

**An Inventory of Bird Species Occurring Within the
San Antonio Missions National Historical Park**

**Final Report
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ABSTRACT

In 2003 the San Antonio Audubon Society entered into a contract with the National Park Service to identify habitat areas and to conduct a bird survey sufficient to detect and record 90% of the bird species occurring on the San Antonio Missions National Historical Park properties in Bexar and Wilson counties, Texas.

Five general habitat types were identified and twenty-five survey points were established and data collected in accordance with the sampling protocols set forth by Pietz et. al. (2002). The sampling was performed by experienced bird watchers donating their labor to the San Antonio Audubon Society.

Data collection began in January of 2004 and has been collected on a bimonthly basis until the present (June 2006). A total of 197 bird species have been detected on the Missions Property to date, 146 of these having been observed during a five minute point count. Specific to the five-minute surveys conducted from survey points, during fifteen separate surveys conducted thus far, 4,785 observations have been recorded of an estimated 12,958 individual birds.

None of the 197 species found are currently on the Federal or State of Texas endangered and threatened species lists. Three species detected, the ringed kingfisher (*Ceryle torquata*), green jay (*Cyanocorax yncas*) and the great kiskadee (*Pitangus sulphuratus*) are listed on the San Antonio Audubon checklist as rare vagrants to this area. Five non-native species were detected on the park properties, these were the rock pigeon (*Columba livia*), Eurasian collared-dove (*Streptopelia chinensis*), monk parakeet (*Myiopsitta monachus*), European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*).

TABLE OF CONTENTS

	<u>PAGE</u>
Abstract	2
Table of Contents	3
Introduction	4
Methods	4
Figure 1: Aerial photograph showing the approximate locations of points 1 and 2 in relation to the park boundaries adjacent to Mission Concepcion inside the City of San Antonio.....	5
Figure 2: The approximate locations of points 3 through 18 in relation to the park boundaries inside the City of San Antonio.	5
Figure 3: Aerial photograph showing the approximate locations of points 19 through 25 in relation to the park boundary, all located on the Rancho de las Cabras property in Wilson County	6
Sampling Protocol	7
Figure 4: Field Data Form	8
Results and Discussion	9
1) Location of Habitat Types and Characteristic Bird Species.....	9
2) Lists of Bird Species Reported.	14
3) Recommendations.	16
Table 1: List of all bird species detected on Missions properties	18
Table 2: List of bird species detected during point counts	24
Table 3: Relative abundance of bird species detected during point counts	28
Table 4: Occurrence of non-native species on park properties detected during point counts	28
References	29
Appendix 1: Protocols for AFBNM bird count	30
Appendix 2: San Antonio Audubon Society Bexar County Checklist	35
Appendix 3: GPS Coordinate, site descriptions and photographs of sampling points	41

Introduction

In accordance with the goals of the National Park Service Inventory and Monitoring Program, the primary purpose of this study was to observe and document the presence of at least 90% of the bird species occurring on the San Antonio Missions National Historical Park properties in San Antonio, Bexar County, Texas and near Floresville, Wilson County, Texas.

Inventory Objectives

- To divide the Park into macrohabitat types and inventory the bird species which occur within each area of the Park.
- To cover all areas within the Park including Parklands near the San Antonio River and acequias, the four Mission sites, and Rancho de las Cabras. Birds were to be identified by sight and call, and their presence recorded utilizing a variable circular plot methodology.
- No Federal or State Endangered, Threatened, Species of Concern, or Rare species were to be collected or harmed.
- To develop a GIS-compatible electronic file indicating the locations of species of management concern.
- To enter all species data into the Park's NPSpecies database and in ANCS+.
- To prepare a final report to the National Park Service with a species list and identification and locations of endangered or threatened species and species of concern on the San Antonio Missions National Historical Park properties.

Methods

This study was conducted from November 2003 and continued to the present (June 2006). The San Antonio Missions National Historical Park (SAAN) consists of two main units, within the City of San Antonio the buildings and grounds associated with Missions San Jose, San Juan, Espada, and Concepcion, and in Wilson County the 99 acre Rancho de las Cabras property.

All areas of the park properties have experienced a long history of human habitat use and alteration resulting in a complex array of habitat types which defy easy categorization. However six general habitat types were recognized, these were: 1) **aquatic/wetland**, 2) **riparian woodland**, 3) **upland woodland** 4) **South Texas brush** 5) **old field/grassland** and 6) **other**. Twenty-five sampling locations were laid out towards the end of covering

the park properties as thoroughly as possible, with the constraint that no sampling point could be located within 250m of another point.

Aerial photos showing the approximate location of the twenty five sampling points may be seen in Figures 1, 2 and 3. Detailed site descriptions for each point are listed in Appendix 3.

Figure 1: Aerial photograph showing the approximate locations of points 1 and 2 in relation to the park boundaries adjacent to Mission Concepcion inside the City of San Antonio.



Figure 2: The approximate locations of points 3 through 18 in relation to the park boundaries, all inside the City of San Antonio.

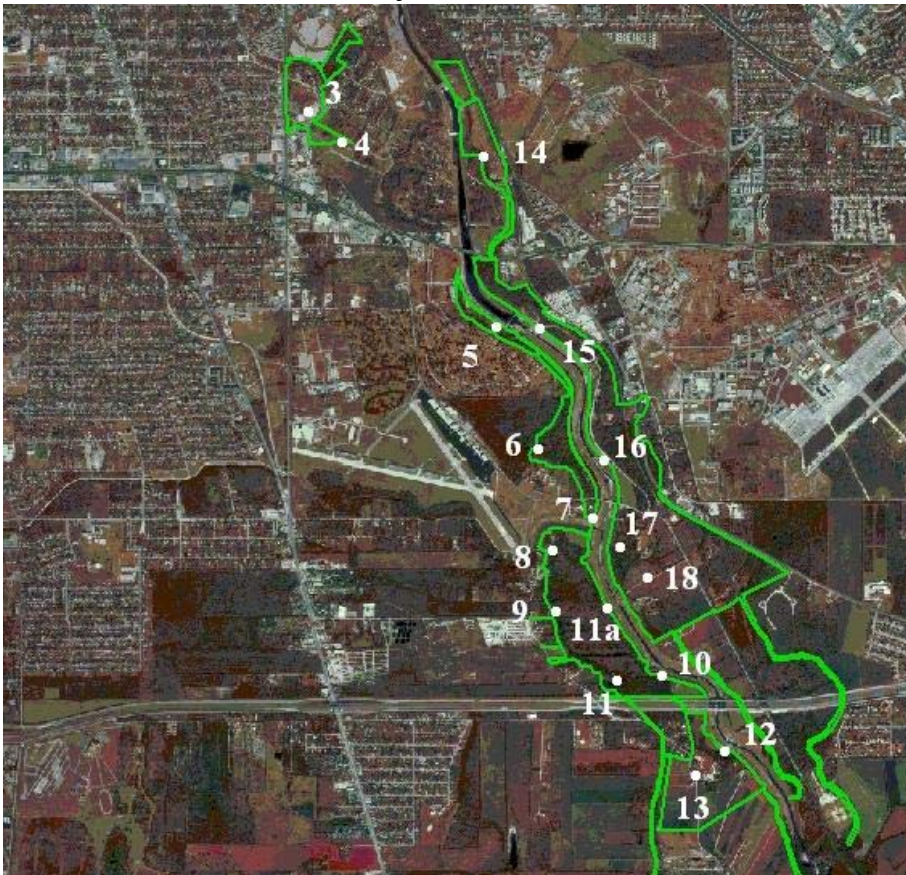


Figure 3: Aerial photograph showing the approximate locations of points 19 through 25 in relation to the park boundary, all located on the Rancho de las Cabras property in Wilson County.



The twenty five sample points, organized by physical feature or locality:

- 1) **Mission Concepcion:** Points 1, 2.
- 2) **Mission San Jose:** Points 3, 4.
- 3) **South Presa Street Property:** Point 14.
- 4) **Old Espada Dam:** Point 5.
- 5) **Espada Acequia:** Points 6, 7, 8, 9, 11.
- 7) **San Antonio River:** Points 7, 10, 11a, 12, 15, 16, 24, 25
- 6) **Mission San Juan:** Points 17, 18.
- 8) **Mission Espada:** Point 13.
- 9) **Rancho de las Cabras:** Points 19, 20, 21, 22, 23, 24, 25.
- 10) **Picoso Creek:** Points 23, 24.

The same sample points listed by habitat type. Most points lay adjacent to more than one habitat type:

- 1) **Aquatic habitats/Wetlands:** Points 5, 6, 7, 8, 9, 10, 11, 11a, 12, 15, 16, 17, 24, 25.
- 2) **Riparian woodland:** Points 5, 6, 8, 9, 17, 23, 24, 25.
- 3) **Upland woodland:** Points 6, 7, 8, 9, 10, 11a, 12, 14, 15, 16, 18, 19, 20, 21, 23.
- 4) **South Texas brush:** Points 10, 19 and 22.
- 5) **Old field/grassland:** Points 1, 4, 7, 10, 11a, 12, 14, 15, 16, 18, 23.
- 6) **Other:** Points 2, 3, 5, 8, 13.

Sampling Protocol

The sampling methodology was followed as per Fancy 2002 (see Appendix 1). Data collection began within thirty minutes of sunrise, with data being collected up to four hours after sunrise. Where possible, all points were sampled in a single day. Most often sampling all the points required two or sometimes three mornings, usually consecutive. An effort was made to mix up the order that the points were sampled on different counts. No sampling was done during periods of heavy rain or when sustained winds exceeded about 4 on the Beaufort scale (approximately 20 kilometers or 12.5 miles per hour).

Data was recorded on the data sheets as per Fancy 2002 (see Figure 4). Data collection over a five minute interval was begun immediately upon arrival on point, with a distinction being made between data collected during the first three minutes and data collected during the last two minutes of the sampling interval. All birds seen or heard during the five-minute time interval were recorded as to number, type of detection (audio or visual) and estimated distance from point. The sex and age class of the birds were also noted where such could be determined.

Ambient conditions were recorded at the time of sampling pertaining to temperature, precipitation, wind speed, cloud cover, and noise levels. Wind speed and noise levels were recorded on a numerical scale as per the sampling protocol.

Fifteen separate counts have been performed as of June 2006. Problems were encountered on some counts accessing all the sampling points. In September of 2004 (count number five) point number 11 on the Espada Acequia could not be accessed and was not sampled. On the November 2004 and subsequent points a replacement sampling point was designated on the west side of the San Antonio River channel. In November 2004 and January 2005 (count numbers six and seven) flooding and/or deep mud along Picoso Creek on the Rancho de las Cabras property did not permit access to point numbers 23, 24 and 25. Also in January of 2005, due to unforeseen difficulties only twelve of the twenty five points were sampled.

Figure 4: Field Data Form

Point Number: _____ Park: SAAN

Survey: _____ **Date** (mm/dd/yyyy): _____ **Start Time** (hhmm): _____ **Observer:** _____

Temperature (C): _____ **Wind (0-6):** _____ **Rain (0-5):** _____ **Clouds (0-100):** _____ **Noise (0-3):** _____ **Protocol Version: 1**

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Results and Discussion

A) Location of Habitat Types and Characteristic Bird Species.

Most areas of the park property have been profoundly altered by human activity, both in the present and in the past. In addition invasive species have had a major impact on the parks flora and fauna. The park properties at present, despite their relatively modest size, contain a complex array of intermingled habitat types reflecting the many different uses and alterations imposed upon the landscape by human activity. For purposes of this study, six general habitat types were designated. These were: 1) aquatic/wetland habitats, 2) riparian woodland, 3) upland woodland 4) South Texas Brush 5) old field/grassland and 6) other, this last encompassing such areas as mowed lawns and picnic areas.

1) Aquatic Habitats/Wetlands

San Antonio River

Within the City of San Antonio, the San Antonio River channel comprises perhaps the most profoundly altered habitat on the park properties, having suffered nearly complete channelization in the flood control initiatives of the 1950's and 60's. What remains is a broad grassy trench with the river flowing unimpeded at the bottom. Bermuda grass predominates on the banks, the whole being subject to extensive recreational use and mowed regularly. Flow in the channel is relatively constant and regulated, but is subject to periods of heavy flooding.

The substrate of the river consists primarily of rocks, gravel and sandy soils, with deeper pools occurring along its lengths. There is a major impoundment at Espada Park designed to preserve water flow into the Espada Acequia. The small lake here, several acres in size, has recently been drained and dredged.

Despite the habitat alteration, the river channel does attract concentrations of herons and egrets. In addition, flocks of **double-crested cormorants** and **neotropical cormorants** are frequent, and **osprey** have been observed. **Belted kingfishers** and **green kingfishers** both occur regularly, and two **ringed kingfishers** have been seen. Small concentrations of ducks occur in the winter months including **gadwall**, and **green-winged teal** and **blue-winged teal**. **Hooded mergansers** have been seen and **mallard** are resident. A **greater white-fronted goose**, **American coots**, **lesser scaup**, and **ring-billed ducks** have been observed on Espada Lake. **Killdeer** occur all year round, wintering and migrant **spotted sandpipers** are common, as well as small flocks of **least sandpipers** and smaller numbers of other shorebird species.

A large colony of **cliff swallows** is present each year under the Loop 410 bridge near Mission Espada, and another colony has been present up until this most recent year (2006) under the E.Ashley Street bridge adjacent to Mission San Juan. The loss of this second colony possibly due to the unusually dry weather, the river is diverted at that point, the channel under the colony being dry for long periods of time.

Kingbirds and flycatchers forage along the river and **American crow, red-shouldered hawk** and **crested caracara** are all regular. Large flocks of **American pipits** utilize the mowed banks of the river channel in winter.

Two short stretches of the original river channel remain within the city. At Espada Park a small piece of the original Spanish Colonial era diversion dam has been preserved along with an associated stretch of original river channel. The small, silted pool behind the dam is one of the few places on the park property where extensive growths of emergent vegetation can be found, including cattails and elephant ear. This small wetland is bounded on the east by the Espada Park picnic grounds and on the west by San Pedro Cemetery.

