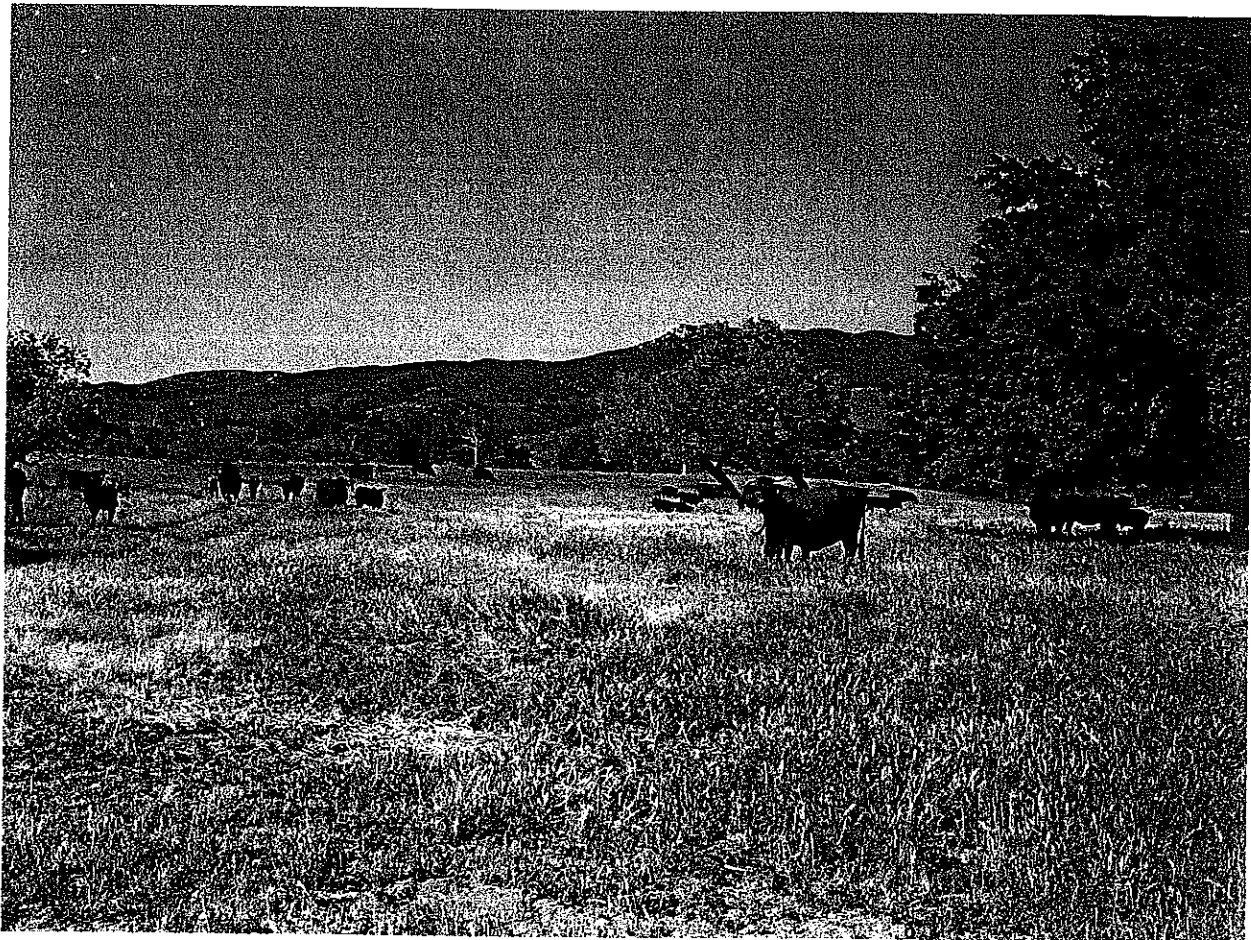


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**2003 UPPER SAN LUIS REY RIVER
AND PAMO VALLEY
BROWN-HEADED COWBIRD CONTROL PROGRAM**



Pamo Valley

GRIFFITH WILDLIFE BIOLOGY

**2003 UPPER SAN LUIS REY RIVER
AND PAMO VALLEY
BROWN-HEADED COWBIRD CONTROL PROGRAM**

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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 flycatcher (*Empidonax traillii extimus*, flycatcher, swfl), least Bell's vireo (*Vireo bellii pusillus*, vireo, lbvi), and their 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 2003. We removed 207 cowbirds (54 males, 38 females, and 0 juveniles at uslr; 61 males, 48 females, and 6 juveniles at pv). In addition, 330 individuals of 8 non-target species were captured (79 at uslr, 251 at pv), of which all but 6 (1.8%) were released unharmed.

Topical protection from cowbird parasitism allows targeted populations of host species to increase annual productivity and to grow between years, 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

The brown-headed cowbird is a small blackbird native to the Great Plains. Cowbirds are brood parasites; they do not build their own nests or raise their own young. Instead, cowbird females lay their eggs in the nests of other birds, called hosts, which then incubate, hatch, and raise the cowbird chick.

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 (Willet 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, 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. Wild brown-headed cowbirds lay eggs on 70-80% of days during a two- to four-month breeding season for a total of at least 40 and perhaps as many as 100 eggs per year (Smith and Rothstein, 2000). In captivity, one female laid 70 eggs (Colford and Roby 1993); wild shiny cowbirds are known to lay 120 eggs per year (Kattan 1997).

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 performed for several years, the abundance and diversity of other host species such as the yellow warbler and yellow-breasted chat, not just the targeted endangered host population, has increased markedly (ibid).

Upper San Luis Rey River and Pamo Valley Cowbird Control

2004 is the third and final year of a program to operate 4 traps at the upper San Luis Rey River and 4 traps at Pamo Valley, jointly funded by the US Fish & Wildlife Service and the USDA Forest Service. The cowbird control program at these two sites was first initiated in 1992 by the Forest Service; both sites are within the Cleveland National Forest.

The purpose of the trapping is to benefit the federally endangered southwestern willow flycatcher, least Bell's vireo, and other 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 was funded by the United States Fish & Wildlife Service and the USDA Forest Service. Assistance was provided by J. Wells of the Cleveland National Forest and P. Cole of the FWS; thank you. Additional permits and cooperation were received of the Vista Irrigation District and the Foster Ranch.

