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COWBIRD TRAPPING IN REMOTE AREAS: ALTERNATIVE CONTROL MEASURES MAY BE MORE EFFECTIVE

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Abstract. Brown-headed Cowbirds *(Molothrus ater)* were trapped on the Cleveland National Forest from 1992 to 1997 in an attempt to increase the reproductive success of the endangered Least Bell's Vireo *(Vireo bellii pusillus)* and Southwestern Willow Flycatcher *(Empidonax traillii extimus)* on National Forest lands. Over this time period the flycatcher population has been stable, while two of three vireo populations have declined. We postulate that the remote locations of vireo populations made cowbird trapping an ineffective tool for reducing the impact of brood parasitism. The lack of road and trail access to these areas limits both the number of traps that can be employed and the selection of trap locations. Where these conditions exist, our data suggest that nest monitoring and cowbird egg removal may be more effective and less costly than cowbird trapping.

Key Words: brood parasitism, Brown-headed Cowbird, *Empidonax traillii extimus,* Least Bell's Vireo, *Molothrus ater,* Southwestern Willow Flycatcher, *Vireo bellii pusillus.*

The Least Bell's Vireo *(Vireo bellii pusillus)* is federally-listed as endangered (U.S. Fish and Wildlife Service [USFWS] 1986). Major threats to this subspecies include loss of riparian habitat and brood parasitism by Brown-headed Cowbirds *(Molothrus ater)* (Goldwasser et al. 1980). The Southwestern Willow Flycatcher *(Empidonax traillii extimus)* is also federally-listed as endangered (USFWS 1995) and faces similar threats. In San Diego County, California, Cleveland National Forest personnel manage habitat for these species. A large population of Southwestern Willow Flycatchers nests along the upper San Luis Rey River, within the Cleveland National Forest. Several smaller populations of Least Bell's Vireos nest along Santa Ysabel, Pine, and Cottonwood creeks. To minimize the effects of cowbird parasitism, the Forest conducted cowbird trapping from 1992–1997. Here we report the results of this cowbird trapping and compare these with data on population trends and reproductive success of vireos and flycatchers on our study areas.

STUDY AREA

Our study included four riparian areas in the foothill regions of the Laguna and Palomar mountains, in San Diego County: Pine Creek, Cottonwood Creek, Santa Ysabel Creek, and the upper San Luis Rey River (Fig. 1). All of the study areas are located on National Forest lands. The breeding habitat for vireos and flycatchers in these areas consists of mixed riparian forest, varying from early successional to mature stands of arroyo willow (*Salix lasiolepis*), cottonwood (*Populus fremontii*), sycamore (*Platanus racemosa*), and coast live oak (*Quercus agrifolia*). Surrounding land uses include wilderness areas, agriculture, grazing, and rural residential development.

Pine Creek is located within the Pine Creek Wilderness Area, and Cottonwood and Santa Ysabel Creeks are in rugged, remote areas that are 2 to 3 km (by air) from the nearest road (Fig. 1). Cottonwood Creek is at the southern edge of the Hauser Canyon Wilderness Area. All of these creeks are located in narrow, steep-sided canyons where the dominant vegetation type is dense chaparral. The primary access is by hiking through the riparian areas; vireo territories are 1.5 to 6.5 kilometers from the nearest road. The San Luis Rey River is adjacent to state Highway 76.

METHODS

Over the past six years, Cleveland National Forest staff have conducted cowbird trapping in the four study areas. We began a pilot trapping effort at Santa Ysabel Creek and the San Luis Rey River in 1992, and fully implemented the program in 1993 with an additional trapping effort at Pine Creek to increase the reproductive success of vireo and flycatcher. Standard trapping methods, as described in Robinson et al. (1992), were employed. The design was modeled on the Australian Crow trap and the trap size was 2 × 2.5 × 1.5 m. In 1992, one trap was placed at Santa Ysabel Creek and one trap at the San Luis Rey River. Beginning in 1993, three to five traps were placed at the San Luis Rey River, three or four traps at Santa Ysabel Creek, and two traps at Pine and Cottonwood Creeks. (Pine Creek is a tributary to Cottonwood Creek; traps were placed near their confluence.)

