



Wild Basin Creative Research Center

Wild Basin Wilderness Preserve

2014 Annual Report

(October 1, 2013 – September 30, 2014)

Submitted by

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

to

Travis County Commissioners Court
And Transportation and Natural Resources

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OVERVIEW OF PRESERVE MANAGEMENT

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.

Wild Basin's education and land management programs are designed to promote conservation and environmental awareness, while encouraging and demonstrating land stewardship practices. Throughout 2013 and 2014, Wild Basin staff maintained public trails; coordinated and trained volunteers and trail guides; organized educational and research activities; managed invasive species; hosted meetings, workshops, trainings, and classes; and began designing and building new environmental education exhibits in the Wild Basin visitors center. 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, it provides authentic environmental education experiences for the community. Its 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.

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

Our vision 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 are:

- 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.

TRAIL MAINTENANCE, RESTORATION, AND CONSTRUCTION

Trail maintenance

- Vegetation adjacent to designated trails (Appendix A) 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 placed to deter foot traffic by humans and wild animals. Natural Resources Manager & Coordinator of Education and Research Dr. Amy Belaire conducted a short study with St. Edward's University student Mia Moore to evaluate the effects of sign design and wording on off-trail use.
- Trail signs indicating directions and trail names were repainted in March 2014.
- Several rotting and loose railings on the bridge on the northeastern leg of the Arroyo Vista loop were removed and replaced in August-September 2014.
- Several major snags that were adjacent to trails and presented major risks to the public were removed by a St. Edward's University arborist. This included the escarpment cherry overhanging the trail on the northeastern leg of Arroyo Vista.
- Five TrailMaster trail counters were set up at key sections of the trail to document the total number of visitors as well as spatial and temporal patterns in activity.

Trail restoration

- Representatives from the Central Texas Trail Tamers worked with Wild Basin staff and volunteers on several occasions throughout the year to emphasize use of trail maintenance techniques that minimize erosion and lead to more sustainable trails.
 - Trail crews removed rotting water diversion bars in several locations and replaced them with soil berm/swales to prevent continued erosion on Arroyo Vista trail.
 - Trail crews removed berms built up on downhill edges of trails to allow sheetflow off trail and prevent continued erosion.
- A large stepping stone in the Bee Creek crossing of Yaupon trail was washed away during a major rain event. We are working with the Central Texas Trail Tamers to find and move a stone that provides a more permanent solution.
- Trail crews replaced rotting log steps in several locations along the eastern portion of Yaupon trail.
- The closed trail to the pond and back gate is lightly pruned to maintain foot traffic access in case of emergency. This trail is of concern for the Westlake fire department as it may be the only way homeowners on Wild Basin Ledge Rd. can escape if a fire is coming from the east (Appendix B). This trail should remain closed to the public (except for authorized neighbors) as it is a dead-end trail off of the main trail system and is unmarked causing confusion for visitors. This trail is no longer depicted on Wild Basin maps.
- Trash along Hwy 360 adjacent to Wild Basin was picked up by volunteer crews on several occasions throughout the year to prevent it from traveling onto the preserve and into Bee Creek.
- Signs discouraging holiday tree decorations were placed along the highway at the beginning of the holiday season, and holiday tree decorations were also removed promptly to discourage further decoration.
- Land management activities used only native juniper for trail/erosion bars and native limestone for boulders, steps and gravel, where needed, on or off the preserve's trails. No old-growth junipers or other native hardwoods are cut down in the preserve for such uses. All trail maintenance and other land

management activities avoid impact or disturbance to cultural and archaeological resources.

Construction

- Eagle Scout Sam Hartman constructed a new large table for the Outdoor Classroom in June 2014. He also constructed new sign-in boxes for the trailheads that will be installed in 2015.

BOUNDARY MANAGEMENT

Staff and volunteers performed several perimeter walks to check the integrity of fencing and boundary markers. The full perimeter was walked in June-July 2014 and several spots of concern were noted and discussed with Travis County personnel. One major spot is still a concern and is shown in Appendix C.

VEGETATION MANAGEMENT

- Vegetation mapping. Wild Basin staff, volunteers, and researchers are currently using a citizen science platform called iNaturalist to map the distribution of plants within the preserve. iNaturalist is accessible via a smartphone app or on the web from a computer and allows us to document locations, photos, and relevant notes about plant species on-site. Currently, we have two projects established in iNaturalist: one for the public to report their observations along the trails (Wild Basin Biodiversity Project), and a second one 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 further analysis.
- Rare plant species. All rare plant locations described are documented in the iNaturalist WBCRCMappingProject (Appendix D). Coordinates are obscured from the public when sightings are off-trail.

- Eastern shooting-stars (*Dodecatheon meadia*) were documented in two locations at Wild Basin in April 2014, including the south-facing slope of North Hollow and the south-facing slope of Southwest Hollow.
- Orchids in the *Hexalectris* genus were documented in three locations at Wild Basin in July-August 2014, including two areas adjacent to the northeast leg of Arroyo Vista trail and one area adjacent to the western leg of Yaupon trail.
- Orchids in the *Spiranthes* genus were documented in multiple locations at Wild Basin in October-November 2014, including along the northeastern leg of Arroyo Vista Trail, adjacent to Yaupon trail, and several locations in the North Hollow drainage.
- Two planted canyon mock orange individuals are located near the Wild Basin visitors center.
- 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*), vitex (*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 E). In addition, we have explored using the EZ-Ject lance with Imazapyr capsules to treat several large invasive stems that were too large to be removed manually with a Weed Wrench. Previous research shows that this method effectively treats invasive plant species while minimizing off-target impacts of herbicide. We are continuing to evaluate this method with formal research on effects in 2015.
- 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. In September 2014, areas along the driveway and near the Visitors Center were pruned to remove ladder fuels and dead limbs low to the ground. This material was removed by volunteer crews and taken off-site by a St. Edward's University chipper.

