DRAFT RESULTS OF A 2004 GOLDEN-CHEEKED WARBLER TERRITORIAL SURVEY ON THE LOWER COLORADO RIVER AUTHORITY McGREGOR PRESERVE, TRAVIS COUNTY, TEXAS

Submitted to

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1.0 INTRODUCTION

SWCA® Environmental Consultants (SWCA) was contracted by the Lower Colorado River Authority (LCRA) to conduct a survey for the federally endangered golden-cheeked warbler (*Dendroica chrysoparia*) on its approximately 548-acre McGregor Preserve property. The McGregor Preserve is located on the northeast side of Lake Travis approximately 2 miles northwest of the intersection of R.R. 620 and R.M. 2222 in western Travis County, Texas (Fig. 1).

The preserve is bounded by Hippie Hollow Park to the south, with these two properties separated by a public road, Comanche Trail. Low to moderate density residential development is present to the east and west of the southern portion of McGregor Preserve. Farther north, the Cypress Creek Arm of Lake Travis and small tracts of undeveloped woodland lie adjacent to the west side of the preserve. Undeveloped woodland is also present to the north of McGregor Preserve and to the east along the northern portion of the property. Woodland to the east of the preserve is owned by the City of Austin (the "Lake Perspectives" property) and managed for the benefit of the golden-cheeked warbler.

The McGregor Preserve was surveyed for golden-cheeked warblers by LCRA personnel in 1992, 1993, and 1994, and was surveyed again in 2001 by a team formed of Blanton & Associates, Inc. and Turner Collie & Braden, Inc. (BAI/TCB). Level of survey effort expended by LCRA varied greatly between 1992 and 1994, with 38 person-hours spent on the property in 1992, 136 person-hours spent in 1993, and 76 person-hours spent in 1994 (LCRA 1995). The 2001 BAI/TCB survey was performed with a level of effort intended to allow accurate estimation of warbler numbers and delineation of warbler territorial boundaries; BAI/TCB surveyors spent a total of 102.75 hours on McGregor Preserve (BAI/TCB 2001). Number of warbler territories estimated to be present on McGregor Preserve, either in their entirety or in part, as a result of these surveys is presented in Table 1.

Table 1. Summary of Results of Past Golden-cheeked Warbler Surveys Performed on the McGregor Preserve.

Surveyor	Year	Survey Time (Person-Hours)	Estimated Number of Warbler Territories
LCRA	1992	38.00	14
LCRA	1993	136.00	18
LCRA	1994	76.00	22
BAI/TCB	2001	102.75	29

