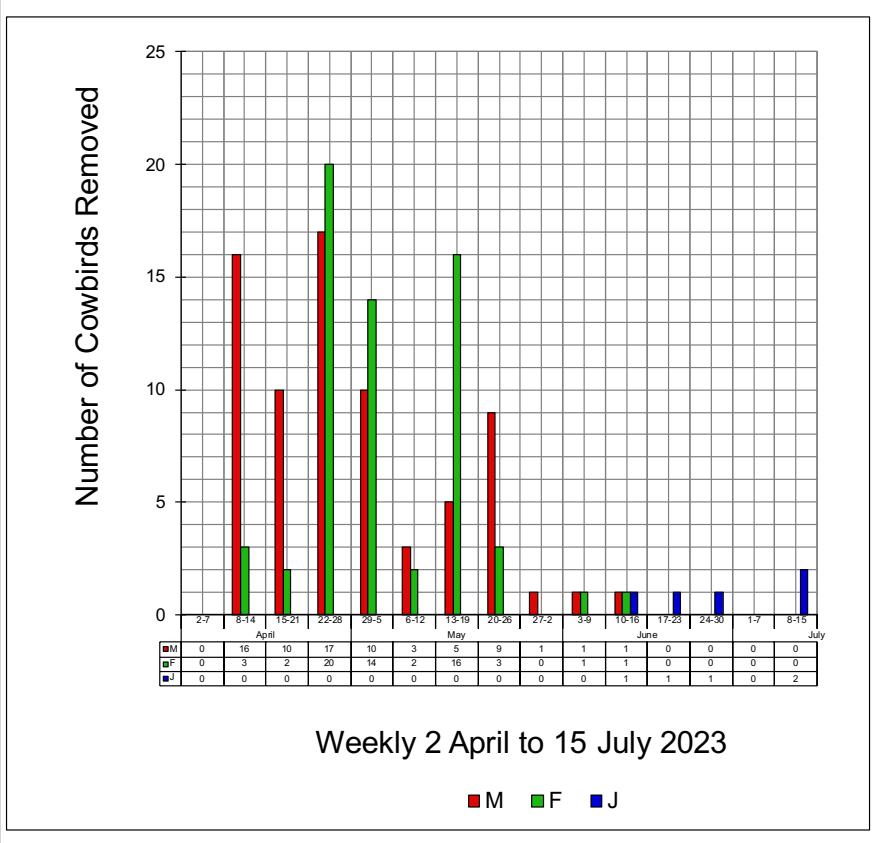
2023 DEVIL'S GATE RESERVOIR RESTORATION PROJECT

BROWN-HEADED COWBIRD CONTROL PROGRAM

GRIFFITH WILDLIFE BIOLOGY



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BROWN-HEADED COWBIRD CONTROL PROGRAM

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EXECUTIVE SUMMARY

Two cowbird traps were operated as part of the Devil's Gate Reservoir Restoration Project (Devil's Gate), at the City of Pasadena Hahamongna Watershed Park (Hahamongna), near and/or in native riparian habitat, the fourth year of a trapping project begun in 2019. The purpose of the trapping was to reduce the incidence of brown-headed cowbird (*Molothrus ater*) brood parasitism among local native host species, particularly endangered, threatened, or sensitive host species including the least Bell's vireo (*Vireo bellii pusillus*) and the southwestern willow flycatcher (*Empidonax traillii extimus*), both of which species are riparian obligates. The traps were operated from 02 April to 15 July (105 days, 15 weeks). The traps contained decoy cowbirds beginning on 08 April and had the preferred minimum decoy ratio (2 males, 3 females) as of 10 April, and 3 males, 5-6 female decoys as of 12 April and subsequently (the initial decoys on 08 April were brought in from another program; the remainder of the decoys were captured onsite).

One hundred-forty (140) cowbirds were removed, including 73 males, 62 females, and 5 juveniles. The 2023 male: female capture ratio was 1.18:1. Most of the adult cowbirds were captured in weeks 2-7: 61/73 males (84%) and 57/62 females (92%). The juvenile cowbirds captured did not have a peak, but all were removed between 16 June – 08 July. No banded cowbirds or other banded birds were captured. The traps were not vandalized in 2023, and there were no trap closures in 2023.

In addition to cowbirds, 389 non-target birds of four different species were captured, of which 386 were released unharmed, and 3 were preyed upon in the traps. This total includes the multiple capture, release, and recapture of a smaller number of individuals. No sensitive or endangered, threatened, or candidate non-target species were captured. No decoy or non-target birds died due to lack of food or water, or because of unclean conditions.

The removal of 62 non-native female cowbirds from the area in 2023 protected the native birds from brood parasitism; each cowbird female may lay 40-60 eggs in a breeding season, so as many as 2,480 – 3,720 native songbird nests were protected.

No changes to the number of traps, dates of operation, locations of traps, or operation protocol are recommended.

Key words: Devil's Gate Reservoir, Hahamongna Watershed Park, brood parasitism, brown-headed cowbird (*Molothrus ater*), California, least Bell's vireo (*Vireo bellii pusillus*), riparian, southwestern willow flycatcher (*Empidonax traillii extimus*).

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INTRODUCTION

The objective of this study was to remove non-native brown-headed cowbirds (*Molothrus ater*, cowbird) from riparian habitat at Hahamongna Watershed Park, to decrease or eliminate cowbird brood parasitism among the federally endangered least Bell's vireo (*Vireo bellii pusillus*, vireo) and southwestern willow flycatcher (*Empidonax traillii extimus*, sw flycatcher), and other native riparian host species present. Prior to implementation of this program, similar mitigation trapping was not previously performed in the area; 2019 was the first year of trapping mitigation.