An additional stretch of original river channel is preserved adjacent to Mission San Juan along with a small stretch of maturing riparian woodland. Walking trails are in place on the east bank, the west bank forms a potentially valuable habitat enclave bounded by the original and channelized river channels and not readily accessible to the public. **Red-shouldered hawks** may breed here as may **green kingfishers**.

The San Antonio River in Wilson County adjacent to the Rancho de las Cabras property retains much of its original character; steep-sided earthen banks bordered by belts of riparian woodland, emergent vegetation being minimal. The Picoso Creek drainage is also steep-sided and muddy, mostly dry much of the time but subject to flooding. **Least grebe, wood duck, green kingfisher** and **great kiskadees** have all been noted.

The Espada Acequia

In addition to its considerable historic interest, the ecological importance of the more than two miles length of this old irrigation canal occurring within the park cannot be overstated. Patches of emergent aquatic vegetation occur in places and the banks support dense growths of vines, brush and undergrowth. Belts of mature hardwoods also occur in association with the ditch channel. **Green, great blue and yellow-crowned night-herons** have all been noted here and **barred owls, green kingfishers and blue jays** may breed. **Red-shouldered hawks, golden-fronted and ladder-backed woodpeckers, great-crested flycatchers, white-eyed vireos, tufted titmice, Carolina chickadees, Carolina wrens, yellow-breasted chats and northern cardinals** all breed, in 2005 a singing first-year male **indigo bunting** was observed on territory and **downy woodpeckers** have been observed.

The brush and vines along the ditch harbors numerous winter residents including **winter wren, house wren, orange-crowned warbler, black-and-white warbler, yellow-rumped warbler, Lincoln's sparrow, white-throated sparrow, and dark-eyed junco. Ruby-crowned kinglets** are common winter residents, and a rare **golden-crowned kinglet** was noted during a point count. **Sharp-shinned hawks** are common here in winter and in 2004 a rare **western tanager** was noted also. The extensive growths of wild grape along the ditch attract fruit eating birds including **scissor-tailed flycatchers, hermit thrushes, American robins** and **cedar waxwings**.

The habitat along the wooded ditch too is one of the best places to find spring migrants within the park. The list of such migrants that were found here is long, including; **olive-sided flycatcher, yellow-bellied flycatcher, Acadian flycatcher, willow flycatcher least flycatcher, Philadelphia vireo, red-eyed vireo, Bell's vireo, gray catbird, Swainson's thrush, gray-cheeked thrush, Tennessee warbler, Nashville warbler, yellow warbler, chestnut-sided warbler, magnolia warbler, black-throated green warbler, cerulean warbler, mourning warbler, hooded warbler, Wilson's warbler, Canada warbler, American Redstart, Ovenbird, Northern waterthrush, summer tanager, scarlet tanager, rose-breasted grosbeak, Baltimore oriole, Bullock's oriole and orchard oriole.**

A generally overlooked habitat feature associated with the acequia lies approximately one mile south of the Old Aqueduct on the old labore east of the ditch and south of a west-east concrete drainage culvert (the approximate location lying under the number "11" in Figure 2). Here, extensive seepage from the ditch has created a small wetland. This is the best (and possibly the only) place in the park to find **American woodcock** and **Wilson's snipe**.

b) Riparian Woodlands

On the Rancho de las Cabras property, a broad belt of riparian habitat consisting of mature or maturing hardwoods occupies a sandy alluvial shelf adjacent to the San Antonio River and extending up the Picoso Creek drainage and associated ravines. Breeding birds include **red-shouldered hawks, yellow-billed cuckoo, golden-fronted woodpecker, ladder-backed woodpecker, great-crested flycatcher, white-eyed vireo, Black-crested titmouse, Carolina chickadee, Carolina wren** and **northern cardinal**. **Northern flicker, house wren, white-throated sparrow** and **Lincoln's sparrow**, have been observed in winter and **red-eyed vireo, Nashville warbler** and **Blackburnian warbler** on migration. Of special interest was the occurrence of a **green jay** noted on one occasion in a brushy ravine. Certainly this species list could be expanded considerably with more observer hours spent on this property. Sampling points number 24 and 25 were located within this area, the riparian zone clearly delimited in part by an old grazing pasture. Points number 23 and 24 also overlook the Picoso Creek drainage (see Figure 3)

On the San Antonio Missions properties proper, small bands and patches of maturing riparian habitat exist along Piedras Creek below the aqueduct, on the preserved stretch of old river channel adjacent to Mission San Juan, and along the Espada Acequia. The many bird species occurring here have been noted above in the section devoted to the acequia.

c) Upland Woodlands.

Mesquite and Western hackberry are both common native invasive trees of local old field habitats, and second growth woodlands comprised primarily of one or both species occupy large areas of the park, mesquite predominating in more arid areas such as on the upland areas of the Rancho de las Cabras property. A broad band of predominantly

hackberry woodlands occurs along the length of the Espada Acequia between the acequia and the San Antonio River channel. Mixed hackberry/mesquite associations occur predominantly south of the Old Aqueduct Park on the west side of the San Antonio River and along the east bank of the river channel in Espada Park.

Of special interest was the apparent arrival of the **long-billed thrasher** as a breeding bird during the study. Singing males were noted from sample points 15 and 16 (see Figure 2) in 2006.

Both **black** and **turkey vultures** were on occasion flushed from the ground in dense brush inside the hackberry woodlands in the area south of Espada Dam and north of E. Ashley Road (approximate to the number “6” on Figure 2) and may breed or attempt to breed there. Other birds noted as breeding or probably breeding in these predominantly hackberry associations include **ladder-backed woodpecker**, **white-eyed vireo**, **black-crested titmouse**, **Carolina wren**, **yellow breasted chat** and **northern cardinal**.

Ladder-backed woodpecker, **common ground dove**, **Bewick’s wren**, **northern cardinal** and **painted bunting** were all characteristic of areas of predominantly mesquite second growth, all five species being common breeding birds on the Rancho de las Cabras property.

d) South Texas Brush

Areas of predominantly thorny scrub or brush habitat can be found on Rancho de las Cabras adjacent to and above the riparian woodlands west of Picoso Creek, primarily associated with the ravines and old quarry areas. On the aerial photographs, sample point number 19 lies on the west rim of an old quarry and sample point number 22 lies on the slope of a ravine within this sort of habitat (see Figure 3). Noted bird species found in these habitat areas include **greater roadrunner**, **verdin**, **olive sparrow**, **curve-billed thrasher** and **pyrrhuloxia**. In addition as noted above, a **green jay** was noted in a riparian ravine adjacent to this habitat.

Isolated pockets of this habitat can be found inside the second growth woodlands within the San Antonio Missions Historical park proper, however none of the above species were located there, although they are certainly possible.

e) Old Field/Grassland

Open old field or grassland habitats can be found in a number of locations around the park properties. The distinction between this habitat designation and the “maintained park areas” is somewhat arbitrary as most grasslands on the park properties are subject to at least periodic mowing, and most old field habitats have been subject to extensive human alteration. For example, for purposes of this study the channelized sections of the San Antonio River lying within the San Antonio city limits were characterized as “grassland” even though this channel is a highly artificial feature that is mowed regularly.

Likewise the prior land use of these old field areas differs in different parts of the park. Sample point number 1 (see Figure 1) is located adjacent to a strip of woodland on the edge of a disused open area containing an old softball field. Sample point number 4 is located on the edge of a large vacant field near mission San Jose, and sample point number 14 on the wooded edge of a field on the Presa Street property, adjacent to the dry San Juan Acequia channel. Sample point number 18 lies on recently acquired old farmland property south of Mission Juan (see Figure 2). Strips of habitat fitting this designation can be found in places adjacent to the second growth woodlands east of the Espada Acequia and especially along the west-east drainage culvert south of the Old Aqueduct Park (just north of the number “11” on Figure 2).

The only grassland area on the property not mowed regularly lies on the Rancho de las Cabras property east of Picoso Creek. Perhaps as a consequence, this section of old pasture shows signs of becoming rapidly overgrown by mesquite. Sample point number 23 lies on the northwest edge of this area (Figure 3).

Bermudagrass and Johnson grass are the predominant grasses found in these areas, neither of these invasive species being particularly conducive to bird species diversity, a fact reflected in the data collected from these areas. However patches of seed bearing wildflowers and other forbs do persist. Birds associated with these open areas and their edges include **scissor-tailed flycatcher, western kingbird, loggerhead shrike, lark sparrow, white-crowned sparrow, vesper sparrow** and **savannah sparrow**.

One important area of grassland initially overlooked when choosing the sampling points was the broad right of way giving access to the Rancho de las Cabras property.

Northern bobwhite and **dicksissel** were both noted as singing on territory here but were found singing nowhere else in the park.

f) Other.

The five points designated as “other” were all located in heavily used areas adjacent to the missions proper and/or in picnic areas. One sampling point each was located on the mowed lawns associated with Missions Concepcion, San Jose and San Juan. A fourth sampling point was located on the mowed lawn in the picnic area of Espada Park adjacent to the Old Espada Dam. Characteristic birds in these heavily used areas included **rock pigeon, white-winged dove, northern mockingbird, loggerhead shrike, European starling, great-tailed grackle, and house sparrow**.

2) Lists of Bird Species Reported

Overview of the Data

One of the objectives of this study was to report and document the occurrence of at least 90% of the bird species expected to occur on the Missions properties. This is a difficult proposition given both the mobility and elusiveness of many bird species. Isolated occurrences of out-of-range vagrants are likely to go unnoticed. For point of reference, the San Antonio Audubon Society lists a total of 437 bird species known to occur or which have occurred in Bexar County (see Appendix 2). However 199 of these species are categorized as “rare” or “vagrant”, leaving some 238 species regarded as at least “uncommon” or better in at least some parts of Bexar County during at least some seasons of the year.

By way of comparison, 197 species have thus far been recorded for purposes of this study on the San Antonio Missions National Historical Park properties (see Table 1). Exactly how many of those species listed for Bexar County as a whole might also be expected on the park properties is open to conjecture. Certainly the park properties are lacking the extensive wetlands present elsewhere in the county, neither do the park properties extend into the Texas Hill Country, however it is highly doubtful that the 197 species thus far reported represents a full 90% of those species actually occurring on the properties each year. While it is believed that all of the common and uncommon species in the park have been recorded, further observer hours will be necessary to document the occurrence of rare, migratory and vagrant species.

Eighteen species listed as “rare”, and three species listed as “vagrant” on the SAA Bexar County checklist were recorded in this study. All three “vagrant” species, the **ringed kingfisher**, **great kiskadee** and **green jay** are endemic to South Texas and the Rio Grande Valley and have been reported regularly in this area. Two of the three species were reported on the Rancho de las Cabras property in Floresville County, an expected result given the usual range of these birds.

Only 146 species have thus far been recorded from the sample points during a five-minute count interval (see Table 2), however this is regarded as being of only minor importance as the limited scope of the sampling methodology employed is intended to provide a database for trend analysis and site comparisons rather than providing for a comprehensive species survey.

Overall, on the fifteen point counts conducted from January 2004 to May of 2006, 4,503 separate detections of birds were noted during the five minute count intervals at the sampling points and the mode of detection recorded. Of these 4,503 observations, 2,595 or 57% were recorded on the basis of sound alone. Thus slightly more than half of the birds recorded on the point counts were heard and not seen, the majority of these singing males.

The sampling methodology used on the point counts is almost certainly biased in favor of those species with loud calls or songs. Table 3 ranks in order of times detected the forty most detected species from the point counts. Note that the two most frequently recorded species, the **northern cardinal** and the **Carolina wren**, were almost entirely recorded on the basis of their loud songs alone, most often the actual bird was not seen. In fact seven of the ten most recorded species on the list were likewise detected primarily by sound.

Of interest is the apparent arrival as breeding birds on the park property of two species. In 2006 the **long-billed thrasher** was detected singing several times from areas second growth woodland east of the river channel in Espada Park.

Also in 2006, a **Eurasian ring-necked dove** was detected calling from a dairy operation close to the Rancho de las Cabras property. The arrival of this dove coincides with an observed rapid increase of this species in Wilson County. Another introduced species of interest was noted on the May, 2006 count. At that time three **monk parakeets** were noted in a mesquite on the front lawn of Mission Concepcion. Although these birds may have been escapes from captivity, this species has been recorded as a breeding bird in Bexar County and is listed on the SAA Audubon checklist (Appendix 2).

Non-Native Species

Five non-native species were observed during the study, these being the **rock dove**, **Eurasian collared-dove**, **monk parakeet**, **European starling** and **house sparrow**. Only two of these species, the Eurasian collared-dove and the European starling, were detected on the Rancho de las Cabras property. The single detection of the Eurasian collared-dove occurred on the ranch property (see Table 4).

Threatened and Endangered Species

None of the species detected on the park property thus far are on the Federal or State of Texas lists of threatened or endangered species. Several species recorded here however, such as the **olive-sided flycatcher**, **loggerhead shrike** and **cerulean warbler** are classified as endangered, threatened or as a species of special concern in one or more States where they occur.

3) Recommendations

Habitat Alteration/Preservation

As San Antonio continues to grow in population the pressure on all of the parks, including the San Antonio Missions National Historic Park, will continue to increase. The value of the collective Missions properties as one of the few contiguous areas of natural habitat remaining within the city limits must be recognized.

In particular the apparent benign neglect of the Espada Acequia corridor and the associated riparian and second-growth woodlands along its length has been a boon to birds and other wildlife. The acequia represents a permanent water source. The heavily wooded and overgrown environs of the acequia channel remain the best place in the Missions Park and among the best places in the county to find concentrations of spring migrants. The fruit crop provided by the hackberry woodlands and wild grape vines attract large concentrations of fruit-eating birds in the late summer, fall and winter.

With the anticipated growth about to occur adjacent to the south end of the Missions properties proper adjacent to Mission Espada the pressure to develop these relatively unused sections of the park may be considerable. The value of the Espada Acequia corridor and associated woodlands in their present state to birds and other wildlife must be recognized.

