Avian Surveys

Coyote Run, Daughenbaugh, and Warembourg Open Spaces

City of Louisville, Colorado

prepared for:

Catherine Jepson
Open Space Specialist
City of Louisville
749 Main St, Louisville, CO 80027

prepared by:

Wildlife Specialties LLC
PO Box 1231, Lyons, CO 80540

July 2017

Table of Contents

Section / Title **Page**

List of Figures

Number / Title **Page**

1. Introduction

The City of Louisville, Colorado Open Space Department contracted Wildlife Specialties LLC to conduct avian surveys at three Open Space Properties: Coyote Run, Daughenbaugh, and Warembourg (Figure 1) in the late spring/early summer of 2017. All three Open Spaces surveyed are surrounded on all sides by residential and commercial development. Of the three, Coyote Run is the only property that has connectivity to other Open Space properties. All of the properties are used heavily for recreation and exercise with almost all of the activity occurring on the designated trails.

2. Methods

The City of Louisville Request for Proposals for conducting the surveys called for the number and type of avian survey used at each Open Space. Two survey methods were used in the 2017 surveys: point counts (n = 1) and line transects (n = 6). Point count strengths and weaknesses are as follows:

- Time is available to spot and identify shy and/or hard to observe species.
- Adaptable to species specific surveys (e.g. Southwestern Willow Flycatchers) and habitats (more dense and diverse habitats).
- Double counting (counting the same bird twice) is a concern (a bird could be detected visually or aurally in one location and move, undetected, to a different location where it is then again unknowingly detected and recorded as a new detection).
- Time is "lost" while moving between point count stations.

Line transect have their strengths and weaknesses as well:

- More area is surveyed more quickly as the surveyor slowly walks each transect.
- Adaptable to species and habitats (better for more open habitats).
- Double counting is a minor problem.
- Adequate for habitat studies.

Two avian line transect surveys were conducted on each of the Open Space properties. The main assumption of line transect surveys is that detectability remains constant (Bibby et al. 2000). Line transects are often done in large open areas with little cover. This is preferred over point counts in open areas because more birds are observed over the same unit of time while moving. Transect location is usually based on access and are often systematically located to provide a representative sample of the survey area. Prior to the finalization of each transect used at the three Open Space properties, transects were laid out in GIS and the locations were presented to the City of Louisville for concurrence that the selected locations provided the best representation of each Open Space (Figure 2). Preselecting transect locations allowed for positioning the transects to intersect with as many habitat types as possible while maintaining sufficient distance between transects so there would be less chance of double counting birds. Each transect was slowly walked with the surveyor being observant of avian activity within 150 meters (parallel) to each transect. Detections beyond that distance were not recorded. When a bird was observed ahead of the surveyor the distance was estimated from the transect, not from the observer. All distance was measured using a Leupold© LASER range finder. Only one survey was completed at each of the transect locations.

Distance sampling was incorporated into the data collections because it is an efficient way to estimate bird density and can provide a measure of bird 'detectability'. However, good density estimate require 60-80 bird detections for line transects and 80-100 detections for point transects.

