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Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo *(Coccyzus americanus);* Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R8– ES–2013–0104; 4500030113]

RIN 1018–AY53

Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (Coccyzus americanus)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine threatened status under the Endangered Species Act of 1973 (Act), as amended, for the western distinct population segment (DPS) of the yellow-billed cuckoo (*Coccyzus americanus*), a species located from the western portions of the United States, Canada, and Mexico. This final rule implements the Federal protections provided by the Act for this DPS.

DATES: This rule is effective November 3, 2014.

ADDRESSES: This final rule is available on the Internet at *http://www.regulations.gov* and at the Sacramento Fish and Wildlife Office at *http://www.fws.gov/sacramento/.* Comments and materials received, as well as supporting documentation used in the preparation of this rule, will be available for public inspection, by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W–2605, Sacramento, CA 95825; by telephone 916–414– 6600; or by facsimile 916–414–6712.

FOR FURTHER INFORMATION CONTACT: Jennifer Norris, Field Supervisor, Sacramento Fish and Wildlife Office (see **ADDRESSES**). If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800– 877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Endangered Species Act, a species may warrant protection through listing if it is endangered or threatened throughout all or a significant portion of its range. Listing a species as an endangered or threatened species can only be completed by issuing a rule. On October 3, 2013, we published in the **Federal Register** a proposed rule (78 FR 61621) to list the western DPS of the yellow-billed cuckoo (hereafter referred to as western yellow-billed cuckoo). This rule finalizes our determination for listing the western yellow-billed cuckoo.

The basis for our action. Under the Endangered Species Act, we can determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

We have determined that the western yellow-billed cuckoo meets the definition of a threatened species and is likely to become endangered throughout its range within the foreseeable future, based on the immediacy, severity, and scope of the threats to its continued existence. These include habitat loss associated with manmade features that alter watercourse hydrology so that the natural processes that sustained riparian habitat in western North America are greatly diminished. Loss and degradation of habitat has also occurred as a result of livestock overgrazing and encroachment from agriculture. These losses are exacerbated by the conversion of native habitat to predominantly nonnative vegetation. Habitat loss results in the additional effects associated with small and widely separated habitat patches such as increased predation and reduced dispersal potential. This threat is particularly persistent where small habitat patches are in proximity to human-altered landscapes, especially agricultural fields, resulting in the potential for pesticides to poison individual western yellow-billed cuckoos and reduce their prey base.

What the rule does. We are making a final listing determination regarding the western distinct population segment of the U.S. population of the yellow-billed cuckoo pursuant to the Endangered Species Act. This species occurs in the western United States, Canada, and Mexico. The western U.S. States include Washington, Idaho, Montana, Oregon, California, Nevada, Wyoming, Utah, Colorado, Arizona, New Mexico, and Texas. This document adds the western DPS of the yellow-billed cuckoo (*Coccyzus americanus*) as a threatened species to the List of Endangered and Threatened Wildlife (50 CFR 17.11(h)).

Peer review and public comment. We sought comments from independent specialists to ensure that our determination is based on scientifically sound data, assumptions, and analyses. We invited these peer reviewers to comment on our listing proposal. We also considered all other comments and information we received during the three open comment periods. We have considered and incorporated any pertinent information from all comments and information we received into this final rule. See the **Summary of Comments and Recommendations** section, below, for a summary of comments we received on the proposed listing.

Previous Federal Actions

On October 3, 2013, the proposed rule to list the western yellow-billed cuckoo as a threatened species under section 4 of the Act (16 U.S.C. 1531 *et seq.*) was published in the **Federal Register** (78 FR 61621). This rule finalizes the Federal action for this species. For additional information on previous Federal actions for the western yellow-billed cuckoo, please see the 12-month petition finding (66 FR 38611; July 25, 2001) and proposed listing rule (78 FR 61621; October 3, 2013).

We proposed critical habitat for the western DPS of the yellow-billed cuckoo on August 15, 2014 (79 FR 48547).

Background

In this section of the final rule, it is our intent to discuss only those topics directly relevant to the listing of the western yellow-billed cuckoo as a threatened species. Please refer to the proposed listing rule for the western yellow-billed cuckoo for detailed background and species information (78 FR 61621; October 3, 2013).

Species Information

The yellow-billed cuckoo (*Coccyzus americanus*) is a member of the avian family Cuculidae and is a Neotropical migrant bird that winters in South America and breeds in North America. Yellow-billed cuckoos spend the winter in South America, east of the Andes, primarily south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (Ehrlich *et al.* 1992, pp. 129–130; American Ornithologists' Union (AOU) 1998, p. 247; Johnson *et al.* 2008b, pp. 18–29). The breeding range of the entire species formerly included most of North America from southeastern and western Canada (southern Ontario, Quebec, and southwestern British Columbia) south throughout the continental United States to the Greater Antilles and

northern Mexico (AOU 1957, pp. 269–270; AOU 1983, p. 284; AOU 1998, p. 247). Currently, the species no longer breeds in western Canada and the northwestern continental United States (Washington, Oregon, and Montana).

Adult yellow-billed cuckoos have a fairly stout and slightly down-curved bill; a slender, elongated body with a long-tailed look; and a narrow yellow ring of colored, bare skin around the eye. The plumage is loose and grayish-brown above and white below, with reddish primary flight feathers. The tail feathers are boldly patterned with black and white below. They are a medium-sized bird about 12 inches (in) (30 centimeters (cm)) in length, and about 2 ounces (oz) (60 grams (g)) in weight. The bill is blue-black with yellow on the basal half of the lower mandible. The legs are short and bluish-gray. All cuckoos have a zygodactyl foot with two toes pointing forwards and two toes pointing backwards. Juvenile yellow-billed cuckoos resemble adults, except the tail patterning is less distinct and the lower bill has little or no yellow. Males and females differ slightly and are indistinguishable in the field (Hughes 1999, pp. 2–3).

Typically a secretive and hard-to-detect bird, adult yellow-billed cuckoos have a distinctive ''kowlp'' call, which is a loud, nonmusical series of notes that slows down and slurs toward the end. Yellow-billed cuckoos advertise for a mate using a series of soft ''cooing'' notes, which they give at night as well as during daytime. Both members of a pair use a soft knocking call as a contact or warning call near the nest (Hughes 1999, pp. 8–9). Please refer to the October 3, 2013, proposed listing rule (78 FR 61623–61642) for additional species information.

Taxonomy

Recent research on yellow-billed cuckoo genetics using mitochondrial DNA did not find any fixed genetic differences between eastern and western yellow-billed cuckoos (Farrell 2013, pp. 165–170). The author concluded that the separation into distinct subspecies may be too recent to be expressed in a single mitochondrial gene and recommended future studies using next-generation sequencing techniques. Avian geneticist Janice Hughes, Ph.D., a peer reviewer of the proposed listing rule, concluded that close examination of the DNA studies conducted to date on cuckoos infers a deeper genetic divergence between western and eastern cuckoos that with further analysis would likely support division of the yellow-billed cuckoo into two subspecies. She indicated that genetic markers used in all three previously conducted genetics studies evolve too slowly to reveal genetic structure within the species. She recommended that future studies use microsatellite techniques because they would be more informative to a study of DNA at the subspecies level. The existing DNA studies, however, show that western yellow-billed cuckoos have developed unique genetic haplotypes not present in eastern cuckoos and that these are reflected in phenotypic (outwardly visible) divergence that has been observed between eastern and western yellow-billed cuckoos. Please refer to the October 3, 2013, proposed listing rule (78 FR 61624–61645) for a more detailed discussion of information on taxonomy for the species.

Distinct Vertebrate Population Segment Analysis

Under the Act, we must consider listing any species, subspecies, or, for vertebrates, any DPS of these taxa if there is sufficient information to indicate that such action may be warranted. To implement the measures prescribed by the Act and its Congressional guidance, we (along with the National Marine Fisheries Service) developed policy that addresses the recognition of DPSs for potential listing actions (61 FR 4722; February 7, 1996). 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.

Before we can evaluate whether a given population segment is a DPS under the Act, we must first determine if any population segments exist for the vertebrate species. As discussed in the *Taxonomy* section of the proposed rule (78 FR 61621; October 3, 2013), much of the available scientific information supports the yellow-billed cuckoos that nest in western North America as a biologically separate population segment.

To establish the range of the population segment under consideration, we used the area occupied by the western yellow-billed cuckoo (the subspecies) originally defined by Ridgway (1887, p. 273) and later refined by other researchers (AOU 1957, pp. 269–270; Oberholser and Kincaid 1974, pp. 434–435; Hughes 1999, Figure 1). After careful consideration of other possible population segment configurations, we determined that the Continental Divide (generally the crest of the Rocky Mountains based on watershed boundaries), the watershed divide between the Rio Grande and Pecos River, and the Chihuahuan Desert in Mexico was the best division between eastern and western populations. The area that we are considering occupied by the potential western DPS for the yellow-billed cuckoo is closely aligned with the traditionally defined range of the western yellow-billed cuckoo subspecies as partially described in the July 25, 2001, 12-month finding (66 FR 38611). Our goal is to determine if this western population meets the criteria of a DPS and, if so, whether the range boundaries identified in the literature are appropriate for the boundary of the DPS. This DPS analysis is based solely on the range during the breeding season because the migration route and winter range of western yellow-billed cuckoos are poorly known.

The geographical breeding range of the yellow-billed cuckoo in western North America includes suitable habitat within the low- to moderate-elevation areas west of the crest of the Rocky Mountains in Canada, Mexico, and the United States, including the upper and middle Rio Grande, the Colorado River Basin, the Sacramento and San Joaquin River systems, the Columbia River system, and the Fraser River. In Mexico, the range includes the Cape Region of Baja California Sur, and river systems in the Mexican States of Sonora, Sinaloa, western Chihuahua, and northwestern Durango. Eastern yellow-billed cuckoos (*Coccyzus americanus americanus*) breed east of the Rocky Mountains; north to North Dakota and southern Ontario, Canada; south to eastern Mexico; and on the islands of the Caribbean (AOU 1957, pp. 269–270) (Figure 1).

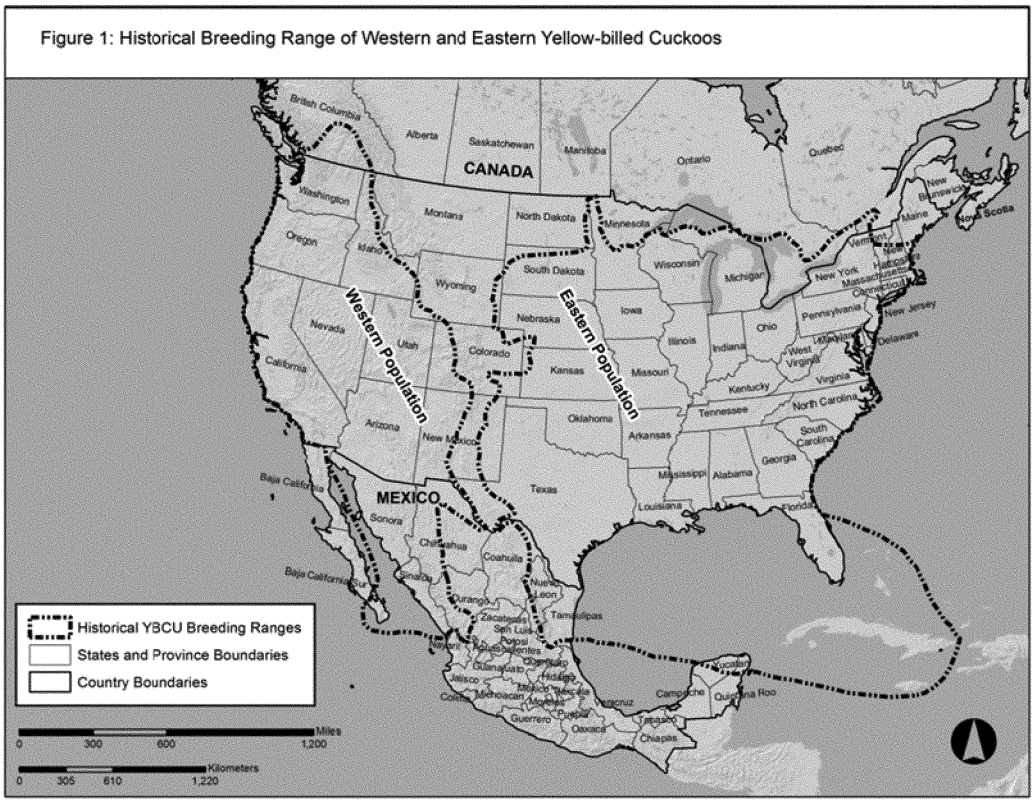

Figure 1. Historical Breeding Range of Eastern and Western Yellow-billed Cuckoos based on American Ornithological Union's 1957 Checklist.

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. The elements are: (1) Discreteness of the population segment in relation to the remainder of the species to which it belongs; (2) the significance of the population segment to the species to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing. In other words, if we determine that a population segment of a vertebrate species being considered for listing is both discrete and significant, we would conclude that it represents a DPS, and thus a ''species'' under section 3(16) of the Act, whereupon we would evaluate the level of threat to the DPS based on the five listing factors established under section 4(a)(1) of the Act to determine whether listing the DPS as an ''endangered species'' or a ''threatened species'' is warranted.

Below, we evaluate under our DPS policy whether the population segment of yellow-billed cuckoos that occurs in the western United States, northwestern Mexico, and southwestern Canada qualifies as a DPS under the Act.

Discreteness

Under our DPS Policy, a population segment of a vertebrate species may be considered discrete if it satisfies either of the following two 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); or (2) it is delimited by international governmental boundaries within which significant 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.

The analysis of the population segment of the yellow-billed cuckoo in western North America is based on the first of those two conditions, the marked separation from other populations. From southwest British Columbia along the Canadian border to the southern end of the Sangre de Cristo Mountains in northern New Mexico, nesting yellow-billed cuckoos in western North America are separated from nesting yellow-billed cuckoos in eastern North America by the high-elevation zone of the Rocky Mountains. Yellow-billed cuckoos breed both east and west of the crest of the Rocky Mountains, where suitable habitat occurs (Johnsgard 1986, p. 201). We generally define the crest of the Rocky Mountains and Continental Divide as the high-elevation zone between the drainages flowing west and east in the United States, Canada, and Mexico, although some areas such as near the Sangre de Cristo Range in southern Colorado and northern New Mexico is east of the east-flowing Rio Grande River. The division between the western and eastern population segments spans a distance of about 2,200 miles (mi) (3,540 kilometers (km)) from southwest British Columbia near the Canadian border along the crest of the Rocky Mountains based on watershed boundaries, south along the Rio Grande-Pecos Rivers watershed divide to the United States-Mexico border in the Big Bend area of Texas, then into Mexico along the eastern and southern boundaries of the State of Chihuahua south to the southern border of the State of Durango and to the Pacific Ocean along the southern border of the State of Sinaloa. The distance of separation between breeding yellow-

billed cuckoos in the east and west varies along this division from 160 mi (257 km) to more than 400 mi (644 km), and consists entirely of areas of unoccupied, unsuitable habitat for breeding yellow-billed cuckoos. The one exception to this distance of separation is along the Rio Grande in Brewster County, in southwestern Texas, where eastern yellow-billed cuckoos breed as far west as Rio Grande Village and western yellow-billed cuckoos are found upstream along the river approximately 50 mi (80 km) to the west.

Yellow-billed cuckoos historically bred at the southern tip of Vancouver Island and in the Fraser River valley north to Kamloops in southwestern British Columbia, Canada (Bent 1940, p. 64; Campbell *et al.* 1990, p. 481). The species was apparently never common, with 23 records (18 specimen and 5 sight records) between 1881 and 1927. Two of these observations were of pairs believed to be nesting but not confirmed. Since the 1920s, the species has been recorded five times in British Columbia, with four of those records occurring since 1990 from the eastern half of the Province in areas not considered breeding habitat (Campbell *et al.* 1990, p. 481; Siddle 1992, p. 1169; Cornell Lab of Ornithology 2012). Today, the species is considered extirpated as a breeder from the Province, but adult, nonbreeding individuals still occur irregularly (British Columbia Conservation Data Centre 2013).

In the northern Rocky Mountains and northern Great Plains—from the Canada border south through Colorado—the yellow-billed cuckoo is ''extremely rare and local'' as a breeding bird both east and west of the Rocky Mountains (Hughes 1999, p. 3). While the species breeds locally in river valleys in southern Idaho, southwestern Wyoming, western Colorado, and in Utah (Hughes 1999, pp. 1–3), it is quite rare or absent within the higher Rocky Mountains (Johnsgard 1986, p. 201). An examination of the distributional records for the Rocky Mountain region indicates that the area has had few records of yellow-billed cuckoos and the species is even scarcer at elevations above approximately 6,000 feet (ft) (1,850 meters (m)), and almost never breeds above 7,000 ft (2,154 m) (Bailey 1928, pp. 307–309; Phillips *et al.* 1964, p. 45; Bailey and Niedrach 1965, pp. 404–406; Johnsgard 1986, p. 201; Corman and Magill 2000, pp. 10, 15; Howe and Hanberg 2000, p. 1–20). Exceptions to the elevational limit do occur and recent records of yellow-billed cuckoos have been confirmed above 6,000 ft (1,850 m) in the areas of Lower Green River Basin from the Seedskadee National Wildlife Refuge (NWR) to the Flaming Gorge Reservoir and west to the Bear River Drainage in Wyoming; along the Yampa River near Craig in northwest Colorado, and the Rio Grande River near Del Norte, and San Luis Valley of south-central Colorado; and the Henry's Fork River in Utah and Wyoming. Nevertheless, most of the crest of the Rocky Mountains includes a wide region of higher elevation where habitat for the species does not occur. In Colorado and Wyoming, the region above 6,000 ft (1,850 m) is typically more than 150 mi (240 km) wide on an east-west axis (Oxford 1995, p. 82).

The separation of the western yellow-billed cuckoo population segment from yellow-billed cuckoos in the eastern population segment continues south along the crest of the Rockies into southern Colorado and northern New Mexico, then the Rocky Mountains end and the separation is along the watershed boundary between the Rio Grande and the Pecos Rivers in central New Mexico (Sangre de Cristo Mountains), and southwest Texas, terminating at the Rio Grande in the Big Bend National Park. In this region, the eastern and western yellow-billed cuckoo populations are separated by arid basins and isolated mountain ranges that emerge from a high desert plateau. These mountain ranges from north to south include the Sangre de Cristo Mountains and Sacramento Mountains in central and southern New Mexico, the Guadalupe Mountains and Delaware Mountains on the Texas-New Mexico border, and the Davis Mountains, Del Norte Mountains, and Santiago Mountains in western Texas south to the Chisos Mountains in the Big Bend National Park on the border with Mexico.

In southern New Mexico and western Texas where western yellow-billed cuckoos nest along the Rio Grande and eastern yellow-billed cuckoos nest along the Pecos River, the geographical separation is as little as 160 mi (257 km) and even closer along the Rio Grande (50 mi; 80 km). The closer proximity of western and eastern yellow-billed cuckoos in this region may be caused in part by the lower height of the mountain range being a less effective barrier (Hubbard 1978, p. 32; Howe 1986, p. 2). Historically, this gap was wider, because the banks of the Pecos River did not have riparian woodland and the area was not used by the species. Today, the riverine habitat along the Pecos River consists primarily of introduced tamarisk (*Tamarix* spp.), and it is thought that yellow-billed cuckoos from eastern North America have colonized the Pecos River system. Much of the area between the Pecos River and the Rio Grande in New Mexico and Texas consists of internal ephemeral drainages that are not connected to any major river systems and have no riparian habitat. Considering these factors along with the information on physical factors, we have included Texas west of the Rio Grande-Pecos River watershed boundary within the range of the western population. This physical division coincides with behavioral differences between eastern and western yellow-billed cuckoos, as discussed below.

South of the United States-Mexico border, yellow-billed cuckoos are separated by extensive areas of desert that lack suitable nesting and foraging habitat. In Mexico, the Chihuahuan Desert widens to 350 mi (563 km), and includes nearly all of the States of Chihuahua and Coahuila. There are very few records of yellow-billed cuckoos for this region, and we are not aware of any nesting records for either State. Suitable breeding habitat or connective riparian corridors are also lacking. Published range maps for the species do not include the eastern three-quarters of Chihuahua or the western three-quarters of Coahuila as part of the species' breeding range (Howell and Webb 1995, p. 347; Hughes 1999, p. 1). There are only 12 records of yellow-billed cuckoos from Chihuahua: 11 specimens from the 1940s to 1960, and a sight observation in 2003. There are only nine records of the species from Coahuila: six specimen and three sight records (1958, 1988, and 2011). Three of the specimens from Coahuila were identified as eastern yellow-billed cuckoos on their museum records, and the others were not identified to subspecies. Seven specimens from Chihuahua were identified to subspecies and six of these were considered the western subspecies. It is likely that many, if not most, of the records from this region are of migrating yellow-billed cuckoos, as 16 are from May to mid-June or from late September, and only 5 are from late June or July, the primary breeding season.

From this information we concluded that the Chihuahua-Coahuila border was the most biologically supportable boundary for the population segment. The boundary then follows the southern border of Chihuahua west to the Continental Divide, then south along the divide through the State of Durango and west along the southern border of Durango and Sinaloa. There are no breeding season records for yellow-billed cuckoos from the State of Nayarit or Jalisco or farther south along the

Pacific coast of Mexico. The species has occurred sporadically in the State of Zacatecas, but the records are from east of the Continental Divide.

Eastern and western yellow-billed cuckoos are highly migratory, and the two populations may spend winters in overlapping regions in South America. However, we do not have information to indicate that there is anything more than an extremely low level of interchange (if any at all) between the two populations during the breeding season. This conclusion is supported by differences in habitat use and morphology, which are genetically controlled traits, as discussed in the following sections.

Although the Rocky Mountains and the Chihuahuan Desert may not wholly prevent movement of yellow-billed cuckoos between the east and west, especially in a migratory species that winters far to the south, and moves thousands of miles between its wintering and breeding grounds, the available information indicates that this mountain range and desert substantially separates yellow-billed cuckoo populations during the breeding season, thereby effectively separating them into discrete populations. The separation between yellow-billed cuckoo population segments in the east and west is a physical one that is maintained by their behavioral differences, which we discuss below.

Behavioral Discreteness

Data collected from publications and other sources demonstrate the existence of behavioral differences between yellow-billed cuckoos in the east and west.

Yellow-billed cuckoo populations in the east and west differ in the timing of arrival on the breeding grounds in the spring. Yellow-billed cuckoos in western North America arrive on the breeding grounds 4 to 8 weeks later than eastern yellow-billed cuckoos at similar latitude (Franzreb and Laymon 1993, pp. 24–25; Hughes 1999, pp. 5–6, 12–13; Laymon 2000, *in. litt.,* pp. 15–16). Timing of spring migration and arrival on the breeding grounds has been determined to be the result of an evolved response under genetic control, and is likely caused by east-west climatic, habitat, and food availability differences (Cresswell *et al.* 2011, pp. 13–15; Pulido *et al.* 2001). The watershed boundary between the Rio Grande and the Pecos Rivers also appears to separate yellow-billed cuckoos that arrive in spring migration earlier on the Pecos River and those that arrive later on the Rio Grande in addition to separating morphological differences.

Information, including timing of migration, indicates that yellow-billed cuckoos from Texas west of the Pecos River (from the Rio Grande upstream of Big Bend) and from northwestern Mexico (Chihuahua, Sonora, Sinaloa, Durango, Baja California Sur) exhibit greater similarity to yellow-billed cuckoos in western North America, and those on the Pecos River in Texas and eastern Mexico (Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosi) are more similar to yellow-billed cuckoos in the east (Wauer 1971, p. 96; Oberholser and Kincaid 1974, pp. 434–435; Franzreb and Laymon 1993, pp. 17–28; Hughes 2000, *in litt.* pp. 1–2, 26; Sproul 2000, *in litt.,* pp. 1–5). Based on the best available science, the watershed boundary between the Rio Grande and Pecos Rivers is the optimum dividing line between eastern and western yellow-billed cuckoo in this area.

Based on migration timing, yellow-billed cuckoos split into two populations. This split occurs along the line that corresponds with the traditional subspecies boundary (see Figure 1, above).

Discreteness Conclusion

The available information indicates that the yellow-billed cuckoo population segment that occurs west of the Continental Divide (as defined above) in the United States, in southwestern Canada, and in northwestern Mexico is markedly separated from the eastern population segment of yellow-billed cuckoo, including those that nest in eastern North America, eastern Mexico, certain Caribbean Islands, and the Yucatan Peninsula. The distribution of the western populations is markedly separated physically (geographically) during the breeding season from the distribution of other yellow-billed cuckoo populations by high mountains, extensive desert, or nonhabitat areas with the shortest geographical separation occurring across 160 mi (257 km) of desert between the Pecos River and Rio Grande in southern New Mexico and western Texas with the exception of nesting of western yellow-billed cuckoos near Big Bend National Park in Texas. Evidence that this geographical separation between populations has been consistent through time may be found in the differences in the two populations' biology and morphology. Even in this area of closest proximity, information on genetically controlled behavior available in the scientific literature provides evidence of a biological separation between the western populations and eastern populations.

Under our DPS policy, the standard for discreteness does not require absolute separation because this can rarely be demonstrated for any population of organism. For the yellow-billed cuckoo populations in western North America, we have met this standard, and, therefore, we consider the western population segment of the yellow-billed cuckoo from southern British Columbia, Canada south along the Continental Divide (including the Rio Grande basin) in the United States into Mexico, and ending at the coast in the State of Sinaloa, Mexico, to be discrete per our DPS policy. We conclude that the western population segment of the yellow-billed cuckoo is discrete from the remainder of the species because the yellow-billed cuckoo population segment that nests west of the Continental Divide (as defined above) and in northwestern Mexico is markedly separated geographically and behaviorally from all other populations of yellow-billed cuckoo, including those that nest in eastern North America.

Significance

Under our DPS policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. Our DPS policy provides several potential considerations that may demonstrate the significance of a population segment to the remainder of its taxon, including: (1) Evidence of the 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 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 the remainder of the species in its genetic characteristics.

We have found substantial evidence that two of these four significance criteria (numbers 2 and 4) are met by the discrete population segment of yellow-billed cuckoos that occurs west of the Continental Divide (as defined above). We address these significance factors below as they relate to the population segment of western yellow-billed cuckoo. We focus on whether the loss of this population segment would result in a significant gap in the range of the taxon and evidence that the discrete

population segment differs from other population segments in its genetic characteristics in demonstrating significance of the DPS.

Evidence That Loss of the Discrete Population Segment Would Result in a Significant Gap in the Range of the Taxon

Loss of the discrete population segment would result in a significant gap in the range of the taxon because an extensive area would be without yellow-billed cuckoos if the western population segment were lost. Seven entire States and substantial portions of five additional States in the United States, and six States in Mexico, that are currently occupied would have no breeding populations of the species. Bird migration experts divide the North American continent into four migratory flyways: The Atlantic, Mississippi, Central, and Pacific. The range of the yellow-billed cuckoo west of the Rocky Mountains covers the entire Pacific flyway and half of the Central flyway. Additionally, the range of the yellow-billed cuckoo west of the Rocky Mountains covers 1,350,000 square (sq) mi (3,496,500 sq km), or approximately 40 percent of the lower 48 States. Even though the actual area occupied by the species in western North America is less than the total area identified above, the potential loss of the western population of the yellow-billed cuckoo would constitute a significant gap in the range of the species in North America.

Evidence That the Discrete Population Segment Differs Markedly From Other Populations of the Species in Its Genetic Characteristics

Data collected from publications and other sources demonstrate the existence of morphological and physiological differences between yellow-billed cuckoos in the east and west. Morphologically, the yellow-billed cuckoos in western North America are generally larger, with significantly longer wings, longer tails, and longer and deeper bills (Franzreb and Laymon 1993, p. 25). Banks, in a review of the species taxonomic status (1988, pp. 473–477), grouped yellow-billed cuckoo specimens into 19 regional groups, 7 in the western United States and western Mexico, 10 in the eastern United States and eastern Mexico, 1 in New Mexico, and 1 in the Caribbean. He found yellow-billed cuckoos in the east to be uniform in measurement throughout their range and yellow-billed cuckoos in the west to be uniform in measurements throughout their range (Banks 1988, p. 475). Banks stated that the change from smaller to larger yellow-billed cuckoos appeared to take place in extreme western New Mexico or extreme eastern Arizona (Banks 1988, p. 476). A subsequent analysis, based on available specimens from New Mexico and western Texas, showed the watershed boundary between the Pecos River and the Rio Grande as the apparent boundary between the smaller eastern and larger western birds, with a majority of yellow-billed cuckoos on the Rio Grande above Big Bend being larger western birds (63 percent, n=19) and the majority of yellow-billed cuckoos on the Pecos River being smaller eastern birds (82 percent, n=11) (Franzreb and Laymon 1993, p. 25). This is the only area where the ranges of the western and eastern population segments are in close proximity; elsewhere the two populations are separated by wide expanses of unsuitable, unoccupied habitat (see Figure 1, above).

One peer reviewer measured 35 cuckoos from the Rio Grande and 25 cuckoos from the Pecos River in the field. With the exception of wing and tail measurements, accurate measurements are hard, if not impossible, to obtain from live birds under field conditions. Male and female cuckoos averaged longer wings and tails on Rio Grande than on the Pecos River, with the difference being more pronounced on male than on female cuckoos. Sample sizes were insufficient to do t-tests to compare the means for the wing and tail data. The bill measurements that the reviewer took in the field were not reliable and therefore could not be compared, and as a result the comparison using the Discriminant Function equations developed by Franzreb and Laymon (1993, pp. 17–28) could not be used reliably on the data.

Other physical and morphological differences exist between yellow-billed cuckoos in the east and west, and provide additional evidence of ecological significance. These include:

- Yellow-billed cuckoos in western North America produce larger eggs (1.2 percent longer, 0.6 percent wider, and 3.2 percent heavier) with thicker eggshells (7.1 percent thicker) (Hughes 1999, p. 14), which is an evolved trait that would help yellow-billed cuckoos in the west to cope with potential higher egg water loss in the hotter, drier conditions of western North America (Hamilton and Hamilton 1965, pp. 426–430; Ar *et al.* 1974, pp. 153–158; Rahn and Ar 1974, pp. 147–152).
- Juvenile yellow-billed cuckoos in the east have yellow bills (Oberholser and Kincaid 1974, pp. 434–435), while juvenile yellow-billed cuckoos in the west have all-black bills (Franzreb and Laymon 1993, p. 26).
- Adult yellow-billed cuckoos in the west have a lower mandible that is orange-yellow, while yellow-billed cuckoos in the east have lower mandibles that are bright yellow (Franzreb and Laymon 1993, p. 26; Laymon 2000, *in litt.,* p. 14).
- As noted previously, adult yellow-billed cuckoos in the west are larger and heavier, on average, than adult yellow-billed cuckoos in the east. More than 80 percent of individuals can be assigned to east or west based on morphological measurements (see also Oberholser and Kincaid 1974, pp. 434–435; Banks 1988, pp. 473–477; 1990, p. 538; Franzreb and Laymon 1993, pp. 17–28). The size differences between eastern and western cuckoos are discussed in detail in the *Taxonomy* section of the proposed rule (78 FR 61624–61625; October 3, 2013).

