ST. EDWARD'S UNIVERSITY

Wild Basin Creative Research Center

Wild Basin Wilderness Preserve

2016 Annual Report

(October 1, 2015 – September 30, 2016)

Submitted by

Wild Basin Creative Research Center and St. Edward's University

to

Travis County Commissioners Court
And Transportation and Natural Resources

TABLE OF CONTENTS

List of Tables and Appendices ..... p. 3

Overview of preserve management and operations…..... p. 4

Wild Basin vision ..... p. 4

Trail Maintenance, Restoration and Construction ..... p. 5

Boundary Management..... p. 7

Vegetation Management..... p. 7

Wildlife Management ..... p. 9

Water Quality and Quantity..... p. 10

Outreach, Education, and Volunteer Coordination..... p. 10

Scientific Research ..... p. 16

Facilities and Signs..... p. 24

Security, Access and Safety ..... p. 25

Appendices..... p. 26

LIST OF TABLES

Table 1: Water quality parameters tested at Wild Basin using Colorado River Watch Network protocols

Table 2: Undergraduate and graduate classes taught at Wild Basin in 2015-2016

APPENDICES

APPENDIX A: Map of Wild Basin Wilderness Preserve trail system

APPENDIX B: Aerial map of Wild Basin and neighbor proximity

APPENDIX C: Locations of rare plants identified at Wild Basin from Oct 2015-Sept 2016

APPENDIX D: Locations of invasive species removal at Wild Basin from Oct 2015-Sept 2016

APPENDIX E: Golden-cheeked warbler (*Setophaga chrysoparia*) survey summary for 2015 by City of Austin biologist Darrell Hutchinson

APPENDIX F: Results of white-tailed deer (*Odocoileus virginianus*) surveys in the neighborhoods south of Wild Basin, October 2015

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 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 experiences for the community. The preserve's urban proximity 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, 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 and preserve management programs are designed to promote conservation and environmental awareness, while encouraging and demonstrating land stewardship practices. Throughout 2015 and 2016, 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 completed several new environmental education exhibits in the Wild Basin Visitors Center.

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 and environmental education, and a gateway to the BCP.

WILD BASIN VISION

The vision of Wild Basin is to preserve endangered species habitat and to educate students and the general public about the role Wild Basin and the BCP have in maintaining habitat integrity and ecosystem services. 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 rain water and reduce trail erosion.
- Several major snags that were adjacent to trails and presented risks to the public were removed by Wild Basin and St. Edward’s University staff.
- An online “Google Forms” survey was created by an intern to help log unusual occurrences found during weekly trail patrols. This database, which includes spatial references of observations, will help provide consistent data about the status of the trails and preserve, including sightings of dogs, evidence of feral hogs, off trail usage, trash, and other conditions generally monitored during weekly trail patrols.

Trail Restoration Activities

- Wild Basin continued to work with representatives from Central Texas Trail Tamers and Austin Parks Foundation to incorporate trail maintenance techniques that minimize erosion and lead to more sustainable trails. Austin Parks Foundation hosted three workshops at Wild Basin (November 2015, December 2015, and June 2016) as part of their Park Improvement Education Series. In each of the workshops, 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 Ledge Trail and Woodland Trail. Approximately 65 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.
- Improvements were made to Arroyo Vista trail to smooth the trail surface and increase accessibility. Crushed granite was added as a substrate to two

lengths of Arroyo Vista trail along with a sealant called “Terra Pave” to make those sections of that trail more resistant to erosion. The trails are being monitored for long-term performance.

Construction & Building Maintenance Activities

- The railings around the artificial pond were reinforced by Stewardship Volunteers.
- Several light fixtures surrounding the building and driveway were fixed or replaced by St. Edwards University Facilities personnel.
- New solar walkway lights were installed to replace the broken hard wire walkway lights.A leak in the water tank that stores water for the building and the fire sprinkler system was repaired.
- A review of FireWise preparedness of the building and surrounding areas was conducted in collaboration with Westlake Fire Department personnel. A plan for conducting removal of fire-prone material and other FireWise activities was prepared and approved by Travis County TNR personnel. The activities in this plan are currently being implemented.

BOUNDARY MANAGEMENT

Boundary Management Activities

- Staff monitored the perimeter at regular quarterly intervals to check the integrity of fencing and boundary markers.
- Perimeter checks revealed that a large portion of fence (~100 feet) had been cut by a private contractor who was resurveying a property adjacent to the preserve. The contractor subsequently repaired the cut fence. Travis County land managers were present during the resolution. A makeshift gate was also found on a portion of perimeter fence bordering a neighbor. The fence has been repaired shut and a “Travis County Property” sign was placed on the fence. Another cut in the fence (~10 feet) was found and repaired by Wild Basin and Travis County 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 onto the preserve and into 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. In December 2015, St. Edward's University students researched and designed several "wildlife-friendly alternatives" for tree decorations, and they decorated a tree in the Wild Basin parking lot as a demonstration for the public.

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 2016, 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 2015, 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 2016 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 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. Firewise guidelines are followed to create defensible space near the visitors center. The SERVE 1 group from St. Edwards University provided twenty-five students to participate on September 17, 2016 in fuel reduction efforts along the driveway and around the building. This involved removing dead and downed limbs in the areas of concern and mulching them in a wood chipper. The wood chipper was also provided by St. Edwards University.
- 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.

