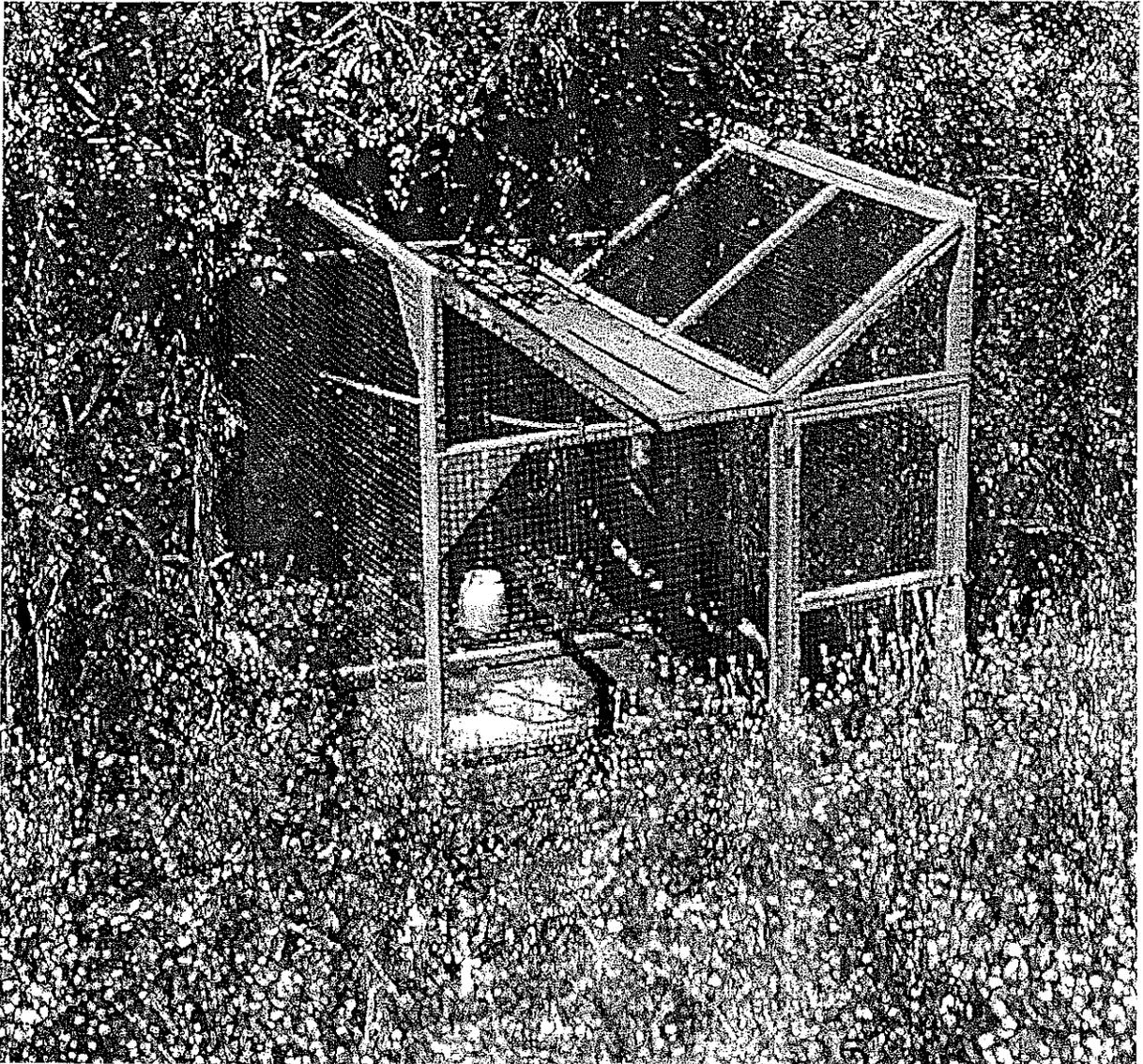


2001 UPPER SAN LUIS REY RIVER

AND PAMO VALLEY

BROWN-HEADED COWBIRD CONTROL PROGRAM



GRIFFITH WILDLIFE BIOLOGY

**2001 UPPER SAN LUIS REY RIVER
AND PAMO VALLEY
BROWN-HEADED COWBIRD CONTROL PROGRAM**

prepared for:

**US Fish & Wildlife Service
Carlsbad Field Office**
John Stephenson
John Martin
2730 Loker Avenue West
Carlsbad, California 92008

prepared by:

Griffith Wildlife Biology
John T. Griffith and Jane C. Griffith
22670 M-203
P.O. Box 47
Calumet, Michigan 49913
www.griffithwildlife.com

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EXECUTIVE SUMMARY

A trapping program was implemented along the upper San Luis Rey River (uslr) and Pamo Valley (pv) in San Diego County, California, to protect nesting southwestern willow flycatchers (*Empidonax traillii extimus*, flycatcher, swfl), least Bell's vireos (*Vireo bellii pusillus*, vireo, lbvi), and riparian cohabitants from brood parasitism by the brown-headed cowbird (*Molothrus ater*). Four traps were operated in each location (8 total) from 1 April to 30 June 2001. We removed 284 cowbirds (68 males, 42 females, and 1 juveniles at uslr; 103 males, 60 females, and 10 juveniles at pv). In addition, 290 individuals of 8 non-target species were captured (47 at uslr, 243 at pv), of which all but 2 (0.7%) were released unharmed.

Topical protection from cowbird parasitism allows targeted populations of host species to increase annual productivity and to grow, but does not affect the regional cowbird population (Griffith and Griffith 2000).

Key words: brood parasitism, brown-headed cowbird (*Molothrus ater*), California, least Bell's vireo (*Vireo bellii pusillus*), Pamo Valley, riparian, San Diego County, San Luis Rey River, southwestern willow flycatcher (*Empidonax traillii extimus*).

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INTRODUCTION

Brown-headed Cowbird

Cowbirds first colonized the area west of the Sierra-Cascade axis about 1890 (Rothstein 1994). At that time, the Nevada cowbird (*M. a. artemisiae*) bred in the Great Basin and the dwarf cowbird (*M. a. obscurus*) bred from the Colorado River east to perhaps Texas. The latter invaded the Far West from the east and expanded northward beginning around 1900. The first cowbird documented in Southern California was at Borrego Springs in 1896 (Unitt 1984). By 1930, cowbirds were "well established" throughout the region (Willett 1933); by 1955 they had reached British Columbia (Flahaut and Schultz 1955). It is not clear if cowbirds would have appeared in the Far West without the unwitting aid of man. It is likely, however, that large cowbird numbers and their devastating impact upon hosts in the region would not have been possible without massive anthropogenic landscape alteration, particularly the provision of year-round cowbird forage by agricultural and livestock operations, and the coincident wholesale destruction of native habitats. A history of the cowbird's invasion of the Far West is available in Rothstein (1994).

