

# U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

## Scientific Name:

Coccyzus americanus

## Common Name:

Yellow-Billed Cuckoo

## Lead region:

Region 8 (California/Nevada Region)

## Information current as of:

04/28/2011

## Status/Action

Funding provided for a proposed rule. Assessment not updated.

Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

New Candidate

Continuing Candidate

Candidate Removal

Taxon is more abundant or widespread than previously believed or not subject

Taxon not subject to the degree of threats sufficient to warrant issuance of

Range is no longer a U.S. territory

Insufficient information exists on biological vulnerability and threats to s

Taxon mistakenly included in past notice of review

Taxon does not meet the definition of "species"

Taxon believed to be extinct

Conservation efforts have removed or reduced threats

## Petition Information

Non-Petitioned

Petitioned - Date petition received: 02/02/1998

90-Day Positive:

12 Month Positive:

Did the Petition request a reclassification? **No**

**For Petitioned Candidate species:**

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing?  
**Yes**

Explanation of why precluded:

Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The Progress on Revising the Lists section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

**Historical States/Territories/Countries of Occurrence:**

- **States/US Territories:** Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming
- **US Counties:** Del Norte, CA, Humboldt, CA, Mendocino, CA, Siskiyou, CA, Trinity, CA
- **Countries:** Canada, Mexico

**Current States/Counties/Territories/Countries of Occurrence:**

- **States/US Territories:** Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, Wyoming
- **US Counties:** Apache, AZ, Cochise, AZ, Coconino, AZ, Gila, AZ, Graham, AZ, Greenlee, AZ, La Paz, AZ, Maricopa, AZ, Mohave, AZ, Navajo, AZ, Pima, AZ, Pinal, AZ, Santa Cruz, AZ, Yavapai, AZ, Yuma, AZ, Del Norte, CA, Humboldt, CA, Mendocino, CA, Siskiyou, CA, Trinity, CA, Alamosa, CO, Archuleta, CO, Conejos, CO, Costilla, CO, Delta, CO, Dolores, CO, Eagle, CO, Garfield, CO, Grand, CO, Gunnison, CO, Hinsdale, CO, La Plata, CO, Mesa, CO, Mineral, CO, Moffat, CO, Montezuma, CO, Montrose, CO, Ouray, CO, Pitkin, CO, Rio Blanco, CO, Rio Grande, CO, Routt, CO, Saguache, CO, San Juan, CO, San Miguel, CO, Summit, CO, Ada, ID, Bannock, ID, Benewah, ID, Bingham, ID, Blaine, ID, Boise, ID, Bonneville, ID, Butte, ID, Canyon, ID, Caribou, ID, Clark, ID, Custer, ID, Elmore, ID, Franklin, ID, Fremont, ID, Gem, ID, Gooding, ID, Jefferson, ID, Jerome, ID, Kootenai, ID, Lemhi, ID, Lewis, ID, Lincoln, ID, Madison, ID, Minidoka, ID, Oneida, ID, Owyhee, ID, Payette, ID, Power, ID, Shoshone, ID, Teton, ID, Valley, ID, Washington, ID, Missoula, MT, Ravalli, MT, Bernalillo, NM, Catron, NM, Cibola, NM, Dona Ana, NM, Grant, NM, Los Alamos, NM, Luna, NM, McKinley, NM, Mora, NM, Rio Arriba, NM, San Juan, NM, San Miguel, NM, Sandoval, NM, Santa Fe, NM, Sierra, NM, Socorro, NM, Taos, NM, Valencia, NM, Clark, NV, Elko, NV, Lincoln, NV, Lyon, NV, Mineral, NV, Nye, NV, Deschutes, OR, Harney, OR, Malheur, OR, Brewster, TX, Culberson, TX, El Paso, TX, Hudspeth, TX, Jeff Davis, TX, Presidio, TX, Beaver, UT, Box Elder, UT, Cache, UT, Carbon, UT, Daggett, UT, Davis, UT, Duchesne, UT, Emery, UT, Garfield, UT, Grand, UT, Iron, UT, Juab, UT, Kane, UT, Millard, UT, Morgan, UT, Piute, UT, Salt Lake, UT, San

Juan, UT, Sanpete, UT, Sevier, UT, Summit, UT, Tooele, UT, Uintah, UT, Utah, UT, Wasatch, UT, Washington, UT, Wayne, UT, Weber, UT, Benton, WA, Chelan, WA, Douglas, WA, Grant, WA, Kittitas, WA, Klickitat, WA, Okanogan, WA, Yakima, WA, Carbon, WY, Fremont, WY, Lincoln, WY, Sublette, WY, Sweetwater, WY, Teton, WY, Uinta, WY

- **Countries:** Canada, Mexico, United States

## **Land Ownership:**

Occurs in western United States west of the Rocky Mountains. Major Federal landownership includes Bureau of Land Management and U.S. Forest Service.

## **Lead Region Contact:**

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## **Biological Information**

### **Species Description:**

The yellow billed cuckoo (*Coccyzus americanus*) is a member of the avian family Cuculidae and order Cuculiformes. The approximate 128 members of Cuculidae share the common feature of a zygodactyl foot, in which two toes point forwards and two toes point backwards. Most species have moderate to heavy bills, somewhat elongated bodies, a ring of colored bare skin around the eye, and loose plumage. Six species of Cuculidae breed in the United States; two of these species breed west of the Continental Divide - the yellow billed cuckoo and the greater roadrunner.

The yellow billed cuckoo is a medium-sized bird of about 12 inches (in.) (30 centimeters (cm)) in length, and weighing about 2 ounces (oz) (60 grams (g)). The species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill, which is blue-black with yellow on the basal half of the lower mandible. Plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail feathers are boldly patterned with black and white below. The legs are short and bluish-gray, and adults have a narrow, yellow eye ring. Juveniles resemble adults, except the tail patterning is less distinct, and the lower bill may have little or no yellow. Males and females differ slightly. Males tend to have a slightly larger bill, and the white in the tail tends to form oval spots, whereas in females the white spots tend to be connected and less distinct (Hughes 1999, pp. 2–3).



## Taxonomy:

Ridgway (1887, p. 273) separated the yellow billed cuckoo into eastern and western subspecies, based on western birds being “larger, with proportionately larger and stouter bill.” Wetmore (1968, pp. 325–326) added that western birds are slightly more gray above, and eastern birds more brown. Ridgway assigned birds from the area north and west from extreme west Texas to the Pacific Coast to the subspecies *C. a. occidentalis*, and other cuckoos in North America to *C. a. americanus*. Ridgway’s western subspecies included birds from the Great Basin portions of Colorado and Wyoming, west and north to the Pacific Coast and southwestern British Columbia. The two subspecies were generally included in ornithological treatments through the 1960s (e.g., American Ornithologist’s Union (AOU 1957, pp. 269–270); Oberholser and Kincaid 1974, pp. 434–435). Many ornithologists, however, have questioned the separation of the species into two subspecies (Todd and Carriker 1922, pp. 209–213; Swarth 1929, pp. 297–298; Van Tyne and Sutton 1937, p. 35; Bent 1940, p. 67), citing the small magnitude and inconsistency of differences between eastern and western cuckoos, and the broad overlap in the size of eastern and western individuals. During this time, however, there was no systematic analysis of geographic variation and the yellow billed cuckoo subspecies question. Since 1983, AOU checklists (the recognized authority for taxonomy of North American birds) have not used subspecies names for any of the bird species in the checklist, stating practical grounds and that the validity of many described avian subspecies needs to be evaluated, as does the potential for unrecognized subspecies (AOU 1983, p. 284; AOU 1998, pp. 1–19). The AOU Checklist Committee (which makes taxonomic decisions for North American birds) has begun the process of reviewing the taxonomic status of subspecies for the North American families of birds, a task that is expected to take at least several years (Banks 1999, pp. 1–2).

Yellow billed cuckoo taxonomy was first reviewed in the late 1980s, when the Service requested that Dr. Banks, an avian taxonomist, evaluate the validity of the cuckoo subspecies. This request was in response to the 1986 petition to list the cuckoo in the States of California, Washington, Oregon, Idaho, and Nevada. Banks compared three morphological characteristics (bill length, depth of upper mandible, and wing length)

of almost 700 adult specimens of yellow billed cuckoos and visually examined the colors of specimens. He found: (1) no pattern of geographic variation in color; (2) substantial overlap between eastern and western birds in wing length, bill length and mandible depth; and (3) no significant differences for these three characteristics. He concluded that the data did not justify the separation into eastern and western subspecies (Banks 1988, pp. 473–477). Subsequently, statistical errors were discovered in Banks' study (Spiller 1988, pp. 1–3), and a reanalysis of the same data indicated statistically significant differences between eastern and western cuckoos ( $p$  less than 0.001), for the three characteristics measured by Banks. Banks published a correction to his earlier paper (Banks 1990, p. 538), acknowledging the computational error, and stating that the “statistical difference cannot be equated to a biological or practical difference.” In support of this, he cited the small differences between mean measurements, the large degree of overlap between eastern and western birds in the ranges of measurements for the three characteristics he measured, and the sensitivity of the statistical procedure to detect very small differences as “significant,” given the large sample sizes. Banks concluded that his fundamental finding remained unchanged, that is, separation into subspecies was not warranted by the morphological data, and that all yellow billed cuckoos in North America should be classified simply as *Coccyzus americanus*.

Banks provided his data to two avian ecologists (Franzreb and Laymon 1993, pp. 17–28) who analyzed the same data set, supplemented by measurements from an additional 41 specimens of western birds and the inclusion of a fourth characteristic, tail length, for the supplemental specimens and from Banks's data when tail length had been measured. Franzreb and Laymon (1993, pp. 17–28) noted statistical errors by Banks (1988, pp. 473–477), finding that western birds are larger than eastern birds, and that one could separate a majority of western cuckoos from eastern cuckoos using discriminant analysis. Franzreb and Laymon (1993, pp. 17–28) also considered behavioral and ecological differences between western and eastern birds, and found evidence of differences in the timing of migration and breeding. They concluded that: (1) “the recognition of subspecies on the basis of measurements of existing specimens is equivocal”; (2) study of geographical variation in vocalizations, bill color, and genetics was warranted; (3) the two subspecies should be retained pending the above studies; and (4) “because the western cuckoo is so critically endangered . . . changes in its classification should be made only after the best possible study.” Banks did not respond in print to their paper, but has stated that his conclusion remains unchanged (Banks 1999, pp. 1–2). A genetic study funded by the Service was not able to detect any diagnostic differences, reciprocal monophyly, or significant divergence between the eastern and western subspecies, after analyzing variation at two regions of the mitochondrial DNA (Fleischer 2001, pp. 14–16). However, another genetic study that examined a different region of the mitochondrial DNA determined that the eastern and western subspecies diverged approximately 205,000–465,000 years ago, with the two subspecies having four fixed base changes, supporting the recognition of the western subspecies as a distinct population segment (Pruett *et al.* 2000, p. 229).

## **Habitat/Life History:**

Western cuckoos breed in large blocks of riparian habitats, particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix sp.*), while eastern cuckoos breed in a wider range of habitats, including deciduous woodlands and parks (Ehrlich *et al.* 1988, p. 286). Dense understory foliage appears to be an important factor in nest site selection, while cottonwood trees are an important foraging habitat in areas where the species has been studied in California (Hughes 1999, p. 6). Johnson *et al.* (2010, p.47) found that yellow-billed cuckoos along the Lower Colorado River occupied riparian areas that had higher canopies, denser cover in the upper layers of the canopy, and sparser shrub layers when compared to unoccupied sites. At the landscape level, the amount of cottonwood-willow-dominated vegetation cover in the landscape and the width of riparian habitat appeared to influence cuckoo distribution and abundance. McNeil *et al.* (2010, p. 65) found that, of four cuckoos fitted with radio transmitters, two nested in Goodding's willow, one in Fremont cottonwood, and one in tamarisk. Clutch size is usually two or three eggs, and development of the young is very rapid, with a breeding cycle of 17 days from egg-laying to fledging of young. Although yellow billed cuckoos usually raise their own young, they are facultative brood parasites, occasionally laying eggs in the nests of other yellow billed cuckoos or of other bird species (Hughes 1999, pp. 16–17).

## Historical Range/Distribution:

We consider the yellow billed cuckoos that occur in the western United States as a distinct population segment (DPS). The area for the western DPS of the yellow-billed cuckoo is west of the crest of the Rocky Mountains. For the northern tier of Rocky Mountain states (Montana, Wyoming, northern and central Colorado), the crest coincides with the Continental Divide. In the southern tier of Colorado and New Mexico, the crest coincides with the eastern boundary of the upper Rio Grande drainage, including the Sangre de Cristo Mountains and excluding the drainage of the Pecos River. In west Texas, the DPS boundary is the line of mountain ranges that form a southeastern extension of the Rocky Mountains to the Big Bend area of west Texas, and that form the western boundary of the Pecos River drainage.

Based on historic accounts, the species was widespread and locally common in California and Arizona, locally common in a few river reaches in New Mexico, locally common in Oregon and Washington, generally local and uncommon in scattered drainages of the arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah, and probably uncommon and local in British Columbia. Hughes (1999, pp. 1–4) summarizes the species' historical range and distribution in these areas, which are described in detail below.

In California prior to the 1930s, the species was widely distributed in suitable river bottom habitats, and was locally common (Grinnell and Miller 1944, pp. 186–187; Small 1994, 130–131). Yellow billed cuckoos nested primarily in coastal counties from San Diego County near the Mexico border to Sonoma County in the San Francisco Bay region, in the Central Valley from Kern County through Shasta County, and along the lower Colorado River (Dawson 1923, pp.2–7; Grinnell and Miller 1944, pp. 186–187; Gaines and Laymon 1984, pp. 53–58; Small 1994, 130–131). Cuckoos also bred locally elsewhere in the State, including in Inyo, San Bernardino, and Siskiyou Counties (Grinnell and Miller 1944, pp. 186–187).

In the Pacific Northwest, the species was formerly fairly common locally in willow bottoms along Willamette and Columbia Rivers in Oregon, and in the Puget Sound lowlands and along the lower Columbia River in Washington (Gabrielson and Jewett 1970, pp. 329–330; Jewett *et al.* 1953, pp. 342–343; Roberson 1980, pp. 225–226; Marshall 1996). The species was also found locally in southeast British Columbia (Hughes 1999), but the available data are not adequate to determine historic abundance. The species was rare east of the Cascade Mountains in these States and provinces. The last confirmed breeding records were in the 1930s in Washington. The species occurred in southwest British Columbia (Victoria, Kamloops, Chilliwack) (Bent 1940, p. 64), but was apparently never common; the last confirmed breeding was in the 1920s.

In Arizona the species was historically widespread and locally common (Phillips *et al.* 1964, pp. 1-212; Groschupf 1987, p. 7). In Colorado west of the Continental Divide, the species was probably never common (Bailey and Niedrach 1965, pp. 404–406). There are very limited data for the area west of the Continental Divide in Montana. Three specimens of the yellow-billed cuckoo have been collected since the early 1960s, and there are few recorded sightings of the yellow-billed cuckoo since the early 1900s (Saunders 1921, p. 174). In Idaho, the species was considered a rare and local summer resident (Burleigh 1972, p. 159) with only three records for the State over the previous 100 years. In northern and central Idaho, there are only four records of yellow-billed cuckoo over the last century.

In New Mexico, the species was historically rare Statewide, but common in riparian areas along Pecos and Rio Grande, as well as uncommon to common locally along portions of the Gila, San Francisco and San Juan rivers (Bailey 1928, pp. 307–309; Hubbard 1978, p. 32). In Utah, the species was historically uncommon to rare along river bottoms. The historical status of the yellow-billed cuckoo in Nevada is poorly documented although there is evidence it was nesting in western Nevada along the lower Truckee and Carson Rivers and in southern Nevada along the Colorado and Virgin Rivers (Linsdale 1951, p. 235; Neel 1999, pp. 118–120).

## Current Range Distribution:

### California

The early literature relating to the cuckoo in California has been summarized and evaluated by Gaines (1974a, p. 204 and 1974b, pp. 2–4), Gaines and Laymon (1984, pp. 53–58), and Hughes (1999, p. 4). Collectively, they report dozens of locations where the species was historically reported and/or collected, sometimes in apparent abundance, but not subsequently found. Laymon and Halterman (1987b, p. 24) estimate that in California the species' range is now about 30 percent of its historical extent. Hughes (1999, p. 2) provides an estimate of 15,000 pairs of breeding birds for the California breeding population during the late 19th century. Gaines (1974, p. 208a) believed that pre-development cuckoo populations in California were even greater than implied by the early literature, due to the species' inconspicuous behavior and the fact that large tracts of floodplain riparian habitat had already been removed for development before the first records and accounts of the species began appearing in literature. There is clearly a broad unanimity among modern investigators that a catastrophic decline of the cuckoo in California occurred following the start of the major era of development beginning about the mid-1800s (Gaines and Laymon 1984, p. 73; Laymon and Halterman 1987b, p. 19; Launer *et al.* 1990, pp. 2–3).