WILDLIFE MANAGEMENT

Wildlife Management Activities

- Golden-cheeked Warbler (*Setophaga chrysoparia*). During the 2016 nesting season, approximately 19 independent surveys were conducted at Wild Basin by Darrell Hutchinson and Patty Ramirez, for a total of 86.5 survey hours. The surveys were executed according to the "2016 City of Austin Standards for Conducting and Documenting Golden-cheeked Warbler Surveys." There were 4 GCWA territories at Wild Basin in 2016, and 3 GCWA nests were found by biologists. One pair bred successfully and produced 4 fledglings ("Gates," banded OR/YE:NB/SI in 2014); one nest was found predated on May 16, 2016 ("Candy," banded NB/WH:MV/SI in 2011); and another nest was assumed predated ("Fallout," banded NB/BL:WH/SI in 2016) (see Appendix E for full report).
- White-tailed deer (*Odocoileus virginianus*). Deer surveys were conducted according to previously established protocols at Wild Basin, in which driving surveys were conducted on three evenings in October 2015 in the residential neighborhoods immediately south of Wild Basin. In addition, two permitted research studies have been conducted to assess the usefulness of camera traps and unmanned aerial vehicles in conducting deer surveys to supplement the driving surveys. Results of the driving surveys are summarized in Appendix F.
- Feral Hogs (*Sus Scrofa*)- First signs of the presence of feral hogs began September of 2016. Those signs included large patches of disturbed soil and a clear hoof print.
- Thirteen Bushnell motion-triggered game cameras are maintained within the preserve at preselected grid points to monitor wildlife activity and off-trail human activity. Two cameras in the south portion of Wild Basin went missing and were replaced. Locks have been attached to all cameras.

WATER QUALITY AND QUANTITY

Water Quality and Quantity Monitoring Activities

Water quality testing was conducted on a monthly basis 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).

Table 1. Water quality parameters tested at Wild Basin, Oct 2015-Sept 2016

Date	Time	Air Temp (C)	Water Temp (C)	Flow	pH	GTLT	Nitrates-N (mg/L)	DO Avg (mg/L)	DO % Sat	Cond (µS/cm)	Days Since Rain	Field Rain Gauge (in.)	GTLT	Transparency (M)
9/26/2016	11:30	20	23	5	6.5	<	1	5.4	62.64	660	0	0.75	=	1.09
8/25/2016	14:00	27	25	3	7	=	1	4.85	58.2	900	5	0.75	>	1.22
7/25/2016	13:30	34	29	2	7	<	1	5.85	74.88	880	15	0	<	1.22
6/28/2016	10:00	26	23.5	3	7	<	1	5.2	60.84	790	3	0.02		1.22
5/24/2016	13:25	27	22	3	7	<	1	5.65	64.41	870	1	0.01	>	1.22
4/26/2016	10:15	22.5	20	5	7	<	4	6.05	66.55	860	6	0	>	1.2
3/22/2016	13:25	22	16	3	7			6.55	66.81	850	4	0	>	1.22
2/24/2016	12:50	15	13	3	7	<	2	7.9	75.84	820	2	1.33	>	1.22
11/23/2015	10:20	9.5	12.5	3	7	<	2	8.2	77.9	870	6	0	>	1.22

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. The major programs held at Wild Basin from Oct 1, 2015 to Sept 30, 2016 are summarized below.

Environmental education & interpretation programs

- School and Group Tours – Approximately 650 **adolescents**, including students from local schools and homeschool and community groups, attended education programs at Wild Basin. Group size is restricted to a maximum of 40 students per visit to control for impact on the preserve and ensure volunteer guides have manageable group sizes. Thirteen trained volunteer guides donated an estimated 143 **hours** to assist with these education programs.
- Family & Public Programs – Local children and families attended several public programs hosted by Wild Basin in 2016 including one stargazing even, one full moon yoga night, and

seventeen family-friendly guided hikes. The stargazing tours were made possible through the volunteer efforts of the Austin Astronomical Society. On the second Saturday of each month, Wild Basin hosts a guided hike for the general public; an additional guided hike on the fourth Saturday of the month is occasionally offered as well. Family friendly self-guided hikes and educational activities were offered in the visitors center on Earth Day. This event brought out over 100 visitors.

- 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 insect safari hike, a bat lecture, stargazing, skeleton and bone identification hike, and a family birding hike.
- Sierra Club Night Hikes – During several full moons this year, Wild Basin hosted free night hikes that were open to the public and organized by the Austin chapter of the Sierra Club.
- Austin Families and Nature Guided Hikes- Wild Basin hosted two guided hikes for this organized group of home-school families.

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 2016, we continued improving the visitors' center, installing several new interpretive exhibits to help connect visitors with our local ecosystem and share information about the environment of Wild Basin. We developed an "Observation Station" with binoculars to find birds perched in the rafters and listen to their call. Two touchscreens were added to explore iNaturalist and Wild Basin's flora and fauna. In addition, we installed a new golden-cheeked warbler exhibit that includes a "Year in the Life of a Golden-cheeked Warbler" wheel, bird beak puppets, and interpretive information about the GCWA. We also installed a large 12' x 8' mural depicting 26 local wildlife species, along with a separate "key" for identification, outside on the porch of the visitors center. Artist Jules Buck Jones and designer Drew Liverman developed and installed the mural and other new exhibits in the center. The environmental exhibits in the visitors center are now complete, thanks to generous donations from 3M, Silicon Labs, Applied Materials, and Austin Community Foundation.
- 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 receives **an average of 300-400 visitors per week,** including public, K-12 students, St. Edward's University students, researchers, and volunteers. Visitation rates are lowest in August (estimated 800-900 visitors/month) and

greatest in March and April (estimated 2000 visitors/month). Previously, we conducted in-person visitor counts to verify the accuracy of the automatic trail counters and found that the units provide fairly accurate estimates of trail visitation (although trail counters likely miss some visitors, especially when in groups).

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-seven bird species were recorded during the 2016 eBird walks, with over 20 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 **562 observations documenting 266 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 2,316 hours** from Oct 2015-Sept 2016. This includes contributions from approximately 200 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 2015-Sept 2016, volunteers on Saturday workdays collectively contributed over 400 hours of service.
    - St. Edward's University Stewardship Days – Wild Basin hosted three stewardship events specifically for St. Edward's University students (Oct 2014, April 2016, and Sept 2016). Over 80 students participated in volunteer stewardship activities including invasive species removal, trash pickup, and trail maintenance.

