



Pilgrim Creek Restoration Project: Bird Community and Vegetation Structure

2001 Annual Report

Prepared for:

**State of California
Department of Transportation
District 11
San Diego, California**

**U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER**

Pilgrim Creek Restoration Project: Bird Community and Vegetation Structure

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I. INTRODUCTION

This report summarizes the results of bird and vegetation monitoring conducted in 2001 as part of a continuing project assessing the Pilgrim Creek Habitat Mitigation Site in San Diego County, California. The Mitigation Site supports natural stands of riparian and coastal sage scrub habitat, as well as planted vegetation intended to restore former expanses of these two habitat types in areas converted by agriculture. Protection of the existing habitats through acquisition, and the restoration of natural communities at the site, were undertaken as mitigation for impacts to riparian and coastal sage scrub habitat produced by a nearby highway expansion project (CalTrans 1995). The objective of the current monitoring is threefold: (1) monitor the status and productivity of least Bell's vireo (*Vireo bellii pusillus*), a State and Federally endangered riparian obligate, (2) evaluate the structural development of planted vegetation in the riparian restoration site with regard to its suitability for nesting vireos and other birds, and (3) quantitatively compare bird use of the restoration site to that of natural reference habitat along Pilgrim Creek with regard to species composition and abundance. This report represents the fifth of five annual evaluations planned by CalTrans to track progress towards the goal of creating habitat with the structural and functional attributes of natural riparian habitat (Kus 1997).

II. STUDY SITE AND METHODS

A. STUDY SITE

The study site is located along Pilgrim Creek, a tributary to the San Luis Rey River in northern San Diego County. The site is bordered to the west by Marine Corps Base Camp Pendleton, to the south by a golf course, and on the remaining sides by Douglas Drive and residential developments. The stretch of Pilgrim Creek on the site supports approximately 7 ha of willow-dominated riparian habitat along a narrow channel. Coastal sage scrub, including 14 ha of restored habitat, covers the slopes bordering the site to the west, and the center of the site supports riparian vegetation planted in 1996 within a 17-ha restoration area, as well as a 0.6-ha freshwater marsh. An additional small cell of planted riparian vegetation lies between Pilgrim Creek and Douglas Drive on the east side of the river.

B. METHODS

1. Least Bell's Vireo Monitoring

Least Bell's vireos were monitored between 15 March and 31 August 2001. Surveys were initiated early in the spring to determine the number, location and breeding status (paired or unpaired) of all singing males within the study area. Once pairs were located, they were observed for evidence of nesting. Nest locations were determined, and nests monitored throughout the period that they were active. Nests were checked during afternoon hours, and

their contents observed using mirrors suspended over the nest from distances of 1-2 m. Any cowbird eggs or young discovered in vireo nests were removed. Nests were visited as infrequently as possible to minimize disturbance to the vireos, and the potential for attracting predators or cowbirds to nest sites. Typically, the first visit to a nest was timed to determine the number of eggs laid, the second visit to determine the number and ages of nestlings present, and the third visit to band nestlings. Territories were visited throughout the season, and an attempt made to determine the number and fate of all nests produced.

Characteristics of nest sites were measured following abandonment of nests. Nest height to the nearest cm was recorded as the distance between the ground and the nest rim. The species of plant supporting the nest was also recorded.

Selected adults, mostly males, were captured in mist nets placed in the bird's territory, using song playbacks to draw the bird into the net. Any birds banded previously as nestlings at Pilgrim Creek or elsewhere were captured to determine identity, age, and natal history, and to re-band with a unique combination. Nestlings were not banded in 2001, as we anticipated that this was the final year of monitoring.

2. Vegetation Structure

Vegetation data were collected at points along permanently marked transects running perpendicular to Pilgrim Creek and arrayed to provide uniform coverage of the restoration site (Figure 1). Twenty-four transects were established in 1997 in habitat to the west of the river, and measured annually. An additional four transects were established in the restored habitat east of the creek in 1998 and measured annually thereafter. A total of 506 quads spaced at 10-m intervals along the transects were measured, yielding a sampling density of 30 quads per hectare (12 per acre). Foliage volume at 1-m height intervals was estimated using the "stacked cube" method, developed specifically to characterize canopy architecture in structurally diverse riparian habitat. By this method, field workers record percent cover of vegetation, by species, within 2- by 2- by 1-m high sampling volumes "stacked" vertically between the ground and the top of the canopy above the point. Four 2-m lengths of PVC pipe are placed on the ground to define the quadrat boundaries, and connectible lengths of PVC, marked at 1-m intervals, are used to determine height within the canopy. Percent cover is scored in the field using a modified Daubenmire (1959) scale with cover classes < 1, 1-10, 11-25, 26-50, 51-75, 76-90, and >90 percent. For analysis, cover codes were converted to class midpoints, which were then used to quantify vegetation structure at each sampling point, within each planting cell, and for the site as a whole.

In addition, vegetation structure data were collected at 54 points along 16 transects within the mature riparian habitat along Pilgrim Creek to provide a reference for the restored habitat, and to facilitate analyses examining relationships between habitat structure and bird densities in both sites.



Figure 1. Vegetation transects and irrigation cells, Pilgrim Creek restoration site.

Because the least Bell's vireo is the primary target of the mitigation project, habitat within the restoration site was assessed with regard to its suitability as vireo nesting habitat by comparing it to a model quantifying vireo habitat at major breeding populations in San Diego County (Kus 1998). The model was developed as a tool for evaluating whether sites unoccupied by vireos supported habitat suitable for nesting; that is, does the site fall within the range of habitat structure found within vireo nesting territories? The criteria established for making this determination requires that average cover at each height in the site under consideration fall within two standard deviations of the corresponding averages for known vireo nesting habitat, a range representing the 95 percent confidence interval of each mean (Snedecor and Cochran 1976). Sites failing to meet these criteria are considered unsuitable as nest sites for vireos.

3. Bird Surveys

Bi-weekly bird surveys of Pilgrim Creek were initiated in 1995 to provide baseline data on the riparian bird community at the site. Beginning in 1998, data collection was expanded to include the restored habitat, which by then was in its second growing season. Data collected along the creek in 2001 served as reference data with which to evaluate bird use of the restored habitat in the current year.

Birds were surveyed by observers following established routes designed to provide coverage of the entire sites. Species, age, sex, and behavior were recorded for every bird encountered, as were plant species and bird height for birds perched in vegetation. Any nests or nesting behavior observed during surveys were noted. Surveys were conducted during early morning hours, and typically lasted 2-3 hours in each habitat, which were surveyed on sequential days.

In addition to surveys of mature habitat along Pilgrim Creek and the restored riparian habitat, surveys of the coastal sage scrub uplands were conducted in the same manner and according to the same schedule. Although not systematically surveyed, birds using the freshwater marsh/pond were noted as well.

