

SPECIES ASSESSMENT FOR YELLOW-BILLED CUCKOO (*COCCYZUS AMERICANUS*) IN WYOMING

prepared by

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Introduction

A petition was first filed in 1986 to list the western subspecies of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) as threatened or endangered under the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) published its 12-month finding in 1988 stating that the petition was not warranted due to ambiguous subspecies range boundaries and the petitioned area did not encompass a distinct population segment. On February 2, 1998 a second petition was filed to list the full species or the western subspecies as endangered (Suckling and Greenwald 1998). The USFWS did not process the petition citing the agency's policy prohibiting the acceptance of new ESA petitions at that time. The USFWS ultimately published its 90-day finding on February 17, 2000 stating that ESA protection may be needed for the western population (subspecies not recognized), but not the full species over its entire range (USFWS 2000). On April 14, 2000 the USFWS received a document containing comments on the 90-day finding from 22 renowned scientists (Amundson et al. 2000) indicating the importance of listing the Yellow-billed Cuckoo and emphasizing the validity of subspecific status for western birds. The 12-month finding was ultimately published on 25 July 2001 identifying the western population as a Candidate taxon.

Specifically, the USFWS found that the petitioned action was warranted only for the western subspecies (*C. a. occidentalis*), but was precluded by higher priority listing actions. Candidate taxa receive no statutory protection under the ESA, although the USFWS reviews Candidate species for possible listing annually. Further, the USFWS recognized the western population as a distinct population segment (DPS) rather than a subspecies (USFWS 2001). The USFWS defines in detail what constitutes a DPS in the 12-month finding (USFWS 2001) and discusses the qualifications of the western population of the Yellow-billed Cuckoo for that designation. In essence, a DPS allows

for specific management actions for populations without explicit taxonomic separation. Since the DPS boundary follows that for the recognized subspecies and the Committee on Classification and Nomenclature of the American Ornithologists' Union (AOU) determines official taxonomic status for birds in North America, we treat eastern and western cuckoos as subspecies in this document. In Wyoming, only cuckoos found west of the continental divide are recognized as belonging to the western subspecies.

Yellow-billed Cuckoos were probably never common in Wyoming and there are relatively few records for the state (Bennett and Keinath 2001). Wyoming lies on the periphery of the Yellow-billed Cuckoo's range, where the low availability of suitable habitat precludes cuckoos from being abundant. Cuckoos likely breed at least occasionally in isolated areas of Wyoming that contain large tracts of cottonwood/willow habitat with a well-developed understory. Records from Wyoming Natural Diversity Database (WYNDD) indicate that most cuckoos observed in Wyoming have been transient individuals. Several areas in Wyoming that have had cuckoo sightings in the past were visited during the summer of 2001 and habitat conditions at these sights suggest that breeding was unlikely (Bennett 2001).

Yellow-billed Cuckoos are not well documented along the periphery of their range and distribution of the two subspecies is not clear. Due to their cryptic behavior, breeding status of Yellow-billed Cuckoos is difficult to determine without conducting playback surveys. Since most records across the region are incidental sightings of transient individuals, systematic surveys for Yellow-billed Cuckoos are needed for both the western and eastern populations in Wyoming. Locating resident cuckoos of both subspecies (DPS) is critical to aid both local management decisions and the USFWS annual status review of the candidate taxon.

Natural History

Morphological Description

The *Coccyzus* profile is unique; slender, long-tailed, and robin sized with a stout, moderately long, de-curved bill (Figure 1). They average 12 inches long and have an 18 inch wingspan. The lower mandible of the Yellow-billed Cuckoo is yellow to orange-yellow at the base with dark tip. The upperparts are brownish-gray tinged with olive and underparts up to the throat are dull white. Its long tail is brownish-gray above and black below. The outer tail feathers have distinctive broad white tips giving the appearance of 6 large white spots on the underside. The inner webs of the flight feathers have distinctive rufous-cinnamon patches, which are visible in flight. Sexes are similar, but juveniles have a less distinct tail pattern and duller cinnamon in the wing coverts.

Black-billed cuckoos (*Coccyzus erythrophthalmus*) are distinguished from Yellow-billed Cuckoos by having much smaller white patches in the tail, no rufous wing patch, and a black lower mandible. More often heard than seen, these cuckoos may best be distinguished by call. The Yellow-billed Cuckoo's call is generally louder and longer in duration than the black-billed cuckoo's and has a distinct cadence (see Breeding Behavior below and refer to recorded vocalizations).

Taxonomy and Distribution

The eastern and western populations of the Yellow-billed Cuckoo form distinct population segments based on morphological, geographical, behavioral, and ecological factors. Due to expediency the last two editions of the American Ornithologists Union have omitted the taxonomic category of subspecies (AOU 1998). The unique populations of the Yellow-billed Cuckoo have traditionally been considered subspecies with boundaries defined in the AOU Checklist of North American Birds fifth edition (1957). Many of the taxonomic differences are

addressed in the sections below. In summary, the western Yellow-billed Cuckoo has more orange in the bill and averages significantly larger than the eastern cuckoo. Western cuckoos arrive on the breeding grounds later and initiate nesting later than eastern cuckoos. Western cuckoos also depart earlier for wintering grounds than eastern cuckoos. The western cuckoo is restricted to cottonwood-willow habitat while the eastern uses a broader range of scrub and woodland habitats. In California there is a male biased sex ratio and it has been noted that young male cuckoos often act as helpers at nests of unrelated pairs; this is not reported for eastern populations (Laymon 2000). In California and Arizona cuckoos avoid tent caterpillars (the eastern's preferred prey across their range) and feed mainly on sphinx moth larvae. Also, it is highly likely that western and eastern cuckoos have different winter ranges and follow different migration paths (Franzreb and Laymon 1993, Laymon 2000, Hughes 1999).

Although differences exist between populations, the subspecific status has been challenged and championed in recent years (Amundson et al. 2000; Banks 1988, 1990; Franzreb and Laymon 1993; Laymon 2000; USFWS 2000, 2001). In order to aid the preparation of the 12-month finding the Service funded mitochondrial DNA (mtDNA) research to investigate validity of taxonomic separation. The researchers found that there were significant differences in haplotype (a set of genes that determines different antigens) frequencies between eastern and western samples, suggesting the two populations are not currently exchanging many individuals. However, the study concluded that the differences in mtDNA across the species range were not great enough to support valid sub-specific designations (Fleischer 2001). Fleischer (2001) suggests that future research using microsattelite markers has the potential to reveal significant variance in genetic structure where analysis of mtDNA did not.

The USFWS considered the results of this study, peer reviews of the study, and numerous comments from other experts and concluded that the subspecific status of Yellow-billed Cuckoo populations is ambiguous. Despite this conclusion, the DPS roughly follows the boundary for the western subspecies as recognized by the AOU (1957). The boundary coincides with the continental divide from Montana south through Wyoming and northern Colorado. From southern Colorado the boundary continues along the eastern boundary of the Rio Grande River drainage through New Mexico and south to the Big Bend area of west Texas (Figure 2). The Yellow-billed Cuckoo breeding in northeast Mexico and the Caribbean is considered as part of the eastern population.

Both subspecies of the Yellow-billed Cuckoo may be found in Wyoming (Figure 3), although morphological and behavioral differences that separate the subspecies may become ambiguous along this peripheral boundary of their range. Based on measurements of 15 live cuckoos and 37 museum specimens, Scharf (2001) determined that most cuckoos found along the North Platte River in Nebraska more closely resemble western subspecies, despite the fact that they would geographically be classified as eastern Yellow-billed Cuckoos. It is possible that this region may contain a mix of both subspecies or be a hybridization zone.

Although the eastern subspecies is still commonly found in appropriate habitat in the core of its range, the western subspecies has been nearly extirpated and is restricted to small isolated populations. It is no longer found in British Columbia, Washington, Oregon or Nevada. Once very common in California (numbering in the thousands), there are now only 40 to 50 pairs (S.A. Laymon, personal communication). Small breeding populations remain in Arizona and New Mexico and may also exist in small, scattered locations in Montana, Idaho, Utah, Colorado and Wyoming.

Habitat Requirements

Summer

Hughes (1999) summarized habitat requirements of cuckoos throughout their range. In general, Yellow-billed Cuckoos prefer relatively large tracts of deciduous, broad-leafed woodland with thick, scrubby undergrowth usually along watercourses and may require substantial edge habitat (interface between woodland and scrub) structure within home ranges. Eastern populations are more generalist than those in the West and can be found in a variety of habitats including: successional shrubland, dense thickets along streams and marshes, willow/dogwood shrublands, dense stands of successional hardwood forests, hammocks and mature hardwood forests with dense undergrowth. Western populations are restricted to narrow zones of riparian woodlands comprised of dense, closed-canopy cottonwood-willow. Mesquite scrubland adjacent to riparian woodland is also used in some years when prime habitat is saturated (Laymon and Halterman 1989). Cuckoos are generally absent from conifer and mixed broad-leafed/conifer forests and urban areas. They are also absent from areas invaded by tamarisk (*Tamarix* spp.) throughout much of their range (Gaines 1974, Laymon and Halterman 1987), but may be found in saltcedar woodland at higher elevations in Arizona (Hunter et al. 1988).

In Wyoming cuckoos generally select relatively large stands of cottonwood-willow habitat below 7,000 feet. Habitat requirements across Wyoming are likely identical to those described for western populations above. This habitat is limited in Wyoming, potentially occurring in scattered fragments along the Bighorn, Powder, Tongue, Cheyenne, Belle Fourche, Little Missouri, Laramie and North Platte River drainages.

Spring and Fall Migration

Little is known about habitat requirements during migration, but Yellow-billed Cuckoos are most commonly observed in woodland and scrub habitat similar to that described above.

Winter

Little is known about habitat requirements during winter, but cuckoos are most often found in tropical and sub-tropical lowlands with woody/scrubby vegetation along watercourses in Central and South America (Rappole et al. 1983).

Area Requirements

In California Yellow-billed Cuckoos can occasionally be found in small riparian woodland patches of approximately 3 ha (Gaines 1974), but observations in patches of this size almost always occur close to more extensive patches (Gaines and Laymon 1984). In California, Laymon and Halterman (1987) considered riparian woodland larger than 15 ha that included a minimum of 3 ha of closed-canopy broad-leafed forest suitable for occupancy. Laymon and Halterman (1989) later examined the relationship between habitat patch size and the proportion of patches that are occupied by either pairs or unmated males. Based on this relationship at least 40 ha of suitable habitat may be required for viable breeding populations (Table 1).

Eastern populations use a broader range of habitats and therefore area requirements may be less restrictive. To our knowledge, area requirements have not been thoroughly examined in the east. In the Florida Keys cuckoos are reportedly not found in fragments smaller than 7.5 ha (Bancroft et al. 1995) and in New Jersey cuckoos are very rare in forest patches smaller than 24 ha (Galli et al. 1976).

Landscape Pattern

No research has explicitly examined the extent to which Yellow-billed Cuckoos tolerate fragmentation of otherwise suitable riparian corridors, so few statements can be made regarding the impact of landscape mosaics on their distribution and productivity. Yellow-billed Cuckoos in the West are restricted to linear zones of riparian habitat along or near watercourses. The extent of unbroken, appropriate habitat appears to be the most important selection criteria for cuckoos and the habitat matrix between riparian areas is not likely critical. Cuckoos in the East have broader habitat requirements and are therefore likely to tolerate more fragmentation than western Yellow-billed Cuckoos, likely occurring in large expanses of deciduous woodland and scrub vegetation in a matrix of open and edge habitats.

Movement and Activity Patterns

Migration

Migration patterns were summarized by Hughes (1999) and Laymon (2000). Yellow-billed Cuckoos are long distance, complete neotropical migrants and generally one of the last migrants to arrive on breeding grounds. Migration timing is distinct for eastern and western subspecies. In the East the most southerly residents begin to arrive from late March to early April. Arrival times become progressively later on more northerly breeding grounds, and cuckoos may arrive during late April to early May in the northern-most portion of their breeding range. In contrast, there is no north-south differentiation in migration timing for the western subspecies. The earliest arrivals are in extreme late May and peak in mid June. The eastern subspecies generally departs for wintering grounds beginning in early September and continuing through October, but stragglers are sometimes seen in late November. The western population departs for wintering grounds 2-3 weeks earlier than eastern birds; beginning in late August with most birds gone by mid September.

In Wyoming, birds east of the continental divide arrive during late May with earliest reported arrival on May 6 (Dorn and Dorn 1999). Although based on relatively few observations, this is contrary to what is expected of eastern Yellow-billed Cuckoos, which further brings into question the sub-specific differentiation in Wyoming. If cuckoos currently occur west of the continental divide in Wyoming, they likely arrive on their breeding grounds during late May and June, although there is no formal documentation of this. Cuckoos likely depart Wyoming during August and September (Dorn and Dorn 1999).

Phenology

No information is currently available on the non-migratory movement patterns of Yellow-billed Cuckoos (e.g., daily movements).

Reproduction and Survivorship

Breeding Behavior

Hughes (1999) summarized the breeding behavior of Yellow-billed Cuckoos. Arrival of Yellow-billed Cuckoos on their breeding grounds is signaled by their distinctive vocalizations (outlined below):

- 1) Kowlp Call: 8-12 guttural, wooden-sounding syllables; ka-ka-ka-kow-kow-kow-kowlp-kowlp-kowlp. This call may function to attract a mate and act as a spacing mechanism between pairs.
- 2) Knocker Call: a harsh, rattled, rapid series of notes; kow-kow-kow-kow-kow that resembles metal doorknocker hitting plate. This call may serve as a contact call between mated pairs.
- 3) Coo Call: several soft, repeated cooing notes; coo-coo-coo-coo-coo-coo-coo. This call is given by males to attract a mate and by females to initiate copulation.

Courtship begins with the female poised on a branch with her head and tail raised. When the male approaches, the female raises and lowers her tail several times. The male then snaps off a small twig and brings it to the female, landing directly on her back. The male places the twig crosswise in the female's bill at which point copulation begins. During copulation, which lasts 3-5 seconds, both birds continue holding the twig. This behavior may be repeated several times (Hendricks 1975, Eaton 1979). The nature of the mating system is not certain, but likely monogamous. Extra-pair copulations have not been reported.

Both members of the pair build a well-concealed nest of twigs in dense foliage that is usually within 10 m of the ground (Laymon 1980), but nests have been found as high as 27 m in Arkansas (Wilson 1999b). Incubation is shared equally between males and females and both parents brood and tend young.

Yellow-billed Cuckoos are heard calling more frequently upon arrival on breeding grounds, during pair formation and nest building. Calling persists through the nesting period to a lesser degree. Cuckoos rarely call after the last young has fledged. Yellow-billed Cuckoos are not highly territorial, but territorial status remains unclear and needs further study (Hughes 1999). In Arizona, cuckoos have been known to aggressively supplant conspecifics and may establish loose breeding ranges that cover several hectares (Hamilton and Hamilton 1965, Hughes 1999). Laymon (1980) found no evidence of breeding or foraging territories in California.

Yellow-billed Cuckoos are facultative brood parasites; raising their own young while occasionally laying additional eggs in host nests, both intra- and inter-specifically. Most often cuckoos parasitize their own species, but other common hosts include the black-billed cuckoo, American Robin (*Turdus migratorius*), Gray Catbird (*Dumatella carolinensis*), and Wood Thrush

(*Hylocichla mustelina*) (Hughes 1997). Brood parasitism is most prevalent during years of high food abundance, but likely uncommon during most years (Nolan and Thompson 1975).

Breeding Phenology

Breeding phenology can be highly variable regionally and seasonally and often coincides with the appearance of large numbers of cicadas, caterpillars, or other large insects (Nolan and Thompson 1975, Laymon 2000) or periods of greatest rainfall (Hamilton and Hamilton 1965). Breeding periods for western populations occur 2-12 weeks later than eastern populations at the same latitude and peak during mid July to early August (Franzreb and Laymon 1993, Laymon 2000). In general, earliest breeding periods begin in the southeast (April) and occur later to the north (June) (Hughes 1999, Laymon 2000). Pair formation and nest building begins soon after arrival on summering grounds. Egg laying dates are variable and incubation lasts 9-11 days (Potter 1980, 1981; Hamilton and Hamilton 1965). Young fledge at seven to nine days and climb branches to meet an attending adult. Adults and young leave the nesting area one day after the chicks have fledged (Potter 1980). It is unclear how long adults tend to fledglings, but likely until a subsequent nest is initiated or individuals depart for wintering grounds.

Breeding Habitat Requirements

For the western subspecies, a matrix of willow and cottonwood is essential. Cuckoos nearly always place their nest in willows and forage primarily in cottonwoods. Also, home ranges of nesting cuckoos generally have a greater proportion of willows than cottonwoods (Laymon 2000). The eastern subspecies typically uses a wider variety of trees and shrubs for nesting and foraging. Generally, cuckoos require groves of deciduous hardwoods with thick brush or hedgerows that provide dense foliage in the lower canopy (Hughes 1999, Wilson 1999a).

Fecundity and Survivorship

Hughes (1999) summarized information for fecundity and survivorship. Both sexes likely breed during their first year. Clutch size is one to five (usually two or three), largest when prey is abundant. Annual reproductive success is highly variable, but generally low and dependent on food availability and predation pressure. Brood reduction by nestling removal and incubation suspension has been noted for populations in California (Laymon 2000). Nest predation may account for the majority of nest failures and low reproductive success in some regions. Both eastern and western subspecies are known to double brood in some years, although the breeding season in the West is much shorter (Laymon 2000). There is no information on offspring survivorship or lifetime reproductive success.

Population Demographics

Metapopulation Dynamics

Populations in the West are assumed to be isolated based on extent of habitat loss, habitat fragmentation and distribution of known populations (Gaines 1974, Gains and Laymon 1984, Laymon and Halterman 1987, Hughes 1999, USFWS 2001), but quantitative data is not available on population connectivity or colonization rates. For these reasons no conclusions can be drawn regarding the extent to which cuckoo populations may function as a metapopulation. Although populations in the East are more widespread than and not likely as isolated as those in the West, a similar lack of data precludes conclusions regarding metapopulation dynamics for eastern populations.

Genetic Concerns

Isolation and low population size for western populations could potentially pose genetic problems such as inbreeding depression, but no studies have been performed. The degree of

isolation between western populations is unclear, although likely significant. Each of the remaining populations is separated by at least 100 miles and population sizes are small, ranging from 40 to 200 individuals.

Food Habits

Food Items and Foraging Flexibility

Cuckoos eat primarily large insects such as caterpillars, cicadas, and grasshoppers (Hughes 1999). In the East, tent caterpillars and webworms are by far the most common prey item (Laymon 2000). These food sources are clumped and cyclic in nature and are available only for a relatively short duration during the summer. In California and western Arizona cuckoos rarely eat tent caterpillars even when common, preferring sphinx moth larvae. This prey source is larger, loosely clumped or solitary, and has a much less cyclic reproductive pattern (Laymon 2000). In agricultural areas pesticide use likely reduces prey availability (Laymon and Halterman 1987). Cuckoos will also consume frogs and small lizards (Hamilton and Hamilton 1965, Laymon and Halterman 1987) and have been known to take eggs and young of other birds (Beal 1898). Cuckoos will eat small fruits and seeds on wintering grounds (Rappole et al. 1983) and occasionally during breeding season (Bent 1940).

Foraging Strategy

Foraging strategy was summarized by Hughes (1999). Cuckoos often use a sit-and-wait strategy for acquiring prey; perching inconspicuously and scanning surrounding vegetation for moving prey items. They will also glean insects from vegetation while perched or hovering, and will sometimes hawk insects similar to a flycatcher. Cuckoos also secure grasshoppers, frogs, lizards etc. by active pursuit on the ground or in vegetation. In California and Arizona, if adults do not find preferred prey (sphinx moth larvae) within an hour they will feed nestlings sub-optimal

prey (e.g. tree frogs, grasshoppers, cicadas or katydids) to satiate young until sphinx moth larvae can be found (Laymon 2000).

Community Ecology

Yellow-billed Cuckoos are facultative brood parasites with at least 11 species of birds known as hosts, but most commonly parasitizes other Yellow-billed Cuckoos (Hughes 1999). Brood parasitism is not common with cuckoos and host species does not likely lose entire brood when parasitized. There is little or no other information for community ecology of Yellow-billed Cuckoos.

Conservation Concerns

Conservation Status

Federal Endangered Species Act

Western Population: The western subspecies of Yellow-billed Cuckoo has been recognized as a distinct population segment and been given candidate status under the U.S. Endangered Species Act in the 12-month finding released on 25 July 2001 (USFWS 2001). Candidate species receive no statutory protection under the ESA. The Service reviews Candidate species for possible listing action annually. In Wyoming, only cuckoos found west of the continental divide are classified as belonging to the western population (USFWS 2001).

Eastern Population: The eastern population of the Yellow-billed Cuckoo has no legal federal status other than that afforded by the Migratory Bird Treaty Act of 1918.

Bureau of Land Management

The Wyoming State BLM includes the Yellow-billed Cuckoo (full species) on its sensitive species list (BLM Wyoming 2001). The goal of the BLM's sensitive species list is to ensure any

actions on public lands consider the overall welfare of these species and do not contribute to their decline. The BLM's sensitive species management will include: determining distribution and current habitat needs of each; incorporating sensitive species in land use and activity plans; developing conservation strategies; ensuring that sensitive species are considered in NEPA analysis; and prioritizing what conservation work is needed (BLM Wyoming 2001).

Forest Service

Regions 2 and 5 of the Forest Service include the western Yellow-billed Cuckoo on its sensitive species list (USDA Forest Service 2000). The goal of the Forest Service Sensitive Species list is to develop and implement conservation strategies for listed species, coordinate management objectives, and address and manage sensitive species in groups and habitat complexes when possible (USDA Forest Service 1994).

State Wildlife Agencies

The Wyoming Game and Fish Department (WGFD) assigned the Yellow-billed Cuckoo (full species) a Native Species Status of 2 (NSS2) (Oakleaf et al. 2002). NSS2 species are defined by having populations that are experiencing an ongoing loss of habitat and are restricted in numbers or distribution. Extirpation of NSS2 species from Wyoming is considered possible, but not imminent. The goal for the NSS system is to focus efforts on the most pressing needs of nongame species in Wyoming and to develop and implement management plans for each listed species (WGFD 1997).

Heritage Ranks and WYNDD's Wyoming Significance Rank

Both the eastern and western sub-species of Yellow-billed Cuckoo have been assigned ranks of G5/S1B,SZN by the Natural Heritage Network and the Wyoming Natural Diversity Database (Keinath et al. 2003). This ranking system was developed by The Nature Conservancy's Natural

Heritage Network to assess the global and statewide conservation status of each species or taxon. Each taxon is ranked on a scale of 1-5, from highest conservation concern to lowest. A global (G) or rangewide status of 5 identifies the Yellow-billed Cuckoo as a low conservation concern across its range. A state rank (S) of 1 signifies that the species of high conservation concern in the state, 'B' identifies the cuckoo as a breeder in the state, and 'ZN' indicates that the cuckoo is not of concern during the non-breeding season.

Wyoming Significance Rank: Medium. WYNDD has designed a Wyoming Significance Rank to explicitly consider how Wyoming contributes to the range-wide persistence of a species (Keinath and Beauvais 2002). This rank is most heavily influenced by how much of a species' total range is in Wyoming and how the population status of the species in Wyoming relates to the rest of North America. All else being equal, the highest ranks will be given to species for which Wyoming contains a large portion of the range and for which that portion seems to be more secure than elsewhere. The rank for the Yellow-billed Cuckoo is based on its resident status, low percent of continental range in Wyoming, extent of population fragmentation, and its greater danger of extirpation in Wyoming than elsewhere in its range.

Biological Conservation Issues

Abundance

The area of peak abundance for the eastern subspecies is southeast Oklahoma, southeast Kansas, southern Missouri, Arkansas, Mississippi, and central Texas [11-30 individuals detected per Breeding Bird Survey (BBS) route] (Sauer et al. 2001). Relative abundance decreases to the east, west, and north of this area of high abundance, and detections drop to one or fewer per BBS route at the limits of its range.

Yellow-billed Cuckoo abundance throughout the western U. S. has been drastically reduced during the past 150 years. Although formerly widespread and locally abundant in New Mexico and western Texas, current estimates range from 100-200 pairs in New Mexico and 100-200 pairs in west Texas (Laymon and Halterman 1987, Hughes 1999). Estimates for Arizona were fewer than 200 pairs in 1987 (Laymon and Halterman 1987) and are likely lower today. Currently 40-50 pairs remain in California (S. Laymon personal communication) where estimates based on former extent of riparian habitat and historical observations equate to between 10,000 and 20,000 pairs before the turn of the century (Gains 1974, Gaines and Laymon 1984, Hughes 1999, USFWS 2001). Yellow-billed Cuckoos are considered very rare in Utah, Colorado, Montana, Idaho and Wyoming with few if any observations reported annually (USFWS 2001). Total current population size for the western subspecies in the U. S. is estimated to be 475 to 675 pairs with a similar number likely in Mexico (Laymon and Halterman 1987).

In Wyoming, WYNDD ranks the State Abundance of Yellow-billed Cuckoos (full species), as ‘Very Rare’ (fewer than 1000 resident individuals) (Keinath and Beauvais 2002). Others consider it an uncommon summer resident (WGFD 1997, Dorn and Dorn 1999). The accuracy of these designations is uncertain given the lack of survey data. There have been relatively few observations reported in Wyoming and fewer still that have documented breeding. WYNDD has a total of 66 recorded observations in Wyoming, including 39 WGFD Wildlife Observation System (WOS) records, 7 BBS records, 17 incidental observations, 2 specimens and 1 survey record. Six of these records are considered confirmed or suspected breeding locations. Breeding was documented within the city limits of Sheridan in 1980 (Downing 1990). Within the last 25 years breeding was suspected along East Wolf Creek and Big Goose Creek near Sheridan, along the North Platte River in Rawhide Wildlife Habitat Management Area (WHMA), near Springer WHMA in Goshen County, and along the South Fork Miller Creek north of Sundance.

Trends

The eastern Yellow-billed Cuckoo is still considered common and abundant across some of its range, although they are less common than they once were. Laymon (2000) summarized results for the BBS data from 1966-1998 (Sauer et al. 2001) and concluded that Yellow-billed Cuckoos are in decline across virtually their entire eastern range (Figure 2). The most serious declines have occurred along the northern periphery of their distribution. Populations appear to be stable only in South Carolina, Delaware and New Jersey (2.3% of its range).

The western subspecies has been nearly extirpated and is restricted to small isolated populations (see Abundance). Analysis of population trends is difficult because quantitative data, including historical population estimates, are generally lacking (USFWS 2001). Cuckoos are no longer found in British Columbia, Washington, or Oregon. Idaho, Montana, Utah, Wyoming and Nevada report occasional scattered observations and remaining populations in California, Arizona, New Mexico, and Texas are vastly reduced (see Abundance).

WYNDD ranks the Historical Trend for Yellow-billed Cuckoos as 'Large Decline' (decrease of over 50% in total numbers since ca. 1850) (Keinath and Beauvais 2002) based on near extirpation in the West and decreases in the East. WYNDD ranks the Recent Trend as 'Moderate Decline' (decrease of less than 50% in total numbers since ca. 1950) since most of the declines in cuckoo abundance in the West occurred prior to 1950. Determination of trend data for Wyoming is problematic, because there are few historical records for Wyoming, Montana, and Idaho, which lie on the northern periphery of the cuckoo's historic range. Although they were probably never abundant in the region, numbers are almost certainly reduced due in part to habitat loss and elimination of potential source populations (Gaines 1974, Gaines and Laymon 1984, Laymon and Halterman 1987, 2000; Hughes 1999; USFWS 2001).

Habitat Trends (Extent and Connectivity)

By the late 1800's large tracts of floodplain riparian woodland in the West had been destroyed for agriculture and fuel (Gaines 1974, Gaines and Laymon 1984). Cottonwood/willow habitat continues to be lost, fragmented, and degraded as a result of conversion to agriculture, dams and river flow management, stream channelization and bank protection, overgrazing, and competition from exotic plants such as tamarisk (Laymon and Halterman 1987, 1989; Hughes 1999; USFWS 2001). These practices have reduced riparian habitat in the West to a fraction of its former extent. For example, the Sacramento Valley of California retains less than 1% of its original riparian habitat (Laymon and Halterman 1987). Estimates for other states may not be as dramatic, but are likely similar.

Eastern populations are not fragmented to the extent that they are in the West and may be considered contiguous. Although eastern cuckoos use a broader range of habitats, breeding populations are greatest in bottomland hardwood forests. These floodplain forests have been drastically reduced in many areas by development and silviculture (Wilson 1999a).

Wyoming Range Context

Since the suggested boundary between the eastern and western subspecies of Yellow-billed Cuckoos is the continental divide, Wyoming may contain elements of both subspecies. Moreover, when considering federal management actions, Wyoming is on the north-eastern periphery of the western Yellow-billed Cuckoo's range. Taking the entire extent of their range in Wyoming, the state roughly contains less than 3 percent of the subspecies' total range, but as noted above, cuckoo habitat in Wyoming is somewhat marginal and patchy in distribution.

Intrinsic Vulnerability

Habitat Specificity

Western Yellow-billed Cuckoos are strictly tied to a single, narrowly-defined habitat type (i.e., closed-canopy, deciduous, riparian forest with a dense shrub understory), which makes them particularly vulnerable to habitat alteration. Although habitat use is broader in the East, cuckoos still specialize on a narrow range of habitats (i.e. deciduous hardwood forests with a dense understory).

Territoriality and Area Requirements

Although not highly territorial, cuckoos require certain habitat conditions and area (see Table 1). Area requirements are not met throughout much of the cuckoos current and former range across the West and are the most likely reason for the western cuckoos disappearance and range contraction. Yellow-billed Cuckoos in the East are likely suffering from the same lack of area requirements where abundance is in decline.

Susceptibility to Disease

Although cuckoos host several parasites, the extent to which they, or disease, may affect population viability is unknown. Hughes (1999) summarized the known parasites. Cuckoos have been found with several blood parasites, nematodes in the gut and caeca, and several parasitic insects (Liposcelidae, Aeolothripidae, Orthoperidae, and Syrphidae Families).

Dispersal Capability and Site Fidelity

Yellow-billed Cuckoos in the West are believed to have low dispersal capability due to appropriate habitat being vastly reduced, isolated, and difficult for them to find. There is no information on dispersal between populations and little information on site fidelity. In California along the Kern River 2-3 pairs were mated over consecutive years and nested in the same territory (Stephen Laymon, personal communication). S. Laymon also noted that many of the males born in

the Kern River area returned to the general vicinity during subsequent years, but no females returned. This may suggest that site tenacity is less prevalent in females and that most extra-limital records may then be female, although no range-wide conclusions should be drawn from these few observations.

Reproductive Capacity

Reproductive capacity was summarized by Hughes (1999). The age at first breeding is thought to be during their first year after fledging. Clutch size ranges from 1-5 eggs, but is usually 2-3 and some pairs double brood in a single season depending on food availability. Along the South Fork Kern River in California, some pairs (30%) have non-related male helpers at the nest that aid in rearing successful second and even third broods in some years (Laymon 2000). Laymon also noted that the youngest of a brood will often be removed from the nest in years of low food abundance and in some years entire broods may be lost.

Sensitivity to Disturbance

Yellow-billed Cuckoos are very sensitive to disturbance in the form of habitat modification and loss (see Abundance and Habitat Trends). Cuckoos are sensitive to natural or human caused reduction in food resources, which result in lower productivity (Hughes 1999, Laymon 2000). Cuckoos are also sensitive to human presence and may abandon their nest if disturbed, especially during the nest building stage (Laymon 1998).

Extrinsic Threats and Reasons for Decline

Anthropogenic Impacts

Historically the loss of habitat and habitat fragmentation has been the primary cause of decreased population sizes of Yellow-billed Cuckoos across the West and are likely the cause of declines in the East (see Habitat Trends). Hughes (1999) summarized effects of heavy pesticide use during the last 50 years, which likely contributed to population declines by removing and/or

poisoning prey, directly poisoning birds, and causing egg shell thinning. It is not clear how meso-predators (house cats, skunks, opossums, raccoons etc.) may affect population viability of cuckoos, but in areas where numbers of these predators have increased in response to removal of top predators (e.g. coyotes), bird populations have suffered (Crooks and Soulé 1999).

Invasive Species

Few invasive species are considered to be a significant contributing factor to the observed declines in Yellow-billed Cuckoos. The expansion of tamarisk into arid wetlands generally below 2000 m has effectively increased fragmentation of suitable cuckoo breeding habitat. The western subspecies breeds exclusively in lowland riparian woodlands and is known to avoid riparian stands that are dominated by tamarisk (Franzreb and Layman 1993). This impact is greatest in the desert riparian habitats in the southern portion of the breeding range. The western-most populations of the eastern subspecies (Eastern New Mexico) will regularly utilize tamarisk stands for nesting habitat.

Genetic Factors

Genetic factors have not been investigated as a cause of decline for the Yellow-billed Cuckoo, but may play a role due to small, isolated populations in the West (see Genetic Concerns above).

Stochastic Factors

Because required habitat in the west has been reduced to remnant stands, stochastic events that reduce habitat further, such as floods and drought, could pose a threat. Stochastic extinctions are believed to be a contributing factor to population declines in the West (Laymon and Halterman 1989) and pose a threat of extinction to current populations.

Natural Predation

The impact of natural predation on cuckoos has been summarized by Hughes (1999). Predation of eggs and nestlings by birds, mammals and snakes is not uncommon and may account

for failure to fledge young from a large percentage of nests in some areas and may affect population viability. Aplomado Falcons (*Falco femoralis*) and other raptors are known to prey on adults and may be important predators of adults and juveniles of both subspecies during migration.

Protected Areas

Particularly in Wyoming, the geographic distribution and habitat associations of the Yellow-billed Cuckoo predispose its occurrence on predominantly private land because the lowland riparian areas they inhabit are also valuable for livestock, agriculture, and development. Thus, cuckoos are less likely than other species to be found on protected public lands, such as national parks or wilderness areas in national forests. Since management practices vary widely among landowners and government agencies, this poses a potential problem for future conservation of cuckoos. WYNDD has 6 confirmed or suspected breeding areas within Wyoming, 3 of which fall on public land; one each for Springer and Rawhide WHMA, and 1 on Black Hills National Forest.

Population Viability Analyses (PVAs)

To the authors' knowledge, no PVAs for any species of cuckoo in North America have been performed to date.

Conservation Action

Existing or Future Conservation Plans

Laymon and Halterman (1989) proposed a habitat management plan for Yellow-billed Cuckoos in California that has been adopted by the Nature Conservancy. Since habitat and populations of cuckoos have been severely reduced, they recommended preserving all existing habitat regardless of quality and initiating habitat restoration projects. The management plan suggests a metapopulation consisting of at least 23 subpopulations along 4 named river systems across the state, each consisting of at least 25 pairs with exchange between subpopulations. At

least a 3 km break between habitat patches is required to delineate a subpopulation. The authors contend a metapopulation with this structure in California should be reasonably safe from extinction by stochastic events. Currently no subpopulations of > 25 pairs exist in Wyoming and indeed the entire population for Wyoming and the region (Montana, Idaho, Utah, Colorado) may not exceed this number.

Conservation Elements

Laymon and Halterman (1987) suggested the first management priority should be to determine the numbers and locations of current cuckoo populations. This information would permit management agencies to direct conservation efforts to areas that would best benefit the cuckoos. The primary focus of conservation efforts should then be on the acquisition and improvement of critical, occupied habitat. Other important considerations include reducing or eliminating pesticide use in or near riparian zones where cuckoos may be found and investigating the feasibility of captive breeding and reintroduction to naturally regenerated or reforested habitat.

Inventory and Monitoring

Yellow-billed Cuckoos have large home ranges, call infrequently when mated, are rarely detected visually, and are only modestly territorial. For these reasons traditional survey methods, such as point counts and line transects, are not very effective methods for detecting cuckoos. Playback surveys are recommended for determining presence/absence and locating all nests in a population. Playback is the only reliable way to census any area of potential breeding habitat (Laymon 1998). For survey and monitoring protocol see Appendix A. Since population levels are so low for Wyoming and breeding does not likely occur every year, every effort should be made to identify critical habitat, determine presence/absence in those areas, and determine breeding status

for every individual observed. Presence of individuals in any given year is likely to be variable given the continental distribution of the species and habitat limitations.

Habitat Preservation and Restoration

Since the major cause for declines of cuckoos has been habitat loss, habitat preservation and restoration are critical to conservation efforts. Laymon and Halterman (1989) discuss several methods for habitat improvement including removal of cattle grazing from riparian habitats. Removing grazing pressure would allow natural regeneration and encourage increased density of willows and cottonwoods. Reforestation of degraded riparian areas has proven to be successful in the Kern River Preserve in California and is probably the most effective way to restore habitat. Cuckoos in this preserve foraged in the second year and nested in the third year following reforestation efforts. Riparian vegetation propagation and site management techniques for this work were outlined by Anderson and Laymon (1989).

Captive Propagation and Reintroduction

Captive propagation and reintroduction efforts have not been initiated, but merit investigation where seemingly suitable habitat still exists within historic range of the Yellow-billed Cuckoo (Laymon and Halterman 1987).

Information Needs

In Wyoming, appropriate habitat needs to be identified and surveys conducted to determine where populations, small groups, or individual Yellow-billed Cuckoos may still exist.

Hughes (1999) has summarized information needs at a range wide level. At this scale it is critical to conduct detailed censuses for the more rapidly declining western subspecies in order to determine effective population sizes needed for future conservation efforts. More detailed information on distribution and habitat use (including the identification of major migratory

corridors) are needed for both eastern and western population segments. Critical information is lacking for mate and site fidelity, as well as habitat and ecological requirements for wintering grounds and migration routes.

Tables and Figures

Table 1. Habitat suitability of Yellow-billed Cuckoos in California (from Laymon and Halterman 1989)

Habitat Suitability	Habitat Type	Area (ha)	Width (m)
Optimum	Willow-Cottonwood	>80	>600
Suitable	Willow-Cottonwood	41-80	>200
Marginal	Willow-Cottonwood	20-40	100-200
Marginal	Mesquite	>20	>200
Unsuitable	Willow-Cottonwood	<15	<100
Unsuitable	Mesquite	<20	

Figure 1. Yellow-billed Cuckoo on nest. Photograph from South Fork Kern River Valley, California, by Ian Tate.



Figure 2. North American summer breeding distribution of eastern and western subspecies of the Yellow-billed Cuckoo.

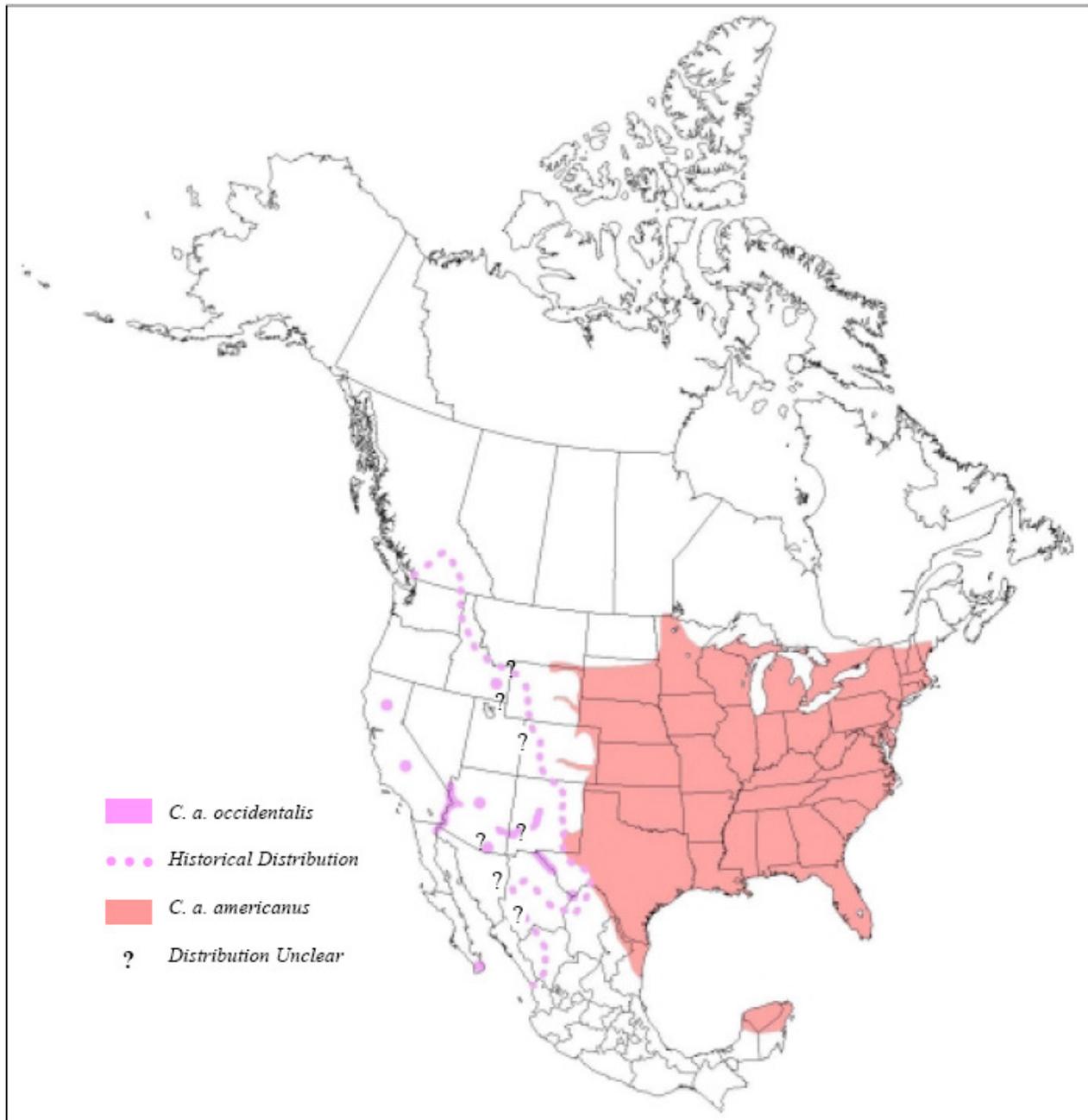
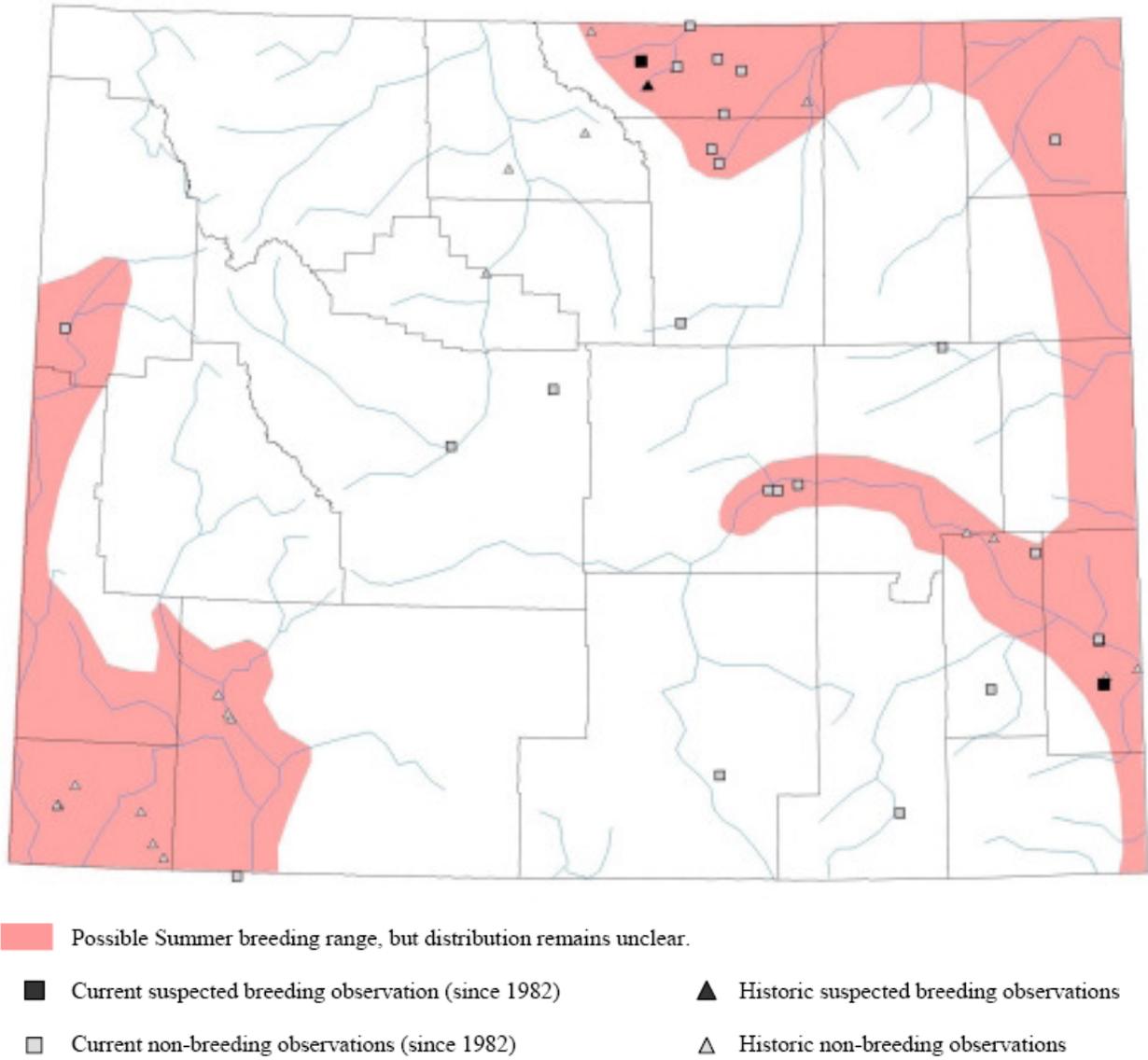


Figure 3. Wyoming distribution of the Yellow-billed Cuckoo.



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Appendix 1: Yellow-billed Cuckoo survey and monitoring protocol for California (Draft)

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Introduction: In the western United States a petition has recently (February 1998) been filed to list the western subspecies of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) as a Federally Endangered Species. The species is extremely rare in California, with less than 50 pairs recorded during the last statewide survey in 1986-1987. There is no indication that the population has increased since that survey. The population in California is concentrated along the Sacramento River from Red Bluff to Colusa and along the South Fork Kern River near Weldon. Other breeding locations of small numbers of pairs are along the Feather River from Oroville to Verona, along the Owens River, along the Amargosa River, and in the Prado Flood Control Basin. The western subspecies, officially known as the California Yellow-billed Cuckoo, is also sometimes referred to as the Western Yellow-billed Cuckoo. The cuckoo has a large home range, calls infrequently when mated, and is rarely detected visually. It is also territorial only in a limited sense. These factors render traditional bird surveys methods, such as point counts and transects, of limited value to determine the presence/absence or abundance of the species. Playback surveys are the recommended method for conducting surveys. Because of large and overlapping home ranges, locating all nests in a population is the only way to census (i.e. to do a complete count of) the population.

Survey Method: Playback of the cuckoo's pair contact call ("kowlp" call) has proved to be the best method to survey the species. The tape-recorded call should be able to be easily heard for a

minimum of 100 m. I recommend a dual speaker, sports tape recorder, like the Sanyo “Outsider” or Sony “Outback”. These recorders have both the power to project the required distance, lack of distortion at high volume, and are rugged enough to stand up under field conditions. I have been using a Sanyo “Outsider” for the past 10 years with no trouble, but have been unable to obtain a replacement. If you find a source please spread the word.

Any recording of the “kowlp” call is fine. I always use the recording from the Peterson Field Guide tape because it is distinctive and I can tell the difference between a real cuckoo and another cuckoo surveyor’s tape. Never use a tape of the cooing call, which is given only by unmated males, to survey for cuckoos. This call will reduce the response rate of mated cuckoos below what it would be if no call were used. Surveys should be conducted between the hours of 6:30 and noon. The hot part of the day should be avoided as response rate declines sharply. I would avoid conducting surveys when the temperature exceeds 100 degrees. Surveys in the late afternoon (6:00) and evening (8:00) are also possible but the survey results have not been compared to known populations. Survey stops located every 200 m along the forest edge are recommended. If the forest patch is greater than 100 m in width, it will be necessary to make two or more transects through the patch. In some locations, surveys can be conducted from a dry creek bed with up to 100 m of habitat on either side. No part of the patch should be more than 100 m from a survey location. In terms of the number of survey stations/40ha (100 acres), 12 stops would be needed for a square habitat patch (633 m x 633 m), 10 stops for a 200 m x 2000 m patch, and 20 stops for a 100 m x 4000 m patch.

The recorded call should be played about 10 times at each stop, with about 30-60 second pauses between each call. An alternative is to stop every 100 m and play the tape 5 times at each stop. I have not found one method to be superior to another. The pauses between the calls are extremely important. Cuckoos rarely respond instantly and usually wait 30 seconds or more before

responding. If you are walking, talking, or playing the tape you will probably not hear the response. Approximately 4 km of habitat can be surveyed per morning.

Three surveys of your study area should be conducted during the breeding season. In California, surveys should not be conducted before 15 June, because most cuckoos have not arrived before that date. Surveys should not be conducted after 10 August because many cuckoos have left their breeding areas by that date and the remaining cuckoos have become very quiet and rarely respond. Surveys should be conducted 10 to 14 days apart between the 15 June to 10 August period. This spacing allows the surveyor to hit the various stages of the nesting cycle for any given pair, increasing the chance of response.

Surveys should not be carried out in winds over 7 mph because this reduces both the cuckoo's response rate and your ability to hear the response. Likewise, surveys should not be conducted when it is raining. Rain is generally not a problem in California during the survey period.

Survey Results: With surveys for sensitive species, the problem of presence vs. absence vs. not found always arises. A response by a cuckoo during a survey of course indicates that a cuckoo is present at the site. Surveys conducted at sites where the population is known indicate that with three surveys there is approximately a 95% chance of detecting at least one member of a pair. Therefore, there is approximately a 5% chance of cuckoos being present at the site but not being detected during the survey. The absence (or presumed absence) of cuckoos in any given year does not indicate that the site is never used by cuckoos. Some sites in California have been unoccupied by breeding pairs for five or six years only to be reoccupied. In addition, numbers of pairs can vary greatly from year to year at even the best sites. At the South Fork Kern River, from 1985 to 1997, the cuckoo population has varied from a low of three pairs to a high of 23 pairs. We recommend that surveys be conducted for a minimum of three years to capture the variation in population size and to conclude that cuckoos are actually absent.

Cuckoo Response and Call Context: Cuckoos can respond to the taped calls in several ways. How they respond depends on their breeding status, breeding season phenology, and individual variation.

Unmated male cuckoos will often fly into where the observer is located and, after one or two minutes, will respond with a cooing call. The cooing call is a mate attraction call and is therefore the song of the cuckoo. To the inexperienced, the call could easily be mistaken for a Mourning Dove. Experienced observers sometimes mistake this call for the call of a Greater Roadrunner. The main difference is that the Roadrunner call descends while each note of the Yellow-billed Cuckoo call is on the same pitch. This cooing can continue indefinitely and unmated males cuckoos will sometimes follow a surveyor for several hours. It is sometimes necessary to skip a survey location to lose these unmated males.

Unmated female cuckoos, when they respond at all, often fly in and silently observe the surveyor. On a few occasions I have had them respond with a low guttural call similar to, but much lower and hoarser than cooing.

Mated male and female cuckoos sometimes also respond by flying in silently, but usually they respond from a ways off with a contact “kowlp” call. Mated cuckoos never coo. Both male and female cuckoos make a “kowlp” call and the sexes can only be told apart by call with much experience. In the vicinity of an active nest both male and female will make a soft knocking call which is used to tell the mate and young that a predator is near. This call can be made in response to your presence or to the presence of a hawk or owl.

Juvenile cuckoos that are still dependent on the adults for food will respond with a soft clucking call, which tells the parents their location. As the young get older (3-4 weeks out of the nest), the clucking gets louder and begins to resemble the parents “kowlp” call.

Nest Location and Monitoring: Nest location is the only method to determine an exact count (census) of Yellow-billed Cuckoo populations. I recommend that nest location only be done after training by someone experienced with the species. Nest finding by an untrained person, unfamiliar with the subtleties of cuckoo behavior and calls, could result in nest loss or abandonment.

Locating nests of Yellow-billed Cuckoos is very difficult and time consuming. An average of 4 person days, by experienced cuckoo nest finders, is needed to locate a nest. Cuckoos view humans as predators and are therefore very wary around the nest and literally will not go to a nest if they know you are watching them. This accompanied with the large home range (up to 100 acres) and the dense vegetation in which they nest make nest finding extremely difficult. Nest finding is easier during the nest building stage, but is not recommended because of the possibility of abandonment. The optimum time to locate nests, both from the standpoint of ease of nest finding and the least likelihood of nest abandonment, is while they are feeding the young. Once nests are found, they should be checked only when the parents are absent.

Surveyor qualifications: It is recommended that those who are planning to survey for this species should attend a training course before conducting surveys. This is needed because of the cuckoo's cryptic nature, the difficulty of identification of some of its calls, and the need to understand call.

Verified sightings should be considered sightings that have been made by field biologists who have experience with the species. The best way to get experience is to take a cuckoo workshop or accompany trained observers on a survey. Many highly skilled birdwatchers and field ornithologists also have the necessary knowledge to positively identify this species. In the case of untrained and inexperienced observers, a tape recording or photo would be necessary for the sighting to be considered verified.

Further Reading

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