Least Bell's Vireo

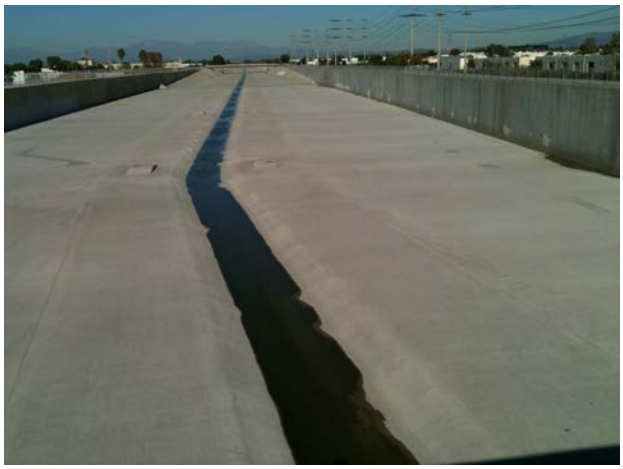
The least Bell's vireo is a small gray and white migratory songbird that winters in the Cape District of Baja California Sur, Mexico and nests in willow-dominated riparian habitat in central and southern California and northwestern Baja California, Mexico. Vireos arrive in breeding habitat in mid March through early April, initiate most nests by mid to late April, and fledge most young by late May to mid June. Multiple nesting attempts (2-7) after nest failure are common. Very few nests are initiated in July, although early August fledge dates are not unusual. Double brooding is not uncommon. Nest building usually takes four days. The typical clutch of 3-4 eggs is incubated for 14 days; the young fledge 12 days after hatching. Young vireos can forage on their own after 2-3 weeks, although family groups may remain associated into August or September, when they depart for points south (Griffith and Griffith 2000).

The vireo was formerly abundant and bred as far north as Red Bluff in Tehama County (about 130 miles north of Sacramento, and about 550 miles north of the LA Basin) (Cooper 1874), but due to habitat loss (agriculture, flood control, livestock) (Smith 1977, USFWS 1986, Wilbur 1981) and brood parasitism by the brown-headed cowbird, by the 1940's there was "a noticeable decline in numbers... apparently coincident with an increase of cowbirds" (Grinnell and Miller 1944). Due to their nest size, shape, and location "No birds are more frequently parasitized either absolutely or relatively [than the least Bell's vireo]" reported Dawson (1923), an observation echoed by Hanna (1918) and Rowley (1930). Meanwhile, in 1933 Willet observed that "the increase of the cowbird in southern California during the past 20 years has been remarkable, in fact unparalleled by any of our native birds", a situation that was true statewide by 1944 (Grinnell and Miller). By 1970, cowbirds had extirpated vireos from the Central Valley, and vireos were found in only a few locations in southern California (Gains 1974). Surveys of 158 locations where vireos were abundant prior to 1915 were performed in 1977-78; only 90 breeding territories were located in 31 of the 158 sites (all in southern California), and half of the nests located contained cowbird eggs (Goldwasser et al 1980, Franzreb 1989). Because of the persistent cowbird parasitism and associated low reproductive success causing local extirpations of populations already reduced and fragmented by habitat loss, the least Bell's vireo was declared an endangered species by the California Department of Fish and Wildlife (CDFW) in 1980 and by the United States Fish and Wildlife Service (USFWS) in 1986.

After listing and with habitat protection and cowbird trapping, first-year vireos dispersed from extant populations and began to reoccupy drainages and habitat that had been vacant for

decades, expanding slowly northward, with colonizers usually settling within 10 kilometers (km) of their natal home ranges (Griffith and Griffith 2000). New colonizers in suitable habitat established new populations, existed in low numbers, or were extirpated within a few years, depending upon two factors: distance from source populations, and more importantly, whether or not cowbird trapping was implemented.

Willow-dominated vireo habitat at the Santa Ana River.



Former habitat, now concrete, lower Santa Ana River.

Adult male vireo on nest.

Vireo nest hung in mulefat (*Baccharis salicifolia*).


Hatch-day vireo chick.


Hatch-day cowbird chick in vireo nest.

Habitat is a critical component for any species, and habitat loss decidedly decimated the historic vireo population. However, throughout the decades-long decline, at the time the vireo was listed as endangered, and today, there were and are thousands of acres of vacant, vireo-quality riparian habitat available. It appears that persistent cowbird brood parasitism, not habitat loss or degradation, caused the endangered status of the least Bell's vireo, and that cowbird trapping (in suitable/ protected habitat) is the primary cause of the ongoing recovery. The goal of the vireo recovery plan is the reestablishment of the vireo in the Central Coast and Central Valley, the center of the vireo's historic range (USFWS 1998).


Vireo nestlings 3 days after hatching.


12-day-old vireo chicks ready to fledge.

<u>Southwestern Willow Flycatcher</u>

The southwestern willow flycatcher was listed as endangered by the USFWS in February 1995 for reasons similar to those cited for the least Bell's vireo: severe habitat loss and degradation exacerbated by cowbird brood parasitism. Other factors such as possible loss of wintering habitat, more specific nesting habitat needs, and more sensitivity to disturbance also contributed to the decline of the sw flycatcher.

Southwestern willow flycatcher (image courtesy of Utah Dept. of Natural Resources).