Public events, meetings, workshops, and conferences

- Balcones Canyonlands Preserve (BCP) – Wild Basin hosted several of the BCP Education/Outreach meetings.
- REI – REI conducted several outdoor workshops and trainings such as Wilderness First Aid, backpacking hikes, and staff hikes.
- Hill Country Alliance- Hill Country Alliance held their 2015 certified interpretive guide training at Wild Basin.
- Meetings of local organizations – Wild Basin hosted several group meetings for entities such as City of Austin Wildland Conservation Division, Audubon Society, Capital Area Master Naturalist and Association of American Teachers of French.
- Travis Audubon Master Birder Training

St. Edward's University Events

- Staff Retreats and Meetings - Various departments and school groups from SEU scheduled their planning and staff retreats at Wild Basin including Wild Basin Advisory Committee, School of Humanities, School of Behavioral and Social Sciences, Campus Ministry, Office of OI, Academic Support, 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 200 students participated in a project to collect water samples and evaluate water quality parameters in Bee Creek.
- Student research symposiums – student researchers presented their work on Wild Basin-related projects at two symposiums on the St. Edward's University campus. This included 9 graduate students presenting their work at the annual Research Symposium for the Professional Science and Master's in Environmental Management and Sustainability program, 5 students at the 2016 NSF-CASAR/TG symposium, 4 students at the Lucian Symposium, and 1 student at the SOURCE event. Several graduate students also presented their Wild Basin research at national conferences, including 3 students who won the "best graduate student poster" award at the 2016 Texas Society for Ecological Restoration conference in Livingston, Texas.
- Wild Basin Internship program – Wild Basin provided internships for 12 students in 2016. This includes internships in Environmental Management, Sustainability, Environmental Education, and Outreach/Social Media.
- 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 Spring, Summer, and Fall 2016 is included in

Table 2. Approximately 200 university students visited Wild Basin as part of their course work in 2016.

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

Course #	Title	# of Students	Semester
BIOL 1305	Contemporary Biology	10	Spring 2016
MSEM 6301	Population Ecology	18	Fall 2016
BIOL 4142	Population Biology & Ecology Lab	21	Spring 2016
ENSP 1304	Introduction to Sustainability	25	Spring 2016
BIOL 1107	Cells, Genetics, and Organ Systems Lab	50	Fall 2016
BIOL 1108	Populations and Organisms	30	Spring 2016
SCIE 2320	Science in Perspective	13	Spring 2016
HONS 2360	Writing in Science	15	Spring 2016
CNEL 6335	Alternative Approaches to Counseling	20	Summer 2016
	TOTAL	**182 students**	**9 classes**

Publications

- Wild Basin staff and interns reported on Wild Basin news, events, and volunteers in two email newsletters, as well as updates in regular blog posts and social media outlets.
- An article titled "Wild about Wild Basin" was published in Texas Highways, a state travel magazine (http://www.texashighways.com/travel/item/8079-wild-about-wild-basin)
- An article titled "Wild Basin Founders Reflect on Preserving a Westbank Jewel" was published in the Austin American Statesman (and Westcave Picayune) on July 19, 2016.
- An article titled "Urban Refuge" was published in the St. Edward's University Magazine, Fall 2016 Issue

SCIENTIFIC RESEARCH

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

(1) Barnes, M. and A. Haynes. Potential effects of a major highway on the stress hormone levels of the Gulf Coast toad (Incilius valliceps) in Central Texas

ABSTRACT: Environmental stressors affect all organisms and those stressors play a role in driving adaptive evolution. Stress may reduce reproductive success or suppress immune system responses, thus reducing fitness (Bee & Swanson 2007; Wollermann & Wiley 2002; Parris et. al. 2009; Rollinns-Smith et. al. 2011; Gabor et. al. 2013). One such stressor includes sound (Tennessen et. al. 2014), with variation in frequency, intensity, and source influencing how stressful a specific sound is for a particular species. All the sounds present within an environment make up a soundscape. With increasing fragmentation due to roads and highways, populations are becoming increasingly subjected to noise from traffic; particularly on the borders of the fragmented habitats. To understand the role road traffic noise plays in a soundscape we collected 123 sound samples within a wilderness preserve bordered by a major highway. Our results indicate that distance from the highway can explain 66.1% of noise variation within the preserve. Recent studies have shown that road noise does affect anuran behavior primarily in regards to mate choice (Bee & Swanson 2007; Wollermann & Wiley 2002; Parris et. al. 2009). Road noise may also indirectly affect reproduction if it triggers chronic stress. Therefore, we inquire if proximity to road noise is correlated with variation in corticosterone concentrations for a population of Gulf Coast toad (*Incilius valliceps*) in Wild Basin Wilderness Preserve, Austin, Texas. To answer this question we will quantify urinary corticosterone levels in toads, measure their distance from TX-360, and quantify the noise levels across the preserve.

(2) Johnson, D., N. Barrett, M. Fencl, and K. Moller. Determining patterns of plant succession and hydrology at Wild Basin Wilderness Preserve.

ABSTRACT: In this study we sought to calculate the ecosystem services that are provided by the woody vegetation at Wild Basin Wilderness Preserve in Austin, Texas. This was accomplished by inputting field measurements of the woody vegetation, taken from 19 grid points in the wilderness preserve, into the computer program iTree Eco. The results of the computer analysis were sorted by the community in which the gridpoint lay (determined based on aerial photos and the succession of Ashe Juniper in Wild Basin after the 1961 fire), and then multiplied the community averages by constants to account for the total area of Wild Basin. In addition to this, soil moisture measurements and soil composition analyses were

conducted at five sites that were characteristic of Wild Basin's landscape in order to better understand the relationship between soil hydrology and community type. Through this comprehensive assessment of Wild Basin, we were able to successfully estimate the various ecosystem services provided by Wild Basin Wilderness Preserve, including the total carbon stored by the preserve (19,503,596.79 Kg), the amount of carbon sequestered by the preserve every year (539.56 metric tons), and the monetary value for the pollutants removed from the atmosphere by woody vegetation at Wild Basin ($35,051.96 per year). While many people see Wild Basin as a convenient place to experience the outdoors, the majority of the preserve's value lies in the ecosystem services and increased quality of life that it provides for Austin and the surrounding community.