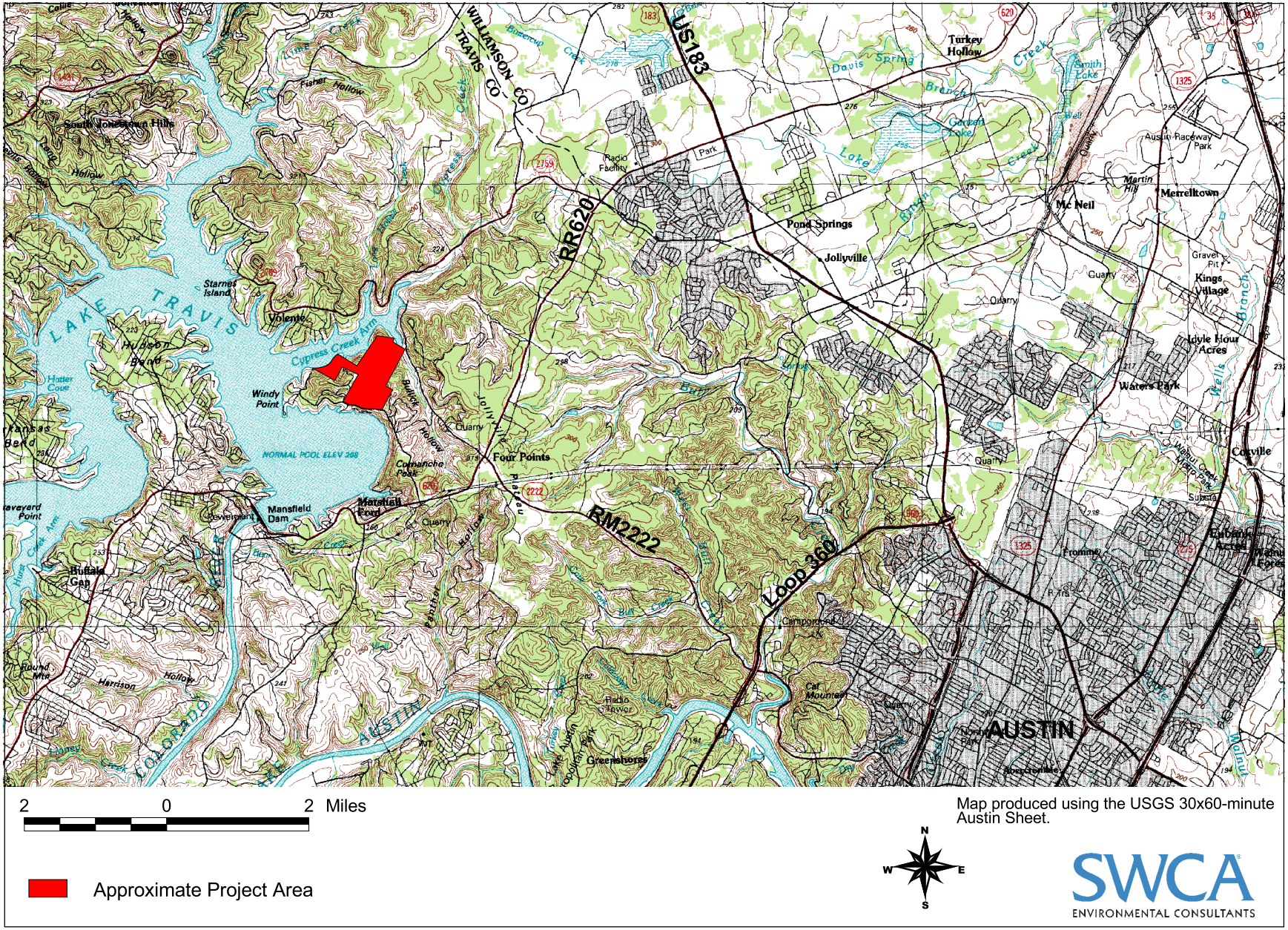


Figure 1. Project Location Map for the McGregor Preserve.

As can be seen in Table 1, number of warbler territories estimated present on McGregor Preserve does not correlate directly with survey effort. At some level, numbers of warblers and level of survey effort do correlate, especially on relatively large properties, because it requires more than a minimal amount of time to survey all areas where birds could occur. However, because warblers sing and, therefore, render themselves easy to find, all warblers present in an area are usually found readily and increased amounts of survey time cannot result in discovery of additional birds, barring any that may move into an area during the survey period. Also, golden-cheeked warbler numbers fluctuate naturally from year to year. Thus, the situation exists where 20 hours of survey time could result in estimation of 10 warbler territories present on a property in one year, while 120 hours of survey time the next year could result in estimation of 7 warbler territories because these were the actual numbers of birds present on the property in those two years.

Similar to the 2001 survey, SWCA was also contracted to survey McGregor Preserve in 2004 with a level of effort intended to allow accurate estimation of warbler numbers and delineation of warbler territorial boundaries. Survey methods and level of effort are described in Section 3.0 of this report, which follows a general description of the property in Section 2.0. Results of the 2004 survey are provided in Section 4.0 and discussed in Section 5.0.

2.0 PROPERTY DESCRIPTION

The McGregor Preserve lies near the eastern edge of the Edwards Plateau within a region referred to as the "Balcones Canyonlands." These canyonlands are the result of accelerated rates of erosion along the margin of the Edwards Plateau, which is raised relative to lands lying to the east. Topography of McGregor Preserve is hilly and characterized by moderate to relatively steep hillsides, along with a few reasonably flat hill and ridge tops, incised by ephemeral, steep-sided ravines and drainages. A broad canyon drains to the northwest from near the southeast corner of the property to the Cypress Creek Arm of Lake Travis on the northwest side of the preserve.