Based on a 1986–87 statewide survey, only three areas in the State support more than about five breeding pairs on a regular basis: the Sacramento River (roughly between Colusa and Red Bluff); the South Fork of the Kern River upstream of Lake Isabella; and the lower Colorado River (Laymon and Halterman 1987a, pp. 1–18). Laymon and Halterman (1987a, p. 7) estimated 31 to 42 breeding pairs in the State, a decline of 66–81 percent from a 1977 survey (Gaines and Laymon 1984, pp. 59–72).

The lower Colorado River, on the California-Arizona border, supported an estimated 180–240 pairs in 1976–1977, a number which had declined by an estimated 80–90 percent in 1986 (Laymon and Halterman 1987a, pp. 34–35); one study (Rosenberg *et al.* 1991, p. 203) estimated a decline of 93 percent over this period, from an initial 242 pairs in 1976–1977. These declines coincided with habitat losses resulting from high water levels of long duration in 1983–1984 and 1986 (Laymon and Halterman 1987b, p. 22; Rosenberg *et al.* 1991, p. 203). Final results from a Service-funded 1999 statewide survey indicate that cuckoo numbers in the Sacramento Valley and along the Kern River are comparable to numbers from the 1980s, while only two pairs were located on the California side of the Colorado River. No pairs were found in the part of the state west of the Colorado River and south of the Kern River (Halterman 1999, p. 1). In 2006, surveys were conducted at various sites throughout the Lower Colorado River Multi-Species Conservation Plan Boundary area for the yellow billed cuckoo (Johnson *et al.* 2007, pp. 1–220). Two survey areas were on the California side of the Lower Colorado River, the Picacho State Recreation Area and the Imperial National Wildlife Reserve (Imperial paradise area). Only one bird was detected at the Picacho State Recreation Area (Johnson *et al.* 2007, p. 25). The 3,300 acre (ac) (1,335 hectare (ha)) riparian forest in the South Fork Kern River Valley is one of the largest remaining contiguous tracts of riparian habitat in California.

The species has declined greatly in the San Joaquin Valley in California. Cuckoos had been recorded from every county in the San Joaquin Valley region except Kings County and were locally common as a breeding bird at least in San Joaquin, Kern, Fresno, and Stanislaus Counties (Gaines and Laymon 1984, p. 66). Surveys between 1985 and 2000 at the South Fork of the Kern River have documented an average of 10.5 pairs; however, the number of pairs ranged from a low of 2 pairs in 1990 to a high of 24 pairs in 1992 (Whitfield and Stanek 2011, p. 2). These drastic year to year population fluctuations are thought to be influenced by inter-annual water-level fluctuations at Lake Isabella, which is located at the western end of the Valley. However, the actual mechanism influencing population fluctuations is not known (Henneman 2010, p. 12–14). In 2008 and 2009, presence-absence surveys for yellow-billed cuckoos were conducted along the South Fork of the Kern River in the Valley, yielding detections of 20 (2008) and 21 birds (2009), and indicating that the area continues to be an important breeding area for the species (Henneman 2010, p. 2, 3, 8, 14). There were 71 detections during 2010 surveys, which likely represented 20 individual birds, the maximum detected during any one survey period (Whitfield and Stanek 2011, p. 10). Nest monitoring was

not an objective in 2010; however, one confirmed nest and one potential nest were located. Although the species is documented to still breed at the South Fork Kern River, the number of breeding pairs is very small (Whitfield and Stanek 2011, p. 10; Gaines and Laymon 1984, p. 66).

In contrast, a 10-year study on songbird population, health, management, and riparian restoration efforts in the Sacramento Valley documented that, of 20 avian riparian habitat species in the study, only one, Lazuli bunting (*Passerine amoena*), showed a decline and 11 showed an increase in population (Gardali et al. 2005, p. 13–15). However, surveys in 2010 along the Sacramento River from Red Bluff to Colusa detected 18 individual cuckoos, but did not observe any breeding behavior (Dettling and Howell 2011, p. 3). The population is believed to have declined since surveys were last conducted in 2000 (Dettling and Howell 2011, p. 3).

Yellow-billed cuckoos were considered accidental in coastal Northern California. During surveys from 2005 through 2009 in Humboldt County, from the mouth of the Eel River to approximately 15 miles upstream, cuckoos were detected and breeding was probable during two of those years (McAllister *et al.* 2010, p. 64). If breeding is confirmed, this would document a new breeding site in California.

### Pacific Northwest

The yellow-billed cuckoo may now be extirpated from Washington. The Washington Department of Fish and Wildlife rank the species as having historical occurrences only, but still being expected to occur in Washington and it is currently a state candidate species (Washington Natural Heritage Program 2009, p. 9, 35; Washington Department of Fish and Wildlife 2007, p. 4). Although several surveys have been conducted in Okanogan and Yakima Counties in the last several years to check locations of previous sightings (Okanogan County) and potential habitat (Yakima County), no cuckoos were detected, despite a small number of statewide accounts in recent years (Salzer 2010, p. 1–3).

In Oregon, the last confirmed breeding records were in the 1940s in Oregon. However, four cuckoo sightings were made west of the Cascade Mountains between 1970 and 1994, and at least 20 records east of the Cascades (Gilligan 1994, pp. 162–163). A few pairs may nest very locally east of Cascades in Oregon. A 1988 survey in eastern Oregon and Klamath County located no birds, but identified potential breeding habitat along the lower Owyhee River (Littlefield 1988, p. 34). Most recent records were from May and June of 1999 (Johnson and O’Neil 2001, pp. 460–461) and a single yellow-billed cuckoo was sited during the breeding season (June 26–27 1999) along Bonita Road in Malheur County. This species is considered a rare visitor at the Malheur National Wildlife Refuge each year (Service 2009, p. 2).

The species has been recorded twice in British Columbia since the 1920s (Siddle 1992, p. 1169), and is considered extirpated (British Columbia Conservation Data Centre 1999, p. 5; Hughes 1999, p. 2).

### Arizona

Arizona probably contains the largest remaining cuckoo population among States west of the Rocky Mountains. Losses of riparian habitats from historic levels have been substantial in Arizona (Rosenberg *et al.* 1991, pp. 18–23; Ohmart 1994, p. 273; Noss *et al.* 1995, p. 47). Losses have been greatest at lower elevations (below about 3,000 feet (ft) (914 meters (m))) along the Lower Colorado River and its major tributaries, which have been strongly affected by upstream dams, flow alterations, channel modification, and clearing of land for agriculture (Ohmart 1994, pp. 273–285). As habitat has declined, cuckoo numbers have likely declined, as has been documented for the lower Colorado River (Rosenberg *et al.* 1991, pp. 202–205), and described above for California. Following the high water levels of 1983–1984 and 1986, cuckoo numbers also declined by 70–75 percent on the Bill Williams River delta, which abuts the lower Colorado River (Rosenberg *et al.* 1991, p. 203). Habitat has since recovered on the Bill Williams River delta, but cuckoo numbers remain low (Halterman 1999, p. 1).

In some Arizona areas, such as the San Pedro Riparian National Conservation Area along about 40 mi (65 km) of the upper San Pedro River, ongoing conservation efforts may improve habitat conditions for the species. The species is considered a Species of Concern by the Arizona Game and Fish Department, a designation that does not provide protection to the species (Corman 1999, p. 1). One hundred and sixty-eight cuckoo pairs and 80 single birds were located in Arizona in 1999, based on preliminary results from a state-wide survey which covered 265 miles (mi) (426 kilometers (km)) of river and creek bottoms (Magill 1999, pp. 1–2). From these results, it is evident that cuckoo numbers in 1999 were substantially less than some previous estimates for Arizona, including a 1976 estimate of 846 pairs for the lower Colorado River and five major tributaries 1976 (Groschupf 1987, pp. 20–28).

Surveys conducted in 2004 and 2005 at 37 sites within the Verde River watershed were done at historic sites (16) with previous detections in 1998-1999 and at random sites (21) with appropriate riparian forest (Holmes *et al.* 2008, p. 6, 7). In the two years of surveys, 59 percent of sites had detections; 75 percent of historic sites had detections and 48 percent of random sites had detections (Holmes *et al.* 2008, p. v). Holmes *et al.* (2008, p. 20) found evidence of breeding at 14 sites, but confirmed breeding at only 5 sites. The maximum number of detections during any one survey period was 23 in 2004 and 31 in 2005. Occupied sites within the Verde River watershed had deciduous riparian habitat that was at least 100 m wide; were dominated mainly by Fremont cottonwood, Gooding's willow, Arizona alder, and Arizona sycamore; and were adjacent to patches of mesquite over 5 ha in size (Holmes *et al.* 2008, p. 27).

In 2006 and 2007, surveys were conducted at various sites throughout the Lower Colorado River Multi-Species Conservation Plan Boundary area for the yellow billed cuckoo (Johnson *et al.* 2007, pp. 1–220; Johnson *et al.* 2008, pp. 1). In 2006, there was a high of 117 detections during any one survey period along the Bill Williams River in the Bill Williams River National Wildlife Refuge; in 2007, the high was 139 also at the Bill Williams River National Wildlife Refuge (Johnson *et al.* 2008). Bill Williams River National Wildlife Refuge is considered the largest, highest quality stand of suitable habitat for the cuckoo along the lower Colorado River (Johnson *et al.* 2008, p. 106). In addition to the Bill Williams River National Wildlife Refuge, other sites in Arizona in which Johnson *et al.* (2008) detected cuckoos in 2006 or 2007 (or both) include: the Grand Canyon National Park and the Lake Mead National Recreation Area; Havasu National Wildlife Refuge; Cibola National Wildlife Refuge; Imperial National Wildlife Refuge; the Gila-Colorado River confluence; Limitrophe Division; and Quigely Pond Wildlife Management Area (Johnson *et al.* 2008, pp. 107). Breeding was detected at the Bill Williams River National Wildlife Refuge in 2006 and 2007, and the Grand Canyon National Park and Lake Mead National Recreation Area in 2006; breeding status of most birds was classified as unknown (Johnson *et al.* 2008, pp. 1, 107).

In 2009, surveys were conducted in the Tumacacori National Historic Park to assess the effects of a 2008 fire on riparian broadleaf forest along the Santa Cruz River (Krebbs and Moss 2009, pp. 7, 8). Surveys detected an estimated four pairs of birds, but no evidence of nesting, although a nest was located by other researchers working in the area. Cuckoos were not detected in the burn area, where more than 50 percent of the trees were destroyed. Managers are implementing several actions, including restriction of livestock grazing, to meet recommended conservation measures that are expected to slow the decline of the yellow-billed cuckoo (Krebbs and Moss 2009, pp. 7, 8). Additional recent data for Arizona is being compiled by yellow-billed cuckoo working group partners.

## Colorado

In Colorado west of the Continental Divide, the species is now extremely rare (Kingery 1998, pp. 1–636). The yellow-billed cuckoo is an uncommon summer resident of Colorado. Within the species western DPS west of the Rocky Mountains, yellow-billed cuckoos were found along the Colorado River in Palisade, near Grand Junction (Mesa County) annually through the 1950s and 1960s (Richter *et al.* 2004, pp. 1–214). Cuckoos were also regularly detected as recently as the mid-1980s along the Uncompahgre and Gunnison Rivers near Delta (Delta County) (Rich Levad 2010, p. 1). In 1998, the Colorado Breeding Atlas (1998, pp. 1–636), gave the general status of the yellow-billed cuckoo in Colorado as nearly extirpated in the West with

once common eastern populations becoming uncommon to rare. During the 1987 to 1994 period covered by the Atlas, only three cuckoos were recorded on the western slope, with one confirmed nesting observation that occurred along the Yampa River near Hayden in 1988. Other confirmed nesting records (mid-1980s) were associated with outbreaks of caterpillar infestations in box elders in the Four Corners Region/Durango area, although subsequent actions were taken to limit box elder infestations (Colyer 2001, pp. 1-6). National Park Service surveys in southwest Colorado from 1988 through 1995 for the Colorado Bird Breeding Atlas provided no records of yellow-billed cuckoo. In 1998, biologists surveyed 242 mi (389 km) of lowland river riparian habitat along six rivers in west-central Colorado for cuckoos. They found one cuckoo, representing a probable nesting pair (Dexter 1998, p. 3).

Since 2000, detections of the western yellow-billed cuckoo DPS have been limited in western Colorado. Consistent cuckoo observations have been recorded at only two locations in the range of the western DPS of the yellow-billed cuckoo in western Colorado. They have been detected annually in the San Luis Valley of south-central Colorado since 2001 in Conejos County; breeding is suspected, but not confirmed (Banks and Lucero 2004, Beason 2010a, p.1). Since 2003 they have also been detected annually at the North Fork of the Gunnison River valley of west-central Colorado in Delta County; breeding was confirmed in 2008 near Hotchkiss (Beason 2010b, p. ii).

Reports of single yellow-billed cuckoos have come primarily from the Grand Junction area and Mesa County in 2001, 2002, 2005, and 2008, with a report of more than one cuckoo at Orchard Mesa Wildlife Area in 2006 (Arnold 2010, p. 1; Beason 2010a, p. 1; Wright 2010, p. 1). Additional reports include a cuckoo south of Montrose in Montrose County near the Uncompahgre River in 2009, a cuckoo along the Gunnison River near Gunnison in 2007 (Hicks 2010, p. 1), and detections by the Rocky Mountain Bird Observatory along the Yampa River near Craig in 2007 and 2008, and in far western Colorado near Nucla in 2005 and 2008 (Beason 2010a, p. 1; Beason 2010b, p.1; Dexter 2010, p. 1). The detections near Craig and Nucla in 2008 resulted from surveys completed by the Rocky Mountain Bird Observatory in five western Colorado counties. However, surveys repeated in two of the counties in 2009 failed to detect birds. Surveys by the Rocky Mountain Bird Observatory in 2010 were conducted near historical detections and at sites with suitable habitat in Archuleta, Conejos, Montezuma, and Rio Grande counties in south-central and southwest Colorado; no cuckoos were detected (Beason 2010b, p. ii). Survey results to date are insufficient to determine population size or trend.

## Wyoming

The summer breeding range for the yellow-billed cuckoo is located along the boundary between the eastern and western population segments of the species, with the western DPS occurring on the western side of the Rocky Mountains along the Lower Green River Basin from the Seedskaadee National Wildlife Refuge to the Flaming Gorge Reservoir and west to the Bear River Drainage. Prior to 2001, the distribution of summer records of yellow-billed cuckoos from the Wyoming Natural Heritage Database showed a few scattered sightings, with potentially three records from the western range. Although breeding habitat is limited, most riparian habitat is located along rivers east of the Rocky Mountains (Bennett and Keinath 2001, pp. 3 – 5, 8, 9). In 2005 surveys were done on the Green River. One of the routes was surveyed in 2006, but no cuckoos were detected although one cuckoo was reported downriver from the surveyed transect, at the Seedskaadee National Wildlife Refuge. No other recent surveys have occurred to date (Orabona 2010, p. 2, 3).

## Montana

There are very limited data for the area west of the Continental Divide in Montana. Local records for the species around the Flathead River area are scarce. A few records indicate that yellow-billed cuckoos do occur in this area, but no confirmed breeding information exists (Lenard 2001, pp. 1–3). Yellow-billed cuckoos occur locally in the southern portion of the state along the larger stream corridors that run from Montana into northeastern Wyoming (Nordstrom 2001, p. 1).

## Idaho

The most recent record for this area comes from the South Fork of the Snake River in 1992 (Stephens and Sturts 1997, p. 36). In southwestern Idaho, the yellow-billed cuckoo has been considered a rare, sometimes erratic, visitor and breeder in the Snake River valley. Numerous sightings have been recorded in the southwestern part of the state during the past 25 years. The yellow-billed cuckoo appears to be hanging on precariously in Idaho and could easily become extirpated from the State in the near future. Therefore, available information is inadequate to judge population or distributional trends. The breeding population in Idaho is likely limited to a few breeding pairs at most. A recent survey of yellow-billed cuckoo continues to show the majority of sightings are in the Snake River corridor in southeast Idaho with other areas where the cuckoo has been historically observed having few or no sightings (Reynolds and Hinckley 2004, pp. 6–7). However, a survey in 2009 located a singing male in a location that was previously unknown, and additional surveys in Idaho were planned for 2010 (Carlisle 2010, pp. 2, 3) but reports have not been received yet.

## New Mexico

In New Mexico, the species is found in riparian zones with dense understory vegetation, most commonly in the south and along major drainages (New Mexico Partners in Flight 2007, pp. 1–5). Current information is inadequate to judge trends, but the species was fairly common in the mid-1980s along the Rio Grande between Albuquerque and Elephant Butte Reservoir, and along the Pecos River in southeastern New Mexico. Numbers may have increased there in response to salt cedar (*Tamarix* spp.) colonization of riparian areas formerly devoid of riparian vegetation (Howe 1986, pp. 12–13). A review on the status of the species in New Mexico concluded that the species would likely decline in the future due to loss of riparian woodlands (Howe 1986, pp. 14–15). In the eastern third of the state, nonnative salt cedar has provided habitat for approximately 1000 pairs of yellow-billed cuckoos in historically unforested areas. The broad-scale clearing of exotic vegetation, such as salt cedar along the Pecos River, will likely result in additional loss of nesting habitat for the yellow-billed cuckoo (New Mexico Partners in Flight 2007, pp. 1–5). In the western portion of the state, damage to native riparian habitat is occurring. Along the Rio Grande, understory is being removed to reduce fire risk, and land is being converted to agriculture. Throughout New Mexico, grazing is impacting the quality of riparian habitat available to yellow-billed cuckoos (Howe 1986, pp. 12–13).