Information, including morphology, indicates that yellow-billed cuckoos from Texas west of the Pecos River (from the Rio Grande upstream of Big Bend) and from northwestern Mexico (Chihuahua, Sonora, Sinaloa, Durango, Baja California Sur) exhibit greater similarity to yellow-billed cuckoos in western North America, and those on the Pecos River in Texas and eastern Mexico (Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosi) are more similar to yellow-billed cuckoos in the east (Wauer 1971, p. 96; Oberholser and Kincaid 1974, pp. 434–435; Franzreb and Laymon 1993, pp. 17–28; Hughes 2000, *in litt.* pp. 1–2, 26; Sproul 2000, *in litt.,* pp. 1–5). Based on the best available science, the watershed boundary between the Rio Grande and Pecos Rivers is the optimum dividing line between eastern and western yellow-billed cuckoo in this area.

Based on morphological measurements, bill color of young and adults, egg size and weight, and migration timing, yellow-billed cuckoos split into two populations. This split occurs along the line that corresponds with the traditional subspecies boundary (see Figure 1, above). Phenotypically or outwardly expressed traits present substantial evidence that the western population segment of yellow-billed cuckoo differs markedly from other populations of the species.

However, the strongest evidence of differences between yellow-billed cuckoos in the western population segment and those of the east in genetic characteristics is the difference in timing of migrations. This difference can only have developed as an evolved trait in response to environmental factors over a long period of time, and thus is genetically linked (Cresswell *et al.* 2011, pp. 13–15; Pulido *et al.* 2001). As previously discussed, the difference

in size of yellow-billed cuckoos between east and west, as well as differences in size, weight, and shell thickness of eggs, are also evolved genetically linked traits. As discussed in the October 3, 2013, proposed rule, researchers have developed methods using these phenotypic (outwardly expressed) traits that correctly predicted separation for nearly 90 percent of yellow-billed cuckoos that were eastern, and up to approximately 86 percent that were western (Franzreb and Laymon 1993, pp. 17–28). Thus, based on the phenotypic traits, there is indirect evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Significance Conclusion

The best available information indicates that the discrete yellow-billed cuckoo population segment that nests west of the Continental Divide (as defined above) and in northwestern Mexico is important to the taxon to which it belongs because: (1) Loss of the population segment would leave a significant gap in the species' range (more than one third of the species' range would be vacant); and (2) it differs markedly from other yellow-billed cuckoo populations in morphology (e.g., western yellow-billed cuckoos are larger) Therefore, we conclude that the western population segment of the yellow-billed cuckoo is *significant* per our DPS Policy.

DPS Conclusion

Based on the best scientific and commercial data available on distribution as well as behavioral and morphological characteristics of the species, we have determined that the western population segment of the yellow-billed cuckoo is both discrete and significant per our DPS policy. Therefore, we conclude that the western distinct population segment of the yellow-billed cuckoo is a DPS, and thus a ''species'' under section 3(16) of the Act. Our determination of biological and ecological significance is appropriate because the population segment has a geographical distribution that is biologically meaningful.

The term ''distinct population segment'' is not commonly used in scientific discourse. As such, and in contrast to taxonomically defined species and subspecies, there is no established name for the western distinct population segment of the yellow-billed cuckoo in the available literature; we will refer to this ''species'' (DPS) as the western yellow-billed cuckoo. The range of the western yellow-billed cuckoo in Canada includes the area of Vancouver Island and along the Fraser River system upstream to Kamloops to the Rocky Mountains west of the Continental Divide. In the United States the DPS includes the area west of the Continental Divide, south through Montana, Wyoming, Colorado, and along the watershed divide between the upper and middle Rio Grande and Pecos Rivers in New Mexico and Texas, south to Big Bend in southwestern Texas, and extending to the States of the west coast. In Mexico, the DPS is the area west of the eastern and southern border of the State of Chihuahua, west of the Continental Divide in the State of Durango, and the southern border of the State of Sinaloa (Figure 2).

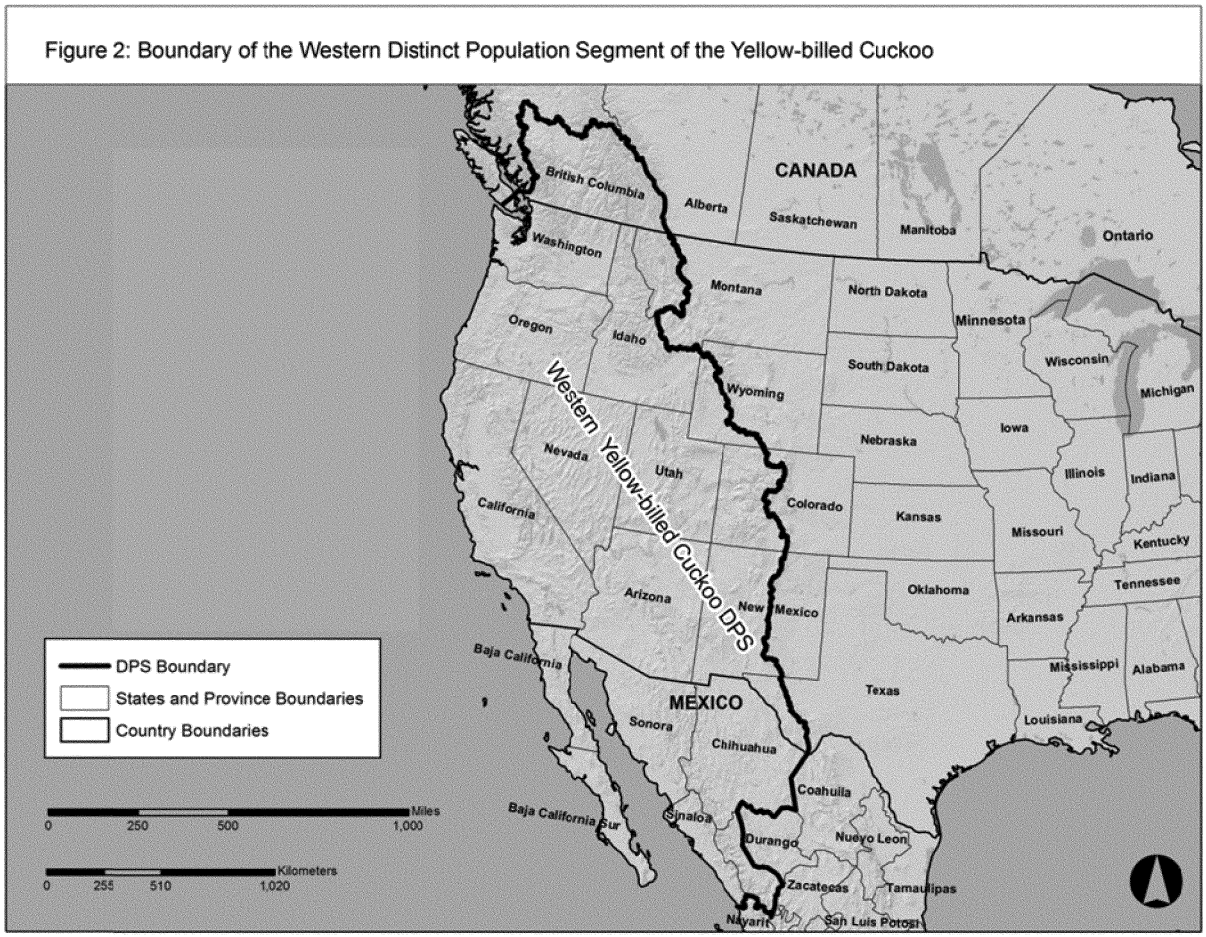

Figure 2. Western Yellow-billed Cuckoo distinct population segment boundary.

Summary of Comments and Recommendations

In the proposed rule published on October 3, 2013 (78 FR 61621), we requested that all interested parties submit written comments on the proposal by December 2, 2013. The comment period was reopened on December 26, 2013, and remained open until February 24, 2014 (78 FR 78321). The comment period was reopened again on April 10, 2014, and remained open until April 25, 2014 (79 FR 19860). We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. Newspaper notices inviting general public comment were published in the Idaho State Journal (Pocatello, ID), Post Register (Idaho Falls, ID), Idaho Mountain Express (Sun Valley, ID), Idaho Statesman (Boise, ID), Coeur d'Alene Press (Coeur d'Alene, ID), Las Vegas Sun (Las Vegas, NV), Las Vegas Review-Journal (Las Vegas, NV), Reno Gazette-Journal (Reno, NV), The Oregonian (Portland, OR), Yakama Herald, (Yakima, WA), Wenatchee World (Wenatchee, WA), The Olympian (Olympia, WA), The Spokesman Review (Spokane, CA), Bellingham Herald (Bellingham, WA), Salt Lake Tribune (Salt Lake City, UT), Helena Independent Record (Helena, MT), The Missoulian (Missoula, MT), Valley Courier (Alamosa, CO), Craig Daily Press (Craig, CO), (The Daily Sentinel (Grand Junction, CO), El Paso Times (El Paso, TX), Albuquerque Journal (Albuquerque, NM), The Arizona Republic (Phoenix, AZ), The Californian (Bakersfield, CA), and Press-Enterprise (Riverside, CA). We did not receive any requests for a public hearing.

During the comment periods for the proposed rule, we received 34,459 comment letters directly addressing the proposed listing of the western DPS of the yellow-billed cuckoo as a threatened species. The vast majority of these comment letters voiced their support or opposition to the action, but did not provide significant supporting information on the proposed listing. A total of 34,380 letters were in support of the listing, while 54 letters were in opposition to listing, with 25 commenters providing additional information, but took no position on the listing of the species. Approximately 141 of these comment letters provide additional information or comments. All substantive information provided during comment periods has either been incorporated directly into this final determination or is addressed below.

Peer Review

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), we solicited expert opinion from five knowledgeable individuals with scientific expertise that included familiarity with the yellow-billed cuckoo and its habitat, biological needs, and threats. We received responses from all five of the peer reviewers.

We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the listing of the western DPS of the yellow-billed cuckoo. The peer reviewers generally concurred with our methods and conclusions, and provided additional information, clarifications, and suggestions to improve the final

rule. Peer reviewer comments are addressed in the following summary and incorporated into the final rule as appropriate.

Peer Reviewer Comments

(1) *Comment:* One reviewer discussed the heritability of migration timing, indicating that the difference in migration timing between eastern and western cuckoos is reflective of genetic differences and added a supportive reference (Pulido *et al.* 2001).

Our Response: In the proposed and this final rule, we outlined our reasoning for determining that the western populations of the yellow-billed cuckoo constitute a valid DPS (see **Distinct Vertebrate Population Segment Analysis**, above). In our determination, we relied on behavioral and morphological and other characteristics of the species to support separation and distinctness from yellow-billed cuckoos in the east. Although genetics most likely play a role in behavioral and morphological aspects of a species, in our determination we did not rely on specific genetic information or separation to come to our conclusion. The views of the peer reviewer and the information they provided (Pulido *et al.* 2001, pp. 149–158) further support our conclusions reached in determining a valid DPS for the western yellow-billed cuckoo. We revised this final rule to include the information provided.

(2) *Comment:* One reviewer stated that a close examination of the DNA studies conducted on cuckoos to date would infer a deeper genetic divergence between western and eastern cuckoos than presented in the proposed rule and that further analysis would likely support division of species into two subspecies. The reviewer also provided a critique of the techniques used in the studies to date, noting that markers used in all three genetics studies evolve too slowly to reveal genetic structure within the species, and that the choice of outgroup for study comparison was flawed in one study.

Our Response: See response to *Comment* 1 above for a discussion of how we used genetic information in our DPS determination. Although we agree that further studies and information on the genetics for the yellow-billed would assist in further validating our determination of separation between eastern and western yellow-billed cuckoo populations, we must rely on the best scientific or commercial data available to make our listing determinations. We appreciate the information provided and have made some revisions to the DPS analysis to incorporate citations provided by the peer reviewer, as needed.

(3) *Comment:* Two reviewers indicated that recent research has shown that vocalizations cannot be reliably used to determine the sex of cuckoos in the field. Two public commenters also raised this concern.

Our Response: We concur and have revised the text to clarify information on vocalizations for the western yellow-billed cuckoo.

(4) *Comment:* One reviewer indicated that the habitat section could be strengthened by presenting habitat models that have been developed. This reviewer suggested that the presentation of tamarisk as a habitat component could be improved by using information from several references from research on the Colorado River (see Johnson *et al.* 2008a, Johnson *et al.* 2012, McNeil *et al.* 2012). Within-patch vegetation measurements show that sites occupied by western yellow-billed cuckoos do not include dense tamarisk patches.

Our Response: Based on observations of western yellow-billed cuckoos, we have identified riparian trees including willow (*Salix* sp.), Fremont cottonwoods (*Populus fremontii*), alder (*Alnus* sp.), walnut (*Juglans* sp.), sycamore (*Platanus* sp.), boxelder (*Acer* sp.), ash (*Fraxinus* sp.), mesquite (*Prosopis* sp.), and tamarisk (*Tamarix* sp.) as habitat that provides cover, shelter, foraging, and dispersing habitat for the western yellow-billed cuckoo. Tamarisk is considered a nonnative, invasive species across the West. Although the western yellow-billed cuckoo uses tamarisk as a component of its habitat, it is usually in areas where the habitat has been degraded. We appreciate the peer reviewer's information on habitat modeling and will review this information in development of any final critical habitat determination for the species. We have reviewed the information provided by the reviewer and have revised our discussion of habitat selection and tamarisk use and compatibility for the western yellow-billed cuckoo in this final rule (see ''Use of Tamarisk by Western Yellow-billed Cuckoos and the Spread of the Introduced Tamarisk Leaf Beetle into the Southwest,'' below).

(5) *Comment:* One reviewer suggested that estimates of breeding populations of western yellow-billed cuckoos may be overestimates and the numbers may be even lower than indicated in the proposed rule.

Our Response: We are aware of the difficulties in obtaining accurate counts of western yellow-billed cuckoos. Survey methods for western yellow-billed cuckoos have evolved over time since the first play-back surveys were conducted in California in the 1970s. Some changes in survey method include changes in the distance between calling stations (100 vs. 200 meters), changes in the number of calls played at calling stations (5 vs. 10 calls), number of surveys carried out during the breeding season (2 to 5 surveys), and the timing of the surveys (1 June to 15 August vs. 15 June to 1 August). Despite these changes, general response rates have remained constant. On average, an individual western yellow-billed cuckoo will respond to playback call 50 percent of the time, and one member of a pair will respond 75 percent of the time. With a second visit, the probability of an individual responding has risen to 75 percent, and the probability of one member of a pair responding has risen to 94 percent. With three visits, the probability of an individual responding is 94 percent, and the probability of one member of a pair responding is 99.6 percent.

Obtaining accurate survey results are made more difficult because: (1) Western yellow-billed cuckoos often have helper males at the nest; (2) they are only loosely territorial; (3) nests of adjacent pairs can be very close to each other; (4) female western yellow-billed cuckoos often lay a second and third clutch sometimes with different mates; and (5) it is likely that they move from one river system to another between clutches. These unusual behaviors can lead to either an over count or an under count of individuals, pairs, or territories.

Many of the earlier population estimates were made of pairs of western yellow-billed cuckoos. For the reasons listed above, some recent researchers have decided that it is more accurate to use the term territories rather than pairs. An assessment of the methodology used to determine pairs in the older studies and territories in the more recent studies concludes that very similar methodology is used and that the numbers are comparable.

In some cases, we were able to use the original survey data and simply compare the number of survey hours and number of western yellow-billed cuckoos surveyed and compare them from one year to the next and one time period to another. This is a very reliable and accurate method of comparison. In other cases, such as that at the South Fork Kern River Valley in California from 1985 to 2001, when all nesting pairs were either documented by finding a nest or seeing positive nesting behavior (e.g., western yellow-billed cuckoos carrying food to young) the

number of pairs were compared over time.

We have taken all of these difficulties and changes of survey methods and changes of data and behavior interpretation into account in our assessment of survey results and western yellow-billed cuckoo population trends. We have used the best available data and science in determining population estimates and trends. Because we have been aware of the changes in survey methods and have factored that information into our analysis, we are confident that our estimates of breeding populations are accurate.

(6) *Comment:* One reviewer indicated that habitat use separates eastern and western cuckoos; observations suggest that in eastern New Mexico and Texas yellow-billed cuckoos from eastern populations nest in monotypic stands of tamarisk, while western yellow-billed cuckoos do not.

Our Response: We have considered this information in our determination of the DPS for the yellow-billed cuckoo. Although credible observations of species behavior are valuable, peer-reviewed published materials would further support these observations, and additional research on this topic would be valuable. The information provided will be considered further in the development of the final critical habitat designation for the species and in recovery planning.

(7) *Comment:* Two reviewers suggested that the section on climate change could be condensed and that uncertainties in forecasting precipitation could bog down conservation actions that would clearly benefit western yellow-billed cuckoos in the near future.

Our Response: The Service used the climate change information that was available in the literature. Because the western DPS of the yellow-billed cuckoo covers such a large area, the effects of climate change will be different in the various regions. The Pacific Northwest may become cooler and wetter, the desert Southwest may become warmer and dryer. The exact effect of these changes on western yellow-billed cuckoos is difficult to predict. However, based on our review of the literature, we have concluded that a warmer and dryer Southwest, an area that is already water-stressed, with a growing human population, is likely to have an adverse effect on riparian habitat. This will exacerbate the changes that have already occurred in the region and should not be ignored. We appreciate the expressed concerns; however, we have retained the information presented in the section.

(8) *Comment:* One reviewer provided survey results indicating that western yellow-billed cuckoos have been detected along the San Juan and Green rivers in Utah, although it is not yet known whether breeding occurs in these areas. The reviewer notes that further surveys are needed.

Our Response: We appreciate this additional information and have considered this in our listing determination. This information will also be considered in our final critical habitat designation.

(9) *Comment:* One reviewer commented that a potential planned activity is the reallocation of water from the San Juan River on Navajo Tribal lands, which could negatively affect water delivery on the Colorado River and western yellow-billed cuckoo habitat on the Lower Colorado River.

Our Response: We appreciate this additional information and have considered this in our listing determination. This information will also be useful in recovery planning and implementation.

(10) *Comment:* One reviewer provided information that describes the ecological cascade process that leads to loss of western yellow-billed cuckoo habitat in riparian areas. The peer reviewer stated that the key to sustaining western yellow-billed cuckoo habitat is maintaining an ongoing process of new land creation and flow patterns conducive to colonization of willow and cottonwood. The peer reviewer also noted that it is problematic that a National Wildlife Refuge (NWR) on Sacramento River only occurs on one side of the river, and the opposite bank is not allowed to erode.

Our Response: We appreciate this additional information and have considered this in our listing determination. The information will be helpful when developing a recovery plan for the western yellow-billed cuckoo.

(11) *Comment:* One reviewer adds an additional pervasive threat is the design of open channel flood control channels with inappropriately smooth roughness coefficients. This over-scours the floodplains and requires removal of woody riparian vegetation that regenerates on floodplains. This leads to floodplains with no western yellow-billed cuckoo habitat.

Our Response: We have added this information to section ''Encroachment of Levees and Flood Control and Bank Stabilization Structures into the River Channel and Floodplain'' in the Factor A discussion in this final rule.

(12) *Comment:* One reviewer provides information on several additional projects that he indicates are impacting western yellow-billed cuckoo habitat. The reviewer notes that the U.S. Army Corps of Engineers (USACE) Sacramento River Bank Protection Project has been channelizing and rip-rapping river banks for many decades and that the project impedes the dynamic riverine processes that create western yellow-billed cuckoo habitat. The reviewer adds that the California Department of Water Resources has proposed a new reservoir project (the Sites Reservoir) for off-stream water storage, suggesting that the project would be a major water diversion project that would further degrade stream power on the Sacramento River, and contribute to an ecological cascade on the river (see *Comment* 10 above and the discussion under Factor A below). The reviewer also noted two proposed projects that he thinks would provide a potential conservation benefit to western yellow-billed cuckoo habitat. Both projects involve the creation of several miles-long oxbow lakes on the Sacramento River, at Woodson Bridge, and at a pumping facility across from Llano Seco unit of Sacramento River NWR.

Our Response: We appreciate this additional information and have considered this in our listing determination. This information will be helpful in developing and implementing the recovery plan for the species.

(13) *Comment:* One reviewer indicated that in Conservation Efforts section under the Factor E discussion, a distinction should be made between ''active'' restoration and ''process-based'' restoration.

Our Response: We have revised the text in the section to clarify the difference in types of restoration activities.

(14) *Comment:* One reviewer measured 35 cuckoos from the Rio Grande and 25 cuckoos from the Pecos River. He found that Rio Grande males and females were larger for all measurements than Pecos cuckoos, but Pecos cuckoos are larger than eastern or Trans Pecos cuckoos reported in Franzreb and Laymon's (1993, pp. 17–28) subspecies paper. He applied the Discriminant Function Analysis (DFA) equation (developed by Franzreb and Laymon, 1993, pp. 17–28) to 35 cuckoos from Rio Grande, of which 86 percent tested as western and 25 cuckoos from Pecos River of which 68 percent tested as western.

Our Response: We thank the reviewer for this information. However, we are concerned that the measurements may have been taken incorrectly for the

following reasons. We first note that, with the exception of wing measurements, accurate measurements are hard, if not impossible, to obtain from live birds under field conditions. We are concerned that in the given sample, bill-depth measurements may have been measured incorrectly because all individuals measured, regardless of area of origin, had deeper bills than any of the cuckoos measured by Banks (1988, pp. 473–477) or Franzreb and Laymon (1993, pp. 17–28). It is likely that these measurements were taken on an incorrect location on the bill. We note that several of the bill-length measurements reported were also record lengths for cuckoos, regardless of origin and suspect that they too were likely measured incorrectly. The use of these incorrect measurements in the DFA equations would be expected to yield incorrect ''likely area of origin.'' Therefore, we have not used this information in our final listing determination.

Federal Agency Comments

During the development of the proposed and this final listing rule, we coordinated with Federal agencies and asked for their input on the information presented and any concerns they may have. We have not included specific comments and responses to Department of the Interior (DOI) agencies in this rule (Bureau of Land Management, Bureau of Reclamation, and National Park Service). We have worked with the DOI agencies during the development of this rule, and their comments and concerns are included in the record materials for this final determination. We have reviewed any DOI comments and information, and have made changes that we determined were appropriate to the final listing of the western yellow-billed cuckoo. A total of seven comment letters were received from five Federal agencies from outside the DOI, and they are outlined below.

(15) *Comment:* The U.S. Air Force stated that training flights from Luke Air Force Base (AFB) may pass over western yellow-billed cuckoo habitat, but they are unlikely to disturb the western yellow-billed cuckoos because the airplanes fly over 500 ft. above ground level, while western yellow-billed cuckoo fly, forage, and nest within the canopy of the trees. Also, the duration of the sound from the jet airplanes is only for a few seconds and the flights are infrequent.

Our Response: We appreciate receiving the information on Air Force training flights at Luke AFB. We will consider this information during any consultation regarding the species in the future.

(16) *Comment:* The USACE provided references that deal with southwestern willow flycatcher (*Empidonax traillii extimus*) consultations and management at Lake Isabella, California. They stated that their conservation plan and associated conservation easements for southwestern willow flycatchers provide habitat protections for the western yellow-billed cuckoo as well as least Bell's vireos (*Vireo bellii pusillus*). They are concerned that if the western yellow-billed cuckoo is listed and formal consultation for long-term operations of Isabella Reservoir are triggered, the USACE may be required to ''reoperate'' the reservoir, which would increase risk of loss of human life and cause significant impacts to economics downstream. This concern was also voiced by one public commenter.

Our Response: Although specific project activities may require additional review and potentially result in formal consultation for various Federal actions, it is reasonable to assume that the conservation plan and associated conservation easements for the southwestern willow flycatcher may provide habitat protections for the western yellow-billed cuckoo. However, consultation with the Service will not likely result in operation decisions that would cause a risk of loss of human life or cause significant impacts to downstream economies. We have been coordinating with the USACE on their activities and dam operation at Lake Isabella as it relates to all listed species and will continue to do so into the future.

(17) *Comment:* The U.S. Forest Service (USFS) provided several reports on western yellow-billed cuckoo surveys conducted at Isabella Reservoir. The Southwest Region of the USFS does not think they have western yellow-billed cuckoos on the Carson or Cibola National Forests. They also had several questions about wording in the proposed rule regarding grazing and listed several references regarding the effects of well-managed grazing, which they say has less adverse impact on western yellow-billed cuckoos and their habitat than traditional, poorly managed grazing. Lastly, they stated that mesquite bosque habitat was very important to western yellow-billed cuckoos and that the habitat was more important than the proposed rule indicated.

Our Response: We appreciate the additional information provided by the USFS and have considered it or incorporated changes to language into our final listing determination. Well-controlled grazing activity can be compatible within riparian zones and in western yellow-billed cuckoo habitat depending on the conservation measures implemented for the grazing activity. The amount of management depends on the sensitivity of the habitat at any given location and would most likely need to be managed on a site-by-site basis. For example, a grazing regime used on Audubon California's Kern River Preserve in the South Fork Kern River Valley limits grazing to outside the growing season (October to March). This time restriction allows for regeneration of willows and cottonwoods and precludes the tree browsing and high-lining that often accompanies heavy summer (growing season) grazing. We concur that mesquite bosque habitat is very important to western yellow-billed cuckoos, and this has been stated clearly in the proposed and this final rule.

(18) *Comment:* The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) in Texas stated that they are interested in helping landowners conserve and manage critical habitat for the western yellow-billed cuckoo.

Our Response: We appreciate this additional information and have considered this in our listing determination. NRCS' cooperation and assistance will be very helpful during the recovery phase for the species.

(19) *Comment:* The International Boundary and Water Commission provided information on riparian habitat restoration along the Rio Grande as well as results of recent western yellow-billed cuckoo surveys.

Our Response: We appreciate this additional information and have considered this in our listing determination. Restoration of riparian habitat will be an important phase in the recovery of the western yellow-billed cuckoo. This information will also be helpful in the development and implementation of a recovery plan for the western yellow-billed cuckoo.

(20) *Comment:* The USDA NRCS in Texas expressed concern regarding economic impacts to local landowners and municipalities. This concern was echoed by several public commenters.

Our Response: According to section 4(b)(1)A) of the Act, we are to base our listing determinations solely on the basis of the best scientific and commercial data available as they relate to the five factors listed in section 4(a)(1) of the Act. The consideration of economics is only related to the designation of critical habitat under section 4(b)(2) of the Act.

Comments From States

Section 4(i) of the Act states, ''the Secretary shall submit to the State agency a written justification for his failure to adopt regulations consistent with the agency's comments or petition.'' Comments received from the States regarding the proposal to list as a ''threatened species'' for the western DPS of the yellow-billed cuckoo are addressed below. We received 17 comment letters from 17 State agencies in 11 States. Of the 17 letters submitted, 9 were from State wildlife agencies. We did not receive comments from the State of Oregon.

Washington State

(21) *Comment:* The Washington State Department of Fish and Wildlife supports the DPS determination and listing of the western yellow-billed cuckoo as threatened. This is based on their observations that reports of individual occurrences for the State have been very rare for the past several decades and that the species is not confirmed to be breeding in the State. This is despite having some sizable areas of riparian habitat still remaining along the Lower Columbia River and additional habitat improvements, acquisition, and restoration efforts elsewhere in the State. The Washington State Department of Fish and Wildlife provided suggestions for clarification of habitat use by the western yellow-billed cuckoo in moist riparian habitat areas of western Oregon, western Washington, and southwestern British Columbia. They also provided information on several records of wider habitat use in the Northwest and suggested that there is historical evidence that the species may have used conifer woodlands and open brushy hillsides in Washington as secondary nesting habitat (Bent 1940, pp. 54–70; Jewett *et al.* 1953, pp. 342–343).

Our Response: We appreciate this additional information and have considered this in our final listing determination. This habitat information has been discussed in detail in our proposed critical habitat designation. See the proposed critical habitat rule for the western yellow-billed cuckoo published in the **Federal Register** on August 15, 2014 (79 FR 48547). Also see the **Summary of Changes from Proposed Rule** section of this final rule and the *Habitat Use and Needs* section from the proposed listing rule for additional discussion on habitat use in Washington and Oregon (78 FR 61633–61634; October 3, 2013).

(22) *Comment:* The Washington State Department of Natural Resources (DNR) stated that they have developed a conservation strategy on its trust lands for conservation of salmonid freshwater stream habitat and other riparian obligate species habitat (DNR Trust Lands Habitat Conservation Plan). DNR stated that they would expect that implementation of the plan would assist in benefiting the western yellow-billed cuckoo's habitat and any future recovery efforts for the species. DNR also stated that they would continue to participate in the development of any future critical habitat designation.

Our Response: We appreciate this additional information and have considered this in our listing determination. This information will also be considered in our final critical habitat designation.

Idaho

(23) *Comment:* The Idaho Office of Species Conservation and the Idaho Department of Fish and Game stated that the Service fails to define foreseeable future in the proposed rule. This comment was echoed by several other commenters.

Our Response: The Act does not specifically define the term ''foreseeable future,'' and does not require the Service to quantify the time period of foreseeable future in making listing determinations. The Solicitor for the Department of the Interior conducted a review of the Congressional intent behind the term ''foreseeable future'' in the Act, and concluded that Congress intended the term ''foreseeable future'' to describe the extent to which the Secretary can reasonably rely on predictions about the future in making determinations about the future conservation status of the species. The Secretary's ability to make reliable predictions may vary according to the threat at issue; consequently, the Solicitor concludes that this timeframe of ''the foreseeable future is not necessarily reducible to a particular number of years. Rather, it relates to the predictability of the impact or outcome for the specific species in question.'' In addition, the opinion notes that ''definitive quantification is rarely possible . . . and not required for a 'foreseeable future' analysis'' (Department of the Interior Memorandum M–37021, January 16, 2009; available at: *http://www.doi.gov/solicitor/opinions/M-37021.pdf*).

In considering the foreseeable future as it relates to the status of the western yellow-billed cuckoo, we considered the factors acting on the species and looked to see if reliable predictions about the status of the species in response to those factors could be drawn. We considered the historical data to identify any relevant existing trends that might allow for reliable prediction of the future conservation status of the species (in the form of extrapolating the trends). We also considered whether we could reliably predict any future events that might affect the status of the species, recognizing that our ability to make reliable predictions into the future is limited by the variable quantity and quality of available data. Available population information for western yellow-billed cuckoo is limited for determining trends because no long-term rangewide status survey has been completed and the threats facing the species are variable in intensity and scope across the species' range and do not reliably provide a sound basis for specific timeframe predictions. The available data do not allow us to determine a specific timeframe for the foreseeable future for the western yellow-billed cuckoo; therefore, we rely on a qualitative assessment of the foreseeable future, in terms of that period of time over which we can reasonably predict the future population trends and threats to the species, and the likely consequences of those threats and trends for the status of the species. We have discussed the timeframe for when we have determined the threats are acting on the species under each factor in the **Summary of Factors Affecting the Species** and in our **Determination** sections below.

Montana

(24) *Comment:* Montana Fish, Wildlife, and Parks indicated that the portion of the State that is shown as being within the DPS has historically not been considered within the range of the species. The agency indicated that there are only 8 records for western Montana, and only 3 of those were found in the past 30 years. They stated that the western quarter of the State, west of the Continental Divide, should be excluded from the DPS and the species not listed in Montana. This comment was also echoed by commenters in Utah, Colorado, and Wyoming who wanted their States removed from the DPS.

