWORT FAMILY
Commelina erecta L.	Erect dayflower, hierba del pollo
Commelinantia anomala (Torr.) Tharp	False dayflower
Tradescantia gigantean Rose	Giant spiderwort
T. ohioensis Raf.	Ohio spiderwort
JUNCACEAE	RUSH FAMILY
Juncus interior Wieg.	Inland rush
J. texanus (Engelm.) Cov.	Texas rush
J. torreyi Cov.	Torrey rush
LILIACEAE	LILY FAMILY
Allium canadense L.	Canada garlic
A. drummondii Regel	Drummond onion
Nolina lindheimeriana (Scheele) Wats.	Devil’s shoestring, Lindheimer nolina
N. texana Wats.	Sacahuista
Nothoscordum bivalve (L.) Britt.	Yellow false-garlic, crow-poison
Smilax bona-nox L.	Saw greenbriar, car-brier
Yucca rupicola Scheele	Texas yucca, twisted-leaf yucca
AMARYLLIDACEAE	AMARYLLIS FAMILY
Cooperia drummondii Herb.	Eveningstar rainlily, cebolleta
IRIDACEAE	IRIS FAMILY
Sisyrinchium ensigerum Bickn.	Swordleaf blue-eyed grass
S. pruinosum Bickn.	Dotted blue-eyed grass

FLOWERING PLANTS – DICOTS

SALICACEAE	WILLOW FAMILY
Salix nigra Marsh.	Black willow
JUGLANDACEAE	WALNUT FAMILY
Carya illinoinensis (Wang.) K. Koch	Pecan
Juglans major (Torr.) Heller	Arizona walnut

TABLE VI (continued)

Vascular Plants of Wild Basin

J. microcarpa Berl.	Little walnut
FAGACEAE	BEECH FAMILY
Quercus fusiformis Small	Plateau live oak
Q. sinuata Walt. var. *breviloba* (Torr.) C. H. Mull.	White shin oak
Q. texana Buckl.	Texas oak, Texas red oak, Spanish oak
ULMACEAE	ELM FAMILY
Celtis laevigata Willd.	Sugar hackberry, Texas sugarberry
C. reticulata Torr.	Netleaf hackberry
Ulmus americana L.	American elm
U. crassifolia Nutt.	Cedar elm
MORACEAE	MULBERRY FAMILY
i)*Ficus carica* L.	Common fig
Morus microphylla Buckl.	Texas mulberry, mountain mulberry
URTICACEAE	NETTLE FAMILY
Parietaria floridana Nutt.	Florida pellitory, cucumber pellitory
VISCACEAE	MISTLETOE FAMILY
Phoradendron tomentosum (DC.) Gray	Common mistletoe
RANUNCULACEAE	CROWFOOT FAMILY
Anemone heterophylla Nutt.	Tenpetal anemone
Clematis drummondii T. & G.	Texas virgin’s bower
Delphinium carolinianum Walt.	Carolina larkspur, blue larkspur
BERBERIDACEAE	BARBERRY FAMILY
Berberis trifoliolata Moric.	Agarito, algerita
MENISPERMACEAE	MOONSEED FAMILY
Cocculus carolinus (L.) DC.	Carolina snailseed

TABLE VI (continued)

Vascular Plants of Wild Basin

PAPAVERACEAE	POPPY FAMILY
Argemone polyanthemos (Fedde) G. Ownbey	Prickly poppy
CRUCIFERAE (BRASSICACEAE)	MUSTARD FAMILY
Descurainia pinnata (Walt.) Britt.	Pinnate tansy-mustard
Draba cuneifolia T. & G.	Wedgeleaf draba, whitlow-grass, whitlow-wort
D. platycarpa T. & G.	Broadpod draba
Lepidium austrinum Small	Southern pepperweed
L. virginicum L.	Virginia pepperweed, peppergrass
Lesquerella gracilis (Hook.) Wats.	Lax bladderpod
i)*Rorippa nasturtium-aquaticum* (L.) Hayek	Watercress
CRASSULACEAE	ORPINE FAMILY
Sedum nuttallianum Raf.	Yellow stonecrop
PLATANACEAE	PLANE-TREE FAMILY
Platanus occidentalis L.	American sycamore
ROSACEAE	ROSE FAMILY
Geum canadense Jacq.	White avens
Prunus mexicana Wats.	Mexican plum
P. serotina Ehrh.	Black cherry
Rubus trivialis Michx.	Southern dewberry
LEGUMINOSAE (FABACEAE)	LEGUME FAMILY
Amorpha fruticosa L.	Indigobush, bastard indigo
Astragalus crassicarpus Nutt.	Ground plum milkvetch
Cassia lindheimeriana Scheele	Lindheimer senna
C. roemeriana Scheele	Two-leaf senna
Cercis canadensis L. var. *texensis* (Wats.) Rose	Texas redbud
Dalea frutescens Gray	Black dalea
D. nana Torr.	Dwarf dalea
Desmanthus virgatus (L.) Willd. Var *depressus* (Willd.) B. L. Turner	Bundleflower

TABLE VI (continued)

Vascular Plants of Wild Basin

Desmodium psilophyllum Schlecht.	Simple-leaf tick-clover
Eysenhardtia texana Scheele	Texas kidney wood
Galactia volubilis (L.) Britt.	Downy milkpea
Indigofera miniata Ort. var. leptosepala (Nutt.) B. L. Turner	Western indigo, scarlet pea
Lespedeza texana Britt.	Texas lespedeza, Texas bushclover
Lupinus texensis Hook.	Texas bluebonnet
Mimosa borealis Gray	Fragrant mimosa, pink mimosa
i)Parkinsonia aculeata L.	Retama, Jerusalem thorn
Prosopis glandulosa Torr.	Honey mesquite
Psoralea cyphocalyx Gray	Turniproot scurfpea
P. latestipulata Shinners var. appressa Ockendon	
Rhynchosia texana T. & G.	Texas snoutbean
Sophora secundiflora (Ort.) DC.	Mescalbean, Texas mountain laurel
Vicia ludoviciana Nutt.	Louisiana vetch, deer pea vetch
KRAMERIACEAE	RATANY FAMILY
Krameria lanceolata Torr.	Trailing ratany
GERANIACEAE	GERANIUM FAMILY
Erodium texanum Gray	Texas filaree, stork’s-bill, heronbill
OXALIDACEAE	WOOD-SORREL FAMILY
Oxalis dillenii Jacq.	Yellow wood-sorrel
O. drummondii Gray	Drummond oxalis
O. violacea L.	Violet wood-sorrel
LINACEAE	FLAX FAMILY
Linum rigidum Pursh	Stiff-stem flax
L. rupestre (Gray) Engelm.	Rock flax
RUTACEAE	CITRUS FAMILY
Ptelea trifoliata L.	Hop-tree, wafer ash, skunk-bush, nickels-dimes-and-quarters, money tree