The sw flycatcher is one of four *Empidonax traillii* subspecies that occur in the United States and one of three that occur in Southern California during migration. The only reliable way to discern between the three subspecies in the field is by breeding chronology and geography: if a willow flycatcher breeds in Southern California or is reliably territorial after 21 June, it is *E. t. extimus*. All other sightings before or after could be, and likely are (based upon their much larger populations) northbound or southbound migratory *E. t. brewsteri* or *E. t. adastus*.

In southern California, sw flycatchers nest in habitat similar to that of the least Bell's vireo, although often near running water and with larger canopy trees, and their general breeding biology is similar but 1-2 months "behind" the vireo. Willow flycatchers arrive on breeding grounds from late April through mid-June. Nests are active from mid to late May through early August. Double brooding is uncommon. Most breeding habitat is vacated by mid-September. Extensive information regarding flycatcher natural history and legal status is available in Tibbetts et al (1994) and USFWS (1995).

Yellow-breasted Chat and Yellow Warbler

The yellow-breasted chat (*Icteria virens*) and yellow warbler (*Setophaga petechia*) are migratory songbirds that breed in willow-dominated riparian woodland in southern California. Both are listed by the CDFW as California Species of Special Concern (SSC) (CDFW 2023) due to declining numbers and local extirpations, again associated with habitat loss and cowbird brood parasitism. The USFWS And CDFW consider the yellow-breasted chat and yellow warbler as "indicator species" for the vireo and to a lesser degree, the sw flycatcher.


Yellow-breasted chat nest.


Yellow-breasted chat nestlings.

Brown-headed Cowbird

The brown-headed cowbird is an obligate brood parasite. Cowbirds do not make nests or raise young. They lay eggs in the nests of other birds, called hosts, which then raise the cowbird. Female cowbirds loosely defend breeding territories (Darley 1968, 1983; Raim 2000) and can lay 40-100 eggs each spring (Scott and Ankney 1983, Holford and Roby 1993, Smith and Arcese 1994). Cowbirds may remove or puncture host eggs during parasitism events, and may kill older host nestlings to initiate host renesting and create parasitism opportunities. Cowbirds are extreme generalists and parasitize nearly every species (at least 220) with which they are sympatric (Friedmann 1963, Friedmann and Kiff 1985). *This lack of host specificity allows the extirpation or extinction of rare species (like the vireo) without harm to the cowbird.*


Brown-headed cowbirds (males dark, females light).


Two cowbird eggs in a least Bell's vireo nest.

Cowbirds are native to the Great Plains and were closely associated with bison. It is possible that brood parasitism developed because cowbirds traveled with bison and seldom remained in one locale long enough to build a nest, lay and incubate a clutch of eggs, raise nestlings, and care for fledglings. Host species that co-evolved with cowbirds on the Great Plains and margins have behavioral defense mechanisms against parasitism, including cowbird

egg removal, nest abandonment, and re-clutching. Hosts in the Far West, including the vireo, generally do not.

Cowbirds were first documented in California at Borrego Springs, San Diego County, in 1896; the first cowbird egg found in California was in a vireo nest on the San Gabriel River (Unitt 1984). By 1930, cowbirds were "well established" throughout the region (Willett 1933); by 1955 they had reached British Columbia (Flahaut and Schultz 1955). Cowbirds likely would not have reached the Far West without the unwitting aid of man. Regardless, 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, allowed the establishment of an artificially large cowbird population, and the resulting devastating impact upon local hosts.

In contrast to the increase in distribution and abundance of cowbirds in California over the last century, populations of most native birds are in decline, primarily due to their dependence upon increasingly reduced, fragmented, and degraded native habitats in which they are less productive and 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 vireo and flycatcher, and the number and subsequent impact of brown-headed cowbirds and predators upon such populations.

Cowbird eggs hatch sooner than host eggs and the young are larger and more aggressive. Therefore, cowbird chicks are able to outcompete their host nest-mates; small host chicks often hatch but then are simply smothered or starve to death. Large host species can raise a cowbird without significant harm to their own reproductive effort (Weatherhead 1989, Robinson et al. 1995). Small host species like the endangered vireo, flycatcher, and the threatened California gnatcatcher (*Polioptila californica californica*) can raise only a cowbird chick and none of their own young from parasitized nests (Grzybowski 1995). For these small hosts, parasitism and predation have the same result (no young produced), but after predation or other natural nest failures, the host pair often successfully re-nest in 2-14 days, while a parasitism event consumes the time and energy of an entire breeding season (Griffith and Griffith 2000). Decreased productivity caused by persistent cowbird parasitism caused or contributed to the endangered/threatened status of these host species (USFWS 1986, 1993, 1995, 1998).

Cowbird chick in California gnatcatcher nest.