The number of traps placed at each site was based on the number of suitable trap locations that were reasonably accessible for monitoring. At the San Luis Rey River, traps were placed at 0.8 km intervals in the riparian habitat. Due to the lack of road access to Pine and Cottonwood

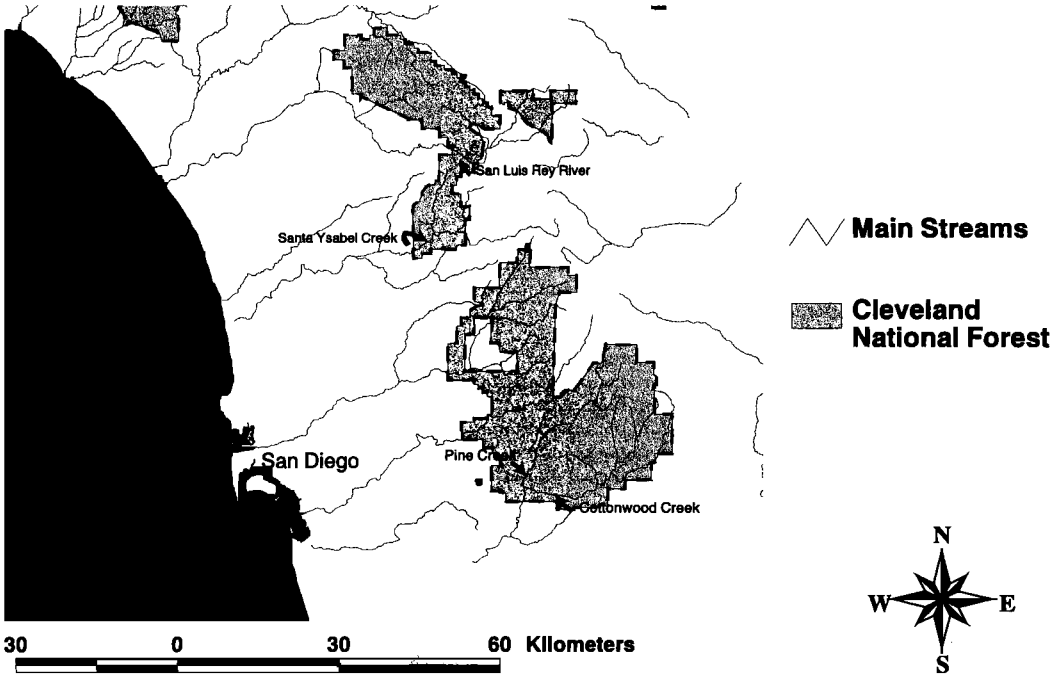

FIGURE 1. Least Bell's Vireo and Southwestern Willow Flycatcher study sites, Cleveland National Forest, CA, 1992–1997.

Creeks, traps were placed near Barrett Lake where these creeks converge; this was the only area in which road access was available. At Santa Ysabel Creek, there is road access to the riparian habitat only at a point where a road crosses the riparian area, about 1.5 kilometers from the nearest vireo territory. Traps were placed in three areas in the adjoining Pamo Valley, which is the primary cowbird foraging area.

The trapping season was approximately April 1 through July 15. Each trap had 'bait birds,' typically two male cowbirds and three female cowbirds, to entice additional cowbirds to enter the trap. Traps were checked daily and the number, age and sex of trapped cowbirds were recorded. Excess cowbirds and non-target bird species were released and cowbirds were humanely destroyed. Water and food were provided within the trap and were replenished daily.

Population monitoring and nest monitoring of Least Bell's Vireos and Southwestern Willow Flycatchers fluctuated between years as a function of funding and staffing levels. For Least Bell's Vireo, nest and population surveys were conducted in 1993, 1994, and 1997 between April 1 and July 15. In 1995 and 1996 no surveys were conducted (US Forest Service, unpubl. reports). For Southwestern Willow Flycatcher, intensive population monitoring was conducted from 1994 through 1997, between May 1 and August 15 (J. T. Griffith and J. C. Griffith unpubl. report, W. E. Haas unpubl. report).

Population surveys consisted of walking through the study area in the morning hours, typically between 0600 and 1100 hrs. Taped playbacks of Least Bell's Vireo and Southwestern Willow Flycatcher songs were occasionally used to elicit responses. Nest monitoring was conducted by observing Least Bell's Vireo and Southwestern Willow Flycatcher behavior for more extended periods. The observer would determine whether birds were paired and would locate nests. Once nest locations had been determined, the observer would monitor nests at 7–10 day intervals to determine the rate of brood parasitism and number of successful fledglings. In 1997, cowbird trapping at Cottonwood Creek was supplemented with nest checks and cowbird egg removal. Five Least Bell's Vireo pairs were monitored.