TABLE VI (continued)

Vascular Plants of Wild Basin

Thamnosma texana (Gray) Torr.	Texas desert-rue, Dutchman's-breeches
Zanthoxylum hirsutum Buckl.	Prickly ash, tickle-tongue, toothache tree
MELIACEAE	MAHOGANY FAMILY
i)Melia azedarach L.	Chinaberry
MALPIGHIACEAE	MALPIGHIA FAMILY
Thryallis angustifolia (Senth.) O. Ktze.	Narrow-leaf thryallis
POLYGALACEAE	MILKWORT FAMILY
Polygala alba Nutt.	White milkwort
P. lindheimeri Gray	Shrubby milkwort
EUPHORBIACEAE	SPURGE FAMILY
Acalypha lindheimeri Muell. Arg.	Lindheimer copperleaf
Argythamnia simulans J. Ingram	Plateau wild-mercury
s)Bernardia myricaefolia (Scheele) Wats.	Brush myrtle-croton, oreja de ratón, rat's-ears
s)Cnidoscolus texanus (Muell. Arg.) Small	Texas bull nettle, mala mujer
Croton fruticulosus Torr.	Bush croton, encinilla
C. monanthogynus Michx.	One-seed croton, prairie tea
C. texensis (Kl.) Muell. Arg.	Texas croton
Euphorbia cyathophora Murr. (Poinsettia c. (Murr.) Kl. & Garcke)	Painted euphorbia
E. dentata Michx. (Poinsettia d. (Michx.) Small)	Toothed spurge
E. fendleri T. & G. (Chamaesyce f. (T. & G.) Small)	Fendler euphorbia
E. longicruris Scheele (Tithymalus l. (Scheele) Small)	Wedgeleaf euphorbia
E. villifera Schelle (Chamaesyce v. (Schelle) Small)	Hairy euphorbia

TABLE VI (continued)

Vascular Plants of Wild Basin

Phyllanthus polygonoides Spreng.	Knotweed leaf-flower
i)*Sapium sebiferum* (L.) Roxb.	Chinese tallow tree
Stillingia texana I. M. Johnst.	Texas stillingia, Queen's delight
Tragia ramosa Torr.	Noseburn
ANACARDIACEAE	SUMAC FAMILY
Rhus aromatica Ait.	Fragrant sumac
R. lanceolata (Gray) Britt.	Lance-leaf sumac
R. toxicodendron L. (*Toxicondendron radicans* (L.) O. Ktze.)	Poison ivy
R. virens Gray	Evergreen sumac
AQUIFOLIACEAE	HOLLY FAMILY
Ilex decidua Walt.	Possum haw, deciduous holly
I. vomitoria Ait.	Yaupon
ACERACEAE	MAPLE FAMILY
s)*Acer negundo* L.	Box elder, black maple
HIPPOCASTANACEAE	BUCKEYE FAMILY
Aesculus pavia L.	Red buckeye
SAPINDACEAE	SOAPBERRY FAMILY
Sapindus saponaria L. var. *drummondii* (H. & A.) L. Benson	Western soapberry
Ungnadia speciosa Ednl.	Mexican buckeye
RHAMNACEAE	BUCKTHORN FAMILY
Berchemia scandens (Hill) K. Koch	Alabama supplejack, rattan-vine
Ceanothus herbaceus Raf.	Inland ceanothus
Colubrina texensis (T. & G.) Gray	Texas colubrina, Texas snakewood
s)*Condalia hookeri* M. C. Johnst.	Brasil
Rhamnus caroliniana Walt.	Carolina buckthorn, Indian cherry
VITACEAE	GRAPE FAMILY
Ampelopsis arborea (L.) Koehne	Peppervine

TABLE VI (continued)

Vascular Plants of Wild Basin

Cissus incisa (Nutt.) Des Moul.	Ivy treebine, possum grape
Parthenocissus heptaphylla (Buckl.) Small	Sevenleaf creeper
P. quinquefolia (L.) Planch.	Virginia creeper
Vitis berlandieri Planch.	Spanish grape, winter grape
V. mustangensis Buckl.	Mustang grape
V. rupestris Scheele	Sand grape
MALVACEAE	MALLOW FAMILY
Abutilon incanum (Link) Sweet	Indian mallow
Callirhoe involucrata (Torr.) Gray	Low poppymallow, common winecup, cowboy rose
C. leiocarpa Martin	Tall poppymallow
rs)Pavonia lasiopetala Scheele	Texas mallow
Sida filicaulis T. & G.	Spreading sida
Wissadula holosericea (Scheele) Gke.	Velvet-leaf
VIOLACEAE	VIOLET FAMILY
Viola missouriensis Greene	Missouri violet
PASSIFLORACEAE	PASSION-FLOWER FAMILY
Passiflora lutea L.	Yellow passion-flower
P. tenuiloba Engelm.	Spread-lobe passion-flower
CACTACEAE	CACTUS FAMILY
Opuntia leptocaulis DC.	Pencil cactus
O. lindheimeri Engelm.	Texas prickly pear
O. macrorhiza Engelm.	Plains prickly pear
ONAGRACEAE	EVENING PRIMROSE FAMILY
Calylophus drummondianus Spach	Drummond sundrops
Oenothera laciniata Hill	Cutleaf evening primrose
O. missouriensis Sims	Missouri primrose, flutter-mill
UMBELLIFERAE (APIACEAE)	PARSLEY FAMILY
Daucus pusillus Michx.	Southwestern carrot, rattlesnake-weed
Sanicula canadensis L.	Canada snakeroot
Spermolepis inermis (DC.) Math. & Const.	Scaleseed