WILDLIFE MANAGEMENT

- Golden-cheeked Warbler (*Setophaga chrysoparia*). During the 2014 nesting season, approximately 34 independent surveys were conducted at Wild Basin by the Darrell Hutchinson and Patty Ramirez. The surveys were executed in partnership and according to the protocols of the City of Austin's Balcones Canyonlands Preserve GCWA Demographic Project (City of Austin, Travis County, U.S. Forest Service, 2012 Annual report: Golden-cheeked Warbler (*Setophaga chrysoparia*) monitoring program, Balcones Canyonlands Preserve. Austin, Texas). There were 7 GCWA territories at Wild Basin in 2014. One pair bred successfully, three pairs were unsuccessful, and three males were not observed with mates (see Appendix F 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 five evenings in October 2013 in the residential neighborhoods immediately south of Wild Basin. Results are summarized in Appendix G.

WATER QUALITY AND QUANTITY

Water quality testing was conducted by Travis County staff in the beginning of 2014 until June 2014 when the Wild Basin staff (Amy Belaire) was trained by Travis County staff (Renee Fields) on the Colorado River Watch Network water quality monitoring protocols. Wild Basin staff tested water quality on a monthly basis using the CRWN protocols. Several different parameters were tested, including turbidity which was added in 2014 (Table 1). All data from water quality testing at Wild Basin can be found online (<https://crwn.lcra.org/events.aspx?qrySite=72>). In addition, two research projects conducted by St. Edward's University graduate students focused on water quality in Bee Creek and are discussed in more detail below.

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

Date	Time	Monitor name	Sample depth (m)	Total depth (m)	Standard depth (m)	Air temp	Water temp	DO	Specific conductance	pH	Flow Severity	Nitrates-N (mg/L)	Transparency (m)	Days since rain
6/24/2014	10:30	Belaire	0.07	0.145	N/A	28	22	6.2	970	7.5	3	0.25	N/A	N/A
7/25/2014	9:00	Belaire	0.13	0.25	0.131	26.5	23	6	920	7.5	3	< 1.0	> 1.21	
8/27/2014	9:00	Belaire	0.12	0.24	0.12	28.9	N/A	5.9	940	7.5	2	< 1.0		
9/24/2014	9:50	Belaire	0.08	0.16	0.16	22.7	N/A	7.25	910	7.5	3	< 1.0	> 1.21	4
10/24/2014	10:30	Belaire	0.06	0.12	0.13	22.2	N/A	7	940	7.5	3	< 1.0	> 1.21	
11/25/2014	9:20	Belaire	0.12	0.23	0.22	11	N/A	8.9	970	7.5	5	< 4.0	0.09	3

OUTREACH, EDUCATION, AND VOLUNTEER COORDINATION

Wild Basin has been active in providing environmental educational opportunities and volunteer stewardship opportunities for the community. The major programs held at Wild Basin from Oct 1, 2013 to Sept 30, 2014 are summarized below.

Environmental Education & Interpretation

- School & Group Tours – Approximately 1282 adolescents, including students from local schools and community groups, attended education programs at Wild Basin. Group size limits are restricted and capped at a maximum of 40 students per visit. **Forty-six volunteers donated 414 hours to assist with these education programs.**
- Family & Public Programs – Local children and families attended several public programs hosted by Wild Basin in 2014 including stargazing, kid-friendly hikes and public guided hikes. The stargazing tours were made possible through the volunteer efforts of the Austin Astronomical Society. The kid-friendly hikes included programs set up for the BCP hike and lecture series. On the second Saturday of every month Wild Basin hosts a guided hike, and an additional guided hike on the fourth Saturday of the month is occasionally offered as well.
- BCP Hike and Lecture Series- Wild Basin hosted 6 events focusing on kid-friendly and family activities, including flint knapping, an insect safari hike, a snake lecture, a spider lecture and hike, and a family birding hike. A lecture on the history of Wild Basin was also provided as part of this series.
- 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.

- STEM Teacher Trainings – Wild Basin staff hosted two teacher development training sessions in Fall 2014. The trainings covered environmentally-focused citizen science applications, field-based exercises, and construction of an inexpensive microscope for classroom or outdoor use. Over 35 science and math teachers in K-12 schools attended the trainings. The teacher training sessions were funded by 3M and Applied Materials.
- Texas Nature Challenge – Wild Basin was a participant in the Central Texas Challenge from May-August 2014. Families could participate in one of two nature learning “missions” and then document their experiences in blog or scrapbook form.
- Earth Day – Wild Basin hosted two native plant hikes with expert anthropologist Leslie Bush and seed ball activities for Earth Day 2014.
- Austin Families and Nature Guided Hike- Wild Basin hosted two guided hikes for this organized group of home-school families.
- Interpretative Education Center- School groups and the general public have access to our education center Monday-Friday, 9am-4pm. New educational exhibits are currently being designed and work is on-going.
- REI – REI held several of its training classes (e.g., Intro to Hiking, Wilderness Survival) at Wild Basin in 2014.
- iNaturalist – Students, volunteer natural resource stewards, and the public are encouraged to participate in our citizen science project on iNaturalist (www.inaturalist.org), the Wild Basin Biodiversity Project. This project allows users to sign up with an account on the website and 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.
- Public visitation - In the summer of 2014, we placed five trail counters at strategic sections of the trail system. Preliminary estimates from the trail counters indicate Wild Basin receives **an average of 200-300 visitors per week**, including public, K-12 students, SEU students, researchers, and volunteers.

Volunteer stewardship

- Volunteer Stewardship Workdays- Wild Basin provides an opportunity 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 1,005 hours** from Oct 2013-Sept 2014. This includes contributions from over 165 volunteers participating in Saturday workdays and a dedicated small group of volunteers participating in weekly workdays.
- St. Edward's University Stewardship Days – In Spring 2014, a large group of 35+ SEU students came to Wild Basin for volunteer stewardship activities including invasive species removal, trash pickup, and trail maintenance. In Fall 2014, two smaller workdays were held at Wild Basin for students to learn about and get involved in active stewardship on site.
- St. Stephen's Stewardship Day – In April 2014, a group of 20 students and teachers from St. Stephen's school volunteered in trail pruning and cleaning up around the Wild Basin trailheads.
- University of Texas Lions Club Stewardship Day – In September 2014, a group of 40 students from UT-Austin volunteered in brush management adjacent to the driveway and building.