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 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 of 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 a few vireos. 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-Temesal 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 the 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. Both trap sites in Pamo Valley are inside fenced active cattle pasture. The eastern portion of the Pamo Valley study area (Santa Ysabel Creek from Sutherland Reservoir to the valley) is similar to the upper San Luis Rey River with regard to topography and vegetation.

The composition of the riparian vegetation in Pamo Valley proper contains less ash, more willow, and, due to grazing, less herbaceous and shrub layer than at the upper San Luis Rey River. Pamo Valley has a broad flood plain with a wider riparian habitat corridor, although much of the valley floor is grazed grassland. It has a less diverse and abundant bird community. No willow flycatcher or least Bell's vireo have been present for three or more years (J. Wells, pers. comm.).

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. 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 motion 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 and images of each trap are shown on Figures 2 and 3 (uslr) and Figures 4, 5, and 6 (pv).

Upon placement on a north-south axis, 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); four 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; and 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, 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.

The traps were operated from 1 April to 30 June and were therefore in place for cowbird dispersal from wintering flocks to breeding areas in early April and for the April through June host 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 programs.

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 207 cowbirds, including 54 males, 38 females, and 0 juveniles at the uslr; and 61 males, 48 females, and 6 juveniles at pv (Table 1, Table 2, Table 3). The male:female capture ratio was 1.42:1 at uslr and 1.27:1 at pv. The first cowbirds captured at uslr were 2 males in Trap 4 on 14 April and at pv 1 male in Trap 2 on 8 April. Both sites showed early season capture peaks and a small late season spike of males, females, and juveniles (Table 2, Table 3, Figure 7, Figure 8). At the uslr, Trap 4 captured the most males (47), females (30), and total cowbirds (70). At pv, Trap 2 captured the most males (24), females (25), juveniles (5), and total cowbirds (54).

In addition to cowbirds, the 4 traps at uslr captured 79 individuals of 8 non-target species; all were released unharmed (Table 4). At pv, the 4 traps captured 251 individuals of 6 non-target species, of which all but 6 (2.4%) 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 during focused flycatcher (and vireo?) surveys (and nest monitoring ?) [please confirm].

DISCUSSION AND CONCLUSIONS

The upper San Luis Rey River is one of only three viable southwestern willow flycatcher 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 few lbvi and the large population of yellow warblers present.

Annual topical trapping does not affect the regional cowbird population. About the same number of cowbirds disperse to and are removed from the study area every year.

In the absence of proven regional cowbird control, the current topical cowbird trapping program will be required indefinitely to control cowbird 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. If surveys and monitoring are performed for the flycatcher or vireo, data on the location, breeding status, and parasitism events, if any, should be provided each year to the cowbird control contractor for use in determining trap number and placement.

LITERATURE CITED

- American Ornithologist's Union. 1989. Thirty-seventh supplement to the AOU Checklist of North American Birds. *Auk* 106:532-538.
- Flahaut, M.R., and Z.M. Schultz. 1955. Northern Pacific Coast Region. *Audubon Field Notes* 9:395-397.
- Fleischer, R.C. 1985. A new technique to identify and assess the dispersion of eggs of individual brood parasites. *Behav. Ecol. Sociobiol.* 17:91-99.
- Friedmann, H. 1963. Host relations of the parasitic cowbirds. *US Natl. Mus. Bull.* 233. 273 pp.
- Freidmann, H., and L. F. Kiff. 1985. The parasitic cowbirds and their hosts. *Proc. West. Found. Zool.* 2:226-304.
- Gaines, D. 1974. A new look at the nesting riparian avifauna of the Sacramento Valley, CA. *Western Birds* 5:61-80.
- Goldwasser, S., D. Gaines, and S.R. Wilbur. 1980. The least Bell's vireo in California: a de facto endangered race. *American Birds* 34:742-745.
- Griffith, J. T. and Griffith, J. C. 2000. Cowbird Control and the Endangered Least Bell's Vireo: A Management Success Story. Pp. 342-356 *in Ecology and Management of Cowbirds and Their Hosts* (J. N. M. Smith et al, editors). University of Texas Press, Austin, Texas.
- GWB. 1992 (updates 1994, 1998). Brown-headed cowbird trapping protocol. Unpublished document prepared for use by the USFWS and CDFG for permitting by Griffith Wildlife Biology, Calumet, MI.
- Grinnell, J., and A.H. Miller. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* 27:1-608.
- Holford, K.C., and D.D. Roby. 1993. Factors limiting fecundity of Brown-headed Cowbirds. *Condor* 95:536-545.
- Kattan, G.H. 1997. Shiny Cowbirds follow the "shotgun" strategy of brood parasitism. *Anium. Behav.* 53:647-654
- Rothstein, S.I. 1994. The cowbird's invasion of the far west: history, causes, and consequences experienced by host species. Pages 301-315 *in* J.R. Jehl and N.K. Johnson eds. *A Century of Avifaunal Change in W. North America. Studies in Avian Biology*, No. 15.

- Smith, J.N.M., and S.I. Rothstein. 2000. Brown-headed Cowbirds as a Model System for Studies of Behavior, Ecology, Evolution, and Conservation Biology. Pp. 1-9 *in* Ecology and Management of Cowbirds and Their Hosts (J. N. M. Smith et al, editors). University of Texas Press, Austin, Texas.
- Unitt, P. 1984. The birds of San Diego County. San Diego Soc. of Natural History, Memoir 13.
- Wilbur, S.R. 1981. The least Bell's vireo in Baja California, Mexico. *Western Birds* 11:129-133.
- Willet, G. 1933. Revised list of birds of southwestern California. *Pacific Coast Avifauna*. 21:1- 203.

Figure 1. 2003 upper San Luis Rey River and Pamo Valley brown-headed cowbird control project study area.