The Glen Rose Formation, a lower Cretaceous deposit of interlayered beds of limestone, marl, and dolomite, underlies the majority of the McGregor Preserve. The highest elevations on the property are underlain by the Edwards Formation. The Edwards Formation consists of mostly porous and permeable layers of limestone and dolomite. These two formations are separated by the Walnut Formation, a relatively thin layer of marly limestone that crops out on some slopes and on some ridgetops (Garner and Young 1976).

Soils on the property are thin to very thin on slopes and on hill and ridge tops, but may have moderate depths in canyon and drainage bottoms. Nearly all of the McGregor Preserve is covered by soils classified as the "Brackett soils and Rock outcrop, steep" series (Soil Conservation Service 1974). This soil typically consists of shallow, gravelly clay loam formed over limestone that on average contains approximately 21 percent rock outcrop at the surface. The floor of one relatively large drainage that passes through the northeast corner of the property is covered by Volente series soils. The Volente series typically consists of deep, well-drained, dark clay loams developed in slope alluvium.

Vegetation on the McGregor Preserve consists primarily of semi-open to relatively dense woodland dominated by Ashe juniper (*Juniperus ashei*) and live oak (*Quercus virginiana*) trees. Deciduous trees, primarily Texas oak (*Quercus buckleyi*), but also cedar elm (*Ulmus crassifolia*) and escarpment black cherry (*Prunus serotina* var. *eximia*), occur along drainage channels in relatively low densities. However, these trees are relatively common on the margins of higher elevation ridges and hills at and immediately below the exposed contact between the Edwards and Walnut Formations.

3.0 SURVEY METHODS

SWCA biologists conducted territorial surveys for the golden-cheeked warbler on McGregor Preserve on 23 and 26 March, 1, 7, 14, 22, and 27 April, and 5, 6, 10, 13, and 15 May 2004. Two SWCA biologists were present on all survey visits except on 5, 13, and 15 May, when one biologist visited the property each day. A total of 120 hours and 26 minutes was spent conducting the survey, with surveys generally conducted between 0530 and 1230 Central Standard Time. A summary of survey time spent on the property is provided in Table 2.

Table 2. Summary of Survey Dates and Time Spent Surveying on the McGregor Preserve in 2004.

Survey Date	Start Time	End Time	Number of Surveyors	Total Survey Time (min.)
23 March	0610	1210	2	720
26 March	0610	1227	2	754
1 April	0605; 0615	1215;1210	2	725
7 April	0610; 0612	1200	2	698
14 April	0600; 0613	1200	2	702
22 April	0550	1155	2	730
27 April	0801	1102	2	362
5 May	0545	1200	1	375
6 May	0534	1134	2	720
10 May	0558	1158	2	720
13 May	0600	1200	1	360
15 May	0600	1200	1	360
Total (min.)				7,226
Total (hours)				120.43

Surveys were conducted primarily by walking through areas and listening for golden-cheeked warbler vocalizations. Once found, location of the bird was mapped in the field on 1" = 200' aerial photographs and, if the bird was reasonably close to the surveyor, its location was also recorded using a Garmin Etrex Global Positioning System (GPS) device. No tape-recorded calls of warblers or screech-owls were used to elicit responses. Warblers located during surveys were usually

followed passively for periods of time, sometimes for up to an hour, in an attempt to better determine the extent of their territories. In addition to individual surveys, coordinated surveys using two observers were used in some areas in an effort to better determine numbers of warblers present in those areas. By stationing people with synchronized watches in adjacent areas, it was possible to compare times that warblers were heard singing and, sometimes, prove presence or further suggest absence of multiple birds.

Notes were taken during field surveys that recorded warbler observations and movements, general vegetation descriptions, weather conditions, and other species of birds observed on the property. Photocopies of SWCA field notes are provided as an appendix to this report.