Cowbirds are extreme generalists and parasitize nearly every species (at least 220) with which they are sympatric (Friedmann 1963, Friedmann and Kiff 1985). Because this lack of host specificity appears to be true even on an individual basis (Fleischer 1985), and because cowbird productivity is generally proportional to the losses host species experience (Rothstein 1990), there are no feedback processes on ecological or evolutionary time scales that lead to the amelioration of parasitism of a particular host. Therefore, unlike most parasites whose fate is closely tied to a specific host, cowbirds may drive a rare species like the southwestern willow flycatcher and least Bell's vireo to extinction with negligible effect upon their own population. In addition, because of their extreme fecundity (cowbirds are called "passerine chickens" because each female lays 40-60 eggs each spring), even a single female cowbird can reduce the productivity of hosts in a given area such as the upper San Luis Rey River or Pamo Valley study areas.

Cowbird eggs hatch sooner than host eggs (10-12 days versus 12-16 days), and cowbird young develop faster than host young. As a result, nestling cowbirds are often able to out-compete their host nest-mates. Most small passerine hosts produce only a single cowbird chick and none of their own young from parasitized nests. For the flycatcher, vireo, and other small hosts, nest parasitism and nest predation have the same end result. However, following predation the host pair renests within 2-14 days, while a successful parasitism event may consume the time and energy of an entire breeding season. In addition, host species in the Far West did not co-evolve with cowbirds and have fewer behavioral defense mechanisms against parasitism than hosts elsewhere.

In contrast to the increase of cowbirds in distribution and abundance throughout California in this century, populations of many native birds are in general decline, primarily because of their dependence upon increasingly reduced, fragmented, and degraded native habitats in which they are more susceptible to predation and parasitism (Gaines 1974, Goldwasser et al

1980). Thus there is an inverse relationship between the amount of native habitat and associated avian populations, such as the southwestern willow flycatcher and least Bell's vireo, and the number and subsequent impact of brown-headed cowbirds and predators upon such populations.

We have shown that parasitism of endangered hosts can be dramatically reduced or eliminated, even over large areas (such as Camp Pendleton, California), by removing cowbirds from host habitat during the breeding season using small, relatively mobile traps placed within or near to the targeted host habitat during the host breeding season ("topical trapping") (Griffith and Griffith 2000). Not surprisingly, in areas where cowbird control has been done for five or more years, the abundance and diversity of all host species, not just the target population, has increased markedly (ibid).

Upper San Luis Rey River and Pamo Valley Cowbird Control

This (2001) is the inaugural year of a three year program to operate 4 traps at the upper San Luis Rey River and 4 traps at Pamo Valley. The cowbird control program at these two sites was initiated in 1992 by the USDA Forest Service; both sites are within the Cleveland National Forest.

The purpose of the trapping is to benefit the federally endangered least Bell's vireo, southwestern willow flycatcher, California gnatcatcher, and other riparian and sage scrub host species by removing brown-headed cowbirds from their riparian nesting habitat. Topical trapping is the most effective means of cowbird control (Griffith and Griffith 2000).

Funding and Acknowledgments

This project is funded by the United States Fish & Wildlife Service and ably administered by J. Stephenson. Trap placement and access was facilitated by J. Wells of the Cleveland National Forest. Additional permits and cooperation were received of the Vista Irrigation District and the Foster Ranch. Thank you all.

STUDY AREA

Upper San Luis Rey River

The upper San Luis Rey River flows northwest from Lake Henshaw in north-central San Diego County (Figure 1), then turns west and empties in the Pacific Ocean at Oceanside. The study area enjoys a Mediterranean climate with warm, dry summers and cool, wet winters, though due to its distance from the mediating effect of the ocean (about 50 miles) and its elevation (about 2800 feet), temperatures fluctuate markedly.

Ownership in the area is a mix of public and private, primarily the Vista Irrigation District, USDA Forest Service, Indian reservations, and cattle ranches.

Historically, the San Luis Rey river experienced the seasonal flow typical of southern California, with peak flows in the rainy winter months and above-ground flows diminishing to damp or dry conditions in the summer. Currently, the flow from Lake Henshaw is regulated; a large volume of water flows above ground all year.

The vegetation along the river consists large stands of mature oaks (*Quercus agrifolia*), mixed-age flowering ash (*Fraxinus dipetala*), scattered cottonwoods (*Populus fremontii*), willows (*Salix* spp.), sycamores (*Platanus racemosa*), and stands of alder (*Alnus rhombifolia*). Interspersed with the larger canopy species are thickets of brushy willow, flowering ash, and alder, and extensive hedges or wild rose (*Rosa californica*), blackberry (*Rubus ursinus*), false indigo (*Amorpha fruticosa*), and poison oak (*Toxicodendron diversilobum*). Other shrubs include mulefat (*Baccharis salicifolia*), elderberry (*Sambucus mexicana*), scrub oak (*Quercus dumosa*), and current (*Ribes* sp.). Herbaceous species include stinging nettle (*Urtica holosericea*), fern (*Pteridium* spp.), and extensive stands of cattails (*Typha* spp.). Dense areas of shrubs and herbs alternate with open grassy or sandy clearings.

An abundant and diverse avian community utilizes the lush habitat along the upper San Luis Rey River, including the endangered flycatcher and vireo. Traps were placed at the edge of riparian habitat near to known flycatcher breeding sites for this project.

Pamo Valley

Pamo Valley is located about 8 miles south and 3 miles west of the upper San Luis Rey River site (Figure 1). The two sites are linked by the Lusardi Canyon-Temescal Canyon corridor and the Lusardi Truck Trail. Pamo Valley runs north-south; Temescal Creek enters from the north, and is joined by Santa Ysabel Creek from the east after a short run from Sutherland Reservoir. At the foot of the valley, Santa Ysabel Creek turns westward once again and ultimately empties into the Pacific Ocean at Del Mar after passing through San Pasqual Valley, Lake Hodges, and San Dieguito Valley.

Like the San Luis Rey River, the flow of Santa Ysabel Creek is no longer seasonal; it is regulated by discharge from Sutherland Reservoir.

Pamo Valley also enjoys a Mediterranean climate, though with less variability due to its lower elevation (900'). Most of the study area is owned by the City of San Diego and leased to the Foster Cattle Ranch. All trap sites in Pamo Valley were inside fenced active cattle pasture.

The composition of the riparian vegetation in Pamo Valley is comparable to that at the upper San Luis Rey, although there is less ash, more willow, and, due to grazing, less herbaceous and shrub layer. Unlike the uslr, Pamo Valley has a broad flood plain with a wider riparian habitat corridor, although much of the valley floor is grazed grassland.