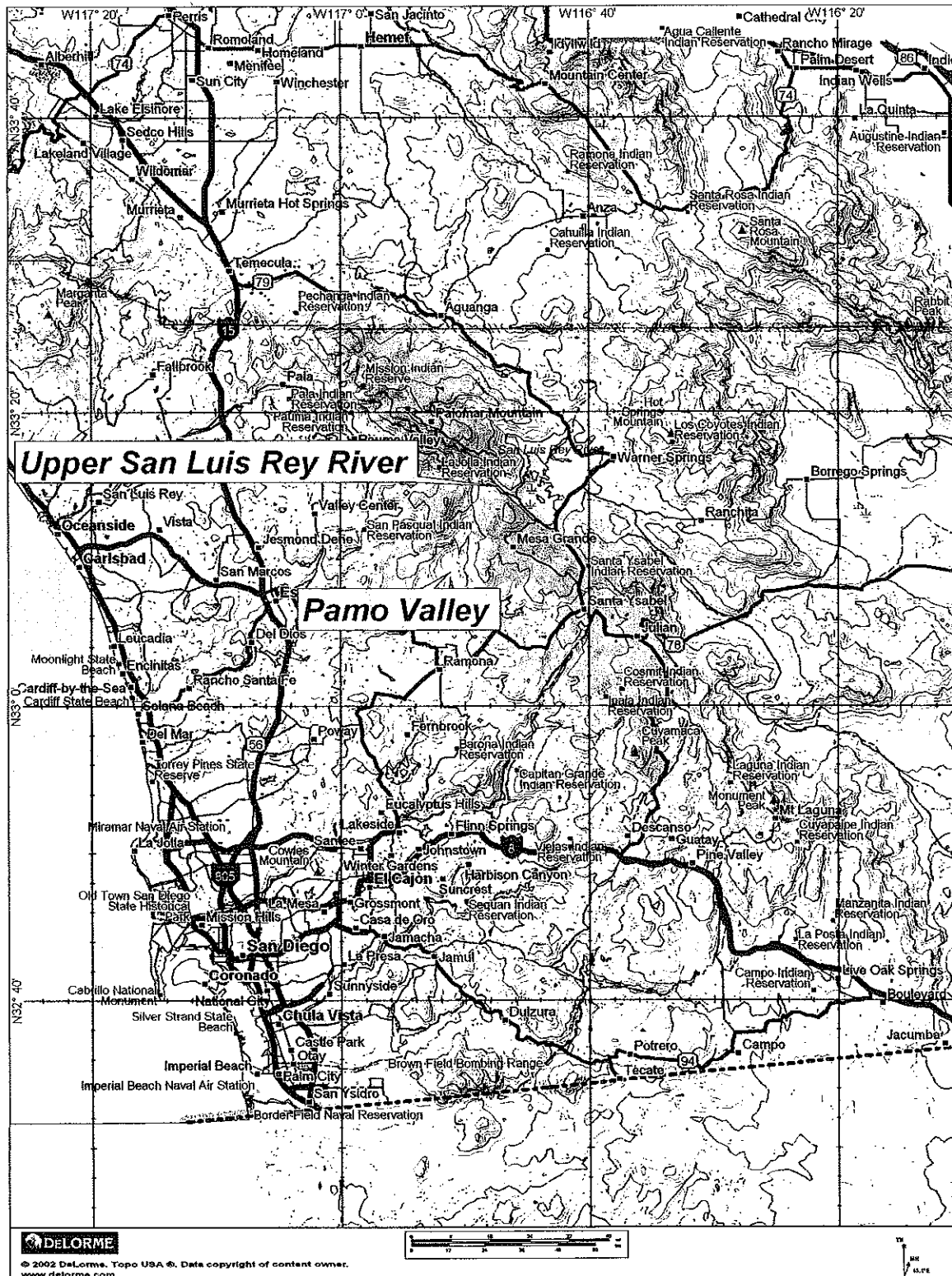


Figure 2. 2003 upper San Luis Rey River brown-headed cowbird trap locations.

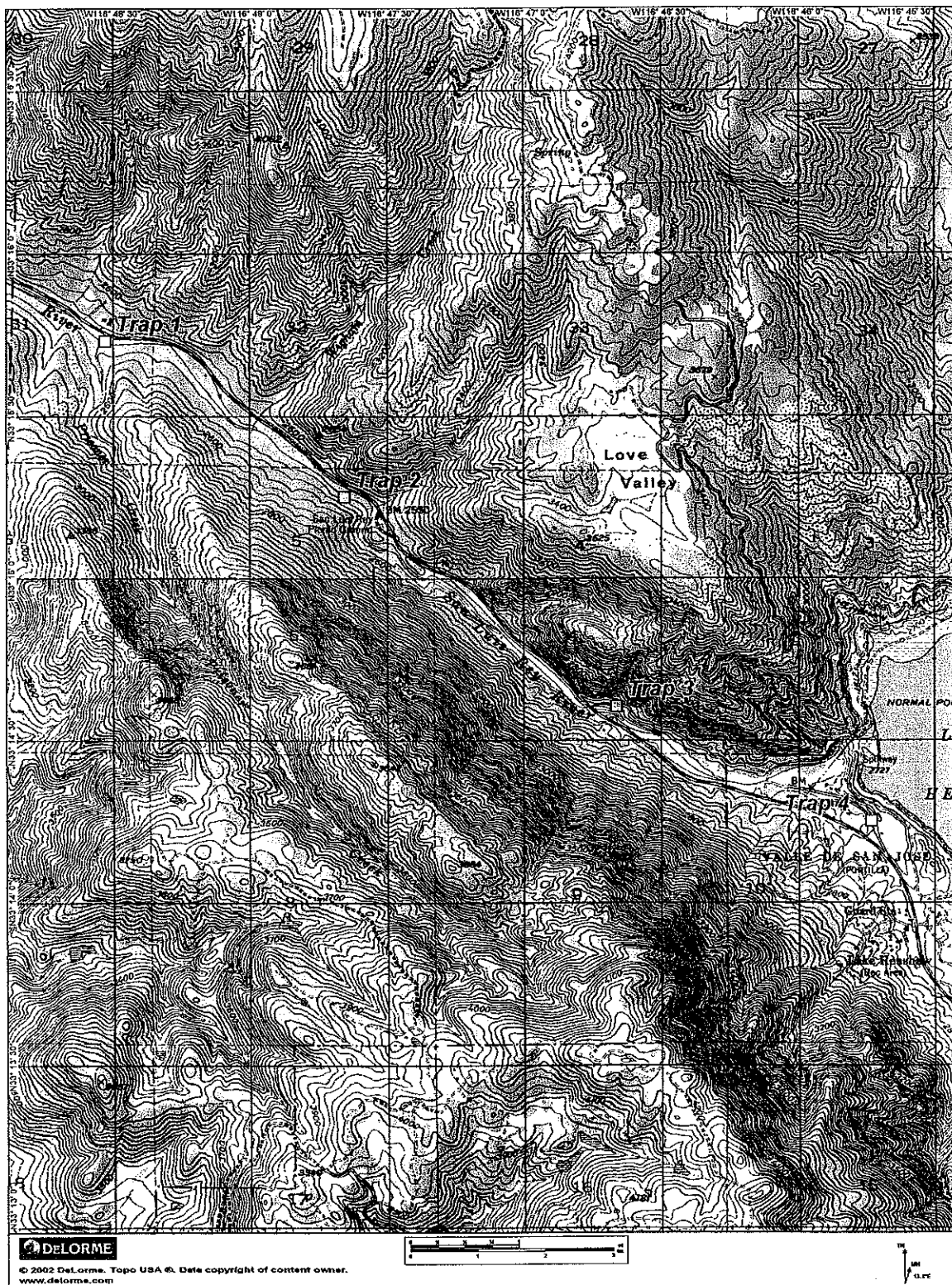
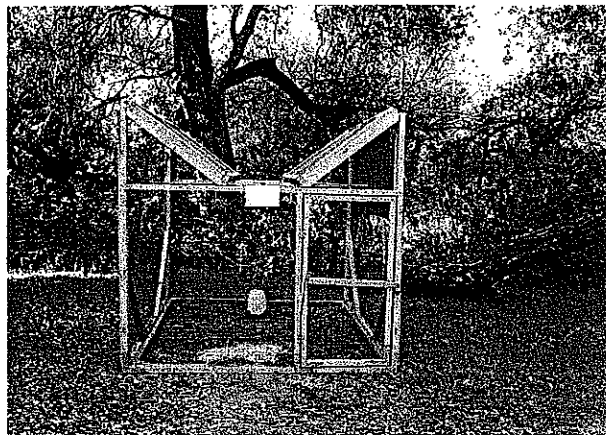


