Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program

Riparian Bird Survey Report 2006

April 23, 2007

TABLE OF CONTENTS

INTRODUCTION **1**
Survey Goals 1

METHODS **1**
Protocol Development 1
Personnel and Training 2
Study Site Selection 2
Survey Methods 3
Data Analysis 4

RESULTS **4**
Presence/Absence and Occupancy Analyses 4
Reproduction 7
Vegetation 7

DISCUSSION **7**
Reproduction 8
Recommendations for Future Surveys 8

REFERENCES **9**

LIST OF TABLES AND FIGURES

Table 1. Summary of monitoring-related MSHCP species objectives for covered riparian bird species. 10

Table 2. List of covered species Core Areas and the agency that monitored each area in 2006.....11

Table 3. Number of observations of covered species within surveyed areas and results of occupancy analyses.....12

Figure 1. 2006 riparian bird survey areas and point count locations 13

Figure 2a. 2006 riparian species detected.....14

Figure 2b. 2006 riparian species detected.....15

LIST OF APPENDICES

Appendix A: Riparian Bird Point-Count Survey Protocol 16

Appendix B: Riparian Point Count-Vegetation Association Protocol.....19

NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological Monitoring Program monitors the distribution and status of the 146 covered species within the Conservation Area to provide information to Permittees, land managers, the public and the Wildlife Agencies (i.e., the California Department of Fish and Game and the U.S. Fish and Wildlife Service). Monitoring Program activities are guided by the MSHCP species objectives for each covered species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. Any reader wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

The primary preparer of this report was the 2006 Avian Program Lead, Matt Talluto. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the Western Riverside County Regional Conservation Authority. For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

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INTRODUCTION

Thirteen MSHCP covered bird species are frequently found in riparian areas: Cooper's Hawk (*Accipiter cooperi*), Downy Woodpecker (*Picoides pubescens*), Least Bell's Vireo (*Vireo bellii pusillus*), Macgillivray's Warbler (*Oporornis tolmiei*), Nashville Warbler (*Vermivora ruficapilla*), Sharp-Shinned Hawk (*Accipiter striatus*), Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Tree Swallow (*Tachycineta bicolor*), Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*), White-tailed Kite (*Elanus leucurus*), Wilson's Warbler (*Wilsonia pusilla*), Yellow-breasted Chat (*Icteria virens*), and Yellow Warbler (*Dendroica petechia brewsteri*). Six of the above-mentioned covered riparian bird species (Least Bell's Vireo, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, White-tailed Kite, Yellow-breasted Chat, and Yellow Warbler) have specific objectives that require the demonstration of successful reproduction in 75% of specified Core Areas (Table 1) every 3 or 5 years depending on the species. The remaining 7 covered riparian bird species have species objectives that require the status and distribution of each species to be monitored at a minimum of once every 8 years.

In 2006, the Western Riverside County MSHCP Biological Monitoring Program conducted a pilot riparian bird study modeled after the riparian bird survey conducted in the Conservation Area by the University of California, Riverside, Center for Conservation Biology ("CCB") in 2004 (U.C. Riverside 2005). A vegetation sampling component was added and the study was stratified across a larger area than the CCB study. The goals of the study were as follows:

Survey Goals

A) Determine the distribution and occupancy rates of MSHCP covered bird species and other co-occurring bird species within riparian habitats across the Conservation Area
B) Determine detection probabilities for covered species to assist with future survey design
C) Collect vegetation data for a covariate analysis of habitat preferences
D) Evaluate the protocol developed for this survey with respect to feasibility and ability to accomplish survey goals

METHODS

Protocol Development

The survey methods for the pilot riparian bird study were based on a variable radius point count method. This is an extension of the protocol that was initially developed and tested by the CCB (U.C. Riverside 2005). This method allows multiple analyses to be performed on the data collected, including estimates of bird densities, occupancy rates, and estimates of detection probabilities. This method also allows for various analyses using presence-absence data (e.g., MacKenzie et al. 2002), distance sampling (Buckland et al. 2001), and auditory removal models (Farnsworth et al. 2002). The data can be manipulated *post hoc* so that comparisons can be made

with more traditional relative abundance indices, including both fixed and unlimited-radius scenarios (e.g., Hutto et al. 1986). The numbers of repeat visits were determined from detection probabilities calculated based on data generated in 2004 by the CCB. Point count methods are not suitable for collecting data on reproductive success, however, this type of protocol can locate potential breeding territories and provide information on the timing of the reproductive season for use in a nest searching component to be added to the study at a later time.

A vegetation sampling method was devised to provide covariates and add robustness to the study. The protocol is intended to capture structure and coarse diversity within the riparian community. The sampling strategy is characterized by nested circular sampling plots. In the outer (15 m radius) plot, only tree diversity and structure is quantified. In the inner circle (7.5 m radius), more fine scale vegetation data are collected including components of the herbaceous and shrub layers.

Personnel and Training

All field personnel demonstrated proficiency at both visual and aural identification of the covered species as well as common co-occurring riparian bird species. All observers practiced visual and aural identification with a local bird expert (i.e. Lynn Miller) for several weeks prior to the beginning of field surveys. Personnel were also trained in visual distance estimation. All personnel demonstrated proficiency with survey techniques before field surveys commenced. Personnel conducting riparian bird surveys in 2006 included:

- Matt Talluto, Avian Program Lead (Regional Conservation Authority)
- Conan Guard (Regional Conservation Authority)
- Iris Koski (Regional Conservation Authority)
- Lynn Miller (Regional Conservation Authority)
- Kim Oldehoeft (Regional Conservation Authority)
- Chadette Pfaff (Regional Conservation Authority)
- Matt Reed (Regional Conservation Authority)
- Carol Thompson (Regional Conservation Authority)
- Dan Williams (Regional Conservation Authority)

Study Site Selection

The Monitoring Program surveyed 5 Core Areas and 4 conserved riparian areas not identified as Core Areas (Table 2). Addionally, three Core Areas (Prado Basin, San Timoteo Canyon, and Temescal Wash) were surveyed by the Santa Ana Watershed Association (SAWA).