TABLE VI (continued)

Vascular Plants of Wild Basin

i)	Torilis arvensis (Huds.) Link	Tickseed, hedge-parsley
CORNACEAE		DOGWOOD FAMILY
	Cornus drummondii C. A. Mey.	Roughleaf dogwood
	Garrya lindheimeri Torr.	Lindheimer silktassel
ERICACEAE		HEATH FAMILY
	Arbutus xalapensis H.B.K.	Texas madrone
PRIMULACEAE		PRIMROSE FAMILY
	Samolus cuneatus Small	Limerock brookweed
	S. parviflorus Raf.	Small-flowered water-pimpernel
SAPOTACEAE		SAPODILLA FAMILY
	Bumelia lanuginosa (Michx.) Pers.	Gum elastic, ironwood, coma, chittamwood
EBENACEAE		EBONY FAMILY
	Diospyros texana Scheele	Texas persimmon
OLEACEAE		OLIVE FAMILY
	Forestiera pubescens Nutt.	Elbow-bush, spring herald
s)	Fraxinus pensylvanica Marsh	Red ash
	F. texensis (Gray) Sarg.	Texas ash
i)	Ligustrum japonicum Thunb.	Japanese privet
LOGANIACEAE		LOGANIA FAMILY
s)	Buddleja racemosa Torr.	Wand butterfly-bush
	Cynoctonum mitreola (L.) Britt.	Lax hornpod, miterwort
	Polypremum procumbens L.	Juniperleaf
GENTIANACEAE		GENTIAN FAMILY
	Centaurium beyrichii (T. & G.) Robins.	Rock centaury, mountain pink
	C. texense (Griseb.) Fern.	Texas centaury, Lady Bird’s centaury
APOCYNACEAE		DOGBANE FAMILY
	Amsonia ciliata Walt.	Fringe slimpod, blue-star

TABLE VI (continued)

Vascular Plants of Wild Basin

ASCLEPIADACEAE	MILKWEED FAMILY
Asclepias asperula (Dene.) Woods. subsp. capricornu (Woods.) Woods.	Spider antelope-horn
A. oenotheroides Cham. & Schlecht.	Hierba de zizotes
A. texana Heller	Texas milkweed
Cynanchum barbigerum (Scheele) Shinners	Bearded swallow-wort
Matelea reticulata (Gray) Woods.	Milkvine
CONVOLVULACEAE	MORNING GLORY FAMILY
Convolvulus equitans Benth.	Texas bindweed
Dichondra carolinensis Michx.	Ponyfoot
Ipomoea lindheimeri Gray	Blue morning glory
I. trichocarpa Ell.	Sharp-pod morning glory
POLEMONIACEAE	PHLOX FAMILY
Gilia incisa Benth.	Splitleaf gilia
Phlox roemeriana Scheele	Roemer phlox, gold-eye phlox
HYDROPHYLLACEAE	WATERLEAF FAMILY
Nemophila phacelioides Nutt.	Baby blue-eyes
Phacelia congesta Hook.	Blue curls, blue pearls
BORAGINACEAE	BORAGE FAMILY
Heliotropium tenellum (Nutt.) Torr.	Pasture heliotrope
Lithospermum incisum Lehm.	Narrowleaf gromwell, puccoon
r)Onosmodium helleri Small	Heller marbleseed, Heller false gromwell
VERBENACEAE	VERBENA FAMILY
Callicarpa americana L.	American beautyberry, French mulberry, filigrana
Lantana horrida H.B.K.	Common lantana, Texas lantana
Phyla incisa Small	Texas frog-fruit
Verbena bipinnatifida Nutt.	Dakota vervain
V. canescens H.B.K.	Gray vervain

TABLE VI (continued)

Vascular Plants of Wild Basin

V. neomexicana (Gray) Small	Hillside vervain, New Mexico vervain
i)*Vitex agnus-castus* L.	Chaste tree, lavender tree
LABIATAE (LAMIACEAE)	MINT FAMILY
Brazoria scutellarioides Engelm. & Gray	Prairie Brazoria
Hedeoma drummondii Benth.	Limoncillo
Monarda citriodora Cerv.	Lemon beebalm
Salvia roemeriana Scheele	Cedar sage
S. texana (Scheele) Torr.	Texas blue sage
Scutellaria drummondii Benth.	Drummond skullcap
Teucrium canadense L.	American germander
SOLANACEAE	NIGHTSHADE FAMILY
Bouchetia erecta DC.	Erect bouchetia
Chamaesaracha coronopus (Dun.) Gray	Green false nightshade
Physalis viscosa L.	Ground cherry
SCROPHULARIACEAE	FIGWORT FAMILY
Agalinis edwardsiana Penn.	Plateau gerardia, plateau remarkable-flax
Bacopa monnieri (L.) Wettst.	Coastal water-hyssop
Castilleja purpurea (Nutt.) G. Don, var. *lindheimeri* (Gray) Shinners	Lindheimer paintbrush, orange paintbrush
s)*Leucophyllum frutescens* (Berl.) I. M. Johnst.	Cenizo, purple sage, Texas silverleaf, barometer-bush
Maurandya antirrhiniflora Willd.	Snapdragon vine
ACANTHACEAE	ACANTHUS FAMILY
Justicia americana (L.) Vahl	American water-willow
Ruellia humilis Nutt.	Low ruellia
R. occidentalis (Gray) Tharp & Barkl.	False petunia
PLANTAGINACEAE	PLANTAIN FAMILY
Plantago helleri Small	Cedar plantain
P. rhodosperma Dene.	Red-seeded plantain

TABLE VI (continued)

