

PREFACE

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The concept for this volume began as a scientific symposium at the North American Ornithological Conference (NAOC) in Veracruz, Mexico in October 2006. The symposium was entitled "Avian Distributional Change, Anthropogenic Challenges, and Recent Avian Research and Technological Advances within the US-Mexico Border Region," and was co-chaired by two of us (DJK and TB) along with Carol Beardmore (Sonoran Joint Venture) and Bill Howe (USDI Fish and Wildlife Service). In light of the importance of the borderland region for birds and bird conservation, and because of the great need for additional information about this poorly studied region, we have compiled this volume to present new information about bird distribution, ecology, and conservation.

GEOGRAPHY AND HUMAN POPULATION

The US-Mexico borderlands region, stretching from the Gulf of Mexico to the Pacific Ocean, includes southern portions of Texas, New Mexico, Arizona, and California in the US and northern portions of Tamaulipas, Coahuila, Nuevo León, Chihuahua, Sonora, and Baja California in Mexico (Fig. 1). For purposes of this introduction we are defining the borderlands region as roughly 325 km (202 miles) on either side of the border. However, this is a somewhat arbitrary assignment; although most of the information presented in this volume falls within these boundaries, the reader will note that some chapters include study sites outside this area.

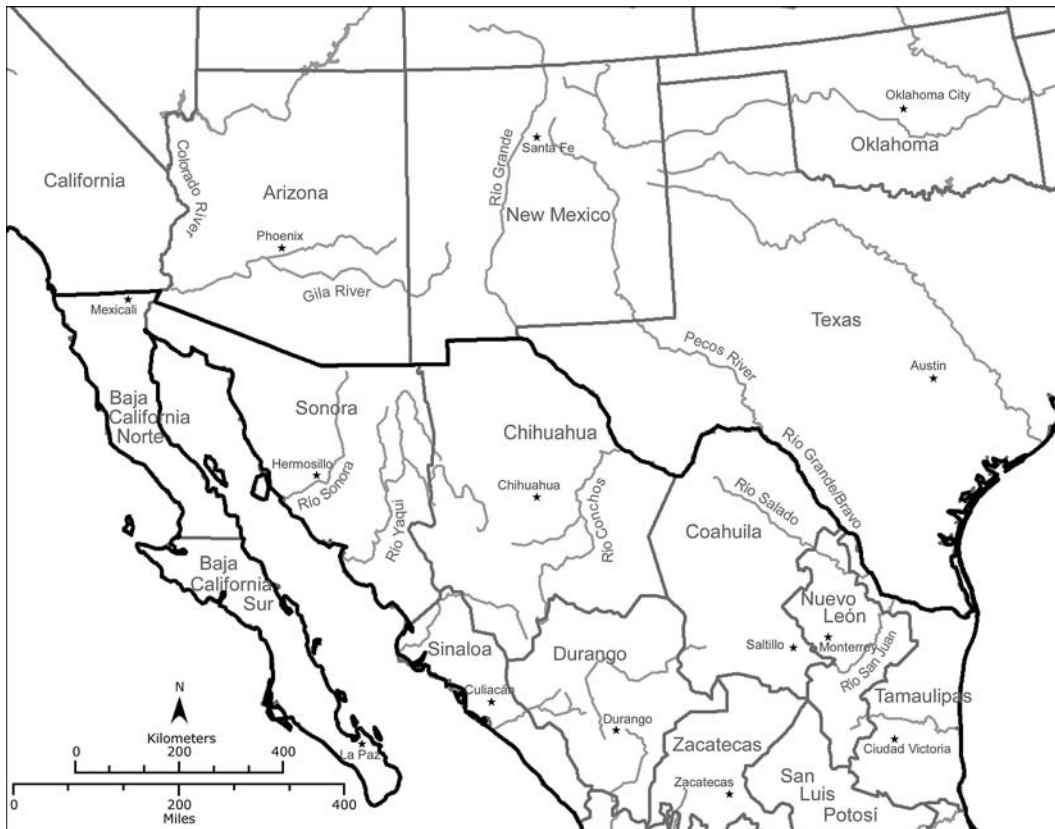


Figure 1. Map of the US-Mexico borderlands region.