Building upon previous years' analyses, we assessed development of the restored riparian habitat by comparing bird communities in the restored and reference habitats. We expanded our analysis beyond comparisons of the sites in 2001 to include data from 2000, allowing temporal comparisons of the bird communities. Specifically, we compared changes in species richness and abundance of several guilds using the restored and reference sites. Birds were categorized relative to seasonal occurrence (year-round resident, migratory breeding species, migratory wintering species, and migrant/transient) based upon the species use of the Pilgrim Creek site, not necessarily their occurrence in the region as a whole. Only breeding species, both resident and migratory, were included in the analysis presented here, excluding

raptors and waterbirds whose association with the vegetative component of the habitats of interest here are weak. Birds were grouped for analysis into guilds describing (1) habitat preference, (2) vegetation structure association, and (3) foraging style, using Ehrlich *et al.* (1988), Unitt (1984), and our own experience to assign species to guilds. Habitat preference was defined to reflect a spectrum of habitat use from open country species to willow riparian specialists, and included five categories: open habitat and grasslands, shrublands, multiple habitats (e.g. habitat generalists), woodlands, and willow riparian habitat. Habitat structural association was categorized as “no structure”, describing species that inhabit open areas lacking vegetation, “variable” or generalists with regard to structure, “low” for species characteristically associated with low shrub cover independent of habitat type, “high” for species requiring a tall canopy associated with woodlands, and “high and low” describing those species dependent upon woodlands with a highly stratified canopy structure. Foraging style was assigned based upon the species’ primary feeding mode (Ehrlich *et al.* 1988) and condensed to four categories: hawk and/or hover-glean, bark glean, ground glean, and foliage glean.

Species richness was determined for the restoration and reference sites in each year, using only data for the breeding season (April-July). Species densities were calculated and expressed as the average number of individuals per survey per ha, using site areas calculated from coordinates obtained in the field using a Global Positioning System. Richness and density, both overall and by guild, were compared between the two sites using the ratio of each variable in the restoration site to the reference site, allowing us to control for any inter-annual variability in the reference habitat. The percent change in these ratios between 2000 and 2001 was compared across guilds, predicting that the greatest changes would occur in guilds most closely associated with particular habitat features undergoing change.

III. RESULTS AND DISCUSSION

A. Least Bell’s Vireo Monitoring

1. Population Size and Composition

The least Bell’s vireo population within the study site numbered 25 territorial males in 2001, including 22 pairs and three unpaired males (Figure 2, Table 1). The population increased by 39% from 2000, when 18 territories were present (Kus *et al.* 2001), the smallest the population had been since monitoring began in 1996 (Kus *et al.* 1999). Vireos occupied all of the habitat they occupied in 2000, but increased in density, particularly in the mature habitat along the southeast periphery of the restored habitat to the west side of Pilgrim Creek, and in Cell 16 of the restored habitat east of the creek (Figure 2).

Thirteen territories were established within the restored riparian habitat (Figure 2), an increase of 62% over the number (eight) in restored habitat in 2000 (Kus *et al.* 2001). Five of these were situated entirely within restored vegetation, including territories 1 and 17, both



Figure 2. Least Bell's Vireo Territory Locations at Pilgrim Creek, 2001.

these were situated entirely within restored vegetation, including territories 1 and 17, both occupied since 1999, territory 16, occupied since 2000, and territories 4 and 5, wholly contained for the first time in planted vegetation in cell 16. Eight territories, virtually all of those bordering restored vegetation, included roughly equal extents of mature and restored habitat within their boundaries. Cell 16 and the adjacent creek habitat supported four territories in 2001, double the number in this area in 2000. All but two (territories 5 and 17) of the territories in restored habitat were occupied by pairs, all of which nested. A total of five nests were placed in restored vegetation.

Table 1.
Status and Territory ID of Least Bell=s Vireos, Pilgrim Creek, 2001

Map Code	Status ^a	Comments ^b	Map Code	Status ^a	Comments ^b
1	P		14	P	M=2140-39233
2	P		15	P	M=Mblk
3	P	M=1890-35259	16	P	
4	P		17	S	
5	S		18	P	M=2070-14823
6	S		19	P	F=2140-39355
7	P		20	P	
8	P	M=2070-14869	21	S	
9	P		22	P	M=1960-42415
10	P	M=2140-39236	23	P	
11	P	M=2070-14885	24	S	
12	P	M=banded ^c	25	P	
13	P	F=1710-58811			

^aP=pair, S=single male.

^bM=male, F=female. Number is federal band number. Mblk@=black anodized federal band.

^cExact band combination not determined.

Nine of the 25 males and two of the 22 females breeding at Pilgrim Creek in 2001 were birds banded in previous years (Table 1). The majority of these birds were banded at the site as adults of unknown age; however, five were banded as nestlings in territories along Pilgrim Creek (2), the San Luis Rey River (2), and the Sweetwater River (1), and their precise ages and natal sites are thus known (Table 2). The eldest of these is a male nine years old, one of four banded males present at Pilgrim Creek at the onset of the study in 1996. A second male was six years old in 2001 and had been present in the same territory since 1997. The other three birds were one year old and included a female from the Sweetwater River, and a male and female both fledged from the Pilgrim Creek study area in 2000. One additional male in the study area was banded for the first time as an adult in 2001.

Table 2.
Histories of Banded Least Bell's Vireo Males at Pilgrim Creek, 1996-2001

1996			1997			1998			1999			2000			2001		
Band Number	Age (yrs)	Natal Site	Band Number	Age (yrs)	Natal Site	Band Number	Age (yrs)	Natal Site	Band Number	Age (yrs)	Natal Site	Band Number	Age (yrs)	Natal Site	Band Number	Age (yrs)	Natal Site
1890-35259	4	SLR ^c	C>	5		C>	6		B>	7		->	8		->	9	
1650-30078	2	?															
2080-53440 ^a	AHY	?	C>	?													
2080-33444	AHY	?	C>	?													
			1960-42415	2	SLR	C>	3		B>	4		->	5		->	6	
			2080-53428	1	PIL	C>	2		B>	3							
			2070-14812	AHY	?	C>	?		B>	3							
			2070-14813	AHY	?	C>	?										
			2070-14814	AHY	?	C>	?		B>	3							
			2070-14815	AHY	?	C>	?		B>	3							
			2070-14816	AHY	?	C>	?										
			2070-14817	AHY	?	C>	?										
			2070-14818	AHY	?	C>	?		B>	3		->	4			35	
			2070-14819	AHY	?	C>	?										
			2070-14820	AHY	?	C>	?										
			2070-14821	AHY	?	C>	?										
			1650-60041	AHY	?												
						2070-14823	AHY	?	B>	?		->	3		->	4	
						2070-14824	AHY	?									
						2070-14825	AHY	?									
						2070-14826	AHY	?									
						2070-14836	AHY	?									
						2070-14837	AHY	?									
						2070-14838	AHY	?	B>	?							
						2070-14840 ^d	AHY	?									
						2070-14868	AHY	?	B>	?							
						2070-14869	AHY	?	B>	?		->	3		->	4	
									2070-14885	AHY	?	->	?		->	?	
									2070-14900	AHY	?						
									2140-39231 ^d	AHY	?						
												2190-52233	1	SLR			
												Mdb ^d	1	SLR			
												2140-39305 ^d	1	PIL			
												2140-39354	AHY	?			
												2140-39233	AHY	?			
												2140-39235	AHY	?			
												2140-39236	AHY	?			
															->	?	
															1710-58811 ^d	1	SWE
															2140-39355 ^d	1	PIL
															Mblk	1	PIL
															2140-39365	AHY	?

^aBand numbers in italics indicate adults banded that year at Pilgrim Creek.

^bAHY = adult of unknown age.

^cSLR = San Luis Rey River, SWE = Sweetwater River, PIL = Pilgrim Creek study area.

^dSex = female.