Vascular Plants of Wild Basin

RUBIACEAE	MADDER FAMILY
Cephalanthus occidentalis L.	Common buttonbush
Galium virgatum Nutt.	Southwest bedstraw
Hedyotis nigricans (Lam.) Posb.	Prairie bluets, star-violet
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY
i)*Lonicera japonica* Thunb.	Japanese honeysuckle
L. sempervirens L.	Trumpet honeysuckle
Viburnum rufidulum Raf.	Southern black-haw
VALERIANACEAE	VALERIAN FAMILY
Valerianella radiata (L.) Dufr.	Beaked cornsalad
CUCURBITACEAE	GOURD FAMILY
Ibervillea lindheimeri (Gray) Greene	Lindheimer globe-berry, balsam gourd, balsam apple
CAMPANULACEAE	BLUEBELL FAMILY
Triodanis coloradoensis (Buckl.) McVaugh	Colorado Venus' looking-glass
COMPOSITAE (ASTERACEAE)	SUNFLOWER FAMILY
Achillea millefolium L.	Common yarrow
Ambrosia psilostachya DC.	Western ragweed
A. trifida L.	Giant ragweed
Aster spinosus Benth.	Mexican devil-weed
A. subulatus Michx.	Hierba del marrano
A. texanus Burgess	Texas aster
Baccharis neglecta Britt.	Roosevelt weed, New Deal weed, poverty weed
Brickellia cylindracea Gray & Engelm.	Gravelbar brickle-bush
Calyptocarpus vialis Less.	Prostrate lawnflower
Centaurea americana Nutt.	American basketflower, powderpuff thistle
Chaptalia nutans (L.) Polak var. *texana* (Greene) Burk.	Silverpuff
Cirsium texanum Buckl.	Texas thistle
C. undulatum (Nutt.) Spreng.	Wavyleaf thistle
Conyza canadensis (L.) Cronq.	Horse-weed

TABLE VI (continued)

Vascular Plants of Wild Basin

Erigeron modestus Gray	Plains fleabane
Eupatorium havanense H.B.K.	Shrubby boneset
E. rugosum Houtt.	White snakeroot
E. serotinum Michx.	Late eupatorium
Gaillardia pulchella Foug.	Indian blanket, firewheels
Gnaphalium purpureum L.	Purple cudweed
Gymnosperma glutinosum (Spreng.) Less.	Tatalencho
Helenium microcephalum DC.	Smallhead sneezeweed
Hellianthus annuus L.	Common sunflower
Hymenopappus scabiosaeus L'Her. var. corymbosus (T. & G.) B. L. Turner	Old plainsman
Hymenoxys linearifolia Hook.	Fineleaf bitterweed
H. scaposa (DC.) Parker	Plains bitterweed
Iva angustifolia DC.	Narrowleaf sumpweed
I. annua L.	Marsh-elder
Lygodesmia texana (T. & G.) Greene	Texas skeleton-plant
Melampodium leucanthum T. & G.	Plains black-foot
Palafoxia callosa (Nutt.) T. & G.	Small palafoxia
Perezia runcinata (D. Don) Gray	Peonía
Pinaropappus roseus (Less.) Less.	White rock-lettuce
Pyrrhopappus multicaulis DC.	Many-stemmed false dandelion
Ratibida columnaris (Sims) D. Don	Mexican hat, prairie coneflower
Rudbeckia hirta L.	Brown-eyed susan
Tetragonotheca texana (Gray) Engelm. & Gray	Plateau nerve-ray
Thelesperma simplicifolium (Hook.) Gray	Slender greenthread
Verbesina encelioides (Cav.) Gray	Cowpen daisy, golden crownbeard
V. lindheimeri Robins. & Greenm.	Lindheimer crownbeard
V. virginica L.	Frostweed, white crownbeard
Vernonia lindheimeri Gray & Engelm.	Woolly ironweed

TABLE VI (continued)

Vascular Plants of Wild Basin

Viguiera dentata (Cav.) Spreng.	Plateau golden-eye, sunflower golden-eye
Zexmenia hispida (H.B.K.) Gray	Hairy zexmenia

LISTING of WILD BASIN VERTEBRATES

For birds, please see Appendix: *Birds of Wild Basin Wilderness Preserve Checklist*, updated 2006

These vertebrates are known to be currently living or have been sighted in the Wild Basin Wilderness Preserve as of 31 December 2006. This is knowledge gathered through either actual encounters or indirect signs such as tracks or droppings.

Amphibia (Amphibians)

- Smallmouth Salamander – *Ambystoma texanum*
- Dwarf Salamander – *Eurycea quadridigitata***
- Rio Grande Chirping Frog – *Syrrhophus cystignathoides campi***
- Cliff Chirping Frog – *Syrrophus marnocki*
- Blanchard's Cricket Frog – *Acris crepitans blanchardi*
- Copes Gray Tree Frog – *Hyla chrysoscelis*
- Spotted Chorus Frog – *Pseudacris clarki*
- Spring Peeper – *Pseudacris crucifer*
- Strecker's Chorus Frog – *Pseudacris streckeri*
- Upland Chorus Frog – *Pseudacris triseriata feriarum*
- Eastern Green Toad – *Bufo debilis debilis*
- Rio Grande Leopard Frog – *Rana berlandieri*
- Great Plains Narrowmouth Toad – *Gastrophyryne carolinensis*

**These species, according to Dixon and other herpetologists, do not occur in this area. Their presence in Wild Basin was confirmed in 2001, but the reason is unknown at this time.