RESULTS

The Santa Ysabel Creek and San Luis Rey River trap arrays were most effective at capturing large numbers of cowbirds (Fig. 2). An average of 59 cowbirds (SD = 23) were trapped annually at Santa Ysabel Creek and 79 (SD =

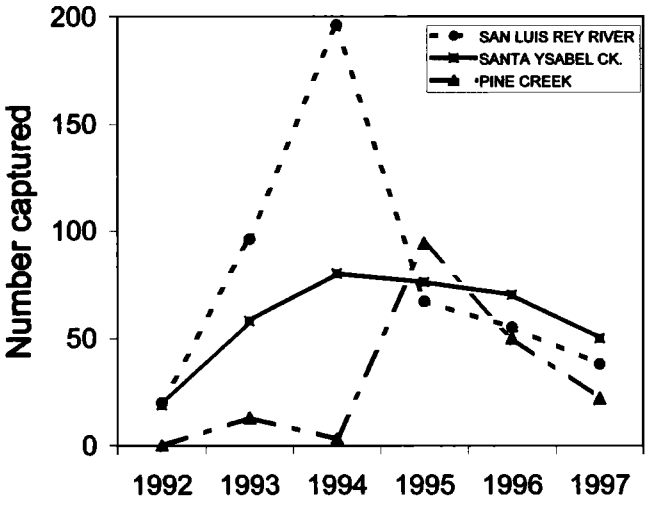

FIGURE 2. Cowbird trapping results Cleveland National Forest, CA, 1992–1997. Note that in 1994, cowbird shooting was substituted for cowbird trapping at Pine Creek and Cottonwood Creek.

63) at San Luis Rey River. However, the trapping effort was complicated by a few factors. For example, one trap at the San Luis Rey River was constantly vandalized with consequent release of cowbirds, and one trap at Santa Ysabel Creek was a favorite feeding area for predators, making it difficult to maintain the target number of bait birds in the trap. The presumed predators were Cooper's Hawks *(Accipiter cooperi)* and raccoons *(Procyon lotor)*. It appeared that predators grabbed cowbirds and pulled them through the mesh enclosing the trap.

The cowbird traps at Pine Creek and Cottonwood Creek caught an average of 45 (SD = 36) cowbirds per year (Fig. 2). In 1994 cowbird shooting was substituted for trapping and three cowbirds were shot. The trapping in this area was complicated by the frequent capture of large numbers of non-target species, particularly Red-winged Blackbirds (*Agelaius phoeniceus*). At all locations the number of cowbird captures per year decreased slightly from 1995 to 1997.

Bell's Vireos

The Least Bell's Vireo population at Pine Creek declined over the course of the study (Fig. 3). The Pine Creek population was at its highest level in 1994 with a total of five pairs reported (U.S. Forest Service, unpubl. Report), and at its lowest level in 1997 with no Least Bell's Vireos found (Wells and Turnbull 1998). The Least Bell's Vireo population at Santa Ysabel Creek declined from four pairs in 1992 to a single territorial male in 1997 (Fig. 3). The Cottonwood Creek population of Least Bell's Vireo fluctuated from 1990 to 1997, but has been generally increasing since 1993 (Fig. 3). In 1990, before the initiation of cowbird trapping, five pairs of vireos were detected, and in 1997 six pairs were observed at Cottonwood Creek (Wells and Turnbull 1998).

In 1997, we detected no breeding activity at Pine Creek, and in 1994 and 1997, no activity at Santa Ysabel Creek due to the absence of paired vireos (Fig. 4). At Cottonwood Creek (Fig. 4), the Least Bell's Vireo population has been able to maintain itself over the years, and in fact experienced its best year ever in 1997.

Five vireo pairs were monitored at Cottonwood Creek in 1997. They made a total of eight nesting attempts. Four nests failed due to predation, and cowbird brood parasitism affected three out of eight attempts, for a parasitism rate of 37.5%. However, cowbird eggs were removed from the parasitized nests, allowing the three parasitized broods to successfully fledge a total of seven young (Wells and Turnbull 1998).