4.0 SURVEY RESULTS

Based on the distribution of warbler observations, results of coordinated survey efforts, and observation of contemporaneous vocalizations (or sometimes lack thereof), it was estimated that all or portions of 13 to 14 golden-cheeked warbler territories were present on the McGregor Preserve in 2004. Distribution of these territories is depicted on Fig. 2 (map pocket), with locations of warbler observations only depicted at smaller scale on Fig. 3. On Fig. 2, each territory is labeled for later discussion purposes. Of these 13 to 14 territories, 10 to 11 were contained wholly or mostly on the McGregor Preserve, while 3 were believed to mostly lie off-site to the east on the Lake Perspectives property.

Territory boundaries as depicted with green lines on Fig. 2 should only be considered approximate because for the most part they were drawn based on limits of bird movements and not direct observation of territorial defense. In most cases, warblers occurred at distance from other birds so few birds had cause to actively defend their territories beyond singing from within their home ranges. As a result, few observations of physical interactions between males were made, with locations of these conflicts depicted on Fig. 2. One such conflict was observed in the northeast portion of the property, with location of this conflict somewhat puzzling because a warbler was not observed consistently to one side of the area of conflict.

Two of the territories depicted on the south end of the property (Territories “L” and “M”) are shown as overlapping. Warblers always defend discrete territories, and the overlapping shown on Fig. 2 is the graphical representation of what we believed to be a shift in condition during the survey period. On 7, 14, and 22 April, one warbler was detected singing on Hippie Hollow Park and one warbler was regularly detected singing at the top of the large hill immediately to the north on the McGregor Preserve. Both birds could be heard singing from Comanche Trail or from the top of the hill. These areas were next visited on 5 May; however, at that time no bird was detected on Hippie Hollow, but two warblers were observed and heard singing contemporaneously on the McGregor Preserve hilltop. Similar results were obtained in this area on 10, 13, and 15 May. This, it appeared to SWCA that the warbler previously detected on Hippie Hollow Park had abandoned that area and moved up to the hilltop on the south end of McGregor Preserve, forcing the second bird to withdraw slightly to the north.



300 0 300 600 Feet

Approximate Property Boundary

Golden-cheeked Warbler Observation

Less Precisely Located Golden-cheeked Warbler Observation

Female Golden-cheeked Warbler Observation

Two Male Golden-cheeked Warblers in Territorial Confrontation

Solid Lines Connect Sequential Observations.
Dashed Lines Connect Contemporaneous Vocalizations. Observations Believed To Represent The Same Individual Are Enclosed. Large Dashed Lines Across Enclosures Represent Uncertainty as To Whether Observations Represent One or Two Birds. Enclosures Approximate Territorial Boundaries.

Map produced using the USGS 2-foot Jollyville and Mansfield Dam DOQs (2002).