METHODS

Trapping was performed per the GWB protocol (1992, updates) using relatively mobile 8-panel modified Australian crow traps measuring 6 x 8 feet on each side and 6 x 6 feet on front and back (see cover photo). Cowbirds entered the traps through a 1 3/8 inch drop-down slot on top through which they could not, with few exceptions, fly up and out. The traps were placed to incorporate a maximum of the following site characteristics: near or within flycatcher/vireo habit (at the edge or in a clearing), a cowbird foraging area (dairy, stable, or agricultural field), a cowbird flight corridor or funnel area (along a river or canyon, or in a ridge saddle), or a cowbird roosting area; visible from above (target cowbirds were attracted to live decoy motions and vocalizations); under a perch from which a cowbird could inspect the trap before approaching (telephone wire or tree snag); accessible by vehicle; and out of public view or access (trap sites are shown on Figures 2 and 3).

Upon placement, each trap was assembled by completing the following tasks: the site was leveled; the panels were tightly fastened with carriage bolts and hex nuts; the front mesh floor was covered with sand or dirt (to create a foraging pad); 4 1 meter long x 1.5 cm diameter perches made of giant reed were inserted in the trap corners (3 high and 1 low for wing-clipped female and subordinate decoy birds); nylon mesh shade was stapled to the west-facing panel (if the site was unshaded); an informative and warning sign was attached to the door; and the trap was labeled with a number. Lastly, the trap was activated by adding a 1 gallon water guzzler, 1 1/2 pounds of wild bird seed without sunflower seeds (including a sprinkling on the slot board), and 2 male and 3 female live decoys. The right wing of each female was clipped to prevent parasitism upon release by accident or vandals. The trap was secured with a heavy padlock.

Five live decoy cowbirds were used, 2 males and 3 females – a small flock whose vocal and other social displays were attractive to target cowbirds. Male cowbirds vocalized and displayed most when at least one other male was present, and female cowbirds were more likely to enter a trap containing at least one more female than male, thus the 2M: 3F decoy ratio, restored daily.

The traps were operated from 2 April to 27 June and were therefore in place for cowbird dispersal from wintering flocks to breeding areas in early April and for the April through June nesting season peak. The traps were serviced daily in compliance with California live trap regulations and to reduce the otherwise high mortality of generally less hardy non-target species. Daily visits consisted of adding bait seed, releasing non-target birds, wing-clipping newly captured females, adding or removing cowbirds to maintain the 2M:3F live decoy ratio, adding water if necessary, repairing any damage from vandals, and verifying that the perches, shade, and sign were intact. All captures and other information were recorded on a daily data sheet, which were then faxed to the project manager. All decoy transfers to or from holding cages were performed inside the trap to preclude accidental release. In addition to the daily tasks, a complete water change and trap integrity inspection were performed each week.

All captured cowbirds were euthanized with carbon monoxide by introducing the gas into a sealed holding cage, or by thoracic compression. The birds were anesthetized within 20 seconds and expired within one minute. Specimens in good condition were donated to local museums, universities, and raptor recovery or reintroduction programs.

No well-managed cowbird control program has failed to reduce or eliminate cowbird parasitism of target least Bell's vireo populations. Successful programs are formulaic; the few failures have been management driven and should not indict the methodology. A complete protocol for trapping cowbirds, including trap construction, placement, activation, daily servicing, disassembly and storage, and operation dates is available in *GWB* (1992, updates).

RESULTS

We removed 284 cowbirds, including 68 males, 42 females, and 1 juvenile at the uslr; and 103 males, 60 females, and 10 juveniles at pv (Table 1, Table 2, Table 3). The male:female capture ratio was 1.6:1 at uslr and 1.7:1 at pv. The first cowbirds captured at uslr were 2 males in Trap 1 on 5 April; at pv 6 males in Trap 3 on 4 April. At both sites, most of the males (40/68, 59% uslr; 81/103, 79% pv) and females (34/42, 81% uslr; 46/60, 77% pv) were captured in the first 6 weeks of trapping (2 April - 12 May, 46%) (Table 2, Table 3, Figure 4, Figure 5). At the uslr, Trap 1 captured the most males (38), females (23), and total cowbirds (62). At pv, Trap 3 captured the most males (43), females (19) and total cowbirds (68).

In addition to cowbirds, the 4 traps at uslr captured 47 individuals of 8 non-target species of which all but 1 (2.1%) were released unharmed (Table 4). At pv, the 4 traps captured 243 individuals of 6 non-target species, of which all but 1 (0.4%) were released unharmed (Table 5). No non-target birds died due to lack of food or water or unclean conditions.

No cowbird eggs or young were recorded in incidentally observed host nests or family groups (no focused surveys or nest monitoring were performed).

DISCUSSION AND CONCLUSIONS

The upper San Luis Rey River is one of only three viable swfl breeding sites in California. Cowbird control at the uslr is essential to the stability and recovery of the flycatcher. To a lesser degree, this is also true for the lbvi and the large population of yellow warblers present.

Removal of 102 female cowbirds precluded up to 4,080 local parasitism events (40 eggs per female), facilitating the production of up to 16,320 host young (4 nestlings lost per parasitized nest). These are maximum estimates; the actual number is likely much less but still significant.

In the absence of proven regional cowbird control, the current topical cowbird trapping program will be required indefinitely to control brood parasitism and allow normal reproduction rates among host species, including the southwestern willow flycatcher and least Bell's vireo.

MANAGEMENT RECOMMENDATIONS

1. No changes in the number of traps (8), operation dates (1 April - 30 June), or operation protocol (GWB) are recommended.
2. Depending upon accessibility, and in consultation with FWS, two Pamo Valley traps may be moved or added to sites along Santa Ysabel Creek between Sutherland Reservoir and Pamo Valley, near to known flycatcher/vireo locations.
3. Status or protocol surveys and/or nest monitoring for swfl and lbvi should be performed periodically to aid and assess the efficacy of the cowbird control program.

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Figure 1. 2001 upper San Luis Rey River and Pamo Valley brown-headed cowbird control project study area.