Our Response: We are aware of the limited number of sightings for the species in western Montana and other areas within the DPS. However, we consider yellow-billed cuckoos that are found in the portion of Montana west of the Continental Divide are western yellow-billed cuckoos based on dispersal and migratory patterns, the large gap between this region and southeastern Montana where eastern yellow-billed cuckoos sporadically

occur, and criteria used to map the DPS boundary. We based our boundary for the DPS on watershed boundaries along the upper elevation areas along the Rocky Mountains and on species occurrence records. It would be inconsistent and arbitrary to move the boundary or not include the western yellow-billed cuckoos in western Montana from the DPS regardless of how seldom they are found in the area.

Wyoming

(25) *Comment:* The Wyoming Game and Fish Department (WGFD) provided information on additional surveys for the Green River and on the State's classification of the species as a Tier III Species of Greatest Conservation Need with unknown population status and trends due to an extremely limited number of detections during targeted survey work (WGFD 2010, pp. IV-i-8). The WGFD stated it does not differentiate between eastern and western yellow-billed cuckoos but that habitat for the species continues to decline primarily as a result of nonnative plant (tamarisk) invasion. The WGFD believes that the estimate in the proposed rule of five or fewer pairs is an overestimate for the State, that it is highly unlikely that western yellow-billed cuckoos breed in the State on a consistent basis, and they doubt that the small numbers in Wyoming add to population viability of the subspecies. The WGFD recommended not designating any critical habitat or land use restrictions for the species in the State as most of the potential habitat for the species is above 7,000 ft (2,134 meters (m)). The State also recommended that ongoing and planned tamarisk removal should not be impeded as a result of the Service's final determination.

Our Response: As stated in the proposed rule and this final rule, we agree that the number of western yellow-billed cuckoos nesting in Wyoming is small. It is also possible that western yellow-billed cuckoos do not nest in the State every year. However, the species most likely uses the available habitat as movement corridors or stop-over areas during its migration to areas farther north or as foraging areas during prey outbreaks. We will consider any information on critical habitat during the development of the final critical habitat designation. As a result of listing the species, we would expect agencies and organizations conducting tamarisk removal projects to do so in a manner compatible with conservation of the western yellow-billed cuckoo (see response to *Comment* 28 below for additional information on tamarisk removal and the conservation of the western yellow-billed cuckoo).

California

(26) *Comment:* The California Department of Fish and Wildlife supports the DPS determination and listing of the western yellow-billed cuckoo as the species is already listed as endangered under the California Endangered Species Act (CESA) and the populations of the species in the State continue to decline. The California Department of Fish and Wildlife will continue to provide support in habitat management that will encourage recovery for the species in California.

Our Response: We appreciate the review and support of the California Department of Fish and Wildlife. This information will help with the development and implementation of the recovery plan for the western yellow-billed cuckoo.

Nevada

(27) *Comment:* Nevada State Department of Wildlife concurred with the Service's concerns regarding declines of the western yellow-billed cuckoo and summarized the status of the species in the State. The Nevada State Department of Wildlife also provided clarifications and updated information on occurrence records and habitat for the State. The western yellow-billed cuckoo is a species of conservation priority in Nevada, and the Nevada State Department of Wildlife is dedicated to conserving the species and improving its habitat whether it is listed or not.

Our Response: We appreciate this additional information and have considered this in our listing determination. This information will also be used in the development of our final critical habitat designation and implementation of a recovery plan for the western yellow-billed cuckoo.

(28) *Comment:* Nevada State Department of Wildlife, Wyoming Game and Fish Department, Utah Office of Governor, and Colorado Department of Agriculture listed tamarisk invasion as a major threat for western yellow-billed cuckoos and their habitat. There is some concern that listing the western yellow-billed cuckoo will curtail tamarisk removal projects and riparian restoration. Several commenters would like us to develop a rule under section 4(d) of the Act for riparian habitat restoration.

Our Response: The Service agrees that tamarisk is a major threat to the western yellow-billed cuckoo's habitat. We expect that in areas where restoration of native riparian vegetation is possible, removal of tamarisk would be considered a net benefit, as native riparian vegetation has a greater habitat value for the western yellow-billed cuckoo. If western yellow-billed cuckoos are documented to use an area slated for tamarisk removal, consultation with the Service may be necessary in order to jointly develop appropriate measures to avoid or minimize the potential for adverse effects to the western yellow-billed cuckoo. However, the process of listing a species as threatened under the Act is not designed to curtail projects that have the potential to benefit that species, and it is unlikely that beneficial tamarisk removal and riparian restoration projects would be negatively impacted from listing the western yellow-billed cuckoo. At this time, we are not developing a rule under section 4(d) of the Act for this species.

Utah

(29) *Comment:* The Director for the Utah Public Lands Policy Coordination Office stated that: (a) Utah has made great strides in conserving the yellow-billed cuckoo and its habitat and that the Service did not characterize the conservation benefits for the yellow-billed cuckoo as a State-sensitive species adequately in the proposed rule; (b) the DPS boundary is arbitrary and includes unoccupied areas or migratory habitat; and (c) the Service did not use or consider the best available scientific information provided by the Utah Division of Wildlife Resources (e.g., Beason 2009, additional Statewide surveys, GIS habitat models). The State requested that the Service not list the species as endangered or threatened under the Act, as it believes that the State is in the best position to manage and conserve the species and its habitat.

Our Response: We commend the State of Utah on the efforts they have made in conserving the western yellow-billed cuckoo and its habitat. However, we were not supplied with any information by the State on specific conservation efforts for the western yellow-billed cuckoo, so characterization of the conservation benefits for the species is not possible.

We disagree that the DPS line is arbitrary. The DPS line used to separate the western yellow-billed cuckoo from yellow-billed cuckoos in the east in the vicinity of Utah was the watershed boundaries along the Continental Divide. This boundary does not imply that all areas within the DPS contain suitable habitat. In fact, most areas within the DPS do not contain suitable habitat for the species because the

species is restricted to riparian habitat and most of western United States is upland habitat covered by forest, desert, shrubland, or agriculture. Riparian habitat, by definition, is limited to the banks of rivers and streams, and comprises a very small percentage of the arid West. The DPS simply shows the outer limits that one can expect to find western yellow-billed cuckoos during the breeding season and during migration to breeding areas.

We received GIS data from the State of Utah and excel spreadsheets with location data apparently derived from surveys and incidental observation within the State. We did not receive the information mentioned in the comment letter (e.g., Beason 2009, additional statewide surveys, and GIS habitat models) from the State. During the development of this proposed rule and in response to the State's comment, we independently obtained a copy of the information cited (Beason 2009, pp. 1–19). The results of that study, which surveyed areas in and around Dinosaur National Park in Utah and Colorado, did not confirm any western yellow-billed cuckoo observations. We contacted the researcher and they confirmed the information.

Colorado

(30) *Comment:* The Colorado Department of Agriculture asked to participate in the recovery of the species and is actively removing tamarisk and Russian olive and restoring native riparian vegetation.

Our Response: We appreciate this additional information and have considered this in our listing determination. This cooperation in recovering the species will be important in the development and implementation of a recovery plan for the species.

(31) *Comment:* The Water Resources Division of the Colorado Department of Natural Resources stated that riparian habitat is not threatened in Colorado and the western yellow-billed cuckoo should not be listed because adequate conservation efforts are underway.

Our Response: Riparian systems in Colorado have been highly impacted by the nonnative, invasive tamarisk and Russian olive. Many of the other threats detailed in the proposed and this final rule also apply to riparian habitats in that State. In addition, the State of Colorado contains only a small portion of both the range and population of the western DPS of the yellow-billed cuckoo. Our obligation is to review and assess the population status as a whole and not on a regional or Statewide basis.

Arizona

(32) *Comment:* The Arizona Game and Fish Department supported the Service's overall determination of the western yellow-billed cuckoo as a DPS, but stated that using morphological information in the DPS significance section weakened the argument.

Our Response: We appreciate this additional information and have considered this in our DPS analysis and listing determination. Morphological information is just one of the reasons we have determined that the western yellow-billed cuckoo is a valid DPS under our policy. In order to be more transparent in describing our rationale for our DPS determination, we included the morphological information as further evidence of the DPS. We conclude that including morphological information in the DPS *Significance* section helps to provide a complete picture of the differences between eastern and western yellow-billed cuckoos.

(33) *Comment:* The Arizona Game and Fish Department stated that they did not support listing the western yellow-billed cuckoo as it would be counterproductive to current conservation efforts.

Our Response: Some restoration projects, especially where existing poor-quality, tamarisk-dominated habitat that is occupied by western yellow-billed cuckoo is being removed and higher quality, willow-cottonwood or mesquite habitat is being planted, may require consultation with the Service in order to jointly develop appropriate measures to avoid or minimize the potential for adverse effects to the western yellow-billed cuckoo. However, the process of listing a species as threatened under the Act is not designed to curtail projects that have the potential to benefit that species, and it is unlikely that beneficial tamarisk removal and riparian restoration projects would be negatively impacted from listing the western yellow-billed cuckoo. It is more likely that listing the western yellow-billed cuckoo will complement the recovery efforts and potentially provide additional sources of funding through section 6 of the Act.

(34) *Comment:* The Arizona Game and Fish Department stated that they agreed that western yellow-billed cuckoos have declined in Arizona over the last 100 years due to habitat loss. The Arizona Game and Fish Department went on to state that the western yellow-billed cuckoo population and habitat loss have stabilized over the past 30 years and populations will increase as a result of riparian restoration on the Lower Colorado River. The Arizona Game and Fish Department stated that 4,000 acres (ac) (1,619 hectares (ha)) of habitat is scheduled for restoration, and in locations where restoration has occurred, western yellow-billed cuckoos are using the created habitat within 2 years of planting. They asked us to add references that show that western yellow-billed cuckoos have declined as a result of riparian habitat loss and degradation (they cite Noss *et al.* 1995). They also stated that there was a need to quantify the benefits of riparian habitat restoration to western yellow-billed cuckoos.

Our Response: Most locations in Arizona that have western yellow-billed cuckoo populations have not been surveyed regularly enough to provide population trend information. The only two locations with semi-regular monitoring (the Bill Williams River and the San Pedro River) both show downward trends in western yellow-billed cuckoo populations. The western yellow-billed cuckoo population on the Colorado River on the Arizona-California border appears to be increasing with the riparian restoration activities at that location. More years of survey data are needed to determine whether or not that is a long-term trend.

While the results of the riparian restoration work on the Lower Colorado River are promising, based on the scientific information available we conclude that it is too soon to tell what effect this planned restoration will have on western yellow-billed cuckoo populations. As population goals for recovery of the western yellow-billed cuckoo have not yet been established, it is not known what the overall effect of an addition of the 40 or so pairs of western yellow-billed cuckoos on the Lower Colorado River will have on the overall status of the yellow-billed cuckoo in the West. In addition, so far it appears that western yellow-billed cuckoos nesting on restoration sites tend to have lower nesting success than western yellow-billed cuckoos nesting in areas still containing healthy native riparian forests (McNeil *et al.* 2012, p. 53).

We have added citations in this final rule that show that western yellow-billed cuckoos have declined as a result of riparian habitat loss and degradation (see section in Factor A discussion). We have concluded that this is a well-documented pattern in California and Arizona.

To date it is difficult to quantify the benefit of riparian habitat restoration to western yellow-billed cuckoo populations. Most restoration efforts are carried out on a small scale in

comparison to the home-range size of the western yellow-billed cuckoo. In the Kern River Valley where riparian restoration has been ongoing for the past 30 years, the western yellow-billed cuckoo population has stabilized but has not increased. Along the Sacramento River, where several thousands of acres of riparian restoration has occurred over the past 30 years, the western yellow-billed cuckoo population has continued to decline. The one location where restoration work is appearing to have a positive effect on western yellow-billed cuckoo populations is along the Lower Colorado River, but this work is very recent and the long-term effect on western yellow-billed cuckoo populations there is still unknown. The largest positive effects for western yellow-billed cuckoos have occurred in the reservoir draw-down zones (e.g., Isabella Reservoir and Elephant Butte Reservoir), when riparian habitat has regenerated during droughts. These benefits are ephemeral, as the habitat will be inundated and lost when wet periods return.

New Mexico

(35) *Comment:* New Mexico Game and Fish requested a delay in listing so that more research can be conducted in New Mexico to better define the DPS line. They state that data from e-bird [Cornell Lab of Ornithology] and New Mexico Ornithological Society (2007) do not support difference in migration timing between eastern and western New Mexico, and cite Sechrist and Best (2012) to say that cuckoos from Pecos and Rio Grande had the same migration timing and direction. Twenty additional commenters questioned the DPS' status, indicating that the DPS was neither discrete nor significant, without providing additional information to support their comments.

Our Response: In making listing determinations under the Act, we are to rely solely on the best scientific and commercial data currently available. Our DPS policy outlines the criteria for determination of whether a segment of a vertebrate species population qualifies as a DPS. In reviewing the most current information available, we have determined that the western DPS of the yellow-billed cuckoo is valid and meets the criteria outlined in our policy. As we stated above in the **Distinct Vertebrate Population Segment Analysis** section, we understand that the area in southern New Mexico and western Texas is an area where there may be overlap between both eastern and western populations of the yellow-billed cuckoo. Our DPS policy allows for some ''mixing'' of populations, and absolute separation is not required for a population segment of a species to be considered a DPS (61 FR 4723–4725; February 7, 1996). The location and boundaries of a western DPS for the yellow-billed cuckoo has been under consideration since the Service first received a petition to list the species in 1986. As detailed in the proposed rule and this final rule, yellow-billed cuckoos on the Rio Grande above Big Bend are more similar to yellow-billed cuckoos in the West than they are to yellow-billed cuckoos in the East. Yellow-billed cuckoos on the Pecos River and in eastern New Mexico are more similar to yellow-billed cuckoos in the East than they are to yellow-billed cuckoos in the West. Peer reviewer Dr. Janice Hughes, the only avian taxonomist who has conducted research on yellow-billed cuckoos in this region, believes that the highlands between the Rio Grande and the Pecos River are the dividing line between eastern and western yellow-billed cuckoos.

As discussed above in *Comment* 14, one peer reviewer measured yellow-billed cuckoos on the Rio Grande and Pecos River and found the Rio Grande yellow-billed cuckoos to be larger than those on the Pecos River. The differences were not statistically significant, but the sample sizes were small, so a significant difference would not be expected. Also the measurements were not taken in a similar way as measurements taken by Banks (1988, pp. 473–477) and Franzreb and Laymon (1993, pp. 17–28) so they cannot be compared to measurements from those studies. At this time, a definitive study has not been completed on morphology, genetics, or behavior (including migration timing) comparing yellow-billed cuckoos on the Rio Grande and Pecos River. Until that is done, the best available science on the subject is in Franzreb and Laymon (1993, pp. 17–28) and in the opinion of Dr. Janice Hughes, which divides eastern and western yellow-billed cuckoos along the highlands separating the Rio Grande and the Pecos Rivers.

(36) *Comment:* New Mexico Game and Fish and several other commenters suggest that western yellow-billed cuckoos have been found at elevations higher than reported in the proposed rule.

Our Response: We appreciate this additional information and have considered this in our listing determination. Most of these higher elevation sightings in the Rocky Mountains are likely of migrant western yellow-billed cuckoos, though a few may refer to nesting pairs.

(37) *Comment:* New Mexico Game and Fish would like us to develop a rule under section 4(d) of the Act to allow for economic and agricultural growth in conjunction with conservation efforts, especially while developing the State's comprehensive conservation program.

Our Response: Section 4(d) of the Act allows the Secretary the discretion to issue such regulations as [s]he deems necessary and advisable to provide for the conservation of a species. The Service's standard policy (under 50 CFR 17.31(a)) for issuing prohibitions for threatened species is to apply all the prohibitions of an endangered species to a threatened species unless otherwise revoked by issuance of more specific prohibitions. In the case of the western yellow-billed cuckoo, we are in the process of reviewing whether the ''standard'' prohibitions apply or whether more specific prohibitions are appropriate. If we determine that more specific prohibitions apply and that they are necessary and advisable to provide for the conservation of the western yellow-billed cuckoo, we will issue a proposed rule under section 4(d) of the Act for public comment. However at this time, we do not have and the commenter did not provide enough information on whether a section 4(d) rule for agricultural activities is appropriate. We would be available for future discussion on potentially developing measures to maximize the conservation value of agricultural practices and develop some type of conservation mechanism with the commenter in the future; however, due to time constraints for developing a final rule we cannot currently develop and implement such measures.

(38) *Comment:* New Mexico Game and Fish stated that there was a large discrepancy between population estimates of 100–155 pairs for western New Mexico listed in the proposed rule and 7,000 individuals in the State as reported by the Partners in Flight program (PIF 2014).

Our Response: The Partners in Flight Web site for New Mexico (New Mexico Partners in Flight 2014, entire) reports that the western yellow-billed cuckoo population in New Mexico is much less than 1 percent of the total species population of 9.2 million, or less than 92,000 yellow-billed cuckoos. This was then converted to 0.1 percent of the global population, which should have been 9,200 yellow-billed cuckoos, but was transcribed or rounded to 7,000 yellow-billed cuckoos or 3,500 pairs of yellow-billed cuckoos. This is a questionable method to determine the yellow-billed cuckoo population for a State and should not be accepted as

valid. This is much higher than Howe's (1986, pp. 1–16) estimate of 1,000 pairs of yellow-billed cuckoos Statewide in New Mexico and 315 pairs for the western half of the State. Howe's estimates were made based on an estimate of available habitat and an understanding that western yellow-billed cuckoo territories were much smaller than they actually are, leading to an overestimate for New Mexico. It is likely that fewer than 1,000 pairs of western yellow-billed cuckoos existed in New Mexico in 1986. The population for western yellow-billed cuckoos estimated for the State by Hughes (1999, p. 19) was 100 to 200 pairs. The Service's estimate of 100 to 155 pairs is based on the best available science of surveys conducted over the past 10–15 years.

(39) *Comment:* The New Mexico Department of Agriculture asked that the Service address management of the western yellow-billed cuckoo as a watershed health issue and not list the species.

Our Response: Listing of the western yellow-billed cuckoo under the Act is based on the species' population status and trends, and the threats to the species. Recovery of a species will be based on criteria developed by the Recovery Team once it becomes established. Solving the threats to the western yellow-billed cuckoo is an important part of the recovery process, and watershed health will be very important when developing recovery criteria and implementing recovery actions.

(40) *Comment:* New Mexico Interstate Stream Commission commented that because western yellow-billed cuckoos are listed by New Mexico Fish and Game as a ''Species of Greatest Conservation Need'' the Service should not state that it has no protective status in New Mexico.

Our Response: Although the identification of the western yellow-billed cuckoo by the State of New Mexico as a ''Species of Greatest Conservation Need'' is encouraging, this designation is for planning purposes and provides no regulatory protective status for the species in New Mexico. Any actions or conservation measures implemented for the cuckoo as a result of its State status would be recommendations and voluntary, and would not ensure that actions or measures would be implemented.

(41) *Comment:* New Mexico Interstate Stream Commission states that if the western yellow-billed cuckoo is listed, we should develop a rule under section 4(d) of the Act for ongoing and future water management in the State. Other commenters expressed concern about the impact of listing the western yellow-billed cuckoo on water delivery.

Our Response: The disruption and changes to ''natural'' river and stream processes, which help the development and regeneration of riparian vegetation, have been identified as a threat to the species. The majority of streams and water delivery facilities within the range of the western yellow-billed cuckoo are at least partly managed by Federal entities or proposed activities that would have a Federal nexus. As a result, these Federal agencies have an obligation under section 7 the Act to conserve endangered or threatened species and their habitat. Section 4(d) of the Act states that the Secretary shall issue such regulations as [s]he deems necessary and advisable to provide for the conservation of any threatened species. New projects on Federal land or funding by the Federal government will be subject to section 7 consultations, as will reauthorization of Federal projects. Because of the interrelatedness between water management, the health of riparian habitat, and the dependence of riparian habitat by the western yellow-billed cuckoo, we are not currently considering a rule under section 4(d) of the Act for this species to limit the prohibitions of the Act for ongoing and future water management activities.

(42) *Comment:* The New Mexico Interstate Stream Commission stated that because humans do not have control over caterpillar population, lack of caterpillars should not be listed as a threat.

Our Response: Caterpillar and other insect populations can be affected by health of the riparian habitat, tree and shrub species in the riparian zone, and pesticide use (e.g., pesticide drift into the riparian zone or applying pesticides directly on the riparian zone). All of these factors are influenced by human activities at some level. Lack of an adequate food supply is a major threat for the western yellow-billed cuckoo.

(43) *Comment:* The New Mexico Interstate Stream Commission stated that climate change effects have so far not been as great as they are predicted to be in the future.

Our Response: We appreciate the New Mexico Interstate Stream Commission's comments on climate change and have considered them in our listing determination. The New Mexico Department of Game and Fish in their Comprehensive Wildlife Conservation Strategy for New Mexico (2006) stated that ''[t]he effects of climate change on ecosystems and species are likely to be exacerbated in areas that have already been substantially affected by human activities such as habitat loss and fragmentation, air and water pollution, and the establishment of invasive species.'' They also state that riparian habitat is one of the key habitats that may have the highest risk of being altered by synergistic effects of factors that influence habitats (New Mexico Department of Game and Fish. 2006, pp. 74–79).

We agree that climate change projections and prediction can be difficult due to the availability of information and variability of climate and habitat conditions over time. However, in a study looking at the recent effects of climate change on temperature and precipitation over the past 36+ years (1970–2006), Enquist *et al.* (2008, pp. 1–32) found that in New Mexico, observed climate-linked effects include declines in snowpack, earlier peak stream flows, forest mortality, and population declines in some sensitive species. To avoid issues of uncertainty associated with future climate change predictions, the study used a retrospective approach that analyzed changes over time. Their study found that: (1) 93 Percent of New Mexico's watersheds have become relatively drier over the 36+ year period; and (2) snowpack has declined in 98 percent of New Mexico's major mountain ranges and the timing of peak streamflow from snowmelt in the State is an average of one week earlier than in the 1950s. In addition, the study found that the watersheds with the highest numbers of sensitive species tend be those showing the greatest increase in moisture stress or drying and that these watersheds have already experienced climate change-linked ecological effects. We have determined that the long-term effects of climate change are and will continue to be a factor in sensitive species or habitat conservation regardless of any short-term trends.

(44) *Comment:* The New Mexico Interstate Stream Commission commented that western yellow-billed cuckoos may rely on tamarisk, like southwestern willow flycatchers do, but even if true, tamarisk beetles should not be listed as a threat to western yellow-billed cuckoos.

Our Response: Western yellow-billed cuckoos do not rely on tamarisk in the same way that southwestern willow flycatchers do. Western yellow-billed cuckoos may on rare occasions nest in tamarisk, but they forage almost entirely in native riparian habitat. Western yellow-billed cuckoos are primarily dependent on large caterpillars, which depend on cottonwoods and willows and are not found on tamarisk. On the other hand, southwestern willow

flycatchers feed on small flying insects and both nest and forage in tamarisk as long as water or super-saturated soil is in the vicinity of the nest and flying insects are available. In areas where the hydrology is still intact and will support native riparian habitat, the tamarisk beetle could assist in the restoration of the riparian zone. In areas that can no longer support willows, cottonwoods, and mesquite, the beetle could suppress the tamarisk to the point that western yellow-billed cuckoos will no longer use the habitat. In this latter case, the tamarisk beetle could be considered a threat, as spontaneous regeneration of native vegetation is difficult due to the degraded nature of the habitat and disrupted hydrologic conditions.

Texas

(45) *Comment:* The Deputy Commissioner for the Texas General Land Office stated that listing the western yellow-billed cuckoo would lead to increased economic costs and delay in the development of oil, gas, wind, and solar projects for the State. Royalties collected by the State from such activities would be reduced, and this would indirectly affect funds available for Texas public schools. The Deputy Commissioner also stated that the Service's analysis of the information is not sufficient to support listing and that the Service is only moving forward at this time with listing due to its settlement with outside litigants and not because listing is warranted under the Act.

Our Response: Under section 4(a)(1) of the Act, we are to determine if a species is endangered or threatened based on one of five listing factors. Economics or loss of revenue is not one of the factors used in determining if a species should be listed. Although we understand that listing a species as either endangered or threatened causes some regulatory oversight and the potential need for consultation, we are obligated to make such determinations solely on the threats facing the species or its habitat. Listing a species does not mean projects cannot proceed, it only means they must be implemented in a manner that still conserves the species and its habitat. In addition, because the species occurs in riparian habitat along streams, it is most likely that projects involving the development of oil, gas, wind, and solar projects would not result in significant direct impacts on the species, as these projects typically do not occur in riparian corridors.

We believe we have used the best scientific and commercial information available in coming to our decision to list the western yellow-billed cuckoo as a threatened species. The western yellow-billed cuckoo has been a candidate for listing since 2001. Although we were litigated to develop a timeframe for moving forward on the review of candidate species, the Act requires us to promptly make our evaluations for species considered candidates. Any settlements reached as a result of litigation took into consideration what was best for conservation and protection of candidate or sensitive species and were not dictated by litigants.

(46) *Comment:* The Texas Comptroller of Public Accounts stated that they were concerned that listing of the western yellow-billed cuckoo would have potential economic impacts on landowners, businesses, and communities within the boundary of the DPS in Texas. The Comptroller also stated that additional information is needed on the status of the species and that the benefits of ongoing conservation efforts for the southwestern willow flycatcher are adequate to conserve the western yellow-billed cuckoo.

Our Response: See our response to *Comment* 45 above for economic considerations in the listing process and our view on the information used to determine the status of the species. In regard to conservation measures for the southwestern willow flycatcher being adequate to conserve the western yellow-billed cuckoo, we disagree. Although the range of the southwestern willow flycatcher and the western yellow-billed cuckoo overlap to some degree and they are found in similar habitats, that is not always the case and the two species have very different habitat and ecological requirements.

Public Comments

Comments on ''Endangered'' vs. ''Threatened'' Status

(47) *Comment:* More than 12,000 commenters stated that the western yellow-billed cuckoo should be listed as ''endangered'' rather than the proposed ''threatened'' status.

Our Response: The Act defines an endangered species as any species that is currently ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' Based on the available information on the range and distribution of the species, the immediacy and severity of threats facing the species, the persistence of the species throughout most of its historical range, and the rate of decline of the species, we have determined that the western yellow-billed cuckoo meets the definition of a threatened species rather than an endangered species under the Act. See the **Determination** section below for additional discussion of our rationale for a ''threatened'' determination.

(48) *Comment:* One commenter stated that the entire species (both in the eastern and western United States) should be listed as a threatened species under the Act.

Our Response: Our analysis in the rule is limited to the petitioned entity (western United States), and we have not evaluated the status of the eastern population of the yellow-billed cuckoo. Should new information become available about the status, trends, or threats facing the eastern population of the yellow-billed cuckoo, we would evaluate that information at that time, as budget and staffing allow.

Comments on the Distinct Population Segment

(49) *Comment:* One commenter stated that the western DPS of the yellow-billed cuckoo also meets significance because of persistence of population on unusual or unique ecological setting (i.e., streamside riparian areas in arid West).

Our Response: We appreciate this additional information and have considered this in our listing determination. Yellow-billed cuckoos in both the East and West nest in riparian habitat. The species in the eastern United States has a wider range of habitat use, including nesting in upland broadleaf woodlands that are not available to the species in the West. We do not consider riparian habitat as unusual or unique habitat under our DPS policy.

(50) *Comment:* Several commenters stated that there had been too many studies on the yellow-billed cuckoo and other commenters stated that there had been too few studies. Genetics and taxonomic uniqueness was a suggested area of study by one commenter.

Our Response: Although there has been much focus on research on the yellow-billed cuckoo, most of these efforts have been on survey and monitoring. Additional research activity is a common response once a species is identified for listing under the Act. However, other information, such as migratory routes, timing, and wintering ground use, has been scarce, and we agree that there are many areas of the life history, ecology, genetics, and taxonomy of the western yellow-billed cuckoo that need further research. However, in making our listing

determination, we must use the best scientific and commercial data available in coming to any conclusions on whether the species should be listed.

(51) *Comment:* One commenter stated that the eastern and western yellow-billed cuckoos may be interbreeding on the wintering grounds.

Our Response: Because yellow-billed cuckoos do not breed on their wintering grounds in South America, it is not plausible that they are interbreeding during this time.

(52) *Comment:* Several commenters do not believe that differences in migration timing between eastern and western yellow-billed cuckoos are evidence that there is a marked separation between the two groups.

Our Response: The proposed rule and this final rule identify a wide variety of factors that separates western yellow-billed cuckoos from the rest of the taxon. Migration timing is one of these factors. In general, migration timing is governed by forces of natural selection that operate over long periods of time. Given that populations of eastern and western yellow-billed cuckoos arrive on their breeding grounds, at the same latitude, a month or more apart is significant and is most likely governed by evolutionary forces. This pattern of consistently arriving on their respective breeding grounds a month or more apart is different from year to year, and variations in weather may lead to individual birds arriving on the breeding grounds a few days earlier or later than normal. Please see the **Distinct Vertebrate Population Segment Analysis** section, above, for further explanation of our rationale for determining that the western yellow-billed cuckoo is a valid DPS.

(53) *Comment:* Three commenters stated that they believed that the species was not distinct.

Our Response: The Service is listing a DPS rather than a species or subspecies. As detailed in the *Taxonomy* section under **Background** and *Discreteness* section of the **Distinct Vertebrate Population Segment Analysis** above, the western DPS of the yellow-billed cuckoo coincides with the range of the proposed subspecies boundary of the ''western'' yellow-billed cuckoo (*Coccyzus americanus occidentalis*). However, because there is some scientific uncertainty to the validity of the subspecies, the Service is not listing the subspecies, but rather is listing the western DPS.

Population Numbers

(54) *Comment:* Twelve commenters stated that there have been recent declines of breeding populations of western yellow-billed cuckoos in various locations of California, Arizona, New Mexico, and Colorado. Several additional commenters provided their personal observations in Arizona, New Mexico, and Colorado, which indicated that local populations of western yellow-billed cuckoos have declined over the last 30 years.

Our Response: These additional observations support the information that we presented in the proposed and this final listing rule regarding population trends for the species in these States.

(55) *Comment:* Nine commenters stated that the western yellow-billed cuckoo was not threatened, that they were either not declining or not declining at a rate that would lead to extinction, and that yellow-billed cuckoos were doing well in the East.

Our Response: Yellow-billed cuckoos in the East are declining at 1.4 to 1.6 percent per year over the past 43 years (Sauer *et al.* 2012, entire). Based on the best available science and data, western yellow-billed cuckoos have declined dramatically throughout their range over the past 150 years. This decline has continued in recent years, and with very few exceptions (e.g., the South Fork Kern River Valley, where the small populations appears to be stable, and the Lower Colorado River, where the population is showing an increase), it is continuing to decline. The data and information we have used in this final rule lead us to conclude that the western DPS of the yellow-billed cuckoo is threatened with extinction. No data were presented by commenters that show increasing population trends or population numbers that contradict our conclusion that the western yellow-billed cuckoo is a threatened species.

(56) *Comment:* Eight comments were received on data analysis and proposed rule preparation. Issues raised included the lack of a population viability analysis, the lack of a global population analysis, inadequate citations support for statements made in the document, not providing the names of Service biologists who reviewed data, taking a California-centric approach in the proposed rule, and only providing range maps showing the breeding season's range.

Our Response: Current available scientific data on the western yellow-billed cuckoo are not sufficient to conduct a meaningful population viability analysis. Too many of the important parameters are not known well enough for the results to be reliable. The State-by-State and region-by-region analysis of the entire range of the western DPS of the yellow-billed cuckoo is essentially a global population analysis. Every attempt has been made to be certain that citations support the statements made in the proposed and this final rule. Where we do not have specific reference support we explained our rationale based on the best available information on coming to any conclusions. It is not Service policy to list names of document authors or those who reviewed data. Much of the research that has been conducted on the western yellow-billed cuckoos has occurred in California, which may lead readers to the opinion that the proposed rule is California-centric. The winter range of the western yellow-billed cuckoo is not well-known and therefore could not be mapped.