Public meetings, workshops, and conferences

- Balcones Canyonlands Preserve (BCP) – Wild Basin hosted several of the BCP Education/Outreach meetings. We also hosted a meeting with personnel from Travis County, City of Austin, and Concordia University to discuss research priorities.
- US Fish and Wildlife Retreat- Wild Basin hosted a staff planning retreat for five employees from USFWS.
- Wild Basin neighbors guided hike – Dr. John Abbott led a hike for 10 neighbors of Wild Basin.
- Capital Area Master Naturalists (CAMN) – CAMN held a training day in April 2014 and a monthly meeting in October 2014 at Wild Basin.
- Habitat Steward's Class- Wild Basin hosted the City of Austin's Habitat Steward Class on designing native landscapes and cultivating birds in your backyard.
- Meetings of local governmental and conservation organizations – Wild Basin hosted several group meetings for entities such as Lower Colorado River

Authority, Bat Conservation International, Central Texas Trail Tamers, Native Plant Society, and the Whole Kids Foundation.

St. Edward's University Events

- Van shuttle – In Fall 2014, Wild Basin ran a regular Friday afternoon shuttle service between St. Edward's University campus and the preserve.
- Project SUSTAIN - Project SUSTAIN is a 3M funded project to build secondary school curriculum related to sustainability at Wild Basin. The project brought together students in the Del Valle school district and SEU education students. In November 2013 and April 2014, over 200 students from Del Valle Middle School visited Wild Basin and worked in small groups rotating through a series of activities.
- Poeciliid Symposium – This symposium was hosted by SEU Assistant Professor Raelynn Deaton for 35 attendees, including SEU students.
- Staff Retreats and Meetings - Various departments and school groups scheduled their planning and staff retreats at Wild Basin including School of Humanities, School of Behavioral and Social Sciences, School of Education, Campus Ministry, Office of Advising, Office of Career and Professional Development, Health and Counseling, IT, Student Life, Student Leadership, and Dean's Retreat.
- Art in Space and Place – Students in this SEU course designed installations to serve as temporary exhibits in the Wild Basin visitors center. The installations were displayed inside the visitors center throughout the spring and summer of 2014.
- Courses – A list of undergraduate and graduate courses that incorporated Wild Basin into their curricula in Fall 2013 and Spring, Summer, and Fall 2014 is included in Table 2. Over 200 university students visited Wild Basin as part of their course work in 2013-2014.

Table 2. Undergraduate and graduate classes taught at Wild Basin in 2013-2014.

Course #	Title	# of Students	Semester
BIOL 3345	Advanced Topics in Biology	10	F2013
PHCO 3334	Large Camera Class	12	S2014
SCIE 2320	Science in Perspective	25	S2014
BIOL 4342	Population Biology & Ecology	15	S2014
ARTS 3399	Topics in Art-Space & Place	6	S2014
EDUC 3333	Secondary Instructional Methods	10	S2014
BIOL 1424	Native Plants (Austin Community College)	10	S2014
CNSL 6366	Alternative Approaches to Counseling	16	Sm2014
BIOL 3345	Marine Biology	9	Sm2014
ENSP 2324	Environmental Science	6	Sm2014
BIOL 1424	Native Plants (Austin Community College)	10	Sm2014
BIOL 1305	Contemporary Biology	10	F2014
MSEM 6301	Population Ecology	18	F2014
BIOL 2420	Entomology	15	F2014
CULF 3331	Contemporary World Issues	22	F2014
BIOL 2428	Vertebrate Biology	2	F2014
BIOL 1424	Native Plants (Austin Community College)	10	F2014
	TOTAL	206 students	17 classes

Publications

- SEU art student Christina Schech produced a self-published book of photography at Wild Basin, titled *Wild Basin Wanderings*.
- Wild Basin staff and interns reported on Wild Basin news, events, and volunteers in three email newsletters, as well as updates in regular blog posts and social media outlets.

- An article titled “Wild Basin serves as resource for a spectrum of students” was published in the Austin American-Statesman in June 2014 (<http://www.statesman.com/news/news/local/wild-basin-a-resource-for-a-spectrum-of-students/ngJ4W/>)
- An article titled “Scholarship recipient continues pesticide study at Wild Basin” was published in the Austin American-Statesman in October 2014 (<http://www.statesman.com/news/news/local/scholarship-recipient-continues-pesticide-study-at/nhczg/>)

SCIENTIFIC RESEARCH

Six research projects received scientific research permits and completed work at Wild Basin in 2014. Short summaries of all projects are included below.

The assessment of invertebrate assemblages in the Balcones Canyonlands Preserve

- INVESTIGATORS: Andrew Barrick, Nicole Minicone, Dr. Michael Wasserman, Dr. John Abbott and Andrew Clamann
- ABSTRACT: Water systems are an essential aspect of human development. As such, the assessment of how pollution, whether natural or anthropogenic, affects quality is pertinent to successfully managing aquatic systems. Many of the current methods available are expensive and time consuming and not realistic to implement. A rapid bioassessment, the use of invertebrate species to measure the quality of the water, is an inexpensive and efficient way to identify possible ecosystems that may be at risk. Macroinvertebrate data from the Wild Basin Wilderness Preserve and its associated Bee Creek watershed is limited compared to other streams monitored in the Austin area. The main objective of this project was to establish protocols for the collection of invertebrates in Bee Creek. The protocols were focused on facilitating future studies to implement a rapid bioassessment at Wild Basin. Two other streams, Bull Creek and Barton Creek, were also sampled providing comparative data to that collected at Wild Basin. Data obtained from the Austin Watershed Protection Department were used to observe the historical trends in the streams sampled. Data were then compared with temperature

and rainfall during the collection periods. Trends in the historical data indicated that the streams were consistently being affected by anthropogenic influences but there was no significant chronological change. An inverse correlation with temperature and stream health rating was identified.