Surveys were conducted by the U.S. Bureau of Reclamation (Reclamation) from 2006 through 2009 along the middle Rio Grande, from Highway 60 downstream to Elephant Butte Reservoir (Ahlers *et al.* 2010, p. 4). The area covered by the surveys increased from 35.5 river miles in 2006 to 89.6 river miles in 2009. There were an estimated 28 territories detected in 2006, 36 in 2007, 45 in 2008, and 56 in 2009; however, these estimates are not directly comparable due to variation in survey efforts and protocols (Ahlers 2010, pp. i, 3, 12, 17). These surveys have documented a sizable population that is potentially increasing. In 2007 and 2008, Reclamation used radio telemetry to determine home range and habitat use. Home range estimates were variable, ranging from 5 to 282 ha, with an average size of 81.6 ha; nest monitoring was not a part of the study, but breeding was documented (Sechrist *et al.* 2009 p. vii).

## Texas

The portion of Texas west of the Pecos River has been identified as within the range of the historic western subspecies (Oberholser and Kincaid 1974, pp. 434–435), but other authors consider birds from this area more similar to eastern cuckoos (Hughes 1999, pp. 4–5). The species still occurs in this area but information on its status is lacking (Groschupf 1987, p. 30). Population reports of the yellow-billed cuckoo in the Trans-Pecos area of western Texas near Big Bend National Park support scattered populations of yellow-billed cuckoo (Wauer 1971, pp. 18, 27). These populations tend to be associated with areas of springs and developed wells or earthen ponds supporting mesic vegetation such as cottonwood and willow. The bird checklist of Guadalupe Mountains National Park on the New Mexico border lists the yellow-billed cuckoo as a rare summer and fall breeder. Yellow-billed cuckoo population trends from 1966 to 1998 for the entire state of Texas are showing a decline (U.S. Geological Survey-Biological Resources Division 1999, p. 1).

Yellow-billed cuckoo call studies from the University of Texas at El Paso, conducted from 1988 to 1998, found a significant decline in response calls over numerous sites in southern New Mexico and western Texas. Average response percentages went from 30 percent in 1988 to 5 percent in 1998. The study concluded that the yellow-billed cuckoo is a rare and highly vulnerable species in the Rio Grande Valley of Southern New Mexico and extreme west Texas (Sproul 2000, p. 5). The Texas Parks and Wildlife Department (TPWD) currently does not separate the eastern and western populations of the yellow-billed cuckoo and identifies the species as globally abundant and State secure since the State ranking was last revised in 1994. However, subsequent publications by the TPWD indicate the species is becoming increasingly rare and declining due to urban development and reduction of habitat (Shackelford and Lockwood 2000, p. 1). The species is considered to be fairly common at elevations of 3,000–7,500 ft (900–2,200 m) in El Paso, Hudspeth, Culberson, and Presidio Counties; and widespread and uncommon to common in central and eastern Texas (Oberholser and Kincaid 1974, pp. 434–435; Rappole and Blacklock 1994, pp. 125–126), although Peterson and Zimmer (1998, p. 66) reported that the yellow-billed cuckoo might be declining due to habitat destruction in El Paso County.

## Utah

There are at least two recent breeding records (Ouray National Wildlife Refuge on the Green River, and the Matheson Wetland Preserve near Moab) and reports from at least five other areas where breeding has been suspected (Owens 1998, pp. 3–6). Recent avian surveys of riparian habitats within the historic range (the Salt Lake Valley) recorded three cuckoos in 7,000 survey hours (Owens 1998, pp. 3–6). Threats to yellow-billed cuckoos and their habitat along the Green River in Utah include habitat loss and fragmentation from flooding and dewatering, encroachment by nonnative tamarisk, grazing, and oil and gas development (Howe and Hanberg 2000, p. 1.7). Management of flow regimes was identified as a major impact on habitat with extremely high flows removing habitat and extended periods of low flows likely drying up native riparian habitat which could result in the loss of suitable habitat and invasion by tamarisk. Cattle grazing has also been identified as a possible threat to patches of yellow-billed cuckoo habitat by contributing to the loss of subcanopy vegetation and cottonwood regeneration by grazing and trampling. Another potential threat to yellow-billed cuckoo habitat was attributed to recreational impacts by river users (e.g., use of cottonwood stands for campsites and “lunch spots”). The Utah Division of Wildlife Resources (1998, p. 10) stated that the yellow-billed cuckoo is threatened by habitat loss from agricultural, water, road and urban development, and has declined significantly across its range.

## Nevada

The only set of persistent sightings along the Carson River has occurred on portions near Lahontan Reservoir (Neel 1999, pp. 118–120), where the persistent sightings of single birds year after year suggested long-term occupancy for the period from 1986–1997, although limited information was found after that period (Tomlinson 2010, p. 1). Surveys using call-playback techniques were completed along the Truckee, Carson, and Walker rivers in the early 1970s. In surveys of the six remaining habitats able to support yellow-billed cuckoos, as described by Gaines (1974a, p. 206), no birds were heard or seen (Oakleaf 1974, pp. 18–19). Early documentation of yellow-billed cuckoo nesting in Nevada was a pair at Beaver Dam Wash, Lincoln County in 1979 (Neel 1999, p. 119). Between 1990 and 1999, Neel (1999, p. 119) reported only sporadic sightings of single birds throughout the State.

Beginning in 2000, annual survey efforts became more consistent in the southern portion of the state. The Nevada Division of Wildlife (NDW) (2001, pp. 1–8) conducted surveys in 2000 in southern Nevada and documented 19 yellow-billed cuckoos, comprising 4 pairs and 11 unpaired birds with no nests being found. NDW surveys in 2000 and 2001 detected more birds (19 and 28, respectively) than in succeeding years, with a general decline in detections from 2002 to 2009, although lack of access to private lands may have factored in results (Tomlinson 2010, p. 1). Surveys conducted at the Warm Springs Natural Area on the Muddy River documented a nesting record for the species in 2000, but also indicated a general decline in bird numbers from 2002 to 2009 (Tomlinson 2010, p. 1). Surveys conducted by the San Bernardino County Museum at

sites along the Virgin and Muddy Rivers between 2000 and 2007 provided total detections of 6 and 10 in 2000 and 2001, respectively, total detections between 0 and 3 from 2002 to 2005, 6 and 12 detections in 2006 and 2007, respectively, and 3 detections in 2008 (Braden *et al.* 2009, pp. 1–58), although the number of sites surveyed generally increased in the last 4 years. These surveys were resumed by the Southern Sierra Research Station in 2009 and detected one bird at each of two locations; Pahrnagat Valley and the Key Pittman Wildlife Area (Tomlinson 2010, p. 2). In 2006, surveys were conducted for the yellow billed cuckoo at four Nevada sites within the Lower Colorado River Multi-Species Conservation Plan Boundary area (Johnson *et al.* 2007, pp. 1–220), resulting in detection of eight birds (Johnson *et al.* 2007, pp. 13-16). Fairly extensive surveys of potential habitat at the Ash Meadows NWR resulted in detection of single cuckoos in 2008 and 2009 (Tomlinson 2010, p. 2).

Suitable habitat for the yellow-billed cuckoo is very limited in Nevada due to the fragmentation of most areas of cottonwood riparian forests (Nevada Division of Wildlife 2001, pp. 1–8). National Park Service studies from Great Basin National Park (National Park Service 2001, pp. 1-2) in the South Snake Mountain Range determined that of the 469 ac (190 ha) of existing riparian habitat only 8 ac (3.2 ha) was suitable for supporting yellow-billed cuckoo. Most of the suitable habitat along the Truckee, Carson, and Walker rivers has been modified or destroyed (Nevada Division of Wildlife 1985, pp. 1–4 and 1990, pp. 1–2), leaving limited stands of cottonwood and willow. A 145,500 dollar grant from the Service for tribal entities was given in 2005 for restoration activities for a 20-mile stretch of the Truckee River to remove fish barriers and restore riparian habitat (Service 2006, p. 35). The scattered cottonwoods on the Colorado River tributaries (Virgin, Muddy, and Pahrnagat) are the last places in Nevada where the yellow-billed cuckoo can reliably be expected to occur (Draft Nevada Comprehensive Wildlife Conservation Strategy 2005, p. 155). However, conservation planning, land acquisition, and riparian restoration efforts currently underway at various sites, including the lower Virgin River, lower Truckee River, Muddy River, Ash Meadows, and Pahrnagat Valley are expected to benefit the species in Nevada (Tomlinson 2010, pp. 5–7). Additional surveys were planned for 2010 in southern Nevada along the lower Colorado and the Virgin Rivers, in the Pahrnagat Valley, and at the Ash Meadows National Wildlife Refuge, Warm Springs Natural Area, and several other locations; reports have not been received yet.

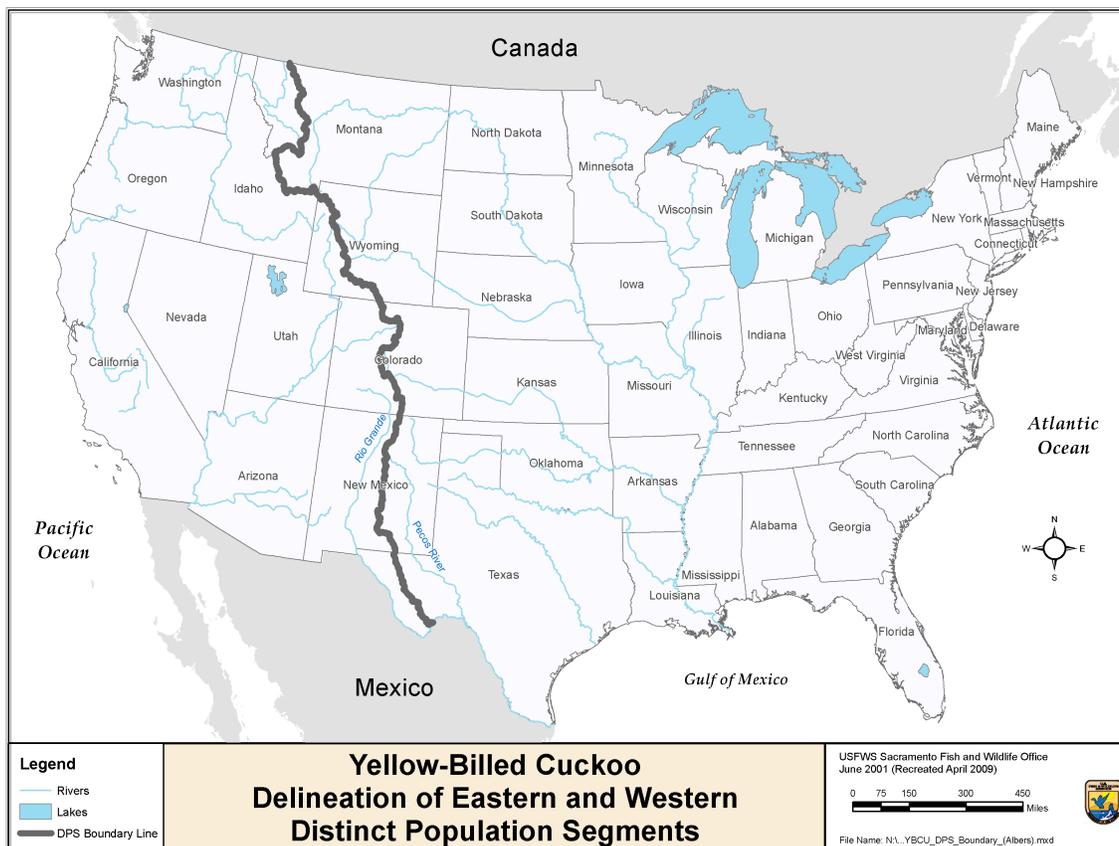
## Mexico

The yellow-billed cuckoo breeds locally in Mexico and is a widespread transient during migration (Howell and Webb 1995, pp. 346–347). The species has been recorded as a summer resident (presumably breeding) locally within several regions of Mexico, including the state of Baja California Sur; northwest Mexico from Sonora and Chihuahua south to Zacatecas; northeast Mexico on the Atlantic slope from Coahuila to Tamaulipas; and in the northern Yucatan Peninsula (Howell and Webb 1995, pp. 346–347). The species has been recorded as locally common in the State of Sonora (Russell and Monson 1998, p. 131). Surveys of 16 secondary watersheds (4 primary watersheds) in northern Sonora between 2000 and 2007 indicated that the yellow-billed cuckoo was rare or uncommon in all but one secondary watershed. In one watershed the species had been observed in earlier studies, but was not observed during the 2000–2007 study (Flesch 2008, p. 35). Within these watersheds, broadleaf and riparian woodland and gallery forest occurred along valleys bottoms and in canyons. Although large areas of the Sonora-Arizona borderlands are managed with conservation objectives, significant threats to riparian areas exist due to agriculture, loss of groundwater, and unsustainable grazing practices. Cottonwood forests have been declining along the Magdalena River, while riparian forests throughout much of the Santa Cruz Valley have been highly degraded and are also declining locally along the Altar River (Flesch 2008, pp. 29, 32, 44). The Fish and Wildlife Service has also conducted yellow-billed cuckoo and riparian bird surveys in Sonora (Mesta 2010, p. 1).

## Range East of Continental Divide (outside the range of the western DPS)

In the United States east of the Rocky Mountains, the yellow billed cuckoo is uncommon to common as a breeding bird. The species' habitat in this region, riparian and other broad-leaved woodlands (Ehrlich *et al.* 1988, p. 286), occupies a significant area of the region (Service 1981, p. 6). This is in sharp contrast to the

west; where suitable habitat is limited to narrow and often widely separated riparian zones that occupy a fraction of 1 percent of the western landscape (Service 1981, p. 6; Knopf and Samson 1994, p. 670). Trend data based on detections by the Breeding Bird Survey (BBS) program (BBS 1999, pp. 1–7) indicate significant population declines between 1966 and 1996 in 12 of 29 eastern and central States; the average annual decline during this period was 1.9 percent. Most of these declines have occurred since 1980. The average number of detections of cuckoos increased in these 29 States for the interval from 1966 to 1979; however, the average number of detections decreased in all 29 States between 1980 and 1996. In 15 of these States, the decline between 1980 and 1996 is statistically significant, and the average annual decline during this period was 2.8 percent. Trends vary widely between states, ranging from a decline of 15.8 percent (Connecticut, 1966-1996) to an increase of 17 percent (Nebraska, 1966-1979). Bird survey data are insufficient to evaluate population trends in regions west of the Continental Divide, but for two Service regions that span both sides of the Divide, the BBS data indicate declines of 2.7 percent in Region 2 (Arizona, Oklahoma, Texas, and New Mexico; 1980-1996), and 4.7 percent in Region 6 (Kansas, Nebraska, the Dakotas, Montana, Colorado, Utah, and Wyoming; 1980-1996).



## Population Estimates/Status:

Since 1980, state-wide surveys from New Mexico, Arizona, and California, indicate an overall estimated 52 percent decline with numbers too low to establish trends from Idaho, Montana, Utah, Nevada and Colorado. Trend information is also lacking from west Texas and Mexico. However, we believe yellow-billed cuckoos exist in large enough numbers to be surveyed. The yellow-billed cuckoo has been extirpated as a breeding bird in Washington, Oregon, and British Columbia. Studies in California along the Sacramento River were initiated by the Service in 2008 to determine presence, abundance and habitat use by the yellow-billed cuckoo in the Sacramento Valley. The information gathered during these studies is still under analysis and no results have been finalized.

## **Distinct Population Segment(DPS):**

Pursuant to the Act, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa if sufficient information indicates that such action may be warranted. The Service along with NOAA Fisheries adopted the interagency policy and published it in the Federal Register on February 7, 1996 (61 FR 4722). The policy allows for more refined application of the Act that better reflects the biological needs of the taxon being considered, and avoids the inclusion of entities that do not require its protective measures. Under our DPS policy, three elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for additions to the list of endangered and threatened species, reclassification, and removal from the list. They are: (1) discreteness of the population segment in relation to the remainder of the taxon; (2) the significance of the population segment to the taxon to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?). A systematic application of the above elements is appropriate, with discreteness criteria applied first, followed by significance analysis to determine if the standard is met. Discreteness refers to the isolation of a population from other members of the species and we evaluate this based on specific criteria. We determine significance by using the available scientific information to determine the DPS's importance to the taxon to which it belongs. If we determine that a population segment is discrete and significant, we then evaluate it for endangered or threatened status based on the Act's standards.