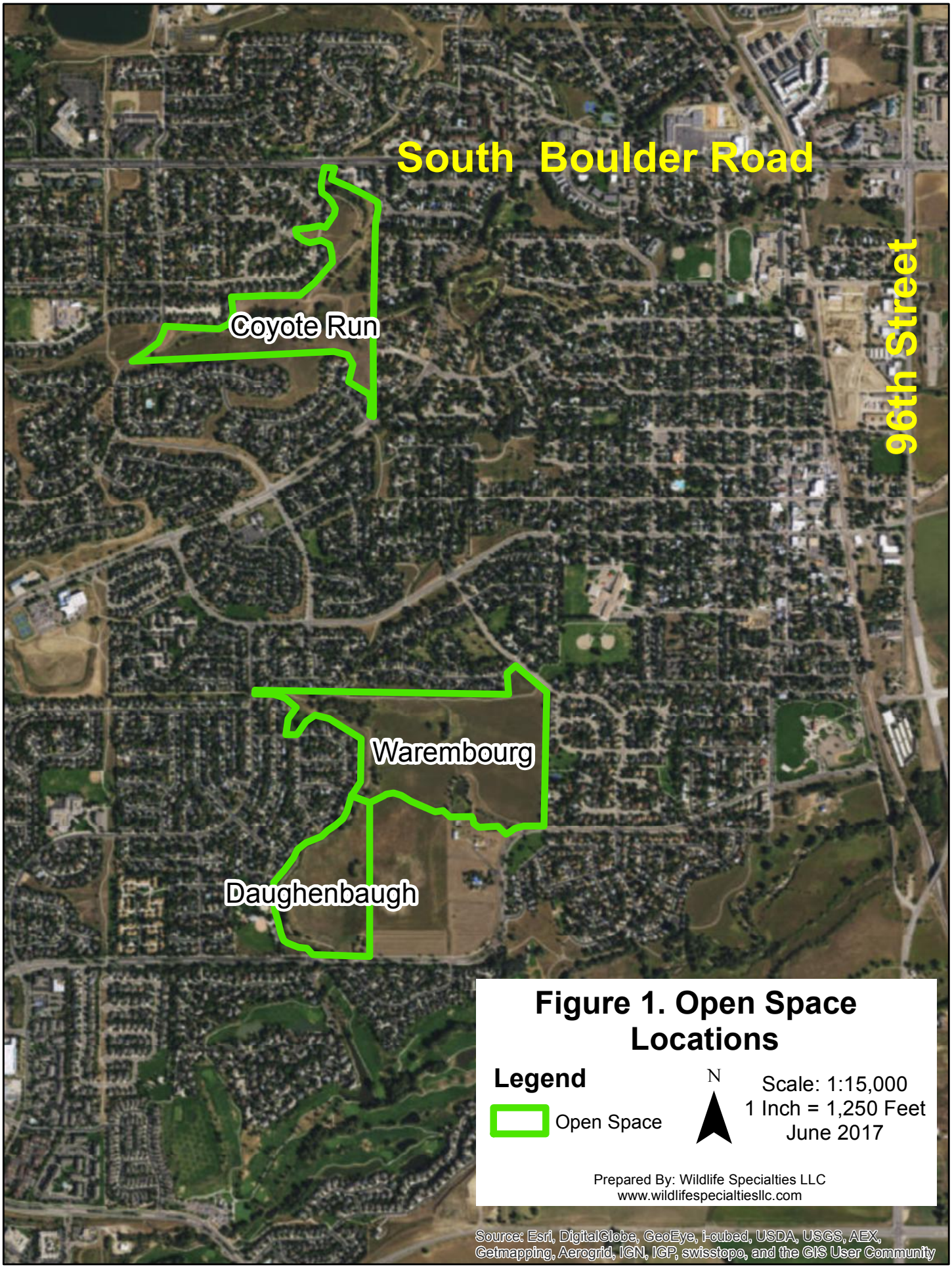

Figure 1. Open Space Locations

Legend

Open Space

N

Scale: 1:15,000
1 Inch = 1,250 Feet
June 2017

Prepared By: Wildlife Specialties LLC
www.wildlifespecialtiesllc.com

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

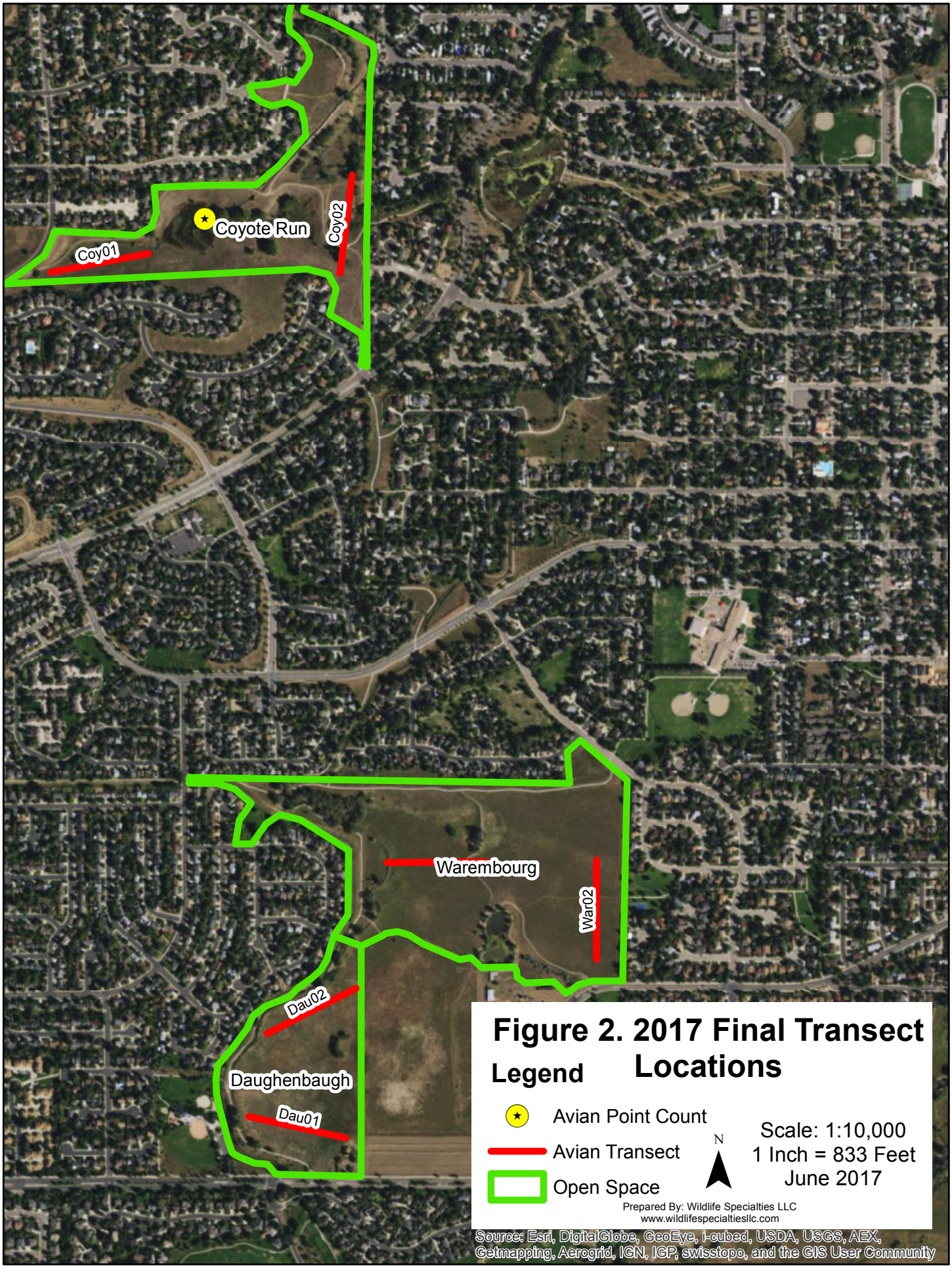

Figure 2. 2017 Final Transect Locations

Legend

- Avian Point Count
- Avian Transect
- Open Space

N

Scale: 1:10,000
1 Inch = 833 Feet
June 2017

Prepared By: Wildlife Specialties LLC
www.wildlifespecialtiesllc.com

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Marsden (1999) stated that a reasonable number of detections are required for adequate analysis. Buckland et al. (1993) recommended at least 60-80 detections be required for fitting the detection function in program DISTANCE. Numbers lower than 60 may be vulnerable to stochastic factors such as a total of 20 detections of one species all occurring very close to the point; this 'spike' in sighting distance would be problematic in analysis. If the data are of high quality, then reliable estimates may be possible for smaller detection samples (Rosenstock et al., 2002).

The lone point count station was located on the southeast corner of the pond/wetland located near the center of Coyote Run Open Space (Figure 2). Although line transects can provide advantages over fixed radius point counts, point counts are more applicable in situations where auditory detections will be incorporated into the analysis, such as in denser habitats where a bird may be heard but not visible. Counts were conducted at this location for 10 minutes. The linear distance from the observer to each bird detected was measured.

All surveys were conducted from 30 minutes before sunrise until no later than 7:00 AM to maximize survey time during periods of high avian activity (Buskirk and McDonald, 1995; Sogge et al., 1997). Surveys were conducted on June 20, 2017 at Daughenbaugh and Warembourg Open Spaces; surveys were conducted June 22, 2017 at Coyote Run.

3. Environmental Setting