For reference purposes, additional pre-trapping data from the years 1985–1990 are summarized here. At Santa Ysabel Creek, a brood parasitism rate of 50% was observed (N = 6 nests detected, 3 parasitized) at Pine Creek, a parasitism rate of 10% (N = 10), and at Cottonwood Creek, a parasitism rate of 30% (N = 10) (U.S. Forest Service, unpubl. report).

Willow Flycatchers

The Southwestern Willow Flycatcher population at the upper San Luis Rey River was monitored between 1994 and 1997 (J. T. Griffith and J. C. Griffith, unpubl. report; W.E. Haas, pers. comm.). This population appeared to be stable

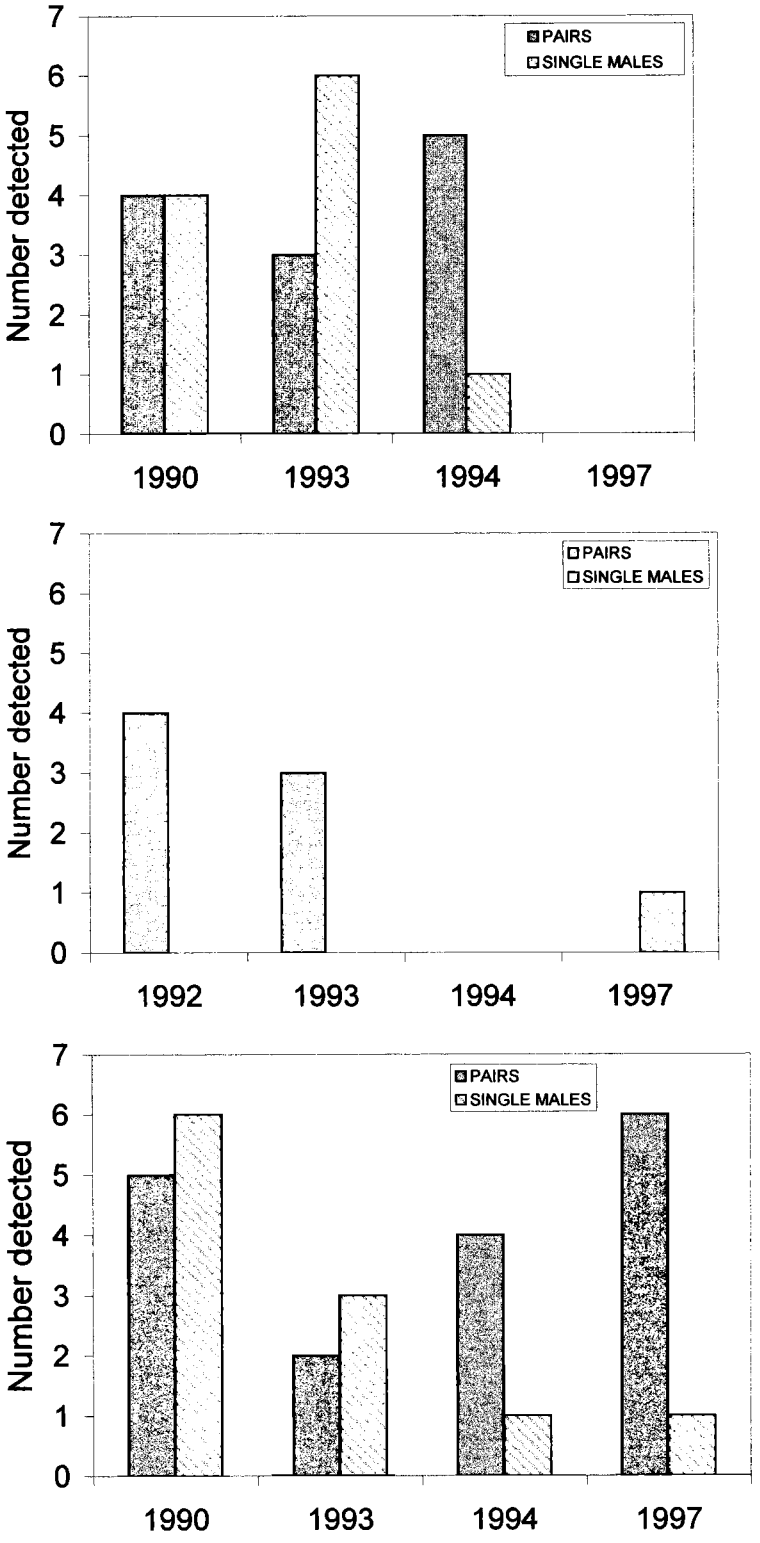

FIGURE 3. Least Bell's Vireo population, Cleveland National Forest, CA, 1992–1997. Top, Pine Creek; middle, Santa Ysabel Creek; bottom, Cottonwood Creek.

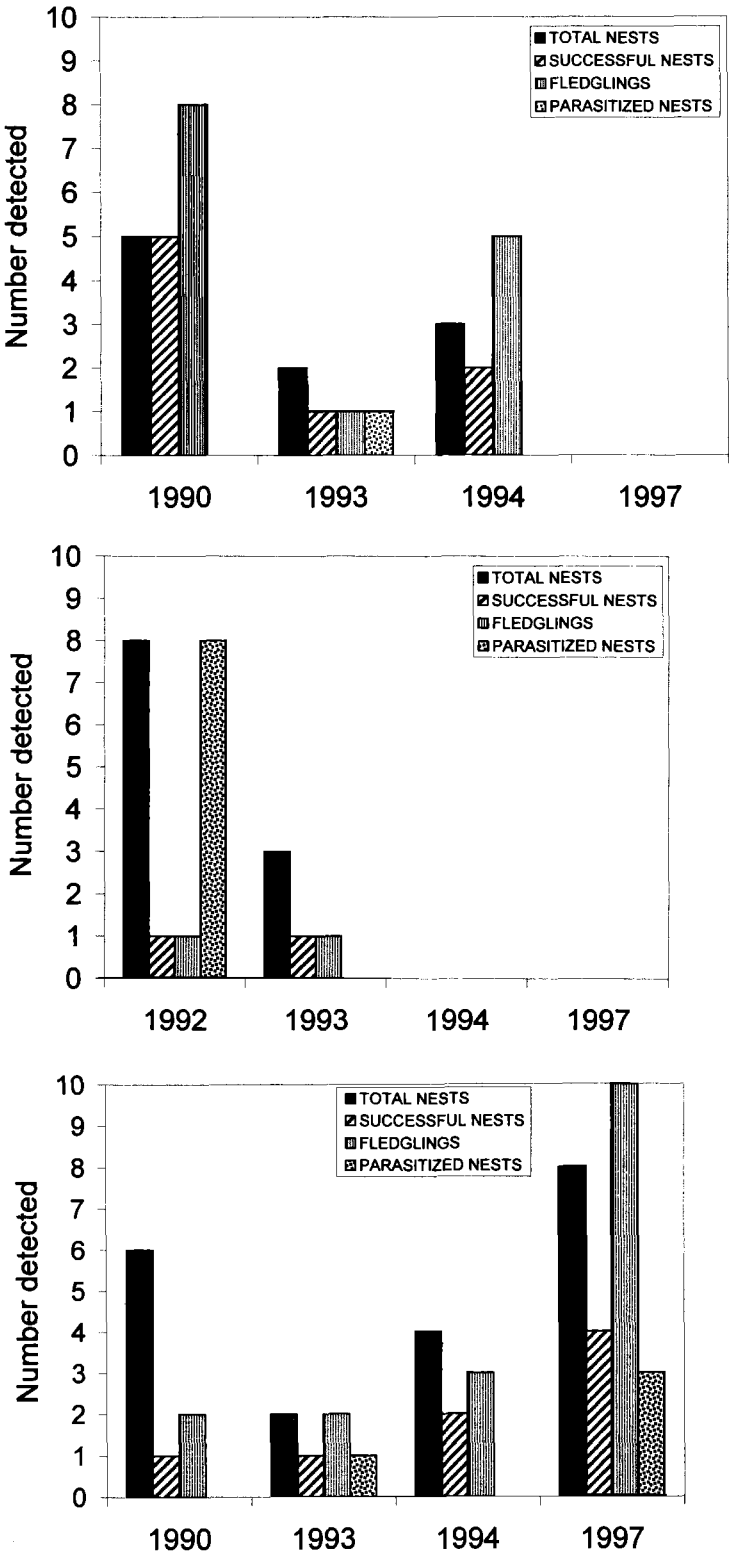

FIGURE 4. Least Bell's Vireo reproduction, Cleveland National Forest, CA, 1992–1997. Top, Pine Creek; middle, Santa Ysabel Creek; bottom, Cottonwood Creek.

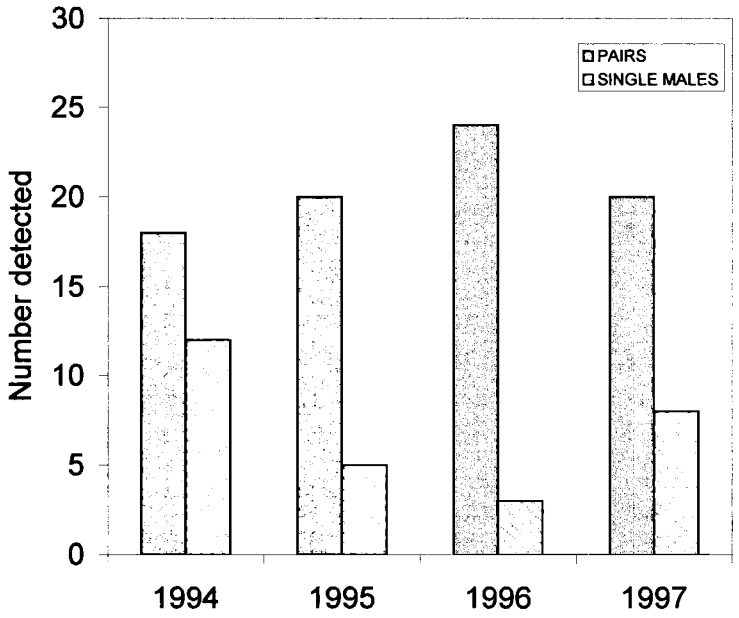

FIGURE 5. Southwestern Willow Flycatcher population, San Luis Rey River, Cleveland National Forest, CA, 1994–1997.

over this time period (Fig. 5). A total of 18 pairs was reported in 1994; the population was at its peak in 1996 at 24 pairs. In 1997, 20 pairs were detected.

No cowbird parasitism of Southwestern Willow Flycatcher nests was noted in 1994–1996. Two out of 27 nests were parasitized in 1997 (7.4%), although both of the affected pairs subsequently re-nested and successfully fledged young (W. E. Haas, pers. comm.). This flycatcher population has had a high rate of reproductive success over the last four years, with a total of 64.6% of detected nests (53/82) successfully fledging young (Fig. 6).

DISCUSSION

On the Cleveland National Forest, cowbird trapping was undertaken as a management technique. This work was not intended to be a research project. Based on trapping results from elsewhere in San Diego County, we expected that trapping would be successful in reducing cowbird parasitism rates. In retrospect, it is clear that we should have placed more emphasis on monitoring the effectiveness of trapping. The data that we do have shows that trapping has had mixed results.

At the San Luis Rey River, cowbird trapping appears to have been effective in controlling cowbird numbers, thereby limiting brood parasitism on the Southwestern Willow Flycatcher. J. T. Griffith and J. C. Griffith (unpubl. report) concluded that the 0% brood parasitism and the 64% nest success rate they observed along the San Luis Rey River in 1994 demonstrated the effectiveness of the cowbird trapping program. However, since there is no information on the pre-trapping rates of brood parasitism for this area it is not possible to determine whether cowbird trapping had any effect.

The consistently high rates of nest success and extremely low rates of cowbird brood parasitism appear to be unique to the San Luis Rey River population. Even with cowbird trapping in place, the Southwestern Willow Flycatcher population at the Kern River, in the southern Sierra Nevada of California, experienced nest success rates of 47.8% and brood parasitism rates of 15.6% in 1993 and 1994 (Whitfield and Strong 1995). Populations of Southwestern Willow Flycatcher at the Grand Canyon, where there is no cowbird trapping, experienced average nest success rates of 18% and brood parasitism rates of 47% between 1992–1996 (Sogge et al. 1997).

In the Pine Creek, Cottonwood Creek, and Santa Ysabel Creek areas, the lack of road and trail access limited both the number of traps that could be employed and the selection of trap locations. In these areas we have observed brood parasitism rates of Least Bell's Vireo populations as high as 100% and the extirpation of two local vireo populations even with cowbird trapping in place. In 1997, the addition of nest monitoring and cowbird egg removal in the Cotton-

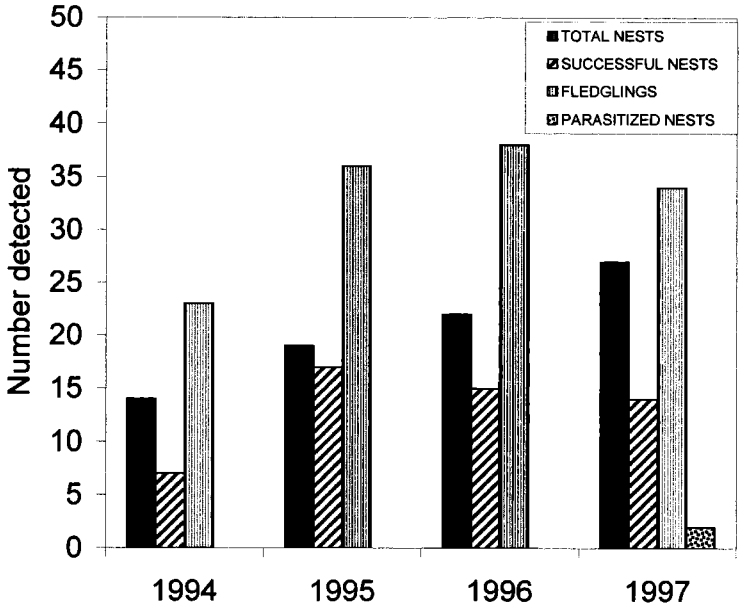

FIGURE 6. Southwestern Willow Flycatcher reproduction, San Luis Rey River, Cleveland National Forest, CA, 1994–1997.

wood Creek area apparently allowed parasitized vireo pairs to successfully fledge young.

In southern California, cowbird trapping has frequently been prescribed as the preferred method for control of cowbird brood parasitism on endangered species (USFWS unpubl. reports). In many areas cowbird trapping has proven to be an effective tool for managing cowbird populations, and Least Bell's Vireo and Southwestern Willow Flycatcher populations have stabilized or increased. For example, at Camp Pendleton, the number of vireo pairs increased from 68 pairs in 1986 to over 900 pairs in 1997, and at the Tijuana River, the number of vireo pairs increased from 5 pairs in 1990 to over 100 pairs in 1997 (USFWS 1998). Range-wide, the Least Bell's Vireo increased from about 300 pairs in 1986 to over 1600 pairs in 1996 (L. Hays, pers. comm.) This increase is largely attributed to an increase in fecundity resulting from cowbird trapping. At the Kern River in the southern Sierra Nevada, a Southwestern Willow Flycatcher population stabilized 2 years after cowbird trapping was initiated (Whitfield and Strong 1995).

The Cleveland National Forest study shows a different pattern. For Least Bell's Vireos, observed rates of brood parasitism remained high, even with cowbird trapping in place. A 100% parasitism rate was observed at Santa Ysabel Creek in 1992 and a 37.5% parasitism rate was observed at Cottonwood Creek in 1997 (Wells and Turnbull 1998). These rates are higher than observed pre-trapping parasitism rates of 50% and 30% respectively. This suggests that cowbird trapping was not effective in reducing brood parasitism in these areas, probably due to the remote locations of vireo breeding habitat. Due to the rugged terrain and lack of road access, cowbird traps at Santa Ysabel, Cottonwood, and Pine Creeks were a minimum of 1.5 km and a maximum of 6.5 km from vireo nesting areas. The effectiveness of individual traps in breeding areas often extends less than 0.8 km from the trap (Robinson et al. 1992).

Nest monitoring in the Cottonwood Creek area in 1997 resulted in the removal of cowbird eggs from three parasitized nests, allowing seven additional vireo fledglings to be produced. Nest checks at 7–10 day intervals can be effective in managing brood parasitism (Wells and Turnbull 1998), whereas cowbird trapping must be completed on a daily basis throughout the breeding season (J. T. Griffith and J. C. Griffith, unpubl. report). Even allowing for the greater technical knowledge required, and the higher pay rates needed to support nest monitoring, we have found that the cost for daily monitoring of cowbird traps is at least twice as much as the cost of nest monitoring for small vireo populations (U.S. Forest Service, unpubl. report). Our data suggest that in rugged, remote areas, nest monitoring and cowbird egg removal may be more effective and less costly than cowbird trapping.

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