### **Discreteness**

Under our Policy Regarding the Recognition of Distinct Vertebrate Population Segments, a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions:

- (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; and
- (2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

Below, we evaluate the population segment of yellow billed cuckoos that occurs in the western United States under our DPS policy. The area for this DPS would be the area west of the crest of the Rocky Mountains. For the northern tier of Rocky Mountain states (Montana, Wyoming, northern and central Colorado), the crest coincides with the Continental Divide. In southern Colorado and New Mexico the crest coincides with the eastern boundary of the upper Rio Grande drainage, including the Sangre de Cristo Mountains and excluding the drainage of the Pecos River. In west Texas the DPS boundary is the line of mountain ranges that form a southeastern extension of the Rocky Mountains to the Big Bend area of west Texas, and which form the western boundary of the Pecos River drainage. The DPS for the yellow-billed cuckoo is based primarily on the first of the two conditions cited above; the population segment is markedly separated from other populations. In addition, the northern and southern boundaries of the proposed DPS are the international boundaries with Canada and with Mexico since the DPS policy allows us to delimit the boundaries of a DPS along international boundaries.

We recognize that cuckoos within the described DPS are not wholly isolated from eastern cuckoo populations by the Rocky Mountain crest in west Texas, and to a lesser extent, farther north. As discussed above, morphologic data and recent genetic data do not support separation of the yellow billed cuckoo into eastern and western subspecies. However, our DPS policy explicitly states that complete reproductive isolation is not

required to recognize discreteness of a DPS, and DPS recognition can be appropriate where differences between populations are not sufficiently large to merit recognition of subspecies.

Yellow billed cuckoos breed on both sides of the crest of the Rocky Mountains, where suitable habitat occurs (Johnsgard 1986, pp. 1–504). Although the Rocky Mountains may not wholly prevent movement of cuckoos across the Rocky Mountain crest, the available information indicates that the Rocky Mountains substantially separate cuckoo populations occurring east and west of their crest. Physical factors also interact with ecological factors, as altitudinal, topographic, and climatic factors influence the distribution of suitable habitat for nesting cuckoos.

Along most of the DPS boundary, nesting birds are separated physically from nesting cuckoo populations east of the Rocky Mountains. In the northern Rocky Mountains and northern Great Plains, from the Canada border south through Colorado, the cuckoo is extremely rare and local as a breeding bird (Hughes 1999, p. 3). While the species breeds locally in southeast Montana, southern Idaho, northeast and southwest Wyoming, west Colorado, and Utah ), it is quite rare or absent within the higher Rocky Mountains (Hughes 1999, p. 3). An examination of the distributional records for the Rocky Mountain region indicate that within this area of few cuckoos, the species is even more scarce at elevations above approximately 2,000 m (6,700 ft). Most sources describe the species range as extending up to this elevation (often described as occurring in the Sonoran Life Zones in older works) (Bailey 1928, p. 308; Bailey and Niedrach 1965, p. 404; Phillips *et. al.* 1964, pp. 1–220; Johnsgard 1986, pp. 1–504; Long 2001, pp. 1–8). Most of the Rocky Mountain crest exceeding 2,000 m (6,700 ft) includes a wide region. In Colorado and Wyoming the region above 2,000 m (6,700 ft) is typically at least 240 km (150 mi) wide on an east-west axis (USGS 1970, p. 59).

Within western Montana and southern Wyoming the crest is less marked. In western Montana, the unoccupied region includes the area west of the Continental Divide, and extends into the panhandle of northern Idaho. The high elevation zone in western Montana narrows to 80 km (50 mi) width and sometimes less, where deep river valleys of the Columbia River drainage cut through the high mountains. However, the scarcity of records from this region indicates that nesting west of the Continental Divide in Montana is at most very limited and sporadic, and the region of effective separation in Montana may be as wide as 800 km (500 mi) (Hughes 1999, p. 3; Laymon 2000, pp. 1, 29; Hendricks 2001, p. 1). Coupled with the rarity of cuckoos in adjacent areas to the west and east, the available information indicates that the Rocky Mountain region in Montana and northern Idaho forms a wide break between cuckoo populations to the east and west.

The band of unoccupied habitat in Wyoming includes Park, Fremont, western Hot Springs, and central and eastern Sweetwater counties (Deibert 2001, p. 2). In southern Wyoming, the crest of the Rocky Mountains dips to near 2,300 meters (7,500 feet) to the southeast of the Wind River Range. In this area, the Great Divide Basin forms a high, internal basin which separates the Snake River drainage from the Missouri River drainage. This basin, while not a physical barrier topographically, it is a high desert lacking in cuckoo habitat (Deibert 2001, p. 1). The basin consists mostly of rolling plains, extensive playas and dune fields that receives 2.25 cm (0.8 in.) of precipitation annually (Reiners and Thurston 1996, pp. 11, 14). Although this lower area may be less of a physical barrier to birds, reported yellow billed cuckoo sites to the east and west in this area are separated by about 240 km (150 mi) of similar unsuitable habitat, as is true for the rest of the Rocky Mountain crest from the Montana to Colorado border (Reiners and Thurston 1996, pp. 10–15; Wyoming Game & Fish 2001, pp. 2–3). Therefore, we find that the appropriate DPS boundary is that which encompasses the Snake River basin, which is, following the southern and western edge of the Great Divide Basin.

In Colorado, the band of high-elevation is over 150 km (100 mi) wide along the entire north-south axis of the Rocky Mountains. The available data indicate that cuckoos do not nest within this broad highlands region, and reveal few records of cuckoos at all in the mountainous region of the state; as noted above, the species was probably never common and is now extremely rare (Bailey and Niedrach 1965, pp. 404–406; Kingery

1998, pp. 204–205). Based on the available information, the Rocky Mountains in Colorado form a substantial break between cuckoo populations east and west of the crest, a break which is accentuated by the species' current extreme rarity in Colorado west of the Great Plains.

The separation of western and eastern populations of yellow billed cuckoo continues south along the Rocky Mountain crest into Southern Colorado, eastern New Mexico and southwest Texas, terminating at the Rio Grande River in the Big Bend National Park. Thus, the western yellow billed cuckoo DPS includes the upper and middle portions of the Rio Grande hydrological basin, and excludes the Pecos River drainage.

The inclusion of the Rio Grande basin within the DPS deviates from the rest of the DPS in that it includes an area, which drains to the Gulf of Mexico, but is consistent in several other respects. First, it follows the crest of the southeastern extent of the Rocky Mountains. This crest includes highlands above 2,000 m (6,700 ft) which separate the Rio Grande and Pecos River drainages for all of New Mexico except in the extreme south. Cuckoos are limited to nesting in riparian areas at lower to middle elevations, and thus the crest is expected to separate eastern and western populations here as it would farther north. Second, ecologically, the portion of the Upper Rio Grande basin with the DPS has greater affinity with the western United States than with the area east of the Rocky Mountains (Graham 1992, pp. 23, 83; U.S. North American Bird Conservation Initiative (NABCI) 2000, pp. 17–21; Pashley *et al.* 2000, pp. 65, 75), whereas regions east of the DPS (lower Rio Grande) have greater affinity for the Great Plains and other eastern ecological regions. The riparian habitats in the Upper Rio Grande of New Mexico and west Texas are similar to those occupied by cuckoos in other western regions, being dominated by Fremont cottonwood and willows, whereas most cuckoo habitat along the Pecos River in New Mexico historically lacked cottonwood forests, and today is dominated by non-native tamarisk trees (Howe 2004, pp. 1–6; Hunter *et al.* 1988, pp. 113–114; Ellis 1994, pp. 339–341). For these reasons, the crest of the Rocky Mountains presents a clearer geographic and biologic separation in New Mexico and west Texas, than does the continental divide.

In the western Great Plains, yellow billed cuckoos nest in riparian corridors that extend westward towards the Rocky Mountains along watercourses draining into the Missouri and Mississippi Rivers. These corridors no doubt lessen the separation of eastern and western cuckoos by providing corridors across otherwise unsuitable habitat in the Great Plains. The taxonomic identity of yellow billed cuckoos nesting along the eastern edge of the Rocky Mountains from central Montana south to eastern New Mexico throughout this area have traditionally been attributed to eastern cuckoo origins (Bailey and Niedrach 1965, p. 404; Laymon 2000, p. 1). Not all evidence supports this view; recent data from an ongoing study suggests that cuckoos from the South Platte River in Nebraska may be more similar to western cuckoos based on morphologic measurements (Scharf 2001, p. 3). As already noted, however, the crest of the Rocky Mountains still presents a wide band of unsuitable habitat between Great Plains cuckoos and cuckoos in the western DPS.

In west Texas and southern New Mexico, the physical separation is less marked, where the Rocky Mountains become a series of relatively low, isolated ranges within a high plateau, stretching between the Guadalupe Mountains on the Texas-New Mexico border to the Chisos Mountains in the Big Bend National Park, on the border with Mexico. In this region the DPS boundary and the separation between eastern and western birds may be less complete than for the rest of the DPS. Our 90-day administrative finding noted the lack of a barrier between the Rio Grande and Gila River drainages in southern New Mexico. This problem is addressed by the DPS boundary, which includes both of these drainages, for reasons described above. The affinity of cuckoos from west Texas is still problematic, however, in that the Pecos River drainage is not strongly separated from the Rio Grande drainage upstream of the Big Bend, and cuckoo movement and interchange across the DPS boundary is expected to be greater in this region than along the rest of the DPS boundary. Such interchange and resulting diffusing of differences may be the reason why west Texas cuckoos have been reported to be morphologically aligned with eastern cuckoo populations (Hughes 1999, pp. 4–5) and with western cuckoos. The majority of the available information, including timing of nesting, indicates that birds from Texas west of the Pecos River and from the Big Bend upstream exhibit greater similarity to western cuckoos (Wauer 1973, p. 96; Oberholser and Kincaid 1974, pp. 434–435; Franzreb and Laymon 1993, pp. 17–26). Considering these factors along with the information on physical factors, we have included

west Texas within the western DPS. This inclusion would be reconsidered during preparation of a listing proposal, should new information become available.

In our 90-day administrative finding (Federal Register (65 FR 8104-8107) February 17, 2000), we discussed the fact that the cuckoo is a mobile species, migrating to South America during the non-breeding season. This mobility raises the question of whether 150 miles of mountains poses a barrier to movement between populations east and west of the crest of the Rocky Mountains. We are unaware of scientific data which would allow us to directly address the effectiveness of the mountains as a physical separation between cuckoo populations, but some evidence bears on the question. We have already described the observation that a broad area of unsuitable habitat largely separates suitable, occupied habitat east and west of the crest of the Rocky Mountains. Also, many other bird species migrate between Central/South America and North America and have maintained discrete populations or subspecies that are separated by the Rocky Mountains (Pitelka 1947, pp. 113–136; Udvardy 1963, pp. 1153i–1158; Johnsgard 1986, pp. 10i–11).

Data from movements of banded cuckoos provide no evidence of movement between eastern and western cuckoo populations, across the Rocky Mountain crest. We received banding information from the U.S. Geological Survey-Biological Resources Division, Bird Banding Laboratory (BBL). Of a total of 8,673 banded cuckoos, of which 26 bands were recovered, no western birds were found east of the Rocky Mountain crest, nor eastern birds recovered west of the crest. While the data provide no evidence for movement between eastern and western cuckoo populations, the sample size is too small to adequately test the hypothesis that movement is limited between eastern and western regions. Only 251 cuckoos were banded in western states, with only one band recovery. Eight of the 26 recovered birds were found in a state different from where banded. Of these, only one significant displacement occurred on an east to west axis, for a bird banded in Iowa and recovered in Pennsylvania.

The extent to which cuckoos nesting in different regions of North America commingle during migration, or while overwintering, is unknown. Data provided by the U.S. Geological Survey-Biological Resources Division, Bird Banding Laboratory (BBL), from bird band returns to date is insufficient to determine migration or wintering patterns (BBL 1998, pp. 1–3). Some scientists have provided information supporting the hypothesis that yellow billed cuckoos breeding in the western United States winter in different regions of South America than do cuckoos nesting east of the Rocky Mountains (Ridgely 2000, pers comm.; Hughes 2000, pers comm.; Laymon 2000, pp. 19i–20). The fact that statements by several ornithologists favor this hypothesis lends it credence, although the information available is not sufficient to test the hypothesis.

Western cuckoos have historically occurred and/or still occur in several distinct ecoregions including the Great Basin, Sonoran Desert, Sonoran and Mohave Deserts, Northern Pacific Rainforest, Northern Rockies, Southern Rockies/Colorado Plateau, Coastal California, and Sierra Madre Occidental ecoregions (Graham 1992, pp. 23–27, 84–99; U.S. NABCI 2000, pp. 7, 9, 12, 19–22; Pashley et al. 2000, pp. 64–65, 75–79). While these western ecoregions differ in many respects, they are joined by common factors, which also distinguish them from most eastern ecoregions within which yellow billed cuckoos occur. Foremost among these is the fact that western cuckoo populations, and the vast majority of yellow billed cuckoos, occur along narrow and patchy riparian corridors which provide relatively suitable moist deciduous woodlands within arid landscapes otherwise dominated vegetation types unable to support cuckoos. By contrast, east of the Rocky Mountains, the yellow billed cuckoo occurs in extensive bottomland forests in the Mississippi River and other drainages, as well in deciduous woodlands in non-riparian situations, including deciduous forests such as oak hickory forests, parks, and some suburban areas (Wilson 1999, pp. 31–33; Amundson et al. 2000, p. 3).

Data collected from publications and other sources demonstrate, to varying degrees of certainty, the existence of morphological, physiological and behavioral differences between eastern and western yellow billed cuckoos exist.

Based on the available information, the best evidence of behavioral/physiological differences between

cuckoo populations west and east of the Rocky Mountain crest is differences in the timing of arrival during the spring migration, and the timing of nesting. Several authors have observed that western cuckoos arrive and nest substantially later than do eastern cuckoos (Franzreb and Laymon 1993, pp. 24–26; Hughes 1999, pp. 5–6; Laymon 2000, pp. 15–17), while an Arizona study found less of a pattern, but noted that Arizona cuckoos appeared to nest several weeks later than California cuckoos (Hamilton and Hamilton 1965, pp. 427–429). Franzreb and Laymon (1993, pp. 24–26;) and Hughes (1999, pp. 5–6) concluded that the nesting season in western states begins a full three to four weeks later than it does east of the Rocky Mountains, and that western cuckoos arrive on their breeding grounds four to eight weeks later than do eastern cuckoos at similar latitudes. One scientist has also suggested that breeding season of western birds is shorter than for eastern birds, due to later spring arrival and earlier fall departure, and that is evidence of evolved behavioral differences between eastern and western cuckoos (Hughes 2000, pers comm.).

We have conducted our own analysis of the timing of arrival on breeding grounds and conclude that there is at least a three to four week difference in the peak of migration and onset of nesting season with eastern yellow-billed cuckoos being the earliest (Franzreb and Laymon 1993, pp. 24–26; Hughes 1999, pp. 5–6; Laymon 2000, pp. 15–17). In our 90-day finding published February 17, 2000, in the Federal Register (65 FR 8104-8107), we speculated that differences in timing of arrival on breeding grounds and in breeding could be the result of genetically similar birds responding to local environmental cues. We believe this remains as one hypothesis for timing of breeding, although the difference could also reflect genetic based differences. In the case of timing of arrival on breeding grounds, comments received in response to the 90-day finding (Laymon 2000, pp. 15–17; Hughes 2000, pers comm.; Amundson *et al.* 2000, p. 3) provide a persuasive argument that timing of arrival is more likely the result of an evolved response to east-west differences, via mechanisms likely under genetic control.

Other behavior differences between cuckoos in the proposed western DPS and eastern cuckoos exist, and provide additional evidence of discreteness. These differences include: Larger egg size and weight (mass in grams) with thicker egg shells in western birds (Hughes 1999, p. 14) which may correlate with potential higher egg water loss from hotter, dryer conditions in the west than the east (Ar *et al.* 1974, pp. 153–158; Rahn and Ar 1974, pp. 147–152).

Eastern juveniles have been reported to have yellow bills (Oberholser and Kincaid 1974, p. 435) while California juveniles western are reported to have all black bills (Franzreb and Laymon 1993, p. 26). Because bill color in juveniles changes from grayish to yellow and black around the age of 60 days (Hughes 1999, p. 22), this reported difference needs to be verified, taking into account juvenile age.

Western adult cuckoos have been reported to have an orange lower mandible, while eastern adults have a yellow lower mandible (Franzreb and Laymon 1993, p. 26; Laymon 2000, p. 14). Western adults, on average, are larger and heavier than eastern adult birds (Banks 1988, p. 475, 1990, p. 538; Franzreb and Laymon 1993, pp. 19–23; Oberholser and Kincaid 1974, p. 435), and are evidence of some degree of physical isolation, although, as discussed by Banks (1988, pp. 475–476, 1990, p. 538), the differences are not strong, and may be clinal.

From the analysis of two different mtDNA genes (control region and ATP8) totaling 736 base pair sequences, Dr. Fleischer concluded that the mitochondrial DNA results do not support the hypothesis that the western populations of the yellow-billed cuckoo are a separate subspecies from the eastern populations. There was, however, significant divergence in haplotype frequencies between eastern and western samples which suggests that they may not currently be exchanging many migrants and that selection of more variable markers with higher mutation rates may reveal significant genetic structure (Fleischer 2001, pp. 15–16).