(3) Belaire, A., D. Hutchinson, B. Shults, J. Salinas, and S. Kramer. Abundance and distribution of avian nest predators and predator activity at Wild Basin

ABSTRACT: Nest predator distribution and activity may have important implications for the Golden-cheeked Warbler. Some avian nest predators, especially corvid species, tend to be more abundant in human-altered landscapes. However, it is unclear whether the urban "predator paradox" phenomenon may be at work in this landscape, in which predator numbers increase while predation activity decreases (due to anthropogenic food sources, prey switching, or other mechanisms). This project built on previous studies of avian nest predators at Wild Basin in Fall 2014 and Summer 2015, with the goal of evaluating the abundance and distribution of several avian nest predators and the relative predation pressure at Wild Basin and across the urban "matrix" in Austin. We conducted point counts and installed artificial nests with motion-triggered video cameras at four sites in Wild Basin; we also conducted the same procedure at ten residential sites across the gradient of urbanization in Austin. Our results in Summer 2016 were consistent with results from previous studies at Wild Basin, with 50% (two of the four) of artificial nests predated within Wild Basin. We also found that nests in more urbanized landscapes in Austin are less likely to be predated – only 20% of the nests within 3.5 miles of downtown were predated whereas 100% of nests farther from downtown were predated. There was a significant positive relationship between nest predation activity (using number of videos as a proxy) and distance from downtown (Spearman's rho = 0.80, p = 0.006).The Western Scrub-jay (*Aphelocoma californica*) and Blue Jay (*Cyanocitta cristata*) were the only two species observed to predate the artificial nests at the Wild Basin. Videos from nests in the residential sites revealed a more diverse predator community, including the Blue Jay, Great-tailed

Grackle (*Quiscalus mexicanus*), Deer Mouse (*Peromyscus maniculatus*), Opossum (*Didelphis virginiana*), and Squirrel (*Sciurus niger*).

(4) Belaire, A., T. Bilinski, and J. Salinas. Evaluation of a 30-year old restoration site in Wild Basin (continuation of 2014 study)

ABSTRACT: A 5-acre portion of Wild Basin was used as a municipal dump by the City of Austin beginning in 1947. This site was located along the southern drainage of North Hollow, a tributary to Bee Creek. In 1985, 0.5 acres of the historic dump site was restored and revegetated by David Mahler and Judy Walther through their research firm, Environmental Survey Consulting (Mahler & Walther 1987). The goal of restoration is to "create a self-supporting ecosystem that is resilient to perturbation without further assistance" (Ruiz-Jaen and Aide 2005). However, many restoration sites are not monitored or evaluated to determine whether the restoration was successful, and the Wild Basin dump site is no exception. In the almost 30 years since the restoration occurred, the site has been re-evaluated only once (in the year following the restoration; J Walther, personal communication). Researchers at Wild Basin investigated woody vegetation composition at the site in 2014; in 2016, the study was expanded to investigate soil parameters and bird species. Point counts were conducted on one morning in late June 2016 in each of three sites: the restored dumpsite ("restored"), a nearby un-disturbed reference site ("reference"), and a portion of the original dumpsite that was not ecologically restored ("not restored"). Similar avian species were reported in each of the three sites, with slightly higher species richness in the reference site (9 bird species) than in the restored and not restored sites (7 bird species in both sites). Analysis on the soil characteristics in each site is on-going and has not yet been completed.

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

ABSTRACT: The research we conducted at Wild Basin focused on understanding how urbanization influences the ecosystem services provided at the Wild Basin Wilderness Preserve. We investigated this question from multiple perspectives. For example, we performed research to understand the spatial variability in ecosystem services provided by soil such as soil buffering, litter decomposition, nutrient cycling and water retention. In addition, we evaluated the spatial and temporal variability in fecal coliform bacterial concentrations along Bee Creek and North Hollow at Wild Basin. Our soil ecology research efforts indicate that neither proximity to urbanization, nor the proportion of Ashe Juniper, strongly influences soil pH, soil nutrient concentrations, soil moisture or soil decomposition. However, our

preliminary data suggest that fire history does influence soil ecology. Additional research is required in order to confirm these findings. Our water quality research has identified some unexpected and concerning patterns in fecal coliform bacterial concentrations. Based on samples collected three times at more than 14 locations along Bee Creek and North Hollow at Wild Basin, it appears that there is a source of fecal coliform bacteria within Wild Basin along Bee Creek. Evidence for this is demonstrated by higher fecal bacterial concentrations downstream of the waterfall than directly downstream of the culverts at the furthest upstream location along Bee Creek at Wild Basin. This research is ongoing, and we are using molecular methods in order to better understand the abundance and diversity of fecal coliform bacteria at locations along Bee Creek. In summary, our research has not lent support for the hypothesis that proximity to urban areas decreases the provision of ecosystem services at Wild Basin. Instead, our research shows that there are many interesting and poorly understood ecological processes that influence ecosystem services at Wild Basin. We hope to continue this research in order to learn more about this critical urban preserve ecosystem within Austin.

(6) Ortuno, J. Efficient Mosquito Vector Abundance Comparison Between Work and Natural Protected Areas

ABSTRACT: Mosquitoes, aside from being a nuisance, are of great public health importance due to the numerous pathogens they can carry. In Central Texas, the prime culprits of spreading viruses like West Nile, Zika, and Chikungunya are Aedes albopictus, Aedes aegypti, and Culex. This study used six BG Sentinel 2 traps set up around the St. Edward's University campus and Wild Basin Wilderness preserve to compare mosquito diversity between the two sites. The majority of the mosquitoes captured were A. albopictus and C. quinquefasciatus, with slight variations in between. A greater amount of mosquitoes were regularly captured on the university campus than the wilderness preserve. Further sampling at the two sites is recommended with emphasis placed on gender and potential screening for disease.

***(7) 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, because application of chemical herbicide 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 the 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. We measured the response of the plant community to the following mechanical removal methods: hand-pulling, hand-pulling and oversowing with Inland Sea Oats (*Chasmanthium latifolium*), and hand-pulling with the addition of a cedar based mulch. Results suggest that oversowing may be the most successful method in removing and preventing future invasions. These results can contribute to helping maintain the natural ecosystems, services, and biodiversity that encompass the BCP.