In that same area, a small area of wetland habitat has grown up as an apparent result of leakage from the Espada Acequia, this wetland laying on the west side of the river, east of the Espada Acequia and south of an west-east drainage ditch running to the river channel from Mission Road (the wetland lies in the area covered by the “11” on the aerial photograph in Figure 2). If possible, this small wetlands area should be preserved.

The San Juan Acequia on the east side of the river is presently dry although it is our understanding that plans are in the works to restore it. When the water is flowing again, if the flow is maintained this acequia will have the potential of developing into a bird/wildlife habitat similar in importance to the Espada Acequia.

Acre for acre, the least productive habitat in the park with respect to birds and probably other wildlife are those areas identified as “old field/grassland”. All of these areas are overgrown with Bermuda grass and/or Johnson grass and, in the case of the old grazing meadow on the Rancho de las Cabras property, are rapidly being overrun with mesquite.

Although the difficulties of altering such Bermuda/Johnson grass associations are acknowledged, if a more diverse array of native plants could be encourage the value of these open areas to wintering sparrows and other wildlife could be dramatically enhanced. Some species, like northern bobwhite, dickcissel and grasshopper sparrow might even be induced to breed.

Specific to the San Antonio River channel, it is recognized that the periodic inundation of the channel with flood waters may make control of Bermuda/Johnson grass even more difficult. However the uppermost portions of the channel generally escape inundation. Perhaps these areas might be heavily seeded with wildflowers as has been practiced along our highways to increase the appeal of the river channel to both humans and wildlife.

The most limited habitat on the SAMNHP properties is that classified here as South Texas brush, an area of this habitat occurring on Rancho de las Cabras and isolated smaller patches occurring on the Mission Park properties proper in San Antonio. Despite the limited extent of this habitat, at least four species of birds characteristic to it have been observed. Perhaps some of the extensive areas of predominantly mesquite second growth within the park could be cleared in order to promote the proliferation of arid brush habitat.

Further Observation/Sampling

As noted, probably all of the commonly occurring bird species within the park properties have already been noted. What remains to be detected are those many species occurring rarely or irregularly in the park. The only way this can be accomplished is for experienced observers to spend more time on the park property.

Outside of a continuing formal count protocol, experienced observers must be encouraged to visit the park properties and to submit their observations.

Table 1: List of all bird species detected on missions properties. (page 1 of 6)
boldface = detected during sampling underline = non-native species

197 Species detected total.	City of S. A. = 176 species.	City of S.A.	Ran de Cab	Status in Park
146 Species at points.	Ran. d.I. Cab. = 110 Species			
Anseriformes				
Black-bell. Whistling Duck	<i>Dendrocygna autumnalis</i>	x	x	c
Greater White-fr. Goose	<i>Anser albifrons</i>	x	x	r
Snow Goose	<i>Chen caerulescens</i>	x	x	r
Wood Duck	<i>Aix sponsa</i>		x	u
Gadwall	<i>Anas strepera</i>	x	x	c
American Wigeon	<i>Anas americana</i>	x		u
Mallard	<i>Anas platyrhynchos</i>	x		c
Blue-winged Teal	<i>Anas discors</i>	x		u
Northern Shoveller	<i>Anas clypeata</i>	x		u
Northern Pintail	<i>Anas acuta</i>	x		r
Green-winged Teal	<i>Anas crecca</i>	x		c
Ring-necked Duck	<i>Aythya collaris</i>	x		u
Lesser Scaup	<i>Aythya affinis</i>	x		u
Hooded Merganser	<i>Lophodytes cucullatus</i>	x		r
Galliformes				
Wild Turkey	<i>Meleagris gallopavo</i>		x	c
Northern Bobwhite	<i>Colinus virginianus</i>		x	u
Podicipedidae				
Least Grebe	<i>Tachybaptus dominicus</i>		x	r
Pied-billed Grebe	<i>Podilymbus podiceps</i>	x		u
Pelecaniformes				
American White Pelican	<i>Pelecanus erythrorhynchos</i>		x	r
Neotropical Cormorant	<i>Phalacrocorax brasilianus</i>	x		c
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	x	x	c
Ciconiiformes				
Great Blue Heron	<i>Ardea herodias</i>	x	x	c
Great Egret	<i>Ardea alba</i>	x	x	c
Snowy Egret	<i>Egretta thula</i>	x	x	c
Little Blue Heron	<i>Egretta caerulea</i>	x	x	c
Tri-colored Heron	<i>Egretta tricolor</i>	x		u
Cattle Egret	<i>Bubulcus ibis</i>	x	x	c
Green Heron	<i>Butorides virescens</i>	x	x	c
Black-cr. Night heron	<i>Nycticorax nycticorax</i>	x		c
Yellow-cr. Night Heron	<i>Nyctanassa violacea</i>	x		c
Turkey Vulture	<i>Cathartes aura</i>	x	x	c
Black Vulture	<i>Coragyps atratus</i>	x	x	c

Table 1: List of all bird species detected on missions properties. (page 2 of 6)
boldface = detected during sampling underline = non-native species

		S.A.	R.C.	Status
Falconiformes				
Osprey	<i>Pandion haliaetus</i>	x		c
Mississippi Kite	<i>Ictinia mississippiensis</i>	x		u
Northern Harrier	<i>Circus cyaneus</i>		x	u
Sharp-shinned Hawk	<i>Accipiter striatus</i>	x	x	c
Cooper's Hawk	<i>Accipiter cooperii</i>	x	x	c
Red-shouldered Hawk	<i>Buteo lineatus</i>	x	x	c
Broad-winged Hawk	<i>Buteo platypterus</i>	x		r
Swainson's Hawk	<i>Buteo swainsoni</i>	x	x	u
Red-tailed Hawk	<i>Buteo jamaicensis</i>	x	x	c
Crested Caracara	<i>Caracara plancus</i>	x	x	c
American Kestrel	<i>Falco sparverius</i>	x	x	c
Gruiformes				
American Coot	<i>Fulica americana</i>	x		u
Sandhill Crane	<i>Grus canadensis</i>		x	r
Charadriiformes				
American Golden-Plover	<i>Pluvialis dominica</i>	x		r
Killdeer	<i>Charadrius vociferus</i>	x	x	c
American Avocet	<i>Recurvirostra americana</i>	x		r
Greater Yellowlegs	<i>Tringa melanoleuca</i>	x		c
Lesser Yellowlegs	<i>Tringa flavipes</i>		x	u
Spotted Sandpiper	<i>Actitis macularia</i>	x		c
Upland Sandpiper	<i>Bartramia longicauda</i>	x	x	u
Least Sandpiper	<i>Calidris minutilla</i>	x		c
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	x		r
Wilson's Snipe	<i>Gallinago delicata</i>	x		u
American Woodcock	<i>Scolopax minor</i>	x		r
Franklin's Gull	<i>Larus pipixcan</i>	x		u
Bonaparte's Gull	<i>Larus philadelphia</i>	x		r
Ring-billed Gull	<i>Larus delawarensis</i>	x		u
Forster's Tern	<i>Sterna forsteri</i>	x		r
Columbiformes				
Rock Pigeon	<i>Columba livia</i>	x		a
Eurasian Collared-Dove	<i>Streptopelia chinensis</i>		x	r
White-winged Dove	<i>Zenaida asiatica</i>	x		a
Mourning Dove	<i>Zenaida macroura</i>	x	x	c
Inca Dove	<i>Columbina inca</i>	x	x	c
Common Ground-Dove	<i>Columbina passerina</i>	x	x	c

Table 1: List of all bird species detected on missions properties. (page 3 of 6)
boldface = detected during sampling underline = non-native species

		S.A.	R.C.	Status
<i>Psittaciformes</i>				
<u>Monk Parakeet</u>	<i>Myiopsitta monachus</i>	x		r
<i>Cuculiformes</i>				
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	x	x	c
Greater Roadrunner	<i>Geococcyx californianus</i>		x	u
<i>Strigiformes</i>				
Great Horned Owl	<i>Bubo virginianus</i>	x	x	u
Barred Owl	<i>Strix varia</i>	x	x	u
<i>Caprimulgiformes</i>				
Lesser Nighthawk	<i>Chordeiles acutipennis</i>	x		c
Common Nighthawk	<i>Chordeiles minor</i>	x	x	c
Common Poorwill	<i>Phalaenoptilus nuttali</i>	x		o
<i>Apodiformes</i>				
Chimney Swift	<i>Chaetura pelagica</i>	x	x	c
Black-chin. Hummingbird	<i>Archilochus alexandri</i>	x	x	c
<i>Coraciformes</i>				
Ringed Kingfisher	<i>Ceryl torquata</i>	x		o
Belted Kingfisher	<i>Ceryle alcyon</i>	x		c
Green Kingfisher	<i>Chloroceryle americana</i>	x	x	u
<i>Piciformes</i>				
Golden-fr. Woodpecker	<i>Melanerpes aurifrons</i>	x	x	c
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>			r
Ladder-bck. Woodpecker	<i>Picoides scalaris</i>	x	x	c
Downy Woodpecker	<i>Picoides pubescens</i>	x		r
Northern Flicker	<i>Colaptes auratus</i>	x	x	u
<i>Passeriformes</i>				
Olive-sided Flycatcher	<i>Contopus cooperi</i>	x		u
Eastern Wood-Pewee	<i>Contopus virens</i>	x	x	c
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	x		u
Acadian Flycatcher	<i>Empidonax virescens</i>	x		r
Willow Flycatcher	<i>Empidonax traillii</i>	x		u
Least Flycatcher	<i>Empidonax minimus</i>	x	x	c
Eastern Phoebe	<i>Sayornis phoebe</i>	x	x	c
Say's Phoebe	<i>Sayornis saya</i>	x		r
Vermillion Flycatcher	<i>Pyrocephalus rubinus</i>	x		u
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	x	x	u
Great-crested Flycatcher	<i>Myiarchus crinitus</i>	x	x	c
Brown-crested Flycatcher	<i>Myiarchus tyrannulus</i>		x	r

Table 1: List of all bird species detected on missions properties. (page 4 of 6)
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		S.A.	R.C.	Status
Great Kiskadee	<i>Pitangus sulphuratus</i>		x	o
Couch's Kingbird	<i>Tyrannus couchii</i>	x		u
Western Kingbird	<i>Tyrannus verticalis</i>	x	x	c
Eastern Kingbird	<i>Tyrannus tyrannus</i>	x		u
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	x	x	c
Loggerhead Shrike	<i>Lanius ludovicianus</i>	x	x	c
White-eyed Vireo	<i>Vireo griseus</i>	x	x	c
Bell's Vireo	<i>Vireo bellii</i>	x		r
Blue-headed Vireo	<i>Vireo solitarius</i>	x		u
Warbling Vireo	<i>Vireo gilvus</i>	x		u
Philadelphia Vireo	<i>Vireo philadelphicus</i>	x		u
Red-eyed Vireo	<i>Vireo olivaceus</i>	x	x	u
Blue Jay	<i>Cyanocitta cristata</i>	x		c
Green Jay	<i>Cyanocorax yncas</i>		x	o
American Crow	<i>Corvus brachyrhynchos</i>	x	x	c
Purple Martin	<i>Progne subis</i>	x	x	c
Northern Ro.-wing. Swallow	<i>Stelgidopteryx serripennis</i>	x		u
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	x	x	c
Cave Swallow	<i>Petrochelidon fulva</i>	x	x	c
Barn Swallow	<i>Hirundo rustica</i>	x	x	c
Carolina Chickadee	<i>Poecile carolinensis</i>	x	x	c
Black-cr. Titmouse	<i>Baeolophus atricristatus</i>	x	x	c
Verdin	<i>Auriparus flaviceps</i>	x	x	u
Carolina Wren	<i>Thryothorus ludovicianus</i>	x	x	c
Bewick's Wren	<i>Thryomanes bewickii</i>	x	x	c
House Wren	<i>Troglodytes aedon</i>	x	x	c
Winter Wren	<i>Troglodytes troglodytes</i>	x		r
Golden-crowned Kinglet	<i>Regulus satrapa</i>	x	x	r
Ruby-crowned Kinglet	<i>Regulus calendula</i>	x	x	c
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	x	x	c
Eastern Bluebird	<i>Sialia sialis</i>	x	x	u
Gray-cheeked Thrush	<i>Catharus minimus</i>	x		r
Swainson's Thrush	<i>Catharus ustulatus</i>	x		u
Hermit Thrush	<i>Catharus guttatus</i>	x	x	c
American Robin	<i>Turdus migratorius</i>	x	x	u
Gray Catbird	<i>Dumetella carolinensis</i>	x		r
Northern Mockingbird	<i>Mimus polyglottos</i>	x	x	c
Long-billed Thrasher	<i>Toxostoma longirostre</i>	x		u
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>		x	u

Table 1: List of all bird species detected on missions properties. (page 5 of 6)
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		S.A.	R.C.	Status
European Starling	<i>Sturnus vulgaris</i>	x	x	c
American Pipit	<i>Anthus rubescens</i>	x		c
Cedar Waxwing	<i>Bombycilla cedrorum</i>	x	x	u
Tennessee Warbler	<i>Vermivora peregrina</i>	x		r
Orange-crowned Warbler	<i>Vermivora celata</i>	x	x	c
Nashville Warbler	<i>Vermivora ruficapilla</i>	x	x	c
Yellow Warbler	<i>Dendroica petechia</i>	x		c
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	x		u
Magnolia Warbler	<i>Dendroica magnolia</i>	x		u
Yellow-rumped Warbler	<i>Dendroica coronata</i>	x	x	c
Black-thr. Green Warbler	<i>Dendroica virens</i>	x		u
Blackburnian Warbler	<i>Dendroica fusca</i>		x	r
Cerulean Warbler	<i>Dendroica cerulea</i>	x		o
Black-and-white Warbler	<i>Mniotilta varia</i>	x	x	c
American Redstart	<i>Setophaga ruticilla</i>	x		u
Ovenbird	<i>Seiurus aurocapillus</i>	x		u
Northern Waterthrush	<i>Seiurus noveboracensis</i>	x		u
Louisiana Waterthrush	<i>Seiurus motacilla</i>	x		u
Mourning Warbler	<i>Oporornis philadelphia</i>	x		u
Common Yellowthroat	<i>Geothlypis trichas</i>	x	x	u
Hooded Warbler	<i>Wilsonia citrina</i>	x		o
Wilson's Warbler	<i>Wilsonia pusilla</i>	x		c
Canada Warbler	<i>Wilsonia canadensis</i>	x		u
Yellow-breasted Chat	<i>Icteria virens</i>	x		u
Summer Tanager	<i>Piranga rubra</i>	x		r
Scarlet Tanager	<i>Piranga olivacea</i>	x		r
Western Tanager	<i>Piranga ludoviciana</i>	x		o
Olive Sparrow	<i>Arremonops rufivirgatus</i>		x	u
Spotted Towhee	<i>Pipilo maculatus</i>	x	x	u
Chipping Sparrow	<i>Spizella passerina</i>	x		u
Clay-colored Sparrow	<i>Spizella pallida</i>	x	x	u
Field Sparrow	<i>Spizella pusilla</i>	x		u
Vesper Sparrow	<i>Pooecetes gramineus</i>	x	x	c
Lark Sparrow	<i>Chondestes grammacus</i>	x	x	c
Savannah Sparrow	<i>Passerculus sandwichensis</i>	x	x	c
Grasshopper Sparrow	<i>Ammodramus savannarium</i>		x	r

