ST. EDWARD'S UNIVERSITY

Wild Basin Creative Research Center

Wild Basin Wilderness Preserve

2016- 2017 Annual Report

(October 1, 2016 – September 30, 2017)

Prepared for the

Travis County Commissioners Court

And Transportation and Natural Resources Department

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Photo: Trail Tamers Workshop at Wild Basin (Aaron Haynes)

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OVERVIEW OF PRESERVE MANAGEMENT AND OPERATIONS

Wild Basin Wilderness Preserve is jointly owned and managed by St. Edward's University and Travis County. Wild Basin's mission is to protect and maintain its urban wilderness, and to promote the importance of environmental education, research, conservation and preservation.

Situated at the edge of the Texas Hill Country and surrounded by commercial and residential growth in west Austin, Wild Basin is a unique conservation property for Travis County and the larger Balcones Canyonlands Preserve (BCP) system. As an urban and publicly accessible preserve, Wild Basin provides authentic environmental education and recreation experiences for the community. The preserve's location near a major urban area also brings challenges in the form of invasive species, water pollution, noise pollution, and litter. Wild Basin strives to incorporate these challenges into learning opportunities about our urban environments for students and the public.

In addition to helping implement preserve management, St. Edward's University operates the Wild Basin Creative Research Center based at the preserve, which houses a Visitors Center with environmental exhibits, staff offices, an artist in residence space, and classroom, lab, and meeting space. The Research Center is a key resource for educating university level as well as K-12 students, and provides a platform for public outreach.

Wild Basin's education, art, and preserve management programs are designed to promote conservation and environmental awareness, while encouraging and demonstrating land stewardship practices. Throughout 2016 and 2017, Wild Basin hosted stewardship days for students and the public, provided training for trail guides for school group tours; organized environmental educational and interpretive events, coordinated student internships and research activities, hosted undergraduate and graduate classes, maintained public trails, managed invasive species, monitored and reported on water quality, hosted public and inter-agency meetings, workshops, and trainings, and launched an Artist in Residence Program.

Since its merger with St. Edward's University in 2009, Wild Basin remains an important resource to the local community and continues to build on its rich history of promoting conservation, research, and environmental awareness. Wild Basin aspires to become a model for urban preserves, a hub for stewardship, creative research, and environmental education, and a gateway to the BCP.

WILD BASIN VISION

The vision of Wild Basin is to inspire conservation by connecting communities to a dynamic urban preserve. Together with our partners, we focus on the following goals for Wild Basin:

- Managing and restoring a mosaic of habitats indigenous to Wild Basin, including oak-juniper woodlands, riparian corridors, semi-open grasslands and cedar breaks;
- Protecting native biodiversity;
- Protecting habitat for the federally endangered Golden-cheeked warbler and Black-capped vireo;
- 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 the regional flora and fauna, while minimizing impacts to the preserve's biotic community and inherent beauty; and
- Providing stewardship opportunities, research opportunities, and educational resources for students and the community.

TRAIL MAINTENANCE, RESTORATION, AND CONSTRUCTION

Trail Maintenance and Monitoring Activities:

- Regular trail patrols were conducted along the trail system (Appendix A) to monitor trail conditions and identify potential hazards.
- Two TrailMaster trail counters (one at each trailhead) were maintained and checked regularly to document the total number of visitors as well as temporal patterns in activity.
- Vegetation adjacent to designated trails was pruned throughout the year to maintain a visible trail for visitors. Well-maintained trails will minimize confusion about trail edges so the public can easily and efficiently hike to scenic areas. This maintenance is completed regularly to keep up with vegetative growth.

- Throughout the year, as “social trails” (informal trails created by public or animals) were created, signs were placed to indicate that visitors should stay on designated trails. In addition, dead and downed material was strategically placed to deter foot traffic by humans and wild animals.
- Several berms and swales were installed on the trail system at locations where rainfall runoff causes significant trail erosion to increase sheet flow of rainwater and reduce trail erosion.
- Several large snags that were adjacent to trails and presented risks to the public were removed by Wild Basin and St. Edward’s University staff and trained volunteers.

Trail Restoration Activities

- Wild Basin continued to work with representatives from Central Texas Trail Tamers (CTTT) to incorporate trail maintenance techniques that minimize erosion and lead to more sustainable trails. Wild Basin hosted the CTTT in three workshops (February 11th, March 18th, April 29th) where volunteers received classroom and hands-on training in sustainable trail design & maintenance practices. As part of this workshop, several berms and swales were installed on the trail system and one rock water bar was installed on the southern end of Woodland trail. Approximately 33 individual volunteers participated in these workshops.
- Throughout the year, trail crews cleaned existing drainages along the entire trail system to improve functionality and allow water to drain from trails.
- Land management activities used primarily native juniper and native limestone when needed for trail maintenance. No old-growth junipers or other native hardwoods are cut down in the preserve for such uses. All trail maintenance and other land management activities avoid impact or disturbance to cultural and archaeological resources.

Construction & Building Maintenance Activities

- St. Edward's University replaced the Visitor’s Center water pump and control panel for the fire sprinkler system on May 15th. Additional upgrades to the riser room housing the water pump included replacing the heater and insulation.
- St. Edward's University contracted the gate repair company, Austin Entry, to replace the computer that controls the entrance gate to Wild Basin on July 17th.

- St. Edward's University replaced the ventilation fans to the Clivus composting toilets on June 15th.

BOUNDARY MANAGEMENT

Boundary Management Activities

- Wild Basin staff monitored the preserve's perimeter at quarterly intervals to check the integrity of fencing and boundary markers.
- Perimeter checks revealed fence cuts on multiple occasions. Those occurrences were reported to Travis County TNR personnel, who addressed the issues directly with adjacent landowners. Fence cuts were mended by Wild Basin staff.
- Trash along Hwy 360 adjacent to Wild Basin was picked up by volunteer crews on multiple occasions throughout the year to prevent it from traveling into the preserve and Bee Creek.
- Signs discouraging holiday tree decorations were placed along Hwy 360 at the beginning of the holiday season. In addition, holiday tree decorations were removed from trees promptly to discourage further decoration.

VEGETATION MANAGEMENT

Vegetation Management Activities

- Vegetation mapping. Wild Basin staff, volunteers, and researchers are currently using the citizen science platform iNaturalist to map the distribution of plants within the preserve. iNaturalist is accessible via a smartphone app or on the web from a computer. The app allows users to document locations, photos, and relevant notes about plant species on-site. Currently, we have two projects established in iNaturalist: one project for the public to report their observations along the trails (Wild Basin Biodiversity Project), and a second project for staff, researchers, and trained volunteers to report observations of rare plants and invasive species in off-trail locations (WBCRCMappingProject). For the second project, all coordinates are obscured from the public so as not to encourage iNaturalist users to leave the trail. All iNaturalist observations can be exported and then uploaded to ArcGIS or Google Earth for mapping or further analysis. A total of 304 plant

observations were added to the Wild Basin iNaturalist projects between October 2015 and September 2016.

- Rare plant species. All rare plant locations described are documented in the iNaturalist WBCRCMappingProject (Appendix C). Coordinates are obscured from the public when sightings are off-trail.
    - Orchids in the *Hexalectris* genus were documented in multiple locations at Wild Basin in May-September 2017, including two areas adjacent to Arroyo Vista trail, one area adjacent to Creek Trail, and a patch near the northern bank of Bee Creek.
    - Orchids in the *Spiranthes* genus were documented in multiple locations at Wild Basin in October-November 2016, including along Arroyo Vista Trail, adjacent to Ledge trail adjacent to Yaupon trail, and in the North Hollow drainage.
    - Two planted canyon mock orange individuals are located near the Wild Basin visitors center.
    - Eastern shooting-stars (*Dodecatheon meadia*) were documented in several locations at Wild Basin, including the south-facing slope of North Hollow and the south-facing slope of Southwest Hollow. These sites were investigated in April-May 2017 to look for individuals during bloom but none were found in bloom.
- Invasive species management. Invasive plant species are regularly mapped and monitored using the iNaturalist platform. Preserve staff and volunteers continued to monitor for and remove invasive, non-native species, such as Japanese honeysuckle (*Lonicera japonica*), Chinese Tallow (*Triadica sebifera*), Chinaberry (*Melia azedarach*), firethorn (*Pyracantha coccinea)*, Japanese privet (*Ligustrum japonicum)*, Chinese privet (*Ligustrum sinense*), nandina (*Nandina domestica*), King Ranch bluestem (*Bothriochloa ischaemum*), Johnson grass (*Sorghum halepense*), chaste-tree (*Vitex agnus-castus*), bastard cabbage (*Rapistrum rugosum*), and giant cane (*Arundo donax*), among others. Most of the invasive species control measures currently used at Wild Basin involve manual removal of plants by invasive species crews (Appendix D). In addition, we have begun using the EZ-Ject lance with Imazapyr capsules to treat invasive stems that are too large to be removed manually with a Weed Wrench (i.e., greater than 2.5” diameter). Previous research at Wild Basin shows that this method effectively treats invasive plant species while minimizing off-target impacts of herbicide.