(8) Emmons, K., M. Mendoza, and L. Schricker. Determination of the Economic Value of Ecosystem Services Provided by Wild Basin Wilderness Preserve

ABSTRACT: As increasing anthropogenic development encroaches on natural areas, the quantification of poorly-understood ecosystem services, or the conditions and processes through which natural ecosystems (including the species that make them up) sustain and fulfill human life, stands to play a crucial role in the protection and conservation of these places. The research conducted over the past year assessed ecosystem services provided by Wild Basin Wilderness Preserve and studied the variation of services across habitat types to determine which habitat types should be prioritized or which should be restored to maximize the benefits we receive from ecosystems. Furthermore, this research has laid the groundwork for future students to study ecosystem services in more depth at Wild Basin or other urban forests in the Austin region.

(9) Horvath, A., D Metlay, and L. Belyeu. Utilizing a Unmanned Aerial Vehicle Compare White-Tailed Deer (Odocoileus virginianus) Survey Techniques at the Wild Basin Nature Preserve

ABSTRACT: The effective management of any species involves making decisions based on a clear understanding of their population abundance and distribution, and trends in their spatial and temporal movements. Our research aim is to determine the population density of white-tailed deer (*Odocoileus virginanus*) of Wild Basin Nature Preserve; to improve upon previous white-tailed deer surveying techniques with novel instrumentation, and ultimately to compare the efficiency of each through collection and observation methods. Wild Basin is a 227 acre urban nature preserve located in Austin, TX with an open deer population known size and composition. The three methods we evaluated include 1) camera trap surveys, 2) driving spot-count surveys, and 3) performing line-transects surveys using an unmanned aerial vehicle equipped with a standard camera and infrared camera. White-tailed deer estimates were 0.1247, 0.5500, and 0.0000 deer/acre respectively. A total of 7 mammals were captured by camera traps and apart from white-tailed deer, coyote were the most abundant. Camera trapping and driving spotlight surveys yielded accurate results and proved to be successful methods. Camera traps seem to be the most efficient tool as they were the least invasive, continuously gathered data, and required minimal labour to achieve results. The UAV results suggest that further conditions need to be met in order to achieve better results. The infrared camera has the potential to be more useful in cooler climates and can achieve precise results when coupled with the standard camera. Our research facilitates future UAV studies at Wild Basin. UAV technology is becoming increasingly popular in scientific research and can prove to be a valuable tool for conservation management.

(10) Hartman, E. Introductory Biology Lab BIOL 1107&1108 St. Edwards University

SUMMARY: This fall semester the course BIOL 1107 and 1108 at St. Edward's University had approximately 48 students conducting research using water samples at Wild Basin. Twenty-four students collected water upstream of the waterfall, the closest point at Bee Creek to the Highway 360 Bridge while staying on trail. The other 24 students sampled further downstream where Creek Trail intersects the creek at the furthest distance east. Students quantified chlorophyll-a, nitrates, and phosphorus using various methods (Hach® and Lind 1985). These data were made available to all of the students enrolled in those classes, so they could compare sites across Austin to obtain a better understanding of how land use and other factors may affect stream chemistry and quality. Overall, there was no statistical

significance between nitrates and phosphorus at the two Bee Creek sites in Wild Basin. However, there was a statistical significance of chlorophyll-a at the two sites. These data have yet to be compared to other Austin streams, but the course will continue to quantify chemical parameters and biological indices in the spring, if permitted.

(11) *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.

(12) 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.

(13) Bilinski, T. Course-based Undergraduate Research Experience (CURE) for senior-level Ecology lab students (BIOL 4142)

SUMMARY:

Report on Project Activities

During this course 22 students participated in a course-based undergraduate research experience (CURE) focused on investigating the role of urbanization on ecosystem services at Wild Basin. Students were initially introduced to Wild Basin during a group hike with Dr. Amy Belaire. Then, groups of students conducted field data collection off-trail at grid points at Wild Basin on three different occasions. Each student group focused on a different research priority at Wild Basin.

Plant communities & Ecosystem Services

Students characterized plant community composition and diversity at 13 grid points at Wild Basin using iTree protocol. For this protocol, students count every tree within a 5.6m radius plot Also used the National Tree Benefit Calculator (http://treebenefits.com/calculator/index.cfm) to estimate the dollar benefit of each tree in terms of stormwater, electricity, air quality, property value, natural gas and carbon dioxide sequestration in plots with a 5.6m radius. This was a highly valuable learning experience for students. They learned to identify native tree and shrub species, and they realized the ecological and societal importance of individual trees,

as well as differences between trees. Students in the class found that proximity to developed areas (residential or commercial) did not significantly affect plant community composition. However, there was a greater abundance of butterfly bush, a common plant for residential landscaping, at the grid point nearest to residential development.

Soil Ecology

Student collected soil samples at 8 of the grid points. They measured carbon content, pH and soil moisture at all of the locations. This was an important learning opportunity because students saw differences in soil characteristics based on slope, aspect, distance to Bee Creek, and fire history.

Wildlife Occurrence Patterns

Student analyzed images taken on the wildlife cameras at 10 of the grid points at Wild Basin. Students were very excited about being able to see local wildlife on the cameras since many of them had never seen any of these wildlife species before, and did not realize species such as bobcats or foxes actually lived in the Austin area. Also, students were able to understand how habitat characteristics may influence the movement and occurrences of wildlife.

Water Quality

Student collected water samples at four locations at Bee Creek and North Hollow. They observed a decrease in fecal coliform bacteria from as Bee Creek flowed through Wild Basin. They were also able to compare their measurements to measurements collected by previous students. This was an important learning experience because students observed that fecal coliform concentrations in Bee Creek differ between locations and time periods.

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

SUMMARY:

Project description: Students 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 of 2016,

Population Ecology (MSEM 6301) 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 of 2017, students in Community Ecology (MSEM 6311) 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: This semester, 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 Bilinksi 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. We were unable to set up any permanent sampling plots this semester, but will do so in the winter.

Number of participants: 14

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

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. Students in this program will be writing proposals next semester to do applied ecological research over the summer and fall of 2017, so getting some hands-on experience in the field this semester provided a great starting point. 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.