In view of the above information, and considering that our DPS policy does not require complete barriers, we find that the available information supports the recognition of a western DPS of the yellow billed cuckoo, as described, based on the physical, ecological, and behavioral discreteness of the population segment.

## Significance

If we determine a population segment is discrete, we next consider available scientific evidence of its significance to the taxon to which it belongs. Our policy states that this consideration may include, but is not limited to: 1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon, 2) Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon, 3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or 4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. We address these significance factors below as they relate to the population segment of yellow billed cuckoos that occurs west of the Rocky Mountain crest. We focus primarily on the significant gap in the range of taxon that would result from the loss of this population segment in demonstrating significance of the DPS, and secondarily on ecological setting.

### Persistence in an unusual or unique ecological setting

We discussed above the manner in which the western yellow billed cuckoo DPS differs fundamentally from eastern cuckoos, because of its strong association with non-montane riparian woodlands, contrasting sharply with states east of the Rocky Mountains, where cuckoos nest across a much broader range of habitat conditions. In the western states, the cuckoo occurs primarily in arid regions, where riparian woodlands, particularly those which include cottonwood trees as a dominant, provide ecological conditions which are unique for the region. These conditions are essential to the survival of yellow billed cuckoo in the west, as well as to the survival of many other riparian-dependent species (Hunter *et al.* 1987, p. 17; Sanders and Edge 1998, pp. 469–470; Knopf and Samson 1994, p. 672).

The western yellow billed cuckoo populations have persisted over long periods, despite the small number of breeding pairs, which breed in relatively isolated areas. Although site fidelity and dispersal patterns have not been studied, a limited number of banding returns from the cuckoo population on the South Fork Kern River in California indicate that adult birds return to the same nesting areas in subsequent years (Laymon 2000, p. 18). Although the species is reported to have nomadic tendencies (Hughes 1999, p. 5), the repeated return from South America each spring to relatively isolated breeding sites, is strongly suggestive of site fidelity. A scenario of strong breeding site fidelity, and often isolated breeding population, and combined with most river reaches supporting very few (less than 20) breeding pairs, suggests that local western populations may constitute important isolated units. Under this same scenario, these units may contain important genetic and phenotypic diversity.

Evidence that the discrete population segment differs markedly from other population segments in its genetic characteristics

Many subspecies of birds have their taxonomic origins based on their physical and behavioral differences; however they may not show corresponding significant genetic differences. Among 111 subspecies of song (passerine) birds only 26 percent demonstrated significant genetic differences when using mitochondrial DNA (mtDNA) gene sequence data (Zink *et al.* 2000, p). Dr. Fleischer did not find significant genetic differences among the 66 yellow billed cuckoos samples from across North America and Mexico to separate western birds from eastern cuckoos at the subspecies level (Fleischer 2001, pp. 15–16).

In a genetic study by the University of Alaska Museum, mtDNA from a 978 base pair section of the cytochrome b gene was analyzed from a substantially small data set of four birds, two of which were vagrants (migrating) from Alaska and two were birds from Minnesota. They found the eastern and western haplotypes differed by five fixed base pair changes and conclude that they diverged 410,000- 460,000 years ago (Pruett *et al.* 2000, p. 230).

Evidence that loss of the discrete population segment would result in a significant gap in the range of the

taxon

The potential loss of the western yellow billed cuckoo population would constitute a significant gap in the range of the yellow billed cuckoo in the continental United States in North America. We recognize that this conclusion is contrary to our conclusion drawn in our 90-day findings which was based on: (1) the fact that the species is dependent upon riparian ecosystems in the western United States, and occurs both in riparian ecosystems and other habitats in the eastern United States; and (2) data on the extent of riparian ecosystems, which indicate that the area of potential habitat available to yellow-billed cuckoos west of the continental divide represents less than five percent of the available cuckoo habitat in its United States range. However, excluding Washington and Oregon where the cuckoo has been extirpated already, the western population would represent about 22.5 percent of the species range. Including Washington and Oregon, the proposed DPS would represent about 28 percent of the species range, based on the area of the states where the species occurs or formerly occurred as a breeding bird. We have evaluated all the information available. After consideration of the information, including the ecological distinctness of the western DPS, the western cottonwood-willow riparian woodlands upon which the western DPS depends, and other factors discussed above, we conclude that the loss of the species from the United States west of the Rocky Mountain crest would represent a significant gap in the species range.

#### Summary of Discreteness and Significance Evaluations

Based on the above consideration of the western U.S. population of the yellow-billed cuckoo's discreteness and its significance to the remainder of the taxon, we find that it is a distinct population segment. The population's discreteness is due to its separation from other populations of the same taxon as a consequence of physical factors, banding return information, as well as ecological, physiological, behavioral, morphological, biogeographical patterns and genetic information and differences from the remainder of the taxon. The population segment's significance to the remainder of the taxon is due principally to the significant gap that its loss would represent in the range of the taxon and also on ecological setting with western cuckoos having a strong association with non-montane riparian woodlands.

## Threats

### **A. The present or threatened destruction, modification, or curtailment of its habitat or range:**

Principal causes of riparian habitat losses are conversion to agricultural and other uses, dams and river flow management, stream channelization and stabilization, and livestock grazing. Available breeding habitats for cuckoos have also been substantially reduced in area and quality by groundwater pumping and the replacement of native riparian habitats by invasive non-native plants, particularly tamarisk (Groschupf 1987, p. 29; Rosenberg *et al.* 1991, pp. 18–23). Estimates of riparian habitat losses include 90-95 percent for Arizona, 90 percent for New Mexico, 90-99 percent for California, and more than 70 percent nationwide (Ohmart 1994, pp. 276–281; U.S. Department of Interior (DOI) 1994, p. 215; Noss *et al.* 1995, pp. 37, 46). Much of the remaining habitat is in poor condition and heavily affected by human use (Almand and Krohn 1978, p. 359; U.S. Department of Interior 1994, p. 215). Fragmentation effects include the loss of patches large enough to sustain local populations, leading to local extinctions, and the potential loss of migratory corridors, affecting the ability to recolonize habitat patches (Hunter 1996, pp. 179–187).

Dahl (1990, p. 6) reviewed estimated losses of wetlands between 1780 and the 1980s in the Southwest: California is estimated to have lost 91 percent, Nevada 52 percent, Utah 30 percent, Arizona 36 percent, New Mexico 33 percent, and Texas 52 percent. As much as 90 percent of major lowland riparian habitat has been lost or modified in Arizona (State of Arizona 1990, p. 4). Franzreb (1987, p. 4) noted that “[B]ottomland riparian forests are the most highly modified of natural landscapes in California.”

Much of the substantial decline of the cuckoo in California has been directly attributed to breeding habitat loss from clearing and removal of huge areas of riparian forest for agriculture, urban development and flood control (Gaines 1974b, pp. 2–4; Gaines and Laymon 1984, p. 73; Laymon and Halterman 1987b, p. 19; Launer *et al.* 1990, p. 3; Hughes 1999, p. 4). Losses in the Central Valley alone have been huge, especially along the Valley's formerly free-flowing rivers such as the Sacramento, where under pristine conditions, broad overflow plains and dense riparian forests extended for up to 4 mi (6 km) from both banks (Thompson 1961, p. 307; Franzreb 1987, p. 4). Katibah (1984, pp. 26–27) estimated the presettlement riparian vegetation for the entire Central Valley at more than 373,000 ha (924,000 ac), and that as of 1979, about 41,300 ha (102,000 ac) of riparian forest remained in the Central Valley, an 87 percent loss. Of the remaining habitat, approximately 85 percent is considered in a disturbed or degraded condition (Katibah 1984, pp. 26–27). Similar losses of riparian habitat have been documented throughout the U.S. (Noss *et al.* 1977, pp. 37, 46).

A study of the San Joaquin River between Friant Dam and Merced River confluence found that between 1937 and 1993, the area of riparian forest and scrub decreased 28 percent, from 6,787 to 4,914 ac (2,727 to 1,989 ha) and the herbaceous riparian vegetation decreased from 4,076 to 780 ac (1,650 to 316 ha) (Jones and Stokes Associates, Inc. 1998, p. 5–1).

Suitable habitat for the yellow-billed cuckoo is very limited in Nevada with most areas of cottonwood riparian forests being fragmented (NDW 2001, pp. 2–8). National Park Service studies from Great Basin National Park (National Park Service 2001, pp. 1–2) in the South Snake Mountain Range determined that of the 469 ac (190 ha) of existing riparian habitat only 8 ac (3.3 ha) was suitable for supporting yellow-billed cuckoo. Most of the suitable habitat along the Truckee, Carson, and Walker Rivers has been modified or destroyed (NDW 1990, pp. 1–2 and 1985, pp. 1–4).

Loss and modification of southwestern riparian habitats have occurred from urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses. Rosenberg *et al.* (1991, p. 33) noted “it is the cottonwood-willow plant community that has declined most with modern river management.” Loss of the cottonwood-willow riparian forests has had widespread impact on the distribution and abundance of bird species associated with that forest type (Hunter *et al.* 1987, pp. 10–18; Hunter *et al.* 1988, p. 113; Rosenberg *et al.* 1991, pp. 31–34).

Overuse by livestock has been a major factor in the degradation and modification of riparian habitats in the western United States. The effects include changes in plant community structure and species composition and in relative abundance of species and plant density. These changes are often linked to more widespread changes in watershed hydrology (Rea 1983, p. 40; Belsky *et al.* 1999, pp. 419–431). Livestock grazing and other alterations in stream flow in riparian habitats typically results in reduction of plant species diversity and density, especially of palatable broadleaf plants like willows and cottonwood saplings, and is one of the most common causes of riparian degradation (Carothers 1977, p; Rickard and Cushing 1982, pp. 2–4; Cannon and Knopf 1984, p. 236; Klebenow and Oakleaf 1984, p. 202; Clary and Webster 1989, pp. 1–2; Schultz and Leininger 1990, pp. 298–299; Bock *et al.* 1993, p. 300).

Increases in abundance of riparian bird species have followed reduction, modification, or removal of cattle (*Bos* sp.) grazing. Krueper (1993, pp. 322–323) found the following increases in birds associated with cottonwood-willow habitat on Arizona's San Pedro River 4 years after the removal of livestock: yellow warbler – 606 percent; common yellow-throat (*Geothlypis trichas*) – 2,128 percent; yellow-breasted chat (*Icteria virens*) – 423 percent. Bock *et al.* (1993, pp. 300–301) found that 40 percent of the riparian bird species they examined were negatively affected by livestock grazing.

The Service believes that documentation of livestock impacts on willow flycatcher subspecies is relevant to yellow-billed cuckoo because linear riparian habitats in the arid range of the yellow-billed cuckoo are especially vulnerable to fragmentation and destruction by livestock. As shady, cool, wet areas providing abundant forage, they are disproportionately preferred by livestock over the surrounding xeric uplands (Ames

1977, p. 49; Valentine *et al.* 1988, p. 111; Johnson 1989, pp. 38–39). Harris *et al.* (1986, p. 22) believed that termination of grazing along portions of the South Fork of the Kern River in California was responsible for increases in riparian vegetation.

Another likely factor in the loss and modification of yellow-billed cuckoo habitat is the invasion by the exotic tamarisk (*Tamarisk* sp.). Tamarisk was introduced into western North America from the Middle East in the late 1800s as an ornamental windbreak and for erosion control. It has spread rapidly along southwestern watercourses, typically at the expense of native riparian vegetation, especially cottonwood/willow communities. Although tamarisk is present in nearly every southwestern riparian community, its dominance varies. It has replaced some communities entirely, but occurs at a low frequency in others.

The spread and persistence of tamarisk has resulted in significant changes in riparian plant communities. In monotypic tamarisk stands, the most striking change is the loss of community structure. The multi-layered community of herbaceous understory, small shrubs, middle-layer willows, and over-story deciduous trees is often replaced by one monotonous layer. Plant species diversity has declined in many areas and relative species abundance has shifted in others. Other effects include changes in percent cover, total biomass, fire cycles, thermal regimes, and perhaps insect fauna (Kerpez and Smith 1987, pp. 1–5; Rosenberg *et al.* 1991, pp. 18–23; Busch and Smith 1993, pp. 186–194).

Disturbance regimes imposed by humans (e.g., grazing, water diversion, flood control, woodcutting, and vegetation clearing) have facilitated the spread of tamarisk (Kerpez and Smith 1987, pp. 1–5; Hunter *et al.* 1988, p. 113; Rosenberg *et al.* 1991, pp. 18–23). Cattle find tamarisk unpalatable. However, they eat the shoots and seedlings of cottonwood and willow, acting as a selective agent to shift the relative abundance of these species (Kerpez and Smith 1987, pp. 1–5). Degradation and, in some cases loss of native riparian vegetation, lowered the water table and resulted in the loss of perennial flows in some streams. With its deep root system and adaptive reproductive strategy, tamarisk thrives or persists where surface flow has been reduced or lost. Further, tamarisk establishment often results in a self-perpetuating regime of periodic fires, which were uncommon in native riparian woodlands (Busch and Smith 1993, pp. 186–194).

Manipulation of perennial rivers and streams has resulted in habitats that tend to allow tamarisk to out-compete native vegetation. Construction of dams created impoundments that destroyed native riparian communities. Dams also eliminated or changed flood regimes, which were essential in maintaining native riparian ecosystems (Vogl 1980, pp. 84–86; Rosenberg *et al.* 1991, pp. 18–23). Changing (usually eliminating) flood regimes provided a competitive edge to tamarisk. In contrast to native phreatophytes, tamarisk does not need floods and is intolerant of submersion when young (Kerpez and Smith 1987, pp. 1–5). Diversion of water caused the lowering of near-surface groundwater and reduced the relative success of native species in becoming established. Irrigation water containing high levels of dissolved salts also favors tamarisk, which is more tolerant of high salt levels than most native species (Kerpez and Smith 1987, pp. 1–5; Busch and Smith 1993, pp. 186–194).

Conversion to tamarisk typically coincides with reduction or complete loss of bird species strongly associated with cottonwood-willow habitat including the yellow-billed cuckoo (Hunter *et al.* 1987; Hunter *et al.* 1988, pp. 118–119; Rosenberg *et al.* 1991, p. 32). While Brown and Trosset (1989, pp. 268–269) believed tamarisk may serve as an “ecological equivalent” to native vegetation, they noted that their study occurred where a tamarisk community became established where no native equivalent existed before. This is especially evident along the Pecos River in Texas (Hunter *et al.* 1988, p. 113).

Water developments also likely reduced and modified yellow-billed cuckoo habitat. The series of dams along most major southwestern rivers (Colorado, Gila, Salt, Verde, Rio Grande, Kern, San Diego, and Mojave) have altered riparian habitats downstream of dams through hydrological changes, vegetational changes, and inundated habitats upstream. New habitat is sometimes created along the shoreline of reservoirs, but this habitat (often tamarisk) is often unstable because of fluctuating levels of regulated reservoirs (Rosenberg *et al.* 1991, pp. 22–23). Diversion and channelization of natural watercourses are also likely to have reduced

yellow-billed cuckoo habitat. Diversion results in diminished surface flows and increased salinity of residual flows. Consequent reductions and composition changes in riparian vegetation are likely. Channelization often alters stream banks and fluvial dynamics necessary to maintain native riparian vegetation (Vogl 1980, pp. 84–86).

River channelization, construction of levees close to the river, and rock riprap armoring along the levees have caused the Sacramento River to exhibit habitat fragmentation and disconnection from ecological processes which both renew and restore riparian and aquatic habitats (Laymon and Halterman 1987a, pp. 11–14; Halterman 1991, pp. 1–2). More than one-half of the Sacramento River’s banks within the lowermost 194 mi (312 km) of river have now been rip-rapped by four decades of bank protection under U.S. Army Corps of Engineers’ auspices (Service 2000b, pp.26–29). The result is that much of the river’s remaining riparian habitat now occurs in narrow disconnected linear strips (Service 2000b, pp. 26–29; Halterman *et al.* 2001, p. 4), which are not utilized by the cuckoo for nesting (Gaines 1974a, p. 204). This may be due to the loss of continuous migration corridors, lack of patches of adequate size for nesting, and the species inability to use highly isolated patches (Halterman 1991, pp. 33–38). Exacerbating such problems is the fact that the cuckoo now, for unknown reasons, utilizes a narrower range of habitat in California, now predominantly cottonwood-willow complex, than it did historically (Laymon and Halterman 1987b, pp. 19–25).

The yellow-billed cuckoo is considered very vulnerable to tropical deforestation on its wintering grounds (Morton 1992, pp. 582–583), and while losses of neotropical forests and woodlands have been substantial and ongoing, particularly in Central America and northern South America (Hartshorn 1992, pp. 13–18; Brown and Lomolino 1998, pp. 558–561), the relationship between over-wintering habitat and yellow billed cuckoo populations has not been studied.