Conservation psychology and off-trail use

- INVESTIGATORS: Dr. Amy Belaire, Narda Salinas, Mia Moore
- ABSTRACT: The goals of this project were to (1) evaluate trail use patterns at Wild Basin, including prevalence of off-trail use by visitors, and (2) determine the relative effectiveness of various sign wording for encouraging visitors to stay on designated trails. In three sites at Wild Basin, trail counters were used to monitor total trail traffic to see which trails are being used and by how many visitors. In addition, several “social trails” were identified where visitors leave the designated trails. At those locations, we placed motion-activated wildlife cameras off-trail to get an estimate of the proportion of hikers that left the designated trails. Our findings demonstrated that trail use varies substantially across Wild Basin. During the 3-week study period in May-June 2014, the waterfall area experienced the greatest number of weekly visitors (average of 350 people per week) followed by the overlook area (average of 260 visitors per week). Creek Trail (adjacent to Bee Creek and east of the waterfall) experienced the least trail traffic, with approximately 140 visitors per week. Overall, off-trail traffic was relatively low for all sites. The percent of visitors leaving designated trails reached a maximum of 2.2% at the waterfall site. At the waterfall site, a total of 18 visitors were documented leaving the designated trails over the 3-week study period. The results of the temporary signage were inconclusive due to the short duration of the study, but the sign emphasizing negative consequences (“Beware of snakes. Don’t go off trail.”) resulted in the fewest number of off-trail visitors at two of the three test sites.

Evaluation of a 30-year old restoration site in Wild Basin

- INVESTIGATORS: Dr. Amy Belaire, Narda Salinas, Mia Moore, James LaManna, Judy Walther, Dr. John Abbott
- ABSTRACT: The goal of this project was to evaluate the woody vegetation and ant communities in a historic dump site 30 years after it was restored. We evaluated two sites as part of this project: the restored dumpsite and an

undisturbed reference site nearby. The restoration site is located north of the Wild Basin driveway, on the southern slope of the North Hollow drainage. Both the restored and reference sites function as drainages that flow into North Hollow and are located approximately 250 meters apart. We delineated three 10 x 10m plots at low, mid, and high elevations within the restored dumpsite and the restoration site (six plots total). We recorded all woody plant species present in each plot and the percent cover of each. We also measured the diameter at breast height (DBH) of all trees greater than 4cm in diameter. We also installed 9 pitfall traps in each 10 x 10m plot to determine the ant community composition in the restored dumpsite and the reference site. The woody vegetation species richness was 22 in the restored dumpsite and 21 in the reference site. Fourteen species were common to both sites. The canopy of the *restored dumpsite* consists of Ashe juniper, plateau live oak and Texas oak. The understory was dense with shrubs (primarily elbow bush) and vines. The restored dumpsite had a greater variety of species with sizable trunks (>4 cm DBH) than the reference site. Two non-native invasive privet species were present only in the restored dumpsite. The canopy of the *reference site* was also dominated by Ashe juniper, primarily small multi-trunked trees with a diameter between 4-10 cm. Silktassel, evergreen sumac, and yaupon were consistently found in all of the reference plots with a percent coverage ranging from 2-5% to 10-25%. Pitfall traps for this study yielded low species diversity and overall abundance of ants, but the reference site had a greater abundance of ants collected than the restored dumpsite.

Abundance and distribution of avian nest predators at Wild Basin

- INVESTIGATORS: Dr. Amy Belaire, Cali Chidester, Courtney Dunphy, Darrell Hutchinson
- ABSTRACT: The goals of this project were to evaluate the abundance and distribution of several avian nest predators at Wild Basin. This project was focused on documenting year-round residents, especially the Western Scrub-Jay, Blue Jay, Cooper's Hawk, American Crow, and Common Raven, and will serve as a pilot project for future studies. We established a grid of 13 point locations across Wild Basin. We conducted 10-minute point counts at each location using the "double-observer" method, and we recorded all occurrences (seen or heard) of nest predators within 100m of the point. Each site was surveyed four times between September 11-October 30, 2014, between sunrise and 10am on days with minimal wind and little to no

precipitation. We also set up wildlife cameras at 6 of the point locations to document the distribution of other potential nest predators (as well as other wildlife species). Analysis for this project is on-going. However, we expect that this study will shed some light on fine-scale differences in nest predator abundance within an urban preserve and lay the groundwork for future studies.

Determination of Chemical Indicators for the Health and Integrity of Stream Ecosystems in the Bee Creek Watershed

- INVESTIGATORS: Aaron Waters, Jamie Carpenter, Dr. Michael Wasserman, Dr. Teresa Bilinski
- ABSTRACT: Striking a balance between the natural world and cultural development will be at the forefront of any discussion concerning climate change and remediation in the future. Focusing our goals on maintenance of environmental health and integrity is tantamount to global conservation efforts already underway, further emphasizing the need to examine the impacts of all individual actions. The goal of this study was to use an interdisciplinary approach to determine if the recent expansions of suburban development have influenced stream ecosystem health and integrity within the Bee Creek watershed, a 3.3 square mile area surrounding the 3 mile long Bee Creek, a tributary of the Colorado River, and a part of the Edwards Aquifer contributing zone. Our approach employed the measurement of chemical indicators of stream health and integrity, as well as a comparison of our data to historic data from previous studies performed by the City of Austin and the Austin River Watch, in addition to percent land use change since the year 2000, all within the watershed. Using a range of temporally sampled field data, statistical analysis, and geographic information systems for mapping, we identified the suite of parameters that represent the most significant indicators of stream ecosystem health and integrity in the Bee Creek watershed. If a suitable method of measurement is discovered to be an indicator of overall health and integrity, it could be possible to apply it to many other watersheds as a metric for organizations to use in the development of future environmental policy.

Microbial Warfare in Soil: An investigation of microbial competition using secondary metabolites

- INVESTIGATORS: Karina Cuellar, Dr. Teresa Bilinski
- ABSTRACT: The objective of this project was to investigate if a strain of *E. coli* and soil bacterial isolates are equally susceptible to antibiotics produced in the soil. We hypothesized that soil bacteria produces antibiotics that target other soil bacteria, rather than *E. coli* due to the evolutionary pressure of competition. Soil samples were collected from Wild Basin and brought back to the lab until further use. One gram of the soil samples were shaken in 50mL of deionized water for one minute. Afterward, 1mL of the mixture was pipetted into a flask containing 300mL of tryptic soy broth (bacterial growth media). The test tubes containing these samples were incubated in the incubator shaker for a total of twenty four hours to culture bacteria, then transferred to a new set of test tubes to measure microbial growth using a spectrophotometer. These cultures needed to be obtained before reaching stationary phase. To measure the susceptibility of the bacteria to the supernatant we extracted the antibiotics from the bacteria by placing 1mL of the sample in an Eppendorf tube and centrifuge for 30 minutes at a velocity of 16,000 rotational centrifugal force. This allowed the supernatant, which contains antibiotics, to separate from the bacterial cells. The supernatant was placed in sterile discs, then transferred to Mueller-Hinton agar. The supernatant was tested against *E. coli* and 5 soil bacterial isolates. The results of this study indicated that the antibiotics produced by the soil bacteria had less of an effect on *E. coli* than on soil isolates. Future work may include an investigation of whether bacteria in beetle guts produce antibiotic or antimicrobial compounds.