The three Open Space properties have all been converted from native shortgrass prairie into agricultural lands (likely both as rangeland or dryland/irrigated farming) and there is no native habitat present. All surrounding lands are modified as well with commercial and residential development, roads. Irrigation ditches and stormwater drainage structures provide aquatic and riparian habitat where none originally occurred. A description of each property is provided below:

3.1. Coyote Run Open Space

Most of Coyote Run is dominated by the non-native invasive grass smooth brome (*Bromus inermis*) (Photo 1). There are small drainages in which willows (*Salix* sps.) occur along with plains cottonwood (*Populus deltoides)* and chokecherry trees (*Prunus virginiana*) (Photo 2). A pond/wetland occurs near the center of the property that is dominated with cattails (*Typha* sps.) and rushes. The habitat is much more diverse on the east side of the property with small ditches present and more vertical structure with greater plant diversity than the remainder of the property.

3.2. Daughenbaugh Open Space

Daughenbaugh Open Space is dominated by the presence of black-tailed prairie dogs (*Cynomys ludovicianus*). There are varying reports of the effects of prairie dogs on faunal diversity. Recently, Cully et al. (2010) reported small mammal species richness and evenness are less variable within colonies, and Pruett et al. (2010) reported species diversity and evenness greater in areas outside of colonies. This decrease in species richness and evenness within colonies could be in part a result of the change in plant species composition (often towards a non-native invasive community) and a suppression of plant cover by prairie dogs (Baker et al. 2013). The response to lower plant diversity is seen in the avian community as well. The dominant plant species is the non-native field bindweed (*Convolvulus arvensis).* At the eastern edge of the southern transect (Figure 3 – DAU01 Photo 3) there are a number of boxelder (*Acer negundo*) trees which provide species and structural diversity to the landscape. In addition to the trees there are large common mullein (*Verbascum thapsus*) interspersed with cheatgrass (*Bromus tectorum*) and crested wheatgrass (*Agropyron cristatum*), all of which are non-native and the first two are invasive. The diversity of the Open Space in general is increased because of the presence of the Goodhue Ditch which provides foraging habitat for species such as swallows.