## **B. Overutilization for commercial, recreational, scientific, or educational purposes:**

The Service is unaware of threats resulting from overutilization

## **C. Disease or predation:**

West Nile virus is spreading throughout portions of the western United States and poses a threat to bird species. The National Wildlife Health Center of the U.S. Geological Survey (USGS) has identified the yellow-billed cuckoo as a species that may be affected by West Nile virus (USGS, 2005, p. 2).

Predation is also a potential threat to the cuckoo. Adults have been preyed upon by falcons (Hector 1985, p. 338), and nestlings have been taken by hawks, jays, grackles (*Quiscalus quiscula*) (Nolan and Thompson 1975, p. 498; Launer *et al.* 1990, pp. 9–10; Hughes 1999, p. 11) and by various snake and mammal species (Nolan 1963, pp. 311–312). From a study done by Wilson on 252 nests of yellow-billed cuckoos in Arkansas, predation accounted for 91 percent of all nest failures, with small mammals, birds, and reptiles depredating the greatest proportion (Wilson 1999, p. 12).

## **D. The inadequacy of existing regulatory mechanisms:**

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. Sec. 703-712) is the only current Federal protection provided for the yellow-billed cuckoo. The MBTA prohibits “take” of any migratory bird, which is defined as: “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.” However, there are no provisions in the MBTA preventing habitat destruction unless direct mortality or destruction of active nests occurs.

The majority of the occupied areas west of the Continental Divide for the yellow-billed cuckoo lie within California, Arizona, and New Mexico (Hughes 1999, p. 1). Only California classifies the yellow-billed

cuckoo as endangered (California Department of Fish and Game (CDFG) 2008, p. 9). In Arizona, it was listed as threatened by the Arizona Department of Game and Fish; however, it is now listed as a species of concern (Arizona Game and Fish Department 2002, p. 3). The bird has no special protective status in Wyoming, New Mexico, Colorado, Idaho, or Texas (Groschupf 1987, p. 2), and habitat protection or protection of individuals is not provided beyond existing regulations on capture, handling, transportation, and take of native wildlife. Utah considers the cuckoo as threatened. In Nevada, the cuckoo is identified as critically imperiled due to extreme rarity, imminent threats or biological factors and is proposed for protection as threatened. The California Endangered Species Act (CESA) prohibits unpermitted possession, purchase, sale, or take of listed species. However, the CESA definition of take does not include harm, which under the Act can include destruction of habitat that actually kills or injures wildlife by significantly impairing essential behavioral patterns (50 CFR 17.3). CESA does require consultation between the CDFG and other State agencies to ensure that activities of State agencies will not jeopardize the continued existence of State-listed species. Yellow-billed cuckoos have no State status in Oregon because it has not been considered an active breeding species since the 1940s (Oregon Department of Fish and Wildlife 2005, p. 3). In Washington, the yellow-billed cuckoo is considered critically imperiled (five or fewer occurrences); however no active nesting has been documented since the 1930s. The Service believes that these and other regulatory mechanisms are inadequate to ensure the continued existence of the yellow-billed cuckoo.

### **E. Other natural or manmade factors affecting its continued existence:**

Environmental, demographic, and genetic vulnerability to random extinction are recognized as interacting factors that might contribute to a population's extinction (Hunter 1996, pp. 189–190). Environmental random extinction refers to random events, climate, nutrients, water, cover, pollutants, and relationships with other species such as prey, predators, competitors, or pathogens, which may affect habitat quality.

The riparian habitat of the yellow-billed cuckoo has always been rare throughout the western continental U.S. and has become more so. Its habitat rarity and small, isolated populations make the remaining cuckoo populations in this region increasingly susceptible to local extirpation through stochastic events such as floods, fire, brood parasitism, predation, depredation, and land development.

The disjunct nature of habitats and small breeding populations impede the flow of genetic material and reduce the chance of demographic rescue from migration for adjacent populations. The resulting constraints on the gene pool intensify the external threats to the species.

Brood parasitism by the brown-headed cowbird (*Molothrus ater*) has been documented only six times (Friedmann 1971, pp. 241–242; Wilson 1999, p. 7), and less so by the bronzed cowbird (*Molothrus aeneus*) (Clotfelter and Brush 1995, pp. 814–815). With the incubation period of 10–13 days and fledgling 10–11 days, the brown-headed cowbird requires more development time before fledging than the yellow-billed cuckoo. Therefore, successful parasitism of yellow-billed cuckoo nest by brown-headed cowbird is unlikely (Ehrlich *et al.* 1988, p. 286).

In addition to destruction and degradation of riparian habitats, pesticides may affect cuckoo populations (Groschupf 1987, p. 29; Hughes 1999, p. 2), although the evidence is too limited to evaluate this effect. It warrants further study. In areas where riparian habitat borders agricultural lands, e.g., in California's Central Valley, pesticide use may indirectly affect cuckoos by reducing prey numbers, or by poisoning nestlings if sprayed directly in areas where the birds are nesting (Laymon and Halterman 1987b, p. 23). Accumulation of chlorinated hydrocarbon pesticides, particularly dichlorodiphenyltrichloroethylene (DDT), has affected other bird species, particularly top predators (Robinson and Bolen 1989, pp. 269–275). Pesticides may affect behavior (e.g., loss of balance) or cause death by direct contact. Laymon (1980, pp. 11–12) reported sublethal poisoning of young caused by spraying active nests in walnut orchards. Pesticide use may also contaminate preferred prey items, particularly lepidopteran larva, other invertebrates and food sources next to areas adjoining agricultural land (Laymon and Halterman 1987b, p. 23).

Although DDT use has been banned in the United States since 1972, cuckoos may be exposed to DDT on wintering grounds where DDT use has not been banned. Analysis of two eggs collected in California in 1979 showed very low levels of dichlorodiphenyldichloroethylene (DDE), a stable metabolite of DDT, but eggshell fragments collected in 1985 from three nests along the South Fork of the Kern River in California averaged 19 percent thinner than pre-DDT era eggshells (Laymon and Halterman 1987b, pp. 22–23). DDT has caused eggshell thinning in other bird species, but its role in the Kern River observations is unknown.

### **Conservation Measures Planned or Implemented :**

State Wildlife action plans that include the yellow-billed cuckoo as a species of conservation concern are: California, Washington, Arizona, Colorado, Montana, Idaho, New Mexico, Utah, Texas, Nevada, and Wyoming. In southeastern Arizona, a Federal, State and Private cooperative effort was able to purchase and protect in perpetuity 2,628 ac (1064 ha) of land for numerous threatened species as well as the yellow-billed cuckoo. The land will be managed by the Arizona Game and Fish Department (Arizona Game and Fish Department 2005, pp. 3–4). In New Mexico, over \$787,000 in grants were given to Tribal entities for the monitoring and restoration of riparian habitats and species including both the southwestern willow flycatcher and yellow-billed cuckoo; and in Nevada \$145,500 was given to the Tribes for restoration of approximately 20 miles of the Truckee River as part of the Tribal Landowner Incentives Program (TLIP) and Tribal Wildlife Grant Program (TWG) (Service 2005, pp.1–3). In California, over \$151,000 in Federal grants were given to the State for neotropical bird habitat and overwintering site studies, and approximately 400 agricultural ac (162 ha) in the Colusa region are or are being planned to be restored to native riparian habitat adjacent to known occurrences of the yellow-billed cuckoo (Golet *et al.* 2008, p. 20). We are also directly funding three status survey and habitat assessment studies in 2008 along the Sacramento River and along the South Fork of the Kern River in California. In Colorado, over \$120,000 in Federal grants were given to the State for developing conservation plans for neotropical bird species (Service 2005b, pp. 1–9). Several states have also implemented or are planning exotic plant removal projects and riparian area restoration (e.g. McLaughlin Reserve – California; Virgin River –Utah, Arizona, Nevada; 10-year plan submitted to Governor in 2004 – Colorado). A group comprised of Federal, State, and non-governmental agencies organized by the Service (Region 8, Sacramento Fish and Wildlife Office) is currently in the process of completing a rangewide conservation assessment and strategy for the western yellow-billed cuckoo. Researchers have used the group to develop a consistent survey protocol for use by the various partners within the species range. The conservation assessment is in early stages of development with work projected to begin on a conservation strategy in 2011.

### **Summary of Threats :**

The threats facing the western U.S. population of the yellow-billed cuckoo continue as a result of habitat loss from clearing and removal, or alteration and fragmentation of riparian forest for agriculture, urban development, flood control, and as a result of invasion of habitat by exotic species. The majority of the habitat for the cuckoo is on private lands and continues to be lost or significantly altered. The threats affecting the species and its habitat are ongoing and riparian habitat is continuing to be destroyed through land use conversion and grazing. We find that the western United States distinct population segment of the yellow-billed cuckoo is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

### **For species that are being removed from candidate status:**

\_\_\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

## Recommended Conservation Measures :

Conservation recommendations include: determine numbers and locations of remnant populations; acquire and improve riparian habitats; eliminate pesticide spraying in orchards adjacent to riparian areas; restore hydrologic functioning of riparian areas in managed river systems and investigate feasibility reintroduction to naturally regenerated or reforested habitat. In addition, habitat and ecological requirements on migratory routes and wintering grounds in Central and South America should be investigated. Brood parasitism by the yellow-billed cuckoo requires further study to identify the physiological and behavioral controls associated with the production of extra eggs. Furthermore, comprehensive nest surveys should be undertaken to quantify the frequency of parasitism and the overall success rates of parasitically laid eggs. In addition, baseline population estimates and wintering habitat monitoring and evaluation are required in Mexico and Central America to determine conservation status in these areas. We should continue to work with Federal and State wildlife and land management agencies to determine population status of the species throughout the western DPS range.

## Priority Table

Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	<b>Imminent</b>	Monotypic genus	1
		Species	2
		<b>Subspecies/Population</b>	<b>3</b>
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	Imminent	Monotype genus	7
		Species	8
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

## Rationale for Change in Listing Priority Number:

### Magnitude:

The magnitude of threats to the yellow-billed cuckoo was determined to be high. Much of the decline of the cuckoo is due to huge habitat loss from clearing and removal of large areas of riparian forest for agriculture, urban development and flood control, and the invasion by the exotic tamarisk and salt cedar. The majority of the habitat for the cuckoo is on private lands and continues to be lost or significantly altered.

### Imminence :

Threats affecting the species and its habitat are ongoing, and are therefore considered imminent. Riparian habitat is continuing to be destroyed through land use conversion and grazing and altered through flood control and hydrological changes. However, active restoration of riparian habitat is occurring throughout the range of the yellow-billed cuckoo.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

## **Emergency Listing Review**

No Is Emergency Listing Warranted?

After reviewing the current status and distribution of the yellow-billed cuckoo and the threats associated with the species we have determined that an emergency listing of the species is not warranted at this time. Monitoring throughout the range of the species shows that the species, although found in small numbers and in fragmented habitats, continues to persist. Large scale habitat loss is not occurring as was in the past and other federally listed species, such as the southwestern willow flycatcher and least bell's vireo, co-occur in habitats used by the yellow-billed cuckoo. Protections afforded for these species under the Endangered Species Act may provide some protections for the yellow-billed cuckoo.

## **Description of Monitoring:**

Monitoring of the western continental DPS of the yellow-billed cuckoo includes reviewing the current scientific literature, and contacting species experts and State agencies regarding yellow-billed cuckoo status and threats. We work with private and public land owner staff on identifying yellow-billed cuckoo status and threats. These efforts will be ongoing throughout the monitoring period and occur as information becomes available or on a 6 month basis. Due to the wide-ranging nature of the species and its distribution within areas often managed by Federal agencies (e.g. U.S. Forest Service, Park Service, Bureau of Land Management, Department of Defense), it is our opinion that such a level of monitoring is appropriate to update the status of the species, given the biology of the species and the threats it faces. In California, a monitoring report on songbird population, health, management, and riparian restoration efforts determined that of 20 species in the study only one showed a decline and 11 showed an increase in population (Gardali *et al.* 2005, pp. 13–15). We have funded three status surveys, one for the Sacramento River and two for the South Fork of the Kern River in California for 2008/2009.

## **Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:**

Arizona,California,Montana

## **Indicate which State(s) did not provide any information or comment:**

none

## **State Coordination:**

We received information from a variety of Federal agency staff and researchers conducting work on the species, including staff in Arizona, California, Montana, New Mexico, and Colorado. We were in direct contact with State agency staff from Arizona, California, and Montana.

## **Literature Cited:**

Ahlers, D., D. Moore, and V. Johason. 2010. Yellow-billed Cuckoo Study Results – 2009, Presence/Absence Surveys within the Middle Rio Grande, NM. U.S. Department of the Interior, Bureau of Reclamation, Fisheries and Wildlife Resources Group, Denver, Colorado, Albuquerque Area Office.

Almand, J.D. and W.B. Krohn. 1978. The position of the Bureau of Land Management on the protection and

- management of riparian ecosystems. Pp. 359-361 in *Strategies for protection and management of floodplain wetlands and other riparian ecosystems: proceedings of the symposium* (R.R. Johnson and J.F. McCormick, technical coordinators). USDA Forest Service Gen. Tech. Report WO-12, Washington, DC.
- American Ornithologists Union. 1957. *Checklist of North American birds*. 5th ed. American Ornithologists' Union, Baltimore, MD.
- American Ornithologists Union. 1983. *Checklist of North American birds*. 6th ed. American Ornithologists' Union, Washington, D.C.
- American Ornithologists Union. 1998. *Checklist of North American birds*. 7th ed. American Ornithologists' Union, Washington, D.C.
- Ames, C.R. 1977. *Wildlife conflicts in riparian management: grazing*. in R.R. Johnson and D.A. Jones (eds.), *Importance preservation, and management of riparian habitats: a symposium*. Gen. Tech. Rep. RM-43. USDA Forest Service, Denver, CO.
- Amundson, Robert G. et al. 2000. Letter to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, regarding comments on status of yellow-billed cuckoo in western Colorado. April 14, 2000.
- Ar, A., C.V. Paganelli, R.B. Reeves, D.G. Greene, and H. Rahn. 1974. The avian egg: water vapor conductance, shell thickness, and functional pore area. *The Condor* 76:153-158.
- Arizona Game and Fish Department. 2000. *Arizona Game and Fish: status, definitions, priority ranking definitions*. From [www.azgfd.com](http://www.azgfd.com) . July 24, 2000.
- Arizona Game and Fish Department. 2005. News Release dated March 7, 2005, outlining information on purchase of Coal Mine Canyon area.
- Arnold, L. 2010. Personal communication in report from Jason Beason, Rocky Mountain Bird Observatory, to U.S. Fish and Wildlife Service, Sacramento, California. Attachment in email to Karen Leyse April 20, 2010. 3 pp.
- Austin M. L. 2001. Comments to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in Idaho.
- Bailey, F.M. 1928. *Birds of New Mexico*. New Mexico Department of Game and Fish, Santa Fe, NM.
- Bailey, A.M. and R.J. Niedrach. 1965. *Birds of Colorado*. Denver Museum of Natural History, Denver, CO.
- Banks, R.C. 1988. Geographic variation in the yellow billed cuckoo. *Condor* 90:473-477.
- Banks, R.C. 1990. Geographic variation in the yellow billed cuckoo: corrections and comments. *Condor* 92:538.
- Banks, R. 1999. U.S. National Museum of Natural History, phone conversation, January 7, 1999.
- Banks, A. and J. Lucero. 2004. Yellow-billed Cuckoos in Southern Colorado. *Colorado Birds: The Colorado Field Ornithologists' Quarterly* 38:67-68.
- Beason, J.P. 2010a. Colorado and Wyoming cuckoo assessment update (sic). Electronic mail and attachment from Jason Beason, Rocky Mountain Bird Observatory, to Karen Leyse, U.S. Fish and Wildlife Service, Sacramento, California. April 20, 2010.

Beason, J.P. 2010b. 2010 Surveys for yellow-billed cuckoos in Western Colorado. Technical Report R-YBCU-USFWS-09-2. Rocky Mountain Bird Observatory, Brighton, Colorado. 30 pp.

Behle, W. H. and H.G. Higgins. 1959. The birds of Glenn Canyon. Division of Biological Sciences, Arizona State University. pp. 107-133.

Belsky, A. J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation*. 54(1): 419-431.

Bent, A.C. 1940. Life histories of North American cuckoos, goatsuckers, hummingbirds, and their allies. Smithsonian Institution United States National Museum, Bulletin 176. 1989 reprint by Dover Publications, New York, NY. Bird Banding Laboratory (BBL), US Geological Survey - Biological Resources Discipline. 1999. Note to file from Gary Falxa, US Fish and Wildlife Service, providing BBL band recovery data for yellow-billed cuckoo. April 28. 3 pp.

Bock, C.E., V.A. Saab, T.D. Rich, and D.S. Dobkin. 1993. Effects of livestock grazing on neotropical migratory landbirds in western North America. Pages 296-309 in D. Finch and P. Stangel, eds., *Status and management of neotropical Migratory birds*. Gen Tech. Rep. RM-229. USDA Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, CO. 422 pp.

