# MONITORING TRENDS IN A BREEDING BIRD ASSEMBLAGE WITH IMPLICATIONS FOR RIPARIAN CONSERVATION

Monitoring canaries in coal mines, and other bird populations, can uncover limits in habitat management. Over 14 years, a breeding bird assemblage showed substantial declines at a suburban wetland park in Central California. Of the seventy bird species observed here, twenty-five species were known to breed, and four are classified as riparian focal species for conservation. Species richness (5), species diversity (H') and species evenness (J') showed little variability among years, however total individuals of all species territories combined (N) showed statistically significant declines. Breeding bird censuses conducted from 1994

to 2008 showed substantial declines in eleven out of twenty-five species, those of notable conservation interest include common yellowthroat (Geothlypis trichas), Wilson's warbler (Wilsonia pusilla), and song sparrow (Melospiza melodia). These changes were not related to any measurable alteration in vegetation on the plot, but may be related to changes in habitat surrounding the site, or precipitation/climate. To our knowledge, this is the first long-term breeding bird census of a riparian habitat along the eastern shoreline of San Francisco Bay, California. Management recommendations to benefit the avifauna include adaptive management during monitoring, and expansion of the park's riparian habitat by enhancing plants in surrounding area restorations.

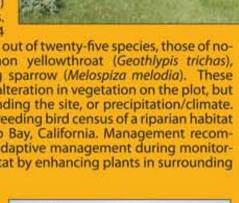
### **METHODS:**

In 1994, we established a Breeding Bird Census (BBC) plot in the park. A team of two or three individuals conducted the census following standard BBC procedures (Van Velzen 1972), recording all birds seen and heard. All counts were made in the early morning, starting about 0.5 hr before sunrise and ending 2.5-3 hr later, and were not conducted on days with heavy rain or strong winds. Sixteen visits were made during each breeding season (March to mid June), and re-

corded all birds seen and heard, giving a total of 96 BBC censuses during this study

Bird species that were observed at Cayote Hills Regional Park, Willow Grave plot (8.5 ha). Endangered, threatened and special status species are in bold. Status as a resident breeder within the park boundaries is signified as (b), all

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Territory boundaries were determined based on repeated behavioral occurrences (male singing and/or displays) and simultaneous singing. In addition, detection of nests, the carrying of nest material, and/or the feeding of offspring was used as evidence to confirm and support the number of territory boundaries. The number of bird territories provided a measure of breeding population density. Standardized methodology of BBC allows density estimates to be compared among different sites and among different years at the same site. Gaps in the research years are due to lack of time and funds, making annual censuses of the plot impractical, but provided two distinct blocks of data to com-

## Looking northeast from the top of Coyote Hills, the Visitor Center is to the right in the grove of trees. Williow Grove is up center.

- In western United States, 77 breeding bird species are identified as obligate or riparian dependent, and their occurrence serves as the standard to which areas can be compared (Rich 2002).
- California's riparian habitat provides important breeding and over winter grounds, migratory stopover areas and corridors for dispersal (Cogswell 1962, Gaines 1977, Ralph 1998, Humple and Geupel 2002, Flannery et al. 2004)

Differences in population densities between 1994 – 1998 and 2004 -2008 were expressed as

percentage change (after Canterbury and Blockstein 1997). The Mann-Whitney U statistical test was used to compare the degree of individual species change at the 90% (marginally significant) and 95% (statistically significant) confidence levels. Using the methods described by Yahner (1983) and Roffflinke et al. (1990), four measures of avian community structure were computed per year. These measures included mean species richness (S), species diversity (H), species evenness (J), and total number of individual territories (N, for separate or combined species). 5

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free Swatton	10.0		- 1	0.67			1.1	+.00.	33%
SOUTH JON	1.5	- 1	1.2	1.50	1.5			1.00	35%
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tong figurious	- 12	- 15	18	11.00		7.5	10.8	6.67	42%
Introduction Consists				241	2	11.0	1.0	1.00	-160%

Population Densities of breeding hird species at Coyate Hills Regional Park, Willow Grove plot (8.5 ha). Focal species for the Riparian Bird Conservation Plan are in italic/bold. Species with < 2 territories found in six seasons are excluded.

is the total number of species; H' is based on the Shannon index and  $J'=H'/\log S$  (after Dickson 1978). These measures of community structure for all years were compared using nonparametric Mann-Whitney U tests, at the 95% confidence level.