2. Nesting Activity

a. *Type and Number of Nests*

A total of 32 nests were documented, including one incomplete nest and 31 completed nests. Of the completed nests, 29 were monitored, although two of these (territories 6 and 8) in dense vegetation were not approached closely enough to view their contents because it was not possible to do so without leaving a trail. The two unmonitored nests included one that was not located but known to have existed by the appearance of fledglings with a pair suspected of nesting (territory 16), and another that was located after it had failed (territory 7). Pairs averaged 1.4 completed nests per season, comparable to the 1.5 nests per season documented in 2000 (Kus *et al.* 2001).

b. *Nest Initiation*

Nesting commenced during the first week of April, slightly earlier than in 2000. Fifty percent of pairs (11/22) had initiated nesting by 30 April, and 82% (18/22) by 15 May. Four pairs (18%) initiated first nests as late as June; otherwise, all nests after mid-May were re-nesting attempts.

c. *Nesting Effort by Pairs*

The majority of nests observed in 2001 represented first nesting attempts, and only 32% of the population attempted more than one nest (Table 3). Pairs in 2001 were less likely to re-nest than pairs in 2000, when 47% of pairs nested more than once (Kus *et al.* 2001). One pair (territory 3) initiated a nest but did not finish it, and failed to produce any completed nests. No pairs in 2001 double-brooded (fledged young from more than one nest).

Table 3.
Number of Completed Nests Produced by Least Bell=s Vireo Pairs,
Pilgrim Creek, 2001

Number of Completed Nests	Number of Pairs
0	1 (0.05) ^a
1	14 (0.64)
2	4 (0.18)
3	3 (0.14)
TOTAL	22

^aNumbers in parentheses are proportions of total pairs.

d. Nesting Success

Fifty-two percent of monitored nests (15/29) successfully fledged young, identical to the rate documented in 2000 (Kus *et al.* 2001) and consistent with success rates observed in previous years (Kus *et al.* 1998, 2000). As in the past, the majority of nest failures were attributed to predation (86% of failed nests; Table 4). Three nests failed for undetermined reasons: one was found abandoned with one egg (of a 2-egg clutch), one was abandoned with one egg after removal of a cowbird egg from the 2-egg (not including cowbird egg) clutch (see below), and one was not located until after it had failed. It is possible that all three of these nests were depredated, but this was not confirmed. Nest failures occurred in roughly equal proportions during the egg and nestling stages (Table 5), similar to 2000.

Table 4.
Cause of Failure of Unsuccessful Least Bell's Vireo Nests,
Pilgrim Creek, 2001

Cause of Failure	Number of Nests
Predation	12
Parasitism	0
Other ^a	3
Total Failed Nests	14
Total Monitored Nests	29

^aSee text for explanation.

Table 5.
Stage of Failure of Unsuccessful Least Bell's Vireo Nests,
Pilgrim Creek, 2001

Stage of Failure	Number of Nests
Pre-laying/eggs ^a	1 (0.07) ^b
Eggs	5 (0.36)
Eggs/Nestlings ^a	4 (0.29)
Nestlings	4 (0.29)
Total Failed Nests	14

^aExact stage of failure not known.

^bNumbers in parentheses are proportions of total number of failed nests.

e. Parasitism by Brown-headed Cowbirds

Seven nests in six territories were parasitized by brown-headed cowbirds, the first

occurrence of parasitism of vireos at Pilgrim Creek since monitoring began in 1997. Parasitism occurred between mid-April and late June, and was concentrated in habitat southeast of the restoration site (territories 10, 11, 14,15, 19, and 21). Six of the seven parasitized nests remained active following removal of cowbird eggs by field investigators; of these, three were later depredated, and three were successful, fledging a total of nine young. A seventh nest from which a cowbird egg was removed was later found abandoned with one vireo egg. It could not be determined whether this nest remained active and experienced partial depredation, or was abandoned in response to the parasitism and associated egg removal, which can occur when cowbird eggs are laid in small vireo clutches (Kus 1999).

Table 6.
Reproductive Success and Productivity of Least Bell's Vireos,
Pilgrim Creek, 2001

Parameter	Total Number
Nests with eggs	26
Eggs laid	86
Average clutch size ^a	3.6 ± 0.5
Hatchlings	57
Nests with hatchlings	17
Hatching success:	
Eggs ^b	66%
Nests ^c	65%
Fledglings	45
Nests with fledglings	13
Fledging success:	
Hatchlings ^d	79%
Nests ^e	77%
Fledglings per egg	0.52
Fledglings per nest ^f	1.7
Fledglings per pair	2.4
Pairs fledging \geq one young	16

^aBased upon 19 non-parasitized nests seen with full clutches.

^bPercentage of all eggs that hatched.

^cPercentage of all nests in which at least one egg hatched.

^dPercentage of all hatchlings that fledged.

^ePercentage of all nests with hatchlings in which at least one young fledged.

^fIncludes eight fledglings from three nests not seen (1) or approached to view contents (2).

f. *Reproductive Success and Productivity*

Clutch size (based on 19 unparasitized nests observed with full clutches) averaged 3.6 ± 0.5 eggs per nest (Table 6), as in 2000 (Kus *et al.* 2001). Hatching rate was lower than in 2000 (76% of eggs, 81% of nests with eggs), but fledging rate was higher (64% of nestlings, 65% of nests with nestlings). Overall, pairs produced 0.52 fledglings per egg, comparable to the 0.49 produced by pairs in 2000.

Seasonal productivity of vireos averaged 2.4 fledglings per pair, consistent with productivity documented in previous years when pairs produced from 2.1 to 2.9 young per season (Kus *et al.* 1999, 2000, 2001). Seventy-three percent of pairs (16/22) fledged one or more vireo young, again consistent with previous years.

3. Nest Site Characteristics

The average height of vireo nests in the study area in 2001 was 1.0 ± 0.4 m (Table 7), comparable to previous years (Kus *et al.* 1999; Kus *et al.* 2000, 2001). Vireos placed nests in a total of six different species, with the majority of nests placed in *Salix lasiolepis* (Arroyo Willow) and *Baccharis glutinosa* (Mule Fat).

Table 7.
Plant Species Used as Nest Support by Least Bell's Vireos,
Pilgrim Creek, 2001

Species	Number of Nests
<i>Salix lasiolepis</i>	14
<i>Salix gooddingii</i>	4
<i>Salix exigua</i>	2
<i>Baccharis glutinosa</i>	8
<i>Platanus racemosa</i>	2
<i>Rosa californica</i>	1
Total	31

B. Vegetation Structure

Foliage cover in the reference habitat along Pilgrim Creek was slightly greater at nearly all heights than in 2000, but the overall canopy structure remained unchanged (Figure 3). Vegetation in the restored habitat continued to grow in height and increased in cover in the upper canopy, but declined in cover in the lower canopy, particularly between 0-2 m (Figure 4). Canopy development in the restoration site differed relative to the preceding year when foliage cover increased substantially at all heights.

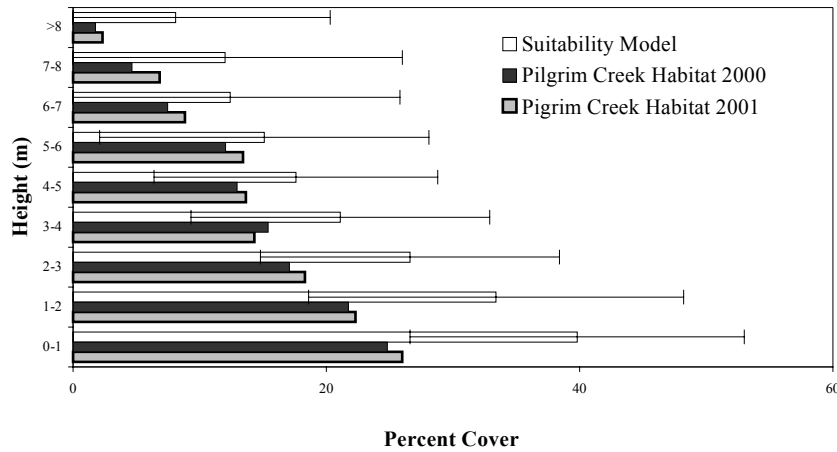


Figure 3. Average percent cover by height: Pilgrim Creek, 2000-2001.