Metagenomics of Glen Rose Soil Microbial Systems and Their Roles in Carbon Cycling and Native Plant Restoration

- INVESTIGATORS: Dr. Charles Hauser, Dylan Fox, Frank Garza, Dylan Sosa, Margaret Walsh, Lisa O'Donnell, Jim O'Donnell
- ABSTRACT: Central Texas has a region of uplifted limestone, the Edwards Plateau, providing an island of glen rose soils that fostered the speciation of many organisms and forms one of North America's areas of endemism. With an extreme and unpredictably variable climate, the survival of regional flora is increasingly recognized to be dependent on tight relationships with soil microbial populations, none of which have been described. The soils are extremely alkaline,

requiring unexplored adaptations and novel biochemistry. Over the summer of 2014 *Muhlenbergia reverchonii*, *Carex planostachys*, *Schizachyrium scoparium*, and *Juniperus ashei* plants were sampled from four distinct habitats within Wild Basin and the Vireo Preserve (Fig. 1, Supplemental Table 1). From these sites DNA from bulk soil not associated with plants was isolated for use as a control for fungal and bacterial populations present at each site. For each plant root sampled, DNA was isolated from three fractions: neighboring soil (loosely adherent to the root); rhizosphere (closely adherent to the root (2-3mm)); and endosphere (within the root tissue itself). Fungal and bacterial rDNA PCR analyses have been conducted on the majority of samples collected. The DNA quality, judged by A260/A280 ratios (Supplemental Table II), while variable should be of sufficient quality to obtain PCR products. Bacterial 16S rDNA PCR products have been obtained from the majority of fractions from each plant sample. Results from attempts to amplify Fungal 18S rDNA from the same DNA samples has yielded few positive results to date. This may indicate either a problem with the primers and/or PCR conditions employed, or an absence of fungal DNA in the samples. The latter condition is believed to be less likely, given our previous ability to amplify fungal, bacterial and bacterial DNA from bulk soil from soils samples obtained at Wild Basin (Hauser, 2013 Report). Attempts to refine PCR conditions, and fungal primers employed are in progress. Backup plant samples have been stored in freezer (-80°C) and are available for DNA isolation if required.

Determining interannual variability in vegetation structure and the relationship between structure and ecosystem function at Wild Basin Wilderness Preserve

- INVESTIGATORS: Dr. David Johnson, Alyseia Alexander, Daniel Ben-Moyel, Dominic Bruno, and Elizabeth Nowaicek
- ABSTRACT: Resampling fixed plots and/or transects within plant communities represents one of the strongest methods of change detection of ecosystem structure and function. With this in mind, the primary goal of our project was to resample plots and transects within Wild Basin that were originally sampled in 2013 to determine how the vegetation structure at Wild Basin differed between 2013 and 2014. Additionally, we sought to understand how structure dictates function by estimating leaf decomposition. Although we had planned to measure leaf level photosynthesis of the dominant plant species and extrapolate estimates over cover values for species across the

different communities identified by the original sampling in 2013, we were not able to do so due to equipment issues. To estimate decomposition, we collected senesced but attached leaf litter from the dominant tree species (red oak: *Quercus texana*, evergreen sumac: *Rhus virens*, and Ashe juniper: *Juniperus ashei*) and place these in litterbags. After two weeks, litter bags were removed from the field and we determined biomass loss and fungal colonization rates among communities. The analysis of community composition is not complete; however, our initial work with these data found no differences in growth forms among the various communities between 2013 and 2014. Additionally, we found that leaf decomposition varied differently than we had predicted. Evergreen sumac decomposed the quickest, while Ashe juniper decomposed the slowest. This study provides a better understanding of the interannual variability in vegetation structure as well as how structure dictates ecosystem function at Wild Basin.

FACILITIES AND SIGNS

Facilities

- Development of the exhibit materials in the Visitors Center is on-going.
- New fluorescent lighting was added to the Main Hall of the Visitors Center.
- A new 80" multi-media screen was added to the large lecture space in the Visitors Center.
- The building's security system has been updated and is currently monitored by ADT.
- A digital entry lock was added to the front door of the Visitors Center.
- We have been actively working on rodent control in the building.
- A new ADA-accessible portable toilet was placed in the parking lot.
- Wiring and infrastructure for the solar panels was updated by the City of Austin.
- Compost toilets are still full and need to be pumped by a septic service.

Signs and maps at Visitors Center

- New educational signage was developed and placed in the display cases outside the Visitors Center. The signs educate visitors about the golden-

- cheeked warbler, the BCP, the Bee Creek watershed, and citizen science opportunities with iNaturalist.
- New trail maps were developed that include interpretive information to accompany existing numbered and lettered signposts along the trail system. These maps are printed on-site and provided at Wild Basin trailheads (they are also available online).