- Protection from browse pressure. Wild Basin staff maintained existing deer exclosures of hog wire cages around stands of young native trees and shrubs to prohibit excessive browse by deer and other animals.
- Fuel reduction. Several sites adjacent to residential areas on the southern border of the preserve have been investigated for potential fuel reduction efforts, as coordinated by Travis County and City of Westlake. Also, Firewise guidelines are followed to create defensible space near the visitors center. Fire fuel was removed within three feet of the perimeter of the building and in some areas rocks beds/breaks were placed to stop the spread of ground fires.
- Replanting. Several small red buckeyes and Carolina buckthorns provided by Travis County were planted adjacent to Bee Creek in re-routed Creek Trail area, with the goal of restoring the old trail and discouraging off-trail traffic in this area. The seedlings were planted with several Wild Basin volunteers during a public stewardship day in November 2016.
- Demonstration Native Plant Garden. St. Edward's University interns planted a butterfly garden behind the Visitors Center at the southern Arroyo Vista trailhead. All the plants were native species and many were donated by the Land Manager of the Vireo Preserve.

WILDLIFE MANAGEMENT

Wildlife Management Activities

- Golden-cheeked Warbler (*Setophaga chrysoparia*). During the 2017 nesting season, surveys were conducted at Wild Basin/Vireo Preserve by Darrell Hutchinson, Jim O'Donnell, and Johnny Salise, for a total of 149 survey hours. Three color banded male GCW returned to Wild Basin including one named "Candy" who is estimated to be at least 8 years old and the oldest known GCW in the BCP. For a full report see Appendix E.
- White-tailed deer (*Odocoileus virginianus*). Deer surveys were conducted according to previously established protocols at Wild Basin. Driving surveys took place on six evenings in October 2016 in the residential neighborhoods immediately south of Wild Basin. Results of the driving surveys are summarized in Appendix F.
- Feral Hogs (*Sus Scrofa*)- Some signs of the possible presence of feral hogs were observed within the reporting period. Those signs included large patches of disturbed soil. Wild Basin staff continue to monitor for additional

signs and communicate any observations or concerns to Travis County TNR personnel.

- From October to February, thirteen Bushnell motion-triggered game cameras were maintained within the preserve at preselected grid points to monitor wildlife activity and off-trail human activity. Locks are attached to all cameras. In February and March of 2017, several cameras were removed to be used in other Austin greenspaces as part of the Austin Wildlife Watch project. As part of a project to study wildlife movement across Wild Basin boundaries, between September and November of 2017, 15 motion-triggered cameras were installed along the perimeter of Wild Basin in areas bordering residential areas and the Vireo Preserve.

WATER QUALITY AND QUANTITY

Water Quality and Quantity Monitoring Activities

Water quality testing was conducted for three of the months during the reporting period by Wild Basin staff (with assistance from student interns) using the Colorado River Watch Network water quality monitoring protocols. Several different parameters were tested, including pH, turbidity, dissolved oxygen, and specific conductance (Table 1). All data from water quality testing at Wild Basin can be found online at the CRWN website (https://crwn.lcra.org/events.aspx?qrySite=72).

OUTREACH, EDUCATION, AND VOLUNTEER COORDINATION

Outreach, Education, and Volunteer Coordination Activities

Wild Basin actively provides environmental educational opportunities and volunteer stewardship opportunities for the community. A total of 588 volunteer hours were logged at Wild Basin on a number of outreach-related activities, including trail maintenance and stewardship (described above), environmental education, research, and the weekend ranger program. The major programs held at Wild Basin from Oct 1, 2016 to Sept 30, 2017 are summarized below.

Environmental education & interpretation programs

- School and Group Tours – Approximately 741 school-aged children, including students from local schools and homeschool and community groups, attended education programs at Wild Basin. Group size is restricted to a maximum of approximately 40 students per visit to control for impact on the preserve and ensure volunteer guides have manageable group sizes. Approximately 10 trained volunteer guides donated an estimated 110 hours to assist with these education programs.
- Family & Public Programs – Local children and adults (approximately 500 total) attended several public programs hosted by Wild Basin during fiscal year 2016-17 including nine Wild by Wild Basin special events, monthly second Saturday guided hikes, seven specialty guided hikes, four public lectures on archeology, skins and skulls, native plant uses, and feather ID, a Living Springs/Bats film screening, and an Earth Day nature art show titled "You are Here".
- BCP Hike and Lecture Series- Wild Basin hosted five events as part of the BCP Hike & Lecture series. Events focused on kid-friendly and family activities such as an archeology lecture, Artist in Residence presentations for adults and children, a tree identification hike and a feather identification lecture.
- Artist in Residence - Wild Basin welcomed its first Artist in Residence in the spring of 2017. The inaugural awardee was local wildlife artist and Wild Basin neighbor, Andrea Wolf. Wolf's work focuses on contemporary portraits of regional wildlife. The artist painted at the preserve weekly and conducted two events open to the public at the Wild Basin Creative Research Center during her time with us. For an adult audience, Wolf's workshop explored the meaning and influence of local wildlife with a painting demonstration. A second event for children focused on incorporating nature themes in artwork.

Environmental education resources for the public

- Interpretative Education Center- School groups and the general public have access to the Wild Basin visitors center on Monday-Friday, 9am-4pm. In 2017, we maintained the educational exhibits installed in the visitor's center and made use of them during group events (i.e. demonstrating the use of iNaturalist on the touch screen computers, pointing out the birds displays and calls, and referencing the other exhibits as well). Additionally, public visitors had access to the exhibits during normal business hours.
- Public visitation - We placed two trail counters at the trailheads to estimate the number of visitors using the Wild Basin trail system. We assume that each individual is counted twice by the counters (arriving and leaving), so we add the totals from both counters together and divide by two for monthly visitation estimates. Estimates from the trail counters indicate Wild Basin welcomed approximately 22,238 visitors during the 2016-17 fiscal year. Visitation rates were lowest in August (approximately 653 visitors) and greatest in March (approximately 3275 visitors). The automatic trail counters have been found to be fairly accurate although they may miss some visitors, especially when walking in large groups. Due to this and standard malfunctions (i.e. dead batteries) estimates may be considered conservative.
- Weekend Ranger Program - Wild Basin volunteers implemented a weekend program to greet and assist visitors, monitor trails, educate hikers about Preserve rules (no smoking, no pets, no leaving designated trails, etc.) and help Wild Basin staff with events. Collectively, weekend rangers contributed approximately 102 hours between Oct. 2016-Sept. 2017.

Citizen science

- eBird quarterly walks – Wild Basin staff and volunteers coordinated quarterly bird walks for the public to participate in the citizen science program, eBird, run by the Cornell Lab of Ornithology and National Audubon Society. Three sections of Wild Basin's trail systems are included as separate survey locations (360 Trail Segment, Bee Creek Segment, and North Hollow Segment), and all birds seen or heard during the quarterly walks were recorded in the eBird database. Thirty-five bird species and 265 total birds were recorded during the 2016-17 eBird walks, with over 16 volunteers contributing as participants.