We selected survey locations within the Conservation Area based on the presence of riparian habitat as shown in the updated GIS vegetation map (CDFG et al. 2005). Portions of the Conservation Area that were surveyed for riparian birds by other agencies (i.e. SAWA) were excluded from site selection. Survey points were placed a minimum of 250 m apart to minimize the chance of surveyors observing an individual bird at multiple survey locations. Streams containing riparian habitat within the Conservation Areas were divided into 250 m segments, with a single survey point located at the center of each segment.

We surveyed a total of 103 points in the following Core Areas: Cleveland National Forest (29 points), Estelle Mountain (12 points), Lake Skinner, including Rawson Canyon and Johnson Ranch (32 points), San Bernardino National Forest (40 points), and Wilson Valley (3 points). We also surveyed 40 points in conserved areas within the Plan Area that were not listed as Core Areas but contained riparian habitat. These areas included Iron Spring Canyon (4 points), Tule Creek (2 points), Potrero (24 points) and the Santa Rosa Plateau (10 points). Survey point locations are mapped in Figure 1.

Survey Methods

Point Counts

Survey methods are detailed in the 2006 Western Riverside County MSHCP Riparian Bird Survey Protocol (hereafter "Protocol'; Appendix A). Observers conducted 10 minute point count surveys at each survey point. During the survey, observers recorded data for the first individual of every species observed. Subsequently observed individuals were only recorded if they were a covered species. This allowed us to record data on the detectability, abundance, and distribution of non-covered species within the Plan Area without compromising the ability to detect and record covered species. Upon observing a bird, observers recorded the exact time of observation relative to the start of the point count, the species, exact distance from the point to the bird (visually estimated or measured with a laser rangefinder), age and sex of the bird, if known, the location of the bird (inside riparian habitat, outside riparian habitat, flying over riparian habitat, or flying through riparian habitat), and the cues used to identify the bird (visual, aural, or both). Observers also recorded temperature, wind speed, and precipitation at each point.

All points were visited 4 times. During the first or second visit to each point, observers noted whether Southwestern Willow Flycatcher nesting habitat was present within detection range of the point. Southwestern Willow Flycatchers are visually and aurally indistinguishable from other Willow Flycatcher subspecies. However, only the Southwestern subspecies is present in the Plan Area after migration and during nesting. To increase the probability of confirming Willow Flycatchers as resident Southwestern Willow Flycatchers, the 56 points that contained Willow Flycatcher nesting habitat were surveyed 2 more times for a total of 6 times, extending the survey period beyond when migrants are likely to be present. Willow Flycatchers were only identified as the Southwestern subspecies if they were observed after 22 June or if they were observed constructing nests (Sogge et al. 1997; USFWS 2000).

Point count surveys were conducted from 1 May 2006 to 11 July 2006 for the first 4 survey periods, and from 12 July 2006 to 9 August 2006 for the additional 2 surveys at points with Willow Flycatcher nesting habitat. Point counts began 30 minutes after sunrise and ended either 4.5 hours after sunrise, when wind speed exceeded 20 km/h, when temperature exceeded 35° C, or when precipitation was heavier than light, intermittent rainfall.

Vegetation Sampling

Vegetation surveys were conducted from 12 July to 16 August 2006. Vegetation characteristics at each point were surveyed following the 2006 Western Riverside County MSHCP Riparian Point Count Vegetation Protocol (hereafter "Vegetation Protocol"; Appendix B). This component was incorporated in an effort to examine the relationship between avian community composition, vegetation structure and plant diversity. Vegetation data were taken at every point count location. Vegetation was sampled in a circular plot of radius 30 m surrounding each point. At each point, the survey area was characterized in terms of the percentage of the area composed of riparian vegetation, the classification of the non-riparian surrounding vegetation type and land-use type, relative amount of standing versus running water, and such structural elements as number of snags and downed logs. Surveyors then visually estimated the percent cover of each separate layer of the vegetation (trees, shrubs, and the herbaceous layer). If there was a super-canopy present (defined as a distinct layer protruding above the tree layer and generally comprised of *Platanus racemosa* or *Populus fremontii*, its cover was estimated as well. The 3 dominant species were also recorded for each vegetation class and the percent cover of each of these was estimated along with the height of the tallest individual and the average height of all individuals of that species.

Data Analysis

We determined point-level detection probabilities for each covered species, as well as the estimated proportion of occupied points, using an occupancy analysis in Program MARK (White and Burnham 1999). Occupancy modeling (MacKenzie et al. 2002) is a technique that estimates point-level detection probabilities based on whether a given species was observed on each of the multiple visits (termed an "encounter history"). In this case, it would be the probability that at least one individual of a given species would be observed at each point-count station during each of the 4-6 visits. The reciprocal of this value (1 – detection probability) is the probability that a species would <u>not</u> be recorded during a 10-minute point count, even though it was actually there. This detection probability is then used to adjust the actual presence/absence data collected during field surveys, and therefore provide a more-accurate estimate of the true occupancy rate for each species. In this report, we present the point-level detection probabilities for all covered species calculated from the least-complicated occupancy model, where detection probabilities were assumed to be constant for each species among all repeated visits to each point-count station.