Table 1: List of all bird species detected on missions properties. (page 6 of 6)
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		S.A.	R.C.	Status
Song Sparrow	<i>Melospiza melodia</i>	x	x	u
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	x	x	c
White-throated Sparrow	<i>Zonotrichia albicollis</i>	x	x	c
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	x	x	c
Dark-eyed Junco	<i>Junco hyemalis</i>	x		r
Northern Cardinal	<i>Cardinalis cardinalis</i>	x	x	a
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	x	x	u
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	x		u
Blue Grosbeak	<i>Passerina caerulea</i>	x	x	u
Indigo Bunting	<i>Passerina cyanea</i>	x		u
Painted Bunting	<i>Passerina ciris</i>	x	x	c
Dicksissel	<i>Spiza americana</i>	x	x	c
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	x	x	c
Eastern Meadowlark	<i>Sturnella magna</i>	x	x	c
Western Meadowlark	<i>Sturnella neglecta</i>	x	x	u
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>		x	r
Common Grackle	<i>Quiscalus quiscula</i>	x	x	c
Great-tailed Grackle	<i>Quiscalus mexicanus</i>	x		a
Bronzed Cowbird	<i>Molothrus aeneus</i>	x		u
Brown-headed Cowbird	<i>Molothrus ater</i>	x	x	c
Orchard Oriole	<i>Icterus spurius</i>	x		u
Bullock's Oriole	<i>Icterus bullockii</i>	x		u
Baltimore Oriole	<i>Icterus galbula</i>	x	x	u
House Finch	<i>Carpodacus mexicanus</i>	x	x	c
Lesser Goldfinch	<i>Carduelis psaltria</i>	x		u
American Goldfinch	<i>Carduelis tristis</i>	x	x	c
House Sparrow	<i>Passer domesticus</i>	x		a

Table 2: List of bird species detected on point counts: 1/25/04 to 5/31/06 (p.1 of 4)
underline = non-native species

<u>Species</u>		No. Times Detected						
		Jan	Mar	May	Jul	Sep	Nov	Total
<u>Anseriformes</u>								
Black-bell. Whist. Duck	<i>Dendrocygna autumnalis</i>	2	20	12	6	1	7	48
Gr. Wh.-fronted Goose	<i>Anser albifrons</i>	2					3	5
Snow Goose	<i>Chen caerulescens</i>						2	2
Wood Duck	<i>Aix sponsa</i>	1						1
Gadwall	<i>Anas strepera</i>	6	2					8
American Widgeon	<i>Anas americana</i>	1						1
Mallard	<i>Anas platyrhynchos</i>		5	8	1	1	2	17
Green-winged Teal	<i>Anas crecca</i>	3						3
Hooded Merganser	<i>Lophodytes cucullatus</i>	1						1
<u>Galliformes</u>								
Wild Turkey	<i>Meleagris gallopavo</i>	1	7	5		2	2	17
<u>Podicipedidae</u>								
Pied-billed Grebe	<i>Podilymbus podiceps</i>		2				1	3
<u>Pelecaniformes</u>								
American White Pelican	<i>Pelecanus erythrorhynchos</i>		1					1
Neotropical Cormorant	<i>Phalacrocorax brasilianus</i>	1	2	3			2	8
Double-cr. Cormorant	<i>Phalacrocorax auritus</i>	8	15		2	1	13	39
<u>Ciconiiformes</u>								
Great Blue Heron	<i>Ardea herodias</i>	8	4	1	5	4	4	26
Great Egret	<i>Ardea alba</i>	12	12	26	21	10	9	90
Snowy Egret	<i>Egretta thula</i>	6	7	8	8	10	9	48
Little Blue Heron	<i>Egretta caerulea</i>	1	3	6	8	4	3	25
Cattle Egret	<i>Bubulcus ibis</i>		1	9	12	6		28
Green Heron	<i>Butorides virescens</i>			2	5	3		10
Black-cr. Night Heron	<i>Nycticorax nycticorax</i>	1		1				2
Yellow-cr. Night-Heron	<i>Nyctanassa violacea</i>			7	3			10
Black Vulture	<i>Coragyps atratus</i>	15	15	3	9	9	3	54
Turkey Vulture	<i>Cathartes aura</i>	11	19	10	11	18	5	74
<u>Falconiformes</u>								
Osprey	<i>Pandion haliaetus</i>	5	1				4	10
Northern Harrier	<i>Circus cyaneus</i>	3						3
Sharp-shinned Hawk	<i>Accipiter striatus</i>	2					1	3
Cooper's Hawk	<i>Accipiter cooperii</i>						1	1
Red-shouldered Hawk	<i>Buteo lineatus</i>	20	23	15	5	9	22	94
Swainson's Hawk	<i>Buteo swainsoni</i>				1			1
Red-tailed Hawk	<i>Buteo jamaicensis</i>	2	1	7		4	1	15
Crested Caracara	<i>Caracara plancus</i>	8	6	1	2	2	2	21
American Kestrel	<i>Falco sparverius</i>		1				1	2

Table 2: List of bird species detected on point counts: 1/25/04 to 5/31/06 (p. 2 of 4)
 underline = non-native species

<u>Species</u>		No. Times Detected						
		Jan	Mar	May	Jul	Sep	Nov	Total
<u>Charadriiformes</u>								
Killdeer	<i>Charadrius vociferus</i>	7	5	4	2	6	5	29
American Avocet	<i>Recurvirostra americana</i>					1		1
Greater Yellowlegs	<i>Tringa melanoleuca</i>	2	2				3	7
Lesser Yellowlegs	<i>Tringa flavipes</i>			1				1
Spotted Sandpiper	<i>Actitis macularia</i>	5	3	6	2	3	4	23
Least Sandpiper	<i>Calidris minutilla</i>		1	1			3	5
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	1						1
Ring-billed Gull	<i>Larus delawarensis</i>	7					1	8
<u>Columbiformes</u>								
Rock Pigeon	<i>Columba livia</i>	7	12	10	9	3	10	51
Eurasian Collared-Dove	<i>Streptopelia chinensis</i>			1				1
White-winged Dove	<i>Zenaida asiatica</i>	18	39	53	43	16	24	193
Mourning Dove	<i>Zenaida macroura</i>	13	24	27	16	14	6	100
Inca Dove	<i>Columbina inca</i>		1	8	3	3	1	16
Common Ground-Dove	<i>Columbina passerina</i>	1		8	5	6		20
<u>Psittaciformes</u>								
Monk Parakeet	<i>Myiopsitta monachus</i>			1				1
<u>Cuculiformes</u>								
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>			36	13			49
Greater Roadrunner	<i>Geococcyx californianus</i>		2	1	2	1		6
<u>Strigiformes</u>								
Great Horned Owl	<i>Bubo virginianus</i>				1			1
Barred Owl	<i>Strix varia</i>		1	1			2	4
<u>Caprimulgiformes</u>								
Lesser Nighthawk	<i>Chordeiles acutipennis</i>			1				1
Common Nighthawk	<i>Chordeiles minor</i>			1				1
<u>Apodiformes</u>								
Chimney Swift	<i>Chaetura pelagica</i>			10	11	14		35
Black-ch. Hummingbird	<i>Archilochus alexandri</i>			6	1			7
<u>Coraciiformes</u>								
Belted Kingfisher	<i>Ceryle alcyon</i>	3	3		1	5	7	19
Green Kingfisher	<i>Chloroceryle americana</i>	1	2	2				5
<u>Piciformes</u>								
Golden-fr. Woodpecker	<i>Melanerpes aurifrons</i>	25	42	21	9	9	16	122
Ladder-bk. Woodpecker	<i>Picoides scalaris</i>	12	6	15	8	15	9	65
Northern Flicker	<i>Colaptes auratus</i>						1	1

Table 2: List of bird species detected on point counts: 1/25/04 to 5/31/06 (p. 3 of 4)

<u>Species</u>		No. Times Detected						
		Jan	Mar	May	Jul	Sep	Nov	Total
<u>Passeriformes</u>								
Eastern Wood-Pewee	<i>Contopus virens</i>			1				1
Least Flycatcher	<i>Empidonax minimus</i>			3				3
Eastern Phoebe	<i>Sayornis phoebe</i>	12	5			1	10	28
Say's Phoebe	<i>Sayornis saya</i>	1						1
Vermillion Flycatcher	<i>Pyrocephalus rubinus</i>	2						2
Ash-thr. Flycatcher	<i>Myiarchus cinerascens</i>			2	1			3
Great-cr. Flycatcher	<i>Myiarchus crinitus</i>		2	12	1			15
Brown-cr. Flycatcher	<i>Myiarchus tyrannulus</i>			1				1
Great Kiskadee	<i>Pitangus sulphuratus</i>		1					1
Couch's Kingbird	<i>Tyrannus couchii</i>		1			2		3
Western Kingbird	<i>Tyrannus verticalis</i>			8	7			15
Eastern Kingbird	<i>Tyrannus tyrannus</i>			2				2
Scis.-tail. Flycatcher	<i>Tyrannus forficatus</i>		8	24	12	23		67
Loggerhead Shrike	<i>Lanius ludovicianus</i>	6	5	6	5	4	1	27
White-eyed Vireo	<i>Vireo griseus</i>	6	63	65	37	33	1	205
Bell's Vireo	<i>Vireo bellii</i>		1					1
Red-eyed Vireo	<i>Vireo olivaceus</i>			1				1
Blue Jay	<i>Cyanocitta cristata</i>	24	12	5	9	13	17	80
Green Jay	<i>Cyanocorax yncas</i>						1	1
American Crow	<i>Corvus brachyrhynchos</i>	47	39	32	13	29	27	187
Purple Martin	<i>Progne subis</i>		7	15	24			46
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>		3	25	14			42
Cave Swallow	<i>Petrochelidon fulva</i>		4	17	14	11	1	47
Barn Swallow	<i>Hirundo rustica</i>		12	22	13	5		52
Carolina Chickadee	<i>Poecile carolinensis</i>	8	8	12	2	3	2	35
Black-cr.	<i>Baeolophus atricristatus</i>	9	40	53	11	5	5	123
Verdin	<i>Auriparus flaviceps</i>	2	3	6	1	1	1	14
Carolina Wren	<i>Thryothorus ludovicianus</i>	53	78	93	57	46	29	356
Bewick's Wren	<i>Thryomanes bewickii</i>	4	4	5	2	7	3	25
House Wren	<i>Troglodytes aedon</i>	2					3	5
Golden-cr. Kinglet	<i>Regulus satrapa</i>	1						1
Ruby-cr. Kinglet	<i>Regulus calendula</i>	24	22				15	61
Blue-gr. Gnatcatcher	<i>Poliophtila caerulea</i>	1	10	1		2	1	15
Eastern Bluebird	<i>Sialia sialis</i>				1	1	2	4
Hermit Thrush	<i>Catharus guttatus</i>	3					3	6
American Robin	<i>Turdus migratorius</i>	7	1				9	17
Gray Catbird	<i>Dumetalla carolinensis</i>			1				1
Northern Mockingbird	<i>Mimus polyglottos</i>	30	42	53	31	35	36	227
Long-billed Thrasher	<i>Toxostoma longirostre</i>		1	1				2
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>	2	3	1		3	2	11
European Starling	<i>Sturnus vulgaris</i>	9	18	22	12	12	12	85

Table 2: List of bird species detected on point counts: 1/25/04 to 5/31/06 (p. 4 of 4)
underline = non-native species

<u>Species</u>		No. Times Detected						
		Jan	Mar	May	Jul	Sep	Nov	Total
American Pipit	<i>Anthus rubescens</i>	13					8	21
Cedar Waxwing	<i>Bombycilla cedrorum</i>	7	1				4	12
Orange-cr. Warbler	<i>Vermivora celata</i>	6					5	11
Nashville Warbler	<i>Vermivora ruficapilla</i>					2		2
Yellow Warbler	<i>Dendroica petechia</i>			1				1
Yell.-rumped Warbler	<i>Dendroica coronata</i>	19	4				14	37
Bl.-and-wh. Warbler	<i>Mniotilta varia</i>		1					1
Ovenbird	<i>Seiurus aurocapillus</i>			1				1
Mourning Warbler	<i>Oporornis philadelphia</i>			1				1
Com. Yellowthroat	<i>Geothlypis trichas</i>		2	1				3
Wilson's Warbler	<i>Wilsonia pusilla</i>			1				1
Yellow-br.Chat	<i>Icteria virens</i>			1				1
Olive Sparrow	<i>Arremonops rufivirgatus</i>			11				11
Spotted Towhee	<i>Pipilo maculatus</i>	1	1				2	4
Chipping Sparrow	<i>Spizella passerina</i>		1					1
Clay-col. Sparrow	<i>Spizella pallida</i>			2				2
Vesper Sparrow	<i>Pooecetes gramineus</i>	2	1					3
Lark Sparrow	<i>Chondestes grammacus</i>		2	1		1		4
Savannah Sparrow	<i>Passerculus sandwichensis</i>	6	6				2	14
Song Sparrow	<i>Melospiza melodia</i>						1	1
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	4	7	1			3	15
White-thr. Sparrow	<i>Zonotrichia albicollis</i>	4	4				2	10
White-cr. Sparrow	<i>Zonotrichia leucophrys</i>	3	1					4
Northern Cardinal	<i>Cardinalis cardinalis</i>	104	192	182	124	46	26	674
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	1	2			1		4
Blue Grosbeak	<i>Guiraca caerulea</i>			7				7
Indigo Bunting	<i>Passerina cyanea</i>					2		2
Painted Bunting	<i>Passerina ciris</i>			23	10			33
Dicksissel	<i>Spiza americana</i>			25	4	6		35
Red-wing. Blackbird	<i>Agelaius phoeniceus</i>	14	30	7	5	1	3	60
Western Meadowlark	<i>Sturnella neglecta</i>	4					1	5
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	2						2
Common Grackle	<i>Quiscalus quiscula</i>	3	6				3	12
Great-tailed Grackle	<i>Quiscalus mexicanus</i>	50	68	71	51	28	34	302
Bronzed Cowbird	<i>Molothrus aeneus</i>		1					1
Br.-headed Cowbird	<i>Molothrus ater</i>	6	11	17	7		3	44
Orchard Oriole	<i>Icterus spurius</i>			4				4
Baltimore Oriole	<i>Icterus galbula</i>			2		3		5
House Finch	<i>Carpodacus mexicanus</i>	5	6	13	7	8	8	47
Lesser Goldfinch	<i>Carduelis psaltria</i>			2	1		1	4
American Goldfinch	<i>Carduelis tristis</i>	10	8				26	44
House Sparrow	<i>Passer domesticus</i>	6	14	27	15	5	9	76

Table 3: Relative abundance of bird species detected during point counts.