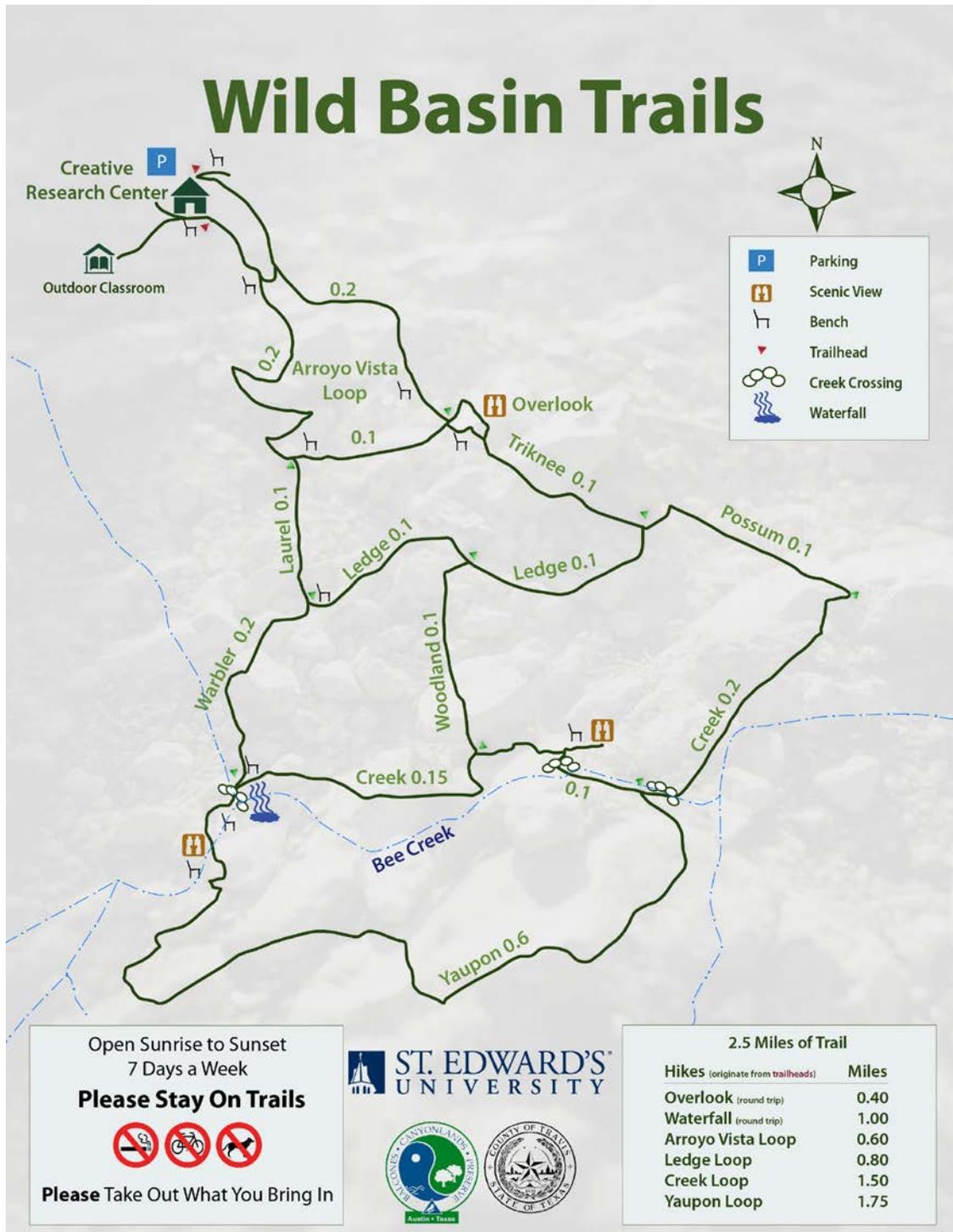
SECURITY, ACCESS AND SAFETY

Fire Safety

- Wild Basin staff communicated with Travis County personnel about fire prevention and evacuation planning. We are following the FireWise protocols of removing dead and down trees near the building and adjacent to the driveway.
- Care Specialty currently monitors for fire in the building.
- Securitas is the security company that opens the gate at dawn and closes gate at dusk and patrols parking lot at those times.

APPENDICES

APPENDIX A: Map of Wild Basin Wilderness Preserve trail system



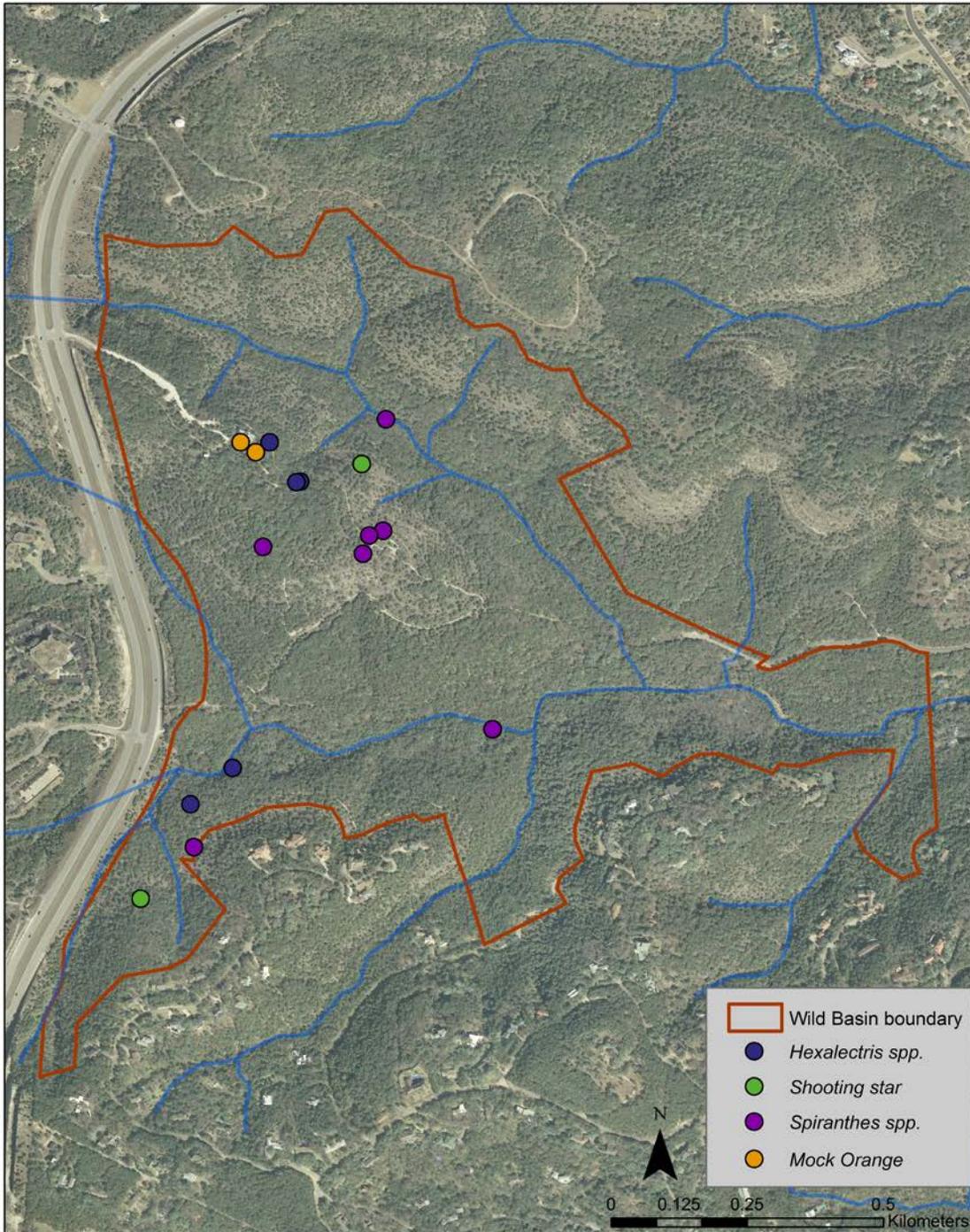
APPENDIX B: Aerial Map of Wild Basin and residential neighbors to south and east