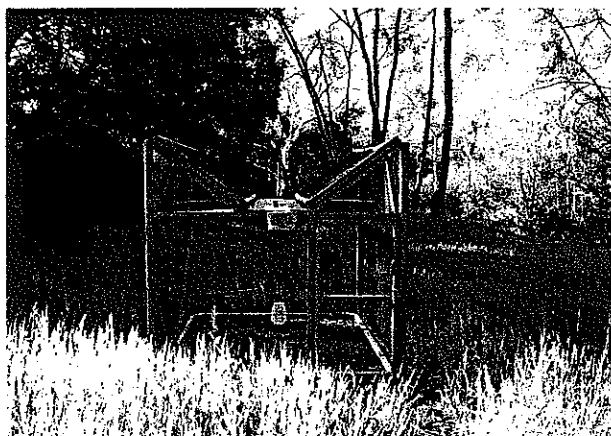
Figure 3. 2003 upper San Luis Rey river brown-headed cowbird traps.



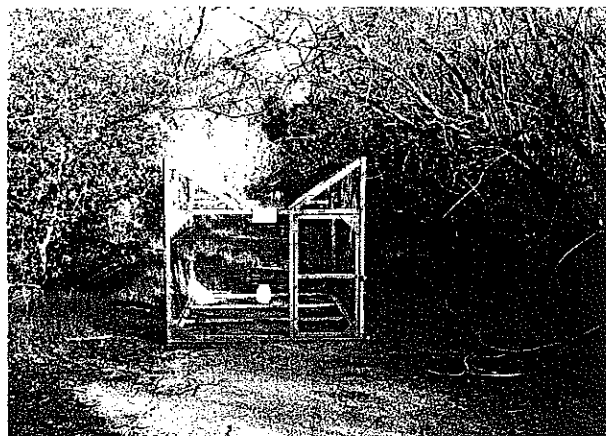
Trap 1



Trap 2



Trap 3



Trap 4

Figure 4. 2003 Pamo Valley brown-headed cowbird traps 1 and 2.