(15) Walther, J. Field Biology Class for New College, St. Edwards University

SUMMARY:
The spring 2016 Contemporary Biology class had a total of twelve participants, six New College students and six 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 w
The spring 2016 Contemporary Biology class had a total of twelve participants, six New College students and six 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 was paved with "Road Base" and sealed with Terra Pave. The areas of the driveway and parking lot available for handicapped parking were paved with all-weather surface. The driveway is in fair condition but requires some maintenance. Potholes are filled with excess road base.
- New exhibits include two touch screen monitors, a large mural of native animals, and 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.
- Compost toilets are being maintained with wood shavings.

Signs and maps

- We are moving toward a paper-free system for delivering interpretive content and maps to visitors. 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.
- Several new trail signs were added at confusing trail intersections.

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 thick rock 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 the newly-installed solar-powered gate at the entry, and both passed inspection.

APPENDICES

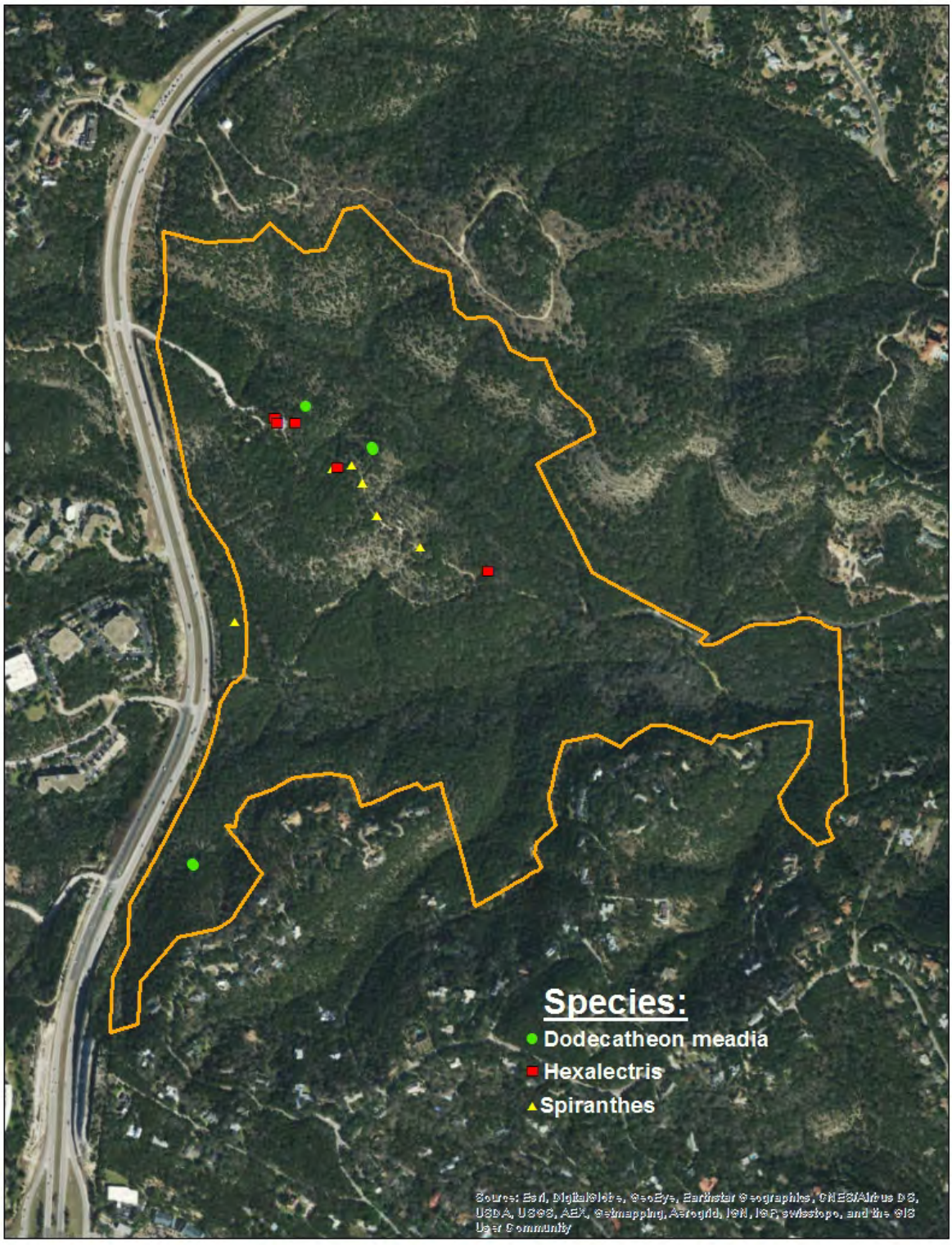
APPENDIX A: Map of Wild Basin Wilderness Preserve trail system