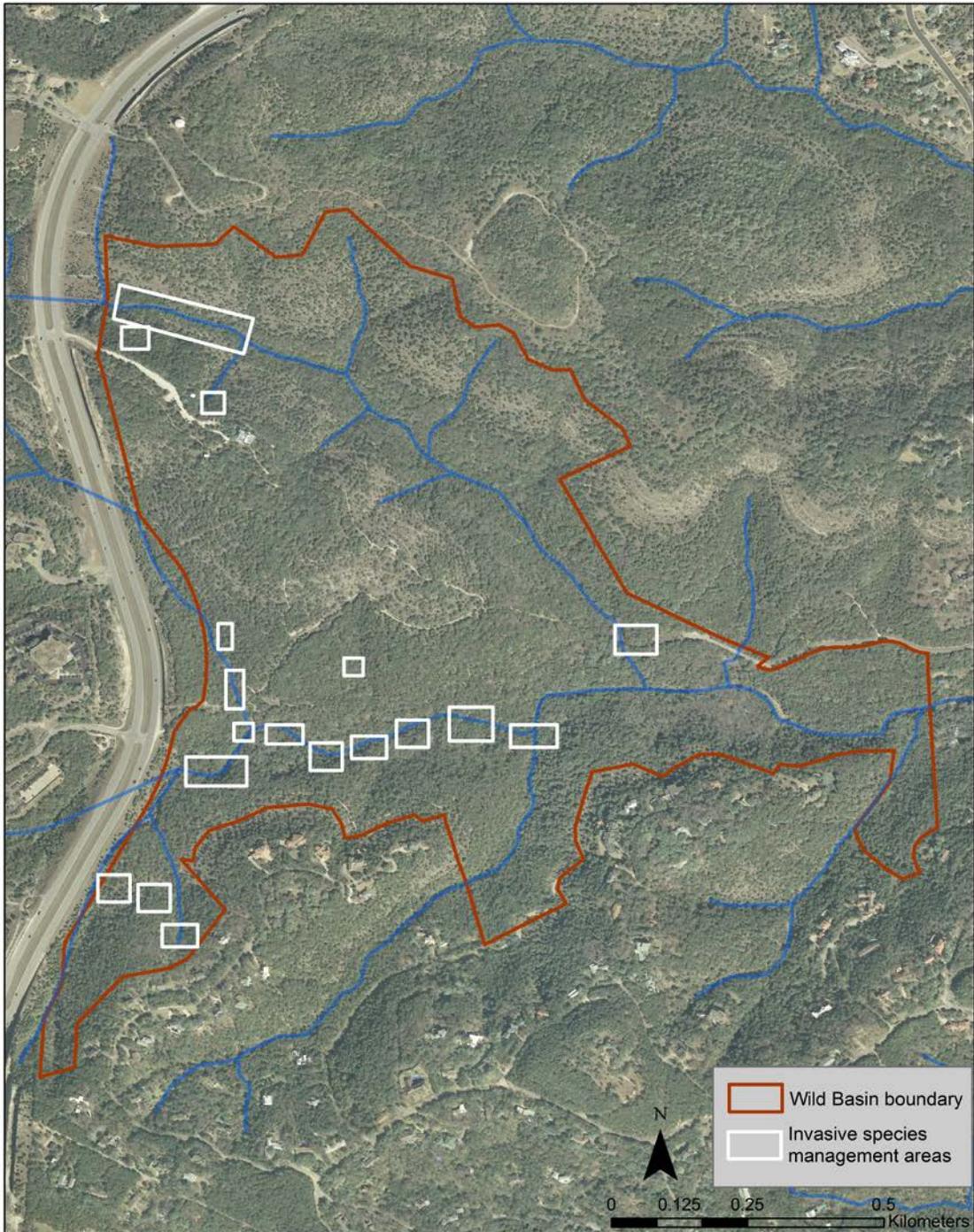
APPENDIX C: Location of boundary concern identified in June 2014



APPENDIX D: Locations of rare plants identified at Wild Basin from Oct 2013-Sept 2014



Appendix E: Locations of invasive species removal at Wild Basin from Oct 2013-Sept 2014



Appendix F: Golden-cheeked Warbles Survey Summary 2014

Summary of 2014 Golden-cheeked Warbler surveys at Wild Basin Wilderness Preserve by Darrell Hutchinson

Thirty-four surveys were conducted between March 17- May 27 by Darrell Hutchinson and Patty Ramirez for a total of 203 survey hours.

Five banded and two unbanded males occupied a total of seven territories inside and on the edge of the Wild Basin Preserve boundary (see 2014 VPWB Territory Polygons). Two color-banded males returned to occupy their same territory from previous years. NB/WH:MV/SI was banded at adjacent Vireo Preserve on 3/25/11 and YE/SI:OR/BL was banded at Wild Basin on 4/9/13. This year, Jim O'Donnell banded OR/YE:NB/SI at Vireo Preserve on April 8, and BK/SI:OR/DG and RD/SI:WH/BL on April 16. The first two were young second-year birds, and RD/SI:WH/BL was an older after-second-year bird.

One pair bred successfully, three pairs were unsuccessful, and three males were not observed with mates:

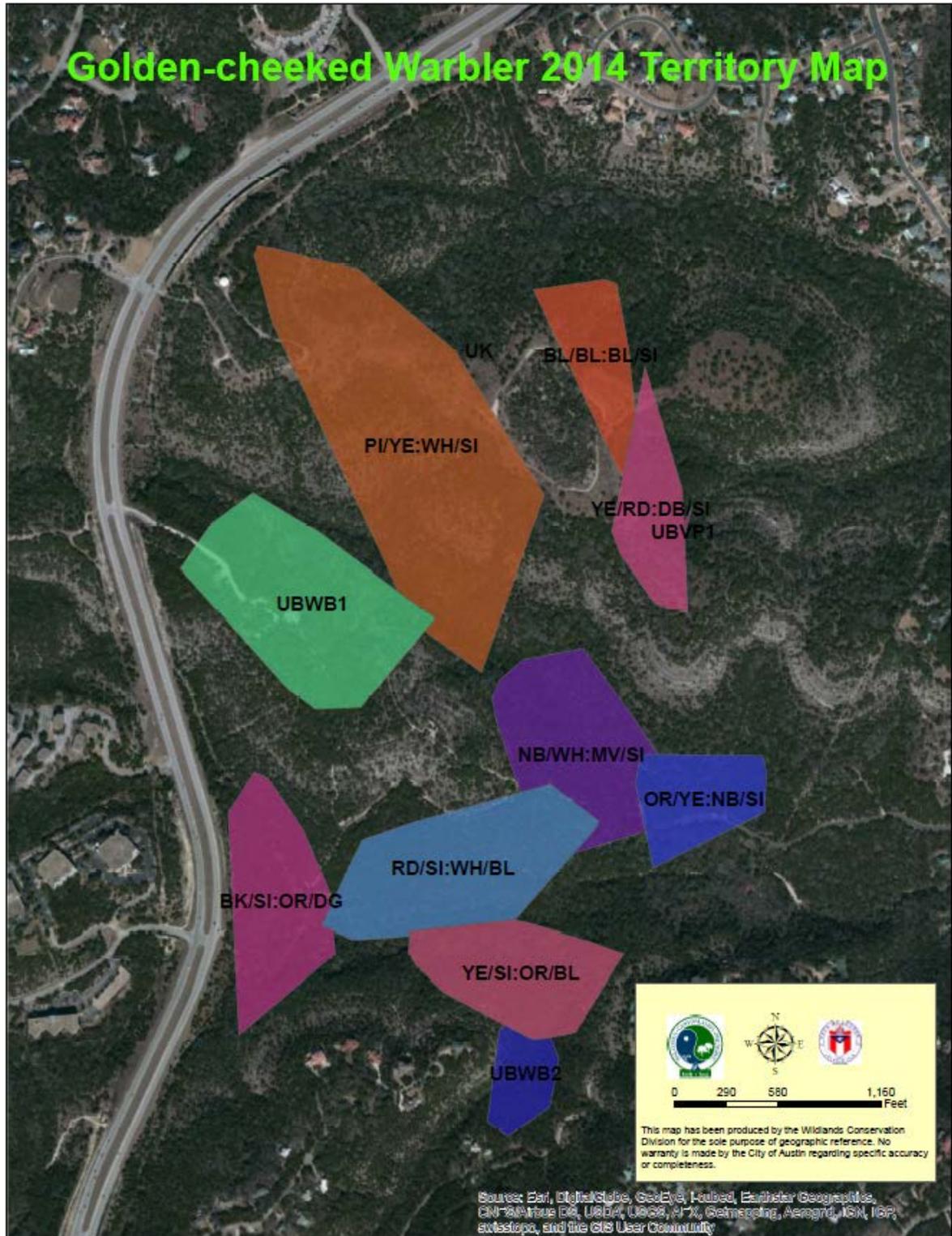
- A nest for OR/YE:NB/SI was located at Vireo Preserve on April 9 and fledged three on May 14.
- A nest for NB/WH:MV/SI was located on April 25 and observed predated on April 29.
- YE/SI:OR/BL was paired this year in contrast to last year. The nest was not found and presumed predated. Male was last detected on April 30.
- RD/SI:WH/BL was paired, but its nest was not found and presumed predated.
- BK/SI:OR/DG was never observed with a female and was last detected on May 2.
- UBWB1 was never observed with a female and was last detected on April 30.
- UBWB2 occupied a territory located partially outside Wild Basin's southern boundary on private property and was not well sampled. Male was not observed with a mate.

This year the Golden-cheeked Warblers experienced their worst nesting success at Vireo Preserve/Wild Basin since intensive monitoring surveys began in 2011. Of ten occupied territories, only five males were observed with females, and only one pair successfully fledged. No renesting attempts after failed nests were observed, and five banded males appeared to leave the plot by early May.

The reasons for poor nesting success are unknown. However, researchers are observing greater abundance of Blue Jays at Wild Basin compared to other plots. Western Scrub Jays and Blue Jays both occupy the oak-juniper woodland inhabited by Golden-cheeked Warblers. Although jays were not observed predated Golden-cheeked Warblers nests directly, jays were observed following warblers during foraging, supplanting perched warblers, foraging actively close to known warbler nests, and seen with nestlings in bill (nestling species undetermined).

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.

Golden-cheeked Warbler 2014 Territory Map



APPENDIX H: Results of white-tailed deer (*Odocoileus virginianus*) surveys in the neighborhoods south of Wild Basin, October 2013

Deer Population Summary using BCP Template									
Macrosite	Wild Basin Preserve			Survey Technique			Modified Hahn Line		
County	Travis			Year			2013		
Survey Route	Date	Deer Observed					Acres Sampled*	Acres Per Deer	Deer per 1,000 Ac
		Bucks	Does	Fawns	Unkn	Total			
Wild Basin	10/29/2013	1	8	0	0	9	69.0	7.7	130.4
Wild Basin	10/30/2013	1	6	0	0	7	69.0	9.9	101.4
Wild Basin	11/1/2013	2	13	1	0	16	69.0	4.3	231.9
Wild Basin	11/6/2013	0	0	0	0	0	69.0	n/a	0.0
Wild Basin	11/8/2013	1	0	0	0	1	69.0	69.0	14.5
Survey Total		5	27	1	0	33	345.0	10.5	95.7
Preserve Size = 227 acres									