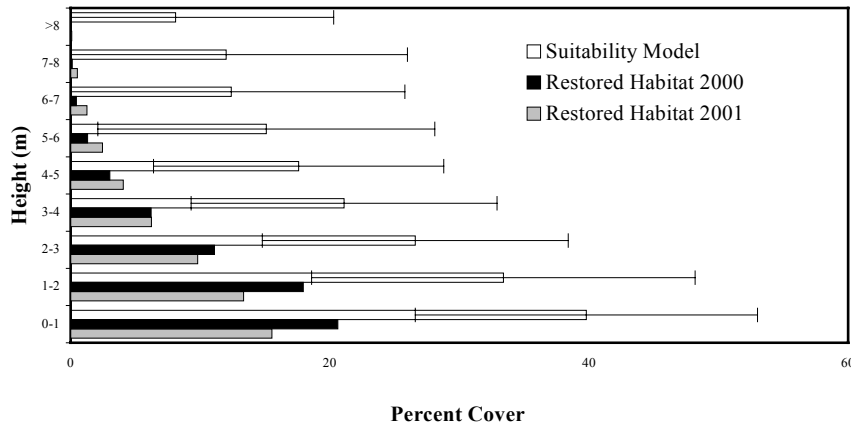


Figure 4. Average percent cover by height: restored habitat, 2000-2001.

Declines in low canopy cover occurred throughout the restoration site, and did not appear to be limited to any particular area (Figure 5). Cells 1 and 2 were the only ones to increase in low canopy cover in 2001. Similarly, most cells exhibited increases in vegetation cover in the upper canopy. Habitat structure continues to be non-uniform across cells (Figures 5,6), with canopy development progressing more rapidly in the northern cells (1-9, 16) than in the southern cells (10-15), and along the western margins of cells 10-15 than in their interior areas. Two cells (1 and 16) meet the habitat suitability model's criteria at all heights; these cells supported all or part of two and four vireo territories, respectively, in 2001, double the number of territories in these cells in 2000. Vireos continued to occupy territories in cells 5-6 and 10, despite a slight reduction in their apparent suitability with regard to low canopy cover.

Figure 5
Average Percent Cover by Height of Restored Habitat: Cell-by-cell Assessment

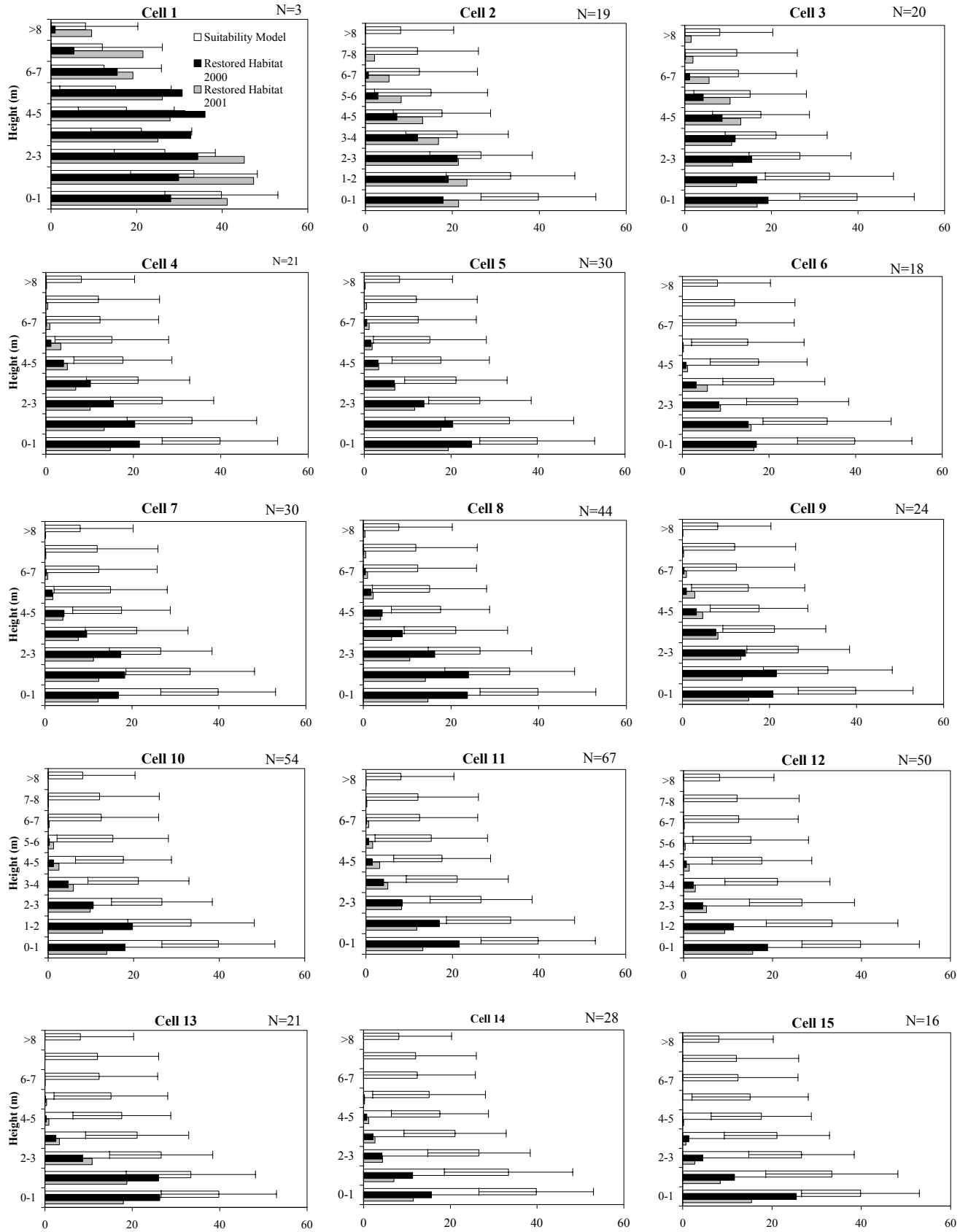


Figure 5 (Continued)
Average Percent Cover by Height of Restored Habitat: Cell-by-cell Assessment

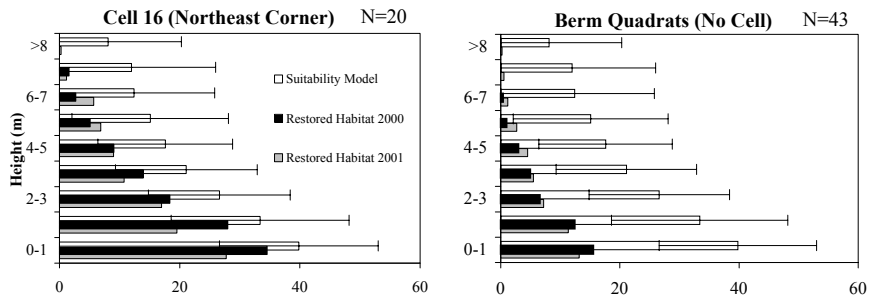




Figure 6. Pilgrim Creek Study Area, March 2000.