At its core, the borderlands comprises portions of the following cross-border Bird Conservation Regions (BCRs) as defined by the North American Bird Conservation Initiative (NABCI), from east to west: Gulf Coastal Prairie (BCR 37), Tamaulipan Brushlands (BCR 36); Edwards Plateau (BCR 20), Chihuahuan Desert (BCR 35); Sierra Madre Occidental (BCR 34); Sonoran and Mohave Deserts (BCR 33); and Coastal California (BCR 32) (<http://www.nabci-us.org/map.html>). At its northern periphery, the borderlands includes the southern portions of several US BCRs: Oaks and Prairies (BCR 21); Central Mixed-grass Prairie (BCR 19); Shortgrass Prairie (BCR 18); and Southern Rockies-Colorado Plateau (BCR 16). At its southern periphery, it includes the northern portions of several Mexican BCRs: Sierra Madre Oriental (BCR 48), Planicie Costera, Lomeríos y Cañones de Occidente (BCR 43), Sierras de Baja California (BCR 39), and Desierto de Baja California (BCR 40) (<http://www.nabci-us.org/mxbcmmap.html>).

Important watersheds draining the borderlands region include the following rivers (ríos): Grande (known as Bravo in Mexico), San Juan, Salado, Nueces, Pecos, Conchos, Yaqui, Sonora, Gila, San Pedro, Santa Cruz, and Colorado (Fig. 1).

In 1854 <80,000 people were living in the borderlands region and it remained largely uninhabited or sparsely settled until after World War II (Webster and Bahre 2001). Although the borderlands remain relatively unpopulated, today a number of major population centers have developed in the region. In addition to cities near the border in the US (San Antonio, Tucson, Phoenix, and Los Angeles) and Mexico (Monterrey, Saltillo, Chihuahua, Hermosillo, and Mexicali), major bi-national metropolitan areas have developed around Brownsville-Matamoros, McAllen-Reynosa, Laredo-Nuevo Laredo, El Paso-Ciudad Juarez, Yuma-San Luis, and San Diego-Tijuana. In fact, with the exception of Mexico City, La Frontera is Mexico's fastest growing region (Webster and Bahre 2001). The populations in these areas are expanding and impacting the surrounding, less-developed regions along the border via increased water demands, exurbanization, and increased transportation needs. An assessment of diversity in the Sonoran Desert region of the borderlands identified the four most significant threats to this region as: (1) urbanization and resulting habitat conversion and fragmentation, (2) population increases and resulting increases in resource consumption, (3) surface water impoundment and diversion away from natural ecosystems, and (4) inappropriate livestock grazing (Nabhan and Holdsworth 1999).

BIOTIC COMMUNITY CHARACTERISTICS

The southwestern US and northern Mexico support a broad range of Nearctic and Neotropical biotic communities (Fig. 2). We present the information in Fig. 2 in order to place the borderlands within this larger context. The borderlands themselves comprise a large portion of this diverse landscape, including (1) cold temperate, warm temperate, and tropical-subtropical forests and woodlands, (2) warm temperate and tropical-subtropical scrublands, (3) cold and warm temperate grasslands, and (4) warm temperate, and tropical-subtropical desertlands (Brown et al. 2007), with valuable riparian and wetland communities embedded in each. It even contains southern examples of subalpine conifer forest at the highest montane elevations.

Climatic factors—precipitation (amount and distribution through the year), growing season length, and elevation—have some of the greatest effects on the characteristics of borderlands biotic communities. The driest portion of the borderlands region is the Gran Desierto in northwestern Sonora and the Salton Trough of southern California (annual precipitation of 39 mm) (Webster and Bahre 2001). Mean annual precipitation throughout the borderlands region varies substantially (Table 1). Lows are recorded in Mohave, Sonoran, and Chihuahuan deserts/scrub, and in California coastal scrub, while highs are recorded in the southeastern deciduous and evergreen forest, gulf coastal grassland, subalpine conifer forest, Tamaulipan semideciduous forest, and portions of the Great Plains grassland. Very high annual precipitation is recorded in the southernmost portions of the borderlands region in the Veracruz cloud forest (Table 1).