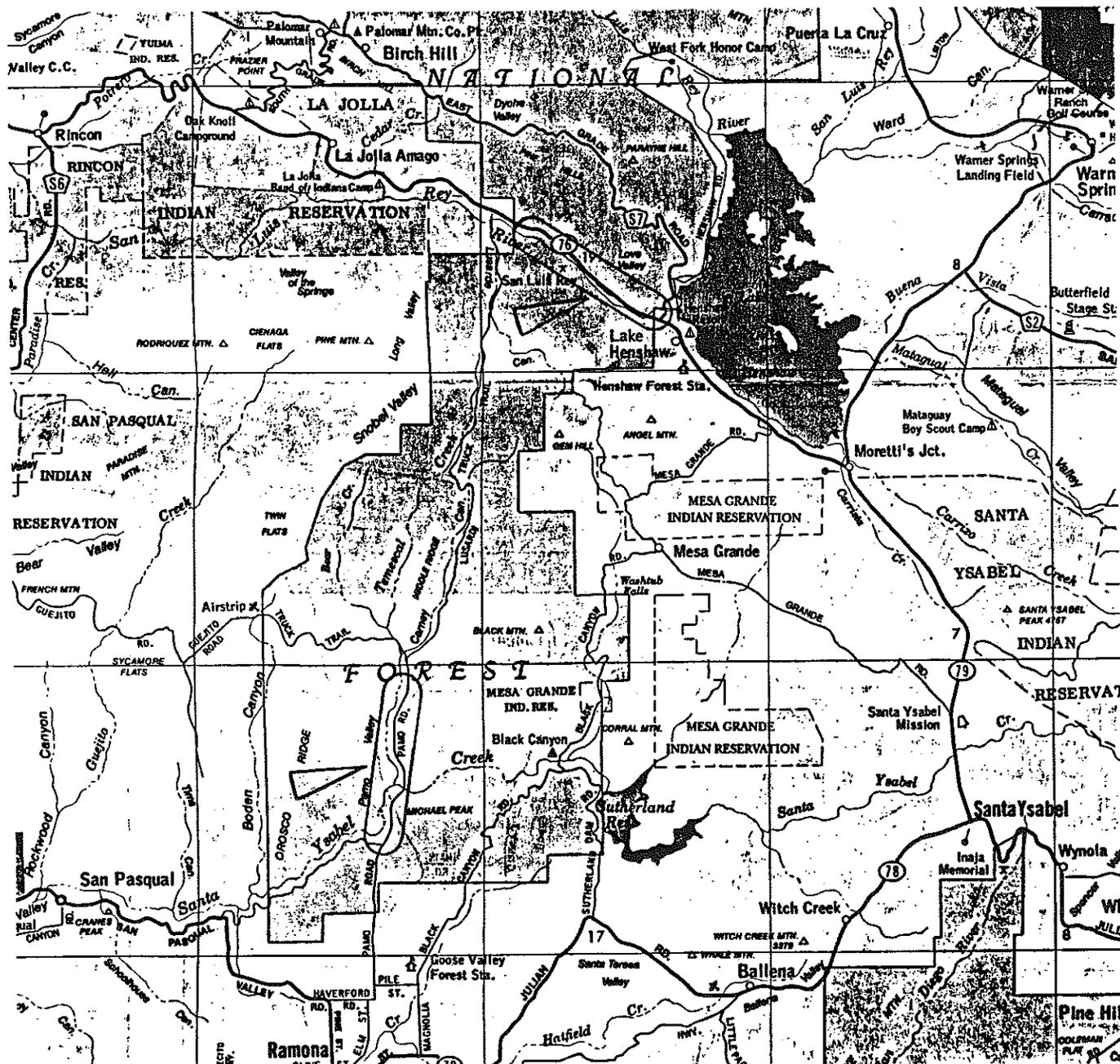
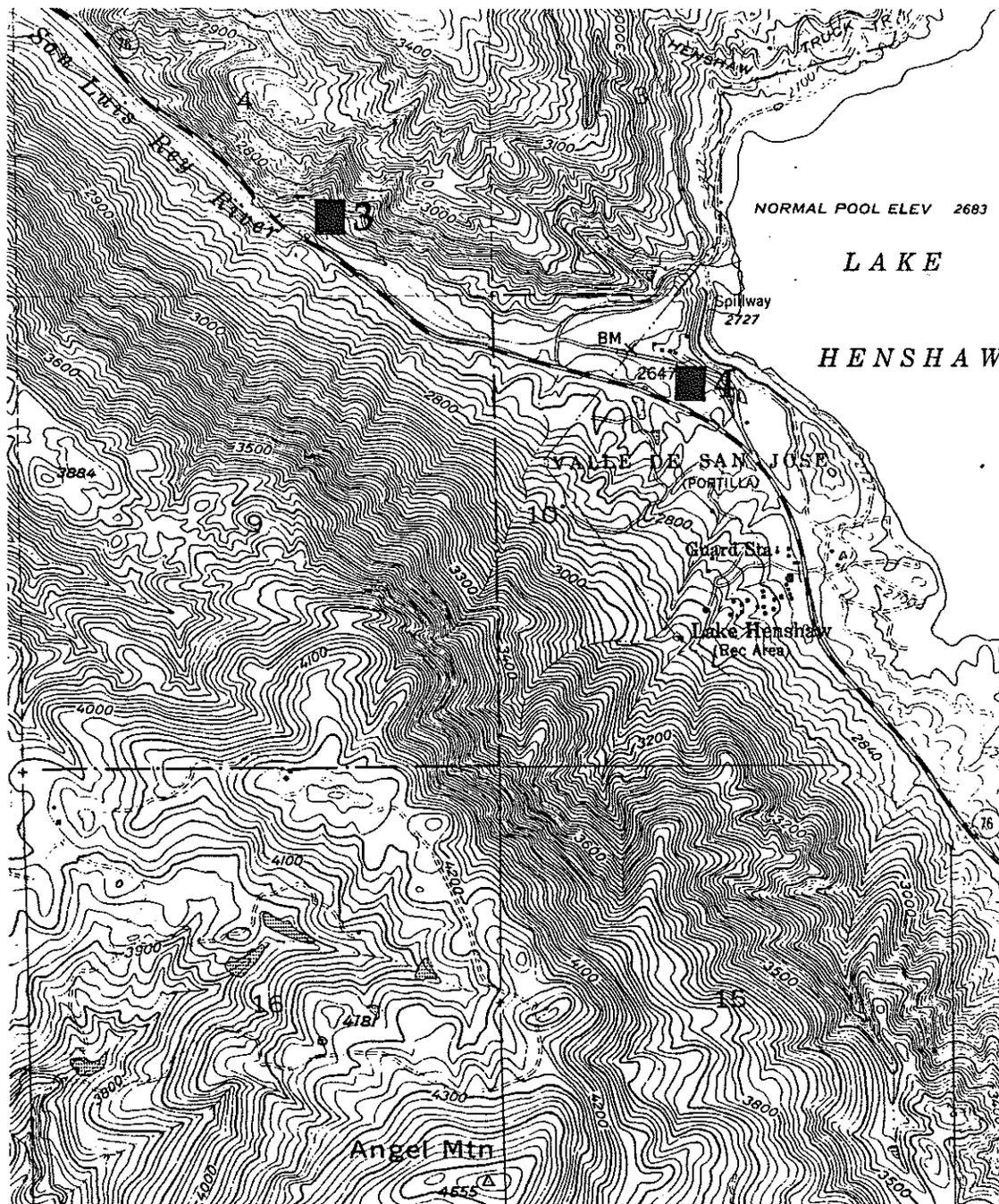
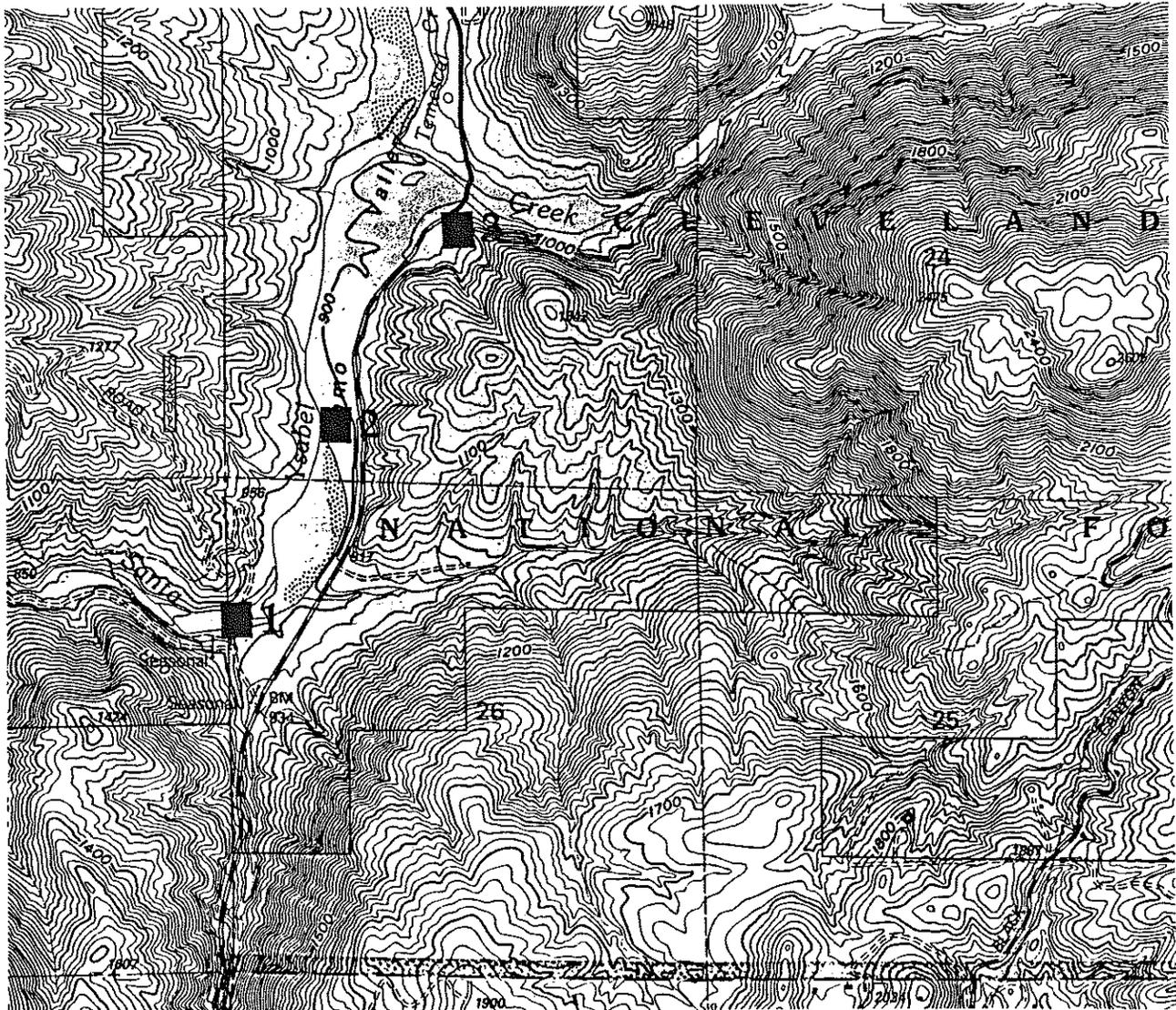