C. Bird Community

1. 2001 Overview

The Pilgrim Creek study area is used by a large and diverse group of birds, including landbirds, shorebirds, waterfowl, and raptors. Eighty-eight species were detected at the site in 2001 (Table 8), including two new species (merlin; *Falco columbarius* and Brewer's sparrow; *Spizella breweri*), bringing the total number documented since 1995 to 136 (Appendix 1). Of these 88 species, 57 (excluding flyovers) occurred in the riparian habitat along Pilgrim Creek, and 65 occurred in the restored riparian vegetation. While the number of species detected in the restored habitat was similar to the number observed in 2000 (68), the number using the reference habitat along the creek declined from the 69 species recorded the previous year, largely through the absence of several species of waterbirds, raptors, and swallows. As in previous years, the proportion of shared species between the two habitats was low, with only 52% of species occurring in both habitats.

Table 8. Bird species detected at Pilgrim Creek, 2001

Common Name	Species Code	Habitat Affinity ^a	Seasonal Occurrence ^b	Detected				
				Anywhere at Site ^c	Reference Habitat ^{d,e}	Riparian Reference Habitat ^{d,f}	Restored Riparian Habitat ^{d,f}	Restoration Pond ^{d,g}
Mallard	MALL	W	R	✓			✓	✓
American wigeon	AMWI	W	W	✓			✓	✓
Green-winged teal	AGWT	W	W	✓			✓	✓
Cinnamon teal	CITE	W	W	✓			✓	✓
White-faced ibis	WFIB	W	R	✓			✓	✓
Great blue heron	GBHE	W	R	✓	✓		✓	
Great egret	GREG	W	R	✓			✓	✓
Black-crowned night heron	BCNH	W	R	✓			✓	✓
Sora	SORA	W	W	✓			✓	
Common snipe	COSN	W	W	✓			✓	✓
Least sandpiper	LESA	W	W	✓			✓	
Greater yellowlegs	GRYE	W	W	✓			✓	
Killdeer	KILL	O	R	✓	✓	✓	✓	
Mourning dove	MODO	G	R	✓	✓	✓	✓	
White-tailed kite	WTKI	G	R	✓	✓	✓		
Northern harrier	NOHA	G	R	✓	✓		✓	
Sharp-shinned hawk	SSHA	G	W	✓	✓		✓	
Cooper's hawk	COHA	D	R	✓	✓	✓		
Red-tailed hawk	RTHA	G	R	✓	✓	✓		
Red-shouldered hawk	RSHA	D	R	✓	✓	✓		
American kestrel	AMKE	G	R	✓	✓			
Merlin	MERL	G	W	✓	✓			
Barn owl	BNOW	G	R	✓			✓	
California quail	CAQU	G	R	✓	✓		✓	

Table 8 (continued). Bird species detected at Pilgrim Creek, 2001

Common Name	Species Code	Habitat Affinity ^a	Seasonal Occurrence ^b	Detected				
				Anywhere at Site ^c	Reference Habitat ^{d,e}	Riparian Reference Habitat ^{d,f}	Restored Riparian Habitat ^{d,f}	Restoration Pond ^{d,g}
Greater roadrunner	GRRO	G	R	✓	✓		✓	
Downy woodpecker	DOWO	D	R	✓	✓	✓	✓	
Nuttall's woodpecker	NUWO	D	R	✓	✓	✓	✓	
Northern flicker	NOFL	D	R	✓	✓	✓	✓	
Vaux's swift	VASW	A	M/T	✓			✓	
White-throated swift	WTSW	A	R	✓	✓	✓	✓	
Black-chinned hummingbird	BCHU	D	B	✓	✓	✓		
Costa=s hummingbird	COHU	G	B	✓			✓	
Anna's hummingbird	ANHU	G	R	✓	✓	✓	✓	
Cassin's kingbird	CAKI	O	R	✓	✓	✓	✓	
Ash-throated flycatcher	ATFL	G	B	✓	✓	✓	✓	
Say's phoebe	SAPH	O	W	✓	✓	✓	✓	
Black phoebe	BLPH	G	R	✓	✓	✓	✓	
Pacific-slope flycatcher	PSFL	D	B	✓	✓	✓	✓	
Willow flycatcher	WIFL	D	B	✓	✓	✓		
Common raven	CORA	G	R	✓	✓	✓		
American crow	AMCR	G	R	✓	✓	✓	✓	
European starling	EUST	H	R	✓	✓	✓		
Brown-headed cowbird	BHCO	G	B	✓	✓	✓		
Red-winged blackbird	RWBL	G	R	✓	✓	✓	✓	
Western meadowlark	WEME	O	R	✓				
Hooded oriole	HOOR	G	B	✓	✓	✓		
Bullock's oriole	BUOR	G	B	✓	✓			
Great-tailed grackle	GTGR	G	R	✓	✓	✓		
House finch	HOFI	G	R	✓	✓	✓	✓	
American goldfinch	AMGO	D	R	✓	✓	✓	✓	
Lesser goldfinch	LEGO	G	R	✓	✓	✓	✓	
Savannah sparrow	SAVS	O	W	✓			✓	
White-crowned sparrow	WCSP	G	W	✓	✓	✓	✓	
Brewer=s sparrow	BRSP	O	M/T	✓			✓	
Song sparrow	SOSP	G	R	✓	✓	✓	✓	
Lincoln's sparrow	LISP	G	W	✓	✓	✓	✓	
Spotted towhee	SPTO	G	R	✓	✓	✓	✓	
California towhee	CALT	G	R	✓	✓	✓	✓	
Black-headed grosbeak	BHGR	D	B	✓	✓	✓	✓	
Blue grosbeak	BLGR	G	B	✓	✓	✓	✓	
Lazuli bunting	LAZB	G	B	✓	✓	✓	✓	
Western tanager	WETA	D	M/T	✓	✓			
Cliff swallow	CLSW	A	B	✓	✓	✓	✓	
Tree swallow	TRES	D	B	✓	✓	✓	✓	
Violet-green swallow	VGSW	A	B	✓			✓	

Table 8 (continued). Bird species detected at Pilgrim Creek, 2001

Common Name	Species Code	Habitat Affinity ^a	Seasonal Occurrence ^b	Detected				
				Anywhere at Site ^c	Reference Habitat ^{d,e}	Riparian Reference Habitat ^{d,f}	Restored Riparian Habitat ^{d,f}	Restoration Pond ^{d,g}
Northern rough-winged swallow	NRWS	A	B	✓	✓			
Hutton's vireo	HUVI	D	R	✓	✓	✓	✓	
Least Bell's vireo	LBVI	D	B	✓	✓	✓	✓	
Nashville warbler	NAWA	D	M/T	✓	✓	✓		
Orange-crowned warbler	OCWA	D	R	✓	✓	✓	✓	
Yellow warbler	YWAR	D	B	✓	✓	✓	✓	
Yellow-rumped warbler	YRWA	G	W	✓	✓	✓	✓	
Black-throated gray warbler	BTYW	D	M/T	✓	✓	✓		
Common yellowthroat	COYE	G	R	✓	✓	✓	✓	
Yellow-breasted chat	YBCH	D	B	✓	✓	✓	✓	
Wilson's warbler	WIWA	D	B	✓	✓	✓		
Loggerhead shrike	LOSH	G	R	✓			✓	
California thrasher	CATH	G	R	✓	✓		✓	
Bewick's wren	BEWR	G	R	✓	✓	✓	✓	
House wren	HOWR	D	B/W	✓	✓	✓	✓	
Marsh wren	MAWR	W	R	✓			✓	
Wrentit	WREN	G	R	✓	✓	✓	✓	
Bushtit	BUSH	G	R	✓	✓	✓	✓	
Ruby-crowned kinglet	RCKI	D	W	✓	✓	✓	✓	
Blue-gray gnatcatcher	BGGN	G	W	✓	✓	✓	✓	
California gnatcatcher	CAGN	G	R	✓	✓			
Hermit thrush	HETH	G	W	✓	✓	✓	✓	
American robin	AMRO	H	R	✓	✓	✓	✓	
Total Species				88	69	57	65	8