FIGURE 2

Results of the 2004 Golden-cheeked Warbler Survey on the McGregor Preserve

N W E S

SWCA ENVIRONMENTAL CONSULTANTS

CAM 09/22/2004
Job # 7814-062

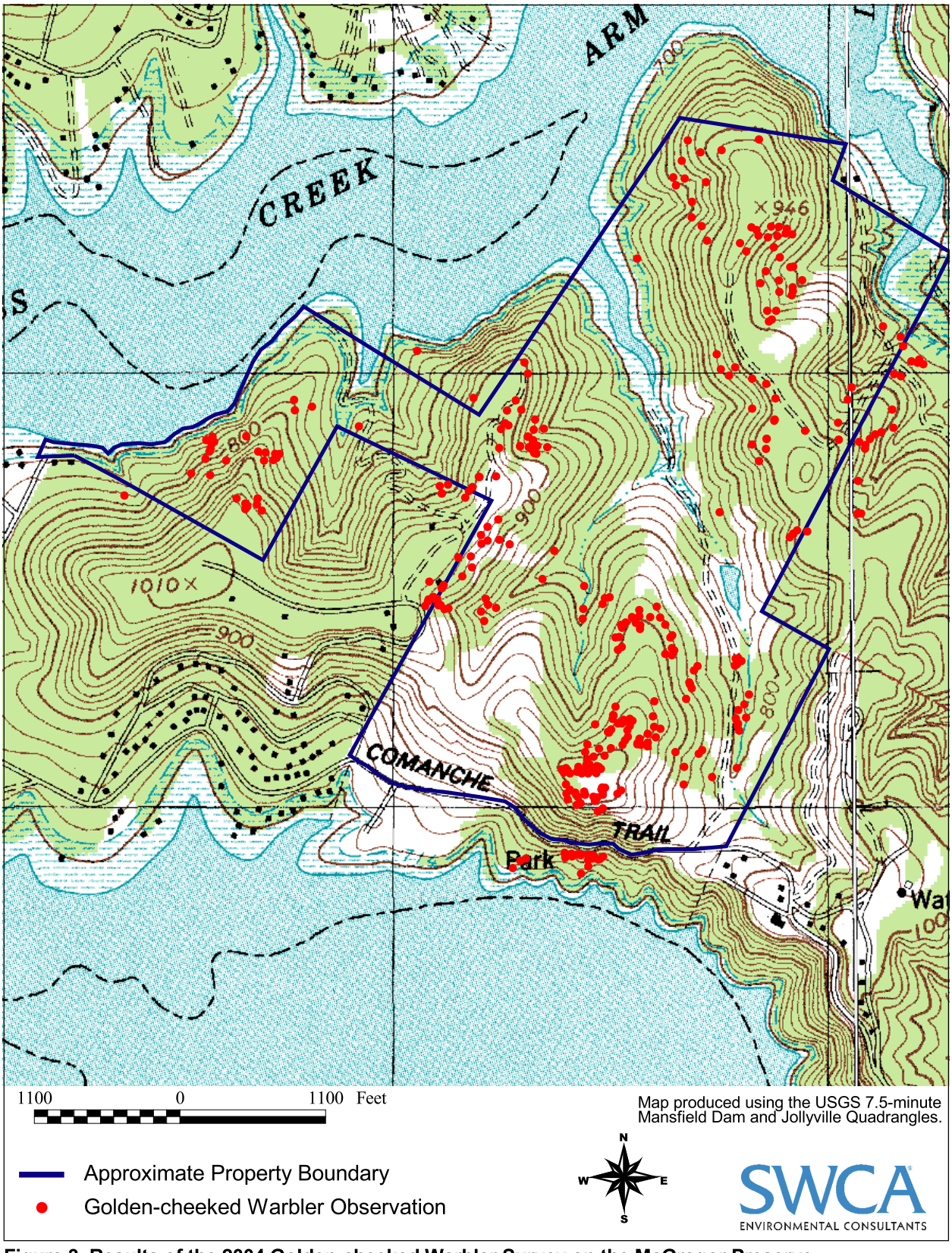


Figure 3. Results of the 2004 Golden-cheeked Warbler Survey on the McGregor Preserve.

An estimated 3 female golden-cheeked warblers were observed on McGregor Preserve in 2004, although it is believed highly probable that more female warblers were present on the property. Locations of observations of female warblers are depicted on Fig. 2. No fledgling warblers were observed on the property, but this is considered the result of poor luck on the part of the surveyors and, possibly, the rugged topography, and not an indication that warblers did not breed successfully in 2004. On 7 April, a pair of warblers present on the north side of a tall hilltop on the south side of the property was observed to exhibit behaviors that suggested they were close to their nest.

5.0 DISCUSSION

The 13 to 14 warbler territories estimated present on the McGregor Preserve in 2004 is less than half the number of territories estimated present in 2001 by BAI/TCB, although it is similar to the number estimated present in 1992 by LCRA, 4 to 5 less than the number estimated present in 1993, and 8 to 9 less than the number estimated present in 1994. In general, comparisons between the results of the 2004 survey and those performed by LCRA in the early 1990s will not be discussed in this report because of the amount of time that has passed since the earlier surveys were conducted. However, it is not surprising to SWCA that the greatest number of birds found on the preserve over those three years was in 1994. SWCA surveyed several large properties in western Travis County for many consecutive years in the early and mid 1990s, and the local warbler population appeared to peak especially high in 1994. This most likely was the result of exceptionally good breeding success in 1993.