(57) *Comment:* Several commenters stated that western yellow-billed cuckoo survey data were missing from the proposed rule or the data have been updated after the proposed rule was published (e.g., Utah, New Mexico, Arizona).

Our Response: We have considered this updated information in our final listing determination, and the information will be considered in the final critical habitat designation and future recovery plan.

(58) *Comment:* One commenter asked why western yellow-billed cuckoos are continuing to decline with all the habitat protection that has been happening over the past 25 years.

Our Response: It is true that significant habitat protection and restoration has been underway for the past 25 to 30 years. Much of this work has been done on a project-by-project basis or on a smaller scale than will likely be necessary for the stabilization and recovery of the species. Recovery goals for western yellow-billed cuckoos and their habitat will be set in the recovery plan for the species as it is developed. In some areas, such as the Sacramento River, western yellow-billed cuckoo populations have continued to decline even though significant habitat restoration activities have been carried out. Aging of the existing habitat and increased occupancy by invasive species, especially edible fig (*Ficus carica*) and black walnut (*Juglans* sp.), may be contributing factors. In addition, effects of pesticides on caterpillars may be a factor in many areas. It is indeed a concern that western yellow-billed cuckoos have declined even in areas where habitat has been protected and has either been stabilized or has increased. Further research is needed to determine the exact causes of this continued decline.

(59) *Comment:* One commenter questioned our science and asked that

all information on western yellow-billed cuckoo populations and declines should be removed from the discussion in the rule.

Our Response: The information on western yellow-billed cuckoo population and declines presented in the proposed and this final rule is based on the best available science. In making listing determinations under the Act, we must conduct a five-factor analysis on the threats facing a species based on the best available scientific and commercial information. In some cases the information on a species' status and trends is unclear or the information available is sparse. In these cases, we nonetheless must base our determinations on the best available information. In the case of the western yellow-billed cuckoo, the available information on population status and declines is appropriate to include in our discussion of the status of the species and in making our final determination on the species' listing status of threatened.

(60) *Comment:* Numerous commenters have concerns regarding survey methods, comparison of survey data, accuracy of survey counts, and changes in survey protocols over the years for the yellow-billed cuckoo.

Our Response: Please see response to *Comment* 5 above for our response to concerns over the survey protocols and other survey concerns.

Comments on Habitat Use and Species Information

(61) *Comment:* Several commenters indicated that habitat use separates eastern and western yellow-billed cuckoo populations. One commenter further stated that in eastern New Mexico and western Texas, yellow-billed cuckoos from eastern populations nest in monotypic stands of tamarisk, while western yellow-billed cuckoos do not. The commenter did not provide any specific study but based their statement on observations.

Our Response: We appreciate this additional information and have considered this in our listing determination. Additional research on this topic would be valuable. The information provided will also be considered further in recovery planning. See response to *Comment* 6, above, for additional information.

(62) *Comment:* One commenter stated that yellow-billed cuckoos select much different habitat in the East than they do in the West.

Our Response: We appreciate this additional information and have considered this in our listing determination. We recognize that habitat use is different between eastern and western populations of yellow-billed cuckoos. See our response to *Comment* 6, above, for additional discussion on habitat use in the eastern and western United States.

(63) *Comment:* One commenter stated that understory vegetation was as important to western yellow-billed cuckoos as overstory vegetation.

Our Response: As stated in the proposed listing rule and cited by reference in this final rule, the amount, size, composition, and density of habitat are important habitat selection criteria for the western yellow-billed cuckoo. Although habitat characteristics vary across the range of the species, understory vegetation is an important characteristic for the species. For example, along the Sacramento River, the size of the site, the amount of riparian habitat in each 5-mi (8-km) river segment, and the presence of young woody vegetation (understory) were the most important factors in a model explaining the distribution of yellow-billed cuckoo pairs (Halterman 1991, p. 30). Along the lower Colorado River, in a comparison of occupied versus unoccupied habitat, yellow-billed cuckoos were found at sites with denser riparian vegetation and more variation in vegetation density, and less tamarisk and shrubby vegetation, compared to unoccupied sites (Johnson *et al.* 2012, pp. 15–17).

(64) *Comment:* Two commenters stated that western yellow-billed cuckoos do not need large blocks of riparian habitat, and one commenter stated that they do not need riparian habitat at all. Another commenter stated that habitat use and patch size needed were not well-defined.

Our Response: The use of large blocks of riparian habitat for yellow-billed cuckoos in western United States is well-documented. Recent studies of habitat use using radio telemetry have shown that a western yellow-billed cuckoo will use 100 ac (40 ha) of habitat or more during the breeding season. See our response to *Comment* 63, above, for additional discussion on habitat use by the western yellow-billed cuckoo.

(65) *Comment:* Eight commenters stated that yellow-billed cuckoos were providing ecosystem services by eating caterpillars.

Our Response: We appreciate this additional information and have considered this in our listing determination. Yellow-billed cuckoos in eastern United States, where they are more abundant, may be numerous enough to control caterpillar populations. It is unlikely that the small populations in the West are able to have an impact on the caterpillar population.

Comments on Specific Habitat Areas

(66) *Comment:* Two commenters stated that water transfers from agriculture to urban areas and from the Kern River Valley to southern California were threats to the western yellow-billed cuckoo.

Our Response: We appreciate this additional information and have considered this in our listing determination. We have identified the disruption of ''natural'' stream hydrology and flows as a threat to the species. The occupied habitat for the western yellow-billed cuckoo in the South Fork of the Kern River is upstream of the control facilities at Lake Isabella. Large-scale water diversions from the Kern River do not take place until downstream of the dam. For the Kern River, the majority of water available for potential transfer to southern California is part of a ground water storage program (underground water bank). Any actions associated with this transfer of water would not affect occupied western yellow-billed cuckoo habitat upstream.

(67) *Comment:* One commenter stated that western yellow-billed cuckoo habitat was declining along the Verde River in Arizona.

Our Response: We appreciate this additional information and have considered this in our listing determination. This is consistent with the pattern of habitat loss and degradation described in the Factor A section of this document.

(68) *Comment:* Several commenters pointed out the importance of the San Pedro River (AZ) and the Gila River (AZ and NM) for western yellow-billed cuckoos.

Our Response: We appreciate this additional information and have considered this in our listing determination. The San Pedro River has the largest population of western yellow-billed cuckoos in Arizona and one of the largest in the western DPS, and the Gila River also contains an important population of western yellow-billed cuckoos in both New Mexico and Arizona.

(69) *Comment:* Commenters in Arizona, Wyoming, Montana, and Colorado all stated that their State was fringe habitat for the western yellow-billed cuckoo and did not contribute to the conservation of the species.

Our Response: Southwestern Wyoming and western Montana are at the northeastern edge of the range of the western DPS of the yellow-billed cuckoo. These areas at the margin of the

range can be very important in monitoring the health of a population, as they may become unoccupied when the population is declining and reoccupied when the population is increasing. Habitat in Colorado is important for the conservation of western yellow-billed cuckoos not only for the small breeding population, but more importantly for habitat for migrating western yellow-billed cuckoos that nest to the north in Idaho. Arizona is at the center of the range of the western DPS of the yellow-billed cuckoo, and habitat there is vital to the DPS' survival.

(70) *Comment:* One commenter mentioned that land in New Mexico is being retired from agriculture, not converted to agriculture.

Our Response: We appreciate the commenter's statement, but they did not provide specific information on the subject. Our research on agricultural land use changes for New Mexico also did not provide any specific information on the extent, location, or nature of agricultural lands being converted or retired; however, it has been estimated that over 90 percent of riparian habitat within New Mexico has been lost during the last century (Krzysik 1990, entire).

(71) *Comment:* One commenter stated that recent information shows that yellow-billed cuckoos that breed in the eastern United States then move to northwestern Mexico and breed as was speculated in another paper is wrong.

Our Response: Researchers (Rowher and Wood 2013 pp. 243–250) have recently retracted an earlier assertion that yellow-billed cuckoos bred in eastern North America and then flew to northwestern Mexico and bred a second time. We have revised our discussion on the subject in this final rule.

Comments on Factors Affecting the Species

(72) *Comment:* Three commenters addressed the threat of proposed mining operations in the Patagonia Mountains in south-central Arizona, the declining water table, and the decline in western yellow-billed cuckoo populations in that area.

Our Response: We concur that gravel mining and other mining activity can impact the western yellow-billed cuckoo and its habitat. This is a localized threat that is discussed under Factor A section of the final rule. See *Factor A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range,* for additional discussion on the threat of mining.

Grazing Impacts

(73) *Comment:* One commenter indicated that impacts to livestock ranchers are unequal east and west of the DPS line, making for unfair economic competition.

Our Response: According to the Act, we are to make listing determinations solely on the basis of the best scientific and commercial data available. The economic impact of listing is only considered when designating critical habitat for a listed species. We will consider the incremental impacts on livestock grazing operations during our designation of critical habitat for the species.

(74) *Comment:* One commenter stated that livestock grazing improves the ecological condition of riparian systems, while another stated that in the past cattle grazing was destructive, but that it was no longer a problem in riparian habitats.

Our Response: We identified past and current grazing activity in riparian areas occupied by the species to be a threat to the western yellow-billed cuckoo. We are not aware of any science or data that support the statement that livestock grazing improves the ecological condition of riparian systems. The western yellow-billed cuckoo nesting habitat is structurally complex with tall trees, a multistoried vegetative understory, low woody vegetation (Halterman 1991, p. 35), and higher shrub area than sites without western yellow-billed cuckoos (Hammond 2011, p. 48). Livestock grazing alters understory vegetation, trampling existing vegetation, reducing density, or eliminating new growth in riparian areas and thereby hampering recruitment of woody species that, when mature, provide nest sites. Furthermore, the relatively cool, damp, and shady areas favored by western yellow-billed cuckoos are those favored by livestock over the surrounding drier uplands. This can concentrate the effects of habitat degradation from livestock in western yellow-billed cuckoo habitat (Ames 1977, p. 49; Valentine *et al.* 1988, p. 111; Johnson 1989, pp. 38–39; Clary and Kruse 2004, pp. 242–243).

Controlled and seasonal livestock grazing can occur in a manner that is compatible with the management of western yellow-billed cuckoo habitat, although effective monitoring and management would most likely be needed especially in the more arid regions of the Southwest. Current grazing management practices are less harmful to riparian systems than some past practices. However, especially during droughts, riparian zones can still be grazed in a manner that may degrade riparian habitat attributes and prevent long-term health and persistence of these systems.

Habitat Loss

(75) *Comment:* One commenter stated that just because California destroyed its riparian habitat that other States should not bear the burden of listing.

Our Response: Listing determinations are based on habitat and population trends and threats. A severe threat in one portion of the range can lead to listing throughout the range. However, for the western yellow-billed cuckoo, there is abundant evidence that riparian habitat has been lost throughout the range of the species. This loss is greater in some areas than in others, but the threats to the western yellow-billed cuckoo through habitat loss, as detailed in this final rule, are widespread and not limited to California (see **Summary of Factors Affecting the Species** for additional discussion of threats affecting the species).

(76) *Comment:* Three commenters stated that the proposed rule does not show a causal link between habitat loss and population declines.

Our Response: We disagree. The data and information utilized for the proposed and final rules show a strong link between the declines in the western DPS of the yellow-billed cuckoo and riparian habitat. The **Historical and Current Status** section of the proposed rule, which is incorporated (by reference) into this final rule, lists numerous examples where riparian forests were removed and the western yellow-billed cuckoo population declined. In addition, literature is referenced in the rule that provides abundant additional supporting examples connecting loss of habitat to western yellow-billed cuckoo population declines. Factor A under the **Summary of Factors Affecting the Species** section in this final rule details the threats to riparian habitat both in the past and present.

(77) *Comment:* Three commenters said that riparian habitat may have declined by 90 percent in the past, but that it now is increasing. One commenter said that there is no evidence that habitat is being adversely affected by natural or manmade factors.

Our Response: Riparian habitat is increasing in some areas, but at the same time is decreasing or becoming less suitable in other areas. The overall trend throughout the range of the western yellow-billed cuckoo is not known. Simply measuring the extent of riparian habitat from one time period to

the next will not tell what the effect on western yellow-billed cuckoos will be. Tens of thousands of acres of riparian habitat still exist on the Lower Colorado River, but almost all of it, with the exception of the recently planted restoration sites, is comprised only of tamarisk that does not support western yellow-billed cuckoos. Tamarisk domination has occurred on many river systems through the range of the western yellow-billed cuckoo. Along other streams like the Sacramento River, other invasive species, such as edible fig and black walnut, have become dominant, and these areas now provide lower quality habitat for western yellow-billed cuckoos even though the overall acreage of riparian habitat has risen over the past 20 years. In many river systems in the Great Basin, Russian olive (*Elaeagnus angustifolia*) is now the dominant species, and it has reduced the habitat value for western yellow-billed cuckoos. In response to the second part of the comment, the discussion under the section *The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range* details the effect that human activities have had and are continuing to have on riparian systems throughout the range of the western yellow-billed cuckoo.

(78) *Comment:* One commenter asked that all statements regarding threats from water projects and water management should be removed from the document.

Our Response: Threats from water projects and water management are significant threats as detailed in the proposed and this final rule. As such, discussion of these threats is appropriate. See discussion under the *Habitat Loss from Dams and Alteration of Hydrology* section for additional information.

Drought

(79) *Comment:* One commenter stated that western yellow-billed cuckoos had declined because of the drought and will recover now that the rains have returned.

Our Response: While drought may have a negative effect on western yellow-billed cuckoo populations, the declines in the western yellow-billed cuckoo's range and populations have occurred through both wet and dry periods over the past 150 years.

Pesticides and Disease

(80) *Comment:* One commenter stated that dichlorodiphenyltrichloroethane (DDT) does not thin eggshells and that western yellow-billed cuckoo eggshells in the West are thicker because there is more calcium in the West.

Our Response: There is a large body of literature linking environmental DDT and its derivatives (e.g., dichlorodiphenyldichloroethylene (DDE)) to eggshell thinning in birds. Calcium deficiency can cause eggshell thinning in bird eggs, but this effect has not been demonstrated through region-by-region comparisons or a population-to-population comparisons. Trees and shrubs rarely show the effects of calcium deficiency within either the eastern or western range of the yellow-billed cuckoo in North America. Yellow-billed cuckoos would obtain calcium from their prey, which would obtain calcium from the leaves they eat. It is not clear that environmental calcium is more available in riparian zones in the West than it is in the East. It is also unclear as to what effect an abundance of environmental calcium has on yellow-billed cuckoo bird eggshells. There are no scientific studies that the Service is aware of on this topic.

(81) *Comment:* One commenter stated that rotenone used by Game and Fish agencies to kill fish may have injured western yellow-billed cuckoos.

Our Response: Although rotenone is classified as a broad-spectrum pesticide and has been used to control insects, we are not aware of any information that the use of the chemical as a piscicide (control of fish) has harmed the western yellow-billed cuckoo. The exposure risk of rotenone to terrestrial birds is low, and studies have shown that it would take levels of consumption of fish, vegetation, and/or water that are not physically possible or probable to reach a lethal dose (Finlayson *et al.* 2000, p. 193). The commenter did not provide information on the possible mechanism behind this perceived threat.

(82) *Comment:* One commenter stated that West Nile virus was a reason that yellow-billed cuckoos have declined.

Our Response: As discussed below in the *Disease or Predation* section, the U.S. Geological Survey's National Wildlife Health Center has identified the yellow-billed cuckoo as a species that is subject to the effects of West Nile virus and the Center for Disease Control's (CDC) Vector-Borne Disease Web site reports that West Nile virus has been documented in a dead yellow-billed cuckoo (Center for Disease Control 2012). The information on the impact of West Nile virus to the western yellow-billed cuckoo does not suggest that it has undergone a precipitous decline coincident with the relatively recent arrival of West Nile virus in western North America, and no scientific data indicate this disease as a major factor in the western yellow-billed cuckoo's decline.

(83) *Comment:* One commenter stated that most pesticides are used in highly populated areas by people who do not follow label instructions.

Our Response: While this statement may be true, western yellow-billed cuckoos rarely occur in or near highly populated areas and are much more likely to be affected by application of pesticides on adjacent agricultural fields. See ''Pesticides'' section, below, for further information on the impacts of pesticides on the western yellow-billed cuckoo.

(84) *Comment:* Two commenters mentioned, and included references on, the new threat of neonicotinoid pesticides, which are extremely toxic to caterpillars.

Our Response: Neonicotinoid pesticides are systemic chemicals that are taken up through various plant parts and can be distributed through a plant's tissues. These chemicals can be applied to a plant as a seed coating, through soil contact, through irrigation water, or as a foliar spray. Many of these chemicals are long-acting, with half-lives up to 2 years. Plant tissues that have been treated are toxic to both sap-sucking (e.g., aphids and true bugs) and foliage-eating insects (e.g., caterpillars, katydids, grasshoppers, and beetles). Many of these foliage-eating insects are potential prey of the western yellow-billed cuckoo. This information has been incorporated into this final rule.

Additional Threats

(85) *Comment:* Several commenters stated that there were threats to western yellow-billed cuckoos that were not discussed in the proposed rule. These included threats from recreational shooting, threats from solar generation sites, and threats from wind power.

Our Response: All the activities may impact the western yellow-billed cuckoo. In our evaluation of threats, we identified those threats that rise to the level of being a threat to the continued existence of the species. Although these activities affect the species, we do not find that these activities would have a significant effect on the species.

Comment on Regulatory Mechanisms

(86) *Comment:* Five commenters stated that Factor D, inadequacy of existing regulatory mechanisms, is also a significant threat. Other commenters stated that the proposed rule ignored the Federal regulatory mechanisms that protect western yellow-billed cuckoos and their habitat.

Our Response: The proposed and this final rule present a detailed discussion of Federal, State, and international laws and regulations that provide some protection and conservation benefit to the western DPS of the yellow-billed cuckoo. The western yellow-billed cuckoo has continued to decline, and its habitat has continued to be lost and degraded. In determining if a species is to be added to the List of Endangered or Threatened Wildlife, the species needs only to be threatened by one of the five factors listed in section 4(a)(1) of the Act. According to our analysis of the best scientific and commercial information available, the western yellow-billed cuckoo is threatened by both Factors A and E. Our evaluation of Factor D discusses the extent to which the inadequacy of each existing regulatory mechanism exacerbates the threats evaluated in Factors A and E. An individual regulatory mechanism may reduce a threat to a greater or lesser extent, but none separately or in combination reduces any of the threats to the point that they are no longer threats to the western yellow-billed cuckoo.

Comment on Cumulative Effects

(87) *Comment:* Several commenters stated that the proposed rule needs more emphasis on cumulative effects.

Our Response: We recognize that cumulative effects are important. Cumulative effects are discussed in several sections of the proposed and this final rule, including the section of water management, grazing, climate change, and pesticide use. Please see those sections for additional information on the impacts of cumulative effects on the western yellow-billed cuckoo.

Comment on Conservation Measures

(88) *Comment:* Eighteen commenters discussed conservation measures and indicated that benefits from conservation measures were not discussed and that conservation measures for other species should ''take care'' of the western yellow-billed cuckoo. Others stated that there was a need to quantify the benefits of riparian habitat restoration to western yellow-billed cuckoos.

Our Response: Conservation measures and their effect on western yellow-billed cuckoos are discussed in the proposed and this final rule. The majority of currently implemented conservation measures focus on species other than the western yellow-billed cuckoo. Conservation measures that are carried out for other species may have a positive effect on the western yellow-billed cuckoo, but western yellow-billed cuckoos, while being a riparian obligate species, have different ecological requirements than other species that are already listed (e.g., southwestern willow flycatcher and least Bell's vireo). As a result, it has not been proven that the conservation measures outlined by commenters would ''take care'' of the western yellow-billed cuckoo and its habitat. In regards to quantification of the benefits habitat restoration, we readily acknowledge that any well-developed and maintained restoration efforts will most likely benefit the western yellow-billed cuckoo and its habitat. However, we have found that, in some cases, even when habitat restoration has been completed, the benefit to the species has not been clear, as some areas still remain unoccupied or their numbers continue to decline.

(89) *Comment:* Two commenters were concerned that the listing of the western yellow-billed cuckoo would disrupt recovery efforts for the southwestern willow flycatcher and the Rio Grande silvery minnow (*Hybognathus amarus*).

Our Response: We disagree. Although additional coordination would be required to ensure that the habitat and species needs for all three species was occurring for a potential recovery action, we do not believe that that process would favor or harm any one single species in particular. In fact, by implementing recovery efforts for two or more species it would present opportunities that may be larger in scale or allow greater flexibility than smaller disjointed efforts for single species conservation.

Comments on Potential Exemptions (Section 4(d) Rule)

(90) *Comment:* Several commenters requested that rules under section 4(d) of the Act be included in the listing to exempt the following activities: (a) Oil and gas development and other economic activities; (b) riparian restoration activities; (c) all existing conservation activities; and (d) land and water use activities.

Our Response: Section 4(d) of the Act allows the Secretary the discretion to issue such regulations as [s]he deems necessary and advisable to provide for the conservation of a species. The Service's standard policy (under 50 CFR 17.31(a)) for issuing prohibitions for threatened species is to apply all the prohibitions applicable to endangered species to a threatened species unless otherwise revoked by issuance of more specific prohibitions. In the case of the western yellow-billed cuckoo, we reviewed whether the ''standard'' prohibitions apply or whether more specific prohibitions might be appropriate for the western yellow-billed cuckoo. Based on our review, we have determined that modifying our ''standard'' regulations for a threatened species would not be necessary and advisable in providing for the conservation of the western yellow-billed cuckoo. If new or additional information is received that may suggest that a rule issued under section 4(d) of the Act may be appropriate, we would review such information and, if appropriate, issue a proposed section 4(d) rule for public comment prior to developing any final section 4(d) prohibitions for the species.

Listing Process Public Input

(91) *Comment:* Eight comments were received on the listing process. This included statements regarding: Inadequate public feedback, that listing decisions should reflect customs and cultures of the local community, that court settlements should not be a factor in listing decisions, and that a finding of warranted but precluded should have been maintained as a possibility.

Our Response: In accordance with the Act and the Administrative Procedure Act (5 U.S.C. Subchapter II), and our regulations in Title 50 of the Code of Federal Regulations (CFR), we have solicited public comment on our proposed listing action. The comment period was reopened twice to insure that the public had ample opportunity to comment on the proposed rule. Listing endangered or threatened species is a process that examines threats to the species. Although customs and cultures of local communities are important considerations, they are not part of the listing process under the Act. Court settlements were not a factor in preparation of the proposed rule to list the western DPS of the yellow-billed cuckoo as a threatened species. The court settlement simply guaranteed that the Service would do an analysis of the western DPS of the yellow-billed cuckoo and determine if it should be listed as an endangered species or a threatened species or not listed. Regarding maintaining the warranted-but-precluded category as a listing possibility, the western yellow-billed cuckoo was previously found to be ''warranted but precluded,'' in 2001; the next step in the listing process is to either propose it for listing (and finalize the proposal if appropriate) or make a finding that the species is no longer warranted for listing.

Use of the Best Available Scientific and Commercial Information

(92) *Comment:* Ten commenters said that the science used in the proposed

rule is flawed, inaccurate, and biased and is not the best available science. Several commenters indicated that the Service should only select the ''best'' data from the data that was available.

Our Response: All available sources of data on distribution and abundance of yellow-billed cuckoos in the western United States were consulted, reviewed, and used in the proposed rule. We also provided the proposed rule for peer review to five knowledgeable individuals with scientific expertise that included familiarity with the yellow-billed cuckoo and its habitat, biological needs, and threats. We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the listing of the western DPS of the yellow-billed cuckoo. The peer reviewers generally concurred with our methods and conclusions, and provided additional information, clarifications, and suggestions to improve this final rule. Additional data were provided by commenters, including Federal and State wildlife and resource agencies, but none of that additional data changed the pattern of western yellow-billed cuckoo distribution and abundance presented in the proposed rule. In response to the selection of data, we conclude that it is much better to present and discuss all available pertinent data in our determinations, rather than be subjective and select which data to present and review. We have made our determination in this final rule solely based on the best available scientific and commercial data available as required by section 4(b)(1)(A) of the Act.

(93) *Comment:* One commenter stated that the Service did not cite papers in the proposed rule that were cited in the 12-month finding.

Our Response: The proposed rule is an updated and more thorough review of the best available information on the western yellow-billed cuckoo and is an independent document from the 12-month finding (66 FR 38611; July 25, 2001). Additional research has been completed on the species, and additional peer-reviewed papers have been published and reports written over the past 13 years that supersede previously published paper and reports. The new information in some cases has confirmed, updated, or revised older research. These are all reasons that some papers that were cited in the 12-month finding are not directly cited in the proposed rule. However, information and research cited in the 12-month finding is still part of the decisional record for the western yellow-billed cuckoo and included (by reference) in this final rule.

(94) *Comment:* One commenter said that two recent peer reviewed papers (Villarreal *et al.* 2014 and Wallace *et al.* 2013) that were not cited in the proposed rule are not valid.

Our Response: The Service appreciates the commenter drawing our attention to these papers that had published after the proposed rule was published in the **Federal Register** (October 3, 2013). We will evaluate these peer-reviewed papers, which deal with modeling western yellow-billed cuckoo habitat using remote sensing, and with the commenter's concerns in mind, we will consider them in our final critical habitat designation as appropriate.

(95) *Comment:* One commenter stated that they did not like the use of data from the Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2005, pp. 202–203) in the proposed rule.

Our Response: Arizona Breeding Bird Atlas data (Corman and Wise-Gervais 2005, pp. 202–203) were used in the proposed rule to demonstrate that western yellow-billed cuckoos are found on a small percentage of the landscape in Arizona. Breeding bird atlases are an important source of information on bird distribution and abundance in areas where they are available. To not present these data would be contrary to our requirement to use the best available science in listing decisions.

Property Rights

(96) *Comment:* Two commenters stated that listing the western yellow-billed cuckoo will restrict property rights and access to public lands.

Our Response: This comment was presented generally with no specific instances or information. It is very unlikely that listing the western yellow-billed cuckoo will have the effect of limiting access to public lands. Direct human disturbance is not seen as a major threat to the western yellow-billed cuckoo as discussed in the final rule. It is unclear what the commenter meant by restriction of property rights, but it is not likely that listing the western yellow-billed cuckoo will have an adverse effect on private property ownership or use.

Summary of Changes From Proposed Rule

Based upon our review of the public comments, comments from other Federal and State agencies, peer review comments, and any new relevant information that may have become available since the publication of the proposal, we reevaluated our proposed rule and made changes as appropriate. Other than minor clarifications and incorporation of additional information on the species' biology, this final rule has not changed significantly from the proposed rule. Changes to the final rule include: (1) Updates to the life-history information of the species' vocalizations and how these changes may have affected survey results for the species; (2) updates to survey data (though no new populations have been located and no major increases have been noted in the past 2 years); (3) updates to the threats in Factor A; and (4) the addition of threats of neonicotinoid pesticides in Factor E.

We did receive information from the State of Washington regarding habitat use in the Pacific Northwest including western Oregon, western Washington, and southwestern British Columbia. This information updates our *Habitat Use and Needs* section of the proposed listing rule. In describing habitat use by the species, we stated that the species requires large blocks of habitat in riparian landscapes for breeding. In the description of breeding habitat, the document generally focuses on riparian areas in arid environments as this is where the majority of confirmed breeding now occurs. The result gives the impression that the species does not currently use or has not historically used more moist riparian areas such as northern California, western Oregon, western Washington, and southwestern British Columbia, Canada, as breeding habitat. Although breeding for the western yellow-billed cuckoo has not been recently confirmed in Oregon, Washington, and British Columbia, these more moist areas are within the historic breeding range of the species. Recent observations indicate that western yellow-billed cuckoos occasionally occur in these areas and the possibility of breeding in Oregon, Washington, and British Columbia cannot be ruled out at this time. We are not including the *Habitat Use and Needs* section in this final rule, but are updating the information here and incorporating the remainder of the discussion contained in the proposed rule by reference.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or

curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors is discussed below.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The decline of the western yellow-billed cuckoo is primarily the result of riparian habitat loss and degradation. Within the three States with the highest historical number of western yellow-billed cuckoo pairs, past riparian habitat losses are estimated to be about 90 to 95 percent in Arizona, 90 percent in New Mexico, and 90 to 99 percent in California (Ohmart 1994, pp. 276–281; DOI 1994, p. 215; Noss *et al.* 1995, pp. 37, 46; Greco 2008, p. 5). Many of these habitat losses occurred historically, and although habitat destruction continues, many past impacts have subsequent ramifications that are ongoing and are affecting the size, extent, and quality of riparian vegetation within the range of the western yellow-billed cuckoo. The connection between habitat loss and the decline of western yellow-billed cuckoos is thoroughly documented in California (Gaines and Laymon 1984, pp. 49–80). These adverse impacts to the western yellow-billed cuckoo's habitat including habitat loss and degradation are occurring now and are anticipated to continue for decades to come.

Moreover, these impacts are often subtle. As described in the Habitat Use and Needs section in the proposed rule, during the breeding season the habitat of the western yellow-billed cuckoo consists of expansive blocks of riparian vegetation containing trees of various ages, including in particular larger, more mature trees used for nesting and foraging. In order for these areas to remain as viable western yellow-billed cuckoo habitat, the dynamic transitional process of vegetation recruitment and maturity must be maintained. Without such a process of ongoing recruitment, habitat becomes degraded and is eventually lost. In our discussion below, we identify human impacts to riparian vegetation as resulting in current and ongoing destruction and modification of existing and future potential habitat for the western yellow-billed cuckoo.

Past actions by humans have resulted in changes to the landscape, the hydrology, or both such that they prevent the riparian plants that are the basis of the species' habitat from growing at all. The consequences of these past actions may have initially resulted in destruction or modification of then-existing riparian habitat; however, once that habitat is lost, the changed conditions (such as changed hydrologic regime) also prevents riparian habitat from regenerating, even in the absence of other impacts. For example, channelization—through manmade levees or other constructs, or through channel incising as a consequence of other actions—may leave the geographical area where riparian plants once grew (such as the watercourse's floodplain) physically untouched, but the altered hydrology prevents riparian plant species from germinating and growing.

Principal causes of riparian habitat destruction, modification, and degradation in the range of the western yellow-billed cuckoo have occurred from alteration of hydrology due to dams, water diversions, management of riverflow that differs from natural hydrological patterns, channelization, and levees and other forms of bank stabilization that encroach into the floodplain. These losses are further exacerbated by conversion of floodplains for agricultural uses, such as crops and livestock grazing. In combination with altered hydrology, these threats promote the conversion of existing primarily native habitats to monotypic stands of nonnative vegetation, which reduce the suitability of riparian habitat for the western yellow-billed cuckoo. Other threats to riparian habitat include long-term drought and climate change. These threats are summarized in a recent detailed review of the literature on the subject (Poff *et al.* 2011, pp. 1241–1254). Water management and delivery throughout the western United States is contentious, and resolving issues related to water allocation is difficult and often a lengthy, heavily contested process. The exact timeframe for resolving water management and delivery issues and their impact on the western yellow-billed cuckoo and its habitat would vary on the location, resource demands, sensitive habitat or species concerns, stakeholders, and amount of water available. As a result, we would expect that resolving water issues for the various uses (agriculture, urbanization, wildlife, and tribal interests) in the west will be a lengthy ongoing process and not be resolved in the near future (10–20 years) and may take substantially longer considering the increased demands and the effects of climate change. The Factor A threats are described in more detail below. Moreover, past and ongoing impacts to the species' habitat are working in combination with other threats, which are discussed in greater detail in Factors C and E, below.