Annual distribution of precipitation also varies substantially throughout the borderlands region. Precipitation is spread evenly throughout the year in the Great Basin conifer woodlands. Precipitation occurs primarily in the winter in the following biotic communities: subalpine conifer forest, montane conifer forest, California coastal scrub and chaparral, California valley grassland, California portions of encinal forest and woodland, Mohave deserts/scrub, and southeastern deciduous and evergreen forest-balcones mixed evergreen woodland. Many borderlands biotic communities experience a majority of their precipitation during the growing season: southeastern deciduous and evergreen forest-oak-pine-hickory, most parts of encinal forest and woodland, plains, semidesert, and gulf coastal grasslands, Chihuahuan deserts/scrub,

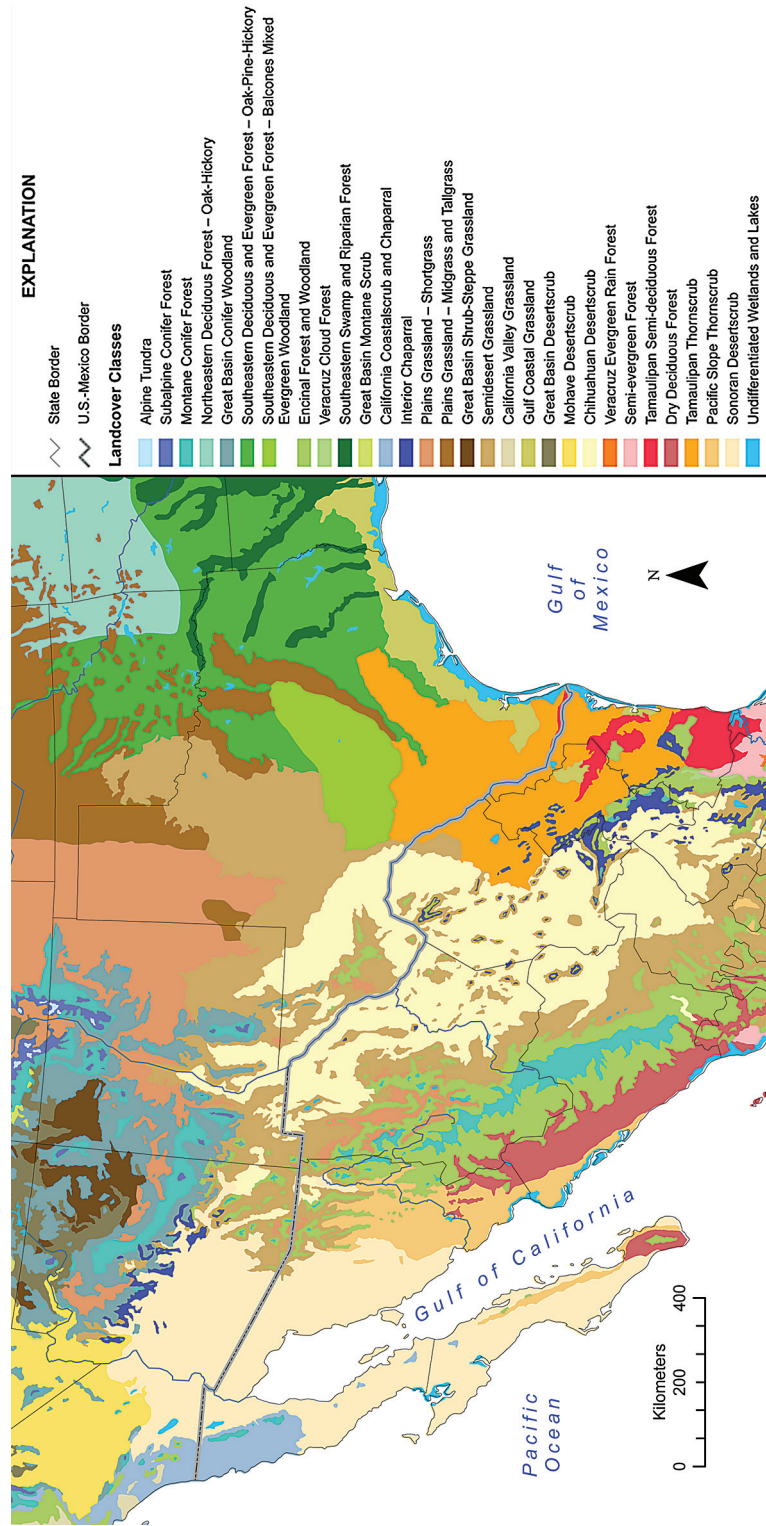


Figure 2. Biotic communities of the US-Mexico borderlands region (modified from Brown et al. 2007).

TABLE 1. MEAN ANNUAL PRECIPITATION FOR US-MEXICO BORDERLANDS BIOTIC COMMUNITIES.^a

Biotic community	Range of mean annual precipitation (mm)
Mohave desertscrub	40-255
Sonoran desertscrub	125-305
California coastal scrub and chaparral	125-760
California valley grassland	150-405
Chihuahuan desertscrub	190-305
Pacific slope thornscrub	205-635
Great Basin conifer woodland	250-560
Semidesert grassland	255-405
Plains grassland-shortgrass	300-510
Encinal evergreen woodland	305-890
Interior chaparral	380-635
Tamaulipan thornscrub	380-635
Plains grassland-midgrass and tallgrass	380-1,015
Montane conifer forest	460-760
Subalpine conifer woodland	635-1,000
Tamaulipan semi-deciduous forest	635-1015
Gulf coastal grassland	750-1,500
Southeastern deciduous and evergreen forest—balcones mixed evergreen woodland	760-1,015
Southeastern deciduous and evergreen forest—oak-pine-hickory	1,015-1,525
Veracruz cloud forest	1,900-5,080

^a Compiled from D. Brown, pers. comm.; Brown et al. 2007, and Brown 1994.