Figure 2. continued.



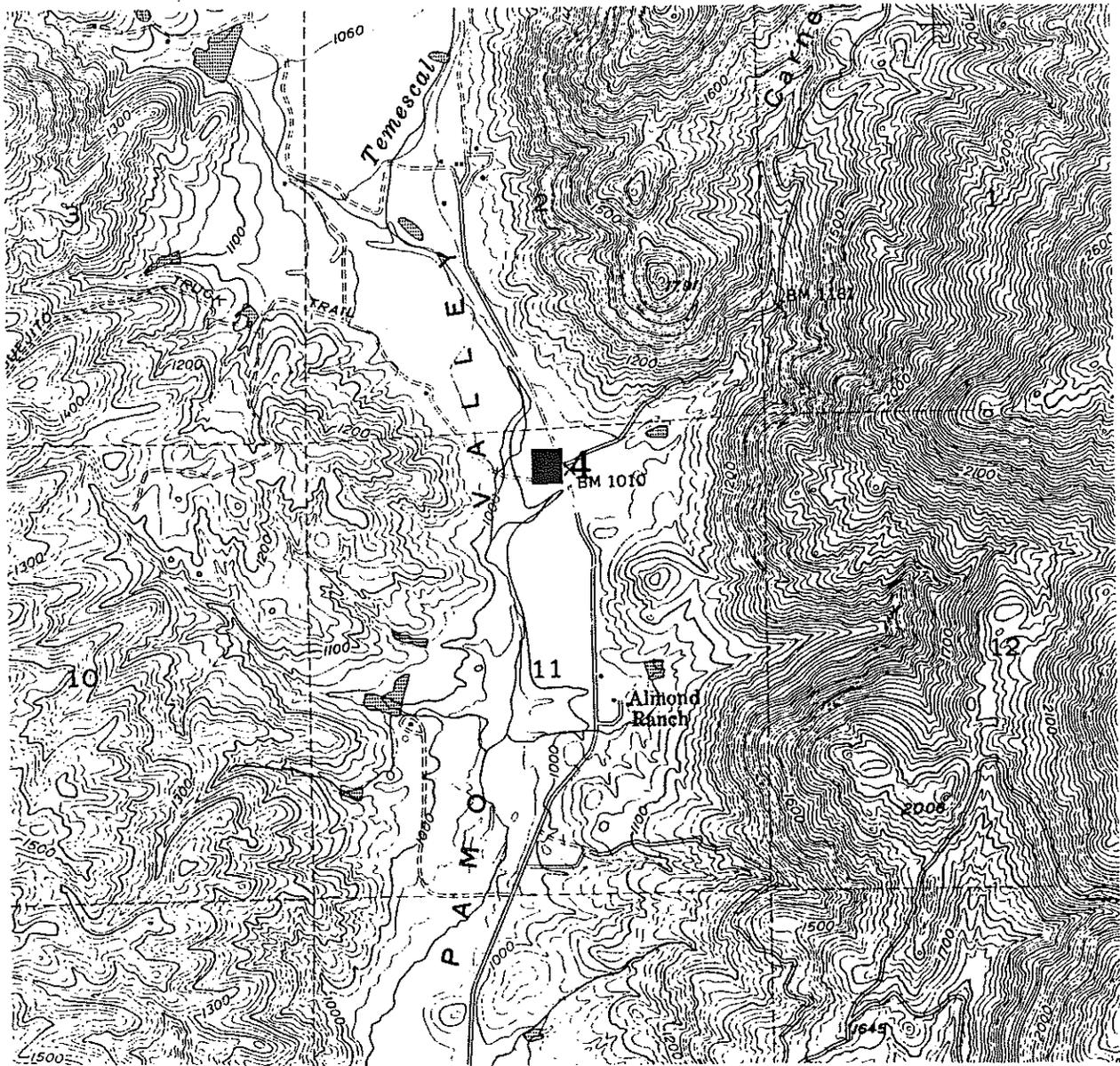
Source: USGS Mesa Grande 7.5 minute quadrangle.