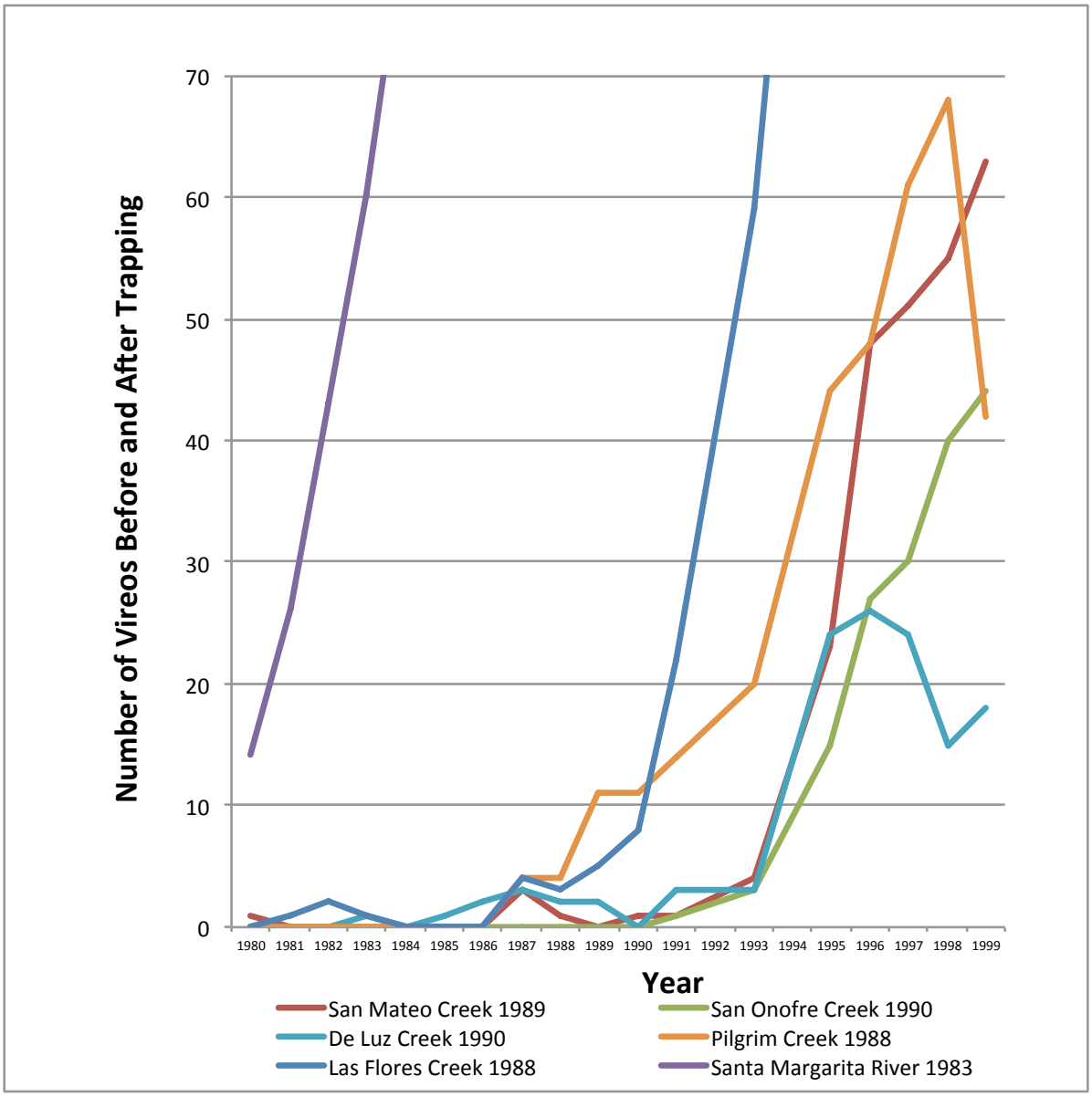
Cowbird chick and smothered/starved gnatcatcher chick.

Cowbird Trapping

The recipe for least Bell's vireo recovery is simple: habitat protection (including land acquisition, exclusion of motorized vehicles and domestic/feral animals, and removal of invasive plants such as *Arundo donax* and *Tamarix* spp.) combined with cowbird trapping. As regards the vireo, each effort is almost meaningless without the other. Cowbird parasitism can be eliminated from any targeted area by topical trapping: operating about one cowbird trap per mile along a typical riparian corridor during the vireo breeding season (minimally 1 April – 30 June; non-breeding season trapping can also be helpful). More traps are used for large, wide rivers, or if there are cowbird foraging areas such as dairies or stables nearby. Cowbird trapping, following the methodology described in the Griffith Wildlife Biology Trapping Protocol (GWB 1992, updates) reduces parasitism rates among the vireo from pre-trapping levels of 50%-100% to at or near 0%. The entire avian host community benefits from trapping, not just the primary target species (unlike nest monitoring and cowbird egg removal). For vireos, cowbird trapping increases per-pair productivity from ~1.3 young per pair to ~3.5 per pair; the difference between decreasing populations/ extinction and increasing populations/ recovery (Griffith and Griffith 2000).

The effectiveness of topical trapping (and the limited range of each trap) is best illustrated with data from Marine Corps Base Camp Pendleton, California, where every individual and pair of vireo, and nearly every vireo nest, was known from 1980-1999 (Griffith and Griffith 2000). During the same period, the number and location of cowbird traps grew from five traps on one drainage to 40 traps on six drainages. Data from these de facto experiments established that about one trap per mile eliminates parasitism and fewer traps do not (e.g., the effective range of each trap is about ½ mile radius). The data conclusively demonstrated that without trapping, vireos were absent or sporadically present in low numbers in suitable habitat for years, even when quite near to occupied habitat where parasitism has been eliminated and the vireo population is large and growing (Santa Margarita River). Conversely, with trapping (see following page; year begun at each drainage shown), new subpopulations become established: dispersing vireos protected from parasitism reproduce successfully, increase in number until the drainage capacity is reached, and ultimately become "source populations" themselves (produce more fledglings each year than settle in the drainage).

Exhibit 1. Vireo population growth at six drainages before and after cowbird trapping at Marine Corps Base Camp Pendleton, California. Note nearly identical growth slopes as vacant habitat is occupied.