3.3. Warembourg Open Space

Warembourg Open Space is located north of and connects to Daughenbaugh Open Space (Figure 2). It is characterized by a sea of smooth brome similar to what is shown in Photo 1, with a small pond/wetland on the north side of the Open Space and the Warembourg Fishing Pond on the south end. Some trees occur along these features which provide some structural diversity; however, most of the trees near the Warembourg Fishing Pond are the non-native Russian olive (*Elaeagnus angustifolia*). Nearby homes offer habitat for species commonly found near homes.

4. Results

On both June 20 and 22 environmental conditions were optimal for conducting avian surveys. The reported temperature at 0530 hours on June 20 was approximately 62°F with wind speeds between 0-4 miles per hour (mph) and visibility of 10 miles. On June 22 it was approximately 75° F with wind speeds between 0-7 mph and visibility of 10 miles. Both mornings were quiet with little traffic noise or other noises because of the early start time. Copies of the original data sheets are provided in Appendix A. Detection numbers were too low to attempt any type of distance sampling analysis.

4.1. Coyote Run Open Space

Coyote Run was surveyed on the morning of June 22, 2017. Table 1 provides the point count station/transect, species, number, and activity when detected.

- Point Count Station: As I arrived at the point count station, prior to the initiation of the 10 minute survey, a pair of Red-tailed Hawks flushed from one of the large plains cottonwood trees northeast of the survey point and flew to the east. The presence of the wetland area provided more diversity and most of the detections occurred in the wetland or associated wet areas. Seven species were detected; he dominant species was the Red-winged Blackbird (*Agelaius phoeniceus*). Several males were detected aurally and visually and it is likely that each of these males is associated with a nest. Nearby houses were within the 150 meter survey distance and two species, the House Wren (*Troglodytes aedon*) and the non-native and invasive Eurasian Collared Dove (*Streptopelia decaocto*) both were seen or heard at these homes.
- COY01: Coyote Run transect 01 (COY01) runs from east to west and is located on the west side of the Open Space. It is located between two housing developments to the north and south, both of which are within 150 meters of the transect. Habitat around the transect is dominated by dense smooth brome with a few small trees and wetlands associated with a small ditch that runs north of and parallel to the transect. Three species were detected. Small wetlands associated with the ditch provided nesting structure for Red-winged Blackbirds, the dominant species observed. No species were detected in the areas with smooth brome and Eurasian Collared Doves and House Finches (*Carpodacus mexicanus*) were detected at one residence to the south of the transect.
- COY02: Coyote Run transect 02 (COY02) runs from north to south and is located on the east side of the Open Space. Houses occur within 70 meters of the east side and the west side is Open Space with no human structures (excluding trails). Smooth brome is still the dominant grass species, but several small swales and low areas contain trees including plains cottonwood, willows, Russian olive, and choke cherry (*Prunus virginianus*). Some of the low areas showed signs of having standing water earlier in the year and Canada thistle (*Cirsium arvense*) was present. The homes to the east provide habitat for the Eurasian Collared Dove, House Finch, and House Wren. Seventeen individuals representing 10 species were detected during the survey, the most of any of the areas surveyed in 2017. The House Wren

and Blue Jay (*Cyanocitta cristata*) both had three detections (please note that the three Blue Jays detected were three fledglings clumped together).

Table 1. Coyote Run Open Space 2017 Avian Survey Results.			
Transect or Point	Species	Number	Activity
Point Count Station	Red-winged Blackbird *Agelaius phoeniceus*	8	Calling and flying short distances within wetland.
	Common Yellowthroat *Geothlypis trichas*	1	Singing while remaining hidden.
	Barn Swallow *Hirundo rustica*	1	Foraging over the point count station.
	Mourning Dove *Zenaida macroura*	1	Calling from large cottonwood tree.
	Broad-tailed Hummingbird *Selasphorus platycercus*	1	Foraging on willow and other blossoms.
	House Wren *Troglodytes aedon*	1	Singing from nearby house.
	Eurasian Collared Dove *Streptopelia decaocto*	1	Singing from nearby house.
COY01	Red-winged Blackbird *Agelaius phoeniceus*	4	Singing or flying within areas along the ditch.
	Eurasian Collared Dove *Streptopelia decaocto*	1	Calling from rooftop of house to the south of the transect.
	House Finch *Carpodacus mexicanus*	1	Singing from top of tree in yard to the south of the transect.
COY02	Red-winged Blackbird *Agelaius phoeniceus*	2	Flying over the transect.
	Eurasian Collared Dove *Streptopelia decaocto*	2	Calling from rooftops of nearby houses.
	House Finch *Carpodacus mexicanus*	2	Singing from a tree in a nearby yard.
	Mourning Dove *Zenaida macroura*	2	Calling from within large cottonwood tree west of the transect and perched on choke cherry.
	Broad-tailed Hummingbird *Selasphorus platycercus*	1	Foraging and resting on choke cherry tree.
	American Goldfinch *Spinus tristis*	1	Flying north along the transect.
	House Wren *Troglodytes aedon*	2	Calling/singing from willow tree and choke cherry tree.
	Barn Swallow *Hirundo rustica*	1	Foraging over transect.