As mentioned, territorial boundaries depicted on Fig. 2 should not be considered exact because, in most cases, warblers occurred at distance from other birds and very few direct territorial conflicts were observed. Observing two male warblers engaged in territorial defense behavior is the only way it is possible to confirm the limits of a particular bird's territory. When a golden-cheeked warbler occurs in an area where its movements are not constrained by adjacent warblers, it cannot be known exactly what area that bird would defend if the situation required it, nor can it be known whether or not the bird was observed moving outside of the area it would have defended. Thus, some observations depicted as within territorial boundaries on Fig. 2 may actually represent extra-territorial movements.

The bird within Territory D appeared to split its time between woodlands on either side of developed ridge. This bird sang well into May, suggesting to us that it was still actively trying to attract a mate. This bird also was regularly observed in trees directly adjacent to houses present along the west edge of the property.

It was not resolved satisfactorily whether observations made within the area labeled Territory E on the north end of the property represented 1 or 2 warblers. No contemporaneous vocalizations were heard in this area and coordinated surveys in the area failed to prove presence of 2 birds, which suggests that only one bird was present. However, because the observations within Territory E occurred on either side of a relatively broad hilltop and a warbler was never observed crossing the hill, it was decided it would be most accurate to depict this area as containing 1 to 2 territories.

Several sets of warbler observations were left outside of mapped territories on Fig. 2. In most cases, these observations were believed to represent birds that were holding territories on the property but happened to be encountered while traveling outside of those territories. Examples of such observations include sightings of male and female warblers in a drainage in the southeast corner of the property. A road parallels this drainage close by to the west. This road was walked by SWCA surveyors virtually every time the property was visited, and usually more than once per day. Compared to the number of times this road was walked, the number of warbler observations made in the drainage was extremely low. The infrequency with which warblers were detected in this drainage made us believe that no warblers were actually holding a territory in the area. Rather, it was considered more likely that warblers were traveling down to this drainage for water from the ridge above it to the west, where warblers were consistently detected on all survey visits in Territories K and L.

Another few warbler observations were left unenclosed on the far west side of the property in the vicinity of Territory A. After the first visit to this area it was believed that 2 warblers were holding territories in this portion of the property because a bird was observed to be singing consistently on the slope facing the lake in this area and when the observer stopped monitoring this bird to cross the ridge top to the south, he immediately encountered a warbler singing on the opposite side. His attempts to hear two birds singing while he was positioned on the ridge top were unsuccessful, and subsequent visits to the area failed to result in any more observations of warblers in the location where these unenclosed observations are depicted on the survey results map to the southeast of Territory A. It is most likely that only one bird was present in this area and it simply happened to cross the ridge top at the same time as the surveyor did on the first visit to the area. However, it is also possible that 2 birds were present in this area, with the second bird either having abandoned the area or happening to be off-site to the east during our subsequent visits to that portion of the property. The latter possibility seems least likely because woodland occurring off the property to the south is within earshot of the McGregor property boundaries and it was believed that had a bird been present in this area it would have been detected during the course of the McGregor survey. Nonetheless, because of the possibility that these observations represented 2 birds, we decided it would be most accurate to leave these observations unenclosed.

The observation left unenclosed to the northeast of Territory A was considered most likely to represent the bird present in Territory A. However, it was also considered possible that this was the bird more regularly detected in Territory D, given that he was believed to be unmated and might be prone to wander outside his territory, or possibly it represented the bird occurring in Territory B or another bird occurring off the property to the south. Again, this last possibility seems least likely because woodland occurring off the property to the south is within earshot of the McGregor property boundaries. Because of these various possibilities, it was considered most prudent to leave this observation unenclosed.