Braden, G. T., M. Rathbun, T. Hoggan, A. Davenport, and K. Carter. 2009. The status of Yuma Clapper Rail and Yellow-billed Cuckoo along portions of the Virgin River and Muddy River in southern Nevada, with Incidental Observations of the Southwestern Willow Flycatcher: 2008 Final. Biological Sciences Division, San Bernardino County Museum, Redlands, California. Report to the Southern Nevada Water Authority. October 2008. 58 pp.

Breeding Bird Survey (BBS). 1999. Breeding bird survey: yellow billed cuckoo *Coccyzus americanus* trend results. Data obtained from BBS Internet site (<http://www.mbr-pwrc.usgs.gov/cgi-bin/atlas99.pl>), March 20, 1999.

British Columbia Conservation Data Centre. 1999. 1999 Provincial vertebrate animal tracking list. British Columbia Ministry of Environment, Lands, and Parks. Obtained from Web Site: <http://www.elp.gov.bc.ca/rib/wis/cdc/vertebrates.htm>, October 19, 1999.

Brown, B.T. and M.W. Trosset. 1989. Nesting-habitat relationships of riparian birds along the Colorado River in Grand Canyon, AZ. *Southwestern Naturalist* 34(2):260-270.

Brown, J.H. and M.V. Lomolino. 1998. *Biogeography*, second edition. Sinauer Associates, Sunderland, MA. Pages 558-562.

Burleigh, T. 1972. Birds of Idaho. Caxton Printers. Caldwell, Idaho. in Austin, M.L. 2001. Comments: "Western Yellow-billed Cuckoo". Idaho Watersheds Project. February 2001.

Busch, D.E. and S.D. Smith. 1993. Effects of fire on water salinity relations of riparian woody taxa. *Oecologia* 94a: 186-194

California Department of Fish and Game. 2001. State and Federally endangered and threatened animals of California. PDF file from [www.dfg.ca.gov](http://www.dfg.ca.gov). April 2001.

Cannon, R.W. and F.L. Knopf. 1984. Species composition of a willow community relative to seasonal grazing histories in Colorado. *Southwestern Nat.* 29:234-237.

Carlisle, J. 2010. Re: Yellow-billed Cuckoo surveys in Idaho. Email from Idaho Bird Observatory to Karen

Leyse, U.S. Fish and Wildlife Service, Sacramento, California.

Carothers, S.W. 1977. Importance, preservation, and management of riparian habitats: an overview. in R.R. Johnson and D.A. Jones (eds.), Importance, preservation, and management of riparian habitats: a Symposium. Gen Tech. Rep. RM-43. USDA Forest Service, Denver, CO.

Carothers, S.W. and B.T. Brown. 1991. The Colorado River through Grand Canyon: natural history and human change. University of Arizona Press. Tucson, AZ. 235 pp.

Clary, W.P. and B.F. Webster. 1989. Managing grazing of the riparian areas in the Intermountain Region. Gen. Tech. Rep. INT-263. Ogden UT. USDA Forest Service, Intermountain Region Research Station. 11 pp.

Clotfelter, E.D. and T. Brush. 1995. Unusual parasitism by the bronzed cowbird. Condor 97:814-815. in Hughes, J.M. 1999. Yellow billed Cuckoo (*Coccyzus americanus*) in The Birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 28 pp.

Colyer, M. 2001. Letter to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in western Colorado.

Corman, T. 1999. Arizona Game and Fish Department, Phoenix, AZ, phone conversation, November 19, 1999.

Corman, T.E. and R.T. Magill. 2000. Western yellow-billed cuckoo in Arizona: 1998-1999 Survey Report. Arizona Game and Fish, Technical Report 150. March 10, 2000.

Dahl, T.E. 1990. Wetland Losses in the United States, 1780s to 1980s. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 13 pp.

Dawson, W.L. 1923. The birds of California. Vol. 3 of 4. South Moulton Co., San Diego, CA.

Dexter, C. 1998. River survey of west-central Colorado, for yellow billed cuckoo and riparian weeds. Report prepared for the Bureau of Land Management. 26 pp.

Dexter, C. 2010. Personal communication in report from Jason Beason, Rocky Mountain Bird Observatory, to U.S. Fish and Wildlife Service, Sacramento, California. Attachment in email to Karen Leyse April 20, 2010. 3 pp.

Deibert, P. 2001. Fax to Jim Browning, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in Wyoming.

Deibert, P. 2001. Phone conversation with Dwight Harvey, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in Wyoming.

Detting, M.D., and C.A. Howell. 2011. Status of the yellow-billed cuckoo along the Sacramento River in 2010. Report to California Department of Fish and Game. Point Reyes Bird Observatory Contribution #1794. 49 pp.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook: a field guide to the natural history of North American birds. Simon and Schuster, New York, NY.

Ellis, L.M. 1994. Bird use of saltcedar and cottonwood vegetation in Middle Rio Grande Valley of New Mexico, USA. Journal of Arid environments (1995) 30: 339-349.

- Fleischer, R.C. 2001. Taxonomic and evolutionary significant (ESU) status of western yellow-billed cuckoos (*Coccyzus americanus*). Report to U.S. Fish and Wildlife Service April 22, 2001. Molecular Genetics Laboratory, Smithsonian Institution, Washington D.C.
- Flesch, A. 2008. Distribution and status of breeding landbirds in northern Sonora, Mexico. *Studies in Avian Biology* 37: 28-45.
- Franzreb, K.E. 1987. Perspectives on managing riparian ecosystems for endangered species. *Western Birds* 18:3-9.
- Franzreb, K.E. and S.A. Laymon. 1993. A reassessment of the taxonomic status of the yellow billed cuckoo. *Western Birds* 24:17-28.
- Friedmann, H. 1971. Further information on the host relations of the parasitic cowbirds. *The Auk*, 88: 239-255.
- Gabrielson, I.N. and S.G. Jewett. 1940. *Birds of the Pacific Northwest, with special reference to Oregon*. Oregon State College. 1970 reprint by Dover Publications, New York, NY.
- Gaines, D. 1974a. Review of the status of the yellow billed cuckoo in California: Sacramento Valley populations. *Condor* 76:204-209.
- Gaines, D. 1974b. Distribution, density and habitat requirements of the California yellow-billed cuckoo in the Sacramento Valley: 1972-73. Report to California Department of Fish and Game. 20 pp.
- Gaines, D. and S.A. Laymon. 1984. Decline, status and preservation of the yellow billed cuckoo in California. *Western Birds* 15:49-80.
- Gardali, T., S. Small, N. Nur, G. Geupel, G. Ballard, and A. Holmes. 2005. Monitoring Songbirds in the Sacramento Valley (1993-2003): population health, management information, and restoration evaluation.
- General Accounting Office. 1988. *Public Rangelands: Some riparian areas restored but widespread improvement will be slow*. General Accounting Office, U.S. Government . Washington, D.C.
- Gilligan, J. (ed.). 1994. *Birds of Oregon: status and distribution*. Cinclus Publications, McMinnville, OR.
- Graham, G.L. 1992. *Texas wildlife viewing guide*. Falcon Press Publishing. Helena, MT. pp.160
- Grinnell, J. 1914. An account of mammals and birds of the lower Colorado valley with special reference to the distributional problems presented. *University of California Publications in Zoology*. 12:51-294.
- Grinnell, J. and A.H. Miller. 1944. *The distribution of the birds of California*. Cooper Ornithological Club, Berkeley, CA. 1986 reprint by Artemisia Press, Lee Vining, CA.
- Groschupf, K. 1987. Status of the yellow billed cuckoo (*Coccyzus americanus occidentalis*) in Arizona and west Texas. Report prepared for the U.S. Fish and Wildlife Service, under contract no. 20181-86-00731. 34 pp.
- Halterman, M.D. 1991. Distribution and habitat use of the yellow billed cuckoo (*Coccyzus americanus occidentalis*) on the Sacramento River, California, 1987-90. M.S. Thesis, California State University, Chico, CA. 49 pp.
- Halterman, M. 1999. Kern River Research Center, CA, phone conversation, July 15, 1999; e-mail August 24,

1999.

Hamilton, W.J. III and M.E. Hamilton. 1965. Breeding characteristics of yellow billed cuckoos in Arizona. Proc. California Academy of Sciences, 4th Series, 32:405-432.

Harris, J.H., S.D. Sanders, and M.A. Flett. 1986. The status and distribution of the willow flycatcher (*Empidonax traillii*) in California. California Department of Fish and Game, Wildlife Management Branch Administrative Report 88-1.

Hartshorn, G.S. 1992. Forest loss and future options in Central America. Pages 13-19 in J.M. Hagan, III and D.W. Johnston, eds. Ecology and conservation of neotropical migrant landbirds. Smithsonian Institution Press, Washington, DC. 19 pp.

Hays, L. 1999. U.S. Fish and Wildlife Service, Carlsbad, CA, phone conversation, January 28, 1999.

Hector, D.P. 1985. The diet of the aplomado falcon in eastern Mexico. Condor 87:336-342. in Hughes, J.M. 1999. Yellow billed cuckoo (*Coccyzus americanus*) in The birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 28 pp.

Hendricks, P. 2001. Letter to Dwight Harvey, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in western Montana.

Henneman, C. 2010. Yellow-billed cuckoo surveys in the South Fork Kern River Valley in 2009. Final Report. Prepared for the U.S. Fish and Wildlife Service, Sacramento, California. February 18, 2010. 17 pp.

Hicks, T. 2010. Personal communication in report from Jason Beason, Rocky Mountain Bird Observatory, to U.S. Fish and Wildlife Service, Sacramento, California. Attachment in email to Karen Leyse April 20, 2010. 3 pp.

Holmes, J.A., C. Calvo, and M.J. Johnson. 2008. Yellow-billed cuckoo distribution, abundance, habitat use, and breeding ecology in the Verde River watershed of Arizona, 2004-2005 Final Report. February 14, 2008. 34 pp.

Howe, F.P. and M. Hanberg. 2000. Willow flycatcher and yellow-billed cuckoo surveys along the Green and San Juan Rivers in Utah, 2000. Utah Division of Wildlife Resources Publication Number 00-31.

Howe, W.H. 1986. Status of the yellow billed cuckoo (*Coccyzus americanus*) in New Mexico. Final Report, Contract No. 516.6-75-09, New Mexico Dept. of Game and Fish. Santa Fe, NM. 16 pp + appendices.

Howe, W. 2004. U.S. Fish and Wildlife Service, Albuquerque, NM, phone message, September 8, 2004.

Howell, S.N.G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press, New York, NY.

Hubbard, J.P. 1978. Revised checklist of the birds of New Mexico. New Mexico Ornithological Society Publication no. 6.

Hughes, J.M. 1997. Taxonomic significance of host-egg mimicry by facultative brood parasites of the avian genus *Coccyzus* (Cuculidae). Canadian J. Zoology 75:1380-1386.

Hughes, J.M. 1999. Yellow billed cuckoo (*Coccyzus americanus*). in The birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 28 pp.

- Hughes, J. 2000. E-mail from Steve Laymon regarding message from Janice Hughes to Kieran Suckling yellow-billed cuckoo listing.
- Hunter, M.L., Jr. 1996. Fundamentals of conservation biology. Blackwell Science, Inc., Cambridge, MA.
- Hunter, W.C., R.D. Ohmart, and B.W. Anderson. 1987. Status of breeding riparian-obligate birds in southwestern riverine systems. *Western Birds* 18:10-18.
- Hunter, W.C., R.D. Ohmart, and B.W. Anderson. 1988. Use of exotic saltcedar (*Tamarix chinensis*) by birds in arid riparian systems. *Condor* 90:113-123.
- Jewett, S.G., W.P. Taylor, W.T. Shaw, and J.W. Aldrich. 1953. Birds of Washington State. University of Washington Press, Seattle, WA.
- Johnsgard, P.A. 1986. Birds of the Rocky Mountains. Colorado Associated University Press, Boulder CO. 504 pp.
- Johnson, A.S. 1989. The thin green line: riparian corridors and endangered species in Arizona and New Mexico. Pp. 35-46 in *Preserving Communities and Corridors*. Defenders of Wildlife, Washington, D.C. 20036.
- Johnson, D.H. and T.A. O'Neil. 2001. Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press. 736 pp.
- Johnson, M.J., Holmes, J.A., C. Calvo, I. Samuels, S. Krantz, and M. K. Sogge, M.K. 2007. Yellow-billed cuckoo distribution, abundance, and habitat use along the lower Colorado and tributaries, 2006 annual report: U.S. Geological Survey Open-File Report 2007-1097. 219 pp. Available at <http://pubs.usgs.gov/of/2007/1097/>.
- Johnson, M.J., S.L. Durst, C.M. Calvo, L. Steward, M.K. Sogge, G. Bland, and T. Arundel. 2008. Yellow-billed cuckoo distribution, abundance, and habitat use along the lower Colorado River and its tributaries, 2007 annual report: U.S. Geological Survey Open-File Report 2008-1177. 284 pp.
- Johnson, M.J., Holmes, J.A., Mattson, D., Arundel, T., and J.R. Hatton. 2010. Yellow-billed cuckoo habitat use at two vegetation scales and its implication for riparian conservation. Page 47 in *Cooper Ornithological Society, American Ornithologists' Union, and Society of Canadian Ornithologists 2010 Joint Meeting Abstract Book*, San Diego, California. 112 pp.
- Jones and Stokes and Associates. 1998. Historical riparian habitat conditions of the San Joaquin River, Friant Dam to Merced River. April. (JSA 97-302.) Sacramento California. Prepared for U.S. Bureau of Reclamation, Fresno, CA.
- Katibah, E.F. 1984. A brief history of riparian forests in Central Valley of California. Pp. 23-29 in *California riparian systems: ecology, conservation, and productive management* (R.E. Warner and K.M. Hendrix, eds.). University of California Press, Berkeley, CA. 1034 pp.
- Kerpez, T.A. and N.S. Smith. 1987. Saltcedar control for wildlife habitat improvement in the southwestern United States. USDI Fish and Wildlife Service, Resource Publication 169, Washington D.C. 17 pp.
- Kingery, H.E. (ed.). 1998. Colorado breeding bird atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO.
- Klebenow, D.A. and R.J. Oakleaf. 1984. Historical Avifaunal changes in the riparian zone of the Truckee

River, Nevada. Pages 203-209 in California Riparian Systems: Ecology, Conservation, and Productive Management. R.E. Warner and K.M. Hendrix (eds). University of California Press. Berkeley, CA.

Knopf, F.L. and F.B. Samson. 1994. Scale perspectives on avian diversity in western riparian ecosystems. Conservation Biology 8:669-676.

Krebbs, K. and J. Moss. 2009. Continued surveys for the yellow-billed cuckoo (*Coccyzus americanus occidentalis*) at Tumacacori National Historic Park, final report for the 2009 fieldwork. Prepared for the National Park Service, Tumacacori National Historic Park, Desert Southwest Cooperative Ecosystems Study Unit, and the Arizona-Sonora Desert Museum. 25 pp.

Krueper, D.J. 1993. Efforts of land use practices on western riparian ecosystems. Pages 321-330 in D. Finch and P. Stangel, eds., Status and Management of Neotropical Migratory Birds. Gen Tech Rep. RM-229. USDA Forest Service, Rocky Mountain Range and Experiment Station, Fort Collins, CO. 422 pp.

Launer, A.E. D.D. Murphy, S.A. Laymon, and M.D. Halterman. 1990. 1990 Distribution and habitat requirements of the yellow-billed cuckoo in California. Center for Conservation Biology Stanford University. Stanford, CA. 26 pp.

Laymon, S.A. 2000. Supporting information for listing of the Western Yellow-billed cuckoo to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, CA. April 17, 2000.

Laymon, S.A. and M.D. Halterman. 1987a. Distribution and status of the yellow billed cuckoo in California. Final report to the California Department of Fish and Game, Contract #C-1845. Sacramento, CA. 35 pp.

Laymon, S.A. and M.D. Halterman. 1987b. Can the western subspecies of the yellow billed cuckoo be saved from extinction? Western Birds 18:19-25.

Laymon, S.A., P.L. Williams, and M.D. Halterman. 1993. Breeding status of the yellow billed cuckoo in the South Fork Kern River Valley, Kern County, California: summer 1992. Unpublished report prepared for U.S.D.A. Forest Service, Sequoia National Forest, CA. 36 pp. + figures.

Lenard, S. 2001. Electronic mail to Arnold Roessler, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in western Montana.

Littlefield, C.D. 1988. Status of the California yellow billed cuckoo in Klamath County and eastern Oregon. Oregon Department of Fish and Wildlife, Nongame Wildlife Program, Technical Report no. 89-5-01. Sacramento, CA. 34 pp.

Linsdale, J. M. 1951. A list of the birds of Nevada. The Condor, Cooper Ornithological Club Pacific Coast Avifauna Vol. 53. Berkeley, CA. pp 228-249.

Long, M. 2001. Memorandum to Dwight Harvey, US Fish and Wildlife Service, Sacramento, California, regarding yellow-billed cuckoo in Wyoming. February 16.

Magill, R. 1999. Arizona Game and Fish Department, Phoenix, AZ, facsimile, July 19, 1999; electronic mail August 25, 1999.