- iNaturalist – Students, volunteer natural resource stewards, and the public are encouraged to participate in the Wild Basin Biodiversity Project, a citizen science project on the iNaturalist platform (http://www.inaturalist.org/projects/wild-basin-biodiversity-project). This project allows users to submit observations of flora and fauna, supported by photos or sound recordings, using either their mobile device or desktop computer. The community of members on iNaturalist then helps to determine or confirm the identity of the animal or plant, and it becomes a valuable data point for our natural resource management efforts as well as broader scientific research. iNaturalist also allows users to view observations uploaded by other visitors to the preserve. A total of **678 observations documenting 288 species** have been reported by students and visitors in the Wild Basin Biodiversity Project on iNaturalist.

Volunteer stewardship

- Volunteer Stewardship Workdays- Wild Basin provides opportunities for the public to volunteer and assist with land management activities, as well as learn about the BCP and conservation issues. Collectively, **land management volunteers contributed approximately 549 hours** from Oct 2016-Sept 2017. This includes contributions from approximately 175 volunteers participating in Saturday workdays, corporate group stewardship events, and a dedicated small group of volunteers participating in weekly workdays. Specific stewardship events include the following:
    - Wild Basin Stewardship Days – the public is invited to participate in stewardship days at Wild Basin one Saturday per month. During the period from Oct 2016-Sept 2017, volunteers on Saturday workdays collectively contributed over 80 hours of service.
    - St. Edward's University Stewardship Days – Wild Basin hosted two stewardship events specifically for St. Edward's University students (The Big Event in April 2017, and SERVE Volunteer Day in Sept 2017). Over 40 students contributed 120 volunteer hours of stewardship activities including invasive species removal, trash pickup, and trail maintenance.
    - Thursday Volunteer Workday - A small group of dedicated Wild Basin volunteers participated in weekly land stewardship activities including trail pruning and protection, invasive plant removal, and pond repair.

Collectively, Thursday volunteers contributed 156 of land stewardship hours.

- Trail Tamers Workshop - Wild Basin hosted a free class with Central Texas Trail Tamers Organization that covered building and maintaining trail systems. The workshop was taught over 3 days from February to April 2017 and approximately 5 participants earned their certification. Attendees contributed a total of 143 hours during the workshop.
- Corporate Events - Wild Basin held 2 events with participants contributing a total of 50 volunteer hours.

Public events, meetings, workshops, and conferences

- Balcones Canyonlands Preserve (BCP) – Wild Basin hosted several of the BCP Education/Outreach meetings.
- Wild Basin hosted nine "Wild by Wild Basin" events during spring break 2017. Public guided hikes included a night hike, mindfulness hike, an adult hike and a "Tiny Footprints" pre-k hike. Other events included full moon yoga, skins and skulls interaction lecture, native plant use lecture, and a family fun day with live music.
- REI – REI conducted a photography class during Wild Basin's spring break event, "Wild by Wild Basin".
- Hill Country Alliance- Hill Country Alliance held their 2017 certified interpretive guide training at Wild Basin.
- Meetings of local organizations – Wild Basin hosted several group meetings for entities such as Make a Wish Foundation, Audubon Society, Capital Area Master Naturalist, Bat Conservation International, Tree Folks and Families in Nature.
- Travis Audubon held their 2016 Master Birder Training Program at Wild Basin. This training involved 8 evening training sessions held in the Wild Basin classroom.
- Project Learning Tree held two workshops covering tree physiology and urban forest that met the needs of TEKS correlated environmental education.

St. Edward's University Events

- F.A.R.M - Wild Basin hosted the "Freshmen Accelerated Research Methods" program in September 2017. This was Wild Basin's first year participating in

in the program. A total of 11 students participated in a Bioblitz on iNaturalist and attempted to I.D. as many species as possible during their visit.

- LLC Freshman Program - Wild Basin hosted the Living Learning Communities (LLC) program on Saturdays in Fall 2017. This program helps students transition from high school to college by connecting freshmen with a common academic or social interest. Approximately 40 students from LLC groups such as Leadership, Social Justice, and Honors visited Wild Basin for a team building exercise.
- Staff Retreats and Meetings - Various departments and school groups from SEU scheduled their planning and staff retreats at Wild Basin including School of Behavioral and Social Sciences, School of Natural Sciences, Campus Ministry, Office of Admissions, Office of Advancement, School of Education, Human Resources, Campus Recreation, Office of Finance, and the Council of Deans.
- Biology 4142 - Ecology Lab – This ecology lab incorporated a semester-long course-based undergraduate research experience (CURE) at Wild Basin for upper-level undergraduate students. Approximately 20 students participated in research projects related to ecological parameters such as vegetation community composition, soil characteristics, wildlife distribution.
- Biology 1107 - Cells, Genetics, and Organ Systems and Biology 1108 – Populations and Organisms - The introductory biology labs incorporated a course-based undergraduate research experience (CURE) that allowed students to participate in hands-on research. Approximately 96 students participated in a project to collect water samples and evaluate water quality parameters in Bee Creek.
- Biology 2124 Plant Biology Lab (David Johnson)
- Biology 1305A Contemporary Biology - held Class (Judy Walther)
- ENSP 1304 Introduction to Sustainability (Beck)
- Crime Scene Investigation II Lab FRSC 3121 (Casie Parish-Fisher)
- MSEM 6311 Community Ecology (visited 3/20/17 and 3/22/17)

- Student research symposiums – student researchers presented their work on Wild Basin-related projects at the following symposiums:
    - **"An Assessment of mechanical removal methods of privet (Ligustrum spp.) at Wild Basin Wilderness Preserve"** by Savannah Bryson, C. Eric Johnson, and Abigail Kropf (poster presentation), Texas Society for Ecological Restoration Annual Conference, Livingston TX, Nov 10, 2016.

- **"Evaluating and mapping habitat characteristics associated with central Texas bobcats"** by Carolyn Harper, Teresa Johnson, and Anne-Marie Walker. Environmental Management and Sustainability Graduate Student Research Symposium, St. Edward's University, Dec 6, 2016
- "**Field test evaluation of white-tailed deer (*Odocoileus virginianus*) surveying methods at Wild Basin Wilderness Preserve"** by Lexington Belyeu, M. Andrew Horvath, and Danica Meltay. Environmental Management and Sustainability Graduate Student Research Symposium, St. Edward's University, Dec 6, 2016
- "**An assessment of mechanical removal methods of privet (*Ligustrum japonicum & Ligustrum sinense*) at Wild Basin Wilderness Preserve**" by Savannah Bryson, C. Eric Johnson, and Abigail Kropf. Environmental Management and Sustainability Graduate Student Research Symposium, St. Edward's University, Dec 6, 2016
- "**Evaluating ecosystem services provided by Wild Basin Wilderness Preserve**" by Kelsey Emmons, Michelle Mendoza, and Lauren Schricker. Environmental Management and Sustainability Graduate Student Research Symposium, St. Edward's University, Dec 6, 2016
- **"Evaluating restoration techniques in riparian areas: an assessment of mechanical removal methods of *Ligustrum spp.* (Privet)"** by Savannah Bryson, **C. Eric Johnson**, and Abigail Kropf, US-IALE 2017 Conference, Baltimore MD, April 11, 2017.
- **"Dye Tracing to Unearth Onion Creek Flow Patterns"** by Chris Enders, Kristen Meisner, Winfred Mudong, Save Barton Creek Association's Creek Crew Happy Hour, Austin, TX, Sept 11, 2017 https://www.facebook.com/events/113019366044234/

- Wild Basin Internship program – Wild Basin provided internships for 15 students. This includes internships in Environmental Management, Sustainability, Environmental Education, and Outreach/Social Media. Projects included water quality testing, invasive species removal, trail maintenance, monitoring animal behavior with wildlife acoustics and camera systems, butterfly garden research and implementation, and trail patrol.
- St. Edward's University events – Wild Basin staff provided resources and community outreach at several SEU events on campus such as Earth Day, Sustainability Fair, and Student Involvement Fair
- Courses – A list of undergraduate and graduate courses that incorporated Wild Basin into their curricula in Fall 2016 and Spring, Summer 2017 is

included in Table 2. Approximately 200 university students visited Wild Basin as part of their course work in 2017.

Table 2. Undergraduate & graduate classes taught at Wild Basin in 2016-2017.

Course #	Title	# of Students	Semester
BIOL 1305	Contemporary Biology	12	Spring 2017
MSEM 6301	Population Ecology	13	Fall 2016
BIOL 4142	Population Biology & Ecology Lab	20	Spring 2017
ENSP 1304	Introduction to Sustainability	18	Spring 2017
BIOL 1107	Cells, Genetics, and Organ Systems Lab	48	Fall 2016
BIOL 2124	Plant Biology	10	Spring 2017
FRSC 2131	Crime Scene Investigation II Lab	21	Spring 2017
MSEM	Community Ecology	13	Spring 2017
BIOL 1108	Populations and Organisms	48	Spring 2017
	TOTAL	**203 students**	**9 classes**

Publications

- Wild Basin staff and interns, along with St. Edward's University marketing staff reported on Wild Basin news, events, and volunteers in Wild Basin electronic newsletters as well as updates in regular blog posts and social media outlets.
    - An article titled "On Safari in the City: A Guide to Urban Wildlife Viewing" in which Wild Basin was mentioned was published in New York Times on May 2, 2017.
    - An article titled "Creation of a National Urban Wildlife Monitoring Network Helps Build Wildlife-Friendly Cities" was published in National Geographic on March 23, 2017.
    - An article titled "Lights, Camera...Bobcats?" was published in the St. Edward's University Magazine, Fall 2017 Issue.
    - An article titled "Caught on Camera: Austin's Urban Wildlife documented for Nationwide Effort" was published on May 24, 2017 on kxan.com and aired with an interview with Wild Basin research director, Dr. Amy Belaire.
    - An article titled "Andy Roddick and Brooklyn Decker's Austin" was published in People Magazine, February 2017 and mentioned Wild Basin as one of four "must visit" destinations.
    - An article titled "Armed with Apps, Citizen Scientists Track Animal Populations" was published in Reporting Texas - UT Austin's School of Journalism in Fall 2016.

- An article titled "The Best Hiking Spots in Austin" was published on Do512.com and noted Wild Basin as a favorite hiking spot to visit in Austin
- An article titled "Four Summer Destinations for the Aggie on a Budget" was published on the Texas A&M University newspaper website, The Battalion, on July 12, 2017 and noted Wild Basin as one of four summer destinations for the Aggie on a budget.

SCIENTIFIC RESEARCH

Nine research projects received Scientific Research Permits from Travis County and completed work at Wild Basin in 2016 and 2017. Several additional Educational Permits were also granted. Short summaries of all permitted projects are included below.

(1) Belair, A. Wild Basin Acoustic Biodiversity Monitoring Project

INVESTIGATORS: Amy Belaire, Barbara Dugelby, Aaron Haynes, Anne-Marie Walker, Gabriela Macias, Olivia Leos, Caleb Spitz, Nicholas Thompson, Darrell Hutchinson, David Knobles, and Preston Williams

ABSTRACT:

Bioacoustic monitoring offers a powerful tool to monitor biodiversity over time and space, especially in rapidly urbanizing landscapes, such as those in and around Austin, Texas. Wild Basin is a 227-acre natural area that provides 3 miles of hiking trails within a 10-minute drive of downtown Austin. Approximately 10,000 students and adults visit Wild Basin annually to experience the native Texas Hill Country ecosystem. The Wild Basin Acoustic Biodiversity Monitoring Project focused on the effects of urbanization on bird communities at Wild Basin. Wild Basin is home to the federally endangered Golden-Cheeked Warbler and many other native wildlife species that are affected by habitat loss, fragmentation, and other anthropogenic factors associated with urbanization. With this project, we began tracking bird communities as the surrounding landscape becomes increasingly urbanized. In addition, through our outreach program, we shared bioacoustic information with students and the public through our social media platforms, helping them understand the value of acoustic monitoring for biodiversity conservation.

PROJECT OBJECTIVES:

1. Use bioacoustics to monitor biodiversity in a rapidly urbanizing landscape
2. Share findings and research process to engage the community

FIELD METHODS:

In Spring 2017, we received an equipment grant from Wildlife Acoustics for four SongMeter SM4 units. Three units were mounted to trees using cable locks in modified transect design, perpendicular to Loop 360 and adjacent to Bee Creek. The fourth recorder was moved to various locations as needed in attempt to record songs of golden-cheeked warbler individual males.

The units on the transect were set up ~300m apart from each other adjacent to the riparian habitat of Bee Creek. Short recordings were taken each morning for an hour centered around sunrise. The goal with the transect design was to conduct simultaneous sampling within a similar habitat type that was subjected to the same environmental interferences; the primary difference between points on the transect was distance from road and adjacent urbanizing landscape.

In addition to the bioacoustics data collected by the SM4 units, students also helped monitor on-site impacts of surrounding urbanization by measuring ambient noise levels at various times of day across the preserve and throughout the season.

ANALYSIS:

For 2017 analysis, we selected 1-minute sound samples collected 30 minutes after sunrise for a total of 20 days during March, April, and May. This included 10 weekdays (Tuesdays and Wednesdays) and 10 weekend days (Saturdays and Sundays). Low frequencies associated with anthropogenic noise (0-1.5 kHz) were filtered out prior to analysis. We then calculated the Acoustic Complexity Index for all samples using the R package soundecology. The Acoustic Complexity Index (ACI) has been used in other studies to evaluate shifts in community composition over time and space. It has also been demonstrated to have a relationship with avian species richness in several studies. In addition to ACI calculations, we also listened to a random subset of our 1-minute samples to estimate the number of bird species around each recorder.

RESULTS:

Our preliminary analysis focused on several questions. First, how does the ACI shift along the transect as we move farther into the preserve and away from traffic noise? We found that ACI increases modestly at ~400m from the highway and jumps more substantially at ~700m from Loop 360 (Fig. 1). In addition, this general trend

corresponds to our finding of increased avian species richness as we get farther from the highway (based on our 1-minute samples).

Second, how does the ACI vary between weekdays and weekends (knowing that traffic varies substantially between workdays and weekend days)? We found that ACI was relatively consistent along the transect on the weekend days, when traffic is relatively quiet. However, at one of our points, we did see a spike in ACI on the weekdays (Fig. 2), which suggests that there might be some attempts to increase vocalizations in response to increased noise during the workweek rush-hour, but then it stops when the noise disturbance decreases. Another possible explanation may be that the two points closest to the highway have consistently loud noise regardless of whether it's a weekday or weekend.