Table 1. Coyote Run Open Space 2017 Avian Survey Results.			
Transect or Point	Species	Number	Activity
	Cliff Swallow *Petrochelidon pyrrhonota*	1	Foraging over transect.
	Blue Jay *Cyanocitta cristata*	3	Three fledglings jumping/flying from limb to limb in large cottonwood tree.

4.2. Daughenbaugh Open Space

Daughenbaugh was surveyed on the morning of June 20, 2017. Table 2 provides the transect name, species, number, and activity when detected.

- DAU01: Daughenbaugh transect 01 (DAU01) runs from east to west and is located on the south side of the Open Space. Because of the diversity of plants and structural height most of the detections occurred on the east end of the transect. Prior to the start of the survey a male Blue Grosbeak (Passerina caerulea) was observed foraging on one of last year's common mullein seed heads. Seven species (the second highest species count for the three Open Space properties surveyed) were detected: the dominant species detected was the Cliff Swallow as it foraged near the Goodhue Ditch.

- DAU02**:** Daughenbaugh transect 02 (DAU02) runs from the southwest to the northeast and is located on the north end of the Open Space. Because the habitat along the transect is limited by the active prairie dog colony the dominant plant species is field bindweed. Little suitable nesting habitat is found along the transect. At the northwest end the prairie dogs are not as active and there is more diversity, and more avian activity. Of the four species detected, the Vesper Sparrow (*Pooecetes gramineus*) was the dominant species detected with all detections occurring near the northwest end of the transect. Other Vesper Sparrows could be heard on the private property to the east.

Table 2. Daughenbaugh Open Space 2017 Avian Survey Results.			
Transect or Point	Species	Number	Activity
DAU01	Barn Swallow *Hirundo rustica*	1	Foraging over the transect near the Goodhue Ditch.
	House Finch *Carpodacus mexicanus*	2	Singing from top of tree to the south of the transect.
	Northern Flicker *Colaptes auratus*	1	Flying over the transect from south to north.
	Blue Grosbeak *Passerina caerulea*	1	Flushed from near transect.
	Savannah Sparrow *Passerculus sandwichensis*	1	Flushed from near transect.
	Cliff Swallow *Petrochelidon pyrrhonota*	5	Foraging over the transect near the Goodhue Ditch.
	Common Grackle *Quiscalus quiscula*	3	Flew from west to east along the transect.

Table 2. Daughenbaugh Open Space 2017 Avian Survey Results.			
Transect or Point	Species	Number	Activity
DAU02	American Goldfinch *Spinus tristis*	1	Flying north over the transect.
	American Robin *Turdus migratorius*	1	Flying north over the transect.
	European Starling *Sturnus vulgaris*	1	Flew from north to south over the transect.
	Vesper Sparrow *Pooecetes gramineus*	3	All were singing and calling along the transect.

4.3. Warembourg

Warembourg was surveyed on the morning of June 20, 2017. Table 3 provides the transect name, species, number, and activity when detected. This Open Space is dominated by dense smooth brome and had the least detections of any of the Open Space properties surveyed.

- WAR01: Warembourg transect 01 (WAR01) runs from west to east and is located on the north side of the Open Space. There is almost no diversity along this transect and all surrounding areas are dominated by dense smooth brome. If not for the presence of a small pond north of the transect, there would have been no detections. All detections were near the pond. The dominant species was the Mallard Duck *(Anas platyrhynchos*) which was seen at the pond. One native grassland species, the Western Meadowlark (*Sturnella neglecta*), was seen on this transect.

- WAR02**:** Warembourg transect 02 (WAR02) runs from north to south and is located on the east side of the Open Space. There is almost no diversity along this transect and all surrounding areas are dominated by dense smooth brome. The houses to the east of the transect provide habitat for habitat generalists and the Russian olive trees surrounding the fishing pond to the west provide limited habitat. One native grassland species, the Western Meadowlark (*Sturnella neglecta*), was seen on this transect.

Table 3. Warembourg Open Space 2017 Avian Survey Results.			
Transect or Point	Species	Number	Activity
WAR01	Western Meadowlark *Sturnella neglecta*	1	Flew from the south side of the transect off of the transect.
	Mallard Duck *Anas platyrhynchos*	3	Flew off the pond north of the transect and east out of line of site.
	Red-winged Blackbird *Agelaius phoeniceus*	1	Flying around pond.
WAR02	Red-winged Blackbird *Agelaius phoeniceus*	1	Flying from trees west of transect to the east.
	House Wren *Troglodytes aedon*	1	Calling/singing from tree next to house to the east.
	Mourning Dove	1	Calling from roof of house to the

Table 3. Warembourg Open Space 2017 Avian Survey Results.			
Transect or Point	Species	Number	Activity
	Zenaida macroura		east.
	Western Meadowlark *Sturnella neglecta*	1	Flew from the west side of the transect to the west beyond 150 meters.