Figure 3. 2001 Pamo Valley brown-headed cowbird trap locations.



Source: USGS Ramona 7.5 minute quadrangle.

Figure 3. continued.



Source: USGS Mesa Grande 7.5 minute quadrangle.

Figure 4. Number of male and female cowbirds captured per week at the upper San Luis Rey River in 2001.

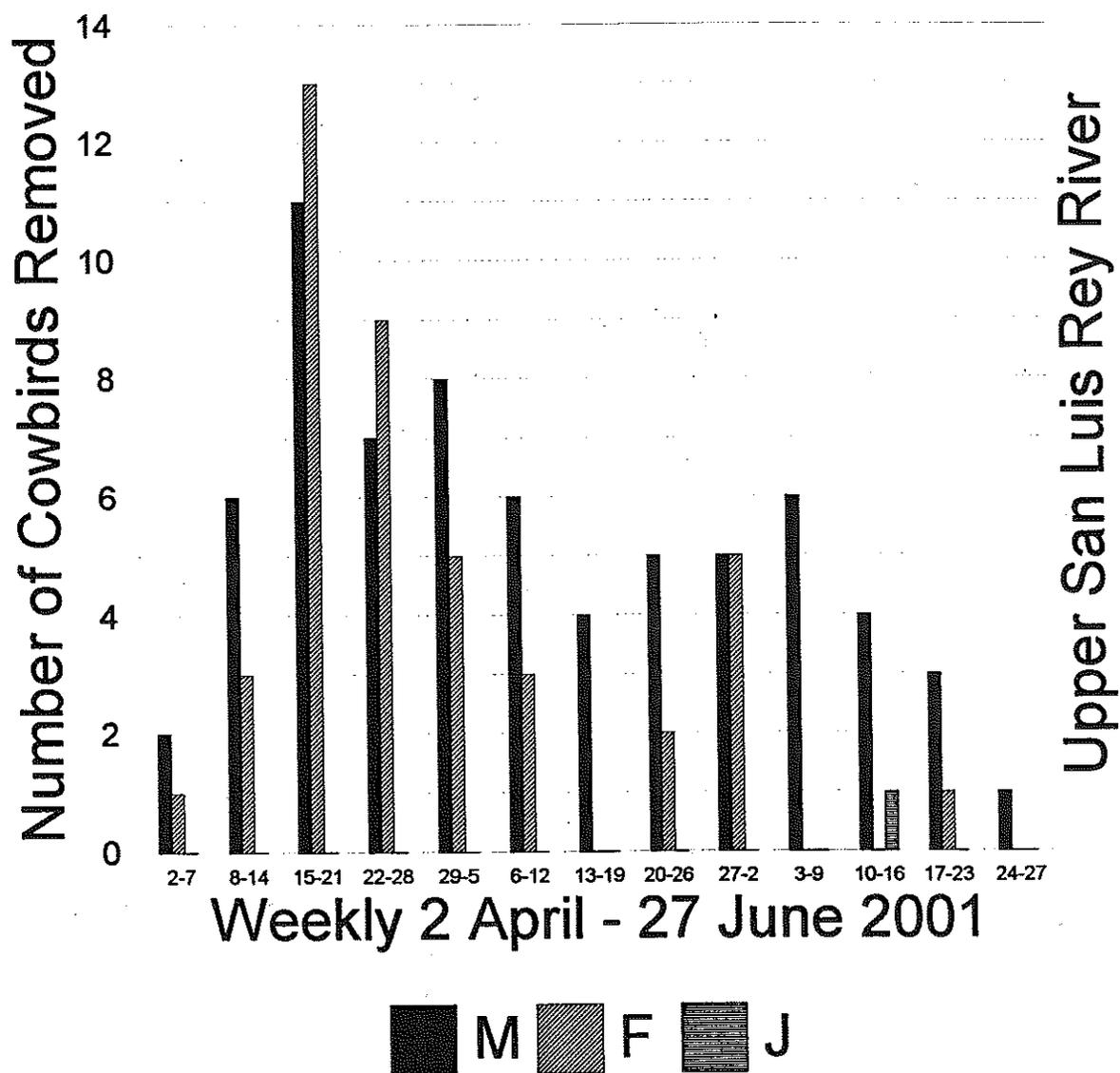


Figure 5. Number of male and female cowbirds captured per week at Pamo Valley in 2001.