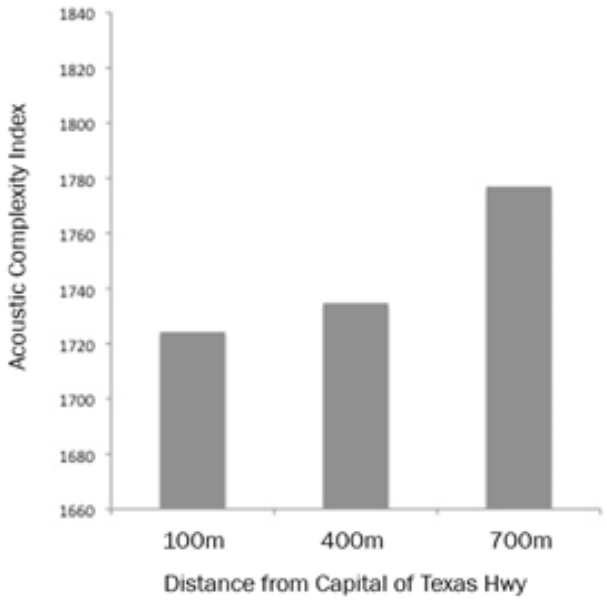


Figure 1 Acoustic Complexity Index along transect, calculated across all samples

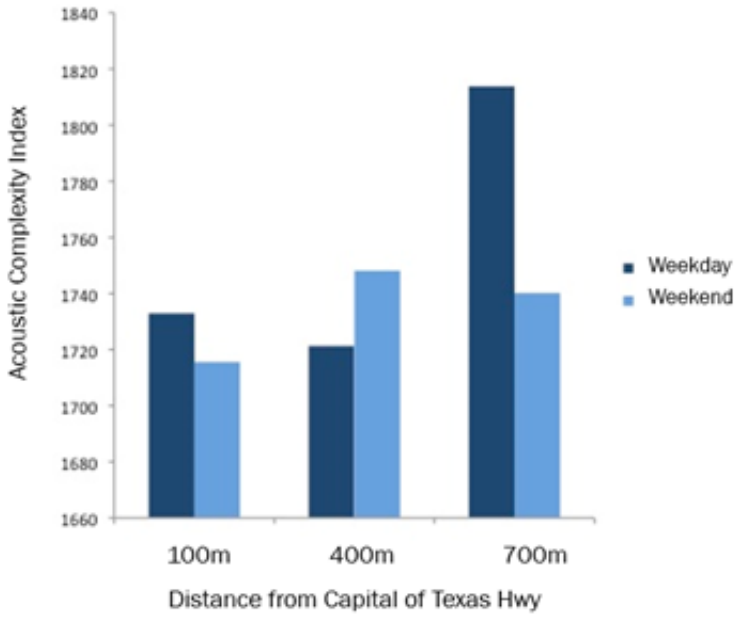


Figure 2 Acoustic Complexity Index calculated separately for weekdays and weekends

OUTREACH:

Dr. Amy Belaire shared these results at the International Urban Wildlife Conference in San Diego, California in June 2017. In addition, we shared many of the student research updates on the Wild Basin "I-Wonder" blog. Excerpts from two student researchers are included below.

"We find that listening to these different birds' songs has given us a whole new appreciation and awareness for a part of nature that we never paid much attention to before. When you begin listening to the birds, you start to realize that there are in fact different species of birds all around us." – Olivia Leos

"Birds aren't really just background noise to me that I tune out anymore. Pretty much everywhere I go now, I'll pause to listen and try to figure out which birds are singing. In fact, Olivia and I are always texting each other saying how we're both always trying to ID birds now." – Gabby Macias

(2) *Belaire, A. A Test of the Relative Abundance and Distribution of Ants at Wild Basin/Vireo Preserve in Relation to Habitat Manipulation for the Black-capped Vireo*

No work was conducted on this project during the reporting period.

(3) Belair, A. Documenting Spatial and Temporal Patterns in Wildlife Distribution Across Wild Basin

Summary: Several cameras were maintained within the preserve and used for observational land management purposes. No data analysis was conducted in regards to spatial or temporal patterns of wildlife within the preserve.

(4) Bilnski, T., M. Rodriguez, A. Ontai, S. Kramer, B. Shults, and J. Salinas. Effects of urbanization on ecosystem services at Wild Basin

UPDATE: Data continues to be collected for this research during the year. However, the data have not been analyzed and no new results are available to be presented.

(5) Concilio, A. MSEM Population & Community Ecology class research: Impacts of Emerald Ash Borer on oak-juniper forest structure and composition

SUMMARY:

Project description: Students in MSEM 6310, 6311, and ENSP classes will contribute to long-term data collection on forest structure and composition at Wild Basin with an emphasis on areas populated by ash trees (*Fraxinus* spp). These trees will likely experience high mortality with the impending arrival of the emerald ash borer. Our focus this year will be to characterize the ecosystem pre-infestation. During the fall semester each year, students will go off trail 2-3 times to collect data on overstory structure and composition using point-centered quarter sampling at 5-6 sites. During the spring semester, students will go off trail 2-3 times to conduct non-destructive vegetation sampling of the herbaceous and shrub understory community in the same locations that were sampled in the fall. Students will gain ecological research skills collecting and analyzing these data.

PROJECT PROGRESS:

In 2016, students in the MSEM Population Ecology course read and discussed scientific articles on the Emerald Ash Borer (EAB), visited sites at Wild Basin that might be impacted by the EAB, and then applied that information to discussions about research design for exploring invasive species impacts on populations and communities. While at Wild Basin, the students met with Drs. Belaire, Dugelby and Bilinski to hear about their research interests, experience, and on-going work that is happening at the reserve. We then hiked down to Bee Creek with Drs. Belaire and Bilinski to survey the site, learn about woody plant identification, and talk about all the variables we might want to consider measuring in response to an EAB infestation. While back in the classroom, we covered research design and monitoring of plant populations throughout the semester, and students were able to

discuss and think through how to design a good research project to monitor Texas ash in response to the EAB using the information that they gathered at Wild Basin. In the spring semester of 2017, students in MSEM 6311 set up permanent sampling points along Bee Creek. They collected data on understory plant community composition. In the fall of 2017, MSEM students are working on many of the same activities discussed above. Two ENSP students in Peter Beck's senior research class are characterizing the woody vegetation structure and composition using nested plots at the same permanent sampling sites set up by MSEM students last year.

Number of participants: 14 (2016/17), 10 (2017/2018)

Types of activities performed: Exploratory trip to survey the site and learn to differentiate between dominant woody riparian plant species; herbaceous vegetation surveys; woody plant surveys

OUTCOME:
Our trip to Wild Basin allowed students to integrate concepts that we were covering in class into real-world applications in population monitoring and research design. We will continue to use the EAB project next semester and beyond as a way to integrate key concepts in population and community ecology with a real-world case study.

(6) Hauser, C. Metagenomics of Glen Rose Soil Microbial Systems and Their Roles in Carbon Cycling and Native Plant Restoration

No work was conducted on this project during the reporting period.

(7) Haynes, A. Freshman Accelerated Research Methods workshop (FARM)

SUMMARY:
Thirteen freshman from St. Edward's University participated in the annual Freshman Accelerated Research Methods workshop (FARM). During the workshop the students were required to downloaded iNaturalist onto their smart devices and used iNaturalist to conduct a “Bioblitz” on the preserve. The students split into five groups based on the organism types mammals, insects, reptiles/amphibians, birds, and plants. Each group was given a field guide to help identify organisms within their designated groups. They conducted the Bioblitz for roughly three hours. Upon completion, they were shown how to download CSV data to an Excel spreadsheet for statistical analysis. Due to extreme heat conditions wildlife observations were

relatively low with a total of roughly 25 observations made. The majority of observations were of plants.

(8) Haynes, A. A comprehensive diversity survey of Herpetofauna at Wild Basin Wilderness Preserve

No work was conducted on this project during the reporting period.

(9) Heartman, E. Introductory Biology Lab (Cells, Genetics, & Organ Systems), BIOL 1107 St. Edwards University

SUMMARY:

During the spring 2017 semester, the course BIOL 1108 at St. Edward's University had approximately 48 students conducting research at Wild Basin. 24 students collected data upstream of the waterfall, the closest point at Bee Creek to the Highway 360 Bridge while staying on the trail. The other 24 students sampled further downstream where Creek Trail intersects the creek at the furthest distance south and east. Students quantified periphyton biomass, macroinvertebrate diversity, and coliform concentration. This data was made available to all of the students enrolled in BIOL 1108, so that they could compare sites across Austin to obtain a better understanding of how land use and other factors may affect stream quality.

The data for the coliforms were not conclusive as the students faced the issue of contamination. If we continue to pursue this data collection, we will be more stringent on which groups are assigned to collect this data. Those that exhibit skill in sterile technique will be chosen.

Students collected macroinvertebrates using the kick and sweep method which utilizes a kick screen to collect individuals. The students brought the samples back to the lab and anesthetized and preserved the animals in 70% ethanol and then identified the individuals. Students were required to identify the organisms to family and then calculate % EPT, which is the percent of families identified that belong to the orders: Ephemeroptera, Plecoptera, and Trichoptera. These organisms are more sensitive to pollution so serve as bio-indicators. The results suggest that the two sample sites within Wild Basin are statistically significant ($p=0.09015$, $\alpha=0.10$). The sample site at the waterfall had a higher %EPT than the downstream site. A higher %EPT suggests that there may be better water quality upstream. This is

interesting considering the construction occurring upstream, which would arguably negatively impact the stream as it enter Wild Basin. Alternatively, it may be that there are more habitats or niches available to accommodate more species upstream and does not have water quality implications.

The periphyton data was less conclusive and there was not a statistical significance between the two Wild Basin sites ($p=0.516$, $\alpha=0.10$). Also, the students had difficulty measuring the surface area of the rocks they scraped. We hope to collect same data parameters in Spring 2018.

(10) Johnson, E., A. Kropf, and S. Bryson, An Assessment of Mechanical Removal Methods of Privet (*Ligustrum japonicum* & *Ligustrum sinense)* at Wild Basin Wilderness Preserve

ABSTRACT:

Invasive plant species have characteristics that allow them to invade, proliferate, and outcompete native species, which gives them the propensity to damage natural ecosystems, sometimes resulting in novel ecosystems. In order to maintain and restore native biodiversity in these damaged systems, it is important to identify successful methods for invasive plant species removal that is both effective and appropriate for the target ecosystem. Riparian ecosystems are vulnerable to some known removal methods such as application of chemical herbicide, which could cause further damage to the ecosystem due to its close proximity to a water source. Our study site was at Wild Basin Wilderness Preserve (WBWP) and, as it is a part of the Balcones Canyonlands Preserve (BCP), it has many riparian corridors. *Ligustrum japonicum* (Japanese Privet), and *Ligustrum sinense* (Chinese Privet) are two invasive plant species coexisting and disrupting the natural riparian ecosystem at WBWP. The objective of this research project was to identify an effective mechanical removal method, with the capability of being implemented on a large scale by the volunteers and staff at WBWP, and the greater BCP. A plot experiment was conducted at WBWP to assess which removal method was the most effective at inhibiting the re-growth of the two *Ligustrum* species. Of the three mechanical removal methods that were tested, results showed that hand-pulling and subsequent over-sowing with the native grass, Inland Sea Oat (*Chasmanthium latifolium*), was the most successful at inhibiting re-growth of *L. japonicum* and *L. sinense*.

(11) Johnson, D. Measuring herbaceous cover across plant communities at Wild Basin

SUMMARY:

This research provided a one-week research experience for three St. Edward's students. They learned about experimental design, data collection, and data analysis with this project as the framework. No results were produced as the project was intended as a learning experience for first year undergraduate researchers.

(12) Walther, J. Field Biology Class for New College, St. Edward's University

SUMMARY:

The spring 2017 Contemporary Biology class had a total of twenty-four participants, twelve New College students and twelve traditional students. The class topics included topographic maps, geology, plant identification, habitat restoration, riparian habitat and endangered species. During the three-hour hikes, students worked on field handouts to map locations, find and identify fossils and rock types, used a dichotomous key for plant identification, collect and identify aquatic insects, mapped the Bee Creek drainage basin, and observed and listened to the golden-cheeked warbler and its habitat. Students wrote essays about each hike's topic, wrote wondering questions generated from their reading assignments and took short quizzes. Their last assignment was to hike alone and answer questions during their solo hikes. Students expressed positive reactions to their hikes and what they learned. They especially liked the solo hike, which was a first for many of the students. Most of the students said they would go forward in their lives with a newly developed appreciation for native habitat and a concern for the environmental issues discussed in class.

FACILITIES AND SIGNS

Facilities

- The driveway paved with "Road Base" is being maintained by Wild Basin Land Management staff and volunteers. Potholes are filled with excess road base.
- Previous exhibits are still in place including two touch screen monitors, a large mural of native animals, and a bird song exhibit that requires people use binoculars to identify a bird and its song.
- The building's security system is currently monitored by ADT.

- We have been actively working on rodent control in the building. Land Management staff are using baited snapping rat traps.
- Compost toilets are being maintained with wood shavings. St. Edward's University replaced two ventilation fans on the Clivus composting toilets.

Signs and maps

- Currently, we have two versions of digital maps available on the website homepage (www.wildbasin.org) for visitors to access on their smartphones, including a Google Earth file for the trail system and a PDF copy of the trail map. We also have other resources available on the website, including interpretive information and resources for specific age groups. Paper maps are still available inside the visitors' center, and a weather-resistant map of the trail system is mounted at each trailhead.

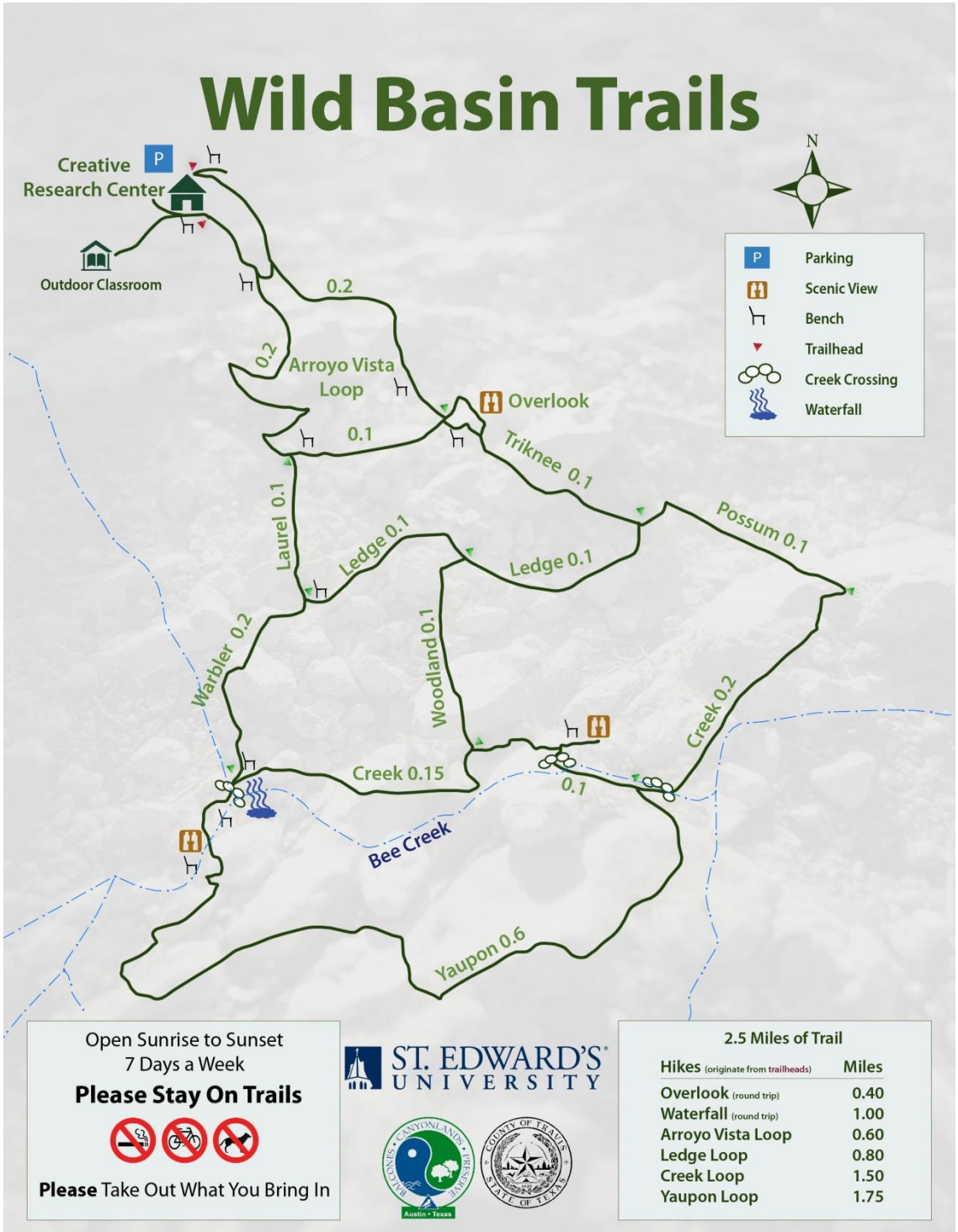
SECURITY, ACCESS, AND SAFETY

Fire Safety

- Wild Basin staff met with Travis County personnel and Lieutenant Jack Frost of the Westlake Fire Department to discuss fire prevention and evacuation planning. Jack Frost visited and provided several suggestions on making the Creative Research Center building and the area around it more FireWise. Suggestions included clearing of dead and downed wood in the understory directly surrounding the building (~50-100 feet), keeping canopy limbs from touching the building, removing stored lumber from under the building, and creating a 3-foot-wide rock-base fire break around the base of the building.
- The company, Care Specialty, currently monitors for fire in the building.
- Westlake Fire Department inspected the visitors center and it passed inspection.