Habitat Loss From Dams and Alteration of Hydrology Dams

Several researchers and scientific organizations including the Service reviewed the following effects of human modification of natural hydrological processes on riparian habitat, including those from dams (Poff *et al.* 1997, pp. 769–784; Greco 1999, pp. 36–38; National Academy of Sciences (NAS) 2002, pp. 145–150; Service 2002, Appendix I, pp. 1–12). Dams result in an immediate effect of destroying riparian structure and functioning due to habitat displacement from dam construction and by permanent inundation, sometimes flooding miles of upstream riparian areas. This results in the physical loss of riparian vegetation. In the absence of vegetation, the western yellow-billed cuckoo cannot breed, feed, or find shelter. Current and future releases of water downstream from dams at unnatural rates of flow or timing that differ from preconstruction hydrologic circumstances, or at too frequent or too infrequent intervals, may lead to flooding or desiccation beyond the tolerance limits of the native riparian vegetation, thus resulting in loss of habitat of the western yellow-billed cuckoo.

Dam construction has been occurring since the settlement of western North America with its peak in the mid-20th century. These include most major western rivers, many of which have a series of dams, and include, but are not limited to, the Sacramento, Kern, San Joaquin, Mojave, Snake, Gila, Salt, Verde, and Rio Grande, including 25 major reservoirs built on the Colorado and Green Rivers alone between the 1930s and 1970s (Richter *et al.* 1998, p. 332). In northern Mexico, these rivers include the Río Conchos, Yaqui, and Mayo, Río Bambuto, Río Bravo, Tubutama, La Reforma, Cuchujaqui River in Alamos, Aconchi and Baviacora in Río Sonora, and Upper San Pedro River in Sonora (Instituto del Media Ambiente y el Desarrollo Sustentable del Estado de Sonora (IMADES) 2003, p. 4; Kelly and Arias Rojo 2007, pp. 2–3; Cornell *et al.* 2008, p. 96).

There are now dozens of large dams and scores of smaller dams on rivers throughout the range of the western yellow-billed cuckoo. Today, the rate of building new dams has slowed because most of the highest quality dam sites

already have dams constructed on them. There were proposals to build two dams on Cottonwood Creek, one of the major tributaries of the Sacramento River (USACE 1982), but it is not clear when or if these dams will be built. A larger current threat is the enlargement (raising of dams or control structures) of existing dams. The enlargement of Terminus Dam on the Tule River in California by 21 ft (6.5 m) in height was completed in 2004 (Barcouda *et al.* 2006, p. 12), and proposals to enlarge Shasta Dam on the Sacramento River by up to 18.5 ft (5.7 m) in height and increasing its storage capacity (Reclamation 1999, pp. 3–8; Reclamation 2013, pp. ES 15–22) and Friant Dam on the San Joaquin River by up to 140 ft (43 m) in height are being explored (Reclamation 2003, pp. 3.1–3.8), and the raising of Lake Isabella on the Kern River by the USACE is in the final stages of implementation (USACE 2012, pp. 1–4). Larger dams with additional storage would likely flood potential western yellow-billed cuckoo habitat upstream and cause additional hydrologic disruption downstream.

While the amount of habitat lost within the construction zone of a dam is relatively small, far greater amounts of habitat are destroyed in the areas of inundation and through the ongoing effects of the amount and timing of water releases through the dam operation, which affects both upstream and downstream habitats. Ongoing downstream effects to riparian habitat from dams include changes in sediment transport due to sediment retention behind the dams so that channels below a dam become increasingly ''sediment starved.'' This situation causes vertical erosion (downcutting), which can lead to loss of river terraces that sustain riparian vegetation (NAS 2002, pp. 145–150; Poff *et al.* 2009, pp. 773–774; Poff and Zimmerman 2010, pp. 196–197).

Ongoing operations of large dams can also dampen the magnitude of normal high flows, thus preventing cottonwood germination (Howe and Knopf 1991, p. 218), and dewater downstream reaches, causing substantial declines of riparian forests (NAS 2002, pp. 145–150). For example, Groschupf (1987, p. 19) found that almost all cottonwoods and over half of all willow trees were eliminated from one waterway in Arizona that was exposed to repeated large releases of water from a dam. This situation reduced the density of western yellow-billed cuckoos from 13 per 100 ac (40 ha) before the flooding to 3 per 100 ac (40 ha) after the flooding (Groschupf 1987, p. 19). In another example, a study of the San Joaquin River from downstream of the Friant Dam to the 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, Chap. 5, pp. 1–2). These losses are most likely attributed to reduced stream flow down the river as a result of water diversions.

In the case of the San Joaquin River, efforts are under way for restoring a more natural functioning hydrologic system and to restore riparian habitat (Reclamation 2012, pp. 7–8). Generally, in the absence of ongoing dam operations, where areas are allowed to flood and deposit sediment, the habitat is likely to regenerate naturally. However, because of the way the majority of dams are operated, the ability for the stream courses to promote natural regeneration and maintenance of riparian habitat has been greatly diminished. These impacts are happening now and are likely to continue without changes to water release strategies and management.

After the completion of the larger dams on the Colorado River system starting in the 1930s, limited pulse flows reached the lower Colorado River in Mexico for nearly 50 years, resulting in the loss of cottonwood–willow forests and the establishment of tamarisk (Glenn *et al.* 2001, pp. 1175–1186; Nagler *et al.* 2005, pp. 1843–1844). Local decline of the western yellow-billed cuckoo and other riparian birds has been attributed to that habitat loss and degradation (Hinojosa-Huerta *et al.* 2008, p. 81). Additionally, along the Río Altar in northern Mexico, completion of the Cuauhtémoc Dam and Reservoir (Presa Cuauhtémoc) in 1950 diverted surface water and contributed to increased vegetation clearing for agriculture, degradation of mature cottonwood forests, and subsequent declines in distribution and abundance of riparian bird species associated with these forests (Flesch 2008, p. 43), including the western yellow-billed cuckoo, which is known to occur there. In addition to past habitat losses, the altered hydrology caused by dams continues to have an ongoing impact on riparian habitat.

While alteration of hydrology due to dam construction and other water supply projects has been widely implicated in the loss and degradation of downstream riparian habitat for the western yellow-billed cuckoo (Gaines and Laymon 1984, p. 73; Greco 1999, pp. 36–38; Greco 2012, pp. 8–9), some dams have resulted in temporary habitat expansion for the western yellow-billed cuckoo within the immediate upstream influence of the associated reservoirs. For example, one of the largest concentrations of western yellow-billed cuckoo in New Mexico occurs at the inflow to Elephant Butte Reservoir on the middle Río Grande (Sechrist *et al.* 2009, p. 1; Ahlers and Moore 2011, pp. 19–20). Western yellow-billed cuckoo numbers increased following several years when water levels receded and riparian vegetation expanded into the exposed area of the reservoir pool. The western yellow-billed cuckoo population there continues to increase, likely as a result of continued drawdown from long-term drought that allows maturation of the riparian forest into suitable breeding habitat (Ahlers and Moore 2011, pp. 19–20). Drought patterns are cyclical, and, when wetter conditions return to the region, Elephant Butte Reservoir likely will be refilled. When this happens, approximately 92 percent of 44 to 87 pairs of western yellow-billed cuckoos there (detected during the 2007 and 2008 surveys) would be displaced through inundation (Reclamation 2009, pp. 64–65).

The threat to the western yellow-billed cuckoo's habitat from fluctuating water levels behind dams is likely to occur elsewhere in the range of the western yellow-billed cuckoo. In California, the State's second largest population of western yellow-billed cuckoos occurs within the inflow delta footprint of Lake Isabella, a dammed reservoir on the Kern River. Breeding western yellow-billed cuckoos are also found at other reservoir inflow deltas, such as Horseshoe Reservoir on the Verde River (Dockens and Ashbeck 2011a, p. 1) and the Tonto Creek and Salt River inflows to Roosevelt Lake in Arizona (Salt River Project 2002, pp. 61–67).

The temporary gain in riparian habitat at the inflow of reservoirs can be beneficial to the western yellow-billed cuckoo by providing large expanses of additional nesting and foraging habitat during a sequence of low-water years. However, the value of such habitat is affected by fluctuating water levels between years. Drastically fluctuating water levels with alternating inundation and desiccation cycles have been associated with fluctuations in populations of western yellow-billed cuckoos that breed in reservoir inflow sites (Laymon and Williams 2002, pp. 12–13; Henneman 2008, pp. 12–13). For example, along the Kern River, western yellow-billed cuckoo numbers increased during low reservoir levels for multiple years when vegetation recolonized the drawdown area (Laymon *et al.* 1997, p.

10), but western yellow-billed cuckoos moved to other sites during a wet year when lake levels rose and flooded out habitat (Launer *et al.* 1990, p. 10; Halterman *et al.* 2001, p. 20). When the water receded, it took up to 2 years for western yellow-billed cuckoos to return to breed in the area; however, this return was at reduced numbers even though the habitat returned to previous levels (Laymon and Williams 2002, pp. 12–13; Henneman 2008, pp. 12–13). The reason for this delay in recolonization needs further study (Henneman 2010, pp. 12–14).

The water level continues to remain below capacity at Lake Isabella due to dam safety concerns (Stewart 2012, pers. comm.). Once Lake Isabella fills again to capacity, the riparian habitat that has since formed at the inflow and that supports western yellow-billed cuckoos will become inundated, at least periodically (Whitfield 2012, pers. comm.), thereby impacting the habitat of the western yellow-billed cuckoo. In addition, the USACE and the USFS are developing a proposal and have completed a final environmental impact statement on options to repair dam deficiencies and raise the height of the dam an additional 16 ft (4.9 m) (Isabella Lake Dam Safety Modification Project Environmental Impact Statement Final October 2012). Pursuant to section 7 of the Act, consultation was completed for the proposed action, but the western yellow-billed cuckoo was not a species addressed in the biological opinion.

Lake Isabella is currently managed to minimize incidental take of the southwestern willow flycatcher (flycatcher) (*Empidonax traillii extimus*) from reservoir operations and recreation using reasonable and prudent measures developed during consultation with the Service (Service 1996, 1999, and 2005, entire). Some of these measures to conserve the flycatcher may be beneficial to the western yellow-billed cuckoo; however, the eventual inundation of the drawdown area of the reservoir will result in some degree of temporary habitat loss and degradation under current operational guidelines and may result in permanent loss of habitat for the western yellow-billed cuckoo if the proposed dam raise is implemented. Similar periods of inundation and drawdown, resulting in corresponding development and destruction of suitable western yellow-billed cuckoo habitat, occur at Roosevelt Lake (Salt River Project (SRP) 2002, entire).

In Arizona, following the high water levels of 1983–1984 and 1986 on the Bill Williams River Delta, which is influenced by fluctuating water levels from dams in the Colorado River system (Rosenberg *et al.* 1991, pp. 18–23), the western yellow-billed cuckoo numbers declined by 70–75 percent. Habitat has since improved on the Bill Williams River Delta, but western yellow-billed cuckoo numbers remained low for several years (Laymon and Halterman 1987a, pp. 10–18). The actual mechanism that influences the yellow-billed cuckoo's response to fluctuations in water levels is unknown, but loss of prey has been implicated; areas that were inundated normally support ground-nesting invertebrates, such as katydids and sphinx moths, that western yellow-billed cuckoos feed upon, and it may take several years for these prey populations to rebound (Laymon and Williams 2002, pp. 12–13; Henneman 2008, pp. 12–13).

In Sonora, Mexico, large dams exist on the Mayo, Yaqui, and Sonora Rivers (Villaseñor-Gomez 2006, p. 107). We do not have information on the magnitude or frequency of effects, positive or negative, from water management activities, to the western yellow-billed cuckoo in those locations. However, we have no reason to believe that the dams are managed in a substantially different manner in Mexico than dams in the southwestern United States, and the effects to riparian habitat are expected to be similar.

Despite some positive effects of dams on increasing western yellow-billed cuckoo habitat in a few areas, these gains in habitat are only temporary, and overall, the net effect of dams on the species has been negative. As such, dams and their ongoing operations are a threat to the western yellow-billed cuckoo over most of its range. This threat has resulted in substantial historical losses of western yellow-billed cuckoo habitat resulting in a curtailment of the species' range. The ongoing operation of these dams is likely to have minor impacts to the species at any given location, but because so many of the waterways within the range of the species have been dammed, we believe this threat has a substantial cumulative impact on the habitat of the western yellow-billed cuckoo, especially when considered with other threats. Moreover, we expect the operation of these dams will continue in a similar manner for decades to come, and thus we expect this threat to be an ongoing impact to the western yellow-billed cuckoo's habitat.

The areas where the floodplain is still hydrologically connected to the river and has relatively unconstrained riverflow, such as in some areas of California and Sonora, Mexico, support the highest number of western yellow-billed cuckoos (Villaseñor-Gomez 2006, pp. 107–108; Greco 2008, p. 6; Greco 2012, pp. 8–9). For example, the Sacramento River from Red Buff to Colusa has a highly dynamic mosaic of habitat patches of varying ages that form, disappear, and reform in response to active river channel processes that operate over decades (Greco 2008, p. 6; Greco 2012, pp. 8–9). Although this section of the Sacramento River is also affected by altered hydrology, it is far enough below Shasta Dam and below several major undammed tributaries, such as Cottonwood Creek and Battle Creek, that it still has flood events every few years that help support riparian habitat processes (Werner 2012, pers. comm.).

The river provides habitat characteristics that Laymon (1998, p. 4) indicated were important for the western yellow-billed cuckoo in California, such as a meandering system with young riparian habitat that, compared to mature woodlands, provides preferred nesting sites; high productivity of invertebrate prey; and reduced predator abundance (Laymon 1998, p. 4). Another example of relatively intact riparian habitat in the range of the western yellow-billed cuckoo is found in the highlands of central Sonora, Mexico, which supports occupied habitat of the western yellow-billed cuckoo. Villaseñor-Gomez (2006, p. 108) found that the maintenance of the natural flooding regimes due to the limited number of water development structures has allowed riparian vegetation along sections of the Sonora, Moctezuma, and Sahiaripa Rivers to persist in very good condition in some areas. Most of the known occurrences of western yellow-billed cuckoo in central Sonora are associated with these regions.

We conclude that dams continue to affect both the downstream and upstream habitat through alteration of flows. These effects can include widely fluctuating water levels at inflow sites that inundate nesting habitat, limit food resources, and flood or desiccate habitat (Poff *et al.* 1997, pp. 769–784; Greco 1999, pp. 36–38; NAS 2002, pp. 145–150; Service 2002, Appendix I, pp. 1–12). Downstream effects caused by sediment retention behind dams, or sediment scouring and removal caused by excessive water releases, do not mimic the natural flow regimes and often result in the inability for cottonwoods to become established or regenerate and provide habitat for the western yellow-billed cuckoo. Woody and herbaceous debris accumulates in the absence of these scouring flows,

increasing fire risk and intensity (Stromberg and Chew 2002, pp. 195–219) (see section on Wildfire below).

Dams and their flow modifications have ongoing effects to habitat and will likely do so for decades to come, further modifying the habitat of the western yellow-billed cuckoo. Therefore, direct and indirect destruction of riparian habitat resulting from altered hydrology from past dam-building activities continues to contribute to the curtailment of the range of the western yellow-billed cuckoo. Additionally, as a result of future predicted climate change (see Climate Change section below), the climate within the range of the western yellow-billed cuckoo will likely become drier, which will increase the demand for water storage and conveyance systems, which in turn will likely increase the frequency and severity of impacts on western yellow-billed cuckoo habitat (Stromberg *et al.* 2013, pp. 411–415).

Surface and Ground Water Diversion

Water extractions, both from surface water diversions and ground water pumping, can negatively affect riparian vegetation (Poff *et al.* 1997, pp. 769–784; Service 2002, Appendix I, pp. 1–8). Water diversions and withdrawals can lower ground water levels in the vicinity of riparian vegetation. Because ground water and surface water are generally connected in floodplains, lowering ground water levels by only about 3 ft (1 m) beneath riparian areas is sometimes sufficient to induce water stress in riparian trees, especially in the western United States (NAS 2002, p. 158). Physiological stress in native vegetation from prolonged lower flows or ground water results in reduced plant growth rate, morphological change, or mortality, and altered species composition dominated by more drought-tolerant vegetation, and conversion to habitat dominated by nonnative species (Poff *et al.* 1997, p. 776). These effects reduce and degrade habitat for the western yellow-billed cuckoo for foraging, nesting, and cover.

Adverse effects of excessive ground water extraction on riparian vegetation have been well-documented in the southwestern United States. Case histories on many river systems in Arizona including the Santa Cruz River and on the Owens River in California have documented the connection between overutilization of the ground water, lowering of the water table, and the decline and eventual elimination of riparian vegetation (Zektser *et al.* 2005, pp. 400–401; Webb and Leake 2006, pp. 317–320). Ground water extraction is also affecting river flows and riparian vegetation along rivers that support the western yellow-billed cuckoo in Mexico, including the Río Conchos in Chihuahua (Kelly and Aria-Rojo 2007, p. 174; Cornell *et al.* 2008, p. 98) and the Río Altar in Sonora, where the quantity of surface water declined greatly between 2000 and 2007 (Flesch 2008, pp. 44–45). Therefore, ground water extraction and water diversions create an ongoing threat to western yellow-billed cuckoo habitat.

The hydrologic regime (stream flow pattern) and supply of (and interaction between) surface and subsurface water is a driving factor in the long-term maintenance, growth, recycling, and regeneration of western yellow-billed cuckoo habitat (Service 2002, p. 16). As streams reach the lowlands, their gradients typically flatten and surrounding terrain opens into broader floodplains (Service 2002, p. 32). In these geographic settings, the stream-flow patterns (frequency, magnitude, duration, and timing) will provide the necessary stream-channel conditions (wide configuration, high sediment deposition, periodic inundation, recharged aquifers, lateral channel movement, and elevated ground-water tables throughout the floodplain) that result in the development of riparian habitat suitable for use by western yellow-billed cuckoos (Poff *et al.* 1997, pp. 770–772; Service 2002, p. 16).

Allowing the river to flow over the width of the floodplain, when overbank flooding occurs, is integral to allow deposition of fine moist soils, water, nutrients, and seeds that provide the essential material for plant germination and growth. An abundance and distribution of fine sediments extending farther laterally across the floodplain and deeper underneath the surface retains much more subsurface water, which in turn supplies water for the development of the vegetation that provides western yellow-billed cuckoo habitat and microhabitat conditions (Service 2002, p. 16). The interconnected interaction between ground water and surface water contributes to the quality of the riparian vegetation community (structure and plant species) and will influence the ability of vegetation to germinate, regenerate, and maintain its foliage density, vigor, and species composition (Arizona Department of Water Resources 1994, pp. 31–32).

In many instances, western yellow-billed cuckoo breeding site occur along streams where human impacts are minimized enough to allow more natural processes to create and maintain the habitat. However, there are also breeding sites that are supported by various types of supplemental water including agricultural and urban runoff, treated water outflow, irrigation or diversion ditches, reservoirs, and dam outflows (Service 2002, p. D–15). Although the waters provided to these habitats might be considered ''artificial,'' they are often important for maintaining the habitat in appropriate condition for breeding western yellow-billed cuckoos within the existing environment.

Encroachment of Levees and Flood Control and Bank Stabilization Structures Into the River Channel and Floodplain

Other alterations in river hydrology with ongoing effects on western yellow-billed cuckoo habitat include river channelization, construction of levees, bank stabilization, and placement of any flood control structures that encroach into the river and its floodplain. These actions result in direct loss of habitat from construction and from maintenance activities that remove woody vegetation that has become established on the structures. Furthermore, these structures are effective, by design, at severing the hydrologic connection of the river's main channel and the river's immediate floodplain, thereby preventing overbank flooding. By preventing overbank flooding, levees and other similar structures reduce the amount of water available to riparian vegetation in the floodplain, which results in desiccation and eventual loss and degradation of riparian habitat (Vogl 1980, pp. 84–86; NAS 2002, p. 155; Greco 2012, pp. 8–9). Such effects are less destructive, however, for those levees located farther from the stream system, such as those outside the meander belt of a river (Greco 2012, p. 4).

As an illustrative example, we provide a brief summary of how river channelization, construction of levees close to the river, and rock riprap armoring along the levees have caused destruction and modification of western yellow-billed cuckoo habitat on the Sacramento River, one of the most substantial historical nesting and foraging habitat areas for the western yellow-billed cuckoo. The Sacramento River is now disconnected from ecological processes that both renew and restore riparian and aquatic habitats (Laymon and Halterman 1987a, pp. 11–14; Halterman 1991, pp. 1–2; Greco 2008, p. 6; Greco 2012, pp. 8–9). 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 40 years of bank protection (Service

2000, pp. 26–29). Rock riprap armoring a river reach often changes the river dynamics and leads to channel downcutting and erosion immediately downstream from the riprap. Therefore, riprapping banks leads to the need for more riprapping.

Channelizing the river and severing the connection to the floodplain has severely altered the natural disturbance regime that would have allowed riparian habitat to regenerate now and in the future (Poff *et al.* 1997, pp. 769–784; Greco 2008, p. 6; Greco 2012, pp. 8–9). The result is that much of the river's remaining riparian habitat is modified, and now occurs in narrow, disconnected, linear strips (Service 2000, pp. 26–29; Halterman *et al.* 2001, p. 4) that are not utilized by the western yellow-billed cuckoo for breeding (Gaines 1974, p. 204; Greco 2012, p. 9). With the example of the Sacramento River, nesting western yellow-billed cuckoos no longer occur south of Colusa as the river has been channelized and riprapped from that point into the Sacramento-San Joaquin River Delta. These flood control and bank stabilization structures also keep the riparian habitat from regenerating and maturing. The factors that reduce western yellow-billed cuckoo breeding in these areas are not well-understood, but reductions of breeding population have been attributed to lack of patches of adequate size for nesting (Greco 2012, pp. 8–9), increased predators, and the species' inability to use highly isolated patches (Halterman 1991, pp. 33–38), as discussed under Factor E. The Sacramento River is but one of many rivers within the range of the western yellow-billed cuckoo where these activities have destroyed and modified riparian habitat and where the ramifications of these past actions are continuing to impact the western yellow-billed cuckoo's habitat today. These ongoing impacts will likely continue for decades to come.

An additional pervasive threat is the design of open-channel flood control channels with inappropriately smooth roughness coefficients. This creation over-scours the floodplains and requires removal of woody riparian vegetation that regenerates on floodplains, which in turn leads to floodplains with no western yellow-billed cuckoo habitat (Greco 2013, pp. 707–717).

Transportation Systems

Similarly, transportation systems have directly and indirectly altered a large number of riparian areas in western North America (NAS 2002, p. 182). Road and rail systems are frequently sited along rivers, and often entail removing riparian vegetation for construction of the roadbed, and modifying local hydrology to reroute surface water and ground water. Bridges or culverts require abutments along the bank to provide roadway support. Because abutments and roadbeds physically constrain the stream, future lateral adjustments by the stream, which can affect floodplain dynamics, are effectively eliminated, which reduces and degrades riparian habitat (NAS 2002, p. 182). Such impacts result in additional destruction and modification of habitat for the western yellow-billed cuckoo. In comparison with construction of dams and altered hydrology, this threat, by itself, is less likely to result in severe impacts to riparian habitat. However, this threat is but one of many that, in combination, results in substantial changes to physical and hydrological properties of a watercourse, which in turn contributes to a substantial curtailment in the habitat of the western yellow-billed cuckoo.

Gravel Mining

Other past and ongoing effects to riparian habitat result from gravel mining (Kondolf *et al.* 2001, pp. 54, 59). Extraction of gravel, primarily for construction products, typically occurs along rivers and adjacent floodplains where gravel deposits are naturally found. Large amounts of gravel removal from the stream and active floodplain result in channel downcutting or incision, which affects groundwater levels, frequency of overbank flows, bank stability, and the extent and character of riparian vegetation of specific stream reaches (Collins and Dunne, 1989, pp. 213–224; Kondolf 1995 pp. 133–136; NAS 2002, p. 179). Some examples of downcutting on streams in California that historically had, but no longer have, populations of western yellow-billed cuckoos, include: Cache Creek, Yolo County (15.0 ft (4.6 m) average and 26.0 ft (8.2 m) maximum downcutting); Merced River, Merced County (5.9 ft (1.8 m) average and 7.8 ft (2.4 m) maximum downcutting); Putah Creek, Yolo County (7.8 ft (2.4 m) average and 15.0 ft (4.6 m) maximum downcutting); Russian River, Sonoma County (11.4 ft (3.5 m) average and 17.9 ft (5.5 m) maximum downcutting); and Santa Clara River, Ventura County (15.6 ft (4.8 m) average and 20.2 ft (6.2 m) maximum downcutting) (Kondolf *et al.* 2001, p. 50).

Furthermore, gravel extraction creates a knickpoint (a sharp change in channel slope) that typically erodes upstream in a process known as headcutting, which has the potential to propagate upstream for miles on the main river and its tributaries. As headcuts migrate upstream, the incision propagates upstream (Kondolf *et al.* 2001, p. 49). This process creates ongoing and future impacts to habitat from past as well as current gravel mining operations. Similar to the effects of manmade levees when they disconnect floodplain habitat from the active river channel, artificial channel incision as a result of gravel mining and similar activities reduces overbank flooding. This situation reduces the hydrological connection to the floodplain (Kondolf *et al.* 2001, p. 56), thereby resulting in subsequent loss and degradation of riparian habitat for the western yellow-billed cuckoo, throughout its range, including Mexico (Cornell *et al.* 2008, p. 98). The effects of incision and channel erosion are further exacerbated where gravel mining occurs in sediment-starved reaches below dams (Kondolf *et al.* 2001, p. 10). We expect past and ongoing gravel mining activities, either alone or in combination with other hydrological changes in riparian areas, to continue to modify habitat and further curtail the range of the western yellow-billed cuckoo for decades.

In conclusion, dams, channelization, and other manmade features that alter the watercourse hydrology and encroach into the active channel and floodplain are threats to the habitat of the western yellow-billed cuckoo because they, separately or in combination, significantly reduce and degrade nesting and foraging habitats. The natural processes that sustain riparian habitat in these and similar dammed and channelized river systems in the American West and in northwestern Mexico have been altered, resulting in only fragments or remnants of formerly large tracts of native riparian forests that no longer support breeding western yellow-billed cuckoos or support them in fewer numbers. The multiple effects from altered hydrology comprise the most widespread and greatest magnitude of current threats to habitat that supports the western yellow-billed cuckoo. Such processes continue to modify habitat and further curtail the range of the western yellow-billed cuckoo. Moreover, we expect these alterations in the hydrology to continue to affect habitat of the western yellow-billed cuckoo into the future.

Habitat Loss and Degradation From Agricultural Activities

Following the effects from alterations in hydrology in severity, conversion of riparian areas for agricultural crops and livestock grazing has been, and continues to be, a major contributor to

riparian habitat loss and degradation (NAS 2002, p. 161; Johnson *et al.* 2007, p. 61).

Large areas of cottonwood–willow floodplain vegetation have been converted to agricultural uses, further reducing the extent of habitat available to western yellow-billed cuckoos for breeding (Swift 1984, pp. 225–226; Rosenberg *et al.* 1991, pp. 18–23). For example, within areas that support the western yellow-billed cuckoo, clearing for agricultural uses occurred extensively in the past. On the floodplains of the Sacramento River (Greco 1999, pp. 2, 107), riparian habitat was reduced from 775,000 ac (314,000 ha) in the 1850s to less than 18,000 ac (7,287 ha) by 1977 (Swift 1984, p. 226). Clearing for agriculture is also extensive along the lower Colorado River (Rosenberg *et al.* 1991, pp. 18–23), San Pedro River, Gila River (Swift 1984, p. 226), Río Grande, and several river courses in northern Mexico including, but not limited to, the Río Yaqui, Río Mayo, Río Bambuto, Río Tubutama, and Río Sonora (Russell and Monson 1998, p. 11; IMADES 2003, p. 4; Villaseñor-Gomez 2006, p. 108). Clearing also occurred along the coasts of Sinaloa and southern Sonora, Mexico, resulting in massive losses of thorn forest to industrial agriculture (Rohwer *et al.* 2009, p. 19054).

Although most riparian and thorn scrub habitat losses largely stem from past agricultural clearing, effects from cultivated agricultural lands are ongoing. Agricultural lands continue to dominate much of the remaining riparian landscape, particularly along the Sacramento (Greco 1999, pp. 94, 104, 107), parts of the Gila, and lower Colorado Rivers (Johnson *et al.* 2007, p. 207); along the latter, 65 percent of western yellow-billed cuckoo survey sites are bordered on at least one side by agriculture fields (Johnson *et al.* 2007, p. 61). Riparian areas are sometimes viewed as a potential source of plant and animal pests, a source of shade that may reduce crop yields, and competition for scarce water resources (NAS 2002, pp. 170–171). For example, in the Salinas Valley in California, a vigorous program is under way to comply with food safety practices that involve the clearing of riparian habitat adjacent to certain types of crops in an effort to eliminate wildlife presence, which has been linked to contamination of crops with a virulent strain of the bacteria *Escherichia coli* (Beretti and Stuart 2008, pp. 68–69; Gennet *et al.* 2013, pp. 236–242). While western yellow-billed cuckoos do not currently breed along the Salinas River (Gaines and Laymon 1984, p. 52), if these same rules are applied to farmland along the Gila, Rio Grande, Sacramento, and Colorado Rivers, western yellow-billed cuckoo habitat could be eliminated to meet these food safety concerns.

Accidental fire from farm workers operating machinery or burning weeds sporadically escapes into adjacent riparian habitat. Recent fires on western yellow-billed cuckoo and southwestern willow flycatcher conservation properties occurred in 2011, burning 58 ac (24 ha) and 6 ac (2 ha), respectively, within the Fort Thomas Preserve, on parcels owned by the Salt River Project and U.S. Bureau of Reclamation. Both fires were determined to be human-caused, likely from farm workers burning weeds along irrigation drains (SRP 2011, p. 39).

Other ongoing effects from cultivated agriculture on the western yellow-billed cuckoo are addressed under Factor E. These include fragmentation of habitat into smaller, more widely disjunct patches; ongoing influence of agriculture on riparian bird community composition; and effects from pesticides, which can negatively impact insect prey populations of the western yellow-billed cuckoo.

Habitat Loss and Degradation From Livestock Grazing Activities

Domestic livestock grazing is a traditional agricultural land use practice in the southwestern United States since the first Spanish settlement along the Rio Grande in New Mexico in 1598 (Little 1992, p. 88; Clary and Kruse 2004, p. 239). Livestock grazing continues to be a widespread agricultural use of riparian areas in the western United States and is one of the most common sources of past and ongoing riparian habitat degradation (Carothers 1977, p. 3; Rickard and Cushing 1982, pp. 2–4; Cannon and Knopf 1984, p. 236; Klebenow and Oakleaf 1984, p. 202; Swift 1984, pp. 225–226; Clary and Webster 1989, pp. 1–2; Schultz and Leininger 1990, pp. 298–299; Bock *et al.* 1993, p. 300). Livestock grazing occurs in western yellow-billed cuckoo habitat along sections of the middle Rio Grande in New Mexico (Lehman and Walker 2001, p. 12), Río Conchos (Cornell *et al.* 2008, p. 96), Río Bambuto, Tubutama, La Reforma, and Cuchujaqui River in Alamos, Aconchi and Baviacora in Río Sonora, and upper San Pedro River (IMADES 2003, p. 4), and several other rivers in central Sonora, Mexico (Villaseñor-Gomez 2006, p. 108). Grazing also occurs extensively along watercourses in a protected reserve on the Río Aros and Río Yaqui in Sonora, Mexico, where the western yellow-billed cuckoo has been documented (O'Brien *et al.* 2008, p. 8). Grazing intensity in northern Sonora, Mexico, is generally much higher than in adjacent Arizona (Balling 1988, pp. 106–107; Flesch 2008, pp. 44–45), which leads to greater degradation of riparian habitat than in Arizona.