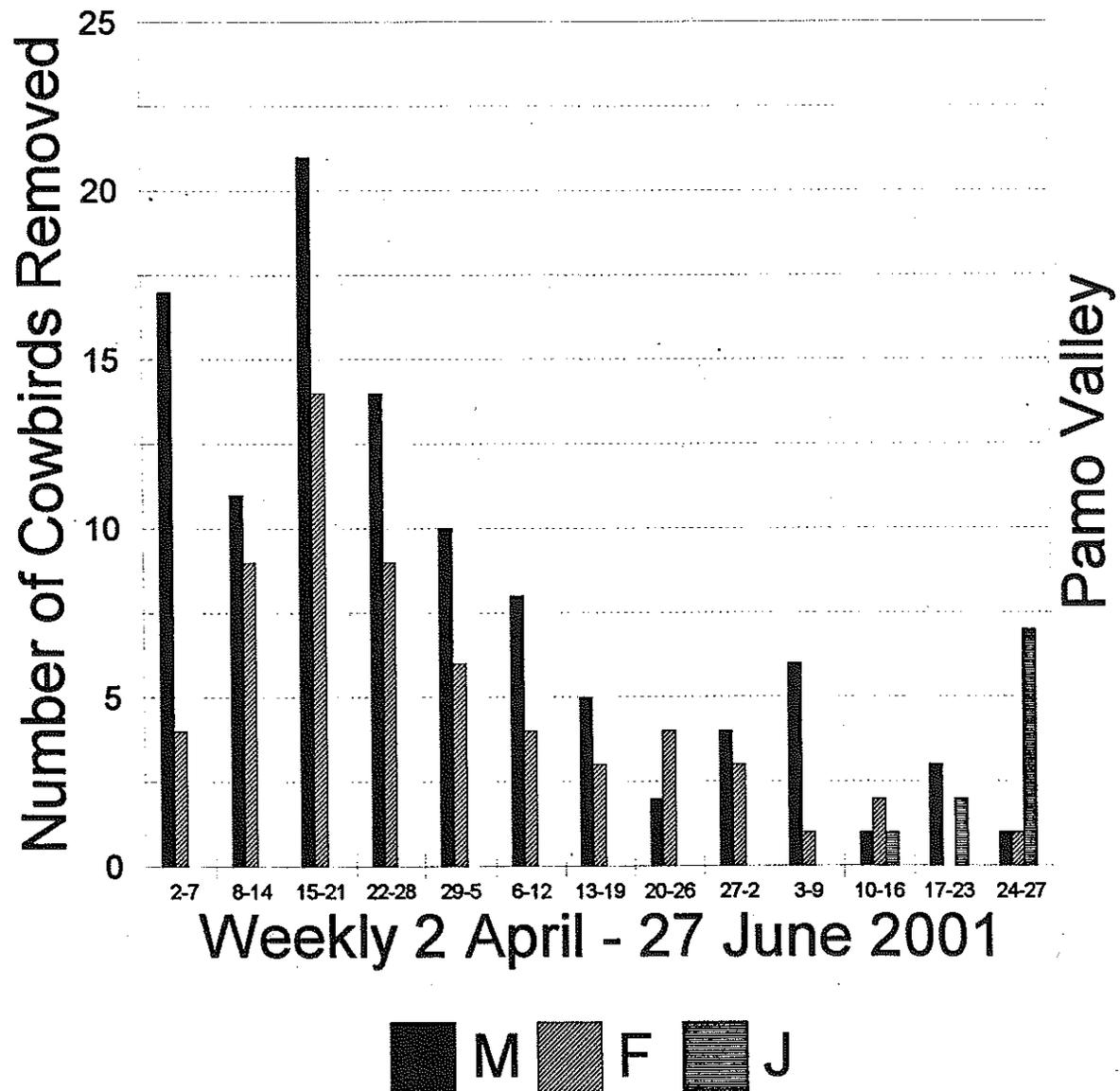


Table 1. Number of cowbirds captured at the upper San Luis Rey River and Pamo Valley, 1992-2001.

Year	Number of Cowbirds Captured				M:F Ratio	Dates of Operation	Number of		
	Male	Female	Juvenile	Total			Traps	Days	Capt/Day
1992	12	4	4	20	3.00	23 Jun - 3 Aug	1	42	0.48
1993	68	27	1	96	2.52	1 Apr - 1 Aug	2	123	0.78
1994	122	43	9	174	2.84	29 Mar - 1 Jul	5	95	1.83
1995	33	34	0	67	0.97	18 Apr - 15 Aug	4	120	0.56
1996	38	16	1	55	2.38	4 Apr - 15 Jul	5	103	0.53
1997	25	12	1	38	2.08	1 Apr - 2 Jul	3	93	0.41
1998	31	19	2	52	1.63	1 May - 5 Jul	4	66	0.79
1999	58	41	0	99	1.41	1 May - 16 Jul	6	77	1.29
2000	no data								
2001	68	42	1	111	1.62	2 Apr - 27 Jun	4	87	1.28
Total	455	238	19	712	1.91		34	806	0.88

Pamo Valley

Year	Number of Cowbirds Captured				M:F Ratio	Dates of Operation	Number of		
	Male	Female	Juvenile	Total			Traps	Days	Capt/Day
1992	no data								
1993	no data								
1994	60	36	6	102	1.67	29 Mar - 1 Jul	4	95	1.07
1995	no data								
1996	no data								
1997	no data								
1998	no data								
1999	no data								
2000	no data								
2001	103	60	10	173	1.72	2 Apr - 27 Jun	4	87	1.99
Total	163	96	16	275	1.70			182	1.51

Sources uslr 1992 - 1999, except 1994: Wells 1999
 uslr 1994 and 1999 (in part): GWB 1994, 2000
 pv 1994: GWB 1994

Table 2. Number of male, female, and juvenile cowbirds captured per day, per week, per trap, and total at the upper San Luis Rey River in 2001.

Date	Trap 1			Trap 2			Trap 3			Trap 4			TOTAL		
	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J
Apr 1													0	0	0
2													0	0	0
3													0	0	0
4													0	0	0
5	2												2	0	0
6													0	0	0
7								1					0	1	0
wk 1	2	0	0	0	0	0	0	1	0	0	0	0	2	1	0
8													0	0	0
9													0	0	0
10													0	0	0
11									1				1	0	0
12	1												1	0	0
13									1	2			1	2	0
14						1			2	1			3	1	0
wk 2	1	0	0	0	0	0	1	0	0	4	3	0	6	3	0
15													0	0	0
16									4	6			4	6	0
17									1				1	0	0
18													0	0	0
19						2	3		3	3			5	6	0
20									1				1	0	0
21								1					0	1	0
wk 3	0	0	0	0	0	0	2	4	0	9	9	0	11	13	0
22													0	0	0
23					1		2	1					2	2	0
24													0	0	0
25													0	0	0
26													0	0	0
27								1	1		2	6	3	7	0
28									2				2	0	0
wk 4	0	0	0	0	1	0	3	2	0	4	6	0	7	9	0
29									1	1			1	1	0
30	2	1											2	1	0
May 1										1			0	1	0
2	1			1						1			2	1	0
3													0	0	0
4	2	1								1			3	1	0
5													0	0	0
wk 5	5	2	0	1	0	0	0	0	0	2	3	0	8	5	0
6									1	1			1	1	0
7										2			2	0	0
8													0	0	0
9						1	1						1	1	0
10													0	0	0
11										1			1	0	0
12													1	1	0
wk 6	0	0	0	0	0	0	2	3	0	4	0	0	6	3	0
13													0	0	0
14													0	0	0
15													-2		1
16													1		-1
17														1	0
18														0	0
19	3													0	0
wk 7	3	0	0	-2	0	0	1	0	0	2	0	0	4	0	0
20													0	0	0
21									1				0	1	0
22													0	0	0
23	3									1			3	0	0
24													0	0	0
25													0	0	0
26													0	0	0
wk 8	3	1	0	0	0	1	0	2	0	0	0	0	5	2	0
27													2	0	2
28													0	0	0
29													0	0	0
30										1	2	3	4	3	0
31													0	0	0
Jun 1													0	0	0
2													1	0	0
wk 9	0	1	0	0	0	0	0	1	2	0	4	2	5	5	0
3													1	0	0
4	1									1			3	0	0
5													0	0	0
6										1			1	0	0
7													0	0	0
8													0	0	0
9										1			1	0	0
wk 10	1	0	0	-2	0	0	3	0	0	4	0	0	6	0	0
10													0	0	0
11	1												1	2	0
12													0	0	0
13													1	0	0
14													0	0	0
15													0	0	0
16													2	0	0
wk 11	1	0	0	0	0	0	0	0	0	3	0	1	4	0	1
17													0	0	0
18													0	0	0
19										1			1	1	0
20										1			2	0	0
21													0	0	0
22													0	0	0
23													0	0	0
wk 12	0	0	0	2	0	0	0	1	0	1	0	0	3	1	0
24													0	0	0
25													1	0	0
26													0	0	0
27													0	0	0
wk 13	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
TOTAL	16	4	0	-1	2	0	15	13	0	38	23	1	68	42	1

Table 3. Number of male, female, and juvenile cowbirds captured per day, per week, per trap, and total at Pamo Valley in 2001.