^a A = aerial, W = wetland, O = open habitat, G = scrub or habitat generalist, D = woodland

^b R = resident (All year), B = breeding (Spring/Summer), W = winter (Fall/Winter), M/T = migrant/transient

^c Includes flyovers and aerial foragers, all habitats

^d Does not include flyovers or aerial foragers

^e Includes all habitats (riparian, coastal sage scrub, wetland)

^f Does not include coastal sage scrub

^g Includes only wetland species

2. Development of Riparian Bird Community: 2000-2001

Of the total species using the study site in 2000 or 2001, 42 breeders or potential breeders were selected for further analysis and assigned to guilds (Table 9).

Table 9.
Guild Assignments of Breeding Birds at Riparian Restoration and Reference Sites, Pilgrim Creek

Common Name	Habitat Preference	Habitat Structure	Foraging Mode
		Association ¹	
California quail	Shrubland	L	Ground glean
Killdeer	Open / Grassland	N	Ground glean
Mourning dove	Multiple	V	Ground glean
Greater roadrunner	Shrubland	L	Ground glean
Downy woodpecker	Willow Riparian	H/L	Bark glean
Nuttall's woodpecker	Woodland	H	Bark glean
Black-chinned hummingbird	Woodland	H/L	Hawk, hover glean
Costa's hummingbird	Shrubland	V	Hawk, hover glean
Anna's hummingbird	Multiple	H/L	Hawk, hover glean
Western kingbird	Open / Grassland	V	Hawk, hover glean
Ash-throated flycatcher	Multiple	H/L	Hawk, hover glean
Black phoebe	Multiple	V	Hawk, hover glean
Pacific-slope flycatcher	Woodland	H	Hawk, hover glean
Willow flycatcher	Willow Riparian	H/L	Hawk, hover glean
Common raven	Multiple	V	Ground glean
American crow	Multiple	V	Ground glean
Red-winged blackbird	Multiple	V	Ground glean
Hooded oriole	Multiple	H/L	Foliage glean
Bullock's oriole	Woodland	H	Foliage glean
Great-tailed grackle	Multiple	V	Ground glean
House finch	Multiple	V	Ground glean
American goldfinch	Willow Riparian	H/L	Foliage glean
Lesser goldfinch	Multiple	V	Foliage glean
Song sparrow	Multiple	L	Ground glean
Spotted towhee	Multiple	H/L	Ground glean
California towhee	Multiple	V	Ground glean
Black-headed grosbeak	Woodland	H	Foliage glean
Blue grosbeak	Multiple	H/L	Ground glean
Lazuli bunting	Multiple	H/L	Ground glean
Hutton's vireo	Woodland	H	Foliage glean
Least Bell's vireo	Willow Riparian	H/L	Foliage glean
Orange-crowned warbler	Woodland	H/L	Foliage glean
Yellow warbler	Willow Riparian	H	Foliage glean
Common yellowthroat	Multiple	L	Foliage glean
Yellow-breasted chat	Willow Riparian	H/L	Foliage glean
Wilson's warbler	Woodland	H/L	Foliage glean
California thrasher	Shrubland	L	Ground glean
Bewick's wren	Multiple	H/L	Ground glean
House wren	Woodland	H/L	Ground glean
Wrentit	Multiple	L	Foliage glean
Bushtit	Multiple	H/L	Foliage glean
Swainson's thrush	Willow Riparian	H/L	Foliage glean

¹N = No structure; L = Low structure; H = High structure; H/L = High & Low; V = Variable

Species richness of breeders in the restored habitat, which in 2000 exceeded that in the reference habitat (34 and 33 species, respectively), declined to 31 species in 2001, while richness in the reference habitat remained the same (Table 10). The proportion of shared species declined

slightly from 72% (28/39) in 2000 to 68% (26/38) in 2001.

Table 10.
Species Richness, by Guild, of Breeding Birds in Restored and Reference Riparian Habitats

Guild	# Species in Guild	Reference		Restoration		# Shared Species		Rest./Ref.		% Change in Rest./Ref.	
		2000	2001	2000	2001	2000	2001	2000	2001		
Habitat Preference	Open / Grassland	2	0	0	2	2	0	0	-	-	-
	Shrubland	4	0	0	2	4	0	0	-	-	-
	Multiple	20	18	19	15	16	14	16	0.83	0.84	0.01
	Woodland	9	9	8	9	5	9	5	1.00	0.63	-0.38
	Willow Riparian	7	6	6	6	5	5	5	1.00	0.83	-0.17
Structural Preference	No structure	1	0	0	1	1	0	0	-	-	-
	Variable	11	8	8	7	8	6	7	0.88	1.00	0.14
	Low	6	3	3	5	6	3	3	1.67	2.00	0.20
	High & Low	18	16	17	15	11	13	11	0.94	0.65	-0.31
	High	6	6	5	6	5	6	5	1.00	1.00	1.00
Primary Foraging Mode	Hawk, Hover-glean	8	5	6	6	4	4	3	1.20	0.67	-0.44
	Bark Glean	2	2	2	2	2	2	2	1.00	1.00	0.00
	Ground Glean	17	11	12	12	14	8	11	1.09	1.17	0.07
	Foliage Glean	15	15	13	14	11	14	11	0.93	0.85	-0.09
Total	All Breeders	42 ¹	33	33	34	31	28	26	1.03	0.94	-0.09

¹Total for both years combined. 39 species present in 2000; 38 present in 2001.

We used changes in the vegetation structure of the restored habitat between 2000 and 2001 to make predictions about changes in bird species richness and density during the same period. Specifically, we predicted a decline in species associated with low canopy cover ("low structure"), and an increase in species associated with high canopy ("high structure"), reflecting the decline in vegetative cover in the 0-2m height range, and the increase in canopy height quantified through our vegetation sampling. Changes in species associated with both high and low cover ("high and low") were not possible to predict, since these two habitat components differed in their direction of change. We expected that changes would be more evident in bird density than in species richness, since the latter parameter is so influenced by additions or deletions of species represented by the occurrence of just a single individual.

Species richness of the low structure guild in the reference habitat did not change between 2000 and 2001 (three species), and increased from five to six species in the restored habitat (Table 10). Richness of the high structure guild in both habitats was identical in 2000 and 2001. In contrast, the number of species associated with a vertically stratified canopy with both high and low cover declined by 27% in the restored habitat, dropping from 15 species in 2000 to 11 species in 2001, substantially higher than the 6% decline in richness in the reference habitat.