5. Conclusions & Recommendations

Sixty-three individuals representing twenty avian species (all Open Space properties combined) were detected at three Open Space properties surveyed in 2017. In areas where there was greater plant diversity (in composition and structure) more detections occurred. In general, none of the surveyed areas had much avian diversity. The Red-winged Blackbird was the dominant species observed and its presence is maintained by the ponds and wetland features found on or near the Open Space properties. It is recommended that surveys be conducted in mid-May to mid-June in future years when breeding activity is higher.

The dense stands of smooth brome are likely limiting the functionality of these areas for avian nesting and foraging. Smooth brome (a non-native introduced species that is aggressive and can be invasive) is good for soil stabilization, aesthetics, can be used for livestock grazing/haying, and does will along the Front Range. For these reasons it is a commonly seeded species. Smooth brome however has a tendency to grow into very thick mats, too thick to nest in and too thick for young chicks to move around. Grazing or mechanical break-up of these areas could help to break down and lessen the thick mat – opening it up for other ground nesting species including Savannah and Vesper Sparrows and Western Meadowlarks.

Detections at the three properties were too low to conduct a Shannon-Weaver diversity index number to measure the order (or disorder) within a community. The Shannon-Weaver diversity index number measures the order (or disorder) within a community. The diversity index combines two quantifiable measures: the species richness (number of species within the community) and species equitability (a measure of how similar the abundances of different species are). A diversity index value near zero would indicate that a community is not diverse in its species composition; a higher value would indicate greater diversity. For each of the three Open Space properties the value would be near zero, based on the small number of species and individuals observed.

The three Open Space areas are important islands for those species which use them. While moving between transects other species were either seen or heard, the complete avian species list is provided in Appendix B. Several times during the survey voles (*Microtus* sps.) were seen moving through the grass/brush at all properties. Coyote Run Open Space had the most wildlife observations. A very large and mature mule deer (*Odocoileus hemionus*) buck was observed slinking into the pond/wetland from the west and one large bull snake (*Pituophis catenifer sayi*) was seen between the point count station and transect COY01. Coyotes (*Canis latrans*) were very vocal before sunrise on the morning of the 22nd.