Mammalia (Mammals)

Didelphimorphia (Opossums and allies)

- Virginia Opossum – *Didelphis virginiana*

Xenarthra (Armadillos, Sloths and allies)

- Nine-banded Armadillo – *Dasypus novemcinctus*

Chiroptera (Bats)

- Mexican Free-tailed Bat – *Tadarida brasiliensis*

Carnivora (Carnivores)

- Coyote – *Canis latrans*
- Common Gray Fox – *Urocyon cinereoargenteus*
- Ringtail – *Bassariscus astutus*
- Northern Raccoon – *Procyon lotor*
- Western spotted skunk – *Spilogale gracilis*
- Striped Skunk – *Mephitis mephitis*
- Bobcat – *Lynx rufus*

Artiodactyla (Even-toed Ungulates)

- White-tailed Deer – *Odocoileus virginianus*

Rodentia (Rodents)

- Rock Squirrel – *Spermophilus variegatus*
- Eastern Fox Squirrel – *Sciurus niger*
- Texas Mouse – *Peromyscus attwateri*
- White-footed Mouse – *Peromyscus leucopus*
- White-ankled Mouse – *Peromyscus pectoralis*
- Hispid Cotton Rat – *Sigmodon hispidus*
- Eastern Woodrat – *Neotoma floridana*
- North American Porcupine – *Erethizon dorsatum*

Lagomorpha (Hares and rabbits)

- Eastern Cottontail – *Sylvilagus floridanus*
- Black-tailed Jackrabbit – *Lepus californicus*

Osteichthyes (Bony Fish)

- Channel catfish – *Ictalurus punctatus*
- Green sunfish – *Lepomis cyanellus*
- Mosquitofish - *Gambusia affinis*
- Texas shiner – *Notropis amabilis*

Reptilia (Reptiles)

- Common Snapping Turtle – *Testudo serpentina serpentina*
- Texas River Cooter – *Pseudemys texana*
- Eastern Box Turtle – *Terrapene carolina*
- Red-eared Slider – *Trachemys scripta elegans*
- Mediterranean Gecko – *Hemidactylus turcicus*
- Texas Earless Lizard – *Cophosaurus texanus texanus*
- Texas Spiny Lizard – *Sceloporus olivaceus*
- Southern Prairie Lizard – *Sceloporus undulatus consobrinus*
- Green Anole – *Anolis carolinensis*
- Southern Prairie Skink – *Eumeces septentrionalis obtusirostris*
- Four-lined Skink – *Eumeces tetragrammus tetragrammus*
- Ground Skink – *Scincella lateralis*
- Texas Spotted Whiptail – *Cnemidophorus gularis gularis*
- Six-lined Race Runner – *Cnemidophorus sexlineatus sexlineatus*
- Eastern Yellow-bellied Racer – *Coluber constrictor flaviventris*
- Bull Snake – *Pituophis catenifer sayi*
- Red-striped Ribbon Snake – *Thamnophis proximus rubilineatus*
- Eastern Garter Snake – *Thamnophis sirtalis sirtalis***
- Western Cottonmouth – *Agkistrodon piscivorus leucostom*

**This species, according to Dixon and other herpetologists, does not occur in this area. Its presence in Wild Basin was confirmed in 2001, but the reason is unknown at this time.

Name of Bird	SP	SU	F	W
Pelicans PELECANIDAE				
American White Pelican	R-O		R-O	
Cormorants PHALACROCORACIDAE				
Double-crested Cormorant	R-O			R - O
Herons, Egrets ARDEIDAE				
Great Blue Heron	U	U	U	U
Snowy Egret	R	R		
Little Blue Heron				R
Cattle Egret				R - O
Green Heron	U	U		
Ducks, Geese ANATIDAE				
Wood Duck	U	U	U	U
Vultures CATHARTIDAE				
Turkey Vulture	A-O	A-O	A-O	A-O
Black Vulture	A-O	A-O	A-O	A-O
Hawks, Kites, Ospreys ACCIPITRIDAE				
Mississippi Kite	R-O		R-O	
Sharp-shinned Hawk	R-O		R-O	R - O
Cooper's Hawk	R-O		R-O	R - O
Red-shouldered Hawk	R-O			
Broad-winged Hawk	U-O		U-O	
Swainson's Hawk	U-O		U-O	
Red-tailed Hawk	C-O	U-O	C-O	C-O
Bald Eagle				R - O
Osprey	R-O		U-O	
Kestrels, Caracara FALCONIDAE				
American Kestrel	U-O		U-O	U-O
Turkeys, Quail PHASIANIDAE				
Northern Bobwhite	U	U	U	U
Cranes GRUIDAE				
Sandhill Crane	R-O		R-O	R - O
Plovers CHARADRIIDAE				
Killdeer	C	C	C	C
Sandpipers, Woodcocks SCOLOPACIDAE				
Solitary Sandpiper	R	R		
Upland Sandpiper	R	R		
Long-billed Curlew	R			
American Woodcock	R			
Gulls LARIIDAE				
Franklin's Gull	U-O			
Doves COLUMBIDAE				
Mourning Dove	C	C	C	C
White-winged Dove	U-O			
Inca Dove	U	U	U	U
Common Ground Dove	R			
Rock Dove	R-O			

Roadrunners, Cuckoos CUCULIDAE				
Yellow-billed Cuckoo	U	U		
Black-billed Cuckoo	R			
Greater Roadrunner	U	U	U	U
Owls STRIGIDAE				
Great Horned Owl	U	R	R	U
Eastern Screech-Owl	U	U	U	U
Goatsuckers and Nightjars CAPRIMULGIDAE				
Common Poorwill	R	R		
Chuck-will's-widow	U	C	U	
Whip-poor-will	R			
Common Nighthawk	C	C	U	

Swifts APODIDAE				
Chimney Swift	C-O	C-O	C-O	
Hummingbirds TROCHILIDAE				
Black-chinned Hummingbird	C	C	U	
Ruby-throated Hummingbird	U	U	U	
Kingfishers ALCEDINIDAE				
Belted Kingfisher	C	C	U	
Woodpeckers PICIDAE				
Golden-fronted Woodpecker	U			
Red-bellied Woodpecker	U	U	U	U
Yellow-bellied Sapsucker	U			R
Downy Woodpecker	U	U	U	U
Ladder-backed Woodpecker	C	C	C	C
Northern Flicker	U		C	C
Flycatchers, Phoebes TYRANNIDAE				
Olive-sided Flycatcher	U		R	
Eastern Wood-Pewee	U	R	R	
Empidonax species	U	R	R	
Yellow-bellied Flycatcher	R	R		
Least Flycatcher	U		R	
Eastern Phoebe	C	C	C	R
Ash-throated Flycatcher	U	C	R	
Great Crested Flycatcher	U	U	U	
Western Kingbird		R		
Scissor-tailed Flycatcher	U	U		
Shrikes LANIIDAE				
Loggerhead Shrike	R	R	R	R
Vireos VIREONIDAE				
Red-eyed Vireo	R	R		
Philadelphia Vireo	R			
Bell's Vireo	R	R		
Black-capped Vireo	U	U		
White-eyed Vireo	C	C	R	R
Blue-headed Vireo	R		R	R
Jays, Crows, Ravens CORVIDAE				
Blue Jay	C	C	C	C
Western Scrub-Jay	C	C	C	C
Common Raven	C	R	U	U
American Crow	C	C	U	C
Swallows, Martins HIRUNDINIDAE				
Purple Martin	C	C		
N. Rough-winged Swallow	C	U	C	
Cliff Swallow	U	U		
Barn Swallow	U	U		