Marshall, D.B. 1996. Species at risk: sensitive, threatened and endangered vertebrates of Oregon, 2nd ed. Prepared for Wildlife Diversity Program, Oregon Department of Fish and Wildlife, Portland, OR. 2 pp.

McAllister, S.E. and G.A. Falxa. 2010. A new breeding site for yellow-billed cuckoo in coastal Northern California? Page 64 in Cooper Ornithological Society, American Ornithologists' Union, and Society of

Canadian Ornithologists 2010 Joint Meeting Abstract Book, San Diego, California. 112 pp.

McNeil, S.E., D. Tracy, and E.T. Rose. 2010. Yellow-billed cuckoo telemetry at riparian restoration sites on the Lower Colorado River, 2009. Page 65 in Cooper Ornithological Society, American Ornithologists' Union, and Society of Canadian Ornithologists 2010 Joint Meeting Abstract Book, San Diego, California. 112 pp.

Mesta, R. 2010. Email on Sonoran surveys conducted by the U.S. Fish and Wildlife Service to Sherry Barrett, U.S. Fish and Wildlife Service, Tucson, AZ. 2 pp.

Monson, G. and A.R. Phillips. 1981. Annotated checklist of the birds of Arizona, second edition. Univ. of Arizona Press, Tucson, AZ.

Morton, E.S. 1992. What do we know about the future of migrant landbirds? Pages 579-589 in J.M. Hagan, III and D.W. Johnston, editors. Ecology and conservation of neotropical migrant landbirds. Smithsonian Institution Press, Washington, DC.

National Park Service. 2001. Letter to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in Nevada.

Neel, L. A. 1999. The Nevada partners in flight bird conservation plan. The Nevada Partners In Flight Working Group, Reno, NV. 335 p.

Nevada Division of Wildlife. 2001. Letter to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in Nevada.

Nevada Division of Wildlife. 1990. Memorandum in Response to U.S. Fish and Wildlife Service Reno Field Station request for information on status of yellow-billed cuckoo in Nevada.

Nevada Division of Wildlife. 1985. Letter to William F. Shake, Assistant Regional Director, U.S. Fish and Wildlife Service, Portland, Oregon, regarding information on status of yellow-billed cuckoo in Nevada.

Nevada Division of Wildlife. February 2003. Breeding status and surveys for the southwestern willow flycatcher and yellow-billed cuckoo at various sites in southern Nevada: Program Activities Report January 1, 2002 through December 31, 2002. Prepared by B. Furtek, C.R. Tomlinson, and J.A. Williams; edited by S. Canning and L.A. Neel.

Nevada Division of Wildlife. October 2003. Breeding status and surveys for the southwestern willow flycatcher and yellow-billed cuckoo at various sites in southern Nevada: Program Activities Report January 1, 2003 through December 31, 2003. Prepared by B. Furtek and C.R. Tomlinson; edited by S. Canning and L.A. Neel.

Nolan, V. Jr. 1963. Reproductive success of birds in a deciduous scrub habitat. Ecology 44:305-313. in Hughes, J.M. 1999. Yellow billed cuckoo (*Coccyzus americanus*). in The birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 28 pp.

Nolan, V. Jr. and C.F. Thompson. 1975. The occurrence and significance of anomalous reproductive activities in two North American non-parasitic cuckoos *Coccyzus* spp. IBIS 117. pp. 496-503.

Nordstrom, L. 2001. Personal communication with Terry Ireland, U.S. Fish and Wildlife Service, Helena, MT, to Dwight Harvey, U.S. Fish and Wildlife Service, Sacramento, CA.

Noss, R.F., E.T. LaRoe III, and J.M. Scott. 1995. Endangered ecosystems of the United States: a preliminary

assessment of loss and degradation. U.S. Geological Survey, Biological Resources Division (National Biological Service), Biological Survey Report no. 9501, Washington, DC.

Oakleaf, R. J. 1974. Species distribution and key habitats of selected non-game species. Nevada Department of Fish and Game, Reno, NV. pp 17-21.

Oberholser, H.C. and E.B. Kincaid, Jr. 1974. The bird life of Texas, volume 1. University of Texas Press, Austin, TX.

Ohmart, R.D. 1994. The effects of human-induced changes on the avifauna of western riparian habitats. *Studies in Avian Biology* 15:273-285.

Orabona, A. 2010. Personal communication in report from Jason Beason, Rocky Mountain Bird Observatory, to U.S. Fish and Wildlife Service, Sacramento, California. Attachment in email to Karen Leyse April 20, 2010. 3 pp.

Owens, E. 1998. U.S. Fish and Wildlife Service, Salt Lake City, UT. Fax to Gary Falxa November 20 (received), 1998. 2 pp.

Oxford. 1995. Oxford Atlas of North America, 1995.

Pashley, D.N., C.J. Beardmore, J.A. Fitzgerald, R.P. Ford, W.C. Hunter, M.S. Morrison, K.V. Rosenberg. 2000. Partners in Flight - Conservation of the birds of the United States. The Plains, VA. pp. 92

Peterson J.B. and R. Zimmer. 1998. Birds of the Trans-Pecos. University of Texas Press, Austin, TX.

Phillips, A.R., J. Marshall, and G. Monson. 1964. The birds of Arizona. Univ. of Arizona Press, Tucson, AZ.

Pitelka, F. A. 1947. Distribution of birds in relation to major biotic communities. Contribution No. 562 from the Zoological Laboratory of the University of Illinois. Pages 133-137 in *American Midland Naturalist - Distribution of Birds*.

Pruett, C.L., D.D. Gibson, and K. Winker. 2000. Molecular "cuckoo clock" suggests listing of western yellow-billed cuckoos may be warranted. *Wilson Bulletin* 113:228-231.

Rahn, H. and A. Ar. 1974. The avian egg: Incubation time and water loss. *The Condor* 76:147-152.

Rappole, J.H. and G.W. Blacklock. 1994. A Field Guide: Birds of Texas. Texas A&M Press, College Station, TX.

Rea, A.M. 1983. Once a river: bird life and habitat changes on the middle Gila. University of Arizona press, Tucson, AZ. 285 pp.

Reiners, W.A. and R.C. Thurston. 1996. Delineations of landtype associations for southwest Wyoming final report. Bureau of Land Management. University of Wyoming. 49 pp.

Reynolds, T.D. 2004. 2003 Summary Report, A survey for yellow-billed cuckoo in recorded historic and other likely locations in Idaho.

Rickard, W.H. and C.E. Cushing. 1982. Recovery of streamside woody vegetation after exclusion of livestock grazing. *J. Range Mgt.* 35:360-361.

Ridgely, R. 2000. Electronic mail from Steve Laymon to Robert Ridgely on information of wintering

yellow-billed cuckoo in South America. 3 pp.

Ridgway, R. 1887. A manual of North American birds. Lippincott Press, Philadelphia, PA.

Righter, R., R. Leivad, C. Dexter, and K. Potter. 2004. Birds of Western Colorado Plateau and Mesa Country. Grand Valley Audubon Society. 214 pp.

Roberson D. 1980. Rare birds of the west coast of North America. Pacific Grove, Calif. : Woodcock Publications. Pacific Grove, CA. 496 pp.

Robinson, W.T. and E.G. Bolen. 1989. Wildlife Ecology and Management. MacMillian Pub. Corp., N.Y., N.Y. 574 pp.

Rosenberg, K.V., R.D. Ohmart, W.C. Hunter, and B.W. Anderson. 1991. Birds of the lower Colorado River Valley. University of Arizona, Tucson, AZ.

Roy, R. 2004. Personal communication with Rick Roy, Malheur National Wildlife Refuge, to Amy Welsh, U.S. Fish and Wildlife Service, Sacramento, California.

Russell, S.M. and G. Monson. 1998. The birds of Sonora. University of Arizona Press, Tucson, AZ.

Salzer, L. 2010. Email from Washington Department of Fish and Wildlife to Karen Leyse, U.S. Fish and Wildlife Service, Sacramento, California.

Sanders, T.A. and W.E. Edge. 1998. Breeding bird community composition in relation to riparian vegetation structure in the western United States. *Journal of Wildlife Management* 62(2):1998. pp 461-471

Saunders, A.A. 1921. A distributional list of birds of Montana, with notes on the migration and nesting of the better known species. Cooper Ornithological Club. Berkeley, CA. 194 pp.

Scharf, W. C. 2001. Yellow-billed Cuckoo Subspecies Designation Along the North Platte River and Other Locations in Nebraska, a New Endangered Taxon? Eleventh Platte River Basin Ecosystem Symposium February 27, 2001, Kearney, Nebraska. Abstract. 3 pp.

Schultz, T.T. and W.C. Leininger. 1990. Differences in riparian vegetation structure between grazed areas and exclosures. *J. Range Mgt.* 43:295-299.

Shackelford, C. E. and M.W. Lockwood. 2000. Rare and declining birds of Texas: conservation needed, Second Edition. Texas Parks and Wildlife Department, Austin Texas. 12 pp.

Siddle, C. 1992. British Columbia/Yukon Region. *American Birds* 46:1167-1170.

Sechrist, J., V. Johason, and D. Ahlers. 2009 Western yellow-billed cuckoo radio telemetry study results, Middle Rio Grande, New Mexico 2007-2008. U.S. Department of the Interior, Bureau of Reclamation, Fisheries and Wildlife Resources Group, Denver, Colorado, Albuquerque Area Office.

Small, A. 1994. California birds: their status and distribution. Ibis Publishing Co.

Spiller, S.F. 1988. Taxonomic status of the western yellow billed cuckoo--a review. Memo dated December 8, 1988, to Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico, from Field Supervisor, Phoenix Ecological Services Offices, U.S. Fish and Wildlife Service, Phoenix, AZ. 3 pp.

Sproul, J. A., Jr. 2000. Letter to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California,

regarding information on status of yellow-billed cuckoo in southern New Mexico and Far Western Texas.

State of Arizona. 1990. Final report and recommendations of the Governor's riparian habitat task force. Executive Order 89-16. Streams and riparian resources. Phoenix, Arizona. October 1990. 28 pp.

Stephens D. A. and S.H. Sturts. 1997. Idaho bird distribution. Idaho Museum of Natural History, Pocatello and Idaho Department of Fish and Game. Boise, ID.

Swarth, H.S. 1929. The faunal areas of southern Arizona: a study in animal distribution. Proceedings California Acad. Sciences, 4th Series 18:267-383. in Laymon, S.A. 2000. Supporting information for listing of the western yellow-billed cuckoo to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, April 17, 2000.

SWCA, Inc. 2002. Southwestern willow flycatcher (*Empidonax trallii extimus*) and yellow-billed cuckoo (*Coccyzus americanus*) surveys in the Tres Rios study area, Maricopa County Arizona. Unpublished report prepared for the City of Phoenix Office of Environmental Programs, Phoenix, Arizona. 35 pp. + appendices.

Todd, W.E.C. and M.A. Carriker, Jr. 1922. The birds of the Santa Marta region of Colombia: a study in altitudinal distribution. Annals of the Carnegie Museum 14:1-611. in Laymon, S.A. 2000. Supporting information for listing of the western yellow-billed cuckoo to Wayne S. White, U.S. Fish and Wildlife Service, Sacramento, California, April 17, 2000.

Tomlinson, C. 2010. Yellow-billed cuckoo (*Coccyzus americanus*) – Candidate Species Assessment – Nevada – April 14, 2010. Attachment in email to Karen Leyse, U.S. Fish and Wildlife Service, Sacramento, California. April 14, 2010. 12 pp.

U.S. Department of Agriculture. 2003. 2003 Yellow-billed cuckoo (*Coccyzus americanus*) inventory, a summary report with geo-referenced locations. Surveys in the Prescott National Forest. 8 pp.

U.S. Department of Interior. 1994. The impact of Federal programs on wetlands, Vol. II, a report to Congress by the Secretary of the Interior, Washington, DC, March 1994. Pages 1,5,13-18,213-225.

U.S. Fish and Wildlife Service. 1981. Riparian ecosystems: their ecology and status. U.S. Fish and Wildlife Service publication no. FWS/OBS-81-17, by the Eastern Energy and Land Use Team, Kearneysville, WV.

U.S. Fish and Wildlife Service. 1996. Notice of Policy. Federal Register 61:4722-4725.

U.S. Fish and Wildlife Service. 2000a. Notice of 90-day petition finding. Federal Register 65:8104-8107.

U.S. Fish and Wildlife Service. 2000b. Impacts of riprapping to ecosystem functioning, lower Sacramento River, California. U.S. Fish and Wildlife Service, Region 1. Dated June 2000. Sacramento, CA. 40 pp.

U.S. Fish and Wildlife Service. 2005. Summary Report of Native American Federal Grants Report for Nevada. Accessed on 11-8-05 (<http://faims.fws.gov>).

U.S. Fish and Wildlife Service. 2005b. Summary Report of Neotropical Grants for California and Colorado. Accessed on 11-8-05 (<http://faims.fws.gov>).

U.S. Fish and Wildlife Service. 2005c. News Release, U.S. Fish and Wildlife Service, Region 2. August 26, 2004. Information on Tribal Grant Information.

U.S. Geological Survey. 1999. North American breeding bird survey 1966-1998-trend analysis. [www.mbrpwrc.usgs.gov/bbs/trend/trenpif98.html](http://www.mbrpwrc.usgs.gov/bbs/trend/trenpif98.html).

- U.S. Geological Survey. 2004. Species affected by West Nile virus. [www.nwhc.usgs.gov/research/west\\_nile/SpeciesAffected2004.pdf](http://www.nwhc.usgs.gov/research/west_nile/SpeciesAffected2004.pdf)
- U.S. North American Bird Conservation Initiative. 2000. U.S. Fish and Wildlife Service, Arlington, VA.
- Utah Division of Wildlife Resources. 1998. Utah sensitive species list, dated February 1998. Obtained from Internet Web Site: <http://www.nr.state.ut.us/dwr/sensppl.htm>, November 5, 1999.
- Udvardy, M. D. F. 1963. Birds faunas of North America. Proceedings of the XIII Inter. Ornithological Congress. pp. 1147-1167
- Valentine, B.A., T.A. Roberts, S.P. Boland, and A.P. Woodman. 1988. Livestock management and productivity of willow flycatchers in the central Sierra Nevada. *Trans W. Sec. Wild.* 24:105-114.
- Van Tyne, J. and G.M. Sutton. 1937. The birds of Brewster County, Texas. Miscellaneous Publications No. 37, Museum of Zoology, Univ. of Michigan. Ann Arbor, MI.
- Vogl, R.J. 1980. The ecological factors that produce perturbation-dependant ecosystems. in *The Recovery Process in Damaged Ecosystems*, J. Cairns (ed). Ann Arbor Science Publishers, MI. pp. 63-94
- Washington Department of Fish and Wildlife. 2007. Washington State Candidate Species list - October 23, 2007. Obtained from (<http://wdfw.wa.gov/wlm/diversity/soc/candidat.htm>)
- Washington Natural Heritage Program. 2009. Washington animal species list - April 2009. Obtained from ([http://www1.dnr.wa.gov/nhp/refdesk/lists/animal\\_ranks.html](http://www1.dnr.wa.gov/nhp/refdesk/lists/animal_ranks.html)), operated by State of Washington, 6 November 1999. Accessed April 27, 2010.
- Wauer R. H. 1971. Ecological distribution of birds of the Chisos Mountains, Texas. *The Southwestern Naturalist*. 16(1):1-29.
- Wauer R. H. 1973. *Birds of Big Bend National Park and vicinity*. University of Texas Press. p 96.
- Werner, G. 2007. Personal communication with Greg Werner, The Nature Conservancy, Chico, CA, to Michelle Tovar, U.S. Fish and Wildlife Service, Sacramento, CA.
- Wetmore, A. 1968. Additions to the list of birds recorded from Colombia. *Wilson Bull.* 80:325-326.
- Whitfield, M. and J. Stanek. 2011. Yellow-billed cuckoo surveys in the South Fork Kern River valley in 2010, Final Report. Prepared for the U.S. Fish and Wildlife Service, Sacramento Field Office. Southern Sierra Research Station. March 30, 2011. 18 pp.
- Wilson, J.K. 1999. Breeding biology of the yellow-billed cuckoo relative to timber harvest in a bottomland hardwood forest. PhD Thesis, University of Georgia. 107 pp.
- Wright, D. 2010. Personal communication in report from Jason Beason, Rocky Mountain Bird Observatory, to U.S. Fish and Wildlife Service, Sacramento, California. Attachment in email to Karen Leyse April 20, 2010. 3 pp.
- Wyoming Game and Fish Department. 2001. Memorandum from Field Supervisor, U.S. Fish and Wildlife Service, Cheyenne, Wyoming to Dwight Harvey, U.S. Fish and Wildlife Service, Sacramento, California, regarding information on status of yellow-billed cuckoo in Wyoming.

**Approval/Concurrence:**

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:



05/31/2011  
Date

Concur:



10/07/2011  
Date

Did not concur:

\_\_\_\_\_

\_\_\_\_\_  
Date

Director's Remarks: