

# CENSUS OF THE INYO CALIFORNIA TOWHEE IN THE EASTERN THIRD OF ITS RANGE

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The Inyo California Towhee (*Pipilo crissalis eremophilus*) is restricted to the southern Argus Mountains in Inyo County, California, on lands administered primarily by the Bureau of Land Management (BLM) and China Lake Naval Air Weapons Station (China Lake NAWS). The population is geographically isolated from other subspecies of *P. crissalis* and differs morphologically from *P. c. carolae* by having (on average) shorter wings, tail (males only), culmen, tarsus, middle toe, and possibly a grayer coloration (van Rossem 1935, Davis 1951, LaBerteaux 1989).

The population of the subspecies appears to be limited by suitable breeding habitat. In the arid Argus Range, Inyo California Towhees breed in or near dense willow thickets associated with springs and forage primarily in surrounding uplands. From observations of 72 adults range-wide during 1978 and 1979, Cord and Jehl (1979) estimated a population of 138 birds. Approximately two-thirds of available breeding habitat lies on China Lake NAWS (LaBerteaux 1994), and most of the remainder lies within or immediately adjacent to the Great Falls Basin Area of Critical Environmental Concern (ACEC), managed by the BLM (BLM 1987). The Inyo California Towhee is listed as threatened by the United States Fish and Wildlife Service (USFWS). Fourteen areas were designated as critical habitat in 1987 (USFWS 1987). Eight of these areas are entirely or partially on lands outside China Lake NAWS.

During 1992, we conducted a census of Inyo California Towhees in the Great Falls Basin ACEC and a privately owned parcel (Indian Joe Canyon) in order to provide a population estimate for the ACEC and to make comparisons with the earlier study. By following Cord's field notes, we repeated surveys at all the locations he visited, excluding those sites on China Lake NAWS, and visited several additional sites that had not been surveyed. In 1994, we examined several drainage basins in the northern Argus Range to search for towhees and determine the presence or absence of additional breeding habitat north of the ACEC. Our study therefore provides census data for virtually all available habitat outside China Lake NAWS, or the eastern approximately one-third of the subspecies' range.

## SURVEY AREA

Our 1992 census area extended from the southern boundary of the ACEC (Wilson Canyon) north through Great Falls Basin to North Homewood Canyon, and from the boundary of China Lake NAWS on the west to the base of the Argus Mountains on the east (Figure 1). Four sites (Benko Spring, North Homewood Canyon, North Ruth Spring, and Ruby Spring)

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either straddle the border with China Lake NAWS or are just inside the base but are included in this survey. Upland habitat is Mojave desert scrub (Holland 1986), dominated by the Creosote Bush (*Larrea tridentata*) and Burrobush (*Ambrosia dumosa*). Breeding habitat is always associated with a drainage and water source and is typically composed of Arroyo Willow (*Salix lasiolepis*), with lesser amounts of Narrow-leaf Willow (*Salix exigua*), Desert Olive (*Forestiera pubescens*), and Squaw Waterweed (*Baccharis sergiloides*). Elevations at the breeding sites range from 695 to 1433 m. Elevations of the surrounding mountains extend to 2000 m. Annual rainfall averages 74.9 mm (records are from the town of Trona, 9.7 km southeast of the study area).

In 1994, the census area included seven drainage basins north of the ACEC from Bruce Canyon to Darwin Falls. Much of the riparian vegetation on BLM lands in the northern Argus Range is severely degraded. Only Bruce Canyon, Darwin Falls, and a tributary of Water Canyon supported significant riparian vegetation.

## METHODS

We identified potential breeding habitat from a review of USGS 7.5' series maps, the Great Falls Basin ACEC Management Plan (BLM 1987), Cord and Jehl (1978, 1979), and Cord's field notes. Whenever possible, we used existing names to identify survey sites. After an initial reconnaissance, we elected not to survey Christmas Spring, Nadeau (= People's) Spring, and Pothole Spring because they were so badly degraded. Three drainage basins (North Homewood Canyon, Great Falls Basin, and Indian Joe Canyon) contain significant surface and subsurface water, supporting strips of riparian vegetation. We used natural gaps in vegetation to separate these strips into numbered survey sites.

We surveyed 28 sites 27–29 April 1992 and repeated surveys at these sites and visited 16 new sites 26–29 May 1992. Surveys began at sunrise and continued for 5 hours. We spent 1 to 3 hours walking a transect that paralleled each study site, pausing to make observations at suitable overlooks. The minimum of 1 hour at each site was necessary to detect towhees that may have hidden in the dense cover on our approach. We surveyed circular patches of breeding habitat, common around isolated springs, by remaining quietly at appropriate vantage points. Observer position relative to riparian vegetation varied according to the orientation of the willows and terrain. In areas with large amounts of breeding habitat, such as the Great Falls Basin, all three researchers surveyed different stretches of the canyon simultaneously, then compared the times of each observation in order to determine the towhee numbers more accurately. We recorded each detection on a map, number and age (adult or juvenile) of individuals, distance from riparian vegetation, behavioral notes, and microhabitat use. At each water source, we estimated the area of free surface water, flow in gallons per hour, and dimensions of riparian vegetation surrounding each water source. Qualitative descriptions regarding impacts of burros, horses, and human disturbances were recorded at every site. The locations, water-source data, and habitat evaluations are available from the BLM (Laabs et al. 1992) and

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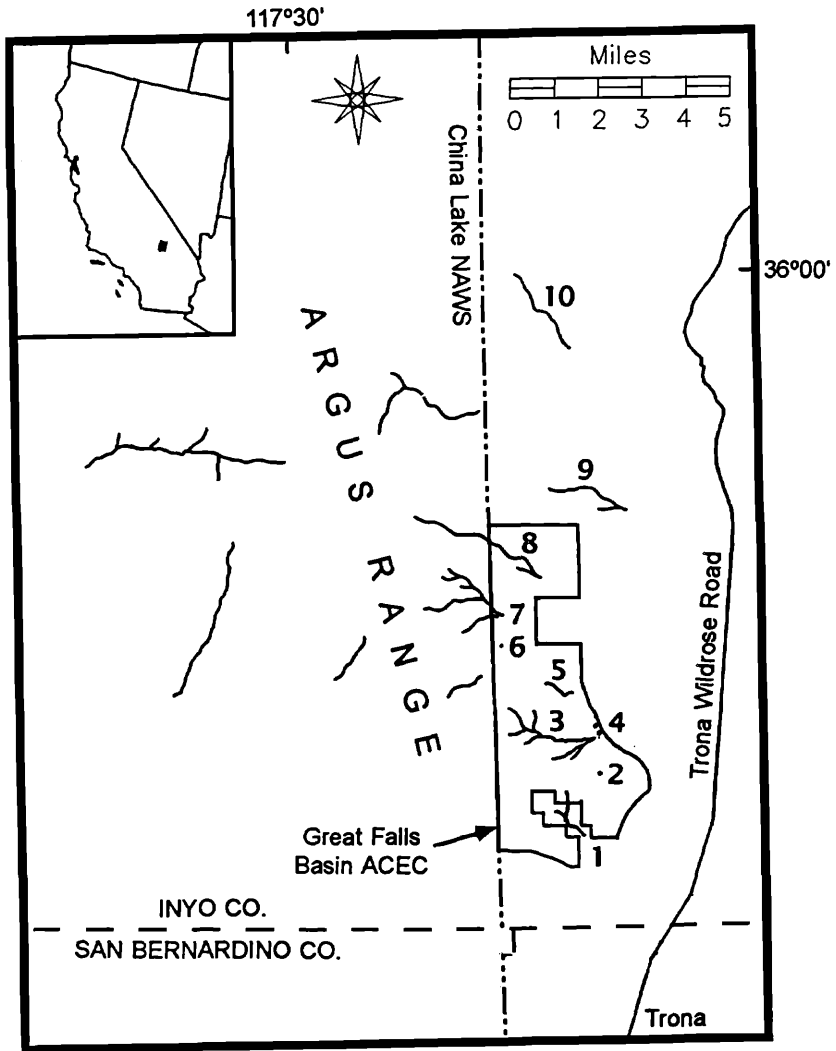


Figure 1. Canyons and isolated springs in which the Inyo California Towhee has been observed. Data from China Lake Naval Air Weapons Station from LaBerteaux (1994). Survey areas from the present study are numbered. 1, Indian Joe Canyon, including Allen Springs; 2, Bainter Spring; 3, Great Falls Basin, including Twin Orchard, Elliot and Willow springs; 4, Austin and Mumford springs; 5, Mumford Canyon, including Rattlesnake Springs; 6, North Ruth Spring (= South Homewood Canyon); 7, Benko Spring; 8, North Homewood Canyon, including Ruby, Alpha and Bobcat springs; 9, Bruce Canyon, including Cabin, Rock and Dripping springs; 10, tributary of Water Canyon.

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are not reported here in detail. Using aerial photographs acquired after our field effort, we were able to confirm that every site within the ACEC with riparian vegetation was visited with the exception of Skull Spring and an unnamed water source located in Great Falls Basin west-southwest of Willow Spring.

From 20 to 22 March 1994, we surveyed portions of seven canyons north of Great Falls Basin ACEC in order to determine the extent of the species' current range. Springs were identified from U.S. Geological Survey 7.5' series maps. We visited sites only outside China Lake NAWS. Each spring that contained appropriate breeding habitat was surveyed by techniques comparable to those used in 1992, except that sites were visited only once and detailed water source data were not gathered. The areas surveyed were Bruce Canyon (four springs), a tributary of Water Canyon (three springs), Shepherd Canyon (two springs), Knight Canyon, Revenue Canyon, Snow Canyon, and Darwin Falls ACEC.

## RESULTS

We observed 76 adult Inyo California Towhees in 1992 (Table 1). Thirty-nine of these individuals were observed in Great Falls Basin, 15 in North Homewood Canyon (including Alpha, Bobcat, and Ruby springs), and 12 in Indian Joe Canyon (including Allen Springs). The remainder were observed at isolated springs. Fifteen pairs of towhees were observed with 32 juveniles, averaging 2.1 per pair. At 19 sites surveyed previously, we observed 41 birds at locations where Cord and Jehl (1979) observed 36. Thirty-five towhees were observed at sites within the ACEC that were not surveyed by Cord.

The 1994 surveys resulted in sightings of seven Inyo California Towhees in two canyons that to our knowledge have not been previously surveyed. Towhees were observed at Dripping Spring, Rock Spring, and Cabin Spring in Bruce Canyon, and at an unnamed spring in a tributary of Water Canyon. Additional unoccupied appropriate habitat was present in the tributary of Water Canyon. Springs in Shepherd, Knight, Revenue, and Snow canyons contained little or no riparian vegetation and were heavily disturbed by burros and mining. No towhees were observed in any of these areas. None were seen at Darwin Falls, a site with extensive riparian vegetation 38 km north of the known breeding range.

Figure 1 presents the locations of all drainage basins and isolated springs in which Inyo California Towhees were observed during our census. In addition, locations summarized by LaBerteaux (1994) are presented for the remainder of the range on China Lake NAWS.

## DISCUSSION

Cord and Jehl (1979) estimated the Inyo California Towhee's population on the basis of the following assumptions: each nesting pair requires a minimum of 4000 square feet of riparian habitat; a minimum of 450 feet of riparian habitat is necessary between adjacent pairs along a linear corridor; and circular patches of riparian vegetation, especially around isolated

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**Table 1** Estimates and Censuses of Adult Inyo California Towhees in 1978–79 versus 1992–94

Site	Census 1978/79 <sup>a</sup>	Estimate 1978/79 <sup>a</sup>	Census 1992/94 <sup>b</sup>	Estimate 1992/94 <sup>b</sup>
Indian Joe Spring	2	2	2	2
Bainter Spring	0	0	1	2
Great Falls Basin (Sites 1–13)	27	36	31	32
South Homewood Canyon (= N. Ruth Spring)	2	2	1	2
Benko Spring	1	2	1	2
North Homewood Canyon (near Ruby Spring)	2	2	4	4
Ruby Spring	2	2	1	2
Indian Joe Canyon	NS <sup>c</sup>	NS	8	8
Allen Springs	NS	NS	2	2
Twin Springs (Great Falls Basin)	NS	NS	2	2
Elliot Spring (Great Falls Basin)	NS	NS	2	2
Orchard Spring (Great Falls Basin)	NS	NS	2	2
Willow Spring (Great Falls Basin)	NS	NS	2	2
Austin Spring	NS	NS	2	2
Mumford Springs	NS	NS	0	0
Mumford Canyon (incl. Rattlesnake Spring)	NS	NS	5	6
North Homewood Canyon (south portion)	NS	NS	6	6
Alpha and Bobcat springs	NS	NS	4	4
Bruce Canyon	NS	NS	6	8
Water Canyon	NS	NS	1	2

<sup>a</sup>Data from Cord and Jehl (1978, 1979).

<sup>b</sup>All census data collected in 1992 except in Bruce and Water canyons, which were visited in 1994.

<sup>c</sup>NS, not surveyed.

springs, support only one pair because the greatest linear distance at these sites is typically less than 450 feet. In general, we concur with these assumptions. However, like LaBerteaux (1989), we observed pairs, some of which had young, in riparian areas of less than 4000 square feet. Cord and Jehl (1979) and LaBerteaux (1989) noted that the size and configuration of riparian patches determined the size of territories maintained by Inyo California Towhees and therefore influence population size. Circular springs isolated from other riparian areas typically supported a single pair of towhees. Even a small gap along a linear corridor of riparian vegetation appeared sufficient to enable two pairs to maintain neighboring territories along a segment that might support only one pair if it were contiguous.

Results from the 1978–79 census are similar to the results of our census at those sites surveyed in both studies (Table 1). Most sites supported a similar number of pairs in both surveys, and relative abundance at these sites does not appear to have changed appreciably. The most significant differ-

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ence was the number of juveniles detected in 1979 (none) compared with 1992 (32). It is possible that Cord's surveys were not conducted at a time optimal for detecting fledglings. It is also possible that nesting success was high in 1992 as a result of vigorous vegetation and insect production following above-average winter rainfall.

We observed 83 towhees in 1992 and 1994. From the distribution of available breeding habitat and these census data, we estimate that there is sufficient habitat to support 46 pairs of towhees outside the China Lake NAWS between Indian Joe Canyon and the tributary of Water Canyon. Our estimate assumes that single birds observed at nine sites containing breeding habitat in 1992 and 1994 represent one pair. North of Water Canyon, outside China Lake NAWS, springs have been severely degraded by human uses and appropriate riparian habitat no longer exists. Our observations suggest that virtually all suitable habitat within the range of the Inyo California Towhee is occupied. Towhees inhabiting suboptimal sites may not successfully rear offspring yet may still be able to disperse into higher-quality territories when they become vacant.

The population estimated by Cord and Jehl (1979) in the area in which we estimate 92 towhees (46 pairs) was 46 towhees (23 pairs). The difference does not appear to reflect an increase in population size. Rather, the difference may result from the previous estimate's not considering sites less than 4000 square feet to be large enough to support towhees and/or from an underestimate of the overall amount of riparian vegetation. We observed towhees at 15 locations that had not been surveyed previously. Several of these sites were small or in canyons that Cord did not visit. Therefore, the population range-wide may be higher than the estimate of 138 birds suggested by Cord and Jehl (1979). Regardless, the population is very small and susceptible to a number of threats.

Riparian habitat within the range of the towhee has been degraded at several sites, including some within the critical habitat and the ACEC. We noted burro sign at virtually every site visited. Extensive burro damage was observed in the upland areas of Great Falls Basin and throughout Water Canyon. Towhee breeding sites at which water diversion was noted were Bainter Spring, Alpha Spring, Indian Joe Canyon, and North Ruth Spring. Exotic vegetation has replaced native riparian plants at certain isolated springs, including Austin Spring. These impacts are inconsistent with a conservation agenda for the threatened Inyo California Towhee. The recent acquisition of Indian Joe Canyon by the state of California and designation of portions of Water and Bruce canyons as wilderness by Congress has improved the habitat protection to some degree.

## SUMMARY

During a census of the Inyo California Towhee conducted in 1992 and 1994 throughout lands east of the China Lake NAWS, we observed 83 towhees. From this, we estimate a population of 92 towhees (46 pairs) between Indian Joe Canyon and a tributary of Water Canyon, in an area constituting approximately one-third of the range of the subspecies. North

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of Water Canyon, riparian habitat has been severely degraded and no towhees were observed. A previous population estimate (Cord and Jehl 1979) appears to have underestimated towhee numbers on lands east of China Lake NAWS. We observed towhees in several small (< 4000 square feet) riparian areas, as well as in canyons that had not been previously surveyed. Threats to the riparian habitat on which the towhee depends include disturbance by feral burros and horses, proliferation of non-native riparian species, and diversion of surface water.

### ACKNOWLEDGMENTS

The 1992 field study was funded by contract B950-C200-18 from the Bureau of Land Management. We thank Bob Parker and Kathryn O'Conner of the Ridgecrest Resource Area of the BLM for their assistance. Kathryn Buescher, Sara Higgins, and John Pofahl assisted with the field effort in 1994. Michael Patten, Denise LaBerteaux, and Philip Unitt provided comments on the manuscript, greatly improving its accuracy and readability. Mike Pantoja assisted with preparation of the map.

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*Accepted 16 September 1995*

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