## RESULTS:

Bird community - Seventy bird species were observed during this 14-year study period, of which forty-six species are known to nest within Coyote Hills and twenty-five species attempted to breed on the site (Table 1). Based on relative population densities, the six most common species on the plot were, in decreasing order of abundance; song sparrow (Melospiza melodia) averaging 12 territories/8.5 ha, marsh wren (Cistothorus palustris) averaging 6 territories/8.5 ha, common yellowthroat (Geothlypis trichas) averaging 4.5 territories/8.5 ha; Bewick's wren (Thryomanes bewickii), mourning dove (Zenaida macroura), and bushtit (Psaltriprus minimus)

each at 3 territories/8.5 ha (Table 2). The entire breeding bird assemblages showed a markedly decrease in population density during this 14-year study period (Figure 1). In addition, three out of four of the highly important, Riparian Focal species (Figure 2) showed significant (95%) and marginally significant (90%) territory density declines. Throughout this study, the song sparrow remained the predominant species. The four variables describing the structure of the avian community in all six years (Table 3) showed little variability among years with the exception of individual species' territories, which showed a significant decline.

#### STUDY AREA:

We conducted this study at Coyote Hills Regional Park (hereafter: "Coyote Hills") in Fremont, California. Coyote Hills is 3.5 km long, almost 405 hectares in size, and contains one of the largest willow-dominated riparian woodlands, 8.5 hectares, remaining along the eastern shore of San Francisco Bay. Coyote Hills is part of the East Bay Regional Park District, a two-county special district with about 38,850 ha in Alameda and Contra Costa Coun-

Our study achieved some noteworthy goals: data collected established baseline information on the riparian breeding bird community that may serve as a basis for evaluating future findings, and our study demonstrated that with adequate planning, staff support, and trained vol-

unteers, ongoing long-term surveys can be an integral part of a resource stewardship pro-

Figure 2. The number of riparian focal species breeding bird territories Coyote Hills Regional Park, Willow Grove plot (8.5 ha). The Mann Whitney U-test revealed a significant difference for the Wilson's warbler and the song sparrow (tied p < 0.05) and marginally significant (tied p = 0.077) for the common yellowthroat.

Years

MANAGEMENT IMPLICATIONS:

gram. This study provides the first statistically sound, comprehensive assessment of the East Bay Regional Park District's riparian breeding bird community at Coyote Hills Regional Park and will serve as a basis for developing future park district surveys to assist in the conservation of nongame birds. Effective management of riparian vegetation and wildlife in the area can only occur through continued, wider, longterm monitoring to clearly understand physical factors that may be involved in causing the declines we observed.

Years	Richness (S)	Diversity (H')	Evenness (J')	Individuals (N)	
1994	19	2.31	1.81	52.5	
1995	21	2.58	1.91	58.5	
1998	22	2.43	1.81	71.5	
2004	18	2.49	1.99	42	
2005	16	2.48	2.06	32.5	
2008	17	1.77	1.43	36.5	
Level of Significance	0.18	0.83	0.51	0.049	

"probability of change by chance." (tied p) Avian community variables by year at Coyote Hills Regional Park, Willow Grove plot (8.5 ha) 1994 – 2008. Statistical Alpha (tied p) based on Mann-Whitney U-test (significant change when tied p < 0.05)

**AUTHORS** 

DAVID L. RIENSCHE East Bay Regional Park District Certified Wildlife Biologist® 950 Peralta Oaks Court, P.O. Box 5381

Oakland, CA 94605

UNIVERSITY

CALIFORNIA STATE CHRISTOPHER L. KITTING East Bay

E A S T B A Y 25800 Carlos Bee Blvd. Hayward, CA



MARTHA MORROW Ohlone Audubon Society 102 Sunnyside Ave.

MAGGIE CLARK Ohlone Audubon 3227 Rohrer Dr.

Contact Information Dave "Doc Quack" Riensche, at docquack@ebparks.org or call (\$10) 544-2319



pare, a decade apart. Lafayette, CA 94549 Piedmont CA U-test, n = 296 among six years, tied p < 0.05)

The number of breeding bird territories at Coyote Hills Regional Park Willow Grove plot (8.5 ha): The breeding bird population shows a