As a result, the similarity between the restored and reference sites with regard to this component of the bird community dropped by 31%. The high and low habitat structure specialists present in the restoration site in 2000 but absent in 2001 were black-chinned hummingbird (*Archilochus alexandri*), willow flycatcher (*Empidonax traillii*), hooded oriole (*Icterus cucullatus*), and Wilson=s warbler (*Wilsonia pusilla*).

Changes in bird densities matched the predictions for the low cover and high cover structural preference guilds (Table 11). Although densities of low cover species declined between 2000 and 2001 in both the reference and restored habitats, the decline was proportionately greater in the latter habitat, with the result that the similarity between the two habitat types was reduced by 24%. In contrast, densities of the high cover and high and low cover guilds increased in 2001, increasing the similarity between the restored and reference habitat by 64% and 22%, respectively.

Table 11.
Density (ave. # individuals/survey/ha), by Guild, of Breeding Birds in Restored and Reference Riparian Habitats

Guild		Reference		Restoration		Rest./Ref.				% Change in Rest./Ref.
		2000	2001	2000	2001	2000	P	2001	P	
Habitat Preference	Open / Grassland	0.00	0.00	0.03	0.04	-	0	-	NS	-
	Shrubland	0.00	0.00	0.03	0.05	-	0	-	0	-
	Multiple	13.80	12.30	7.54	6.69	0.55	****	0.54	****	-0.01
	Woodland	1.46	1.63	0.14	0.17	0.10	**	0.10	***	0.02
	Willow Riparian	4.50	3.59	0.90	0.83	0.20	****	0.23	****	0.13
Structural Preference	No structure	0.00	0.00	0.02	0.04	-	NS	-	NS	-
	Variable	3.39	2.41	1.45	1.20	0.44	**	0.50	***	0.12
	Low	7.52	7.02	4.88	3.69	0.65	**	0.53	****	-0.24
	High & Low	6.73	6.14	2.17	2.53	0.32	****	0.41	****	0.22
Primary Foraging Mode	High	2.12	1.96	0.12	0.31	0.06	****	0.16	***	0.64
	Hawk, Hover-glean	1.25	1.39	0.33	0.75	0.26	***	0.54	**	0.52
	Bark Glean	0.36	0.27	0.03	0.06	0.08	**	0.22	**	0.63
	Ground Glean	6.50	5.65	3.68	2.74	0.57	**	0.48	****	-0.18
	Foliage Glean	11.66	10.22	4.62	4.22	0.40	****	0.41	****	0.04
Total	All Breeders	21.20	19.76	6.46	8.65	0.30	****	0.44	****	0.44

* P < 0.05, ** P < 0.01, *** P < 0.001, **** P < 0.0001; one-tailed t-tests comparing density in the restored habitat to density in the reference habitat for a given year.

Other notable changes in the bird community using the restored habitat between 2000 and 2001 included a decline in the species richness of the hawk/hover foraging guild (Table 10), coupled with an increase in bird density in this guild (Table 11). The decline in species richness is attributable to the absence of willow flycatchers and black-chinned hummingbirds from the restoration site in 2001 (see above); nevertheless, densities of the remaining species more than doubled relative to the previous year. Densities of bark gleaners, a guild represented by two woodpecker species, also doubled between 2000 and 2001, increasing the similarity between the

restored and reference sites, although the similarity remains comparatively low.

Previous analyses of guild structure in restored and reference habitats (Kus et al. 2001, Kus and Beck in press) identified a group of 13 species that collectively better reflect habitat change in restored vegetation better than all but one of the 14 individual guilds examined. Analysis of this group in 2001 revealed a decline in similarity between the two habitat types with regard to species richness, but an increase in similarity with regard to bird densities, which more than doubled in the restoration site relative to 2000.

Table 12.
Species Richness and Density (ave. # individuals/survey/ha) of Habitat Change Indicator Species in Restored and Reference Riparian Habitats

Component Species	Reference		Restoration		Rest./Ref.		% Change in Rest./Ref.
	2000	2001	2000	2001	2000	2001	
Black-chinned hummingbird	<i>Species Richness</i>						
Pacific-slope flycatcher	12	11	12	8	1.00	0.73	-0.27
Willow flycatcher							
Bullock's oriole							
American goldfinch	<i>Density</i>						
Black-headed grosbeak	5.37	4.73	1.00	2.15	0.19	0.45	1.44
Hutton's vireo							
Least Bell's vireo							
Orange-crowned warbler							
Yellow warbler							
Yellow-breasted chat							
Wilson's warbler							
Swainson's thrush							

IV. CONCLUSIONS

The Pilgrim Creek study area continues to support a large and diverse community of riparian and upland birds, including several endangered and sensitive species. Least Bell's vireos, a species of particular management concern at the site, increased in number in 2001, achieving a population size typical of years prior to 2000. Vireos continue to expand beyond the habitat along Pilgrim Creek into the riparian restoration site, with over half the population establishing at least part of their territories in planted vegetation. Nesting success and productivity continue to be high as documented at the site in previous years.

Cowbird parasitism of vireo nests in the study area was observed for the first time since monitoring began in 1997. Although seven of 29 monitored nests were parasitized, removal of cowbird eggs allowed three of these nests to eventually fledge vireo young, and per pair productivity was comparable to that in previous years without parasitism. While the occurrence of parasitism at the site bears further monitoring, the absence of an impact on vireo productivity documented in 2001 does not suggest an immediate need for a change in management to include cowbird control.

Canopy height of the restored vegetation, as well as foliage cover in the upper canopy layers, continued the increase observed in 2000. However, foliage volume in the lower canopy (0-2m) declined relative to 2000, reversing the trend of increasing vegetative cover documented since the site was planted in 1996. The reasons for this decline are unknown, particularly since it was not matched by a comparable decline in the reference habitat; one possibility is that it reflects the impact of increasing drought conditions on herbaceous and other young vegetation in this height zone.

Bird use of the restoration site reflected the changes in habitat structure quantified in 2001. Densities of species in the high, and high and low habitat structure guilds, increased, while densities of species associated with low canopy cover declined. Increases in hawk/hover foragers provided further evidence of the development of the upper canopy, since five of the seven (71%) species in this guild require high or vertically stratified cover. Changes in species richness of the habitat structure guilds were less reflective of habitat change, and were attributable largely to the absence of Wilson's warbler, willow flycatcher, and black-chinned hummingbird - species that typically occur in only very low numbers in the restored habitat.

Analysis of the 13 "indicator" species indicates that the bird community at the restoration site is continuing to increase in similarity to that in the reference habitat with regard to bird densities, although similarity in species richness declined slightly. However, it should be noted that this group of 13 species does not include species associated with low cover, as earlier analysis revealed that these species became established early in the development of the restoration site and were thus not useful as indicators of continued growth and stratification of the planted habitat. Thus, assessment of the 13 species, which reflect trends in the development of canopy height and complexity, should be combined with assessment of the low canopy cover guild to provide a complete understanding of the restoration site bird community and how it compares to that in the reference habitat.