APPENDICES

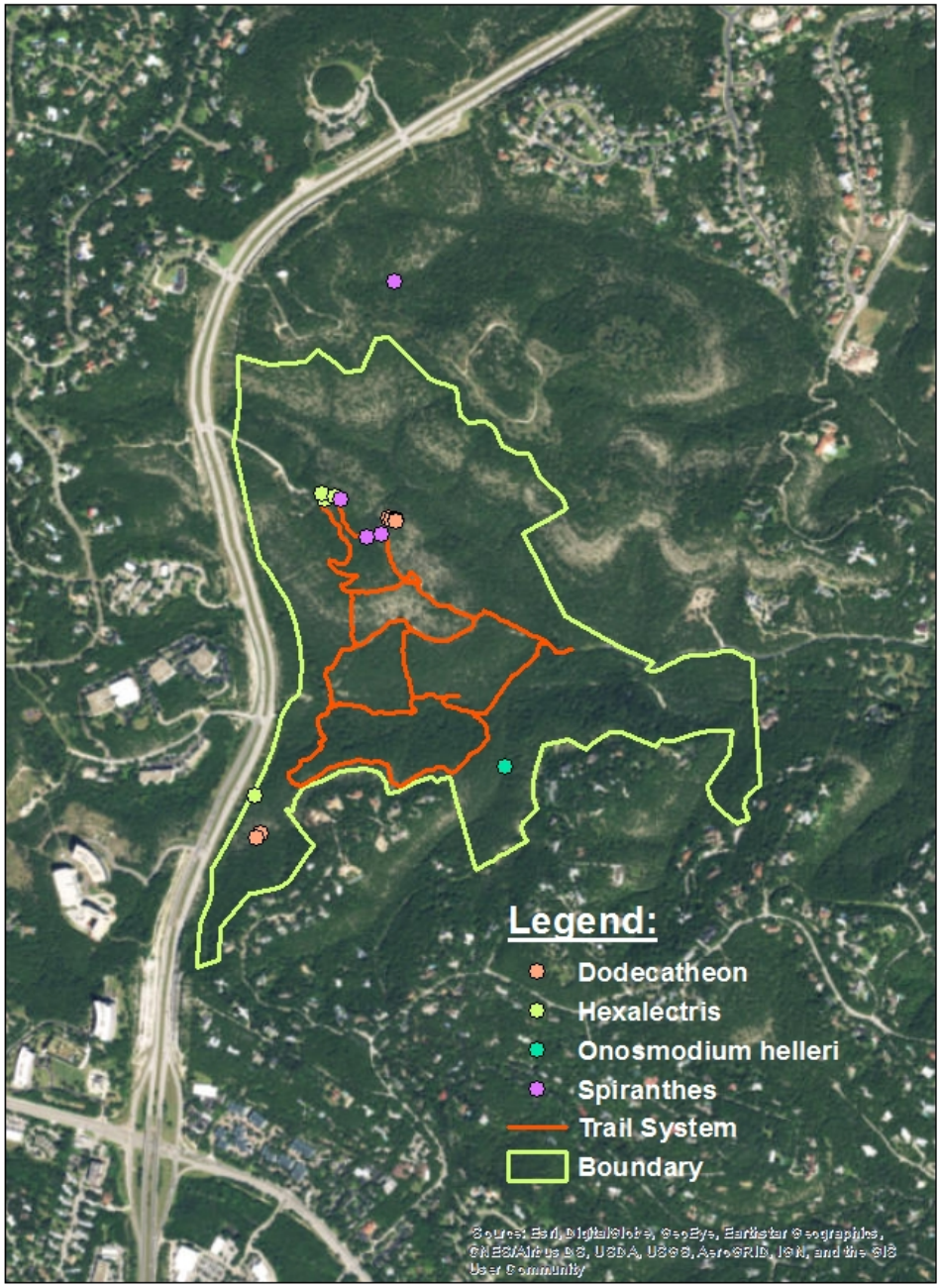
APPENDIX A: Map of Wild Basin Wilderness Preserve trail system



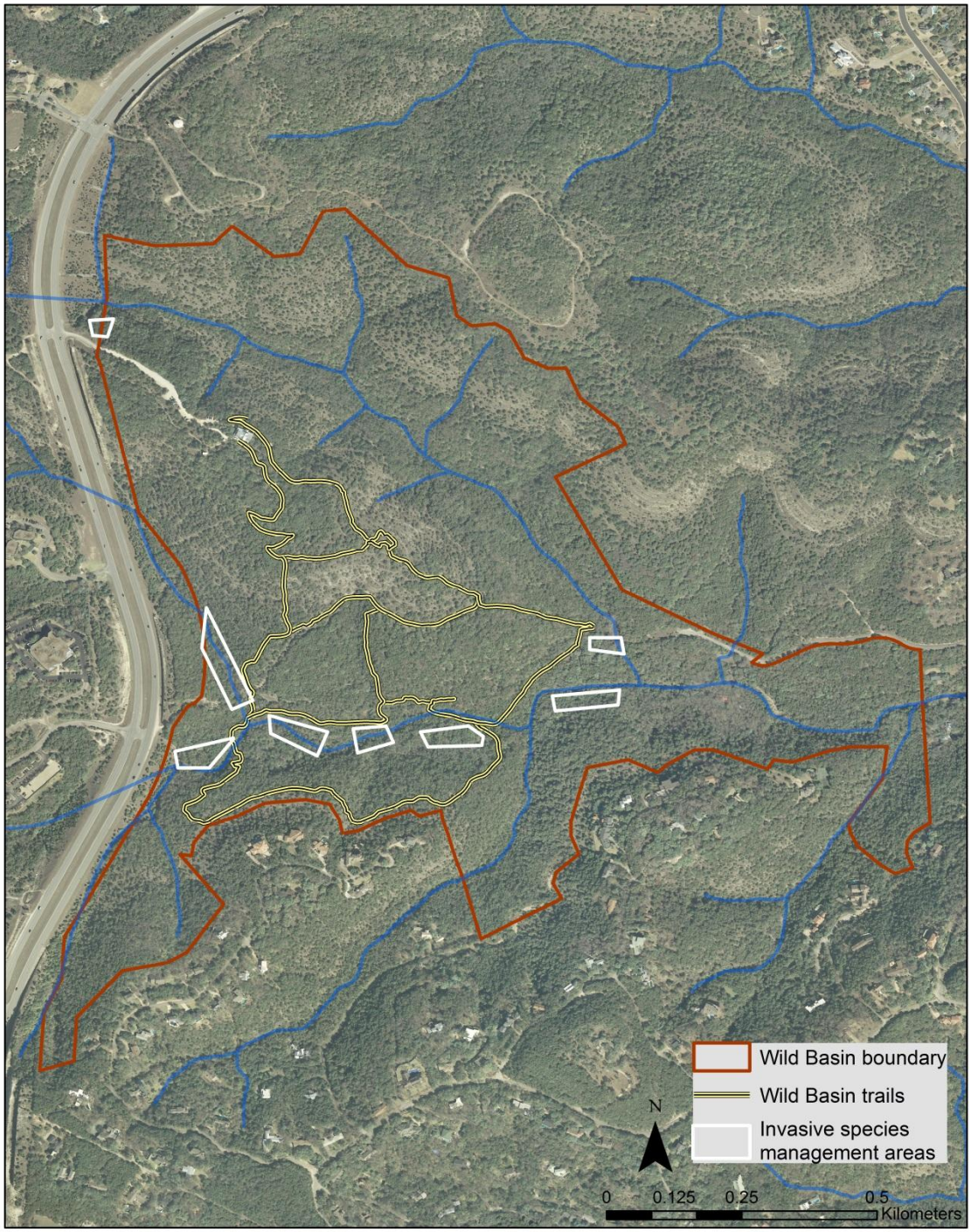
APPENDIX B: Aerial Map of Wild Basin and residential neighbors to south and east



APPENDIX C: Rare plant locations identified at Wild Basin Oct 2016-Sept 2017



APPENDIX D: Invasive species removal locations at Wild Basin Oct 2015-Sept 2016



APPENDIX E: Golden-cheeked Warbler Survey Summary 2017

Summary of 2017 Golden-cheeked Warbler Surveys
at Wild Basin Wilderness Preserve
by Darrell Hutchinson

A total of forty-three surveys were conducted at Wild Basin and Vireo Preserve between 6 March and 19 June by Darrell Hutchinson, Jim O'Donnell, and Jonny Scalise for a total of 149 survey hours.