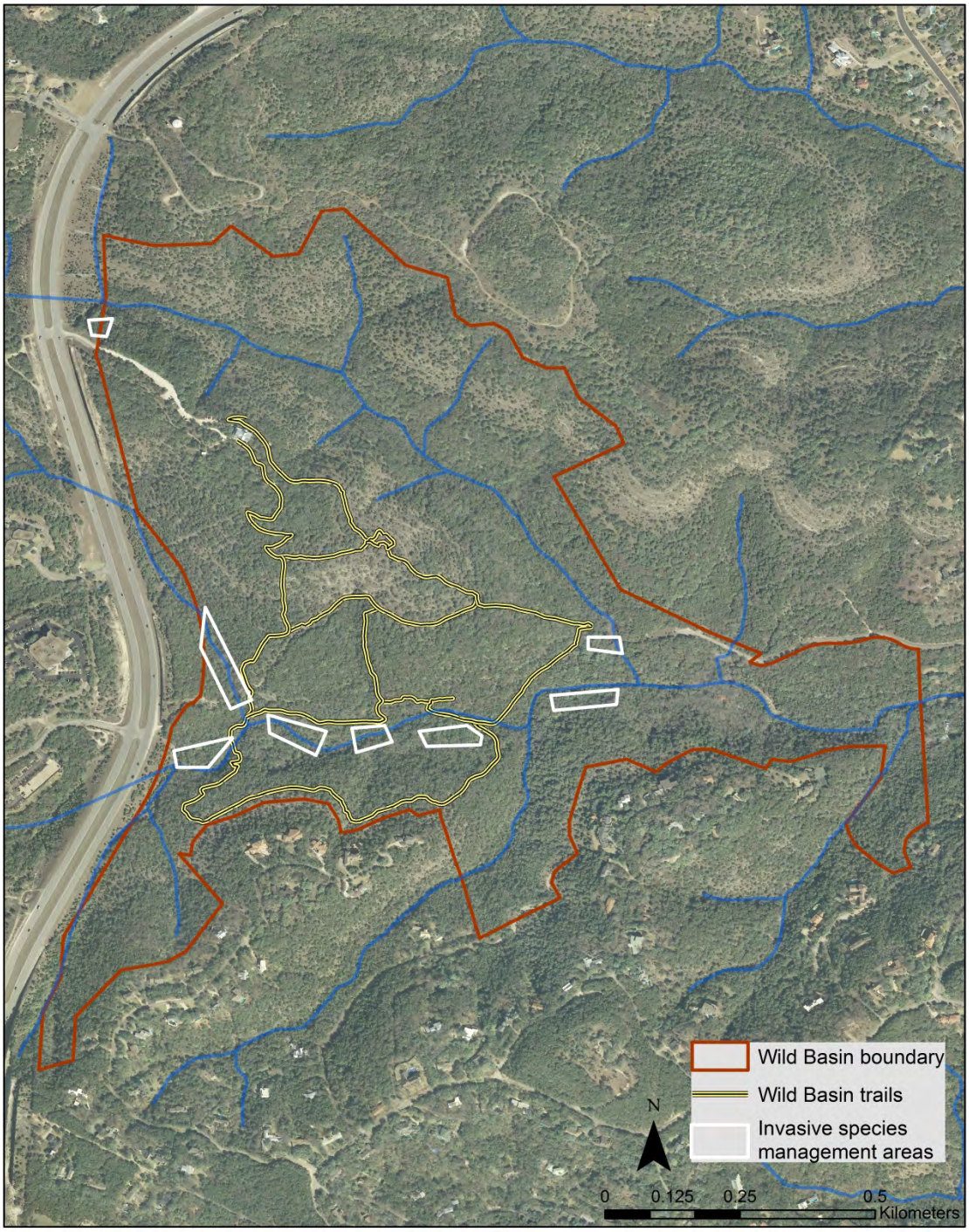
APPENDIX B: Aerial Map of Wild Basin and residential neighbors to south and east



APPENDIX C: Locations of rare plants identified at Wild Basin from Oct 2015-Sept 2016



APPENDIX D: Locations of invasive species removal at Wild Basin from Oct 2015-Sept 2016



APPENDIX E: Golden-cheeked Warbler Survey Summary 2016

Summary of 2016 Wild Basin Golden-cheeked Warbler Monitoring Program

By Patty Ramirez

Golden-cheeked warbler (*Setophaga chrysoparia*) surveys were conducted at Wild Basin in 2016 by Patty Ramirez (Consultant) and Darrell Hutchinson (City of Austin Biologist). This report summarizes the data collected by Patty Ramirez; data collected by Darrell Hutchinson will be combined with these data and presented in the 2016 City of Austin BCP Annual Report.

Methods

Golden-cheeked warbler surveys at Wild Basin were conducted by Patty Ramirez (Consultant) and Darrell Hutchinson (City of Austin Biologist) from March 14 – May 31, 2016. P. Ramirez conducted 19 surveys, totaling 86.5 hours. Survey protocol followed "2016 City of Austin Standards for Conducting and Documenting Golden-cheeked Warbler Surveys."

All observations (both visual and auditory) of male and female GCWAs were plotted on a topographic map with a 100-m UTM grid (created by the City of Austin). GCWA locations were also recorded with a Garmin GPSmap 76CSx Global Position System (GPS) when the surveyor was at the location of the bird. Individual male GCWAs were differentiated by band colors, through counter-singing with adjacent males, or by behavior. Data collected for each GCWA observation included date, time of observation, UTM coordinates, sex, color combination (for banded birds), song type, counter-singing, and presence of female, nest, and/or fledglings. If a male's bands could not be seen, band combination was documented as "Unknown," or "UK." Unbanded GCWAs were documented as "UB."

Once GCWA nests were located, nests were visited several times a week in order to monitor activity. Nest visits were coordinated between surveyors and all nest data were shared soon after so that subsequent nest visits would be well-timed and well-informed. Nest data collected included date of visit, time in/out, male/female/hatch years at nest, and male/female activity in and around nest.

GCWA location data were later recorded in an ArcGIS 10 geodatabase provided by the City of Austin, following the guidelines set forth in their "Avian Endangered Species Data Entry Instructions."