As shown on Fig. 2, the number of birds estimated present on the McGregor Preserve in 2004 is supported in most places by presence of contemporaneous vocalizations. Winds were very light on most survey days, and it was possible for one observer to be situated in the central canyon and hear the bird in Territory C singing at the same time as the bird in Territory G or Territory K. Birds in

Territories C, G, K, and L seemed to sing with exceptional consistency, and provided a strong foundation for estimating numbers of other birds in their proximity.

The bird in Territory D never was heard singing at the same time as birds in Territories K and L, although it was physically possible for one observer to have heard these birds contemporaneously. The bird in Territory D appeared to spend proportionally more time in the northwest part of its territory in the early part of the breeding season when the birds in Territories K and L were singing especially often, and then seemed to spend more time on the east side of its territory later in the season when the birds in Territories K and L did not sing nearly as much. This drop in singing frequency by the birds in Territories K and L suggests that the birds were busy tending to young that were undetected by SWCA.

The great difference in numbers of territories estimated present on the McGregor Preserve in 2004 by SWCA and 2001 by BAI/TCB does not seem able to be explained by a precipitous drop in the local warbler population. Our survey results from other properties in the region over this time period do not suggest such a drop occurred, nor does it seems likely given the size of the property and the degree to which it adjoins off-site warbler habitat on the Lake Perspectives property. We suspect that BAI/TCB may have greatly overestimated the number of birds present on the McGregor Preserve in 2001, although we are unable to offer an alternate interpretation of the 2001 survey data because it was not included in the BAI/TCB report.

However, we believe the 2001 number was likely an overestimate because it does not appear to us that enough "unoccupied" habitat is present on the McGregor Preserve to support another 15 to 16 territories. Some woodland that appeared suitable for use by warblers was not observed to be utilized by the species in 2004. Such woodland occurs immediately west of Territories K and L, in the canyon between Territories F and I, and, possibly, in the canyon bottom between Territories C and G and G and K. While this area may allow for a few more birds to occur on the property, it seems highly implausible that a dozen or more warblers could squeeze themselves into this area.

We recognize that some could contend that we misinterpreted our survey data, and that perhaps a warbler territory was present in the drainage to the east of Territory L and another was present on the slope to the east of Territory A. However, even including these as separate birds and counting the bird in Territory E as two, the total number of birds possibly present on McGregor in 2004 would be 16. Squeezing a few birds into the areas indicated in the paragraph above could raise the theoretical total number of birds on the property up to approximately 20, which is very close to the number estimated present in 1994 by LCRA, a year in which warbler numbers seemed to be abnormally high throughout western Travis County. Based on our experience with golden-cheeked warblers and the density of their occurrence in habitats similar to those present on the McGregor Preserve, it seems extremely unlikely to us that 29 warblers would be able to occur on the property.

Another reason that it appears unlikely to us that 29 warbler territories were present on the McGregor Preserve in 2001 is the very small size of some of the territories mapped by BAI/TCB. A few of the mapped territories are approximately 3 acres in size and the smallest is less than 2 acres. These are far smaller than territories usually defended by the species. In our experience, warbler territories are usually 5 to 15 acres in size, with smaller territories occurring only where habitat is of exceptional

quality. Because woodlands on the McGregor Preserve are mostly xeric and occurrence of deciduous trees is rather restricted, we consider habitat on the property to be of moderate quality and we were not surprised to find warblers defending relatively large territories. It seems extremely unlikely that warblers would occur in areas as small as 2 to 3 acres on the McGregor Preserve.

Unfortunately, because the BAI/TCB report only provides the mapped limits of territory boundaries and does not depict the locations of warbler observations or configuration of contemporaneous vocalizations that led to the mapping of those territories, it is not possible for SWCA to evaluate the BAI/TCB data interpretation. We would not be surprised to find that limits of many of the territories mapped by BAI/TCB were not supported by contemporaneous vocalizations.

6.0 LITERATURE CITED

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APPENDIX A. PHOTOCOPIES OF FIELD DATA SHEETS