The 2017 GCWA breeding season at Vireo Preserve/Wild Basin was marked by a decline in occupancy and reproductive success compared to previous years. Between the two plots, only four males established territories. Two males failed to find a mate and departed half way through the breeding season. Two other males paired relatively late, and successful breeding was not confirmed.

Three color-banded males returned to occupy territories inside Wild Basin and across the boundary with Vireo Preserve (see Figure E1: 2017 VPWB Territory Polygons). All three color-banded males were returns from previous years. NB/WH:MV/SI was banded at Vireo Preserve in 2011 aged after-second-year and returned for the sixth year in a row. "Candy" is, at least, 8 years old and the oldest known bird on the Balcones Canyonlands Preserve. OR/YE:NB/SI was banded at Vireo Preserve in 2014, and returned for the third year in a row. NB/BL:WH/SI was banded at Wild Basin last year.

NB/WH:MV/SI was first detected on 6 March, and was one of the earliest GCWA to arrive on the BCP in 2017. NB/WH:MV/SI occupied his former territory in lower North Hollow Creek, but was also detected vocalizing an advertising A-song at Vireo Preserve from 23 March – 19 April. On 23 April, he was observed with a female, after which they remained in North Hollow Creek. No nest was found, and the pair failed to reproduce.

OR/YE:NB/SI was first detected on 20 March and first observed with a female on 17 April. A nest was found on 14 June where both adults were feeding nestlings. The nest was later predated and no fledglings survived. We assume that this was the pair's second, if not, third failed nesting attempt of the season.

An approximately six week old hatch-year bird was observed begging from OR/YE:NB/SI and his female near the nest on 14 June, but the male appeared to chase the HY away. It's possible that this HY was a successfully fledged offspring from an earlier nest that was partially predated. However, it's also possible that the HY migrated into Wild Basin from another territory off plot. We could not confirm successful breeding for this pair.

NB/BL:WH/SI was first detected on 20 March and last observed on 23 April. He occupied the same territory along Woodland Trail, as he did in the latter portion of the 2016 breeding season. He failed to attract a mate and was not resighted elsewhere on the Balcones Canyonlands Preserve.

Surveys were funded by City of Austin Wildlands Conservation Division and conducted according to City of Austin's Balcones Canyonlands Preserve GCWA Demographic Study protocols.

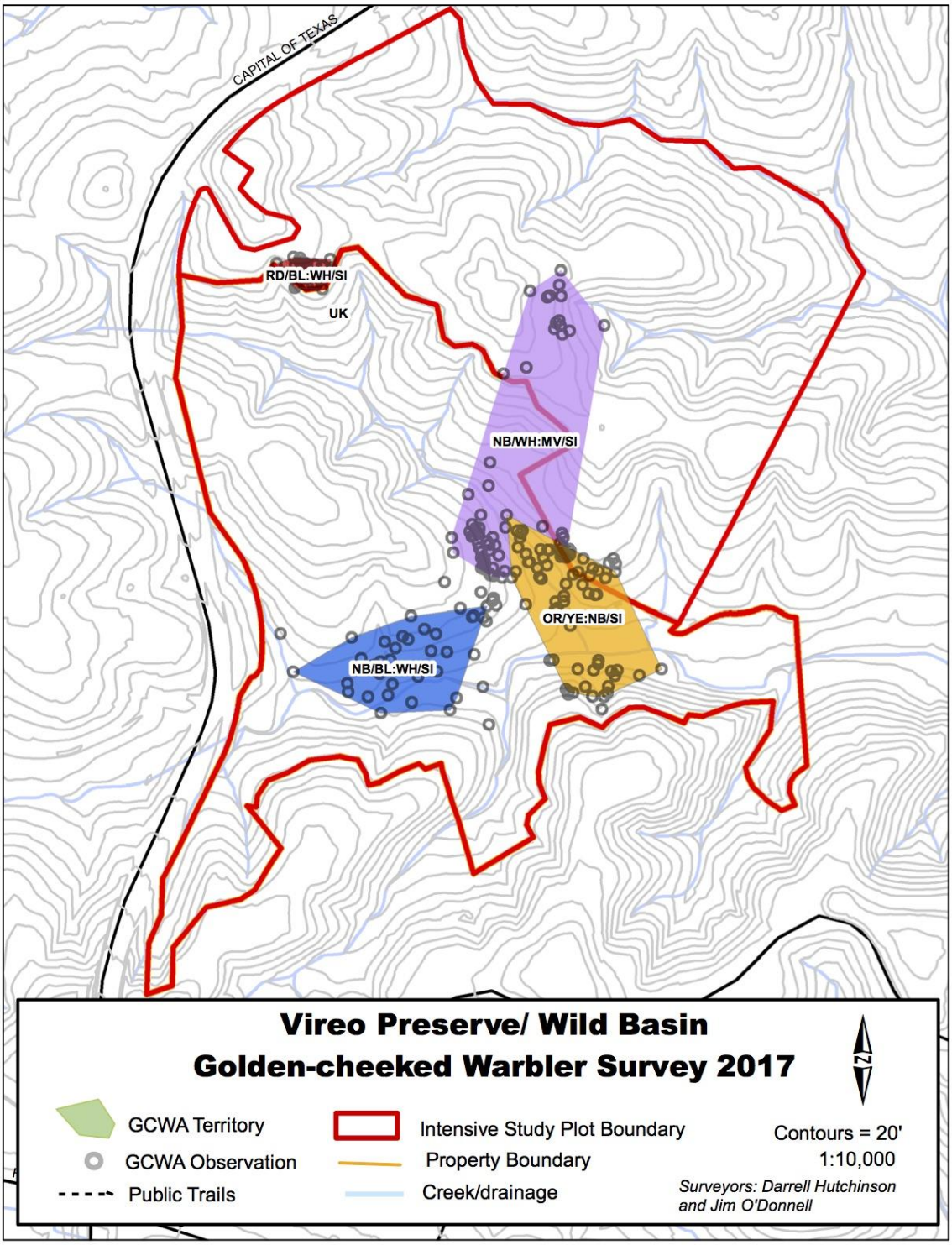


Figure E1: 2017 VPWB Territory Polygons

APPENDIX F: Results of white-tailed deer (*Odocoileus virginianus*) surveys in the neighborhoods south of Wild Basin, October 2016

Deer Population Summary using BCP Template									
Macrosite	**Wild Basin Preserve**				Survey Technique	**Modified Hahn Line**			
County	**Travis**				Year	**2016**			
		Deer Observed					Sampled	Acres Per	Deer per
Survey Route	Date	Bucks	Does	Fawns	Unkn	Total	*	Deer	1,000 Ac
Wild Basin	10/18/2016	2	4	0	0	6	69.0	11.5	87.0
Wild Basin	10/20/2016	0	5	0	0	5	69.0	13.8	72.5
Wild Basin	10/25/2016	1	6	0	0	7	69.0	9.9	101.4
Wild Basin	10/27/2016	2	2	0	0	4	69.0	17.3	58.0
Wild Basin	11/1/2016	1	11	3	0	15	69.0	4.6	217.4
Wild Basin	11/3/2016	1	2	1	0	4	69.0	17.3	58.0
Survey Total		**6**	**28**	**3**	**0**	**37**	**345.0**	**9.3**	**107.2**
Preserve Size = 227 acres									

Table F1: White-tailed deer (*Odocoileus virginianus*) observations in neighborhoods south of Wild Basin, October 2016