Pacific slope thornscrub, and Veracruz cloud forest. Some of these communities average >70% of their precipitation in late spring to late summer: Tamaulipan semi-deciduous forest and Tamaulipan thornscrub. A few biotic communities experience a bimodal pattern of rainfall—interior chaparral (winter and summer monsoons with little rain in April–June) and Sonoran desertscrub (October–March and June–August); D. Brown, pers. comm.; Brown 1994).

The growing season, roughly defined as the mean number of days with temperatures >0°C (Brown 1994), varies widely in the borderlands. Extremely short growing seasons (<100 d) are found in subalpine conifer forest and montane conifer forest. Relatively short growing seasons (100–200 d) are recorded in plains grassland and Great Basin conifer woodland. Relatively long growing seasons (200–350 d) are found in encinal evergreen woodlands, all southeastern deciduous and evergreen forest communities, semidesert, California valley, and gulf coastal grasslands, coastal scrub and chaparral communities, and Mohave and Chihuahuan desertscrub. Extremely long growing seasons (>350 d) are found in the thornscrub communities, much of the Sonoran desertscrub, and Tamaulipan semi-deciduous forest; freezing temperatures are very rare in the Veracruz cloud forest (D. Brown, pers. comm.; Brown 1994).

Annual variation in precipitation is high in much of the borderlands region. The timing and amount of rainfall can have major impacts on plant and animal communities, with some

extreme events such as severe drought and tropical storms and hurricanes having lasting effects (Swetnam and Betancourt 1998). Some of these communities experience rather extreme daily temperature variation; occasional severe freezes, particularly in subtropical areas, can have long-term effects on plant communities and the animals which inhabit them (Lonard and Judd 1991). The northward spread of many plants and animals over the last >100 yr (some discussed further in this volume) may be due to human-induced climate change and/or longer term climate cycles (Avisé and Walker 1998, Norwine and John 2007).

In spite of the great spatial and temporal variation in precipitation levels, the great majority of the borderlands landscape is comprised of extremely arid desertscrub, thornscrub, semidesert grassland, and chaparral communities with very low annual precipitation. Much of this same landscape has a relatively long to very long growing season. The result is a region that is warm/hot and generally dry. These characteristics define the biotic communities, explain the importance of riparian and wetland areas on the landscape, and determine how this region and its flora and fauna responds to environmental and anthropogenic change.

Elevations in the borderlands range from below sea level to >2,500 m. Low elevation areas are found along the coast of the Gulf of Mexico, the Gulf of California, and the Pacific Ocean, and at the Salton Sea (69 m below sea level). The highest elevations are found in the higher mountain ranges of the borderlands region—

Serranías del Burro, Sierra Madre Oriental, Guadalupe, Sacramento, Florida, Big Hatchet, Animas, Chiricahua, Huachuca, Santa Rita, Sierra Madre Occidental, and Sierra San Pedro Mártir. Much of the borderlands falls within the so-called sky islands region (Heald 1993), a complex of forested mountain islands isolated by large expanses of desert and grassland habitats. The topographic complexity of this basin and range landscape in a region that combines temperate and tropical climates, and that is at the intersection of diverse biotic communities, makes the borderlands a region of high biological diversity and therefore conservation interest (DeBano 1995).

The biodiversity and ecological value of the borderlands region is demonstrated by the fact that it includes three Mexican biosphere reserves, five US and nine Mexican national parks, 17 US national wildlife refuges, five US national monuments, five US national forests, four US national conservation areas, >30 Mexican Áreas de Importancia para la Conservación de las Aves (AICAS), and 35 US globally Important Bird Areas (IBAs), plus a great deal of public land administered by the USDI Bureau of Land Management (BLM), US Department of Defense military installations, state parks, and state wildlife management agencies.

BIRDS IN THE BORDERLANDS

The borderlands region supports an extremely diverse breeding avian community, as well as important communities during migration and winter seasons. What makes the borderlands particularly important is the number of bird species of conservation concern found there, using a variety of measures (Table 2). The borderlands region supports 18 species, subspecies, or distinct population segments listed as Threatened or Endangered under the US Endangered Species Act and 48 species listed as Amenazada (Threatened) or En Peligro de Extinción (Endangered) under Mexican Federal Regulations—NOM-059-SEMARNAT-2001 (SEMARNAT 2002). In addition, it supports 103 species or subspecies listed by the USDI Fish and Wildlife Service (USFWS) as a Bird of Conservation Concern in at least one US borderland BCR. At the present time no Mexican equivalent exists to the US Birds of Conservation Concern list (USDI Fish and Wildlife Service 2002). However, we look forward to the availability of substantial new information regarding conservation priorities for all birds from Mexico, and conservation of landbirds at a continental perspective (Canada, US, and Mexico) from

Partners in Flight, both in the near future. Looking specifically at landbird communities, most of the region falls within the southwest avifaunal biome identified in the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004). Forty-two of the 100 national watch list species (landbirds) are found in this southwestern biome during the breeding and/or winter season, along with another 16 national stewardship species. The majority of watch list species with declining trends or high threats in this biome are riparian or grassland species; however, we lack adequate population trend information for 37 of these species of continental importance (Rich et al. 2004). The rugged, remote, hot, and arid nature of this region is one of the primary reasons for this lack of information. We hope that the information in this volume will contribute to our knowledge of some of these species of conservation concern.

We have chosen four general areas of focus for this volume—new information about bird distribution and abundance; information about population trends and ecology of riparian and wetland birds; information about population trends and ecology of grassland birds; and information about new technology applications and bird conservation planning.