The Service (2002, Appendix G, pp. 5–7) and Krueper *et al.* (2003, p. 608) reviewed the effects of livestock grazing, primarily in southwestern riparian systems. The frequency and intensity of effects vary across the range of the species, due to variations in grazing practices, climate, hydrology, ecological setting, habitat quality, and other factors (Service 2002, Appendix G, p. 1). However, these effects generally include the removal and trampling of vegetation and compaction of underlying soils, which can inhibit germination and change hydrology (Rea 1983, p. 40; Belsky *et al.* 1999, pp. 419–431) and promote the dispersal of nonnative plant species. Such effects are most significant when riparian areas have been subject to overuse by livestock (NAS 2002, pp. 24, 168–173). Overuse occurs when grazed vegetation does not recover sufficiently to maintain itself and soils are left bare and vulnerable to erosion. Over time, livestock grazing in riparian habitats, combined with other alterations in streamflow, typically results in reduction of plant species diversity and density and may increase the distribution and density of nonnative tamarisk by eliminating competition from native cottonwood and willow saplings, which are preferred forage for livestock (Krueper *et al.* 2003, p. 608).

Long-term cumulative effects of livestock grazing involve changes in the structure and composition of riparian vegetation (Service 2002, Appendix G, pp. 5–7), which may affect suitability of habitat for western yellow-billed cuckoo breeding and prey population abundance. The western yellow-billed cuckoo nesting habitat is structurally complex with tall trees, a multistoried vegetative understory, low woody vegetation (Halterman 1991, p. 35) and higher shrub area than sites without western yellow-billed cuckoos (Hammond 2011, p. 48). Livestock grazing alters understory vegetation, reducing height and density or eliminating new growth in riparian areas, and thereby hampering recruitment of woody species that, when mature, provide nest sites. Furthermore, the relatively cool, damp, and shady areas favored by western yellow-billed cuckoos are those favored by livestock over the surrounding drier uplands. This preference can

concentrate the effects of habitat degradation from livestock in western yellow-billed cuckoo habitat (Ames 1977, p. 49; Valentine *et al.* 1988, p. 111; Johnson 1989, pp. 38–39; Clary and Kruse 2004, pp. 242–243).

Removal, reduction, or modification of cattle grazing has resulted in increases in abundance of some riparian bird species. For example, Krueper (1993, pp. 322–323) documented responses of 61 bird species, most of which increased significantly 4 years after removal of livestock grazing in Arizona's San Pedro River Riparian National Conservation Area. The bird species guilds that increased most dramatically were riparian species, open-cup nesters, Neotropical migrants, and insectivores, all species that share characteristics with the western yellow-billed cuckoo. The western yellow-billed cuckoo numbers in the study increased, although not significantly (p=0.13) (Krueper *et al.* 2003, p. 612), but their survey methodology was not designed to detect western yellow-billed cuckoos. Recovery of vegetation in response to grazing removal in that study was quickest and most pronounced in the lower vegetation layers, the most accessible to grazing cattle. Thus, this situation would allow a greater number of seedlings and saplings of cottonwoods and other nest trees to attain maturity as suitable nesting sites.

In another example, livestock grazing was terminated along portions of the South Fork Kern River at the Kern River Preserve in the 1980s, and western yellow-billed cuckoos increased in number in the years following livestock removal. Smith (1996, p. 4) contended that termination of grazing at the Kern River Preserve was responsible for the dramatic increase in riparian vegetation, which was concurrent with the increase in western yellow-billed cuckoo numbers. These examples suggest that even severely degraded riparian systems can recover quickly, in at least some cases, after livestock removal (Krueper *et al.* 2003, p. 615), and that damage to riparian vegetation from grazing is at least partly reversible. They also illustrate the extent to which livestock grazing destroys and modifies nesting and foraging habitat of the western yellow-billed cuckoo.

In conclusion, most of the direct loss of habitat from agricultural conversion has occurred in the past, but ongoing agricultural activities, in whole or in combination with other impacts, especially those that result in changes in a watercourse's hydrology, have resulted in the curtailment of nesting and foraging habitat for the western yellow-billed cuckoo by restricting or preventing the growth of riparian plants, and such activities present an ongoing threat. Most of the current impacts from agricultural land uses arise from livestock overgrazing in riparian areas. Riparian vegetation can recover relatively quickly from these effects after livestock removal (Smith 1996, p. 4; Krueper *et al.* 2003, p. 615). However, without proper management to reduce overgrazing, ongoing overgrazing will continue to contribute to habitat modification in the range of the western yellow-billed cuckoo into the future.

Habitat Loss and Degradation Due to Conversion to Nonnative Vegetation

Throughout most of its range, habitat for the western yellow-billed cuckoo is threatened by the conversion of native riparian woodlands to riparian vegetation dominated by tamarisk and other nonnative vegetation. The major threat from this habitat conversion is the change from vegetation that supplies the western yellow-billed cuckoos with essential food and adequate thermal cover to vegetation that does not provide these necessary components of habitat for the western yellow-billed cuckoo. The establishment and persistence of tamarisk is often, but not always, aided by altered hydrology, as described above. Altered hydrology is not the cause for establishment and persistence of other types of nonnative vegetation; therefore, we present information on nonnative vegetation in this separate section.

Tamarisk is the most widespread nonnative woody plant species found in habitat for the western yellow-billed cuckoo. Glenn and Nagler (2005, pp. 420–423) provide most of the following overview of tamarisk. Tamarisk is present in nearly every southwestern riparian plant community, but varies in dominance from stream to stream. On streams where altered hydrology can no longer support native species, it has replaced native plant communities entirely, but occurs at a low frequency on other streams. Tamarisk was introduced into western North America in the 1800s to serve as ornamental windbreaks, and for erosion control and other purposes. Several species escaped cultivation and have since spread rapidly. The center of tamarisk distribution is currently Arizona, New Mexico, and Utah, and it has spread throughout most of the range of the western yellow-billed cuckoo at least as far north as the Yellowstone River in Montana in the Rockies, and at least as far south as the Yaqui River Valley in Sonora, Mexico. Recent studies in the northwest have located major populations of tamarisk in southwestern Idaho, and eastern Washington and Oregon. Models based on projected climate change predict that this invasive species will become more dominant in this region over the next 100 years (Kerns *et al.* 2009, pp. 200–215). Tamarisk also occurs west to the Owens, San Joaquin, and Sacramento Rivers in California, although it is still nearly absent from the mainstem Sacramento River in California and suitable habitat west of the Cascades in Oregon and Washington.

Tamarisk also occurs as isolated individuals along sections of the Sonora, Moctezuma, and Sahiaripa Rivers in Sonora, Mexico, where the hydrology has been little altered by human modifications (Villaseñor-Gomez 2006, pp. 107–108). Its presence is highly variable within sections of the Río Conchos in Chihuahua, Mexico, and becomes dominant in some reaches of that river (Kelly and Arias Rojo 2007, pp. 177–178; Cornell *et al.* 2008, p. 4).

The threshold (in terms of percent tamarisk) for abandonment of a riparian system by western yellow-billed cuckoos is not known. They are not found in areas that are totally dominated by tamarisk with the complete lack of willows or cottonwoods. In California, two native-dominated areas occupied in 1977 by several pairs of western yellow-billed cuckoos had, by 1986, converted to monotypic stands of tamarisk and were found to be uninhabited by western yellow-billed cuckoos. Above Laguna Dam on the Colorado River in 1977, at least three pairs of western yellow-billed cuckoos occupied a 30-ac (12-ha) site that was approximately 20–40 percent willow (Laymon and Halterman 1987a, p. 12). By 1986 no western yellow-billed cuckoos were detected on the site where the dominant vegetation had become tamarisk, with less than 1 percent willow cover. In the vicinity of Picacho State Recreation Area, on the California side of the Colorado River, in 1977, 21 western yellow-billed cuckoos were found in 297 ac (120 ha) of a 230-ft-wide (70-m-wide) willow forest (Gaines and Laymon 1984, p. 72). By 1986, tamarisk and aquatic vegetation dominated this area, and no western yellow-billed cuckoos were found in the 12 ac (5 ha) of scattered willow–cottonwood habitat that remained (Laymon and Halterman 1987a, pp. 12–13).

Human disturbance, such as water diversion, flood control, vegetation clearing, and improper grazing management, often facilitates replacement of native vegetation with tamarisk (Kerpez and Smith 1987, pp.

1–5; Hunter *et al.* 1988, p. 113; Rosenberg *et al.* 1991, pp. 18–23). Altered hydrologic regimes (flooding or reduction in water flows from dams) has disrupted natural flooding events that are essential for maintaining native riparian ecosystems (Vogl 1980, pp. 84–86; Rosenberg *et al.* 1991, pp. 18–23), and the disruption (usually elimination) of flooding tends to favor tamarisk. In contrast to native cottonwoods, tamarisk does not need flooding to regenerate (Kerpez and Smith 1987, pp. 1–5).

Tamarisk is also tolerant of high salt levels, which can be present in river systems as a combined result of water diversions that lower the near-surface ground water and irrigation water runoff that contains high levels of dissolved salts (Kerpez and Smith 1987, pp. 1–5; Busch and Smith 1993, pp. 186–194). This higher tolerance to water stress and salt accumulation is a principle mechanism by which tamarisk has become dominant on some regulated western rivers (Glenn and Nagler 2005, p. 439). In addition, tamarisk takes salts from the ground water and exudes them from its leaves, rendering the soil even more unsuitable for germination of native riparian vegetation. This is a significant problem in streams with artificially reduced streamflows where salts accumulate and are not flushed from the system. These factors favor regeneration of tamarisk over native trees and shrubs and are an ongoing threat. Additional areas of native habitat are continuing to be lost to this process. In summary, the persistence and expansion of tamarisk-dominated habitat is the result of multiple forms of ongoing human-related disturbances, which result in degradation of native-dominated riparian habitat, thus reducing its suitability as breeding habitat for the western yellow-billed cuckoo.

Other nonnative tree and shrub species have become established within the range of the western yellow-billed cuckoo. In western Colorado and Utah, Russian olive (*Elaeagnus angustifolia*) has become established and is a dominant tree species in many riparian systems. Giant reed (*Arundo donax*), common edible fig (*Ficus carica*), and the Himalayan blackberry (*Rubus discolor*) are some of the more conspicuous nonnative plants widely established along the Sacramento River, with Himalayan blackberry dominating the understory at some restoration sites (Borders *et al.* 2006, p. 310). Along the Sacramento River, western yellow-billed cuckoos were far less likely to be detected at sites with an understory dominated by Himalayan blackberry than sites with a predominant native understory. Himalayan blackberry may prevent establishment of native understory species due to its dense growth habit (Hammond 2011, pp. 48–49). Nesting of the western yellow-billed cuckoo has not been documented in riparian stands dominated by giant reed, common fig, or Himalayan blackberry that lack at least some native canopy trees.

In conclusion, because of the absence or near absence of nesting by western yellow-billed cuckoos in nearly monotypic stands of tamarisk and other nonnative vegetation, the available literature suggests that conversion of native or mixed (native and nonnative) riparian woodlands to nearly monotypic stands of tamarisk and other nonnative vegetation, coupled with the inability of native vegetation to regenerate under altered hydrological conditions, is a significant threat to the western yellow-billed cuckoo now and in the future. Nonnative vegetation, such as tamarisk, occurs across most of the range of the western yellow-billed cuckoo; its establishment can be caused by altered hydrology or other disturbances, which are widespread throughout the range. We expect nonnative vegetation to increasingly modify and curtail habitat for the western yellow-billed cuckoo within a majority of its range in the United States and northern Mexico into the future.

Use of Tamarisk by Western Yellow-Billed Cuckoos and the Spread of the Introduced Tamarisk Leaf Beetle Into the Southwest

Western yellow-billed cuckoos use habitat with some tamarisk component for nesting in southern California, Arizona, and western New Mexico, but are not found in monotypic stands of tamarisk. Western yellow-billed cuckoo presence in tamarisk-dominated habitats does not necessarily equate to habitat suitability (Sogge *et al.* 2008, p. 149; Hammond 2011, p. 50), and additional research is needed to determine productivity, survivorship, physiological condition, and food availability in these habitats.

Tamarisk can add to foliar cover that contributes toward reducing temperatures in riparian areas (Paxton *et al.* 2011, p. 259). Even relatively small decreases in foliar cover may render a site unsuitable for nesting western yellow-billed cuckoos (Paxton *et al.* 2011, p. 260). Removal of tamarisk in drainages occupied by western yellow-billed cuckoos can have unintended negative consequences if the removal leaves little or no woody vegetation and native riparian vegetation is unable to reestablish. The available literature that pertains to riparian restoration in New Mexico and Arizona (Poff *et al.* 1997, pp. 769–784; Glenn and Nagler 2005, pp. 439–441; Sogge *et al.* 2008, pp. 151–152; Stromberg *et al.* 2009, pp. 181–182) suggests that restoration of natural hydrological processes, rather than direct removal programs, would be a more effective method for promoting regeneration of native riparian vegetation and diminishing the presence of tamarisk. However, tamarisk removal programs coupled with native riparian plantings can speed up the restoration process assuming that the hydrologic system will support the native vegetation.

Tamarisk leaf beetle insects (leaf beetles) (*Diorhabda* spp.) were released into many locations throughout the southwest to control tamarisk. Leaf beetles are now spreading within the more arid range of the western yellow-billed cuckoo in Nevada, Utah, Arizona, New Mexico, and Texas. Defoliation of tamarisk by the beetles occurs in the summer months when western yellow-billed cuckoos are in the process of nesting. Tamarisk leaf beetles could eventually occur throughout the western United States and northern Mexico (Tracy *et al.* 2008, pp. 1–3). The future effects of the beetle introductions to the western yellow-billed cuckoo are unknown. If beetles succeed in killing tamarisk, western yellow-billed cuckoo numbers may decline in areas where the hydrology is no longer capable of supporting a native riparian habitat and the numbers may increase in areas where native riparian vegetation is able to become reestablished.

Wildfire

Historically, wildfire was uncommon in native riparian woodlands (Busch and Smith 1993, pp. 186–194). However, the lack of scouring floods on regulated and unregulated rivers has resulted in the accumulation of fuel on the floodplain, which increases fire risk and intensity (Stromberg and Chew 2002, pp. 195–219). Water withdrawal, dams, climate change, drought, and human use also contribute toward an increased fuel load and probability of wildfire occurrence. Most fires today are human-caused (Service 2002, p. L–8). In degraded habitat with tamarisk the threat of fire may be greater. Tamarisk ignites quickly, further increasing the incidence of periodic fires. Exacerbating the immediate loss of native trees from fire, tamarisk recovers more quickly than native trees (Glenn and Nagler 2005, pp. 435–436). Along the Rio Grande River in New Mexico and Texas, wildfire has been documented as destroying, degrading, or setting back

successional stages of vegetation development of western yellow-billed cuckoo habitat (Sproul 2000, in litt., p. 3). In summary, the alteration of riparian systems through changes in hydrologic functioning and the introduction of nonnative tamarisk have increased the incidence of wildfire into western yellow-billed cuckoo habitat. These fires further degrade, isolate, or fragment western yellow-billed cuckoo habitat.

Environmental Impacts of Cross-Border Foot Traffic in the Southwest

The environmental impact caused by cross border foot traffic has been increasingly occurring in more fragile and remote areas. The number of U.S. Border Patrol apprehensions of border crossers varies annually. Between October 1, 1999, and September 30, 2012, a yearly average of 333,517 border crossers were apprehended by the United States Border Patrol in the Tucson Sector, which does not account for the many others who were not caught (U.S. Border Patrol 2013, p. 1). Impacts associated with border crossings include creation of erosion and watershed degradation, loss of vegetation and wildlife, and human-caused wildfire (Defenders of Wildlife 2006, pp. 1–42). Drainages used by border crossers include the San Pedro River, Santa Cruz River, Cienega Creek, and many remote drainages in the mountain ranges of southeastern Arizona.

Human-caused wildland fires have been particularly damaging to areas of riparian habitat in Arizona, especially within 100 mi (161 km) of the United States-Mexico border where border crossers are known to set fires to divert law enforcement agents. Border crossers are also responsible for campfires that can escape and spread as wildfires. At least 2,467 wildfires began along the Arizona border with Mexico from 2006 to 2010 (Government Accounting Office 2011, p. 1). Federal officials have officially investigated only 77 of those fires. Of the fires investigated, 30 were started by border crossers. The resulting environmental impacts include the expansion of nonnative plant species, degraded endangered species habitat, and soil erosion.

Climate Change

Climate change may be impacting the western yellow-billed cuckoo. Climate change is discussed here under Factor A because, although it may affect the western yellow-billed cuckoo directly by creating physiological stress, the primary impacts of climate change on the species are expected to be through changes in the availability and distribution of western yellow-billed cuckoo habitat.

Our analyses under the Act include consideration of ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). The term ''climate'' refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements (IPCC 2013a, p. 1450). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (for example, temperature or precipitation) that persists for an extended period, whether the change is due to natural variability or human activity (IPCC 2013a, p. 1450).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has increased since the 1950s. Examples include warming of the global climate system, and substantial increases in precipitation in some regions of the world and decreases in other regions (for these and other examples, see Solomon *et al.* 2007, pp. 35–54, 82–85; IPCC 2013b, pp. 3–29; IPCC 2014, pp. 1–32). Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate and is ''very likely'' (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from use of fossil fuels (Solomon *et al.* 2007, pp. 21–35; IPCC 2013b, pp. 11–12 and figures SPM.4 and SPM.5). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increasing global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (Meehl *et al.* 2007, pp. 760–764, 797–811; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529; IPCC 2013b, pp. 19–23). See IPCC 2013b (entire), for a summary of other global projections of climate-related changes, such as frequency of heat waves and changes in precipitation.

Various changes in climate may have direct or indirect effects on species. These effects may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as threats in combination and interactions of climate with other variables (for example, habitat fragmentation) (IPCC 2014, pp. 4–11). Identifying likely effects often involves aspects of climate change vulnerability analysis. Vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (Glick *et al.* 2011, pp. 19–22; IPCC 2014, p. 5). There is no single method for conducting such analyses that applies to all situations (Glick *et al.* 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of the best scientific information available regarding various aspects of climate change.

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary across and within different regions of the world (IPCC 2013b, pp. 15–16). Therefore, we use ''downscaled'' projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information

that is more relevant to spatial scales used for analyses of a given species (see Glick *et al.* 2011, pp. 58–61, for a discussion of downscaling). With regard to our analysis for the western yellow-billed cuckoo, downscaled projections are available.

The Southwest is already experiencing the impacts of climate change. The region has heated up markedly in recent decades, and the period since 1950 has been hotter than any comparably long period in at least 600 years (Graumlich 1993, pp. 249–255; Salzer and Kipfmueller 2005, pp. 465–487; Millar *et al.* 2006, pp. 273–287; Ababneh 2008, pp. 59–78; Bonfils *et al.* 2008, pp. 6404–6424; Stevens *et al.* 2008, pp. 1–15; Salzer *et al.* 2009, pp. 20348–20353; Woodhouse *et al.* 2010, pp. 21283–21288; Hoerling *et al.* 2012, pp. 74–92). The decade 2001–2010 was the warmest in the 110-year instrumental record, with temperatures almost 2 °F higher than historic averages, with fewer cold snaps and more heat waves (Hoerling *et al.* 2012, pp. 74–92). Compared to temperature, precipitation trends vary considerably across the region, with portions experiencing both decreases and increases (Hoerling *et al.* 2012, pp. 74–92). There is mounting evidence that the combination of human-caused temperature increases and recent drought has influenced widespread tree mortality (Van Mantgem *et al.* 2009, pp. 521–524; Allen *et al.* 2010, pp. 660–684), increased fire occurrence and area burned (Westerling *et al.* 2006, pp. 940–943), and forest insect outbreaks (Bentz *et al.* 2010, pp. 602–613). Human-caused temperature increases and drought have also caused earlier spring snowmelt and shifted runoff to earlier in the year (Barnett *et al.* 2008, pp. 1080–1083).

There are three predictions for anticipated effects from climate change in the southwestern United States and parts of northwestern Mexico. First, climate change is expected to shorten periods of snowpack accumulation, as well as reduce snowpack levels. With gradually increasing temperatures and reduced snowpack (due to higher spring temperatures and reduced winter-spring precipitation), annual runoff will be reduced (Smith *et al.* 2003, p. 226; Ellis *et al.* 2010, p. 236), consequently reducing ground water recharge. Second, snowmelt is expected to occur earlier in the season because increased minimum winter and spring temperatures could melt snowpacks sooner, causing peak water flows to occur much sooner than the historical spring and summer peak flows (Smith *et al.* 2003, p. 226; Stewart *et al.* 2005, pp. 217–218, 224, 230) and reducing flows later in the season. Third, the hydrological cycle is expected to become more dynamic on average with climate models predicting increases in the variability and intensity of rainfall events. This change will modify disturbance regimes by changing the magnitude and frequency of floods.

Precipitation events under most climate change scenarios will decrease in frequency but increase in severity so that, paradoxically, a warmer atmosphere and an intensified water cycle are likely to mean not only a greater likelihood of drought for the Southwest, but also an increased risk of flooding (Karl *et al.* 2009, pp. 132–133; Dominguez *et al.* 2012, pp. 1–7). Precipitation patterns are already observed to be shifting in the Southwest, with more rain falling in heavy downpours that can lead to flooding (Karl *et al.* 2009, p. 133). Adding to flood risk is that the earlier streamflow from earlier snowmelt may impinge on the flood protection stages of reservoir operations so that less streamflow can be captured safely in key reservoirs, increasing spring flooding downstream (Smith *et al.* 2005, p. 1154; Karl *et al.* 2009, p. 133). In some sites, where natural floodplain dynamics allow for overbank flooding, this could result in a positive regenerating effect on habitat for the western yellow-billed cuckoo. However, where floodplains have been constrained, as in many areas of the range, such changes in hydrology could excessively scour remaining habitat, thus preventing their reestablishment and resulting in smaller patch size or loss of habitat for the western yellow-billed cuckoo. Long drought cycles could also hamper recruitment of riparian vegetation following scouring floods and lead to reduced cover and nest sites for the western yellow-billed cuckoo.

Exactly how climate change will affect precipitation from site to site within the range of the western yellow-billed cuckoo in the southwestern United States and northwestern Mexico is uncertain. However, consistent with recent observations of regional effects of climate change, the projections presented for the Southwest predict overall warmer, drier, and more drought-like conditions (Hoerling and Eischeid 2007, p. 19; Seager *et al.* 2007, p. 1181; Ellis *et al.* 2010, p. 243). For example, climate simulations of the Palmer Drought Severity Index (a calculation of the cumulative effects of precipitation and temperature on surface moisture balance) for the Southwest for the periods of 2006 to 2030 and 2035 to 2060 show an increase in drought severity with surface warming. Additionally, drought-like conditions will increase even during wetter simulations because of the effect of heat-related moisture loss through evaporation and evapotranspiration (Hoerling and Eischeid 2007, p. 19). Annual mean precipitation is likely to decrease in the Southwest, as is the length of snow season and snow depth (Sun *et al.* 2013, pp. 21–22; Garfin *et al.* 2014, pp. 462–486). Most models project a widespread decrease in snow depth and earlier snowmelt in the Rocky Mountains (Clow *et al.* 2012, 2583–2591; Pederson *et al.* 2013, 1811–1816).

Assessments for the Sonoran Desert are few, but the region is also expected to warm (Weiss and Overpeck 2005, pp. 2065–2077; National Park Service 2010, pp. 1–4; Munson *et al.* 2012, pp. 1083–1095). Since about the 1970s, the Sonoran Desert region appears to have experienced ''widespread warming trends in winter and spring, decreased frequency of freezing temperatures, lengthening of the freeze-free season, and increased minimum temperatures per winter year'' (Weiss and Overpeck 2005, p. 2065). The Sonoran Desert area is expected to warm faster and experience reduced annual precipitation, resulting in a reduction in soil moisture in an already dry environment. The area will also experience increases in the intensity of heat waves, decreases in the frequency of freezing temperatures, and lengthening of the freeze-free season. Munson *et al.* (2012) stated that ''Climate models and long-term trends predict increased variability in precipitation seasonality, with fewer, larger, and more intense precipitation events'' (Munson *et al.* 2012, pp. 1083–1095). Other researchers have also concluded similar climactic changes for the area (Easterling *et al.* 2000, pp. 2068–2074; Weiss and Overpeck 2005, pp. 2065–2077; Seager *et al.* 2007, pp. 1181–1184).

In California, regional downscaled climate change assessments (Point Reyes Bird Observatory (PRBO) Conservation Science 2011, pp. 1–68) indicate changes in precipitation and temperature of varying magnitude across ecoregions. Assessments for areas occupied by the western yellow-billed cuckoo, such as the Sacramento River, Sierra Nevada (southern), and Sonora Desert (lower Colorado River) (PRBO Conservation Science 2011, pp. 25, 28, 48), mostly indicate an overall reduction in precipitation and increase in average temperature, which can alter hydrology and negatively affect habitat for the western yellow-billed cuckoo, as

described previously. Furthermore, Gardali *et al.* (2012, pp. 8–10) ranked 358 avian taxa in California, and classified 128 as vulnerable to climate change. They ranked the western yellow-billed cuckoo as subject to a moderate level of climate vulnerability, owing in part to its specialization in habitat (riparian) that has already experienced significant loss or alteration. Of the 128 species that were rated vulnerable, only 48 were rated as having high or moderate climate vulnerability.

Regionally downscaled climate models for the Pacific Northwest project higher air temperatures in the next century (Littell *et al.* 2009, pp. 6–7) that will lead to lower soil moisture and increased evaporation from streams and lakes (Climate Leadership Initiative (CLI) and the National Center for Conservation Science and Policy 2009, p. 8). While high uncertainty exists in the total precipitation projections for the region (Littell *et al.* 2009, p. 1), effective precipitation (precipitation that contributes to runoff) may be reduced significantly even if there is no decline in total precipitation (CLI and the National Center for Conservation Science and Policy 2009, p. 8). Increases in extreme high precipitation falling as rain in the western Cascades and reductions in snowpack are key projections from high-resolution regional climate models (Littell *et al.* 2009, p. 1). These may result in more winter flooding and reduced summer streamflows in rivers that depend on snowmelt, which include many of the rivers in the Pacific Northwest.

In drier climates overall, there will be increases in riverine system temperatures that are predicted to result in periods of prolonged low flows and stream drying (Stromberg *et al.* 2013, pp. 411–415) and increased demand for water storage and conveyance systems (Stromberg *et al.* 2013, pp. 411–415). Warmer water temperatures across temperate regions are likely to increase the density and expand distribution of tamarisk because it has a higher tolerance for drought and salt than native cottonwoods and willows (Glenn and Nagler 2005, p. 439). This situation is expected to lead to the conversion of native and mixed (native and nonnative) riparian habitat to monotypic stands of tamarisk, which provides very little or no suitable breeding habitat for the western yellow-billed cuckoo (as described previously above).

Increased drought is expected to adversely affect food availability for western yellow-billed cuckoos (Newton 1980, pp. 11–12; Durst 2004, pp. 40–41; Scott *et al.* 2004, p. 70) through the disruption of the timing between a species and its food resources (Visser and Both 2005, pp. 2561–2569). For example, changes in precipitation or temperature may influence the peak timing of insect emergence or timing of the western yellow-billed cuckoo's arrival from its wintering grounds so that the nesting season does not coincide as closely with peak insect abundance (Anders and Post 2006, p. 225). This change in timing could result in reduced food availability for the western yellow-billed cuckoo and breeding success, possibly causing further population decline and curtailment of its occupied range.

Virtually all future climate scenarios for the Pacific Northwest predict increases in wildfire in western North America, especially east of the Cascades, due to higher summer temperatures, earlier spring snowmelt, and lower summer flows, which can lead to drought stress in trees (Littell *et al.* 2009, p. 14). These effects could result in both short-term and long-term loss of riparian habitat from excessive winter scouring, summer drying, and wildfire. Regional downscaled climate change models for the Intermountain West also provide similar projections for warmer, drier climate with a reduced snowpack and episodic precipitation events. Prolonged drought in the southwestern United States and northern Mexico is expected to increase fire frequency, which results in a short-term loss of patches of riparian or thorn forest habitat for breeding. When fire frequency increases, riparian and thorn forests do not have sufficient time to recover, resulting in habitat conversion to fire-adapted nonforested vegetation types unsuitable for nesting. Furthermore, the effects of climate change and ongoing reduction in habitat and patch fragmentation, discussed previously, would increase.

Little is known about the wintering habitat of the western yellow-billed cuckoo in South America, and uncertainty exists about how climate change will affect it there. Regional downscaled models project an increase in wet-season precipitation and a decrease in dry-season precipitation over most of South America (Kitoh *et al.* 2011, p. 1). In the future, precipitation intensity will increase over most of South America. In particular, precipitation intensity will be greatest over southeast South America, implying an increasing risk of flooding in this region (Kitoh *et al.* 2011, p. 1). At the same time, a large increase of consecutive dry days is projected over the western part of the Amazon, where extremes in seasonal precipitation and resulting runoff is projected to increase in the Amazon River, implying more floods in the wet season and droughts in the dry season (Kitoh *et al.* 2011, p. 1). Uncertainty exists regarding the specific effects of such changes on the wintering habitat of the western yellow-billed cuckoo.

In summary, the available climate change models are predicting altered future environmental conditions across the breeding range of the western yellow-billed cuckoo. In the southwestern United States, northern Mexico, California, Intermountain West, and Pacific Northwest, climate change is generally predicted to result in an overall warmer, drier climate, with periodic episodic precipitation events that, depending on site conditions, are expected to have adverse effects on habitat of the western yellow-billed cuckoo. In rivers that depend on snowmelt, these changes are expected to result in more winter flooding and reduced summer stream flows. The amount of surface ground water available to regenerate and sustain riparian forests is expected to decline overall with persistent drought, favor the spread of tamarisk and other nonnative vegetation, and increase fire frequency. Precipitation events under most climate change scenarios will decrease in frequency and increase in severity. This change may reduce available nesting sites, patch size, and affect prey abundance as a result of lower humidity in riparian areas from reduced moisture retention, and through periods of prolonged desiccation followed by scouring flood events. In addition, evidence shows that climate change may disrupt the synchrony of nesting western yellow-billed cuckoos and their food supply, causing further population decline and curtailment of its occupied range.

Impacts to habitat from climate change exacerbate impacts from impoundments, channelization, and alteration of river flows across the western United States and Mexico, and from conversion of habitat from native to mostly nonnative vegetation. Changing climate is expected to place an added stress on the species and its habitats. While we do not have evidence to suggest that the habitat of the western yellow-billed cuckoo is being substantially affected by climate change at this time, we expect long-term climate trends to have an overall negative effect on the available habitat throughout the breeding range of the western yellow-billed cuckoo. Moreover, a drying trend associated with global climate change may result in more dams, levees, or other activities to

ensure fresh water for human consumption, which may result in additional habitat loss from the activities described in the Habitat Loss from Dams and Alteration of Hydrology section, above.