6. Photos

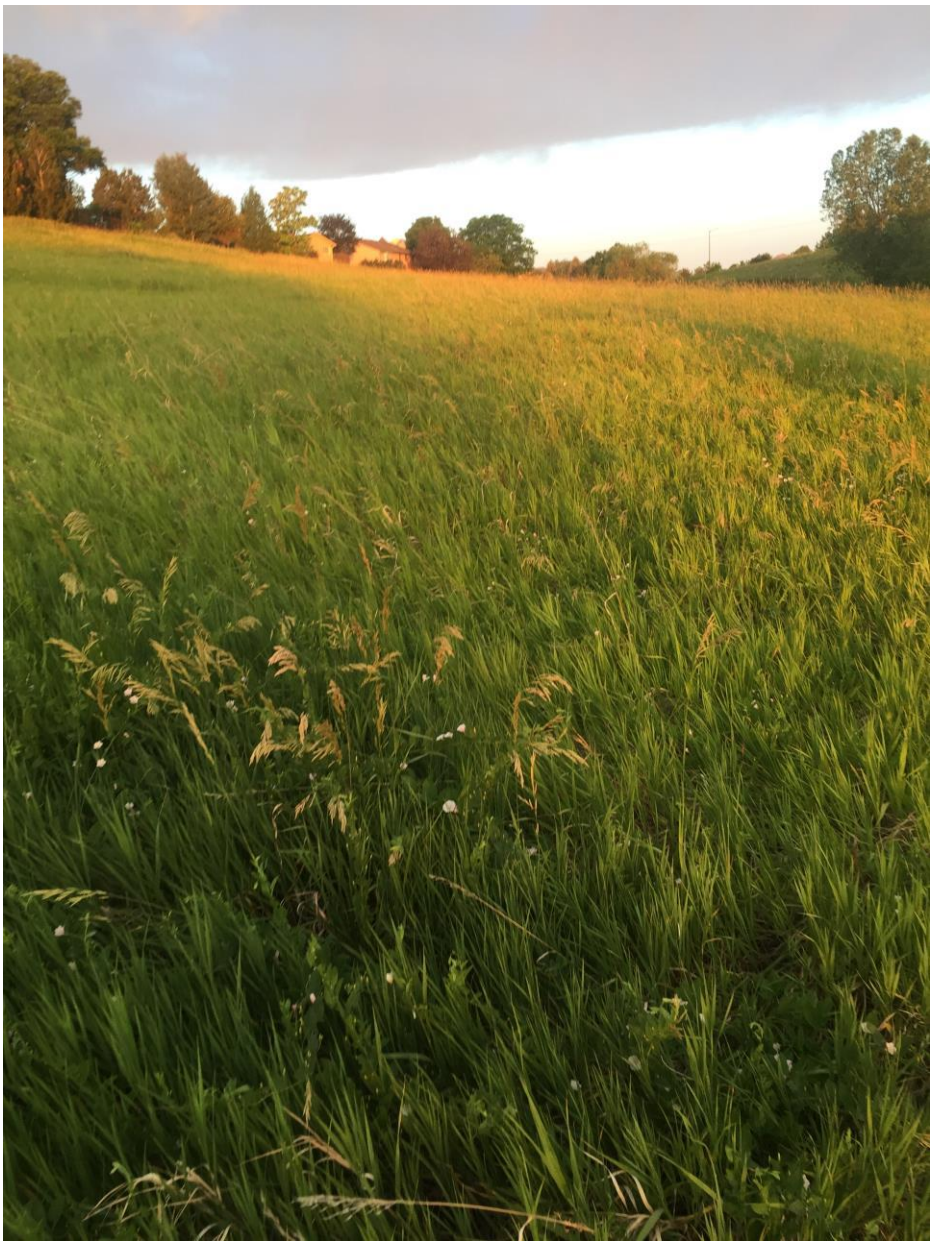

Photo 1. Looking west along COY01

Photo 2. Looking north along transect COY02.

Photo 3. Looking west along transect DAU01.

7. References

Baker, B. W., Augustine, D. J., Sedgwick, J. A., and B. C. Lubow. 2013. Ecosystem engineering varies spatially: a test of the vegetation modification paradigm for prairie dogs. Ecography 36(2):230–239.

Bibby, C.J., N.D. Burgess, D. A. Hill, and S.H. Mustoe. 2000. Bird census techniques. Second edition. Academic Press. Boston, MA. 302 pp.

Boonstra, R., C. J. Krebs, and N. C. Stenseth. 1998. Population cycles in small mammals: The problem of explaining the low phase. Ecology 79(5):1479-1488.

Buckland, S.T., D. R. Anderson, K.P Burnham, J.L. Laake, D.L Borchers, and L. Thomas. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, Inc, New York, NY.

Buskirk, W. and J.L. McDonald. 1995. Comparison of point count sampling regimes for monitoring forest birds. In Ralph, C.J., J.R. Sauer and S. Droege. Tech. eds. Monitoring bird populations by point counts. Gen. Tech. Rep. PSW-GTR-149. Albany CA Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture: 187 pp.

Cully, J. F., Collinge, S. K., VanNimwegen, R. E., Ray, C., Johnson, W. C., Thiagarajan, B., Conlin, D. B., and B. E. Holmes. 2010. Spatial variation in keystone effects: small mammal diversity associated with black-tailed prairie dog colonies. Ecography 33(4):667–677.

Marsden, S. J. 1999. Estimation of parrot and hornbill densities using a point count distanc sampling method. Ibis Vol. 141 No.3:327-390.

Oftedahl, L. O. 1976. Small mammal habitat modification in Northeastern Colorado. Technical Report No. 301. Grassland Biome, U.S. Internation Biological Program.

Pruett, A. L., Boal, C. W., Wallace, M. C., Whitlaw, H. A., J. D. Ray. 2010. Small Mammals Associated with Colonies of Black-Tailed Prairie Dogs (Cynomys ludovicianus) in the Southern High Plains. The Southwestern Naturalist 55(1):50-56.

Rosenstock, S.S., Anderson, D.R., Giesen, K.M., Leukering, T., and M. F. Carter. 2002. Landbird counting techniques: current practives and an alternative. The Auk 119(1):46-53.

Schramm, P., D.B. Dunn, and L. Nachowicz. 1990. The drought and post-drought abundance and habitat distribution of small mammal species in burned and unburned restored tallgrass prairie. Proceedings of the Twelfth North American Prairie Conference. Pp. 55-60.

Sogge, M.K, R.M. Marshall, S.J. Sferra, and T.J. Tibbitts. 1997. A southwestern willow flycatcher natural history summary and survey protocol. Technical Report NPS/NAUCPRS/NRTR-97/12. National Park Service Cooperative Studies Unit, U.S. Geological Survey, Colorado Plateau Field Station, Northern Arizona university, Flagstaff Arizona.

Appendix A
Data Sheets

2017 City of Louisville Avian Survey Data Sheet

How: V= visual; S = singing; C = calling; D = Drumming; O = other aural detection.