Information about bird abundance and distribution in the borderlands region is particularly valuable in providing baseline data as this region faces increasing habitat loss or degradation due to agricultural and suburban/urban development, and land and water management practices. It is also of interest as we try to understand, predict, and document the effects of global climate change on avian communities and their habitats, as well as make management recommendations to address these threats. Several papers in this section present information on distribution, status, and recent changes in bird populations in the borderlands region. Brush summarizes short-term changes in the breeding avifauna in the rapidly urbanizing Lower Rio Grande Valley since the turn of the 21st century, showing that certain temperate and tropical species are increasing while others have declined. Wauer and Flippo document the changes in the breeding avifauna of Big Bend National Park over the last century, identifying recent arrivals, populations that have increased, declined, or were extirpated, as well as some species whose status is uncertain. Flesch's work provides valuable data for northern Sonora, a region with limited information about the distribution and abundance of breeding birds; he makes interesting connections between avian species richness and the number of vegetation communities present. Collins and Palacios

TABLE 2. BIRD SPECIES OF CONCERN IN THE US-MEXICO BORDERLANDS REGION (FOUND WITHIN APPROXIMATELY 325 KM OF THE BORDER AT SOME SEASON IN THEIR LIFE CYCLE—BREEDING, MIGRATION, OR WINTER). SPECIES LISTED BY THE US BIRDS OF CONSERVATION CONCERN (BCC) 2002 (USDI FISH AND WILDLIFE SERVICE 2002), THE US ENDANGERED SPECIES ACT (ESA), AND THE NORMA OFICIAL MEXICANA (NOM) (SEMARNAT 2002).

Species	USFWS and BCC ^a	ESA ^b	NOM ^c	Notes ^d
Muscovy Duck (<i>Cairina moschata</i>)			E	
Mallard (<i>Anas platyrhynchos</i>)			T*	* <i>A. p. diazi</i>
Mottled Duck (<i>Anas fulvigula</i>)			T	
Masked Duck (<i>Nomonyx dominicus</i>)			T	
Crested Guan (<i>Penelope purpurascens</i>)			T	
Great Curassow (<i>Crax rubra</i>)			T	
Northern Bobwhite (<i>Colinus virginianus</i>)		E*	E*	* <i>C. v. ridgewayi</i>
Black-footed Albatross (<i>Phoebastria nigripes</i>)	X		T	
Black-vented Shearwater (<i>Puffinus opisthomelas</i>)			E	
Leach's Storm-petrel (<i>Oceanodroma leucorhoa</i>)			E*	* <i>O. l. willetti</i>
Ashy Storm-Petrel (<i>Oceanodroma homochroa</i>)			T	
Black Storm-Petrel (<i>Oceanodroma melania</i>)			T	
Least Storm-Petrel (<i>Oceanodroma microsoma</i>)			T	
Brown Pelican (<i>Pelecanus occidentalis</i>)		E*		* all populations except Atlantic coast, Florida, Alabama
American Bittern (<i>Botaurus lentiginosus</i>)	X		T	
Reddish Egret (<i>Egretta rufescens</i>)	X			
White Ibis (<i>Eudocimus albus</i>)	X			
California Condor (<i>Gymnogyps californianus</i>)		E		
Swallow-tailed Kite (<i>Elanoides forficatus</i>)	X			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)		T*	E	* recently delisted in US; but recent court order has reinstated the desert DPS in central Arizona
Northern Harrier (<i>Circus cyaneus</i>)	X			
Northern Goshawk (<i>Accipiter gentilis</i>)	X		T	
Crane Hawk (<i>Geranospiza caerulescens</i>)			T	
Common Black-Hawk (<i>Buteogallus anthracinus</i>)	X			
Harris's Hawk (<i>Parabuteo unicinctus</i>)	X			
Solitary Eagle (<i>Harpyhaliaetus solitarius</i>)			E	
Gray Hawk (<i>Buteo nitidus</i>)	X			
Swainson's Hawk (<i>Buteo swainsoni</i>)	X			
White-tailed Hawk (<i>Buteo albicaudatus</i>)	X			
Ferruginous Hawk (<i>Buteo regalis</i>)	X			
Golden Eagle (<i>Aquila chrysaetos</i>)			T	
Ornate Hawk-Eagle (<i>Spizaetus ornatus</i>)			E	
Aplomado Falcon (<i>Falco femoralis</i>)		E*	T	* <i>F. f. septentrionalis</i>
Peregrine Falcon (<i>Falco peregrinus</i>)	X	E*		* recently delisted
Prairie Falcon (<i>Falco mexicanus</i>)	X		T	
Black Rail (<i>Laterallus jamaicensis</i>)	X		E*	* <i>L. j. coturniculus</i>
Clapper Rail (<i>Rallus longirostris</i>)		E*	T**/E***	* <i>R. l. yumanensis</i> , <i>R. l. levipes</i> and <i>R. l. obsoletus</i> ** <i>R. l. yumanensis</i> *** <i>R. l. levipes</i>
Whooping Crane (<i>Grus americana</i>)		E	E	
American Golden-Plover (<i>Pluvialis dominica</i>)	X			
Snowy Plover (<i>Charadrius alexandrinus</i>)	X	T*		* <i>C. a. nivosus</i>
Wilson's Plover (<i>Charadrius wilsonia</i>)	X			
Piping Plover (<i>Charadrius melodus</i>)		E*/T**	E	* Great Lakes breeding population; ** all the rest
Mountain Plover (<i>Charadrius montanus</i>)	X		T	
American Oystercatcher (<i>Haematopus palliatus</i>)	X			
Black Oystercatcher (<i>Haematopus bachmani</i>)	X			
Whimbrel (<i>Numenius phaeopus</i>)	X			
Long-billed Curlew (<i>Numenius americanus</i>)	X			
Hudsonian Godwit (<i>Limosa haemastica</i>)	X			