Date	Trap 1			Trap 2			Trap 3			Trap 4			TOTAL				
	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J		
Apr 1													0	0	0		
2													0	0	0		
3													0	0	0		
4							6						6	0	0		
5													0	0	0		
6				11	4								11	4	0		
7													0	0	0		
wk 1	0	0	0	11	4	0	6	0	0	0	0	0	17	4	0		
8					1			1					0	2	0		
9					1								0	1	0		
10				1	1		2	1		1			4	2	0		
11							2			1			3	0	0		
12				1									1	0	0		
13							1	1		2	1		3	2	0		
14										2			0	2	0		
wk 2	0	0	0	2	3	0	5	3	0	4	3	0	11	9	0		
15							1	2		1			0	0	0		
16	2			2			4			1	2		4	0	0		
17													0	0	0		
18				1			2						1	0	0		
19				1			2	1			1		1	0	0		
20	1	3											1	3	0		
21	1						1	1		2	3		0	1	0		
wk 3	3	4	0	4	0	0	10	4	0	4	6	0	21	14	0		
22					2								0	2	0		
23										4	1		0	0	0		
24							1						0	0	0		
25	1	2					1	1					1	2	0		
26	1									1			1	0	0		
27	1	1		1	1		1			1	1		2	2	0		
28					1								1	0	0		
wk 4	3	3	0	2	3	0	3	1	0	6	2	0	14	9	0		
29				1	1		1	1					1	1	0		
30	1						-2			1			1	0	0		
May 1							2	1					0	0	0		
2	2	1								1			2	1	0		
3							1			1			0	0	0		
4							1			1			0	0	0		
5							1						0	0	0		
wk 5	3	1	0	1	1	0	4	2	0	2	2	0	10	6	0		
6	1	1											1	1	0		
7							1						0	0	0		
8							-2						0	0	0		
9							2			1			0	0	0		
10	1									1			1	0	0		
11					1								1	0	0		
12		2		1						2			1	2	0		
wk 6	2	3	0	2	0	0	1	0	0	3	1	0	8	4	0		
13													0	0	0		
14													0	0	0		
15													0	0	0		
16													0	0	0		
17													0	0	0		
18													0	0	0		
19													0	0	0		
20													0	0	0		
21													0	0	0		
22													0	0	0		
23													0	0	0		
wk 7	0	0	0	0	0	0	0	5	2	0	0	1	0	5	3	0	
24													0	0	0		
25													0	0	0		
26													0	0	0		
27													0	0	0		
28													0	0	0		
29													0	0	0		
30													0	0	0		
31													0	0	0		
Jun 1													0	0	0		
2													0	0	0		
wk 8	0	0	0	0	0	1	0	2	3	0	0	0	0	2	4	0	
3													0	0	0		
4													0	0	0		
5													0	0	0		
6	-2									1	1		3	-2	0	0	
7	1												1	0	0		
8													0	0	0		
9													0	0	0		
wk 9	-1	0	0	0	0	0	0	3	1	0	4	0	0	6	1	0	
10													1	0	0	0	
11	-2												-2	0	0	0	
12													0	0	0	0	
13													0	0	0	0	
14													0	0	0	0	
15													0	0	0	0	
16													1	0	0	0	
wk 10	-2	0	0	1	0	0	0	2	1	1	0	1	0	1	2	1	
17													0	0	0	0	
18													1	0	1	0	
19													0	0	0	0	
20													0	0	0	0	
21	2												2	0	0	0	
22													0	0	0	0	
23													0	0	0	0	
wk 11	2	0	0	1	0	1	0	0	0	1	0	0	0	3	0	2	
24													0	0	0	0	
25	-2			2	1								4	1	-1	0	2
26													0	0	0	0	
27	1												1	1	1	1	
wk 12	-1	0	2	1	1	1	0	0	4	1	0	0	1	1	1	7	
28													0	0	0	0	
29													0	0	0	0	
30													0	0	0	0	
31													0	0	0	0	
TOTAL	9	11	2	25	14	2	43	19	6	26	16	0	103	60	10		

Table 4. Number of non-target species captured & released or preyed upon in cowbird traps at the upper San Luis Rey River in 2001.

Species	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7	
	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU
STJA	2				2									
BHGR					2						1			
CATO	2		4		3		4		2					
EUST										1				
RWBL			1						2					
HOOR														
HOFI	2				4									
TOTAL	6	0	5	0	11	0	4	0	4	1	1	0	0	0
Species	Week 8		Week 9		Week 10		Week 11		Week 12		Week 13		TOTAL	
	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU
STJA									2				6	0
BHGR													3	0
CATO	1				2		1		3				22	0
EUST							1						1	1
RWBL							1						4	0
HOOR									1		1		2	0
HOFI							2						8	0
TOTAL	1	0	0	0	2	0	5	0	6	0	1	0	46	1

STJA Stellar's jay
 BHGR black-headed grosbeak
 CATO California towhee
 EUST European starling
 SOSP song sparrow
 RWBL red-winged blackbird
 HOOR hooded oriole
 HOFI house finch

Table 5. Number of non-target species captured & released or preyed upon in cowbird traps at Pamo Valley in 2001.

Species	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7	
	C&R	PU	C&R	PU	C&R	PU								
BLPH														
EUST			2		1									
CATO	4		5		9		7		3				1	
RWBL	13		33		37		30		7		8		6	
WCSP			2											
HOFI	6		14		1		1							
TOTAL	23	0	56	0	48	0	38	0	10	0	8	0	7	0

Species	Week 8		Week 9		Week 10		Week 11		Week 12		Week 13		TOTAL	
	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU
BLPH							1						0	1
EUST													3	0
CATO			1				1		1				32	0
RWBL	9		18		8		5		7		2		183	0
WCSP													2	0
HOFI													22	0
TOTAL	9	0	19	0	8	0	6	1	8	0	2	0	242	1

BLPH black phoebe
 EUST European starling
 CATO California towhee
 RWBL red-winged blackbird
 WCSP white-crowned sparrow
 HOFI house finch