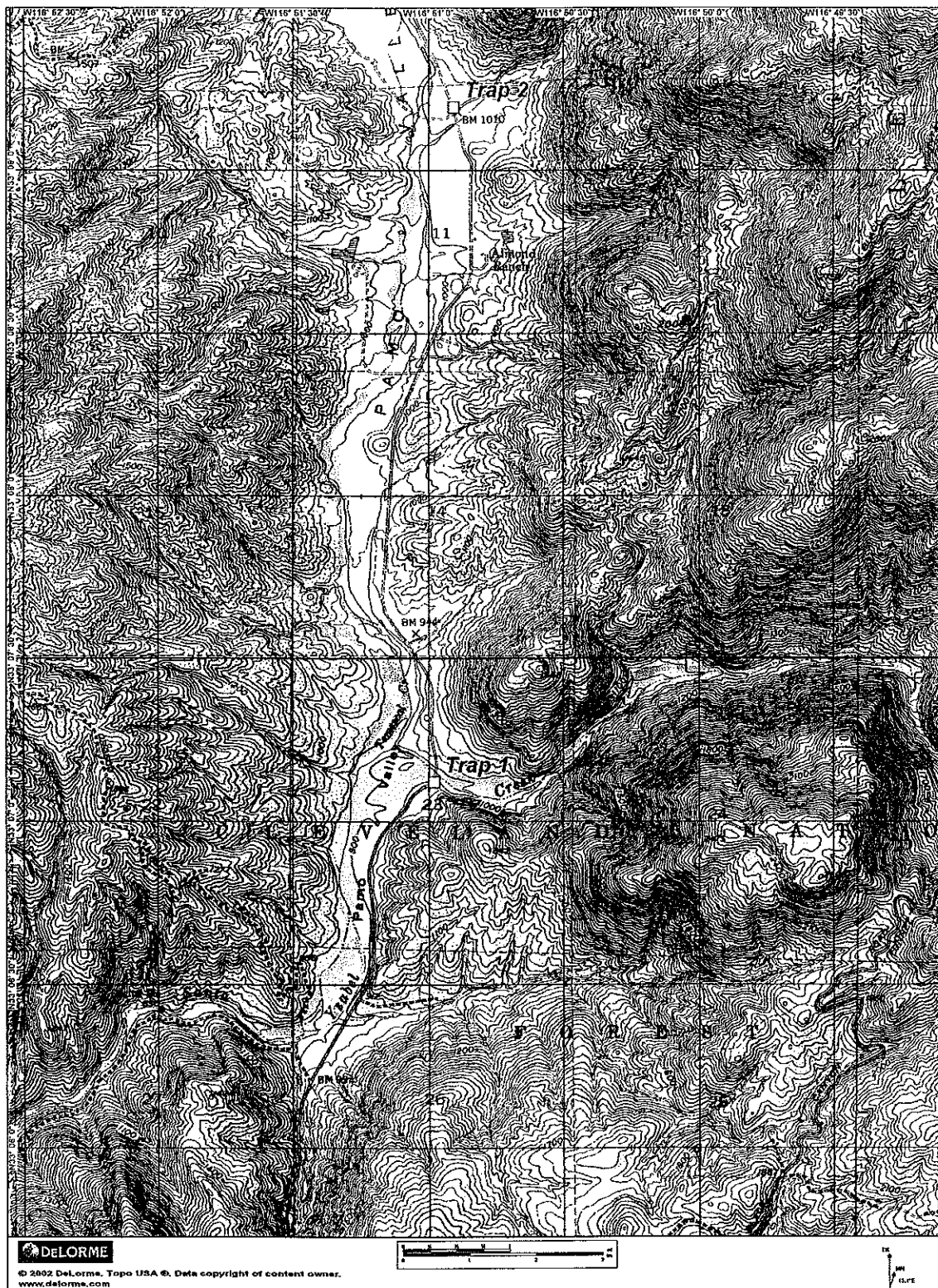


Figure 5. 2003 Pamo Valley brown-headed cowbird traps 3 and 4.

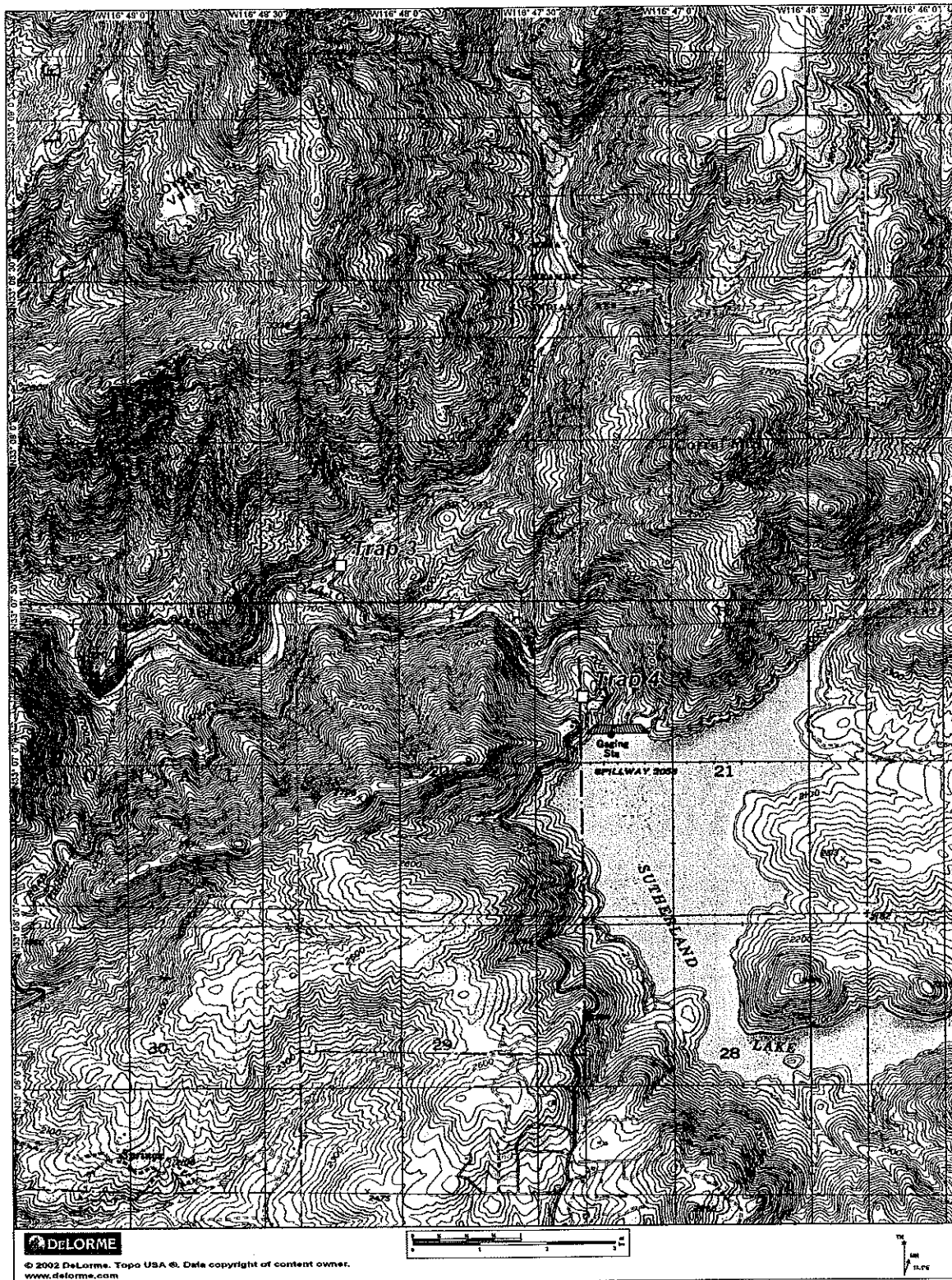
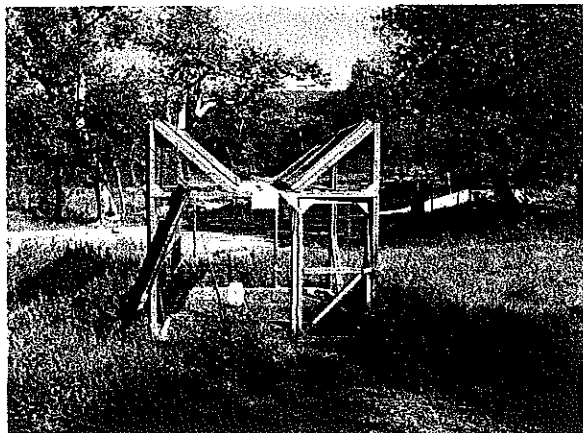
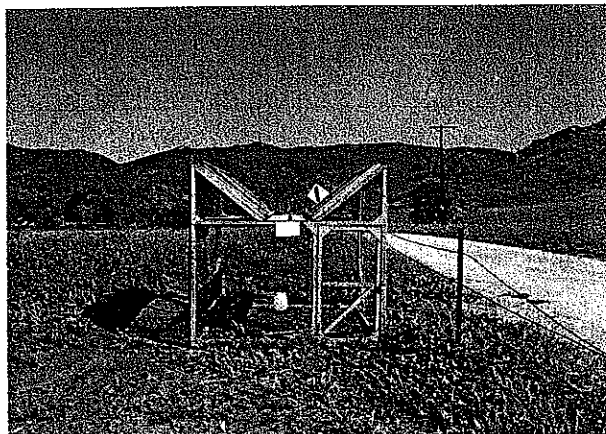


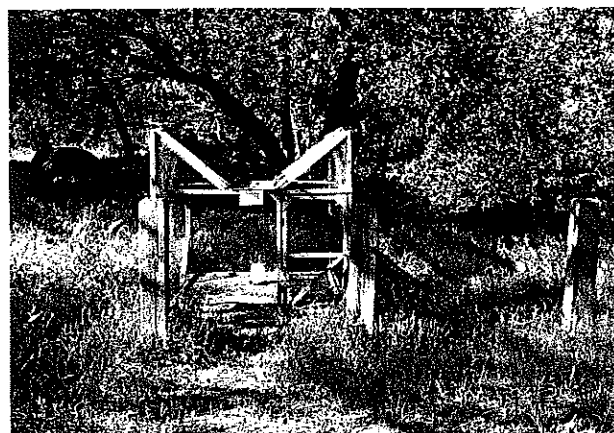
Figure 6. Images of 2003 Pamo Valley brown headed cowbird traps.



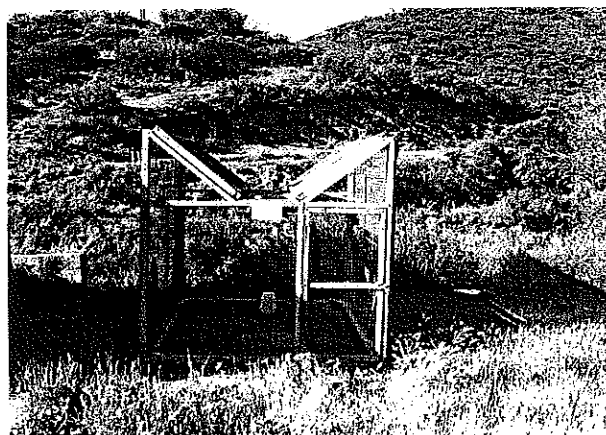
Trap 1



Trap 2



Trap 3



Trap 4

Figure 7. Number of male, female, and juvenile cowbirds captured per week at the upper San Luis Rey River in 2003.

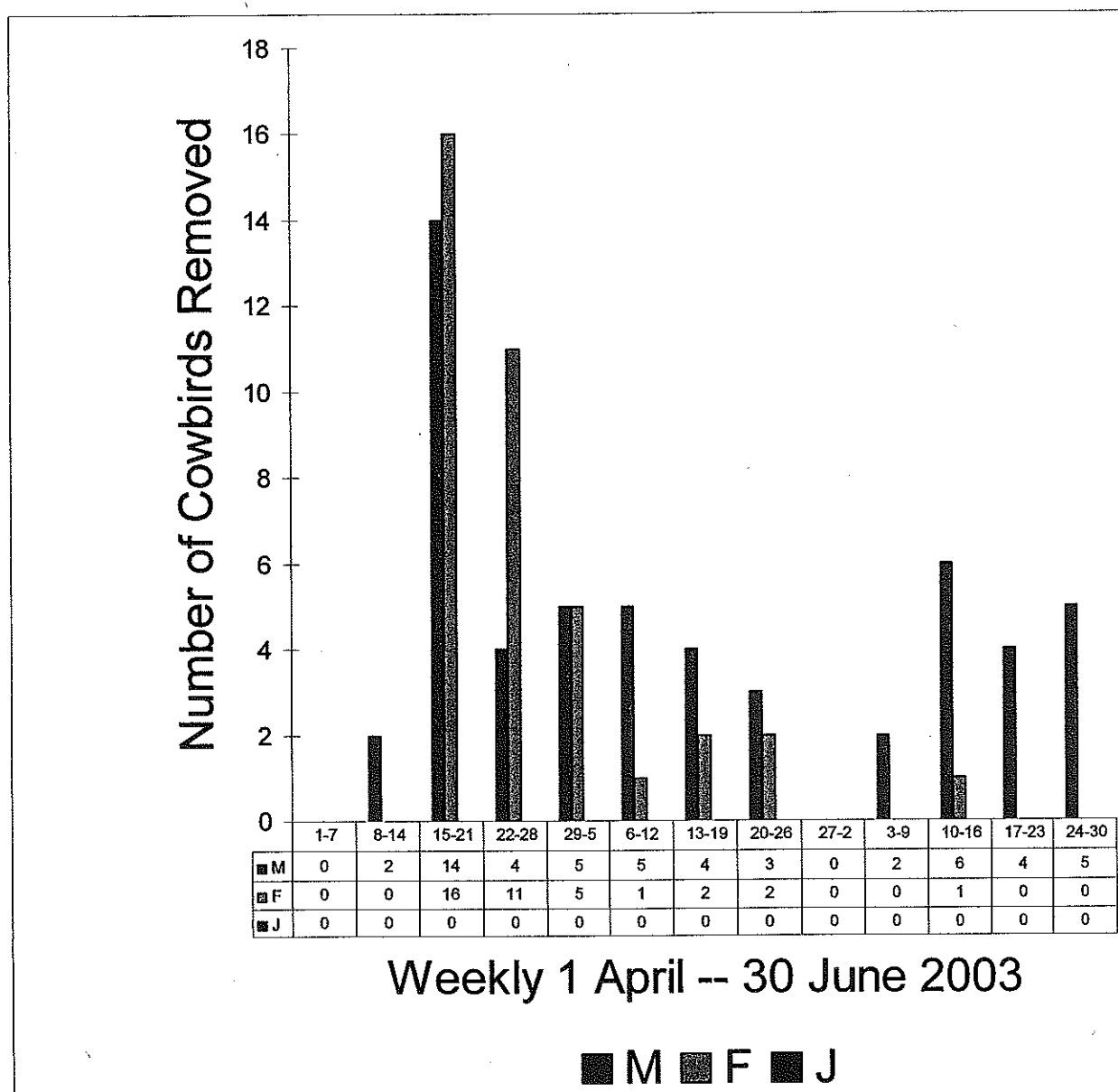


Figure 8. Number of male, female, and juvenile cowbirds captured per week at Pamo Valley in 2003.

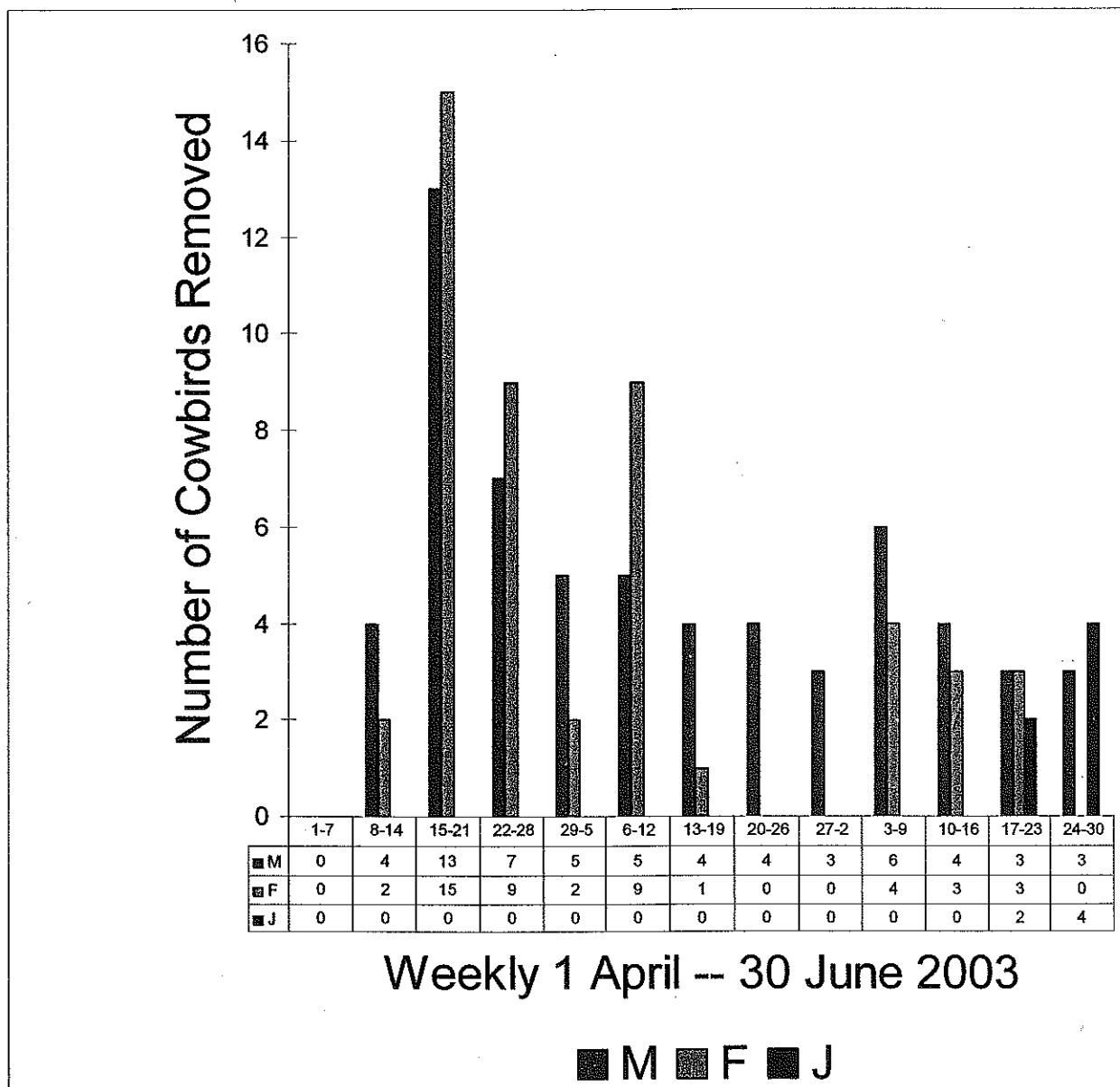


Table 1. Number of cowbirds captured at the upper San Luis Rey River and Pamo Valley, 1992-2003.

Upper San Luis Rey River

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
2002	62	61	2	125	1.02	1 Apr - 29 Jun	4	90	1.39
2003	54	38	0	92	1.42	1 Apr - 30 Jun	4	91	1.01
Total	571	337	21	929	1.69		42	987	0.94

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
2002	94	61	3	158	1.54	1 Apr - 29 Jun	4	90	1.76
2003	61	48	6	115	1.27	1 Apr - 30 Jun	4	91	1.26
Total	318	205	25	548	1.55			363	1.51

Sources

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

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												0	0	0
	6												0	0	0
	7												0	0	0
wk 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8													0	0	0
9													0	0	0
10													0	0	0
11													0	0	0
12													0	0	0
13													0	0	0
14										2			2	0	0
wk 2	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0
15										3			3	0	0
16											2		0	2	0
17										4	6		4	6	0
18										1	1		1	1	0
19										4	5		4	5	0
20					1					1	1		1	2	0
21										1			1	0	0
wk 3	0	0	0	0	1	0	0	0	0	14	15	0	14	16	0
22											1		0	1	0
23		1								3	1		3	2	0
24													0	0	0
25											1		0	1	0
26											1		0	1	0
27					2						2		0	4	0
28										1	2		1	2	0
wk 4	0	1	0	0	2	0	0	0	0	4	8	0	4	11	0
29					1								0	1	0
30											1		0	1	0
May	1						1				2		1	2	0
2										1			1	0	0
3					1								1	0	0

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
4							1			1			2	0	0
5											1		0	1	0
wk 5	0	0	0	1	1	0	2	0	0	2	4	0	5	5	0
6													0	0	0
7										2			2	0	0
8													0	0	0
9													0	0	0
10					1								0	1	0
11										3			3	0	0
12													0	0	0
wk 6	0	0	0	0	1	0	0	0	0	5	0	0	5	1	0
13										1			1	0	0
14				1						1	1		2	1	0
15										1			1	0	0
16								1					0	1	0
17													0	0	0
18													0	0	0
19													0	0	0
wk 7	0	0	0	1	0	0	0	1	0	3	1	0	4	2	0
20										1			1	0	0
21													0	0	0
22	1												1	0	0
23													0	0	0
24		1											0	1	0
25										1	1		1	1	0
26													0	0	0
wk 8	1	1	0	0	0	0	0	0	0	2	1	0	3	2	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 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3										1			1	0	0
4													0	0	0
5										1			1	0	0
6													0	0	0
7													0	0	0

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
8													0	0	0
9													0	0	0
wk 10	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0
10										2			2	0	0
11	1									2			3	0	0
12													0	0	0
13													0	0	0
14										1			1	0	0
15											1		0	1	0
16													0	0	0
wk 11	1	0	0	0	0	0	0	0	0	5	1	0	6	1	0
17													0	0	0
18							1			1			2	0	0
19													0	0	0
20										1			1	0	0
21													0	0	0
22										1			1	0	0
23													0	0	0
wk 12	0	0	0	0	0	0	1	0	0	3	0	0	4	0	0
24													0	0	0
25										2			2	0	0
26													0	0	0
27													0	0	0
28													0	0	0
29													0	0	0
30										3			3	0	0
wk 13	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0
TOTAL	2	2	0	2	5	0	3	1	0	47	30	0	54	38	0

Table 3. Number of male, female, and juvenile cowbirds captured per day, per week, per trap, and total at Pamo Valley in 2003.

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													0	0	0
6													0	0	0
7													0	0	0
wk 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8				1									1	0	0
9													0	0	0
10													0	0	0
11													0	0	0
12				1									1	0	0
13				1									1	0	0
14							1	2					1	2	0
wk 2	0	0	0	3	0	0	1	2	0	0	0	0	4	2	0
15							1	1					1	1	0
16					1		2	2					2	3	0
17				1	3			1					1	4	0
18				1	1					3	1		4	2	0
19													0	0	0
20				3	1					1	1		4	2	0
21					1					1	2		1	3	0
wk 3	0	0	0	5	7	0	3	4	0	5	4	0	13	15	0
22					1								0	1	0
23													0	0	0
24				1	1								1	1	0
25				1									1	0	0
26													0	0	0
27					2		2						2	2	0
28	2	5					1						3	5	0
wk 4	2	5	0	2	4	0	3	0	0	0	0	0	7	9	0
29													0	0	0
30	1			1									2	0	0
May 1													0	0	0
2	1				1		1	1					2	2	0

[illegible]

	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	
6													0	0	0	
7													0	0	0	
8					1	2		1					2	2	0	
9					1			1				1	2	1	0	
wk 10		0	1	0	3	2	0	2	0	0	1	1	0	6	4	0
10												1	0	1	0	
11									1				0	1	0	
12						1		1			2		3	1	0	
13													0	0	0	
14								1					1	0	0	
15													0	0	0	
16													0	0	0	
wk 11		0	0	0	0	1	0	2	1	0	2	1	0	4	3	0
17													0	0	0	
18						1							0	1	0	
19						1	2						0	1	2	
20													0	0	0	
21					1	1							1	1	0	
22													0	0	0	
23					2								2	0	0	
wk 12		0	0	0	3	3	2	0	0	0	0	0	0	3	3	2
24							1						0	0	1	
25					1		1						1	0	1	
26													0	0	0	
27		1											1	0	0	
28											1		1	0	0	
29				1			1						0	0	2	
30													0	0	0	
wk 13		1	0	1	1	0	3	0	0	0	1	0	0	3	0	4
TOTAL		14	6	1	24	25	5	14	8	0	9	9	0	61	48	6

Table 4. Number of non-target species captured & released or preyed upon in cowbird traps at the upper San Luis Rey River in 2003.

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
SCJA	3													
BHGR			3						3		8		1	
CATO	6		6		4		1							
RWBL														
DEJU					1		6		4					
HOFI	2		9		2									
TOTAL	11	0	18	0	7	0	7	0	7	0	8	0	1	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
SCJA									1		10		14	0
BHGR	2		1										18	0
CATO											1		18	0
RWBL									1				1	0
DEJU									1				12	0
HOFI							1		1		1		16	0
TOTAL	2	0	1	0	0	0	1	0	4	0	12	0	79	0

SCJA scrub jay
 BHGR black-headed grosbeak
 CATO California towhee
 RWBL red-winged blackbird
 DEJU dark-eyed junco
 HOFI house finch

Table 5. Number of non-target species captured & released or preyed upon in cowbird traps at Pamo Valley in 2003.

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
EUST			1											
CATH														
BHGR					5		10		10		19		7	
CATO	3	1	7		8		4		9		7		4	
RWBL			1		1				1		2			
HOFI					16		9		15				7	
TOTAL	3	1	9	0	30	0	23	0	35	0	28	0	18	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
EUST					3		2						6	0
CATH											1		1	0
BHGR	13		7		13		6		9				99	0
CATO	1		2		1		2		2		3		53	1
RWBL			1				1		1				8	0
HOFI	8				1		2		8		17		83	0
TOTAL	22	0	10	0	18	0	13	0	20	0	21	0	250	1

EUST European starling
 CATH California thrasher
 BHGR black-headed grosbeak
 SPTO spotted towhee
 CATO California towhee
 RWBL red-winged blackbird
 WCSP white-crowned sparrow
 HOFI house finch

Table 6. Banded cowbirds captured and released at the upper San Luis Rey River and Pamo Valley in 2003.

Band number	Sex	Captures		Releases	
	M F	Date	Trap	Date	Trap
1681 57597	F	Ma 13	U T2	Kept as decoy in U T3	
1681 01858	M	Ap 13	P T2	Ap 14	P T2
1631 08747	M	Ap 14	U T4	Ap 14	U T4
		Ma 21	U T4	Ma 21	U T4
871 00575	M	Ma 12	U T2	Ma 12	U T2
1681 56023	M	Ap 17	U T4	Ap 17	U T4
		Ap 18	U T4	Ap 18	U T4
		Ap 19	U T4	Ap 19	U T4
		Ap 25	U T4	Ap 25	U T4
		Ap 27	U T4	Ap 27	U T4
		Ma 2	U T4	Ma 2	U T4
		Ma 3	U T4	Ma 3	U T4
		Ma 4	U T4	Ma 4	U T4
		Ma 9	U T4	Ma 9	U T4
		Ma 10	U T4	Ma 10	U T4
		Ma 11	U T4	Ma 11	U T4

U= Upper San Luis Rey River

P=Pamo Valley

Appendix 1. 2003 GPS coordinates for brown-headed cowbird traps at the Upper San Luis Rey River (4) and Pamo Valley (4).

	Trap	GPS Location			
		Lat/Long	Degrees	Minutes	Seconds
USLR	1	North	33	15	43.9
		West	116	48	31.7
	2	North	33	15	15.2
		West	116	47	39.5
	3	North	33	14	36.3
		West	116	46	39.7
	4	North	33	14	15
		West	116	45	43.9
PAMO	1	North	33	7	7.2
		West	116	50	58.8
	2	North	33	9	11.6
		West	116	50	54.3
	3	North	33	7	37
		West	116	48	12.6
	4	North	33	7	12.4
		West	116	47	19.6