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**Appendix 1. Common and Scientific Names of Birds Observed at Pilgrim Creek Study Area,
1995-2001**

Common Name	Scientific Name	Common Name	Scientific Name
Allen's hummingbird	<i>Selasphorus sasin</i>	Common yellowthroat	<i>Geothlypis trichas</i>
American avocet	<i>Recurvirostra americana</i>	Cooper's hawk	<i>Accipiter cooperii</i>
American bittern	<i>Botaurus lentiginosus</i>	Costa's hummingbird	<i>Calypte costae</i>
American coot	<i>Fulica americana</i>	Dark-eyed junco	<i>Junco hyemalis</i>
American crow	<i>Corvus brachyrhynchos</i>	Downy woodpecker	<i>Picoides pubescens</i>
American goldfinch	<i>Carduelis tristis</i>	Eared grebe	<i>Podiceps nigricollis</i>
American kestrel	<i>Falco sparverius</i>	European starling	<i>Sturnus vulgaris</i>
American Pipit	<i>Anthus rubescens</i>	Gadwall	<i>Anas strepera</i>
American wigeon	<i>Anas americana</i>	Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>
Anna's hummingbird	<i>Calypte anna</i>	Grasshopper sparrow	<i>Anmodramus savaannarum</i>
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	Great blue heron	<i>Ardea herodias</i>
Barn owl	<i>Tyto alba</i>	Great egret	<i>Egretta alba</i>
Barn swallow	<i>Hirundo rustica</i>	Greater roadrunner	<i>Geococcyx californianus</i>
Belted kingfisher	<i>Ceryle alcyon</i>	Greater yellowlegs	<i>Tringa melanoleuca</i>
Bewick's wren	<i>Thyromanes bewickii</i>	Great-tailed grackle	<i>Quiscalus mexicanus</i>
Black phoebe	<i>Sayornis nigricans</i>	Green Heron	<i>Butorides virescens</i>
Black-chinned hummingbird	<i>Archilochus alexandri</i>	Green-winged teal	<i>Anas crecca</i>
Black-crowned night heron	<i>Nycticorax nycticorax</i>	Hammond's flycatcher	<i>Empidonax hammondi</i>
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	Hermit thrush	<i>Catharus guttatus</i>
Black-necked stilt	<i>Himantopus mexicanus</i>	Hooded oriole	<i>Icterus cucullatus</i>
Black-throated gray warbler	<i>Dendroica nigrescens</i>	House finch	<i>Carpodacus mexicanus</i>
Blue grosbeak	<i>Guiraca caerulea</i>	House wren	<i>Troglodytes aedon</i>
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	Hutton's vireo	<i>Vireo huttoni</i>
Blue-winged teal	<i>Anas discors</i>	Killdeer	<i>Charadrius vociferus</i>
Brewer's sparrow	<i>Spizella breweri</i>	Lawrence's goldfinch	<i>Carduelis lawrencei</i>
Brown-headed cowbird	<i>Molothrus ater</i>	Lazuli bunting	<i>Passerina amoena</i>
Bufflehead	<i>Bucephala albeola</i>	Least Bell's vireo	<i>Vireo bellii pusillus</i>
Bullock's oriole	<i>Icterus bullockii</i>	Least sandpiper	<i>Calidris minutilla</i>
Bush tit	<i>Psaltriparus minimus</i>	Least tern	<i>Sterna antillarum</i>
California gnatcatcher	<i>Polioptila californica</i>	Lesser goldfinch	<i>Carduelis psaltria</i>
California quail	<i>Callipepla californica</i>	Lesser yellowlegs	<i>Tringa flavipes</i>
California thrasher	<i>Toxostoma redivivum</i>	Lincoln's sparrow	<i>Melospiza lincolni</i>
California towhee	<i>Pipilo crissalis</i>	Long-billed curlew	<i>Numenius americanus</i>
Canvasback	<i>Aythya valisineria</i>	Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Caspian tern	<i>Sterna caspia</i>	Loggerhead shrike	<i>Lanius ludovicianus</i>
Cassin's kingbird	<i>Tyrannus vociferans</i>	MacGillivray's warbler	<i>Oporornis tolmiei</i>
Cattle egret	<i>Bubulcus ibis</i>	Mallard	<i>Anas platyrhynchos</i>
Chipping sparrow	<i>Spizella passerina</i>	Marsh wren	<i>Cistothorus palustris</i>
Cinnamon teal	<i>Anas cyanoptera</i>	Merlin	<i>Falco columbarius</i>
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	Mourning dove	<i>Zenaida macroura</i>
Common ground-dove	<i>Columbina passerina</i>	Nashville warbler	<i>Vermivora ruficapilla</i>
Common moorhen	<i>Gallinula chloropus</i>	Northern flicker	<i>Colaptes auratus</i>
Common raven	<i>Corvus corax</i>	Northern harrier	<i>Circus cyaneus</i>
Common snipe	<i>Gallinago gallinago</i>	Northern mockingbird	<i>Mimus polyglottos</i>

**Appendix 1. Common and Scientific Names of Birds Observed at Pilgrim Creek Study Area,
1995-2001
(continued)**

Common Name	Scientific Name	Common Name	Scientific Name
Northern pintail	<i>Anas acuta</i>	Willow flycatcher	<i>Empidonax traillii</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	Wilson's warbler	<i>Wilsonia pusilla</i>
Northern shoveler	<i>Anas clypeata</i>	Wrentit	<i>Chamaea fasciata</i>
Nuttall's woodpecker	<i>Picoides nuttallii</i>	Yellow warbler	<i>Dendroica petechia</i>
Orange-crowned warbler	<i>Vermivora celata</i>	Yellow-breasted chat	<i>Icteria virens</i>
Pacific-slope flycatcher	<i>Empidonax difficilis</i>	Yellow-rumped warbler	<i>Dendroica coronata</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>		
Pine siskin	<i>Carduelis pinus</i>		
Red-shouldered hawk	<i>Buteo lineatus</i>		
Red-tailed hawk	<i>Buteo jamaicensis</i>		
Red-winged blackbird	<i>Agelaius phoeniceus</i>		
Rock dove	<i>Columba livia</i>		
Ruby-crowned kinglet	<i>Regulus calendula</i>		
Ruddy duck	<i>Oxyura jamaicensis</i>		
Rufous-crowned sparrow	<i>Aimophila ruficeps</i>		
Savannah sparrow	<i>Passerculus sandwichensis</i>		
Say's phoebe	<i>Sayornis saya</i>		
Sharp-shinned hawk	<i>Accipiter striatus</i>		
Snowy egret	<i>Egretta thula</i>		
Song sparrow	<i>Melospiza melodia</i>		
Sora	<i>Porzana carolina</i>		
Spotted sandpiper	<i>Actitis macularia</i>		
Spotted towhee	<i>Pipilo maculatus</i>		
Swainson's thrush	<i>Catharus ustulata</i>		
Townsend's warbler	<i>Dendroica townsendi</i>		
Tree swallow	<i>Tachycineta bicolor</i>		
Turkey vulture	<i>Cathartes aura</i>		
Vaux's swift	<i>Chaetura vauxi</i>		
Vesper sparrow	<i>Poocetes gramineus</i>		
Violet-green swallow	<i>Tachycineta thalassina</i>		
Virginia rail	<i>Rallus limicola</i>		
Warbling vireo	<i>Vireo gilvus</i>		
Western kingbird	<i>Tyrannus verticalis</i>		
Western meadowlark	<i>Sturnella neglecta</i>		
Western sandpiper	<i>Calidris mauri</i>		
Western tanager	<i>Piranga ludoviciana</i>		
Western wood-pewee	<i>Contopus sordidulus</i>		
White-crowned sparrow	<i>Zonotrichia leucophrys</i>		
White-faced ibis	<i>Plegadis chihi</i>		
White-tailed kite	<i>Elanus leucurus</i>		
White-throated swift	<i>Aeronautes saxatalis</i>		
Willet	<i>Catoptrophorus semipalmatus</i>		