Results

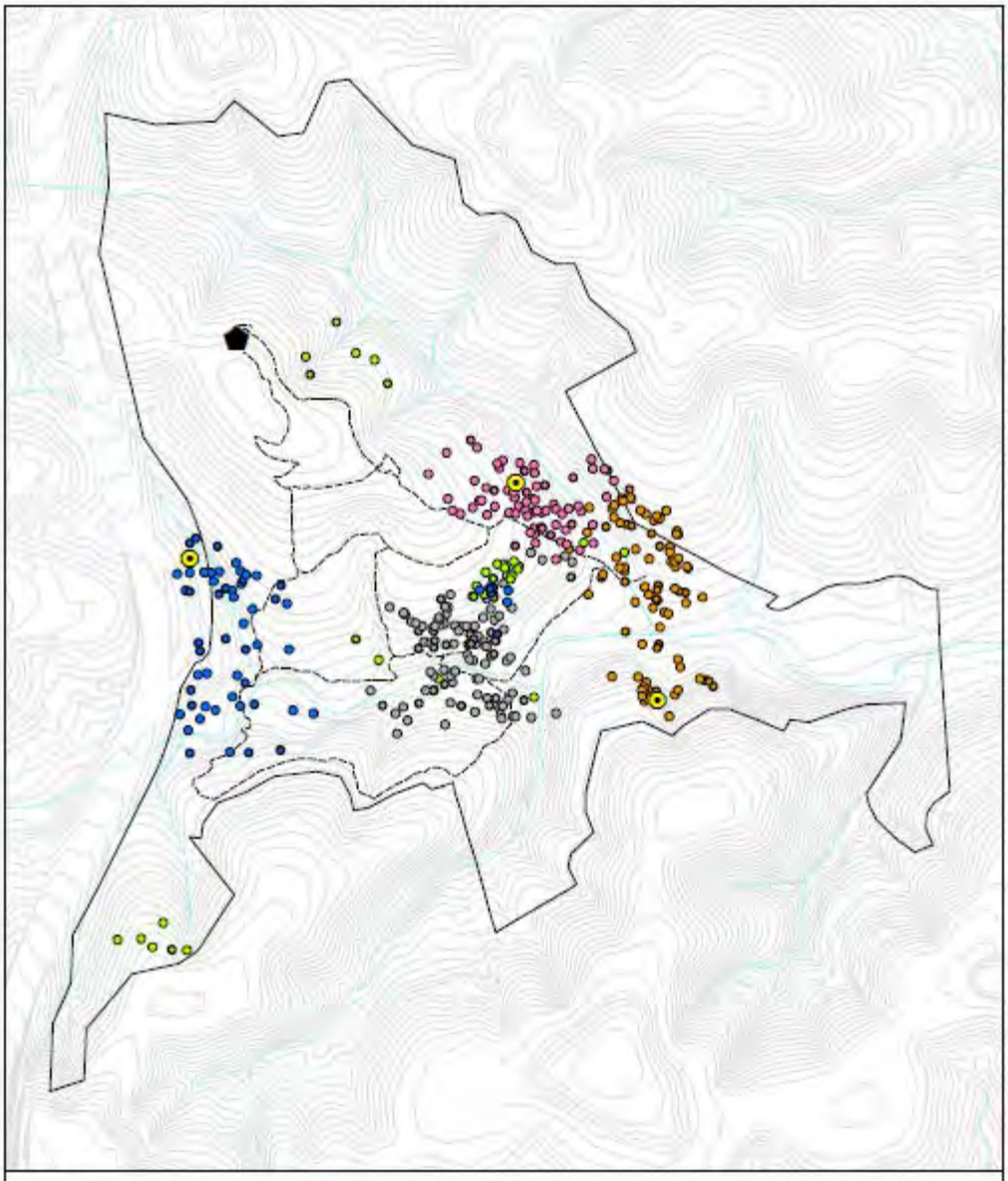
There were four golden-cheeked warbler territories at Wild Basin in 2016 (See Map 1 and Table 1). Two male GCWAs were banded during previous breeding seasons: NB/WH:MV/SI (nicknamed "Candy") was banded at Wild Basin in 2011 and OR/YE:NB/SI (nicknamed "Gates") was banded at Vireo Preserve in 2014. The other two males, YE/BK:NB/SI (nicknamed "Mr. Beez") and NB/BL:WH/SI (nicknamed "Fallout") arrived unbanded; they were banded by City of Austin biologists on April 12, 2016. Other GCWA observations outside of these territories included an unbanded male seen on three different days (3/28/16, 3/29/16, and 4/5/16) in the far southwest corner of Wild Basin (suspected to be Fallout, but unconfirmed) and an additional "floater" seen east-southeast of the visitor center on 5/5/16. Interestingly, Mr. Beez was resighted on 5/16/16 at Bull Creek by another City of Austin biologist, and once his territory

was abandoned, Fallout shifted over and was observed signing in Mr. Beez' former territory. Of these four GCWA territories, three males paired with females and nested (See Map 1 and Table 1). All three nests were found in April 2016 by D. Hutchinson, and all nests were in Ashe juniper (*Juniperus Ashei*) trees. Only one nest (Gates) was successful, producing 4 fledglings. Candy's nest was found predated on 5/16/16. The fate of Fallout's nest is undetermined but was likely predated. The last observed activity at Fallout's nest was on 5/10/16, when D. Hutchinson recorded the female at the nest. After this date, neither the male nor the female were observed at the nest, though the male was observed singing nearby. See Appendices 2, 3, and 4 for nest monitoring data collected by P. Ramirez.

Table 1. 2016 Wild Basin GCWA territory and productivity summary.

Table 1. 2016 Wild Basin GCWA territory and productivity summary.

Male Band Combo	Male Nickname	Year Banded	Paired with Female?	Nest ID	Date Nest Located	Nest Coordinates (UTM)	Nest Outcome	# Fledglings
NB/WH:MV/SI	Candy	2011	Yes	03DH16	04/08/16	613542, 3353544	Predated	0
OR/YE:NB/SI	Gates	2014	Yes	06DH16	04/19/16	613762, 3353200	Fledged	4
YE/BK:NB/SI	Mr. Beez	2016	No	-	-	-	-	-
NB/BL:WH/SI	Fallout	2016	Yes	04DH16	04/16/16	613022, 3353425	Likely predated	0


Map 1. 2016 Wild Basin Golden-Cheeked Warbler Observations
GCWA Observations
Territory ID
NB/BL:WH/SI
NB/WH:MV/SI
OR/YE:NB/SI
YE/BK:NB/SI
UK (Unknown)
GCWA Nest
Visitor Center
Trails
Creeks
10 Foot Countours
Wild Basin Boundary
N
0 50 100 200 300 400 500 Meters

APPENDIX F: Results of white-tailed deer (*Odocoileus virginianus*) surveys in the neighborhoods south of Wild Basin, October 2015

Deer Population Summary using BCP Template

Macrosite **Wild Basin Preserve** Survey Technique **Modified Hahn Line**

County **Travis** Year **2015**

		Deer Observed					Acres	Acres Per	Deer per
Survey Route	Date	Bucks	Does	Fawns	Unkn	Total	Sampled*	Deer	1,000 Ac
Wild Basin	10/13/2015	1	6	1	0	8	69.0	8.6	115.9
Wild Basin	10/19/2015	0	4	0	0	4	69.0	-	58.0
Wild Basin	10/26/2015	0	14	1	0	15	69.0	4.6	217.4
Survey Total		**1**	**24**	**2**	**0**	27	**207.0**	**3.3**	**130.4**

Preserve Size = 227 acres