Between Points, point # = 88 Sex: M = male, F = female; U = unknown; J = juvenile

If found, please return to: PO BOX 1231 Lyons CO 80540

Start Time	Transect # Point Count @ Wetland	Species	Radial Distance	How	Visual?	Sex	Migrating?	Cluster Size	Cluster Code
0527	Point Count	RWBL	32		Y			1	
		RWBL	49		Y			1	
		RWBL	53		Y			1	
		COYE	70		M			1	
		RWBL	25		Y			2	
		BASW	—	Flying	N			1	
		MODO	106						
		RWBL	30					3	
		BHLH	—	Flying				1	
		HOWR	120					1	
		EUCD	140		Y			1	
	0537								
0546	Co#1	RWBL	—	Flyn				1	
		EUCD	70					1	
		HOFI	70					1	
		RWBL	10					1	
		RWBL	10					1	
		RWBL	5					1	
0553									
0607	Co#2	RWBL	—	Flying				1	
		HOFI	40					2	
		MODO	10					1	
		HOWR	65					1	
		RWBL	—	Flying					
		EUCD	70					1	
		BTLH	10					1	
		AMGO	—	Flying				1	
		EUCD	—	Flying				1	
		MODO	15					1	
		HOWR	40					1	

Start Time	Transect #	Species	Radial Distance	HOW	Visual?	Sex	Migrating?	Cluster Size	Cluster Code
		BASW	—	Flying				1	
		HOWR	10					1	
		CLSW	—	Flyn				1	
	0620	BLJA	15					3	

Observer: J. Powell Date: 6/22/17 Project: City of Louisville Open Space Avian Surveys. Coyote Run Open Space

Notes: Coyote Run OPen Space
Pair of Red tails @ wetland upon arrival / @ Point count location. Wetland in seen of smooth brome - cattails, rushes, sedge and salix. Some Cottonwoods. RWBL dominant species HOWR and EUCD associated with homes to the north.
Transect CO#02 most diverse hab. - salix, brome, chokecherry, cottonwoods

When form is completed, photograph the form and send the image as a text message to 303-710-1286. Give original form to on-site Project Manager.

Weather: forecast high T° of 85°F T°@Start = 80°F No wind @ 0556 wind @ level 1-2

2017 City of Louisville Avian Survey Data Sheet

How: V= visual; S = singing; C = calling; D = Drumming; O = other aural detection.

Between Points, point # = 88 **Sex: M = male, F = female; U = unknown; J = juvenile**

If found, please return to: PO BOX 1231 Lyons CO 80540

Start Time	Transect #	Species	Radial Distance	How	Visual?	Sex	Migrating?	Cluster Size	Cluster Code
0534	DAU01	HOFE	55		X	M		2	
		BASW	60	Flying over				1	
		NOFL	55		X	M		1	
	Note #1	BLGR	40		X	F		1	
		SAVS	25		X	U		1	
		CLSW	—	Flying				5	
		COGR	—	Flying over				3	
0546	End								
0551	DAU02	AMGO	—	Flying over				1	
		AMRO	—	Flying over				1	
		VESP	30		X	M		1	
		VESP	70		X	M		1	
		EUST	—	Flying				1	
		VESP	10		X	M		1	
0600									
0608	War01	WEME	70		X	M		1	
		MADU	75		X	M/F		3	
		RWBL	70		X	M		1	
0615									
0620	War02	RWBL	—	Flying				1	
		HOWR	65		X	M		1	
		MODO	75		X	U		1	
		WEME	100						
0627									

Start Time	Transect #	Species	Radial Distance	HOW	Visual?	Sex	Migrating?	Cluster Size	Cluster Code

Observer: J. Powell Date: 6/20/2017 Project:

Notes: Note #1: Adult @ BLGR seen near transect before start of transect

DAU: Very active BTPD colony, more diverse habitat w/ trees, grasses, mullein on east end of DAU01 - more avian diversity. Most of DAU is covered w/ smooth brome and field bindweed.

WAR: Almost a 100% monoculture of Smooth Brome - very little avian activity

When form is completed, photograph the form and send the image as a text message to 303-710-1286. Give original form to on-site Project Manager.

Perfect weather: Aprox 60°F @ start (@0530) and about 62-3°F @ end. few high clouds, no wind, Quiet morning, unlimited visibility

Appendix B
Species List

Mallard Duck *Anas platyrhynchos*
Red-tailed Hawk *Buteo jamaicensis*
Mourning Dove *Zenaida macroura*
Eurasian Collared Dove *Streptopelia decaocto*
Broad-tailed Hummingbird *Selasphorus platycercus*
Northern Flicker *Colaptes auratus*
Say's Phoebe *Sayornis saya*
Blue Jay *Cyanocitta cristata*
Cliff Swallow *Petrochelidon pyrrhonota*
Barn Swallow *Hirundo rustica*
House Wren *Troglodytes aedon*
American Robin *Turdus migratorius*
Common Yellowthroat *Geothlypis trichas*
Blue Grosbeak *Passerina caerulea*
Savannah Sparrow *Passerculus sandwichensis*
Vesper Sparrow *Pooecetes gramineus*
Song Sparrow *Melospiza melodia*
Red-winged Blackbird *Agelaius phoeniceus*
Western Meadowlark *Sturnella neglecta*
Common Grackle *Quiscalus quiscula*
House Finch *Carpodacus mexicanus*
American Goldfinch *Spinus tristis*
European Starling *Sturnus vulgaris*