Rank	Species	number of times detected	% detections by sound alone	number individuals detected
1	Northern Cardinal	674	87%	702
2	Carolina Wren	356	96%	359
3	Great-tailed Grackle	302	31%	1476
4	Northern Mockingbird	227	71%	255
5	White-eyed Vireo	205	97%	205
6	White-winged Dove	193	16%	737
7	American Crow	187	76%	315
8	Black-Cr Titmouse	123	91%	133
9	Golden-fronted Woodpecker	122	82%	127
10	Mourning Dove	100	32%	163
11	Red-shouldered Hawk	94	74%	108
12	Great Egret	90	3%	103
13	European Starling	85	13%	407
14	Blue Jay	80	83%	93
15	House Sparrow	76	70%	165
16	Turkey Vulture	74	1%	335
17	Scissor-tailed Flycatcher	67	39%	94
18	Ladder-backed Woodpecker	65	84%	66
19	Ruby-crowned Kinglet	61	64%	64
20	Red-winged Blackbird	60	26%	1105
21	Black Vulture	54	0%	192
22	Barn Swallow	52	4%	90
23	Rock Pigeon	51	7%	232
24	Yellow-billed Cuckoo	49	94%	48
25	Black-bellied Whistling Duck	48	21%	274

Table 4: Occurrence of non-native species on park properties detected on point counts.

		City of San Antonio		Rancho d. I. Cabras	
		times detected	total detected	times detected	total detected
Rock Pigeon	<i>Columba livia</i>	56	270	0	0
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	0	0	1	1
Monk Parakeet	<i>Columba livia</i>	1	3	0	0
European Starling	<i>Sternus vulgaris</i>	82	400	3	7
House Sparrow	<i>Passer domesticus</i>	76	165	0	0

References

The Birds of North America Online. 2005. Cornell Lab of Ornithology. 25th August 2006.

< <http://bna.birds.cornell.edu/BNAL/> >

Sibley, David Allen, The Sibley Guide to Birds. New York. Alfred A Knopf, Inc. 2001.

SAAS Bexar County Checklist. 2005. San Antonio Audubon Society. 25th August 2006.

< <http://www.saaudubon.org/checklist.html> >

Appendix 1: Protocols for the AFBNM bird count.

Bird Monitoring Protocol for Agate Fossil Beds National Monument, Nebraska and Tallgrass Prairie National Preserve, Kansas

Standard Operating Procedure (SOP) # 5

Conducting the Variable Circular Plot Count

Version 1.0 (September 2002)

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

This SOP gives step-by-step instructions for conducting 5-minute bird counts at Agate Fossil Beds NM and Tallgrass Prairie NP using the Variable Circular Plot (VCP) methodology. The SOP describes the procedure for collecting data and filling in the data form “Field Data Form – Variable Circular Plot Counts” (Form 1).

Procedures:

1. Prior to the day of the counts, determine which plots will be sampled in which order, and make a list that will be taken into the field of the UTMX and UTM Y coordinates for those plots.
2. Sampling will occur in the morning, beginning as soon as it is light enough to see a distance of at least 200 m and ending no later than 4 hours after official sunrise. Try to arrive at the first plot while it is still dark so that the count can begin as soon as it is light enough to see. Singing rate for most species is usually highest before or near official sunrise and then declines slowly for the next four hours.
3. Do not conduct the count during high winds or heavy rains because these conditions inhibit bird activity and impair your ability to see and hear birds. Counts should not be conducted if wind strength on the Beaufort Scale is a sustained 4 or greater (see Table 5.01.1), or if it is raining hard or snowing (rain code ≥ 4 in Table 5.01.2). If you encounter these conditions, wait until the weather improves or else cancel the sampling for today and try again on another day.
4. Navigate to the coordinates of the next plot on the list using the GPS. Approach the plot vigilantly, and if you observe a bird close to the center of the plot that flushes as a result of you approaching the plot, you should record the initial distance from the plot center to that bird on the data form. The reason for this is that a critical assumption of the distance methodology is that any bird directly at (or very close to, e.g., $<5\text{-}10\text{ m}$) the plot center will always be detected, i.e., $g(0) = 1$. If the data are analyzed as grouped data (as recommended), this is not a problem if the bird does not move beyond the first grouping interval. However, if a bird that otherwise would have been recorded in the plot during the count flushes prior to the beginning of the count as a result of the approach of the observer, abundance will be underestimated for that species. The alternative approach is to wait for several minutes after reaching the plot before starting the count, but this approach is likely to underestimate bird density near the plot because of birds flushing as the observer approaches.

5. Once you arrive at the plot center, begin the count as soon as possible. You should have time to fill in the location, event, and weather conditions information at the top of the form during the count. If not, these can be filled in at the end of the 5-minute count.
6. Set your watch to beep at 3 minutes, and then begin the count. Once you reach the 3-minute mark, make a mark on the VCP data form and continue the count for another 2 minutes, making sure that you fill in 3-5 in the Time Interval column for any species detected between 3 and 5 minutes. Only new birds should be recorded.
7. Use a new copy of the “Field Data Form – Variable Circular Plot Counts” for each 5-minute count. Even if no birds are detected at a particular plot, there should still be a form for that plot each time it is sampled (with the first line on the form filled in as explained below under the Species code). As soon as you are able to during or just after the 5-minute count, record the following information at the top of the form:

Location ID: This is the Location Identification code stored in the VCP database to refer to a particular place on the ground (the plot ID code). If you do not know what the LocationID is for this particular plot, or if you are establishing a new plot, you can instead circle the 4-character ParkCode (AGFO or TAPR) and the Location Description, such as “AGFO Plot #46”. The LocationID usually contains the 4-character ParkCode, 6-character Project Code (“Tweety”) and a plot number assigned by the Project Manager. An example is AGFOTweety11 for Plot Number 11 at Agate Fossil Beds NM.

Park: Circle the appropriate ParkCode (AGFO or TAPR) if you do not know the LocationID for this plot and you are going to instead write in a Location Description as described below.

Location Description: This is a brief description (<200 characters) of the sampling location referred to by the LocationID code. An example would be “AGFO Plot #46”, but it could also be something like “Bird VCP plot number 46, 150 m north of highway marker 46 next to rock wall”. If the LocationID for the plot is already known, you do not need to record anything in this space because a description is already stored in the database.

Date (mm/dd/yyyy): Write in the month (2 digits), day (2 digits) and year (4 digits) in the format shown. Include the forward slash. Examples are 05/02/2001 and 06/01/2001.

Starting time (hhmm): Write in the time to the nearest minute when the 5-minute counting period begins, using the hour and minute format shown. Use military time (add 12 to the hour beginning with 1 pm through 11 pm). Fill in all four digits. Examples are 0630 (6:30 am), 0802 (8:02 am). Bird sampling should not occur during the afternoon, but for the habitat form you would record 1:30 pm as 1330 and 8:00 pm would be 2000.

Observer Initials: Fill in the three initials of the person conducting the counts using capital letters. If you do not have a middle name, either make one up or put an underscore for your middle initial. Examples would be DGP for David G. Peitz or SGF for Steven G. Fancy. In the database, these initials will correspond to the full name and contact information for that person. (The 3-character initials in the database must be unique, and if two people have the same initials, one should be given an honorary middle name).

Temperature (C): Record the ambient temperature during the 5-minute count in degrees Celsius, to one decimal place or rounded off to the nearest degree.

Wind (0-6): Record the wind code (0 through 6) from the following Table 5.01.1 as it applies to the strength of the wind during the 5-min count. Record the average wind condition during the 5 minutes, not the maximum condition (do not worry about gusts).

Table 5.01.1. Codes (Beaufort scale) used to record wind strength during bird counts.

Wind Code	Explanation
0	calm, smoke rises vertically (< 2 km/h)
1	smoke drifts (2-5 km/h)
2	light breeze felt on face, leaves rustle (6-12 km/h)
3	leaves and twigs in constant motion (13-19 km/h)
4	small branches move, raises loose paper, dust rises (20-29 km/h)
5	fresh breeze, small trees sway (30-39 km/h)
6	strong breeze, large branches moving, wind whistling (40-50 km/h)

Rain (0-5): Record the rain code (0 through 5) from the following Table 5.01.2 as it applies to conditions during the 5-min count.

Table 5.01.2. Codes used to record precipitation codes during bird counts.

Rain Code	Explanation
0	no rain
1	mist or fog
2	light drizzle
3	light rain
4	heavy rain; difficult to hear birds
5	snow

Clouds (0-100): Record percent cloud cover, rounded off to the nearest 10 percent. This should be a number between 0 (no clouds) and 100 (complete overcast). If there are patches of clouds in different areas of the sky, try to image gathering all of them together into one part of the sky and recording what percent of cloud cover that would represent. Cloud cover is recorded because it affects bird activity and singing for many species.

Noise (0-3): Record the Noise Code (0-3) from the following Table 5.01.3 that applies to background noise conditions during the count, as it relates to your ability to hear birds.

Table 5.01.3. Codes used to record level of background noise as it effects observer's ability to hear birds.

Noise Code	Explanation
0	quiet; normal background noises; no interference
1	low noise; might be missing some high-pitched songs/calls of distant birds
2	medium noise; detection radius is probably substantially reduced
3	high noise; probably detecting only the loudest/closest birds

- Once you have started your watch and begun the 5-minute counting period, record all birds heard or seen during the 5 minutes, regardless of their distance from the center of the plot. For flyovers (birds that fly above the top of the vegetation canopy, never touch down in your field of view, and do not appear to be foraging, displaying, or behaving in any other way that might suggest a link to the habitat below them) you do not need to estimate the distance to the bird; instead just enter the species code and the number of them that you detected as shown in the example below.
- The distance that you record should be the horizontal distance in meters between the center of the plot (where you should be standing) and the location where you first detected the bird. If the bird is flying directly at you and then lands nearby, record the distance to where you first saw it flying towards you, not the distance to where it landed. For species that occur in clusters or flocks, you will record to the distance from the observer to the center of the flock, plus the flock size. If a bird is high in a tree, imagine dropping a plumb bob from the bird down to the ground, and measure the distance to that spot on the ground (the horizontal distance).

10. Many birds are heard and not seen. To estimate the distance to a bird that you detect only by sound, you should first try to determine where it is and select some object near where the bird is, such as a tree or rock that you think it is concealed by, and then estimate to that object.
11. For each bird heard or seen (at any distance) during the 5-minute counting period, record the following information on the "Field Data Form – Variable Circular Plot Counts":

Time Interval: Enter either 0-3 or 3-5, depending on whether you first detected this bird (or flock) during the first three minutes of the count or during the last two minutes of the 5-minute count. This approach makes it possible to compare the data to those collected during BBS counts, which involve a 3-minute sampling period, by analyzing only birds detected during the first three minutes of the VCP count, and only those birds detected with 400 meters of the observer (the cutoff distance for BBS counts).

Observ. #: This is an observation number which will help tie records in the database back to the paper copy of the field data form. Each row on the data form will be sequentially given a number, 1, 2, 3, 4, etc. to record which row of the data form this is. The numbers do not need to be sequential, so if you make a mistake and delete a row from the data sheet, it does not matter that there is a gap in the observation numbers.

Species: This is the 4-character AOU code for the species detected. Examples are WEME for Western Meadowlark, CCLO for Chestnut-collared Longspur and BHGR for Black-headed Grosbeak. These codes are usually easy to determine based on a bird's AOU common name, except where more than one species has the same code and one has to be modified from the convention. Codes for species known to occur at AGFO and TAPR are listed in Appendix A of the protocol narrative. If no birds are detected during a 5-minute count, you should enter data for the first line of the form (0-3 for Time Interval and 1 for Observ. #) and record the code NOBI for "No Birds" in the Species column.

Distance (m): Record the horizontal distance in meters between the center of the plot where you are standing, and the location or presumed location of the bird where you first detected it. Use a laser range-finder whenever possible to get as accurate a distance as possible. **Do not round off numbers to the nearest 5 meters; estimate the distance to the nearest meter.** If you cannot see the bird, estimate the distance to some object (tree, bush, rock) where you think the bird is located.

DT (Detection Type): Record a number 1, 2, 4, 8 or 9 for the detection type based on the following explanations:

- 1 = heard first, but not seen (i.e., detected initially by sound) during the 5-min count
- 2 = seen first (regardless of whether it was later heard or not) during the 5-min count
- 4 = heard first, but then seen (a DT of 1 can be changed to a 4) during the 5-min count

Two additional Detection Type codes can be used for birds that are not detected during the 5-minute count, but that are detected while traveling between plots or before or after the 5-minute sampling period begins. These data are useful for developing annual checklists of birds occurring in the park and for distribution information.

- 8 = heard, but not during the 5-minute sampling period
- 9 = seen, but not during the 5-minute sampling period

The Detection Type code will be used later in various analyses. For example, distances to birds that are seen (code 2 or 4) are probably more accurate than those to birds that are only heard (DT = 1). Recording the DT makes it possible to develop distance histograms to compare birds seen versus those that are only heard. Also, there are probably different detection functions for birds heard versus seen, and recording the DT makes it possible to analyze data separately if needed.

Sex: Record the sex (Male, Female, Unknown) of the bird wherever possible. If it is known that only males of a species sing, and a bird is detected only by song, record the sex as Male.

Age: Record the age category (Adult, Juvenile, Unknown) of the bird wherever possible.

Flock Size: For most species, each individual bird will be treated independently as a separate observation, but for species that usually occur in clusters or flocks, the appropriate unit is the cluster or flock, and not the individual bird. For example, if quail almost always occur in coveys of 10 to 40 birds, and you observe a covey of 40 quail during a count, it is not appropriate to record 40 distances and treat them as independent observations in the analysis. For flocking species, record the distance to the center of the flock and the number of birds in the flock, rather than the distance to each individual bird.

Prev. Plot: (Previous Plot?) Place an X in this column if the bird was already detected from a previous plot. Bias caused by repeated counting of the same individual from more than one plot is usually small unless repeated counting is common during a survey (Buckland et al. 1993:37) or in cases where a rare bird is counted from multiple plots (Nelson and Fancy 1999). Recording whether a bird is thought to have been counted at a previous plot allows the data to be analyzed two different ways, depending on which is most appropriate. Some authorities say that you should not count a bird if you think it was recorded from another plot already, whereas other authorities argue that you should always count each bird detected, even if it was probably detected previously. By placing an X in this column for those cases where you think the bird has already been counted from another station, you allow future investigators the option of analyzing data by either approach.

Flyover: Use the flyover column to record the number of birds of a particular species that fly above the top of the vegetation canopy, never touch down in your field of view, and do not appear to be foraging, displaying, or behaving in any other way that might suggest a link to the habitat below them. These are birds that appear to just be passing over, without actually utilizing the habitat you are surveying. Do not estimate distance to these birds; instead just enter the number of them that you detected, as shown in the example below.

Comments: Record any comments that seem appropriate and that might help someone interpret and analyze the data correctly.

12. At the end of the day, compare vocalizations with known bird sounds on tapes to identify all unknown bird species recorded in the field. If a species is seen in the field and characteristics recorded but it was not identified, it should be identified at this time using reference material.

Appendix 2: San Antonio Audubon Bexar County Bird Checklist.

Legend: The probability of being encountered (as distinct from “abundance”) in a full day’s effort in the appropriate habitat and in the proper season-of-occurrence is indicated as such:

C= Common: to be expected on an outing

F= Fairly common: should be seen from 1/3 to 2/3 of outings

U= Uncommon: expected to be seen on < 1/3 of outings

R= Rare: rarely seen.

V= Very rare: so unexpected it needs verified documentation

Species Status:

n -- species that are known to nest and breed in the county.

= -- bred historically in old records

l -- species that are very local in their occurrence in the county.

i -- irruptive or invasion species that in some years may be much more common than expected and in other years may be absent.

h -- hypothetical in that although it was well observed and described and accepted by the Bird Records Committee, it was seen by only one observer (or two or more observers in the same family) and is without confirming evidence such as specimen, photos, or tape recordings.

s -- status uncertain in that species was seen by two or more observers but confirming evidence is lacking.

ANSERIFORMES	Sp	Su	Fa	Wi	Status
Black-bellied Whistling-Duck	C	C	C	C	n
Fulvous Whistling-Duck	R	V	V	V	
Greater White-fronted Goose	V		R	R	
Snow Goose	R		R	R	
Ross's Goose				R	
Canada Goose	R		U	U	
Tundra Swan				V	
Wood Duck	F	F	F	F	n
Gadwall	C	R	C	C	n
American Black Duck				V	
American Wigeon	C	R	C	C	
Mallard	U	U	U	U	n
Mottled Duck	R	R	R	R	
Blue-winged Teal	C	R	C	F	n
Cinnamon Teal	U	V	U	U	n
Northern Shoveler	C	R	C	C	n
Northern Pintail	C	R	C	C	
Green-winged Teal	C	R	C	C	
Canvasback	U	V	U	U	
Redhead	U	R	U	U	
Ring-necked Duck	U	R	U	F	
Greater Scaup	V	V	R	R	
Lesser Scaup	C	R	C	C	
Surf Scoter			V	V	
White-winged Scoter	V		V	V	
Black Scoter				V	s
Long-tailed Duck			V	V	
Bufflehead	C	V	C	C	

Common Goldeneye	V		R	R	
Hooded Merganser	R		F	F	
Common Merganser				V	
Red-breasted Merganser	V		R	R	
Masked Duck	V				
Ruddy Duck	C	R	C	C	n
Galliformes	Sp	Su	Fa	Wi	Status
Wild Turkey	R	R	R	R	n
Scaled Quail	V	V	V	V	o
Northern Bobwhite	F	C	F	U	n
Montezuma Quail		V		V	o
GAVIIFORMES	Sp	Su	Fa	Wi	Status
Red-throated Loon			V	V	s
Pacific Loon			V	V	s
Common Loon	V	V	R	R	
PODICEPIFORMES	Sp	Su	Fa	Wi	Status
Least Grebe	U	R	U	F	n
Pied-billed Grebe	C	C	C	C	n
Horned Grebe			R	R	
Red-necked Grebe				V	
Eared Grebe	C	R	C	C	o
Western Grebe	R	V	V	R	
PROCELLARIIFORMES	Sp	Su	Fa	Wi	Status
Band-rumped Storm-Petrel		V			
PELECANIFORMES	Sp	Su	Fa	Wi	Status
American White Pelican	C	C	C	C	
Brown Pelican	R	R	R	R	
Neotropic Cormorant	U	C	C	U	
Double-crested Cormorant	C	R	C	C	

Anhinga	R	R	R	R	o
Magnificent Frigatebird		V	V		
CICONIFORMES	Sp	Su	Fa	Wi	Status
American Bittern	R		R	R	
Least Bittern	U	U	U		n, l
Great Blue Heron	C	U	C	C	
Great Egret	C	C	C	C	n
Snowy Egret	F	C	F	U	n
Little Blue Heron	F	F	F	R	n
Tricolored Heron	R	F	F	R	
Reddish Egret		V	V		
Cattle Egret	C	C	C	U	n
Green Heron	C	C	C	R	n
Black-crowned Night-Heron	C	F	C	C	n
Yellow-crowned Night-Heron	C	C	C	R	n
White Ibis	R	R	R	V	
Glossy Ibis	V	V			
White-faced Ibis	F	U	F	R	o
Roseate Spoonbill	R	U	U	R	
Wood Stork	V	R	R		i
Black Vulture	C	C	C	C	n
Turkey Vulture	C	C	C	C	n
FALCONIFORMES	Sp	Su	Fa	Wi	Status
Osprey	F	U	U	F	l
Hook-billed Kite			V		s
Swallow-tailed Kite	V	V	V		
White-tailed Kite	V	R	R	V	
Mississippi Kite	U	R	U		
Bald Eagle	V		V	R	
Northern Harrier	C	V	C	C	
Sharp-shinned Hawk	F	V	F	F	
Cooper's Hawk	F	V	F	F	n
Northern Goshawk		V		V	
Common Black-Hawk			V	V	
Harris's Hawk	U	U	U	U	n
Red-shouldered Hawk	F	F	F	F	n
Broad-winged Hawk	U		R		
Swainson's Hawk	F	U	F	V	n,l
White-tailed Hawk	V	V	V	V	
Zone-tailed Hawk	R		R	R	o
Red-tailed Hawk	C	F	C	C	n
Ferruginous Hawk	R		R	U	
Rough-legged Hawk	V		V	R	
Golden Eagle	R		R	R	

Crested Caracara	F	F	F	F	n
American Kestrel	C	R	C	C	
Merlin	R		R	R	
Peregrine Falcon	R		R	R	
Prairie Falcon	V			V	
GRUIFORMES	Sp	Su	Fa	Wi	Status
King Rail	V	V		V	o
Virginia Rail	V		V	R	
Sora	U		U	F	l
Purple Gallinule	R	R	R		n
Common Moorhen	F	C	F	F	n,l
American Coot	C	U	C	C	n
Sandhill Crane	R	V	R	R	
Whooping Crane			V		s
CHARADRIIFORMES					
CHARADRIIDAE	Sp	Su	Fa	Wi	Status
Black-bellied Plover	R	V	R	V	
American Golden-Plover	R	V	R	R	
Snowy Plover	R	R	R	V	
Wilson's Plover		V	V		
Semipalmated Plover	U	U	U	R	
Piping Plover	V	V	R	V	
Killdeer	C	C	C	C	n
Mountain Plover	V		V	V	
RECURVIROSTRIDAE	Sp	Su	Fa	Wi	Status
Black-necked Stilt	C	C	C	R	n
American Avocet	C	U	U	R	n
JACANIDAE	Sp	Su	Fa	Wi	Status
Northern Jacana		V			n
SCOLOPACIDAE	Sp	Su	Fa	Wi	Status
Greater Yellowlegs	C	U	C	U	
Lesser Yellowlegs	C	U	C	U	
Solitary Sandpiper	U	U	U	U	
Willet	R	V	R		
Spotted Sandpiper	C	U	C	C	
Upland Sandpiper	U	R	U		
Whimbrel	R	V	V		
Long-billed Curlew	R	V	R		
Hudsonian Godwit	R	V			
Marbled Godwit	V	R	V		
Ruddy Turnstone	R	R	R		
Red Knot	V				
Sanderling	R	R	R		
Semipalmated Sandpiper	U	U	U		

Western Sandpiper	C	U	C	R	
Least Sandpiper	C	F	C	C	
White-rumped Sandpiper	U	V	U		
Baird's Sandpiper	C	V	C	V	
Pectoral Sandpiper	F	U	F	V	
Dunlin	R	V	R	R	
Curlew Sandpiper	V				s
Stilt Sandpiper	F	V	F	R	
Buff-breasted Sandpiper	R	R	R	R	
Ruff	V	V	V	V	
Short-billed Dowitcher	R	V	R		
Long-billed Dowitcher	C	F	C	U	
Wilson's Snipe	C	V	C	C	
American Woodcock	V			R	
Wilson's Phalarope	C	U	C	R	
Red-necked Phalarope	V	V	V		
LARIDAE	Sp	Su	Fa	Wi	Status
Parasitic Jaeger		V	V		i
Long-tailed Jaeger		V			i
Laughing Gull	R	R	R	R	
Franklin's Gull	F	R	F	V	
Little Gull				V	s
Bonaparte's Gull	R		R	C	
Mew Gull				V	s
Ring-billed Gull	C	R	C	C	
California Gull	V		V	V	
Herring Gull	R	V	R	U	
Lesser Black-backed Gull				V	s
Glaucous Gull				V	s
Sabine's Gull			V		
Black-legged Kittiwake			V	R	
STERNINAE	Sp	Su	Fa	Wi	Status
Gull-billed Tern	V		V		i
Caspian Tern	R	V	R	V	
Royal Tern		V	V		i
Common Tern	R	V	R		
Forster's Tern	C	R	U	C	
Least Tern	R	R	R		
Bridled Tern		V			s
Sooty Tern		V	V		i
Black Tern	U	U	U		
Black Skimmer	R	R	R	V	
COLUMBIFORMES	Sp	Su	Fa	Wi	Status
Rock Pigeon	C	C	C	C	n

Eurasian Collared-Dove	R	R	R	R	
White-winged Dove	C	C	C	C	n
Mourning Dove	C	C	C	C	n
Inca Dove	C	C	C	C	n
Common Ground-Dove	F	F	F	U	n
PSITTACIFORMES	Sp	Su	Fa	Wi	Status
Monk Parakeet	R	R	R	R	n,l
Green Parakeet	V	V	V	V	
CUCULIFORMES	Sp	Su	Fa	Wi	Status
Black-billed Cuckoo	R	V	R		
Yellow-billed Cuckoo	C	C	C	V	
Greater Roadrunner	F	F	F	F	
Groove-billed Ani	R	U	U		l
STRIGIFORMES	Sp	Su	Fa	Wi	Status
Barn Owl	U	U	U	U	n
Western Screech-Owl				V	s
Eastern Screech-Owl	U	U	U	U	n
Great Horned Owl	U	U	U	U	n
Snowy Owl				V	s,i
Elf Owl	V	V			
Burrowing Owl	V		V	R	
Barred Owl	U	U	U	U	n
Long-eared Owl	R		V	R	
Short-eared Owl	R		R	R	
CAPRIMULGIFORMES	Sp	Su	Fa	Wi	Status
Lesser Nighthawk	U	U	U		n
Common Nighthawk	C	C	C		n
Common Pauraque				V	s
Common Poorwill	R	V	R	V	n
Chuck-will's-widow	F	F	F		n
Whip-poor-will	U		R	V	
APODIFORMES	Sp	Su	Fa	Wi	Status
Chimney Swift	C	C	C	V	n
White-throated Swift				V	
Green Violet-ear	V				
Broad-billed Hummingbird	V				s
Buff-bellied Hummingbird	V	V	R	V	
Magnificent Hummingbird	V				s
Lucifer Hummingbird		V			
Ruby-throated Hummingbird	C	R	C	V	
Black-chinned Hummingbird	C	C	C	V	n
Anna's Hummingbird			R	R	
Calliope Hummingbird	V	V			
Broad-tailed Hummingbird	R	V	R		

Rufous Hummingbird	R	R	U	U	
Allen's Hummingbird		V	V	V	
CORACIIFORMES	Sp	Su	Fa	Wi	Status
Ringed Kingfisher			V	V	
Belted Kingfisher	C	U	C	C	o
Green Kingfisher	U	U	U	U	n
PICIFORMES	Sp	Su	Fa	Wi	Status
Red-headed Woodpecker	V	V	R	R	o
Golden-fronted Woodpecker	C	C	C	C	n
Red-bellied Woodpecker	V			V	
Yellow-bellied Sapsucker	U		U	U	
Red-naped Sapsucker			V		s
Ladder-backed Woodpecker	C	C	C	C	n
Downy Woodpecker	R	R	R	U	n
Hairy Woodpecker				V	h
Northern Flicker	F		F	F	
Pileated Woodpecker		V			o
PASSERIFORMES					
TYRANNIDAE	Sp	Su	Fa	Wi	Status
Olive-sided Flycatcher	U	R	U		
Greater Pewee				V	
Western Wood-Pewee	R		R		
Eastern Wood-Pewee	C	U	U		n
Yellow-bellied Flycatcher	U	R	U		
Acadian Flycatcher	C	F	F		o
Alder Flycatcher	U	R	U		
Willow Flycatcher	U	R	U		
Least Flycatcher	C	R	U		
Cordilleran Flycatcher		V			
Black Phoebe	V		V	R	
Eastern Phoebe	C	U	C	C	n
Say's Phoebe	R		R	F	i
Vermilion Flycatcher	F	R	F	C	o,l
Ash-throated Flycatcher	C	F	U	F	n
Great Crested Flycatcher	C	C	F		n
Brown-crested Flycatcher	U	U	R		n
Great Kiskadee			V		
Couch's Kingbird	U	U	U	U	n
Cassin's Kingbird			V		s
Western Kingbird	C	C	F	V	n
Eastern Kingbird	F	R	R		o
Scissor-tailed Flycatcher	C	C	C	V	n
LANIIDAE	Sp	Su	Fa	Wi	Status
Loggerhead Shrike	C	F	C	C	n

VIREONIDAE	Sp	Su	Fa	Wi	Status
White-eyed Vireo	C	C	C	F	n
Bell's Vireo	F	F	U	V	n
Black-capped Vireo	R	R			n
Yellow-throated Vireo	R	R	R	V	o
Plumbeous Vireo	V	V			
Blue-headed Vireo	C		C	U	
Hutton's Vireo	R	R	R	R	n,l
Warbling Vireo	U		U		
Philadelphia Vireo	U	V	U		
Red-eyed Vireo	F	R	R		n
CORVIDAE	Sp	Su	Fa	Wi	Status
Blue Jay	C	C	C	C	n
Green Jay	V	V	V	V	o
Western Scrub-Jay	C	C	C	C	n
American Crow	C	C	C	C	n
Chihuahuan Raven		V			
Common Raven	U	U	U	U	n
ALAUDIDAE	Sp	Su	Fa	Wi	Status
Horned Lark		V	R	R	
HIRUNDINIDAE	Sp	Su	Fa	Wi	Status
Purple Martin	C	C	U	V	n
Tree Swallow	F	U	F	R	o
Violet-green Swallow			V		h
Northern Rough-winged Swallow	F	U	F	V	n
Bank Swallow	U	U	U	V	
Cliff Swallow	C	C	C	V	n
Cave Swallow	C	C	C	C	n
Barn Swallow	C	C	C	R	n
PARIDAE	Sp	Su	Fa	Wi	Status
Carolina Chickadee	C	C	C	C	n
Tufted Titmouse				V	
Black-crested Titmouse	C	C	C	C	n
REMIZIDAE	Sp	Su	Fa	Wi	Status
Verdin	F	F	F	F	n
AEGITHALIDAE	Sp	Su	Fa	Wi	Status
Bushtit	R	R	R	R	n
SITTIDAE	Sp	Su	Fa	Wi	Status
Red-breasted Nuthatch	R		R	R	i
White-breasted Nuthatch	V			R	
CERTHIDAE	Sp	Su	Fa	Wi	Status
Brown Creeper	R		R	R	
TROGLODYTIDAE	Sp	Su	Fa	Wi	Status
Cactus Wren	U	U	U	U	n

Rock Wren	R	R	R	R	o
Canyon Wren	U	U	U	U	n
Carolina Wren	C	C	C	C	n
Bewick's Wren	C	C	C	C	n
House Wren	C		C	C	
Winter Wren	R		R	R	
Sedge Wren			R	R	
Marsh Wren	F		F	F	
REGULIDAE	Sp	Su	Fa	Wi	Status
Golden-crowned Kinglet	R		R	R	
Ruby-crowned Kinglet	C		C	C	
SYLVIIDAE	Sp	Su	Fa	Wi	Status
Blue-gray Gnatcatcher	C	U	F	F	n
Black-tailed Gnatcatcher	V		V	V	
TURDIDAE	Sp	Su	Fa	Wi	Status
Eastern Bluebird	U	R	U	F	n
Western Bluebird			V	V	
Mountain Bluebird	V			V	
Townsend's Solitaire	V			V	
Veery	R		V	V	
Gray-cheeked Thrush	R		V	V	
Swainson's Thrush	F	V	U	R	
Hermit Thrush	F		F	F	
Wood Thrush	U		U	R	
American Robin	F	R	F	F	n,i
MIMIDAE	Sp	Su	Fa	Wi	Status
Gray Catbird	F		U	R	
Northern Mockingbird	C	C	C	C	n
Sage Thrasher	V		V	R	
Brown Thrasher	U		U	U	
Long-billed Thrasher	F	F	F	F	n
Curve-billed Thrasher	F	F	F	F	n
STURNIDAE	Sp	Su	Fa	Wi	Status
European Starling	C	C	C	C	n
MOTACILLIDAE	Sp	Su	Fa	Wi	Status
American Pipit	C	V	F	C	
Sprague's Pipit	R		V	U	
BOMBYCILLIDAE	Sp	Su	Fa	Wi	Status
Bohemian Waxwing				V	s
Cedar Waxwing	C		R	C	
PTILOGONATIDAE	Sp	Su	Fa	Wi	Status
Phainopepla	V		V		h
PARULIDAE	Sp	Su	Fa	Wi	Status
Blue-winged Warbler	R		V		

Golden-winged Warbler	R		V		
Tennessee Warbler	U		R		
Orange-crowned Warbler	C		C	C	
Nashville Warbler	C		C	R	
Northern Parula	U	V	V	V	n
Tropical Parula		V			s
Yellow Warbler	F	V	F	V	o
Chestnut-sided Warbler	U	V	R	V	
Magnolia Warbler	C	V	R		
Cape May Warbler	V		V		
Black-throated Blue Warbler	V		V	V	
Yellow-rumped Warbler	C		C	C	
Black-throated Gray Warbler	V		V	V	
Golden-cheeked Warbler	F	F			n
Black-throated Green Warbler	C	V	F	R	
Townsend's Warbler			V	V	
Blackburnian Warbler	F	V	R		
Yellow-throated Warbler	R		V	V	
Pine Warbler	R		R	U	
Prairie Warbler			V		
Palm Warbler	V		R	R	
Bay-breasted Warbler	U		R		
Blackpoll Warbler	R				
Cerulean Warbler	R		V		
Black-and-white Warbler	C	U	F	U	n
American Redstart	F	V	U	V	
Prothonotary Warbler	U	R	V		
Worm-eating Warbler	R		V		
Swainson's Warbler	V				h
Ovenbird	U		R	V	
Northern Waterthrush	F	V	R	V	
Louisiana Waterthrush	U	V	R		
Kentucky Warbler	U	V	V	V	o
Connecticut Warbler	V		V		
Mourning Warbler	U	R	R		
MacGillivray's Warbler	U	V	R		
Common Yellowthroat	C		C	C	
Hooded Warbler	U		R	V	
Wilson's Warbler	C	V	F	R	
Canada Warbler	U		R	V	
Rufous-capped Warbler				V	s
Yellow-breasted Chat	C	U	U	V	n
THRAUPIDAE	Sp	Su	Fa	Wi	Status
Hepatic Tanager	V	V	V	V	

Summer Tanager	F	F	U	R	
Scarlet Tanager	U		V		
Western Tanager	R		R	V	
EMBERIZIDAE	Sp	Su	Fa	Wi	Status
White-collared Seedeater				V	h
Olive Sparrow	R	R	R	R	
Green-tailed Towhee	R		R	R	i
Spotted Towhee	C		C	C	
Eastern Towhee	R		R	U	
Canyon Towhee	R	R	R		o,l
Cassin's Sparrow	F	R	R	R	n
Rufous-crowned Sparrow	F	F	F	U	n
American Tree Sparrow				V	s
Chipping Sparrow	C	R	U	C	n
Clay-colored Sparrow	F		F	R	
Field Sparrow	C	R	U	C	n
Vesper Sparrow	C		C	C	
Lark Sparrow	F	F	F	F	n
Black-throated Sparrow	U	U	U	U	o
Lark Bunting	R	V	R	U	
Savannah Sparrow	C	V	C	C	
Grasshopper Sparrow	F	U	U	F	n
Baird's Sparrow	V			V	
Henslow's Sparrow	V			V	
Le Conte's Sparrow	V		V	R	
Fox Sparrow	R		R	U	
Song Sparrow	F		F	C	
Lincoln's Sparrow	C	V	C	C	
Swamp Sparrow	U		U	F	
White-throated Sparrow	C		F	C	
Harris's Sparrow	R		R	U	
White-crowned Sparrow	C		C	C	
Golden-crowned Sparrow				V	s
Dark-eyed Junco	U		R	U	i
McCown's Longspur	V		V	R	s,i
Lapland Longspur				F	i
Smith's Longspur				V	s,i
Chestnut-collared Longspur	V		V	R	
CARDINALIDAE	Sp	Su	Fa	Wi	Status
Northern Cardinal	C	C	C	C	n
Pyrrhuloxia	F	F	F	F	n
Rose-breasted Grosbeak	U		R	V	
Black-headed Grosbeak	R	V	R	R	
Blue Grosbeak	C	F	U	V	n

Lazuli Bunting	R		V	V	
Indigo Bunting	F	U	F	V	n
Varied Bunting	V				h
Painted Bunting	C	C	U	V	n
Dickcissel	C	F	R	V	n
ICTERIDAE	Sp	Su	Fa	Wi	Status
Bobolink	V		V		
Red-winged Blackbird	C	C	C	C	n
Eastern Meadowlark	C	F	C	C	n
Western Meadowlark	R		R	F	
Yellow-headed Blackbird	U	R	U	R	
Rusty Blackbird	R			R	
Brewer's Blackbird	U		U	C	l
Common Grackle	U	V	U	F	o
Great-tailed Grackle	C	C	C	C	n
Bronzed Cowbird	U	U	U	R	n
Brown-headed Cowbird	C	C	C	C	n
Orchard Oriole	F	F	U		n
Hooded Oriole	R	R	R	V	
Bullock's Oriole	C	C	U	R	n
Altamira Oriole		V	V	V	
Audubon's Oriole	V			V	
Baltimore Oriole	C	U	U	R	
Scott's Oriole	R	R	R	V	n
FRINGILLIDAE	Sp	Su	Fa	Wi	Status
Purple Finch	R		R	R	i
House Finch	C	C	C	C	n
Red Crossbill	V		V	V	i
Pine Siskin	R		R	R	i
Lesser Goldfinch	U	U	U	U	n
American Goldfinch	C		C	C	
Evening Grosbeak	V			V	
PASSERIDAE	Sp	Su	Fa	Wi	Status
House Sparrow	C	C	C	C	n

437 species total

238 species “uncommon” or above.

Appendix 3: Sample Point Photographs and Descriptions.

Table A1: GPS Coordinates of Sampling Points.

Point Number	Name on GPS Data Base	Location	14R	UTM
1	01CONF	San Antonio	14 R 0548962	UTM 3251211
2	02CONC	San Antonio	14 R 0549269	UTM 3251397
3	03JOSE	San Antonio	14 R 0550508	UTM 3248042
4	04JOSF	San Antonio	14 R 0550753	UTM 3247768
5	05EDAM	San Antonio	14 R 0551867	UTM 3246481
6	06ACEQ	San Antonio	14 R 0552178	UTM 3245607
7	07WRIV	San Antonio	14 R 0552570	UTM 324114
8	08ACEQ	San Antonio	14 R 0552282	UTM 3244880
9	09ACEQ	San Antonio	14 R 0552288	UTM 3244438
10	10WRIV	San Antonio	14 R 0553057	UTM 3243981
11	11ACEQ	San Antonio	14 R 0552736	UTM 3243939
11a	11A-WR	San Antonio	14 R 0552668	UTM 3244464
12	12WRIV	San Antonio	14 R 0553507	UTM 3243430
13	13ESPA	San Antonio	14 R 0553310	UTM 3243276
14	14PRES	San Antonio	14 R 0551782	UTM 3247718
15	15ERIV	San Antonio	14 R 0552184	UTM 3246474
16	16ERIV	San Antonio	14 R 0552645	UTM 3245533
17	17JUAN	San Antonio	14 R 0552770	UTM 3244903
18	18JUAF	San Antonio	14 R 0552954	UTM 3244682
19	19RCQU	Rancho de las Cabras	14 R 0581132	UTM 3218791
20	20RCWF	Rancho de las Cabras	14 R 0580912	UTM 3218933
21	21RCNF	Rancho de las Cabras	14 R 0580877	UTM 3219188
22	22RCBR	Rancho de las Cabras	14 R 0581131	UTM 3219174
23	23RCFI	Rancho de las Cabras	14 R 0581389	UTM 3219358
24	24RCRJ	Rancho de las Cabras	14 R 0581326	UTM 3218982
25	25RCRI	Rancho de las Cabras	14 R 0581679	UTM 3219316

Sampling Point Description: Point #1.

NAD83 Coordinates: 14 R 0548962 UTM 3251211



Location: On west side of old athletic field west of Mission Concepcion (Access from Theo). Point is located near tall pecan seen in photograph, said pecan located along a north-south line of second growth woodlands separating the old playing fields from Concepcion Park to the west.

Habitat Types: Old field/Grassland

Canopy: Predominantly hackberry. 15-25 ft height. 10% canopy cover.

Understory/Ground Cover: Dense brush blocking view to west. ~100m visibility across old field, bounded by brush.

Sampling Point Description: Point #2.

NAD83 Coordinates: 14 R 0549269 UTM 3251397



Location: Adjacent to steel pipe (see photo) sticking up from front (west) lawn of Mission Concepcion, adjacent to Mission Drive. Point lies ~20m north of grove of trees associated with old stone quarry depression

Habitat Types: Intensively maintained park area.

Canopy: Mixed pecan/hackberry/mequite. 25-40 ft height. 20% canopy cover.

Understory/Ground Cover: Mowed lawn, no understory.

Sampling Point Description: Point #3.

NAD83 Coordinates: 14 R 0550508 UTM 3248042



Location: In mesquite/hackberry grove at bus stop outside of Mission San Jose. Point is adjacent to parking lot approximately 30 meters ESE of torreon (fortified SE corner of mission).

Habitat Types: Intensively maintained park area.

Canopy: Mesquite/hackberry. 25-35 ft height.
15% canopy cover.

Understory/Ground Cover: Dense flowerbeds and ornamental shrubs blocking vision to NW. Flowerbeds extending to south. Mowed lawn elsewhere.

Sampling Point Description: Point #4.

NAD83 Coordinates: 14 R 0550753 UTM 3247768



Location: At eastern edge of large field SE of Mission San Jose and bounded on the north by Napier Drive. Access from Napier. View in photo is looking south towards point from Napier Drive. Point is located ~30m SE of Mesquite tree in background of photo adjacent to north-south line of tall cane bordering field.

Habitat Types: Old field/Grassland.

Canopy: Mesquite. 25-35 ft height. 20% canopy cover.

Understory/Ground Cover: Tall Johnson grass
Dotted with mesquite saplings obstructs view across field. Tall cane obstructs view to east.

Sampling Point Description: Point #5.

NAD83 Coordinates: 14 R 0551867 UTM 3246481



Location: In picnic area of Espada Park near east bank of at lower end of pool/wetland formed by the old Espada Dam. Point is located between tall bald cypress and distinctively leaning pecan tree (see photo), about 30m north of commemorative ceramic plaque.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland
Intensively maintained park area.

Canopy: Predominantly pecan. 40-60 ft height.
25% canopy cover.

Understory/Ground Cover: Dense brush and emergent vegetation blocking view to west..

Sampling Point Description: Point #6.

NAD83 Coordinates: 14 R 0552178 UTM 3245607



Location: Located on old trail on the east bank of the Espada Acequia in area of dense riparian/second growth woodland 0.93 km south of the Old Espada Dam. Point is located ~40m north of place where acequia curves from south to south-east. Best access from area of E. Ashley Road bridge.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland.

Canopy: Tall uneven mix of cottonwood/ash/pecan 30-70 ft height. 30ft hackberry second growth woodlands to east. 80% canopy overall.

Understory/Ground Cover: Dense understory of vines and brush, tall growths of Johnson grass on trail restricting vision to ~20m.

Sampling Point Description: Point #7.

NAD83 Coordinates: 14 R 0552570 UTM 324114



Location: Along paved bike path 140m north of E. Ashley Road bridge on west side of San Antonio River channel. Point is at large rock with plaque 60m south of Piedras Creek diversion channel. Point is immediately adjacent to Espada Acequia, at this point contained in concrete channel.

Habitat Types: Aquatic/Wetland.
Old Field/Grassland

Canopy: Hackberry regrowth woodland on adjacent private land to NW. Scattered tall pecan elsewhere. Open along river channel.

Understory/Ground Cover: Dense brush in regrowth woodland to the NW. Old field habitat to west. Otherwise open along river channel.

Sampling Point Description: Point #8.

NAD83 Coordinates: 14 R 0552282 UTM 3244880



Location: In SE corner of Aqueduct Park adjacent to west bank of Espada Acequia and north of south edge of park bounded by hackberry regrowth woodlands. Riparian woodlands along acequia and in old Piedras Creek ravine to east.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland.
Intensively maintained park area.

Canopy: Pecan/hackberry. To 60ft in park and along creek/acequia. 30ft in hackberry regrowth 60% canopy cover overall.

Understory/Ground Cover: Mowed lawn in park. Dense understory across acequia and in woodlands south of point.

Sampling Point Description: Point #9.

NAD83 Coordinates: 14 R 0552288 UTM 3244438



Location: On old trail running along east side of Espada Acequia ~450m south of Aqueduct Park. Point is on east bank of acequia ~50 north of locked steel gate giving access from Mission Road. Riparian woodlands along acequia, dense hackberry regrowth woodlands to east and west.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland.

Canopy: Tall pecans along acequia to 60ft, hackberry regrowth woodland 30ft-40ft height. 80% canopy cover overall.

Understory/Ground Cover: Dense growth of vines and shrubs along acequia restricting visibility.

Sampling Point Description: Point #10.

NAD83 Coordinates: 14 R 0553057 UTM 3243981



Location: At high point on paved bike trail on west side of river channel. At high point ~1800m south of E. Ashley Road bridge and ~700m north of Loop 410 bridge. Point is located 80m south of concrete-masonry bike path bridge over creek drainage.

Habitat Types: Aquatic/Wetland.
Second growth woodland.
Old field/Grassland.
South Texas brush.

Canopy: Mesquite second growth mixed with dense brush immediately west of point. 15ft-25ft height.

Understory/Ground Cover: Dense brush east of point. unimpeded view along river channel.

Sampling Point Description: Point #11.

NAD83 Coordinates: 14 R 0552736 UTM 3243939

Location: Point is located at pool formed by damming part of the Espada Acequia. Accessible through private property on Mission Road. Point was relocated after March of 2004 due to difficulty with access.

Habitat Types: Aquatic wetland.
Riparian woodland.
Regrowth woodland.

Sampling Point Description: Point 11a.

NAD83 Coordinates: 14 R 0552668 UTM 3244464



Location: At top of bank above paved bike path on west side of San Antonio River channel. Point is ~ 700m south of E. Ashley Road bridge. Point is just SW of point where old and new San Antonio River channels merge in concrete spillway. An old road from the west coming from a Missions Road access gate comes out at this point. Construction underway at this point as of 7/06.

Habitat Types: Aquatic/Wetland.
Second growth woodland.
Old field/grassland.

Canopy: Dense hackberry woodland west of point. 20ft to 30 ft height.

Understory/Ground Cover: Limited visibility in woodlands west of point. Inimpepeded visibility along river channel.

Sampling Point Description: Point #12.

NAD83 Coordinates: 14 R 0553507 UTM 3243430



Location: Photo is looking WSW towards point, situated just south of the Espada crossing of the San Antonio River. Point is on west side of river on point of land just south of where a remnant of the old river channel flows underneath the road. Point is located at edge of mature hackberry woodlands offering a clear view of the 410 highway bridge to the north.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland.
Old field/Grassland

Canopy: Predominantly hackberry. 30-45 ft height.

Understory/Ground Cover: Open understory in woodlands. Unimpeded view of river channel to north.

Sampling Point Description: Point #13.

NAD83 Coordinates: 14 R 0553310 UTM 3243276



Location: On Mission Espada grounds, at south end of old granary foundation.

Habitat Types: Intensively maintained park area.

Canopy: Mixe hackberry/mequite. 25-40 ft height. 20% canopy cover.

Understory/Ground Cover: Mowed lawn, no understory.

Sampling Point Description: Point #14.

NAD83 Coordinates: 14 R 0551782 UTM 3247718



Location: Point is located on S. Presa Street property. Photo is looking west towards point from S. Presa access gate. Point is located on west side of field at edge of regrowth woodlands associated with dry San Juan Acequia channel.

Habitat Types: Second growth woodland.
Old field/Grassland.

Canopy: Isolated tall cottonwoods to 60 ft.
Predominantly hackberry. 15-25 ft height.

Understory/Ground Cover: Dense brush blocking view to west. ~300m visibility along old field, bounded by brush.

Sampling Point Description: Point #15.

NAD83 Coordinates: 14 R 0552184 UTM 3246474



Location: Photo is looking SE from new Espada Dam towards point on east side of river channel. Point is located at edge of second growth woodlands on point of land just south of where roadway climbs up east slope of channel from river crossing.

Habitat Types: Aquatic/Wetland.
Second growth woodland.
Old field/grassland.
Intensively maintained park area.

Canopy: Predominantly mesquite second growth south and east of point, predominantly hackberry to northeast across road, 15ft-30 ft height. Tall pecans in picnic area to north.

Understory/Ground Cover: Dense brush in woodlands to east and south. Unimpeded view along river channel and over Espada lake.

Sampling Point Description: Point #16.

NAD83 Coordinates: 14 R 0552645 UTM 3245533



Location: On east side of river channel ~250m north of E. Ashley Road bridge. Point is located just north of metal crash barrier at south end of dirt parking area. A deep drainage from the east enters main channel just SW of point. Dense regrowth woodlands to east across park road and in drainage to south.

Habitat Types: Aquatic/Wetland.
Second growth woodland.
Old field/Grassland.

Canopy: Predominantly hackberry second growth to east and south of point. 20-35 ft height.

Understory/Ground Cover: Dense regrowth woodlands blocking view across road to east. Unimpeded view along river channel.

Sampling Point Description: Point #17.

NAD83 Coordinates: 14 R 0552770 UTM 3244903



Location: Point is located along paved nature trail in woodlands just west of Mission San Juan. Point is on bank of preserved stretch of old San Antonio River channel adjacent to intersection of three trails and park bench.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland.

Canopy: Mixed pecan/hackberry. 35-60 ft height. 75% canopy cover.

Understory/Ground Cover: Limited visibility due to undergrowth and vines.

Sampling Point Description: Point #18.

NAD83 Coordinates: 14 R 0552954 UTM 3244682



Location: Point is located on newly acquired property south of the San Juan Mission grounds. Point is located where east-west access drive crosses over dry north-south acequia ditch adjacent to small pecan tree.

Habitat Types: Second growth woodland.
Old Field/Grassland

Canopy: Predominantly hackberry second growth
Woodlands and brush to NE of point. 15-25 ft height

Understory/Ground Cover: 80 to 200m visibility across old fields, view blocked by woodlands to NE.

Sampling Point Description: Point #19.

NAD83 Coordinates: 14 R 0581132 UTM 3218791



Location: Rancho de las Cabras. Just east of old ranch building foundation. Point is on old road at west edge of old quarry ~10m south of section of rail fence.

Habitat Types: Second growth woodland.
South Texas brush.

Canopy: Mesquite second growth. 15-25 ft height. 60% canopy cover.

Understory/Ground Cover: Dense brush understory, mesquite regrowth restricting view to ~20m.

Sampling Point Description: Point #20.

NAD83 Coordinates: 14 R 0580912 UTM 3218933



Location: Rancho de las Cabras. Point is located on WSW property line on main access road. Point is 60m south of intersection of property fence and private fence running east-west.

Habitat Types: Second growth woodland.

Canopy: Mesquite second growth. 15-25 ft height.

Understory/Ground Cover: ~50m visibility through arid mesquite second growth to east. Visibility blocked at points by brush along fenceline. Unimpeded visibility across agricultural lands to west of point..

Sampling Point Description: Point #21.

NAD83 Coordinates: 14 R 0580877 UTM 3219188



Location: Rancho de las Cabras. Point is located on NW property line on cleared fire lane. Point is 60m NE of main gate and NW property corner.

Habitat Types: Second growth woodland.

Canopy: Sparse mesquite second growth to south of point. 15-25 ft height.

Understory/Ground Cover: ~50m visibility through mesquite second growth south of point. Unimpeded visibility across agricultural Lands north of point.

Sampling Point Description: Point #22.

NAD83 Coordinates: 14 R 0581131 UTM 3219174



Location: Rancho de las Cabras. Near old NW-SE property fence. Point is on north side of brushy ravine, 10m west of old state park boundary marker.

Habitat Types: South Texas brush.

Canopy: Dense brush, mesquite. Mesquite 15-25 ft height. 10% canopy cover.

Understory/Ground Cover: Dense brush limiting view. ~80m visibility across ravine to south and west.

Sampling Point Description: Point #23.

NAD83 Coordinates: 14 R 0581389 UTM 3219358



Location: Rancho de las Cabras. Point is adjacent to north property fence at east edge of Picoso Creek Ravine and at west side of open field.

Habitat Types: Aquatic/Wetland.
Riparian woodland.
Second growth woodland.
Old field/grassland.

Canopy: Mixed oak/pecan/hackberry along Picoso Creek drainage to 60 ft height. Brushy second growth woodlands along drainage north of fence.

Understory/Ground Cover: Visibility impeded to north and south by line of brush at edge of field. 70m visibility across and down Picoso Creek and associated woodlands. 200m visibility to east across field.

Sampling Point Description: Point #24.

NAD83 Coordinates: 14 R 0581326 UTM 3218982



Location: Rancho de las Cabras. Point is on point of land NE of intersection of Picoso Creek and the San Antonio River, offering a view down both drainage. Photo is looking SW down point of land, San Antonio River drainage to left and Picoso Creek to right of picture.

Habitat Types: Aquatic/Wetland.
Riparian woodland.

Canopy: Cottonwood/oak/hackberry mix. 40ft – 60ft height. 75% canopy cover.

Understory/Ground Cover: Dense brushy understory
Limiting view to 30m in woods, 100m across drainages.

Sampling Point Description: Point #25.

NAD83 Coordinates: 14 R 0581679 UTM 3219316



Location: Rancho de las Cabras. Point is on south bank of San Antonio River Channel. 10m east of tall, forked cottonwood tree (visible in photo).

Habitat Types: Riparian woodland.

Canopy: Cottonwood/oak/hackberry mix. 40ft – 60ft height. 75% canopy cover.

Understory/Ground Cover: Dense brushy understory limiting view to 30m in woods, 100m along river.