WILD BASIN 2007 DEER CENSUS DATA

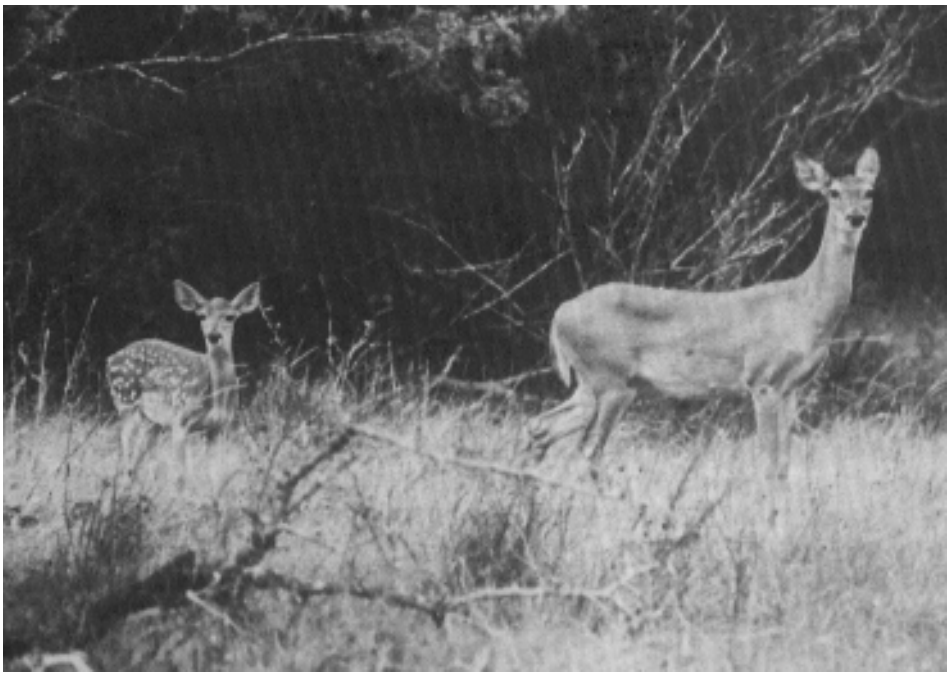
Survey Dates	Does	Fawns	Bucks
9-Aug	13	1	
11-Aug	9		
13-Aug	7	1	1
14-Aug	19	2	1
15-Aug	32	9	8
19-Aug	46	7	8
20-Aug	28	7	1
21-Aug	15	8	5
24-Aug	6	4	4
27-Aug	45	14	3
30-Aug	62	15	11
5-Sep	79	22	6
7-Sep	29	10	2

Total Deer Seen	390	100	50	540
Weekly Avg: Deer Seen				135
Avg: Acres per Deer Seen				1.1455556

Deer Census Techniques

by Milo J. Shult, Wildlife Specialist, Texas Agricultural Extension Service and
Bill Armstrong, Wildlife Biologist, Texas Parks and Wildlife

Why Count Deer?



The white-tailed deer is the No. 1 big game animal in Texas. In fact, Texas has more whitetails than any other state. We harvest more deer annually than most states have in their entire herds. This resource provides tremendous hunting recreation for Texans as well as over 16 million pounds of boneless venison each year.

The great bulk of these animals live on privately owned farms and ranches. Our state is composed of over 95 percent privately owned lands. The harvestable surpluses of deer and other game animals provide landowners with opportunities for increased agricultural income through hunting leases. Continued high quality hunting recreation and increased ranch income are dependent on how well deer herds are managed.

Good deer management doesn't "just happen." It requires a basic understanding of how deer live and how they fit into the range management programs on ranches devoted to livestock-wildlife production. The nutritional requirements must be understood and applied to the vegetative types that exist on the range. For this reason, the number of deer present must be accurately estimated so that populations can be balanced with food supply and livestock which compete for the food supply.

Certainly the ideal situation would be to have a complete count or census of all deer on a particular ranch or in a particular pasture. Unfortunately, complete counts of deer are nearly impossible to obtain, even where animals are confined under a high fence. Unlike domestic livestock which can be rounded up and counted, deer do not confine their activities to large herd groups and cannot be rounded up successfully. For this reason, sample census methods must be used.

Wildlife biologists have had to rely on various sample census techniques to estimate wild populations. The basic principle involved is that if wildlife numbers can be estimated on a known area which is representative of a larger area, those estimates can be applied to the larger area. The key is to sample the study area as well as possible and make sure it is representative of the habitat type the estimates will be used on. For example, if a sample is taken only in heavy juniper stands, the population estimates could not be well used in an open oak savannah.

It must be recognized that censuses are estimates and, therefore, subject to some error. Wildlife managers have done a good job if their estimate is within plus or minus 10 percent of the actual population.

Since deer are living creatures capable of responding to slightly decreased numbers with increased survival of young, these errors are quite tolerable for management purposes and to dictate harvest levels. In fact, where population estimates are carefully made each year under as nearly the same conditions as possible, the trends are as important, if not more important, than the actual numbers in any one year.

In some parts of the country, "sign" can be used to estimate deer herd densities. For example, where mule deer migrate from summer to winter ranges, track counts can be used along migration routes. Or, where deer are the main large herbivores, the condition of major food plants gives an indicator of use and, therefore, population density. When highly palatable plants are being heavily used as well as some plants of secondary importance, deer numbers should be reduced to prevent range depletion. In our area, however, the most widely used census techniques are "strip census" ones which entail counting deer over a known route and estimating the acreage observed.