Population density was not calculated because not enough data were collected on each covered species. Analysis of the vegetation data, as well as distance and auditory removal models had not been completed at the time of this writing, but will be completed in the future.

RESULTS

Presence/Absence and Occupancy Analyses

The results from presence/absence and occupancy models for each covered species are summarized in Table 3. Twelve of 13 covered riparian bird species were detected by the Monitoring Program in 2006. Western Yellow-billed Cuckoo was not detected during the

surveys, although it may have been observed incidentally in the Conservation Area by Monitoring Program biologists in 2006. The occupancy values given below are estimates that have been adjusted to correct for points that were occupied but where surveyors failed to detect target species. The detection probabilities specify the likelihood that at least one of the target species was observed if it occupied a given location. Too few data were collected on 8 of 13 covered riparian bird species to perform an occupancy analysis. Detailed results for each covered riparian bird species targeted in 2006 are given below.

Cooper's Hawk

Of 10 Cooper's Hawk Core Areas identified in the MSHCP, 3 were surveyed by the Monitoring Program, 3 by SAWA, 3 were not surveyed because we could not obtain permission to access the areas, and 1 was not conserved. Cooper's Hawks were present in 5 of the 6 Core Areas surveyed and in 3 additional survey areas. For points surveyed by the Monitoring Program, occupancy was 0.39 and detection probability was 0.10.

Downy Woodpecker

Of 4 Downy Woodpecker Core Areas identified in the MSHCP, 2 were surveyed by SAWA, 1 was not surveyed because we could not obtain permission to access the area, and 1 was not conserved. No Downy Woodpecker Core Areas were surveyed by the Monitoring Program. Downy Woodpeckers were present in both Core Areas surveyed and in 5 additional survey areas. Too few Downy Woodpeckers were observed to perform an occupancy analysis.

Least Bell's Vireo

Of 8 Least Bell's Vireo Core Areas identified in the MSHCP, 2 were surveyed by the Monitoring Program, 3 by SAWA, 2 were not surveyed because we could not obtain permission to access the areas, and 1 was not conserved. Least Bell's Vireos were present in 4 of the 5 Core Areas surveyed and in 3 additional survey areas. For points surveyed by the Monitoring Program, occupancy was 0.10 and detection probability was 0.30.

Macgillivray's Warbler

Macgillivray's Warblers were observed in low numbers in 4 of the areas surveyed. The number of observations of this species was too small to perform an occupancy analysis.

Nashville Warbler

Nashville Warblers were not observed in the only Core Area listed in the MSHCP. However, they were observed in low numbers in 4 of the areas surveyed. The number of observations of this species was too small to perform an occupancy analysis.

Sharp-shinned Hawk

Sharp-shinned Hawks were observed in 3 of the survey areas. The number of observations of this species was too small to perform an occupancy analysis.

Southwestern Willow Flycatcher

Of 6 Southwestern Willow Flycatcher Core Areas identified in the MSHCP, 3 were surveyed by SAWA, 2 were not surveyed because we could not obtain permission to access the areas, and 1 was not conserved. No Southwestern Willow Flycatcher Core Areas were surveyed

by the Monitoring Program. Southwestern Willow Flycatchers were not present in any of the Core Areas. One Southwestern Willow Flycatcher was observed by Monitoring Program staff in Tenaja Canyon in the Cleveland National Forest.

Tree Swallow

Of 5 Tree Swallow Core Areas identified in the MSHCP, 2 were surveyed by the Monitoring Program, 1 by SAWA, 2 were not surveyed because we could not obtain permission to access the areas, and 1 was not conserved. Tree Swallows were present in 2 of the 3 Core Areas surveyed and in 5 additional survey areas. Too few individuals of this species were detected to perform an occupancy analysis.

Western Yellow-billed Cuckoo

Of 5 Core Areas identified in the MSHCP, 3 were surveyed by SAWA and 2 were not surveyed because we could not obtain permission to access the areas. No Western Yellow-billed Cuckoos were detected during any point count survey. However, the song of a Yellow-billed cuckoo was heard after the conclusion of a point count during surveys at Potrero on 2 May 2006. The bird did not repeat the song, no visual confirmation was made, and it was not detected again. The 2 May observation was recorded by the Monitoring Program biologist, Dan Williams, as a probable Western Yellow-billed Cuckoo.

White-tailed Kite

Of 10 White-tailed Kite Core Areas identified in the MSHCP, 3 were surveyed by the Monitoring Program, 2 by SAWA, 4 were not surveyed because we could not obtain permission to access the areas, and 1 was not conserved. White-tailed Kites were present in 3 of the 5 Core Areas surveyed and in 4 additional survey areas. For points surveyed by the Monitoring Program, occupancy was 0.27 and detection probability was 0.32.

Wilson's Warbler

Wilson's Warblers were present in 11 of 12 survey areas. For points surveyed by the Monitoring Program, occupancy was 0.46 and detection probability was 0.52.

Yellow-breasted Chat

Of 5 Yellow-breasted Chat Core Areas identified in the MSHCP, 3 were surveyed by SAWA, 1 was not surveyed because we could not obtain permission to access the area, and 1 was not conserved. Yellow-breasted Chats were present in all 3 Core Areas surveyed and in 2 additional survey areas. Too few individuals of this species were detected to perform an occupancy analysis.