Summary of Factor A

We have identified a number of threats to the habitat of the western yellow-billed cuckoo that have operated in the past, are impacting the species now, and will continue to impact the species in the future. The curtailment and decline in the habitat of the western yellow-billed cuckoo is primarily the result of the long-lasting effects of habitat loss from manmade features that alter watercourse hydrology so that the natural processes that sustained riparian habitat in western North America are greatly diminished. Loss and degradation of habitat has also occurred as a result of livestock overgrazing and encroachment from agriculture. All of these have the potential to promote, and are exacerbated by, the conversion of native habitat to predominantly nonnative vegetation. The curtailment, degradation, fragmentation, and loss of habitat for the western yellow-billed cuckoo is ongoing and, absent changes in the landscape, hydrology, or other factors, it will likely continue to be negatively impacted or lost into the future.

We recognize that climate change is a critical issue with potentially severe wide-ranging effects on the species and its habitat. The available scientific literature suggests that the effects of climate change will likely exacerbate multiple existing threats to the western yellow-billed cuckoo and its habitat. These threats include habitat loss and degradation from altered hydrology, with secondary effects from increases in nonnative vegetation and wildfire. These threats may result in smaller patch sizes of habitat such that many will be no longer occupied by the western yellow-billed cuckoo.

Conservation actions, such as habitat protection and restoration described above, have strong potential to be beneficial to the species by increasing the amount of available habitat and patch size. However, these efforts offset only a small portion of past losses and degradation of riparian habitat in the range of the western yellow-billed cuckoo. Habitat elsewhere in the range continues to be vulnerable to loss and degradation from ongoing alterations in hydrology, nonnative vegetation, and agricultural activities combined with additional or synergistic effects associated with climate change. Moreover, we expect these multiple stressors to continue to affect habitat of the western yellow-billed cuckoo into the future. The amount of time required for willow and cottonwood vegetation to mature and provide habitat for the western yellow-billed cuckoo under optimal hydrologic, environmental, and ecological conditions varies by location but may be as little as between 3 to 5 years (Golet *et al.* 2008, pp. 20–22). However, other vegetation used by the western yellow-billed cuckoo such as alder, walnut, sycamore, boxelder, ash, or mesquite would take several decades for habitat to mature to the point where it would be available for use (Strahan 1984, pp. 58–67; Opperman and Merenlender 2004, pp. 822–834; Trowbridge *et al.* 2004, pp. 157–164; Morris *et al.* 2006, pp. 106–116; Griggs 2009, p. 12). In areas where conditions are less than optimal (as is the current situation in most areas) it may take longer if at all (Briggs 1995, pp. 63–67).

The exact timeframe for resolving water management and delivery issues and their impact on the western yellow-billed cuckoo and its habitat would vary on the location, resource demands, sensitive habitat or species concerns, stakeholders, and amount of water available. As a result, we would expect that resolving water issues for the various uses (agriculture, urbanization, wildlife, and tribal interests) in the west will be a lengthy ongoing process and not be resolved in the near future (next 20 years) and may take substantially longer considering the increased demands and the effects of climate change.

Our review of the best available scientific and commercial information identified numerous activities or processes that threaten to destroy, modify, or curtail the western yellow-billed cuckoo's habitat or range now or are likely to in the near future in any portion of the western yellow-billed cuckoo range. These include habitat loss from reservoirs and water management, surface and groundwater diversion, flood control activities, gravel mining, agriculture, livestock grazing, invasive nonnative plants and their control, and climate change. We, therefore, conclude that habitat loss under Factor A currently constitutes a threat to the western yellow-billed cuckoo, and we expect these activities to continue and habitat loss to be a threat in the near future.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

There are no known threats to the western yellow-billed cuckoo resulting from overutilization for commercial, scientific, or educational purposes. Our review of the best available scientific and commercial information yielded nothing to indicate that overutilization for commercial, recreational, scientific, or educational purposes is occurring at this time or is likely to in the near future in any portion of the western yellow-billed cuckoo range. We, therefore, conclude that such overutilization does not currently constitute a threat to the western yellow-billed cuckoo, nor do we expect it to be a threat in the future.

C. Disease or Predation

Little is known about diseases in the western yellow-billed cuckoo. West Nile virus has recently spread throughout portions of the western United States. It poses a potential threat to many bird species. The U.S. Geological Survey's (USGS) National Wildlife Health Center has identified the yellow-billed cuckoo as a species that is subject to the effects of West Nile virus (USGS–National Wildlife Health Center 2005, p. 2). The Centers for Disease Control's (CDC) Vector-Borne Disease Web site reports that West Nile virus has been documented in a dead yellow-billed cuckoo (CDC 2012); however, it is unknown if this yellow-billed cuckoo was from the western DPS. Although the population of the western yellow-billed cuckoo has been in decline over several decades (see Historical and Current Status section, above), no evidence suggests that it has undergone a precipitous decline coincident with the relatively recent arrival of West Nile virus in western North America. Therefore, we conclude, based on the best available scientific and commercial information, which is limited, that the adverse effects of West Nile virus to the western yellow-billed cuckoo are not significant and do not constitute a threat at this time, nor is there any information to suggest that this situation will change into the future.

All bird species, including the yellow-billed cuckoo, are exposed, to some extent, to parasites. Greiner *et al.* (1975, pp. 1762–1787) found 5 of 16 yellow-billed cuckoos infected with Leucocytozoon, Trypanosoma, and microfilaria blood parasites. No information indicates whether these and other parasites (see Hughes 1999, p. 18, for a brief review) pose any threat to the western yellow-billed cuckoo.

Predation is a potential threat to the western yellow-billed cuckoo. On the Kern River, red-shouldered hawks (*Buteo lineatus*) and northern harriers (*Circus cyaneus*) have been observed preying on nestlings, and western yellow-billed cuckoos have been observed chasing western scrub-jays

(*Aphelocoma californica*) and loggerhead shrikes (*Lanius ludovicianus*) away from their nests (Laymon 1998, pp. 12–14); however, we do not have any information on the frequency of predation. An inverse relationship appears to exist between the presence of western yellow-billed cuckoos and western scrub-jays on the Sacramento River, indicating a possible aversion by the western yellow-billed cuckoos to nesting at sites occupied by western scrub-jays, a known predator of eggs and young (Halterman 1991, p. 38). Avian predators such as the Cooper's hawks (*Accipiter cooperii*) or other similarly sized avian predators are thought to be the only avian predator capable of taking adult western yellow-billed cuckoos (Laymon 1998, pp. 12–13). During migration, adult western yellow-billed cuckoo are susceptible to predation by raptors, such as the Aplomado falcons (*Falco femoralis*) (Hector 1985, p. 338); however, we have no information to suggest that the rate of adult predation is significantly affecting the western yellow-billed cuckoo population. In the Sonoran town of Alamos, Mexico, Mackay (David Mackay 2012, *in litt.*) witnessed a brown vine snake (*Oxybelis aeneus*) leaving a western yellow-billed cuckoo nest after eating one of four nestlings.

On the lower Colorado River, McNeil *et al.* (2011, p. 41) found that high nest predation rates (63 percent of nests failed) contributed to the much lower average nest productivity at restoration sites (1.25 young fledged per nest) compared to nests at the Bill Williams River NWR (2.14 young fledged per nest). Most of that predation was attributed to avian predators; however, for 2 consecutive years a nest was preyed upon by a California king snake (*Lampropeltis getula californiae*) (McNeil *et al.* 2011, p. 41; McNeil *et al.* 2012, p. 50). Nest predation may have been high in restoration sites because most were located adjacent to agricultural areas, which may have increased the exposure of nests to human-adapted avian predators that thrive in agricultural areas. Additionally, these sites did not yet have the height, structure, and composition of more complex riparian habitats (McNeil *et al.* 2011, pp. 41, 49; McNeil *et al.* 2012, p. 56) that may serve to hide nests from predators. Nest predation can be partially compensated by the ability of western yellow-billed cuckoos to renest when a nest fails. In general, despite the instances of nest predation listed above, western yellow-billed cuckoos have higher than normal nest success and lower nest predation rates than other open-cup nesting birds (Laymon *et al.* 1997, p. 11).

In summary, western yellow-billed cuckoos, particularly the eggs or young in nests, are vulnerable to predation. Predation may be a significant threat in some localities and in some years, and may be influenced by several factors, such as surrounding land use and size and complexity of riparian habitat. As a result, predation may act periodically in concert with other stressors that contribute to the decline of the species (which we discuss in greater detail under Factor E, below). However, we conclude that predation by itself does not pose a significant threat to the western yellow-billed cuckoo at this time, and we do not have any reason to believe that this situation will change substantially in the future.

We conclude that predation, parasites, and disease are not currently significant threats to the western yellow-billed cuckoo, and are not expected to become significant threats in the near future.

D. The Inadequacy of Existing Regulatory Mechanisms

Under this factor, we examine whether existing regulatory mechanisms are inadequate to address the threats to the western yellow-billed cuckoo discussed under other factors. We give strongest weight to statutes and their implementing regulations, and management direction that stems from those laws and regulations. They are nondiscretionary and enforceable, and are considered a regulatory mechanism under this analysis. Examples include State governmental actions enforced under a State statute or constitution, or Federal action under statute.

Some other programs are more voluntary in nature or dependent on available funding; in those cases, we analyze the specific facts for that effort to ascertain its effectiveness at mitigating the threat and the extent to which it can be relied on in the future. Having evaluated the significance of the threat as mitigated by any such conservation efforts, we analyze under Factor D the extent to which existing regulatory mechanisms adequately address the specific threats to the species. Regulatory mechanisms, if they exist, may preclude the need for listing if we determine that such mechanisms adequately address the threats to the species such that listing is not warranted.

We have identified a number of significant threats to the western yellow-billed cuckoo that are impacting the species now and will continue to impact the species in the future. The decline of the western yellow-billed cuckoo is primarily the result of the long-lasting effects of habitat loss and modification from altered hydrology resulting from decades of dam construction, channelization, water extraction, and other activities, as well as impacts associated with climate change. Other threats include loss of habitat to agricultural and other land uses, overgrazing, exposure to pesticides (which is addressed in Factor E, below), wildfire, and conversion of habitat to monotypic stands of nonnative vegetation. Under this factor, we discuss whether the existing regulatory mechanisms adequately address impacts to the western yellow-billed cuckoo described under Factors A and E, based on the best available information.

Federal Regulatory Mechanisms

In the United States, 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 yellow-billed cuckoo (the entire taxonomically defined species), which includes the western yellow-billed cuckoo, is considered a ''migratory bird'' under the MBTA. The MBTA prohibits ''take'' of any migratory bird. Take 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, no provisions in the MBTA prevent habitat destruction unless direct mortality or destruction of active nests occurs.

The Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1701 *et seq.*) requires that ''the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that . . . will preserve and protect certain public lands in their natural condition; (and) that will provide food and habitat for fish and wildlife. . . .'' Furthermore, it is the policy of the Bureau of Land Management (BLM) ''to manage habitat with emphasis on ecosystems to ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on public lands'' (BLM manual 6500.06). Similarly, the National Forest Management Act of 1976 (NFMA) directs that the National Forest System ''where appropriate and to the extent practicable, will preserve and enhance the diversity of plant and animal communities.'' Additionally, section 219.12(g) calls for the maintenance of viable populations of native vertebrates in national forests. As such, FLPMA and

NFMA have the potential to benefit the western yellow-billed cuckoo and its habitat. However, given that the BLM and USFS have discretion in how these statutes are carried out and measures are implemented, we continue to see continued loss and degradation of habitat for the western yellow-billed cuckoo on lands that these agencies manage.

Congress passed the Federal Water Pollution Control Act Amendments of 1972 and the Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 *et seq.*) to provide for the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's lakes, streams, and coastal waters. Primary authority for the implementation and enforcement of the CWA now rests with the U.S. Environmental Protection Agency (EPA) and, to a lesser extent, the USACE. In addition to the measures authorized before 1972, the CWA implements a variety of programs, including Federal effluent limitations and State water quality standards, permits for the discharge of pollutants and dredged and fill materials into navigable waters, and enforcement mechanisms. Section 404 of the CWA is the principal Federal program that regulates activities affecting the physical integrity of wetlands and other waters of the United States.

Section 404 prohibits the discharge of dredged or fill material in jurisdictional waters of the United States, unless permitted by USACE under section 404(a) (individual permits) or 404(e) (general permits), or unless the discharge is otherwise exempt from regulation as designated in section 404(r). Some areas of riparian habitat may be considered ''waters of the United States,'' but many areas of riparian habitat do not meet the term's strict definition. The Service can review permit applications and provide recommendations to the USACE to avoid and minimize impacts and to implement conservation measures for fish and wildlife resources, including the western yellow-billed cuckoo. However, incorporation of Service recommendations into section 404 permits is at the discretion of the USACE.

Furthermore, not all activities in wetlands or streams involve fill, and not all wetlands or streams fall under the jurisdiction of the USACE. For example, in areas where the historical floodplain has been cut off from the river by levees, determining the boundaries of wetlands subject to USACE jurisdiction becomes complex. The areas behind these levees have had their hydrological characteristics altered, soil conditions changed, and riparian vegetation removed. As a result, these former floodplains, which in some cases would be important to protect and restore as habitat for the western yellow-billed cuckoo, fall outside the jurisdiction of the USACE. Additionally, many actions that resulted in adverse hydrological modifications, such as channelization and levees, were implemented in compliance with the CWA.

The National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq.*) requires all Federal agencies to formally document, consider, and publicly disclose the environmental impacts of major Federal actions and management decisions that have significant effects on the human environment (including natural resources); however, NEPA does not require that mitigation alternatives be implemented. Additionally, NEPA applies only to actions by Federal agencies, so private landowners are not required to comply with NEPA unless a Federal agency is involved through provision of Federal funding or a Federal permit.

Through the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661 *et seq.*), the Service may recommend discretionary conservation measures to avoid, minimize, and offset impacts to fish and wildlife resources resulting from Federal projects and water development projects authorized by the USACE and other Federal agencies such as Reclamation. Therefore, the FWCA may provide some protection for the western yellow-billed cuckoo and its habitat through avoidance and minimization measures that may be incorporated into Federal projects. However, these measures are discretionary.

A majority of dams in the western United States supply hydropower, and their construction and ongoing operation is authorized by the Federal Energy Regulatory Commission (FERC), under the Federal Power Act of 1920, which incorporates by reference the FWCA and NEPA. The remainder of hydropower in the western United States is largely produced by the USACE and Reclamation. Reclamation also oversees water diversion and delivery projects. FERC reconsiders its hydropower licenses every 30 to 50 years. Through the various Federal regulations under which these agencies implement their water projects, the Service has an opportunity to periodically review their permits and relicensing applications and provide its recommendations to avoid and minimize impacts, and implement conservation measures for fish and wildlife resources, including species such as the western yellow-billed cuckoo. Implementation of these recommendations by FERC, USACE, and Reclamation is discretionary for nonlisted species. We continue to see loss and degradation of habitat for the western yellow-billed cuckoo as a result of altered hydrology from operation of dams and other water supply projects, as described under Factor A.

The EPA is responsible for regulating pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act and the Food Quality Protection Act. Before a pesticide can be distributed, sold, and used in the United States, it must first go through a registration process through the EPA. The EPA conducts short- and long-term toxicity tests to evaluate potential adverse effects on humans, wildlife, fish, and plants, including endangered species and nontarget organisms, and evaluates the potential for possible contamination of surface water or ground water from leaching, runoff, and spray drift. The sensitivity of any life stages of the western yellow-billed cuckoo or its prey items to exposure from common agricultural pesticides that could leach, runoff, or migrate from agricultural areas into the habitat of the western yellow-billed cuckoo has not been tested. However the EPA does evaluate the effects of these factors on surrogate species and has determined the use of certain approved pesticides are appropriate in areas used by the western yellow-billed cuckoo. Even if approved application procedures are followed, pesticides could reduce available insect prey for the western yellow-billed cuckoos.

State Regulatory Mechanisms

The majority of occupied areas for the western yellow-billed cuckoo north of Mexico occur within California, Arizona, and New Mexico (Hughes 1999, p. 1). Only California classifies the western yellow-billed cuckoo as endangered (CDFW 2011, p. 10). 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 Federal 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 CDFW and other State agencies to ensure that their activities will not jeopardize the continued existence of State-listed species; however, the western yellow-billed cuckoo continues to decline in California despite its status

as a State-listed species. In Arizona, the western yellow-billed cuckoo is listed as a species of concern (Arizona Game and Fish Department 2002, p. 3), with no protective status. The western yellow-billed cuckoo has no special protective status in New Mexico.

The State of California has an additional layer of pesticide regulation through the Department of Pesticide Regulation, whose mission is to protect human health and the environment by regulating pesticide sales and use. While concentrating on human health and exposure to pesticides, the agency has a program (Endangered Species Project) that maps sites occupied by federally listed species and candidate species and evaluates pesticide exposure risks to the species at those sites. This project does not include species like the western yellow-billed cuckoo that are listed as endangered by the State but not the Federal Government. In addition, the work was carried out in 1997 prior to the western yellow-billed cuckoo becoming a Federal candidate species. As a result the western yellow-billed cuckoo has not been included in the project.

Washington State's Department of Fish and Wildlife considers the western yellow-billed cuckoo a candidate for listing. The State wildlife agencies in Wyoming, Montana, Colorado, and Texas classify the western yellow-billed cuckoo as a species of concern or a sensitive species. In Utah, the Utah Division of Wildlife Resources (UDWR) has designated the yellow-billed cuckoo as a State-sensitive species and the yellow-billed cuckoo has been a priority for the State's Native Terrestrial Wildlife Program since the late 1990's. For example, in 2009, surveys for the species were conducted on National Park Service and adjacent lands at Cubs Creek and Jones Hole in northeastern Utah (Beason 2009, pp. 1–19). During these surveys no western yellow-billed cuckoos were detected on lands managed by the National Park Service in Dinosaur National Monument or private land in northwestern Colorado. However, suitable habitat is found within Dinosaur National Monument. UDWR has implemented additional survey and monitoring efforts over the past 2 years. This status allows for enhanced attention for the species and potential voluntary conservation, but the status provides no conservation assurances or regulatory oversite.

The western yellow-billed cuckoo is identified as a Species of Greatest Conservation Need in Idaho's Comprehensive Wildlife Conservation Strategy (Idaho Department of Fish and Game 2005, Appendix B, p. 7), and, under Idaho State law, is considered a protected nongame species. It is illegal to intentionally take or possess a protected nongame species, except as provided in sections 36–106(e) and 36–1107, Idaho Code, by Commission rule, or the Idaho Administrative Procedures Act 13.01.10, ''Rules Governing the Importation, Possession, Release, Sale, or Salvage of Wildlife,'' subsection 100.06.b (Idaho Department of Fish and Game 2005, Appendix B, p. 5). While protected status extends certain protections to the western yellow-billed cuckoo in Idaho, neither this status nor the Species of Greatest Conservation Need designation protects its habitat.

In Nevada, the western yellow-billed cuckoo is identified as critically imperiled due to extreme rarity, imminent threats, or biological factors, but this designation provides no protection for habitat. Western 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). State Wildlife Action Plans that include the western yellow-billed cuckoo as a species of conservation concern are: California, Washington, Arizona, Colorado, Montana, Idaho, New Mexico, Utah, Texas, Nevada, and Wyoming. These plans identify conservation needs and actions for a broad range of species and habitats, but their implementation is discretionary.

In summary, where the western yellow-billed cuckoo is State-listed (CA), a State candidate (WA), a species of concern or sensitive species (AZ, ID, WY, MT, CO, TX), or critically imperiled (NV), these designations contain no protection for the western yellow-billed cuckoo from habitat modification or destruction, as described under Factors A and E. Existing State regulatory mechanisms are not specifically designed to protect the western yellow-billed cuckoo from habitat loss and degradation from altered hydrology from upstream dams and surface water and ground water diversions, encroachment into the floodplain by agricultural and other development activities, bank stabilization and levee construction and maintenance activities, overgrazing, pesticide use on adjacent agricultural lands, conversion of habitat to monotypic stands of nonnative vegetation, gravel mining, wildfire, drought, and climate change across the range of the western yellow-billed cuckoo.

Canadian, Mexican, and Other International Laws

Canada

The Canadian Government through the Department of the Environment (Environment Canada, which was first established by the Department of the Environment Act of 1971) administers numerous acts to preserve and enhance the quality of Canada's natural environment. Acts identified for conservation of wildlife and plant species or their habitat are identified below.

1916 Great Britain–United States Convention for the Protection of Migratory Birds. Canada has committed to migratory bird protection through the 1916 Great Britain–United States Convention for the Protection of Migratory Birds in Canada, which encourages voluntary cooperative actions to protect identified migratory birds. The yellow-billed cuckoo is listed under the 1916 Great Britain–United States Convention for the Protection of Migratory Birds in Canada. In addition, Canada has enacted the Migratory Birds Convention Act of 1994 (MBCA). The MBCA is intended to ensure the conservation of migratory bird populations by regulating potentially harmful human activities. The implementing regulations of the MBCA ban all activities that are harmful to migratory birds, their eggs or their nests, but does not protect habitat. Also, some activities, such as hunting or scientific collection, may be allowed with an appropriate permit.

The Species at Risk Act of 2002. The purpose of the Species at Risk Act (SARA) is to prevent Canadian native wildlife and plant species, subspecies, and distinct populations from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species, and encourage the management of other species to prevent them from becoming at risk. SARA establishes the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an independent body of experts responsible for assessing and identifying species at risk. SARA also, among other objectives, establishes: Prohibitions to protect listed Canadian threatened and endangered species and their critical habitat; requirements for use of the best available knowledge on assessing threats to and conservation for wildlife and plant species; and long- and short-term objectives for development of recovery strategies and action plans.

The yellow-billed cuckoo is not identified as a species that is sensitive, threatened, or endangered under Canadian law. Within the range of the

western yellow-billed cuckoo, British Columbia considers the western yellow-billed cuckoo as an extirpated breeder, but that the species still does occur within the Province (British Columbia Conservation Data Centre, 2013).

Canadian Environmental Protection Act of 1999. The Canadian Environmental Protection Act sets out several guiding principles for conserving the environment including but not limited to supporting: Sustainable development; pollution prevention; elimination of releases of substances that are persistent or that bioaccumulate; an ecosystem approach and using the precautionary principle on issues related to the environment; science-based national standards; and seeking intergovernmental cooperation for consistency and avoidance of duplication of efforts. Because the yellow-billed cuckoo is not considered a species at risk, implementation of environmental protection regulations are optional for the species.

Mexico

The Mexican Government, through its Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT), has authority to designate species as threatened or endangered. The western yellow-billed cuckoo is not listed by the Mexican Government's Official Mexican Norm NOM–059–SEMARNAT–2010, Mexico's threatened species law. The yellow-billed cuckoo is listed under the 1936 Mexico–United States Convention for the Protection of Migratory Birds and Game Mammals (Service 2013b), which encourages voluntary cooperative actions to protect identified migratory birds and mammals.

In 1988, the Mexican Government passed the General Law of Ecological Equilibrium and Environmental Protection, which is similar to NEPA in the United States. This Mexican statute requires an environmental assessment of private or government actions that may affect wildlife or their habitat. Currently, no known regulatory mechanisms or conservation planning are in place that specifically targets the conservation of habitat within the range of the western yellow-billed cuckoo in Mexico. Therefore, we anticipate continued threats in Mexico, with little or no protection to the western yellow-billed cuckoo.

The National Natural Protected Areas (NPAs) system is a Mexican program to protect sensitive habitats and species. NPA designation is supposed to protect areas that have not been significantly altered by human activities and that provide diverse ecosystem services. However, prior to 1994, most NPAs lacked sound and comprehensive management plans. By 2000, approximately 30 percent of new and existing NPAs had developed management plans; however, under the NPA model these plans lacked detailed information, and in many cases could be considered obsolete. NPA goals to promote sustainable natural resources are often unattainable because of conflicting land ownership interests (Valdez *et al.* 2006, p. 272). The allocation of funds for management of natural reserve areas in Sonora is not assured, and some reserves have not received protection other than that given by government edicts or their natural isolation (Burquez and Martinez-Yrizar 1997, p. 378). Urban development has reduced some of Sonora's natural reserves. Three of the reserves have already disappeared, reflecting the tenuous state of many nature reserves in Mexico (Burquez and Martinez-Yrizar 2007, p. 546).

Wildlife management units, or UMAs, were part of a program developed and implemented by SEMARANT in 1997 to promote wildlife management on private property in Mexico (Weber *et al.* 2006, p. 1480). The UMA program has not been effective in promoting wildlife management or biodiversity conservation. It has increased the introduction of exotic wildlife species to meet hunting demands. There is a lack of technical capability on private lands to conduct proper wildlife monitoring and management (Weber *et al.* 2006, p. 1482). In Mexico, the exploitation of minerals and industrial development has not been matched by strong measures to protect the environment (Burquez and Martinez-Yrizar 2007, p. 547). Surface water and ground water management in Mexico is also lacking, and restoring water quality and quantity to water bodies is a primary concern (Organisation for Economic Co-operation and Development (OECD) 2013, p. 102). In the State of Sonora, 30 years of unregulated water extraction from both above and below ground has resulted in serious water resource overexploitation and degradation (OECD 2013, p. 115). Although regulatory measures are in place, they lack consistent implementation and oversight (OECD 2013, p. 133).

Current efforts for protecting the western yellow-billed cuckoo in Mexico primarily consist of identifying areas as Important Areas for Bird Conservation (Áreas de Importancia para la Conservación de las Aves), but no specific projects or conservation efforts are focused on the western yellow-billed cuckoo or its habitat (Sánchez-González and Berlanga 2012 in litt.).

Lack of habitat protection for the western yellow-billed cuckoo in northwestern Mexico also impacts the western yellow-billed cuckoo in the United States because individuals are known to make transitory movements up to several hundred miles between the southwestern United States and northern Mexico within a single breeding season (Sechrist *et al.* 2012, p. 5), so that individuals that breed in the United States also depend to some extent on habitat in northern Mexico. We are not aware of any information on the number of western yellow-billed cuckoos that utilize habitats in both countries during a given breeding season; however, these are also stopover areas between breeding and wintering grounds in South America, and are important as foraging habitat. Therefore, lack of regulatory protections for habitat of the western yellow-billed cuckoo in northwestern Mexico also affects western yellow-billed cuckoos in the southwestern United States.

In regard to potential for pesticide exposure south of the U.S. border, Mexico has the second largest pesticide sales in Latin America, behind Brazil, which together account for 78 percent of the volume of pesticides within 11 Latin American countries (Mora 1997, pp. 3–4). While Mexico has laws concerning pesticide use, and import regulations on certain pesticides, there is limited enforcement capacity (Behre 2003, pp. 337–338). The same is true in Paraguay, Bolivia, Brazil, and Argentina, where yellow-billed cuckoos winter. For example, in Paraguay, at the center of the yellow-billed cuckoo's wintering range, importation and use of many pesticides are banned, but it is estimated that the amount of pesticides that are imported illegally are double the amount that are imported legally (Scribano 2013, entire). For additional information on pesticides, see Factor E below.

Based on the best available information, the regulatory mechanisms in Mexico that would protect the western yellow-billed cuckoo from threats described under Factors A and E are either lacking or not being fully implemented. These include water supply projects, water diversions, expansion of agricultural activities and overgrazing, conversion of habitat to nonnative vegetation, climate change (Factor A), and pesticides, as well as the threat of small, isolated patches of western yellow-billed cuckoo habitat (Factor E).

Summary of Factor D

Various Federal, State, and international regulatory mechanisms in

place provide varying degrees of conservation oversight that may to some degree address the threat of ongoing habitat loss and degradation resulting from altered hydrology, conversion of habitat to nonnative vegetation, climate change, agricultural activities (Factor A), or exposure to pesticides and effects of small and isolated habitat patches (Factor E). In California, where the species is listed as endangered, regulations prohibit unpermitted possession, purchase, sale, or take of listed species. Such prohibition of take does not include the species' habitat, and the western yellow-billed cuckoo continues to decline in California despite its status as a State-listed species. In addition, even though the California Department of Pesticide Regulations has a program to protect endangered species, the western yellow-billed cuckoo has not been included as a covered species.

Because the yellow-billed cuckoo is not a protected or sensitive species in Canada, Mexico, or in a majority of the United States, and a variety of factors influence the species and its habitat, we have determined that the current regulatory regime does not adequately address the majority of impacts to the western yellow-billed cuckoo or its habitat. As described under Factor A, one of the primary threats with the greatest severity and magnitude of impact to western yellow-billed cuckoo is the loss of habitat as a result of altered hydrologic functioning of streams in the West. Although some protections currently exist for the species and its habitat as a result of existing regulatory mechanisms at the Federal, State, or local level, our evaluation suggests these protections are inadequate to address the threats associated with the species and its habitat.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Small and Widely Separated Habitat Patches

As described in the **Background** section and under Factor A, the habitat of the western yellow-billed cuckoo has undergone significant loss and modification within its occupied breeding range as a result of widespread multiple human-caused effects. These include altered hydrology in watercourses and past loss and degradation from agriculture. Past destruction and modification transformed formerly large expanses of riparian habitat into a number of smaller patches of smaller total area, isolated from each other by a matrix of mostly human-altered habitats (McGill, 1975, pp. 1–4; Thompson, 1961, pp. 294–315; Wilcove *et al.* 1986, p. 237). The potential natural regeneration or restoration of the habitat to reconnect these areas is low due to various reasons (see Factor A discussion). Under the best of circumstances, for riparian habitat (willows, cottonwoods) to mature to the point at which it provides for appropriate food, shelter, and breeding conditions for the western yellow-billed cuckoo may take 3–5 years (Golet *et al.* 2008, pp. 20–22). However, in areas where conditions are less than optimal, habitat may take several decades to mature to the point where it would be available for use (Strahan 1984, pp. 58–67; Briggs 1995, pp. 63–67; Opperman and Merenlender 2004, pp. 822–834; Trowbridge *et al.* 2004, pp. 157–164; Morris *et al.* 2006, pp. 106–116; Griggs 2009, p. 12).

As a result, the western yellow-billed cuckoo now primarily occurs in smaller, more widely separated populations. Compared to large populations, smaller populations are disproportionately affected by natural and manmade factors. These stressors vary in frequency, timing, and magnitude across the species' range. They are related or correlated to each other or act in combination to result in significant impacts to the western yellow-billed cuckoo within all or portions of its range.

One of the ramifications of smaller, more isolated habitat patches is that the smaller the patch, the more edge it has in proportion to its area, which increases the percentage of the available habitat exposed to the surrounding land uses (Hunter 1996, pp. 186–187). This is a particularly prevalent characteristic of the western yellow-billed cuckoo's remaining disjunct habitat patches, as many patches are in proximity to agricultural and other human-altered landscapes. For example, such land use currently dominates much of the riparian landscape within many regions, particularly along some reaches of the lower Colorado River, Sacramento River, Snake River, Verde River, Gila River, Santa Cruz River, San Pedro River, and Río Grande; and also in parts of northern Mexico in the vicinity of floodplain farming along the Sonora, Magdalena, and Moctezuma Rivers (Villaseñor-Gomez 2006, p. 111).