Before discussing these techniques in detail, however, it is important to remember that herd composition is as important as total numbers. Buck:doe ratios tell us how much of the harvest should be composed of females and how much of males. Some ranchers, biologists, and hunters believe an ideal situation would be a 1:1 ratio as this reflects the approximate way the animals are replaced by births; however, to maintain a deer population at this ratio requires intensive management. In practice a ratio of 1 buck to 2 does is not bad. As these ratios get higher, however, the number of harvestable bucks is decreased. In a herd at carrying capacity, a 1:10 buck:doe ratio tells us we have too many females and fewer bucks to harvest. If meat production was the only goal, this would not necessarily be bad. However, the consumer (hunter) is primarily interested in harvesting bucks. Thus, the rule of thumb is to harvest bucks and does based on the ratios that the census indicate.

Another important ratio which we can get from a census is that of fawns per doe. This gives us an indication of herd health since reproduction will be low when females are stressed as by poor nutrition on depleted ranges. In good deer habitat, adult females tend to have twins with triplets not being uncommon. In marginal to poor habitat, singles become the rule and fawn survival is decreased. The number of fawns produced and their survival is important to future hunting seasons.

Deer Census Methods

Three types of census that can be used by private landowners to census deer on their property are the Hahn, Spotlight, and Mobile Line techniques. All are designed to be used just prior to hunting seasons (usually October) and do not require the use of special equipment.

These three methods determine deer populations by observing animals on a calculated number of acres. In other words, a census line is established by determining the number of acres which can be seen along a given route. Dividing the number of acres by the number of deer seen gives an estimate of the population expressed as acres per deer. This number, when based on a representative sample can be expanded to estimate the number of deer on a given ranch.

To determine the number of acres observed along the route the distances which deer can be seen to the right and left of the line are measured at regular intervals. When these distances are totaled and divided by the number of stops, an average width of the census strip is calculated. The average width (usually in yards) is then multiplied by the length of the line (in yards). This will give square yards in the sample and square yards divided by 4,840 (sq. yds. per acre) will give acres seen.

The visibility can also be determined from an aerial photo, although most people prefer ground estimates.

One general rule to follow in measuring acreage is that distances are not measured across an open draw or gully and deer are not counted across the draw or gully. Also, distances are not to exceed 250 yds. to the right or left of the line and deer are not counted past these distances. All lines should be well marked to insure the same route is followed in future years. This is normally not a problem with

Example:

A line two miles long is walked and, based on the visibility to the right and left at 100 yd. intervals, the average width is 150 yds.

2 miles x 1,760 yds/mile = 3,520 yds. strip length

3,520 yds. (strip length) x 150 yds. (average width) = 528,000 sq. yds. observed

528,000 sq. yds. ÷ 4,840 sq. yds./acre = 109 acres observed

If 11 deer were observed, the density would be 109 acres ÷ 11 deer = 9.9 acres per deer.

driving lines on roads but walking (Hahn) lines should be clearly marked with fence posts, trees, or piles of rocks spot-painted with brightly colored paint.

Hahn Line

A Hahn line (named for Henry Hahn who devised the technique) is a strip census in which numbers of deer are counted along a 2-mile strip by one man walking. The general directions for establishing and using a Hahn line are as follows:

1. The line should be laid out on an east-west axis and always walked from west to east in the evening (sun at observer's back). It may be 1-3 miles long with 2 miles being optimum.

2. Visibility should be taken at 100 yard intervals along the line. In establishing the line, two men are used. One stays on the line and the other walks out at right angles. When the walker disappears from view in the brush, the line man signals him to stop and the distance walked is the visibility.

3. One line per 1,000 acres should be established if possible.

4. The line should be walked at least twice and the results averaged. The more times it is walked the more precise the count will be.

5. The line should be walked in late September or October. Start the line 30 minutes prior to official sunset for a 2-mile line.

6. All deer observed should be recorded. When possible they should be identified as bucks, does, or fawns.

7. The weather conditions are important. Ideal weather would be a southerly wind less than 15 mph, a cloud of less than 50%, and a relative humidity of less than 70%.

8. The Hahn method is accurate on ranges with high deer densities like the Edwards Plateau. The reliability decreases with low deer populations.

Spotlight Census

The spotlight technique involves counting deer at night using a vehicle (preferably a pickup). One person drives the vehicle and preferably two people count deer and make visibility estimates from the bed of the truck. Aircraft or high intensity spotlights are used. This is considered the most consistent method of deer census. However, while it provides a valuable density data and is easy to do, it does not work as well for composition (buck:doe, doe:fawn) data. For this reason, a daylight mobile line may be run to assist in obtaining this information. The criteria for a spotlight line are as follows:

1. The count should be started 45 minutes to 1 hour after official sunset.

2. The driver should not exceed 10 mph. On ranch roads 5-7 mph is preferable.

3. Texas Parks and Wildlife uses lines at least 15 miles long. Shorter lines may be used on a ranch but should be run frequently.

4. Visibility is taken at 1/10 mile intervals along the route.

5. Winds should be less than 20 mph and cloud cover less than 50%. Relative humidity should be less than 70%.

6. Record all deer observed within the sample area. Identify as to sex and age when possible.

7. The local game warden should always be contacted prior to the

count and advised of spotlighting activities, time of spotlighting, and exact location of the activity. No weapons should be carried in the vehicle.

Mobile Line

This technique involves one person driving a vehicle over a marked route to count deer on a measured acreage. It can also be used to count deer without estimating acreage for buck:doe and doe:fawn ratios. It is the least accurate of the three techniques for density figures. The criteria are as follows:

1. The line should run west to east and be approximately 7 miles long if possible.

2. The census should be started 30 minutes before official sundown for a 7-mile line.

3. Weather conditions should be southerly wind less than 15 mph, cloud cover less than 50% and relative humidity less than 70%.

4. Visibility should be taken to the right and left at 2/10 mile intervals if a density estimate is desired.

Other Information

Certain other observations can be made which will increase the reliability of census methods. Some of these are:

1. **Casual Observations:** Keep records of all deer seen from August until the opening of hunting season. Use binoculars to class deer as bucks, does, fawns, and undetermined. This will help verify buck:doe and doe:fawn ratios.

2. **Watch Vegetation:** Deer feed primarily on forbs (broad-leafed plants sometimes classed as weeds) and browse. Watch these indicator plants to determine too heavy deer use or heavy competition from livestock.

3. **Harvest Records:** Quality of deer in the harvest can say a lot about what is happening in a deer herd. Recording antler size, body weights, and body condition are all important. However, they must be related to age. Each deer should be aged to see if it is a young deer doing well or an older deer doing poorly. Texas Parks and Wildlife or your County Extension Agent can provide you with materials to learn about how to age deer. These records from harvested animals will be useful in years to come to evaluate the progress of your management program.

Remember, all census information is trend data. Annual records should be retained to compare population trends and to assist in determining the impact of management practices.

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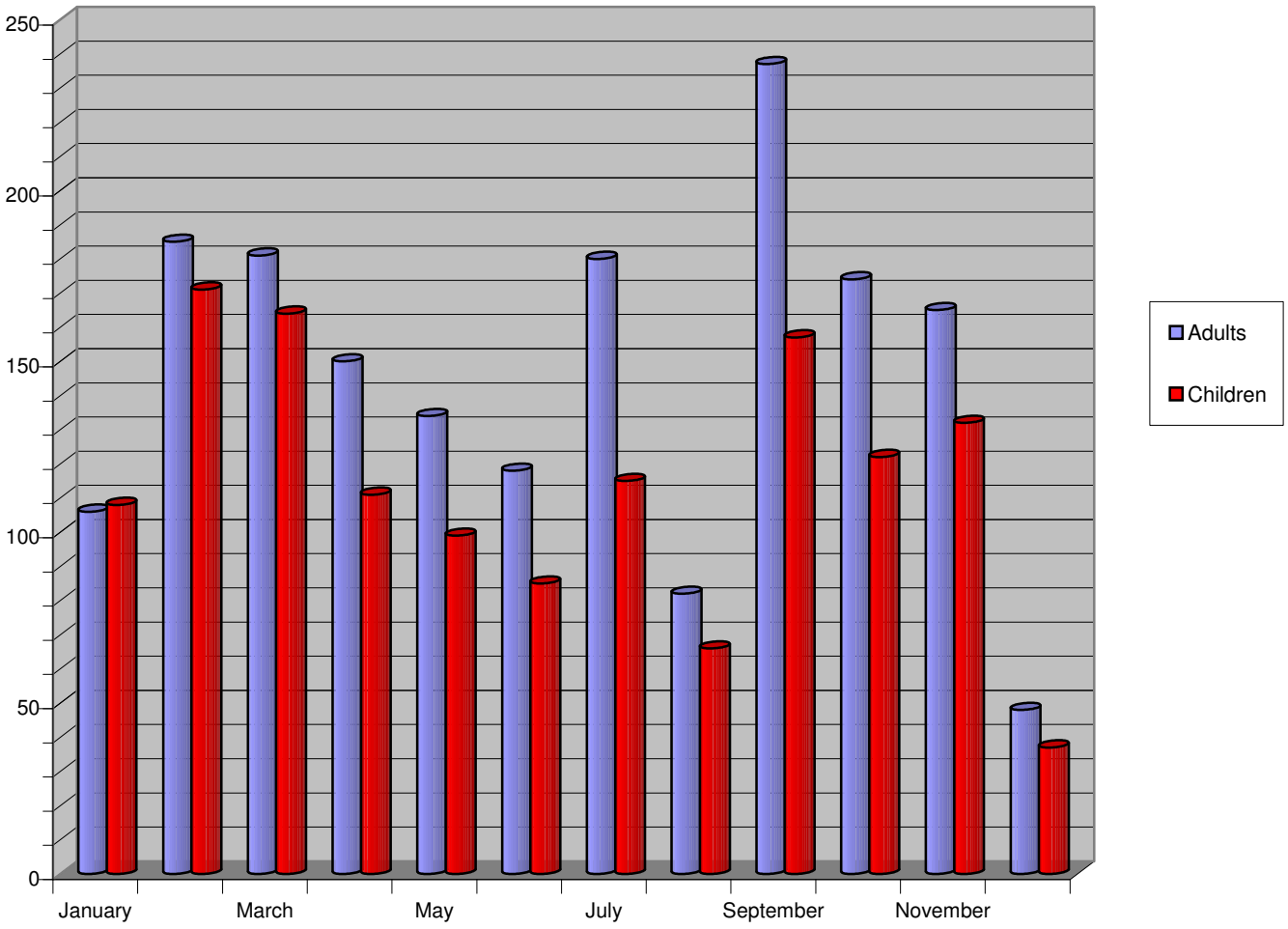
Self-Guided Visitors on the Trails of Wild Basin in 2007

Key: Land Management tracks Self-Guided Visitors from sign-in boxes and Ranger reports. School Groups and all others are tracked by Education.

Month	Type of Tour/Trail Activity					
	2007 Self-Guided			*2006 Self-Guided*		
Month	Adults	Children	**Total**	Adults	Children	**Total**
January	106	108	**214**	215	118	**333**
February	185	171	**356**	151	95	**246**
March	181	164	**345**	260	75	**335**
April	150	111	**261**	310	139	**449**
May	134	99	**233**	237	117	**354**
June	118	85	**203**	201	105	**306**
July	180	115	**295**	196	78	**274**
August	82	66	**148**	102	32	**134**
September	237	157	**394**	147	89	**236**
October	174	122	**296**	213	131	**344**
November	165	132	**297**	224	190	**414**
December	48	37	**85**	175	121	**296**
Total	**1760**	**1367**	**3127**	**2431**	**1290**	**3721**

Subjective staff opinion suggests these numbers, from objective data, represent approximately 25% or less as sign-in data is on the honor system.

2007 Self-Guided Visitors



2007 Self-Guided Visitors to Wild Basin