Yellow Warbler

Of 9 Yellow Warbler Core Areas identified in the MSHCP, 2 were surveyed by the Monitoring Program, 3 by SAWA, 3 were not surveyed because we could not obtain permission to access the areas, and 1 was not conserved. Yellow Warblers were present in 4 of the 5 Core Areas surveyed and in 5 additional survey areas. For points surveyed by the Monitoring Program, occupancy was 0.25 and detection probability was 0.32.

Reproduction

This study did not include methods to address the finding of successful reproduction required for 6 of the covered riparian bird species. However, successful reproduction (defined as the presence of fledglings or juveniles during the breeding season) was recorded if noticed incidentally. Of the 13 covered riparian bird species targeted in 2006, we detected successful reproduction of White-tailed Kites only; 3 fledgling or juveniles were observed at Estelle Mountain, 5 at Johnson Ranch, and 3 at Potrero Reserve.

Vegetation

We collected data on the vegetation and other riparian bird species present at each point, however the data had not been analyzed at the time of this report.

DISCUSSION

The Monitoring Program's primary goal for the 2006 pilot riparian bird study was to test a protocol to determine the distribution and occupancy rates of covered bird species within riparian habitats in the Conservation Area. For the 5 covered species with enough data collected, point-level detection probabilities ranged from 10% to 52%. These detection probabilities suggest that more than 4 visits may be needed to confidently report that a species is absent from a given area. Species with point-level detection probabilities greater than approximately 50% would be adequately surveyed with the MSHCP's current sampling design – 4 repeated visits would provide >95% confidence that, if the species was not detected, that it was actually not there (i.e., the species was not "missed"). However, if a species' detection probability was only 10%, then 28 repeated visits would be required to have that same 95% confidence.

Occupancy rates for these 5 covered species ranged from 10% to 46%. This suggests that each of these species is absent from substantial areas of riparian habitat within the MSHCP Conservation Area. The suitability of local habitat conditions in the vicinity of each point-count station likely affects whether a given species occupies that site. Many of our point-count stations may have provided very poor habitat for some of these species, with resulting biases in the occupancy rate and detection probability estimates. Further analyses of the 2006 habitat characteristics (e.g., width of riparian zone, vegetation structure, permanence of water) at each point-count station in relation to each bird species' occupancy (or abundance) should allow us to create habitat suitability models, which will help refine the actual quantity of suitable habitats available to each species within the Conservation Area (or each Core Area).

Because not all of the Core Areas identified in the MSHCP could be surveyed in 2006, species objectives cannot be completely evaluated in this report. None of the species with occupancy requirements (Least Bell's Vireo, Southwestern Willow Flycatcher, Western Yellow-billed Cuckoo, Yellow-breasted Chat, and Yellow Warbler) were found in enough Core Areas to meet the species objectives. However, due to the lack of sufficient detections to estimate detection probability for many covered species, it is impossible to determine if our survey effort

was sufficient to reliably detect these species if present. More information is needed before the species objectives can be evaluated.

Reproduction

Six covered riparian bird species have reporting requirements that include reproductive success. Point counts are generally not well-suited for detecting juvenile and fledgling birds, and are not appropriate for reporting reproductive success, so the lack of reproductive data from this survey should not be interpreted as a failure of the covered species to reproduce in the Core Areas. The Monitoring Program is developing a nest searching protocol to be implemented alongside riparian point counts in 2007 that will provide more reliable reproductive data for these species.

Despite the limitations of point counts for obtaining reproductive data, we observed juvenile or fledgling White-tailed Kites in 1 of the 5 Core Areas we surveyed. We also observed juveniles of this species in 2 areas not listed as Core Areas. Because point counts were not effective at locating juveniles and fledglings, it is not possible to determine if White-tailed Kites were reproducing or not in other areas where they were observed.

Recommendations for Future Surveys

A number of Core Areas were not surveyed by any agency during 2006. To improve detectability estimates and to provide more complete information on the distribution of covered species, permission should be obtained to survey in more areas.

Covariates should be incorporated into analytical models to potentially improve detectability estimates. If, in future surveys, detectability estimates are reliably low, and using covariates does not provide a substantial improvement, additional visits should be performed to ensure more complete detection of covered species.

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Table 1. Summary of monitoring-related MSHCP species objectives* for covered riparian bird species.

Species	Number of Core Areas	Reporting Frequency (years)	Occupancy	Reproduction
Cooper's Hawk	10	8	None	None
Downy Woodpecker	4	8	None	None
Least Bell's Viero	8	3	75%	75%
Macgillivray's Warbler	0	8	None	None
Nashville Warbler	3	8	None	None
Sharp-Shinned Hawk	0	8	None	None
Southwestern Willow Flycatcher	6	3	75%	75%
Tree Swallow	6	8	None	None
Western Yellow-billed Cuckoo	5	3	75%	75%
White-tailed Kite	10	3	75%	75%
Wilson's Warbler	0	8	None	None
Yellow-breasted Chat	5	5	75%	75%
Yellow Warbler	9	5	75%	75%

*Monitoring reports at a minimum on covered species status and distribution within the plan area. Additional more specific species objectives are summarized below. The occupancy and reproduction columns indicate the percentage of Core Areas a particular species must occupy or successfully reproduce in, respectively. Successful reproduction for these species is defined by the MSHCP as the presence of at least one nest which successfully fledges at least a single offspring.

Table 2. List of covered species Core Areas and the agency that monitored each area in 2006. MP = MSHCP Biological Monitoring Program, SAWA = Santa Ana Watershed Association

Core Area	Covered Species	2006 Survey Agency
Cleveland National Forest	COHA	MP
Lake Mathews, Estelle Mountain	WTKI	MP
Lake Skinner, Diamond Valley Lake	LBVI, TRSW, WTKI	MP
San Bernardino National Forest	COHA, NAWA, YWAR	MP
Wilson Valley	COHA, LBVI, TRSW, WTKI, YWAR	MP
Iron Spring Canyon	Not a Core Area	MP
Potrero	Not a Core Area	MP
Santa Rosa Plateau	Not a Core Area	MP
Tule Creek	Not a Core Area	MP
Prado Basin/Santa Ana River	COHA, DOWO, LBVI, TRSW, WIFL, WTKI, YBCH, YBCU, YWAR	SAWA
San Timoteo Canyon	COHA, LBVI, WIFL, YBCH, YBCU, YWAR	SAWA
Temescal Wash, Alberhill Creek	COHA, DOWO, LBVI, WIFL, WTKI, YBCH, YBCU, YWAR	SAWA
Lake Perris, Mystic Lake	WTKI	Not Surveyed
Murrieta Creek	COHA, LBVI, WIFL, WTKI, YBCU, YWAR	Not Surveyed
Temecula Creek	COHA, DOWO, LBVI, TRSW, WIFL, WTKI, YBCH, YBCU, YWAR	Not Surveyed
Vail Lake*	COHA, DOWO, LBVI, TRSW, WIFL, WTKI, YBCH, YWAR	Not Surveyed
Wasson Canyon	COHA, TRSW, WTKI, YWAR	Not Surveyed

Species Codes: COHA=Cooper's Hawk; DOWO=Downy Woodpecker; LBVI=Least Bell's Vireo; TRSW=Tree Swallow; WIFL=Southwestern Willow Flycatcher; WTKI=White-tailed Kite; YBCH=Yellow-breasted Chat; YBCU=Western Yellow-billed Cuckoo; YWAR=Yellow Warbler

* Not conserved

Table 3. Number of observations of covered species within surveyed areas and results of occupancy analyses. Counts include observations at multiple times at the same point (i.e. one sighting on visit 1 and one on visit 2 would count as two). Highlighted cells indicate Core Areas for each species. Occupancy analyses did not include data from SAWA surveyed areas. "P" indicates a species was present but individuals were not counted.

	Monitoring Program												SAWA			
	Cleveland National Forest Core Area	Lake Mathews/Estelle Mountain Core Area	Lake Skinner/Diamond Valley Lake Core Area	San Bernardino National Forest Core Area	Wilson Valley Core Area	Iron Spring Canyon	Potrero	Santa Rosa Plateau	Tule Creek	**Total Observed (Monitoring Program)**	Occupancy	Detection Probability	Prado Basin/Santa Ana River	San Timoteo Canyon	Temescal Wash/Alberhill Creek	**Total Observed (SAWA)**
Cooper's Hawk	3	1	13	4	0	0	9	0	0	30	0.39	0.10	4	1	4	9
Downy Woodpecker	0	0	2	3	0	1	3	0	0	9	**	**	7	2	10	19
Least Bell's Vireo	0	6	19	1	0	0	0	1	0	28	0.10	0.30	65	32	21	118
Macgillivray's Warbler	1	1	2	2	0	0	0	0	0	6	**	**	0	0	0	0
Nashville Warbler	1	0	1	0	0	0	2	0	0	4	**	**	1	0	0	1
Sharp-Shinned Hawk	0	0	3	0	0	0	2	0	0	5	**	**	1	0	0	1
Southwestern Willow Flycatcher*	1	0	0	0	0	0	0	0	0	1	**	**	0	0	0	0
Tree Swallow	2	1	2	1	0	0	2	1	0	9	**	**	P	0	0	P
Western Yellow-billed Cuckoo	0	0	0	0	0	0	0	0	0	0	**	**	0	0	0	0
White-tailed Kite	1	5	64	0	0	0	17	2	0	89	0.27	0.32	6	7	0	13
Wilson's Warbler	2	2	14	12	0	8	7	1	0	46	0.46	0.52	3	1	2	6
Yellow-breasted Chat	0	3	0	0	0	0	0	1	0	4	**	**	37	12	6	55
Yellow Warbler	5	0	18	5	0	3	4	2	0	37	0.25	0.32	71	18	15	104

*Only one Willow Flycatcher observed was confirmed (based on date observed) to be the Southwestern subspecies. A total of six Willow Flycatchers (unkown subspecies) were also observed: three in the Cleveland National Forest, one in Lake Skinner, one in the San Bernardino National Forest, and one in Johnson Ranch.

**Sample size too small to perform occupancy analysis.

Figure 1: 2006 Riparian Bird Survey Areas and Point Count Locations

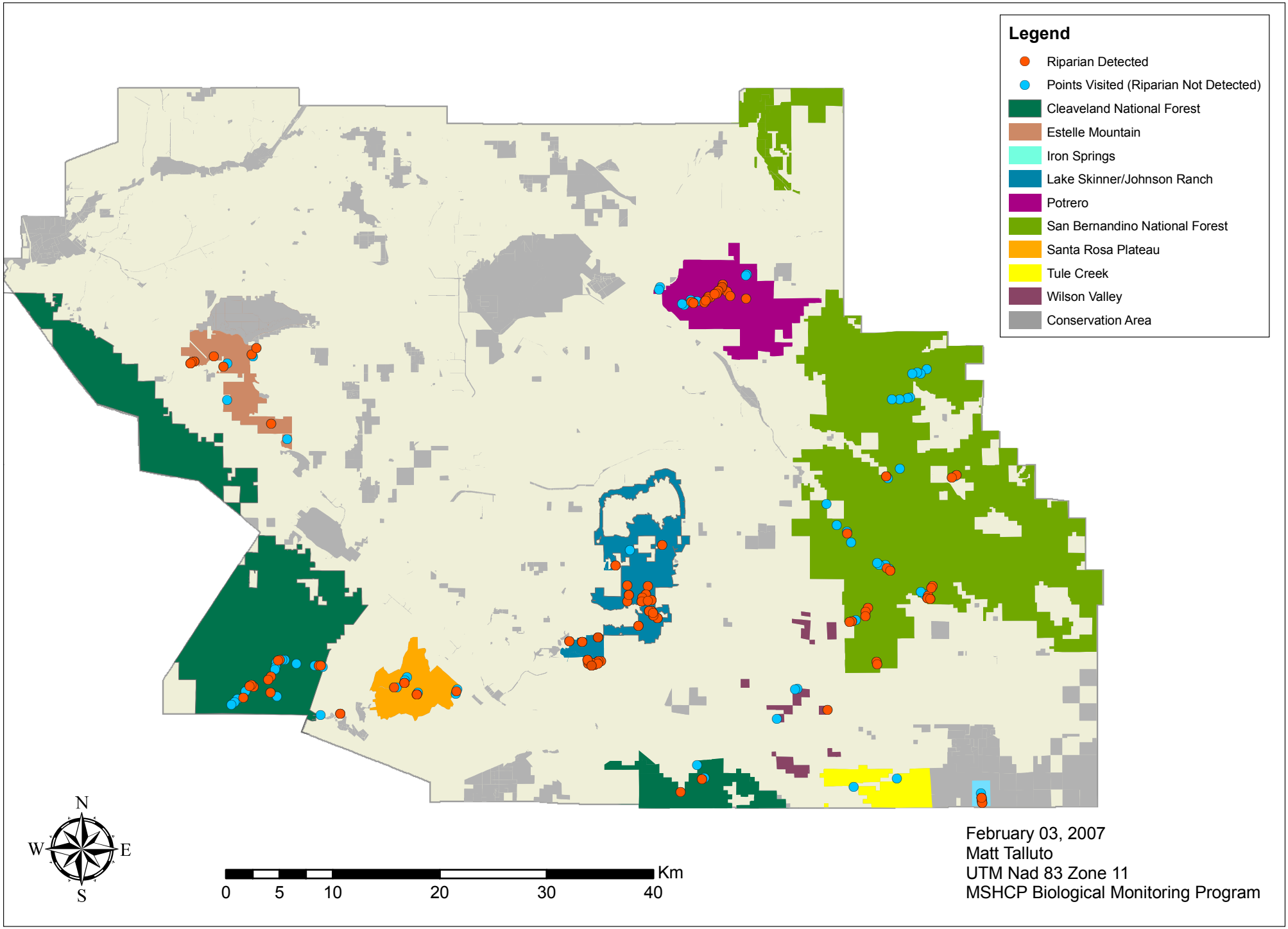

Figure 2a: 2006 Riparian Species Detected

Legend

- Riparian Species Detected
- Conservation Area
- Planning Area Boundary

N
W E
S

0 12.5 25 50 75 100 Km

February 03, 2007
Matt Talluto
UTM Nad 83 Zone 11
MSHCP Biological Monitoring Program

Figure 2b: 2006 Riparian Species Detected

Legend

- Riparian Species Detected
- Conservation Area
- Planning Area Boundary

N
W E
S

0 12.5 25 50 75 100 Km

February 03, 2007
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UTM Nad 83 Zone 11
MSHCP Biological Monitoring Program

APPENDIX A:

RIPARIAN BIRD POINT-COUNT SURVEY PROTOCOL

Overview:

Biological Monitoring Program riparian bird surveys generally will follow the procedures of variable-radius point-count methodology, as outlined in Ralph et al. (1995). These methods can be used to estimate bird densities, occupancy rates, and associated estimates of detection probabilities. This combination of field methods and study design will allow for flexible and thorough analyses using presence-absence data (e.g., MacKenzie et al. 2002), distance sampling (Buckland et al. 2001), and auditory removal models (Farnsworth et al. 2002). Data also can be transformed *post hoc* so that comparisons can be made to more traditional relative-abundance indices, including both fixed- and unlimited-radius scenarios (e.g., Hutto et al. 1986).

General Methods:

The locations of point-count stations will be based on 250-meter stream segments, coinciding with the sampling design for covered stream amphibians. Potential point-count stations will be located at the midpoint of each segment, and at half the distance to the riparian vegetation edge. UTM coordinates for these points will be generated from GIS data layers. From this pool of stations, approximately n=200 will be chosen randomly to become the permanent point-count stations surveyed during 2006. Navigation to the point will be by GPS.

Point count surveys will begin at sunrise. The final point count survey each day will begin no more than four hours after the first survey, or when the temperature exceeds 35 degrees C. Each observer will perform between two and four surveys each day, depending on the accessibility and conditions of each individual station.

Each point-count survey will be 10 minutes in length. The survey will begin after a two minute equilibration period at each point-count station. Hutto et al. (1986) suggest that "equilibration" periods (i.e., waiting for a predetermined period before starting to survey) do not necessarily assure the return of the individual birds that have flushed. In order to circumvent this complication, we will make note and estimate the distance from the point of all species encountered as the surveyor approaches the point-count station (within 125m of the point). These will be included in the data in the event that they do not return during the ten minute interval of the point count.

As the observer is approaching the point, he/she should be aware of any birds that flush upon approach; make notes at the bottom of the data sheet, including their approximate distances from the point station. If these individual birds are not re-observed during the subsequent 10-minute survey period, then record them at the end of the period. In the 'Time Encountered' column on the data sheet, the observer should write "UA."

After commencing the 10-minute survey, at the first observation of each species, the species, sex, age, behavior, distance, and time interval should be recorded, as per the instructions

below. Only the first individual for a species will be recorded, with the exception of brown-headed cowbirds and covered species. For covered species under the MSHCP and brown-headed cowbirds, every *individual* will be recorded in the manner described above. Each survey should last ***exactly*** 10 minutes; i.e., an individual bird first recorded at minute 10:01 should be recorded as "in transit."

Birds that are encountered 'in transit' should be noted at the bottom of the data sheet. These are new bird species that are observed while walking between point stations. Birds that are observed on approach but are not flushed can be recorded as in transit if they are not observed during the ten minute point count. In-transit birds should only be noted if they have not been recorded as part of the point-counts for that drainage. No further information is necessary, and these data will not figure into analyses. Rather, they will further our understanding of the species richness of the watershed.

In the case that the riparian area is narrow, it will be possible to identify birds that are in adjacent, non-riparian habitats. Observers should record whether each bird is within or outside riparian habitat. In the column labeled "location," the observer will record whether the bird is observed Inside, Outside, Flying Over, or Flying Through the riparian area. "Inside" indicates a bird that is actively using the riparian area: birds flycatching, flying between perches, flying completely inside the riparian area without landing and perching on vegetation or on the ground are all considered "Inside." Birds that fly through the riparian area without landing are considered "Flying Through." This category applies when a bird enters and leaves the riparian area without perching, and is beneath the vegetation canopy. Birds that fly over the riparian vegetation well above the canopy are considered "Flying Over." Birds that are outside the riparian area, whether flying or perched, are considered "Outside." Note that soaring birds, such as raptors, crows, etc, are **not** recorded as "Flying Over" unless they fly directly over the riparian area.

All birds that are detected but remain unidentified at the end of the 10-minute point-count survey should be pursued after the end of that survey (if they are still visible or audible), so that species-diversity information is maximized. If positive identification is made, then the observation record(s) from the survey should be updated with the corrected species and age information. No other information (e.g., distance, behavior) should be changed. All birds newly discovered at this time will not be included in the list generated during the point-count survey, but rather recorded in the same fashion as those discovered during travel between point-station locations. Record these as "in transit" at the bottom of the data sheet.

For point-count stations that are in close proximity, individual birds observed during a survey at one station, but that were recorded at a previous station, should be coded in a manner where they can be excluded/included from subsequent analyses. Generally, these "double-counted" birds are eliminated from most analyses, but distance sampling estimates (esp. detection probabilities) can sometimes be improved by treating these observations as independent.

Point-count stations will be re-surveyed at least four times during each breeding season. All points will be surveyed within a two week period, with replicate surveys occurring in subsequent two week periods. A different observer should conduct the survey during each visit to reduce the effects of observer bias (Ralph et al. 1995). Also, because a "cluster" of several point-count stations will usually be surveyed during a single morning, the order in which the point stations are surveyed should be altered during each visit to this "cluster." This will minimize any temporal biases associated with variations in bird behavior (e.g., male singing rates [=detection probability] that might decline from early to late morning).

References:

Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. Introduction to distance sampling. Oxford University Press. New York, NY. 432 pages.

Farnsworth, G. F., K. H. Pollock, J. D. Nichols, T. R. Simons, J. E. Hines, and J. R. Sauer. 2002. A removal model for estimating detection probabilities from point-count surveys. Auk 119:414-425.

Hutto, R. L., S. M. Pletschet, and P. Hendricks. 1986. A fixed-radius point count method for nonbreeding and breeding season use. The Auk. 103:593-602.

MacKenzie, D. I., J. D. Nichols, G. B. Lachman, S. Droege, J. A. Royle, and C. A. Langtimm. 2002. Estimating site occupancy rates when detection probabilities are less than one. Ecology 83:2248-2255.

Ralph, C. J., S. Droege, and J. R. Sauer. 1995. Managing and Monitoring Birds Using Point Counts: Standards and Applications. USDA Forest Service General Technical Report PSW-GTR-149.

APPENDIX B:

RIPARIAN POINT COUNT-VEGETATION ASSOCIATION PROTOCOL

Objective:

The purpose of incorporating vegetation work into the overall design of the avian surveys of riparian bird diversity and abundance in Western Riverside County is to examine the relationship between avian community composition, plant diversity and riparian vegetation structure. It will furthermore add to the robustness of the study by providing greater statistical power in our analysis.

Vegetation data will be taken at all locations that are the sites of point counts for avian diversity. These will be comprised of a random selection of points that are spaced at 250m intervals along all riparian zones. At each point count, a variety of data will be collected. These data will serve to characterize species diversity and stand structure.

General:

We will begin with a rough survey method that will rely on estimations of canopy cover and stand height. If time permits, we will perform field verifications to assess the precision and reliability of our estimates.

Methods:

To begin, the point at which the point count bird survey was conducted must be located. Navigation will be by GPS unit to a predefined point, for which coordinates will be assigned in UTM NAD83.

To estimate cover, we will set up a 30m radius circular plot centered on each point count survey location. The plot can be set up using a meter tape extended the length of the radius. The circular extent of the plot will then be estimated on the ground.

This survey is designed to reveal rough trends and is intended to be completed in no more than 15-30 minutes per point.

In the event that species cannot be identified in the field, vouchers can be collected following standardized procedures and submitted to the plant crew for proper identification.

Instructions:

1. **At the top of the data sheet, enter observer name.**
2. **Enter the date.**
3. **Enter the point number.**
4. **We will find that the point is often placed outside of the riparian zone. In this case, we will move the point center to as close to the center of the riparian zone as possible Based on observer's best judgment. Take a GPS reading and record the UTM's in NAD83. Include the error as well. If the topography precludes moving to the center of the site for the survey, all estimates can be made from a distance. In this case, enter the UTM's of the point and note that the estimates were made from a distance by circling Yes or No on the datasheet.**

5. **Estimate the distance from the stake to the point at which the data is taken.**
6. **From the point, extend a meter tape out 30m in order to establish a reference for the estimation of the circular survey plot.**
7. **Use the diagram to draw the riparian zone (this will be useful for estimating the percent of the circular area occupied by riparian habitat. It may also be used to simplify the estimations, as notes can be made as you walk the area counting snags and estimating coverages).**
8. **Enter the percent of the survey plot that contains the riparian vegetation.**
9. **From now on, all estimates will be *of the riparian zone only*.**
10. **Enter the percentage of the riparian area that contains water in the appropriate space for 'standing' and 'running.'**
11. **Count the number of snags in the riparian zone. Record the number of snags that are >10cm dbh and those that are ≤10 cm dbh. A snag refers to a standing, partly or completely dead tree, often missing a top or most of the smaller branches. These provide critical habitat for many species.**
12. **Count the number of logs (defined as course woody debris of diameter greater than 10cm).**
13. **Enter the vegetation type for the area outside of the riparian zone.**
    a. **This list should be limited to: CSS (Coastal Sage Scrub), chaparral, non-native grassland, pine forest (we can add to the list and update it weekly…). If you are unfamiliar with the non-riparian vegetation types common to this area, you can record the three dominant species (collect samples for identification if necessary).**
14. **Describe the adjacent land use.**
15. **The next section will involve quantifying the separate layers of the vegetation community.**
16. **The tree layer is the layer that is most likely dominated by trees, but which may contain other forms. Strictly speaking, it is defined by the height range of 5 m and above. This may include things such as wild grape vines hanging from trees. For this first layer, estimate the total % cover of the combined tree species in this category. We will make a similar estimation for all layers. It is important to be aware that these can overlap, so the total of all layers can and often will be over 100%.**
17. **Estimate the height of the tallest individual tree in this class (ignoring the super-canopy, to be defined later). Then estimate the average height of all members of this layer.**
18. **Now record the three most dominant species in this layer. Estimate their percent cover *of the layer*. For example, if the trees are willow, cottonwood and oak, I am estimating the % cover of the tree layer that is occupied by each species. Although the combined % cover of the tree layer may only be 50% of the riparian zone, we are looking at the variable within the class, so each of the tree species may have a total of 50% cover, for a total of 150% within the class (assuming there is overlap in the canopy).**
19. **Next, estimate the tallest height and the average height for each of the five most dominant species within the class.**
20. **Next record the super-canopy layer, if there is one. This will be a layer that stands out far above the rest. In our region, this will most likely be Sycamore trees.**

21. **Record the percent cover of this layer.**
22. **Estimate the tallest and average height for the layer.**
23. **Record the two most dominant trees in this class. If there is only one species in the class, enter "N/A" in the species 2 row. If there is no super canopy, enter "N/A" for all rows in this category.**
24. **Estimate the height of the tallest individual for each species in the class as well as the average height of all individuals for each species in the class. If there is only one tree, enter the tallest height in both height fields.**
25. **Do the same for the shrub layer. The shrub layer is defined as vegetation between 1 and 5 meters. This may include non-shrubby vegetation, such as *Arundo donax.***
26. **Estimate the percent cover for this layer.**
27. **Estimate the average height and the tallest height in the layer.**
28. **Record the three dominant species. Record the percent cover of each relative to this vegetation layer.**
29. **Record the tallest and average height of each of the three species within the class.**
30. **Next, estimate the percent cover of the herbaceous layer.**
31. **We will next indicate the dominate species of the herbaceous layer. We will define the dominant herb as any comprising greater than 50% of the herbaceous layer. If no herbaceous species comprises greater than this percentage of the cover in this layer (as will usually be the case), enter "N/A" on this line.**
32. **Now, we will enter percent cover for four classes of herbaceous vegetation. This last segment of the data will be estimated a bit differently. Since the height of these vegetation components may place them in either the herbaceous or the shrub layer, we will estimate their percent cover not of the herbaceous layer, but of the entire riparian zone. Do this for Sedges, Rushes, Typha (cattails), Grasses, and other Herbaceous Vegetation.**
33. **For each of the above classes, enter the estimated height of the tallest individuals and the average height within the class.**
34. **Finally, we will list the invasive species of concern that have not already been listed. Some of the most common species include Tamarisk, Arundo, and Lepidium.**
35. **Enter any other relevant information for the site in the Notes section. This may include access issues, pollutants, potential threats, or anything that may influence the site or our access to it.**