Agricultural activities on adjacent lands affect riparian bird communities in ways that may result in lower reproductive success, and possible abandonment of the patch, as reviewed by Saab (1999, pp. 136, 147–148). Saab (1999, p. 147) found that bird species, including the western yellow-billed cuckoo, were more likely to occur in riparian habitat along the Snake River, Idaho, in sites surrounded by upland natural vegetation than in habitat adjacent to agricultural lands. Saab found that, compared to habitat patches surrounded by natural habitat, patches near agricultural lands supported more avian nest predators that prosper in human-altered landscapes and have a greater effect on the smaller, fragmented habitats (Saab 1999, p. 147). Increases in these predators can result in more nest losses and discourage western yellow-billed cuckoos from nesting, thus suppressing local western yellow-billed cuckoo population size. Increases in nonnative vegetation can displace or degrade suitable nesting and foraging habitat, thereby leading to lower utilization of such areas by western yellow-billed cuckoos. Together, the effects can lead to western yellow-billed cuckoos abandoning these small habitat patches.

The western yellow-billed cuckoo is currently found in the largest contiguous and least-fragmented remaining habitat patches. For example, in California, sites larger than 198 ac (80 ha) in extent and wider than 950 ft (600 m) provided optimal patch size for western yellow-billed cuckoos (Laymon and Halterman 1989, p. 275). Nesting western yellow-billed cuckoos are sensitive to patch size and seldom use patches smaller than 325 × 975 ft (100 × 300 m) (Hughes 1999, p. 20). This observed preferential use of large patches strongly suggests that the western yellow-billed cuckoo is sensitive to fragmentation and reductions in habitat patch size. Moreover, patch-size reduction combined with the scarcity of larger patches keeps the western yellow-billed cuckoo breeding population size depressed. Such effects prevent the western yellow-billed cuckoo from reversing its long-term decline in population and range (Hunter 1996, pp. 179–187).

Moreover, isolated breeding sites separated by hundreds of miles of nonhabitat also reduce the ease with which dispersing juvenile and returning adult western yellow-billed cuckoos are able to find these sites. This isolation may result in low colonization and reoccupation rates, so that otherwise suitable habitat remains unoccupied or occupied at low densities (Laymon and Halterman 1989, p. 274; Hunter 1996, p. 185). For example, the Sacramento River still appears to have sufficient habitat to maintain a self-sustaining population of western yellow-billed cuckoos, as more than 25,000 ac (10,117 ha) of riparian and associated natural habitat has been protected and other sections are in the

process of being restored. However, not all suitable patches are occupied or may only be occupied in very low densities, and the western yellow-billed cuckoo population remains much lower than its potential (Dettling and Howell 2011, pp. 20–21).

On the Colorado River (between Lake Mead and the Mexico border), habitat restoration efforts are being implemented as a result of the Lower-Colorado River Multi-species Conservation Plan (LCR MSCP). The LCR MSCP permittees are in the process of creating and maintaining up to 4,050 ac (1,639 ha) of western yellow-billed cuckoo habitat, reducing the risk of loss of created habitat to wildfire, replacing created habitat affected by wildfire, and avoiding and minimizing operational and management impacts to western yellow-billed cuckoos over the 50-year life of the permit (2005 to 2055) (Lower Colorado River Multi-Species Conservation Program 2004, pp. 5–30–5–36, Table 5–10, 5–58–5–60). Not all of the habitat has been created, and as a result, the restoration sites are not contiguous along the entire river reach. Monitoring and survey efforts for the western yellow-billed cuckoo have shown an increase in detections, but the majority of detections were confined to only a few of the larger areas (McNeil *et al.* 2011, pp. 1–16).

In summary, despite efforts to protect and restore riparian habitat along the Sacramento River and Colorado River and elsewhere in the range of the western yellow-billed cuckoo, these efforts offset only a small fraction of historical habitat that has been lost. Therefore, the threats resulting from the species' behavioral response to the multiple, combined effects of small and widely separated habitat patches exacerbate the effect of other threats within a large portion of the range of the western yellow-billed cuckoo. Moreover, because the threats that create small and isolated patches are ongoing (see Factor A) and maturation of regenerated or restored habitat may take several decades to fully provide for the needs of the species, we expect the effects of the species' response to small patch size to continue to adversely impact the western yellow-billed cuckoo into the future.

Pesticides

Exposure to pesticides may also be a threat to western yellow-billed cuckoos because it negatively impacts populations of insect prey (Groschupf 1987, p. 29; Hughes 1999, p. 2). The effects of pesticides on western yellow-billed cuckoos can be from intentional aerial spraying of habitat for mosquito or forest pest control, or from overspray or drift when the species' foraging habitat is located next to agricultural fields. Pesticides can affect western yellow-billed cuckoos foraging for grasshoppers at the field-forest interface or foraging for caterpillars in riparian habitat adjacent to the sprayed fields. Accumulation of chlorinated hydrocarbon pesticides, particularly dichlorodiphenyltrichloroethane (DDT), has affected other bird species, particularly top predators (Robinson and Bolen 1989, pp. 269–275). Pesticides may affect behavior (for example, loss of balance) or cause death by direct contact. Pesticide use may indirectly affect western yellow-billed 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; Lehman and Walker 2001, p. 12).

Western yellow-billed cuckoo prey populations were affected by aerial spraying of larvicides for control of mosquitoes at Caswell State Park in California (Laymon 1998, p. 12) and in Colorado to control an outbreak of caterpillars on box elders near Durango (Colyer 2001, pp. 1–6). The available evidence suggests that a reduction in prey availability results in reduced nesting success (Laymon 1980, p. 27; Hughes 1999, pp. 19–20), and pairs may even forgo breeding in years with inadequate food supplies (Veit and Petersen 1993, pp. 258–259). Therefore, the application of pesticides directly onto areas of riparian habitat may indirectly affect the reproductive success of the western yellow-billed cuckoo, leading to nest failure and lowered population size. Additionally, because breeding site fidelity is in part dependent on previous successful nesting (see the Breeding Site Fidelity section of the proposed rule), western yellow-billed cuckoos may abandon otherwise suitable nest sites where prey availability is limited by pesticide use, resulting in curtailment of its occupied range.

Effects from overspray of pesticides are more pronounced in smaller patches next to agricultural fields (because they have more edges, which allows for increased chances of exposure), but the effects of pesticides could also affect larger habitat patches as well. In many areas riparian habitat borders agricultural lands, such as California's Central Valley, the lower Colorado River, Snake River, Gila River, Río Grande Valley, and rivers in northern Mexico, including the Sonora, Yaqui, Mayo, and Moctezuma, where western yellow-billed cuckoos are vulnerable to pesticide exposure. Laymon (1980, pp. 11–12) reported sublethal poisoning of young western yellow-billed cuckoos caused by spraying active nests in walnut orchards in California.

Although DDT use has been banned in the United States since 1972, and in Mexico since 1999, yellow-billed cuckoos may be exposed to DDT in Mexico or on wintering grounds where DDT is still used despite any bans on its use. The soil half-life for DDT is from 2 to 15 years. However, in some cases, half of the DDT initially present will remain for 20, 30, or more years (U.S. Department of Human Health & Human Services, Agency for Toxic Substances and Disease Registry 1994, pp. 3–4).

For example, yellow-billed cuckoos (most likely of the eastern population) collected during the spring and fall migration in Florida had unusually high concentrations of DDT, suggesting exposure on the wintering grounds in South America (Grocki and Johnston 1974, pp. 186–188). 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 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, and this percentage of thinning in other species has allowed eggs to be crushed during incubation, but there is no information showing that western yellow-billed cuckoo eggs have been crushed during incubation because of shell thinning.

A recent study in southern Sonora, Mexico, tested for the presence of a group of agricultural pesticides banned in the United States, known as organochlorine pesticides (beta-hexachlorocyclohexane (BHC), lindane, aldrin, endrin, b-endosulfan, methoxychlor, p, p0–DDE, p, p0-Dichlorodiphenyldichloroethane (DDD), p, p0–DDT). Collectively called OCPs, these pesticides are persistent in the environment. Soil samples collected from 24 localities in the Yaqui and Mayo Valleys of southern Sonora, Mexico, watersheds in which the western yellow-billed cuckoo is known to breed, were found to have higher OCP levels than other regions of the world. The OCPs were predominantly DDT (Cantu-Soto *et al.* 2011, p. 559), despite its having been discontinued in Mexico in 1999 after decades of heavy use in agriculture and for malaria control (Yañez *et al.* 2004, p. 18). This finding may indicate recent applications of DDT in agricultural soils (Cantu-Soto *et al.*

2011, p. 559). Because of the proximity of habitat for western yellow-billed cuckoos to these valleys and the prevalence of floodplain agriculture in northern Mexico, these pesticides, especially DDT, may be having widespread long-lasting effects on the western yellow-billed cuckoo. These include direct and indirect exposure through ingestion of contaminated prey items, and reduction in prey availability from direct exposure and pesticide runoff into habitat that supports western yellow-billed cuckoos.

Neonicotinoid pesticides are systemic chemicals that are taken up through various plant parts and can be distributed through a plant's tissues. These chemicals can be applied to a plant as a seed coating, soil contact, irrigation water, or as a foliar spray. Many of these chemicals are long acting with half-lives up to 2 years. Plant tissues that have been treated are toxic to both sap-sucking (e.g., aphids and true bugs) and foliage-eating insects (e.g., caterpillars, katydids, grasshoppers, and beetles). Many of these foliage-eating insects are potential prey of the western yellow-billed cuckoo. These chemicals have the potential to reduce prey abundance if intentionally or accidentally applied to foliage on which western yellow-billed cuckoos forage. To date no scientific studies have been done on western yellow-billed cuckoos and their prey, but additional reports and research on these chemicals discuss the potential adverse effects (Mineau and Whiteside 2013; Hopwood *et al.* 2013; Mineau and Palmer 2013).

In summary, pesticide use is widespread in agricultural areas in the western yellow-billed cuckoo breeding range in the United States and northern Mexico. Yellow-billed cuckoos have been exposed to the effects of pesticides on their wintering grounds, as evidenced by DDT found in their eggs and eggshell thinning in the United States. Because much of the species' habitat is in proximity to agriculture, the potential exists for direct and indirect effects to a large portion of the species in these areas through altered physiological functioning, prey availability, and, therefore, reproductive success, which ultimately results in lower population abundance and curtailment of the occupied range. While agricultural pesticides can kill prey of the yellow-billed cuckoo, and documentation exists of pesticide exposure in the wild, described above, no known data are available to determine specifically how often agricultural chemicals may be affecting yellow-billed cuckoo prey availability, locations where it may be particularly significant, or the extent to which pesticides may be responsible for population-level effects in the western yellow-billed cuckoo. However, based on the close proximity of agricultural areas to where the western yellow-billed cuckoo breeds, the threat is potentially significant.

Collisions With Communication Towers, Wind Turbines, Solar Power Towers, and Other Tall Structures

Yellow-billed cuckoos are vulnerable to collision with communication towers and other tall structures, particularly during their migration. For example, several hundred yellow-billed cuckoo mortalities were documented at a single television tower in Florida over a 29-year period (Crawford and Stevenson 1984, p. 199; Crawford and Engstrom 2001, p. 383), and at an airport ceilometer in the east (Howell *et al.* 1954, p. 212). Lesser numbers of yellow-billed cuckoos have been reported as killed at other sites with both television towers and wind turbines in Wisconsin, West Virginia, and northern Texas (Kemper 1996, p. 223; Schechter 2009, p. 1; Bird Watching 2011, p. 1), Although these mortalities were in the eastern segment of the population, with the number of tall towers that have been constructed in recent years in the western United States, the potential exists for collisions with the western yellow-billed cuckoo. Remains of a yellow-billed cuckoo along with 70 other species of birds have been recovered at the Ivanpah solar power tower facility (California) during its first year of operation (Kagan *et al.* 2014, p. 10). Without further study, we anticipate this to be a minor, but ongoing, effect to individual yellow-billed cuckoos, but in combination with all the other effects to this species, as described under Factors A and E, mortality from collision would have an additive effect to the threats facing the western yellow-billed cuckoo.

Conservation Efforts To Reduce Other Natural or Manmade Factors Affecting Its Continued Existence

Active and hydrological process-based restoration of riparian habitat on the Colorado, Kern, and Sacramento Rivers and elsewhere will help reduce habitat fragmentation, small patch size, and overall lack of habitat. In some restoration plans, reduction of fragmentation is a stated goal, and restoration sites are planned for sites adjacent to existing habitat. The Colorado River riparian habitat restoration work is just beginning and is part of the Lower Colorado River Multi-Species Conservation Plan. This habitat conservation plan calls for the creation of 5,940 ac (2405 ha) of riparian habitat through active restoration of which 4,050 ac (1,640 ha) will be suitable for western yellow-billed cuckoos (Reclamation 2004, Sec. 5, p. 58). Active restoration work began on the South Fork Kern River in California, in 1986. To date, 340 ac (138 ha) of riparian habitat have been restored (Audubon California 2012, pp. 1–10). Along the Sacramento River, the Sacramento River National Wildlife Refuge has implemented an active riparian restoration program. Riparian habitat restoration activities have been conducted on 4,513 ac (1,826 ha) with 2,400 ac (738 ha) slated for additional restoration (Hammond 2011, p. 14). In Utah, from 2008–2013, the State's Watershed Restoration Initiative (WRI) has invested funding with partners toward collaborative habitat enhancement efforts in lowland riparian habitats. The efforts were distributed across 35 different projects and totaled more than 8,000 ac (3,200 ha).

At present, restoration occurs on a relatively small scale in comparison to the need to reduce habitat fragmentation and increase the overall extent of suitable habitat. Future process-based restoration projects that restore natural river hydrology show great promise for large-scale restoration of riparian habitat for western yellow-billed cuckoos.

To date, conservation efforts, though helpful, have been inadequate to significantly reduce the effects of natural or manmade factors affecting the western yellow-billed cuckoo.

Summary of Factor E

As noted in Factor A, habitat for the western yellow-billed cuckoo has been modified and curtailed, resulting in only remnants of formerly large tracts of native riparian forests, many of which are no longer occupied by western yellow-billed cuckoos. Despite recent efforts to protect existing, and restore additional, riparian habitat in the Sacramento, Kern, and Colorado Rivers, and other rivers in the range of the western yellow-billed cuckoo, these efforts offset only a small fraction of historical habitat that has been lost. Therefore, we expect the threat resulting from the combined effects associated with small and widely separated habitat patches to continue to affect a large portion of the range of the western yellow-billed cuckoo. This threat is particularly persistent where small habitat patches are in proximity to human-altered landscapes, such as near agricultural fields that dominate the landscape in many areas where the

western yellow-billed cuckoo occurs. As a result, the potential exists for pesticides to directly affect (poisoning individual cuckoos) and indirectly affect (reducing the prey base) a large portion of the species. These effects could ultimately result in lower population abundance and curtailment of its occupied range. Mortality from collisions with tall structures is also an ongoing but largely unquantified effect.

Cumulative Impacts

Habitat loss and degradation occurs throughout the range of the western yellow-billed cuckoo (see **Background** section and Factor A above), and many of the threats under Factor A have worked and are working in combination to reduce the amount, configuration, and quality of the riparian habitat that remains.

This array of Factor A threats, working in combination, creates the situation that then allows threats from the other listing factors to markedly affect the species. These other-factor threats may not be significant in and of themselves, but because they are not occurring in isolation they, in combination, are contributing to the population decline of the species. For example, as discussed in the Small and Widely Separated Habitat Patches section of Factor E, above, small habitat patches (resulting from the effects of Factor A threats) are more likely to have a larger number and a wider range of nest predators (see the Predation section of Factor C, above) because more nest predators occur in ecological edges. Additionally, habitat patches near areas of agricultural or urban development can foster higher densities of potential nest predators. Thus, any western yellow-billed cuckoo nesting in a small habitat patch near development may be subject to higher levels of nest predation and thus lower productivity. Moreover, the mere presence of certain nest predators in a habitat patch may elicit a behavioral response from western yellow-billed cuckoos such that they do not even attempt to nest in such habitat patches, even if other aspects of the habitat would suggest that it is suitable for nesting.

Similarly, riparian habitat patches that occur near urban and agricultural development may be subject to intentional or accidental pesticide spraying, as discussed in the Pesticide section under Factor E. This spraying would be unlikely to occur but for the habitat patch's proximity to development. This development likely occurs close to the riparian habitat through a process similar to the generalized scenario described above (see also specific details under Factor A).

Much of the available habitat is now in small patches with only a relatively few patches regularly occupied by nesting western yellow-billed cuckoos. Thus, the species' intolerance of small patch size in combination with extensive habitat loss has resulted in much less suitable habitat and a greatly reduced western yellow-billed cuckoo population size. In areas at the edge of the western yellow-billed cuckoo's current range (e.g., the Sacramento River), restoration of riparian habitat has not been accompanied by an increase in the species' population indicating that other factors may be limiting the population in those areas. Moreover, large areas of suitable habitat are unlikely to naturally regenerate within the range of the species into the future because western yellow-billed cuckoos need riparian habitat in a range of ages, including older, more structurally diverse areas for nesting, and nearly all of the areas where riparian habitat could grow in western North America are modified by dams, channelization, water extraction, and other activities that disrupt natural processes to allow good-quality riparian habitat to grow in a mosaic of different ages (see Factor A). Climate change is likely to further add to these impacts.

Summary of Factors

The primary factors threatening the western DPS of the yellow-billed cuckoo are the loss and degradation of habitat for the species from altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture, and conversion of native habitat to predominantly nonnative vegetation as identified in Factor A. Additional threats to the species under Factor E include the effects of climate change, pesticides, wildfire, and small and widely separated habitat patches. The cumulative impact from various threats is also a factor that will exacerbate multiple existing threats to the western yellow-billed cuckoo and its habitat.

Various Federal, State, and international regulatory mechanisms in place provide varying degrees of conservation oversight that may to some degree address the threat of ongoing habitat loss and degradation; however, because the yellow-billed cuckoo is not a protected or sensitive species in a majority of the United States or in Canada and Mexico, the application of these regulatory mechanisms to conserve the western yellow-billed cuckoo or its habitat is unknown and the effectiveness of these regulatory mechanisms is uncertain.

These factors pose current and future threats to the species because they are ongoing and likely to continue in the near future.

Determination

We have carefully assessed the best scientific and commercial data available regarding the past, present, and reasonably anticipated future threats to the western yellow-billed cuckoo. In assessing the status of the western yellow-billed cuckoo, we applied the general understanding of ''in danger of extinction'' discussed in the December 22, 2010, Memorandum to the polar bear listing determination file, ''Supplemental Explanation for the Legal Basis of the Department's May 15, 2008, Determination of Threatened Status for the Polar Bear,'' signed by then Acting Director Dan Ashe (Service 2010, pp. 1–18). Threats to the western yellow-billed cuckoo exist for two of five threat factors. Threats also occur in combination, resulting in synergistically greater effects.

Factor A threats result from habitat destruction, modification, and degradation from dam construction and operations, water diversions, riverflow management; stream channelization and stabilization; conversion to agricultural uses, such as crops and livestock grazing; urban and transportation infrastructure; and increased incidence of wildfire. Continuing ramifications of actions that caused habitat loss in the past have resulted in ongoing curtailment of the habitat of the western yellow-billed cuckoo throughout its range. These factors also contribute to fragmentation and promote conversion to nonnative plant species, particularly tamarisk. The threats affecting western yellow-billed cuckoo habitat are ongoing and significant and have resulted in curtailment of the range of the species. Loss of riparian habitat leads not only to a direct reduction in western yellow-billed cuckoo numbers but also leaves a highly fragmented landscape, which in combination with other threats (see below), can reduce breeding success through increased predation rates and barriers to dispersal by juvenile and adult western yellow-billed cuckoos.

Factor E threats, including habitat rarity and small and isolated population sizes, cause the remaining western yellow-billed cuckoo populations to be increasingly susceptible to further declines through lack of immigration, reduced populations of prey species (food items), pesticides, and collisions with tall vertical structures during

migration. The serious and ongoing threat of small overall population size, which is the result of other threats in combination, leads to an increased chance of local extirpations.

The threats that affect the western yellow-billed cuckoo are important on a threat-by-threat basis, but are even more significant in combination. Habitat loss has been extensive throughout the range of the western yellow-billed cuckoo. The remaining riparian habitat is fragmented into small patches, which the species does not normally select as breeding habitat. Additionally, western yellow-billed cuckoos need riparian habitat in a range of ages, including older structurally diverse areas for nesting. This diversity of tree ages within the riparian vegetation (western yellow-billed cuckoo's habitat) is largely dependent on disturbances that affect some but not all of the vegetation within that habitat patch at one time. A number of threats, working in combination or individually, prevent such disturbance from happening now and will continue to do so in the future.

For example, dams and other flood control modifications to a watercourse may prevent floods from being severe enough to affect that habitat patch; channelization may restrict floodwaters to a narrow channel, allowing floodwaters to cause too much damage to habitat within the channel and not enough (or no) damage to habitat outside the channel; altered flood regimes may allow dead wood to accumulate, allowing fires, when they occur, to be severe and affect most of the patch; development and other human activities next to habitat patches may allow more wildfires to be ignited; and the reduction in patch size, through neighboring development, alteration of hydrology, or encroachment by nonnative plants, makes it more likely that a larger proportion of that patch will be affected during any given disturbance event. Moreover, nearly all areas where riparian habitat could potentially grow are modified by dams or water withdrawal and disrupted by other activities, often in combination, that prevent the reestablishment of riparian habitat. Patch size, when coupled with habitat loss and Factor C and E threats, including proximity to incompatible land uses, which increases exposure to predators and pesticides, is a significant cumulative threat to the western yellow-billed cuckoo now and in the future.

Per section 4(b)(1)(A) of the Act, prior to making our determination, we must first ''[take] into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction, or on the high seas.'' Restoration of riparian habitat on the Colorado, Kern, and Sacramento Rivers and elsewhere will help reduce habitat fragmentation, small patch size, and overall lack of habitat. However, at present, restoration is being done on a relatively small scale in comparison to the need to reduce habitat fragmentation and increase the overall extent of suitable habitat. DDT has been banned in the United States for several decades, but use of DDT continues in Central and South America, thus potentially exposing western yellow-billed cuckoos during migration and winter.

Through our analysis of the best available scientific and commercial information on the species' abundance, life history, current population status and trends, and the response of the species and its habitat to natural and anthropogenic threats, we have determined that the western yellow-billed cuckoo meets the definition of a threatened species under the Act, rather than endangered. The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.''

The geographic extent of the western yellow-billed cuckoo remains rather widespread through much of its historic range, conferring some measure of ecological and geographic redundancy and resilience. Although there is a general decline in the overall population trend and its breeding range has been reduced, the rate of the population decline and contraction of its breeding range is not so severe to indicate extinction is imminent for the western yellow-billed cuckoo. This current downward trend is slow and not expected to increase in the near future. The majority of large-scale habitat losses and conversions through dam building and agricultural development have already occurred, and we are not aware of any large-scale projects that would affect the species to the extent that the current trend of decline would change. Therefore, threats to the species and population declines do not currently reach the level typical of an endangered species.

Because the western yellow-billed cuckoo does not face any known sudden and calamitous threats, it is not a narrowly endemic species vulnerable to extinction from elevated or cumulative threats, is not yet restricted to a critically small range or critically low numbers, and currently does not show any substantial reduction in numbers, it would not meet the definition of ''endangered'' as determined by the Act. More appropriately, we find that the western yellow-billed cuckoo is likely to become endangered throughout all or a significant portion of its range within the foreseeable future, based on the timing, severity, and scope of the threats described above. Therefore, on the basis of the best available scientific and commercial information, we are listing the western distinct population segment of the yellow-billed cuckoo as a threatened species in accordance with sections 3(6), 3(20), and 4(a)(1) of the Act.

Significant Portion of the Range

Under the Act and our implementing regulations, a species may warrant listing if it is an endangered or threatened species throughout all or a significant portion of its range. The Act defines ''endangered species'' as any species which is ''in danger of extinction throughout all or a significant portion of its range,'' and ''threatened species'' as any species which is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The definition of ''species'' is also relevant to this discussion. The Act defines ''species'' as follows: ''The term 'species' includes any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature.'' The phrase ''significant portion of its range'' (SPR) is not defined by the statute, and we have never addressed in our regulations: (1) The consequences of a determination that a species is either endangered or likely to become so throughout a significant portion of its range, but not throughout all of its range; or (2) what qualifies a portion of a range as ''significant.''

In determining whether a species is threatened or endangered in a significant portion of its range, we first identify any portions of the range of the species that warrant further consideration. The range of a species can theoretically be divided into portions an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be both (1) significant and (2) threatened or endangered. To identify only those portions that warrant further consideration, we determine whether

there is substantial information indicating that: (1) The portions may be significant, and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that are not significant, such portions will not warrant further consideration.

If we identify portions that warrant further consideration, we then determine whether the species is threatened or endangered in these portions of its range. Depending on the biology of the species, its range, and the threats it faces, the Service may address either the significance question or the status question first. Thus, if the Service considers significance first and determines that a portion of the range is not significant, the Service need not determine whether the species is threatened or endangered there. Likewise, if the Service considers status first and determines that the species is not threatened or endangered in a portion of its range, the Service need not determine if that portion is significant. However, if the Service determines that both a portion of the range of a species is significant and the species is threatened or endangered there, the Service will specify that portion of the range as threatened or endangered under section 4(c)(1) of the Act.

We evaluated the current range of the western yellow-billed cuckoo to determine if there is any apparent geographic concentration of threats for the species. The western yellow-billed cuckoos are highly restricted to riparian habitat in their ranges, and the threats occur throughout the species' range. We considered the potential threats due to altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture, conversion of native habitat to predominantly nonnative vegetation, pesticides, wildfire, small and widely separated habitat patches, and the effects of climate change. We found no concentration of threats because of the species' limited and curtailed range, and uniformity of the threats throughout its entire range. Having determined that the western yellow-billed cuckoo is threatened throughout its entire range, we must next consider whether there are any significant portions of the range where the western yellow-billed cuckoo is in danger of extinction or is likely to become endangered in the foreseeable future.

The western yellow-billed cuckoo is highly restricted to riparian habitat, and the threats to the species and its habitat occur throughout its breeding range. Therefore, we assessed the status of the western yellow-billed cuckoo throughout its entire breeding range. The threats to the survival of the species occur throughout the western DPS' breeding range and are not restricted to any particular significant portion of that range. We conclude that what affects the entire breeding portion of the western DPS' range affects the status of the entire western yellow-billed cuckoo throughout its breeding range, including migration corridors and stopover areas. Accordingly, our assessment and proposed determination applies to the western yellow-billed cuckoo throughout its entire breeding range.

We found no portion of the western yellow-billed cuckoo's range where threats are significantly concentrated or substantially greater than in other portions of their range and that factors affecting the species are essentially uniform throughout its range, indicating no portion of the range of the species warrants further consideration of possible endangered or threatened status under the Act. Therefore, we find there is no significant portion of the range of the western yellow-billed cuckoo that may warrant a different status.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness and conservation by Federal, State, and local agencies; private organizations; and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection measures required of Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Subsection 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies site-specific management actions that set a trigger for review of the five factors that control whether a species remains endangered or may be downlisted or delisted, and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our Web site (*http://www.fws.gov/endangered*), or from our Sacramento Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribal, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

Following publication of this final listing rule, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to

section 6 of the Act, the States of Washington, Idaho, Montana, Oregon, California, Nevada, Wyoming, Utah, Colorado, Arizona, New Mexico, and Texas would be eligible for Federal funds to implement management actions that promote the protection or recovery of the yellow-billed cuckoo. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants.*

Please let us know if you are interested in participating in recovery efforts for the yellow-billed cuckoo. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR 402. Section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is listed subsequently, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agency actions within or affecting the species' habitat that may require conference or consultation or both as described in the preceding paragraph include, but are not limited to, projects that will result in removal or degradation of riparian vegetation, altered streamflow or fluvial dynamics, or other habitat-altering activities on Federal lands or as a result of issuance of section 404 CWA permits by the USACE; construction and management of energy and power line rights-of-way by the FERC; construction and maintenance of roads, highways, or bridges by the Federal Highway Administration; grazing leases by the USFS or the BLM; and projects funded through Federal loan programs. Such projects may include, but are not limited to, construction or modification of reservoirs, levees, bank stabilization structures, water diversion and withdrawal projects, roads and bridges, utilities, recreation sites, and other forms of development, and livestock grazing.

Under section 4(d) of the Act, the Service has discretion to issue regulations that we find necessary and advisable to provide for the conservation of threatened species. The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to threatened wildlife. The prohibitions of section 9(a)(1) of the Act, as applied to threatened wildlife and codified at 50 CFR 17.31 make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these) threatened wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any listed species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, the National Marine Fisheries Service, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.32. With regard to threatened wildlife, a permit may be issued for the following purposes: For scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities. There are also certain statutory exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a final listing on proposed and ongoing activities within the range of a listed species. However, at this time, we are unable to identify specific activities that would not be considered to result in a violation of section 9 of the Act because the western yellow-billed cuckoo occurs in riparian habitat across numerous western States that exhibit a variety of habitat conditions across its range, and it is likely that site- and project-specific conservation measures may be needed for activities that may directly or indirectly affect the species.

Based on the best available information, the following activities may potentially result in a violation of section 9 the Act; this list is not comprehensive: (1) Handling or collecting of the species; (2) destruction/alteration of the species' habitat by discharge of fill material, draining, ditching, tiling, pond construction, stream channelization or diversion, or diversion or alteration of surface or ground water flow; (3) livestock grazing that results in direct or indirect destruction of riparian habitat; (4) activities such as continued presence of cattle and fragmentation of riparian habitat; (5) pesticide applications in violation of label restrictions; and (6) release of biological control agents that modifies or destroys habitat used by the species.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act should be directed to the Sacramento Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Required Determinations

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), need not be prepared in connection with regulations pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered

Species Act), we readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. During the development of this final rule, we contacted, held meetings with, or otherwise coordinated with all known tribal entities within the range of the species within the United States. Information solicited or gathered as result of this coordination has been incorporated into this final determination as appropriate. We will conduct further coordination during our designation of critical habitat for the species.

References Cited

A complete list of all references cited in this rule is available on the Internet at *http://www.regulations.gov* or upon request from the Field Supervisor, Sacramento Fish and Wildlife Office (see **ADDRESSES**).

Authors

The primary authors of this final rule are the staff members from the Service's Sacramento Fish and Wildlife Office and the Pacific Southwest Regional Office (Region 8) with assistance from staff from the Pacific Northwest Region (Region 1), the Southwest Region (Region 2), and the Mountain-Prairie Region (Region 6).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as follows:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; 4201–4245, unless otherwise noted.

■ 2. Amend § 17.11(h) by adding an entry for ''Cuckoo, yellow-billed (Western DPS)'' to the List of Endangered and Threatened Wildlife in alphabetical order under Birds, to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic Range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
*	*	*	*	*	*		*
BIRDS							
*	*	*	*	*	*		*
Cuckoo, yellow-billed	*Coccyzus americanus.*	U.S.A., Canada, Mexico.	Western DPS: U.S.A. (AZ, CA, CO (western), ID, MT (western), NM (western), NV, OR, TX (western), UT, WA, WY (western)); Canada (British Columbia (southwestern); Mexico (Baja California, Baja California Sur, Chihuahua, Durango (western), Sinaloa, Sonora).	T	850	NA	NA
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* * * * *

Dated: September 24, 2014.

Daniel M. Ashe,

Director, U. S. Fish and Wildlife Service.

[FR Doc. 2014–23640 Filed 10–2–14; 8:45 am]

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