Data from 1980-1999 (GWB 1987-1999), when Base-wide vireo surveys were performed annually. All individuals and pairs were located, and nearly all nests were located and monitored. Cowbird trapping was performed starting in 1983, at first only at the SMR (5 traps) and ultimately at all 6 major drainages on Base (40 traps). The number of vireos increased from 15 on 2 drainages in 1980 to 779 on 6 drainages in 1999. These comprehensive distribution, nesting, parasitism, and trapping data and experiments, repeated elsewhere, conclusively demonstrate that vireos do not recover without cowbird trapping (about 1 trap per mile of linear habitat).

Cowbird traps are baited with live decoy cowbirds, abundant bait seed and clean water, shade, and perches to attract cowbirds whether they are seeking food, water, shelter, companionship, and/or breeding. Female cowbirds must mate prior to laying each egg. Since female cowbirds lay the eggs, they are the primary targets of trapping programs. Males are also important as they may participate in egg removal and host nest destruction activities, and are required to fertilize each egg before it is laid. The sex ratio of the at-large cowbird population is assumed to be 1:1. The goal of trapping programs is to capture and remove as many females as

possible and achieve a capture sex ratio at or below 1:1.

"Cowbird Control" has not been accomplished unless 1) Few or no cowbirds are detected during the breeding season in trapped areas during formal or informal surveys, censuses, and point counts, and 2) The parasitism rate among host species decreases from pre-trapping levels to near zero, as evidenced by finding few/no cowbird eggs or young in host nests, few/no cowbird fledglings in host family groups, and few/no juvenile cowbirds are captured in the trapped area in June, resulting in 3) The absence of cowbird parasitism, increases in host productivity, and increasing/ expanding/ recovering rather than decreasing/ extirpated/ endangered populations. If the three consequences noted above are not recorded (the first two immediately), then efforts to reduce cowbird parasitism (trapping, or even shooting or netting) may have been performed, to some positive effect, but "cowbird control" has not been accomplished (Griffith and Griffith 2000).

Male cowbirds are more active and vocal (attractive as decoys) when at least 2 are present; female cowbirds are more likely to enter traps containing more females than males; and fewer non-target species enter traps when large numbers of decoys are utilized (GWB 1992). Therefore at least 2 males and 3 females are used as decoys in each trap (3: 5-6 works well also).

The capture of non-target birds (non-cowbirds) is undesirable yet unavoidable. Many non-target birds are less hardy than cowbirds and can die due to the stress of confinement or handling. To reduce non-target captures, the capture slot is only 1 3/8 inches wide (large enough for cowbirds, small enough to exclude many larger non-target species), 1-inch hardware cloth is used for the trap panels (small enough to contain cowbirds yet large enough to allow smaller species to exit), bait seed without sunflower seed is utilized (sunflower seed attracts some non-target species but not cowbirds; cowbirds prefer millet), and as possible, large decoy flocks are utilized. To reduce non-target mortality and per state live-trap law, the traps are checked daily and non-target species are handled with care and released immediately.

The goal of trapping programs is to achieve 0% non-target species mortality; when >100 individuals are captured, rates above 2% are considered unacceptable and indicative of poorly managed programs (GWB 1992).


Male cowbird interacts with decoys before entering trap.


Cowbirds foraging for seed and insects at a dairy.

Cowbird Trapping at Devil's Gate

The Brown-headed Cowbird Control Program at Devil's Gate was initiated in 2019. Its purpose is to enhance reproductive success among the least Bell's vireo and other host species by decreasing or eliminating cowbird brood parasitism by removing cowbirds from riparian habitat.

STUDY AREA

The Devil's Gate Reservoir Restoration site is located at Hahamongna Watershed Park, City of Pasadena, in Los Angeles County, California (Figure 1). The site has a typical Mediterranean climate with warm, dry summers and cool, wet winters. The riparian drainage/wash supports stands of high-quality willow-dominated habitat of the type preferred by the least Bell's vireo and southwestern willow flycatcher.

A complete natural history of the study area is available in the Final Habitat Mitigation and Monitoring Plan for the Devil's Gate Sediment Removal and Management Project (ECORP 2018).

METHODS

Two cowbird traps were placed, activated, operated, serviced, disassembled, and stored per the *Brown-headed Cowbird Trapping Protocol* (GWB 1992, updates) and state and federal permit requirements. The traps were placed, assembled, and activated on 02 April, then operated until 15 July (105 days, 15 weeks). (Set up was scheduled to take place on 01 April; however the GWB trap set up vehicle was stuck on wet, super-saturated roads, and was not towed out in time to accomplish trap setup.) Trap 1 was placed in the riparian and Trap 2 was placed near the riparian, next to a horse stable (Figure 1).

Each trap is 6 feet wide, 8 feet long, and 6 feet tall, with a 1 3/8 inch-wide capture slot on top through which cowbirds can drop down and in but cannot fly up and out. The traps include:

one (1) floor, two (2) side, two (2) end (door and back), and two (2) top panels, and a plywood slot board.

Transporting cowbird trap panels to the trap site.

Cowbird trap placed and "flowered" for easy assembly.

Each trap was aligned in the field on a north-south axis. A foraging tray was placed on the front portion of the floor panel centered under the capture slot. Four perches made of dead giant reed or ½" diameter dowel were installed in each trap: one in each trap corner at chest height (except above the door) and one in a rear corner at knee height (for subordinate birds). A warning/ informational sign was stapled to the front of each trap (Appendix A). Shade cloth was applied to the west-facing side panel. Finally, a one-gallon water guzzler, approximately one (1) pound (lb) of sunflower-free wild birdseed (on the foraging tray), and live decoy cowbirds were added to each trap, and the trap was locked.

The initial decoys were provided from another GWB program: the traps contained decoy cowbirds beginning on 08 April and had the preferred minimum decoy ratio (2 males, 3 females) as of 10 April, and 3 males, 5-6 female decoys as of 12 April and subsequently. (Decoys were not available prior to 08 April; in previous years decoys were either obtained onsite and/or were available from other GWB programs by 01 April.) The right primary wing feathers of each female decoy were kept clipped to ensure their demise upon accidental release or escape. All of the live decoys used to stock the traps after 08 April were captured on site.


Trap assembly supplies.


Bait seed ready to be added through the capture slot.


Shade cloth on the west-facing panel.


Adding live decoy cowbirds to trap from transport cage.


Unclipped wing.


Clipped wing.

The traps were serviced daily from 02 April to 15 July. Daily servicing consisted of releasing all non-target birds, adding bait seed, adding water and/or cleaning the water guzzler as

needed, wing-clipping newly captured female cowbirds, adding or removing decoy cowbirds to maintain the preferred decoy ratio, repairing or replacing the perches, foraging pad, sign, shade cloth or lock as needed, repairing damage from vandals, if any, and recording all activities on a data sheet. Data sheets were submitted daily to the project manager. The traps were deactivated, disassembled, and transported to off-site storage on 15 July.

The number of cowbirds removed is a net number calculated by subtracting from the gross number of cowbirds captured: the number of banded cowbirds released, cowbirds released by vandals, cowbirds accidentally released, and unexplained missing decoy cowbirds. Negative numbers indicate decoy cowbirds released by vandals. Captured cowbirds not utilized as decoys were euthanized humanely and provided as forage to raptor rehabilitation/reintroduction facilities. A complete cowbird trapping protocol is available from Griffith Wildlife Biology (GWB 1992).

This project was performed under the authority of USFWS Federal Endangered Species Permit TE 758175-14 and a Letter Permit from the California Department of Fish & Wildlife and in compliance with the Devil's Gate Brown-headed Cowbird Control Program (ECORP 2019). The Project Manager was J.C. Griffith. The Trap Technicians were S. Trom, M. Birney, and K. Griffith. Our thanks to Christine Tischer, Project Administrator, ECORP Consulting.

RESULTS

One hundred forty (140) cowbirds were removed in 2023, including 73 males, 62 females, and 5 juveniles (Table 1, Table 2). The male: female capture ratio was 1.18:1. The first adult cowbirds were captured on 10 April in Trap 1 (one male) and Trap 2 (two males); the first juvenile cowbird was captured on 16 June in Trap 1 (one juvenile). As is typical, most of the adult cowbirds were captured as they traveled through or dispersed into the study area early in the season. Most of the adult cowbirds were captured in weeks 2-7: 61/73 males (84%) and 57/62 females (92%). The juvenile cowbirds captured did not have a peak, but all were removed between 16 June – 08 July. No banded cowbirds or other banded birds were captured. (Figure 5).

Both trap sites performed well and should be utilized again in 2024: Trap 1 removed 4 males, 2 females, 5 juveniles and Trap 2 removed 69 males, 60 females, 0 juvenile. Trap 2 was located next to a horse stable which served as a cowbird foraging area.

In addition to cowbirds, 389 non-target birds of four species were captured, of which all but 3 released unharmed (Table 3). The total includes the multiple capture, release, and recapture of a smaller number of individuals. No sensitive or endangered, threatened, or candidate non-target species were captured. No decoy or non-target birds died due to lack of food or water, or because of unclean conditions. Exotic species captured included European starlings.

The traps were not vandalized in 2023 and the traps were not closed during the season. The traps were operational for 210 (2 traps x 105 days) of the 212 (2 traps x 106 days) contracted trap days (99%). [In 2022, the traps were operational for 214 (2 traps x 107 days) trap days.]

The time spent at each trap each day, exclusive of travel time, ranged from five (5) minutes to 60 minutes depending upon: the number of cowbirds and non-target birds captured and released, the number of live decoy transfers necessary to maintain the proper decoy ratio, the number of water guzzlers scrubbed, the number and severity of vandalism events, and other variables.

The removal of 62 non-native female cowbirds from the area in 2023 protected the nesting native song birds from brood parasitism.

DISCUSSION AND CONCLUSIONS

2019 was the first year of the trapping program at Hahamongna, and the two traps caught 196 cowbirds. In this fifth year, 2023, overall captures were the second highest, 140, as were the male and female captures. Compared to the 5 year average, males were right at the average (73 in 2023, vs 73.4 average), while the females were significantly above the average (62 in 2023, vs 46.2 average).

The removal of 62 female cowbirds may have precluded up to 2,480-3,720 parasitism events (40-60 eggs per female) allowing the production of as many as 9,920-14,880 songbird young (four per otherwise parasitized nest) in the study area. Because not all parasitism events are viable and not all cowbird eggs are laid in the nests of small hosts, the actual numbers of cowbird eggs and songbird young are likely much lower but still significant, especially for the disproportionately targeted vireo. In 2020 ECORP Consulting verified the successful nesting of an endangered vireo within the trapping area (4 vireo young fledged). In areas of Los Angeles County where annual cowbird trapping has been consistently implemented, vireo populations have grown from 0 - 2 pairs to 25 - 40 pairs in a decade (GWB 2009, GWB 1997).

Locally raised cowbirds are easily and quickly captured after fledging, and are therefore good indicators of the efficacy of a trapping program. Five juveniles were captured in 2023, indicating that cowbird parasitism was not entirely eliminated in the study area; however parasitism was certainly lessened.

Topical trapping reduces/ eliminates brood parasitism in a targeted area, to broad general benefit (Griffith and Griffith 2000). Annual topical trapping does not, however, reduce the regional cowbird population (if only because so few cowbirds are trapped in so few areas). If it did, the number of cowbirds captured each year would gradually decline, as would the need for cowbird control. However, for programs with 5 – 25 years of capture data, the number of cowbirds removed each year has not declined over time. If cowbirds were not removed each year, the parasitism rate among hosts would likely immediately return to extirpation-causing pre-trapping levels.

In the absence of proven regional cowbird control, the Devil's Gate Brown-headed Cowbird Control Program, which successfully removes the local cowbirds and reduces parasitism in the study area, should be continued indefinitely. If the Devil's Gate annual

cowbirds captures were to decrease dramatically, however, the program should be re-evaluated (for instance, if the 2 traps caught two or fewer female cowbirds per year). In 2022 only 3 cowbirds were captured in July (1 male, 1 female, and 1 juvenile), and in 2023 only 2 juvenile cowbirds were captured in July; because of this trend a consideration should be made to end the trapping season on 30 June, instead of the current date of 15 July.

MANAGEMENT RECOMMENDATIONS

1. No changes in the number of traps (2), operation dates (01 April to 15 July), or operation protocol are recommended (unless it is determined that an end date of 30 June is acceptable).

2. The trap locations both performed well and should be used again (Trap 1 could be moved within the season to be closer to 2024 nesting LBVI, if a new nesting pair is farther than ½ mile from the current trap location).

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Figure 1. 2023 Devil's Gate Reservoir brown-headed cowbird control project study area at Hahamongna Watershed Park, City of Pasadena.

Figure 2. 2023 Devil's Gate Area brown-headed cowbird Trap 1 location.

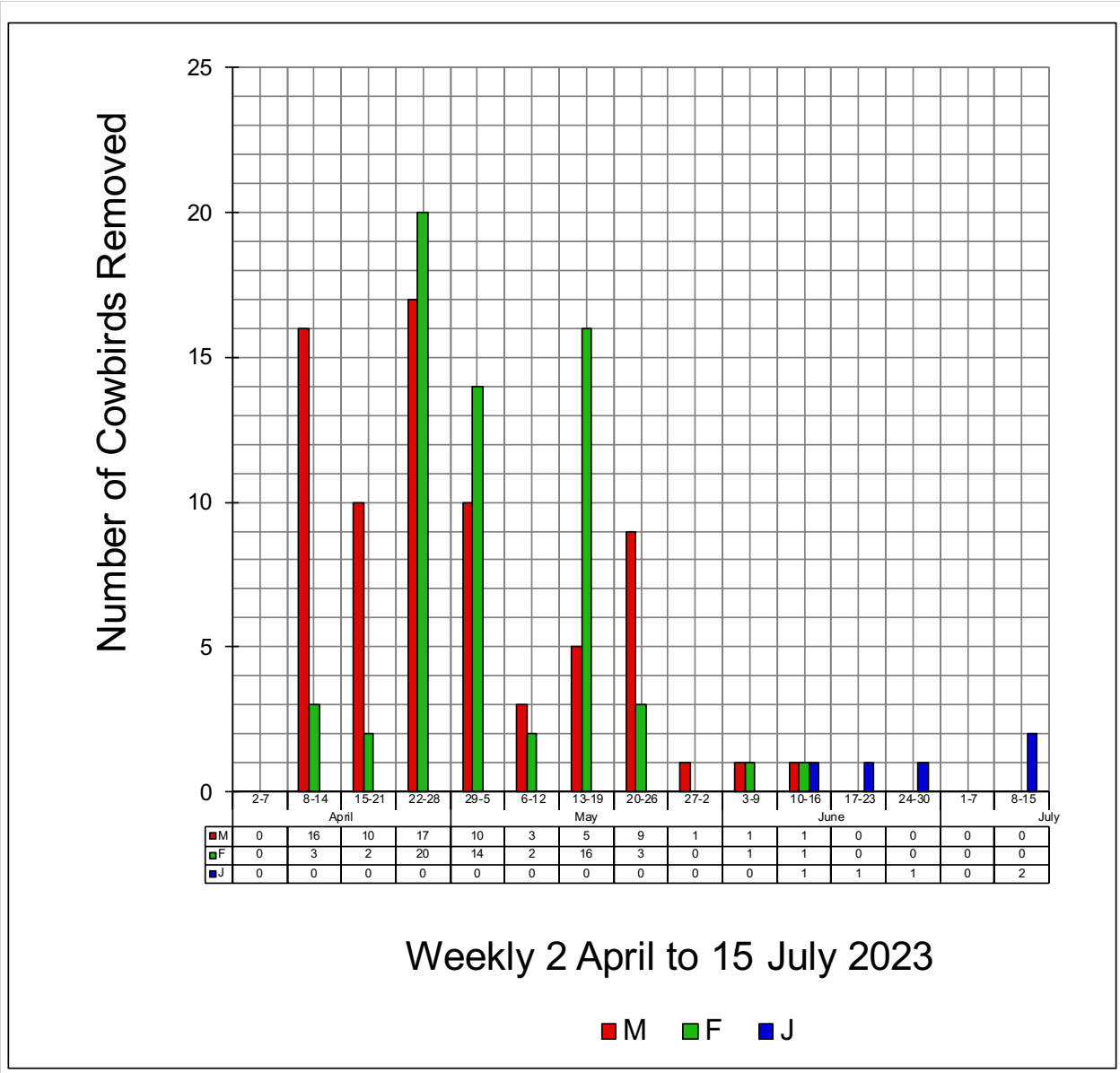
Figure 3. 2023 Devil's Gate Area brown-headed cowbird Trap 2 location.

Figure 4. 2023 Devil's Gate Area brown-headed cowbird control project Traps 1 and 2 photos.

Trap 1

Trap 2

Figure 5. Number of male (M), female (F), and juvenile (J) cowbirds removed per week at Devil's Gate/Hahamongna in 2023.



	2-7	8-14	15-21	22-28	29-5	6-12	13-19	20-26	27-2	3-9	10-16	17-23	24-30	1-7	8-15
	April				May					June				July	
M	0	16	10	17	10	3	5	9	1	1	1	0	0	0	0
F	0	3	2	20	14	2	16	3	0	1	1	0	0	0	0
J	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2

Table 1. Number of brown-headed cowbirds captured at Devil's Gate Reservoir in 2019 - 2023.

Year	Number of Traps	Trapping Period	Number of Cowbirds Captured				Number Per Trap	M:F Ratio
			Male	Female	Juvenile	Total		
2019	2	03/28 - 7/15	115	73	8	196	98.00	1.58
2020	2	04/01 - 7/15	72	33	3	108	54.00	2.18
2021	2	04/01 - 7/15	57	38	7	102	51.00	1.50
2022	2	04/01 - 7/16	50	26	4	80	40.00	1.92
2023	2	04/02 - 7/15	73	62	5	140	70.00	1.18
TOTAL	10	5	367	232	27	626		
AVG	2.0		73.4	46.4	5.4	125.2	62.60	1.58

Table 2. Number of male (M), female (F), and juvenile (J) cowbirds captured per day, per week, per trap, and total at Devil's Gate in 2023.

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

Date	Trap 1			Trap 2			TOTAL		
	M	F	J	M	F	J	M	F	J
27				1			1	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	1	0	0	1	0	0
3							0	0	0
4							0	0	0
5							0	0	0
6				1			1	0	0
7					1		0	1	0
8							0	0	0
9							0	0	0
wk 10	0	0	0	1	1	0	1	1	0
10							0	0	0
11							0	0	0
12							0	0	0
13							0	0	0
14					1		0	1	0
15							0	0	0
16			1	1			1	0	1
wk 11	0	0	1	1	1	0	1	1	1
17			1				0	0	1
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 12	0	0	1	0	0	0	0	0	1
24			1				0	0	1
25							0	0	0
26							0	0	0
27							0	0	0
28							0	0	0
29							0	0	0
30							0	0	0
wk 13	0	0	1	0	0	0	0	0	1
Jul 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 14	0	0	0	0	0	0	0	0	0
8			2				0	0	2
9							0	0	0
10							0	0	0
11							0	0	0
12							0	0	0
13							0	0	0
14							0	0	0
wk 15	0	0	2	0	0	0	0	0	2
15							0	0	0
							0	0	0

	Trap 1			Trap 2			TOTAL		
	M	F	J	M	F	J	M	F	J
TOTAL	4	2	5	69	60	0	73	62	5

Table 3. Number of non-target species captured & released (C&R) or preyed upon (PU) in cowbird traps at Devil's Gate in 2023.

Species	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Week 8	
	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU
CATO	20		27	1	23		16	1	18		18		15		19	
EUST									1						1	
CASJ	2								1							
HOFI			1		1											
TOTAL	22	0	28	1	24	0	16	1	20	0	18	0	15	0	20	0

Species	Week 9		Week 10		Week 11		Week 12		Week 13		Week 14		Week 15		**TOTAL**	
	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	C&R	PU	**C&R**	**PU**
CATO	16		21		24		28	1	32		39		60		**376**	**3**
EUST					1										**3**	**0**
CASJ									1						**4**	**0**
HOFI			1												**3**	**0**
TOTAL	16	0	22	0	25	0	28	1	33	0	39	0	60	0	**386**	**3**

CATO California towhee
EUST European starling*
CASJ California scrub jay
HOFI house finch

* exotic

Appendix A. Warning/informational sign placed on cowbird traps at Devil's Gate in 2023.

COWBIRD TRAP

PLEASE DO NOT DISTURB

This trap removes *non-native* brown-headed cowbirds so that *native* songbirds can reproduce naturally.

***Cowbirds NEVER make their own nests; they ONLY lay eggs in the nests of other birds.**

Each female cowbird lays 40-60 eggs each spring; the cowbird eggs hatch first and the cowbird chick smothers the songbird young as they hatch. **Each female cowbird removed = 160-240 more songbird young in this area.**

To attract other cowbirds, this trap contains live male (shiny black body, brown head) and female (plain brown) decoy cowbirds.

THIS TRAP IS SERVICED DAILY **to care for the live decoy birds, release non-cowbirds, and add fresh seed & water.**

If you have questions about the operation of this trap, please call 906.337.0782 or visit www.griffithwildlifebiology.com

Operated by GWB under authority of the U.S. Fish & Wildlife Service and the California Department of Fish & Wildlife.

THE LOCAL SONGBIRDS THANK YOU FOR YOUR COOPERATION

2 cowbird eggs in songbird nest.

Cowbird chick, smothered songbird chick.

Songbird adult feeding cowbird chick.

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