TABLE 2. CONTINUED.

Species	USFWS and BCC ^a	ESA ^b	NOM ^c	Notes ^d
Marbled Godwit (<i>Limosa fedoa</i>)	X			
Black Turnstone (<i>Arenaria melanocephala</i>)	X			
Red Knot (<i>Calidris canutus</i>)	X			
Stilt Sandpiper (<i>Calidris himantopus</i>)	X			
Short-billed Dowitcher (<i>Limnodromus griseus</i>)	X			
Least Tern (<i>Sternula antillarum</i>)	X*	E**	E**	* <i>S. a. athalassos</i> ** <i>S. a. brownii</i>
Gull-billed Tern (<i>Gelochelidon nilotica</i>)	X			
Black Tern (<i>Chlidonias niger</i>)	X			
Elegant Tern (<i>Thalasseus elegans</i>)	X			
Black Skimmer (<i>Rynchops niger</i>)	X			
Xantus's Murrelet (<i>Synthliboramphus hypoleucus</i>)	X	C	E	
Craveri's Murrelet (<i>Synthliboramphus craveri</i>)			T	
Cassin's Auklet (<i>Ptychoramphus aleuticus</i>)	X		T*	* <i>P. f. aleuticus</i>
Red-billed Pigeon (<i>Patagioenas flavirostris</i>)	X			
Green Parakeet (<i>Aratinga holochlora</i>)			E*/T**	* <i>A. h. brewsteri</i> ** rest of the species
Military Macaw (<i>Ara militaris</i>)			E	
Thick-billed Parrot (<i>Rhynchopsitta pachyrhyncha</i>)			E	
Maroon-fronted Parrot (<i>Rhynchopsitta terrisi</i>)			T	
Red-crowned Parrot (<i>Amazona viridigenalis</i>)			E	
Yellow-headed Parrot (<i>Amazona oratrix</i>)			E	
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	X	C*		* western US DPS
Flammulated Owl (<i>Otus flammeolus</i>)	X			
Whiskered Screech-Owl (<i>Megascops trichopsis</i>)	X			
Ferruginous Pygmy-Owl (<i>Glaucidium brasilianum</i>)	X*		T*	<i>G. b. cactorum</i> recently delisted
Elf Owl (<i>Micrathene whitneyi</i>)	X			
Burrowing Owl (<i>Athene cunicularia</i>)	X			
Spotted Owl (<i>Strix occidentalis</i>)	X*	T**	T***	* <i>S. o. occidentalis</i> ** <i>S. o. lucida</i> *** entire species
Short-eared Owl (<i>Asio flammeus</i>)	X			
Black Swift (<i>Cypseloides niger</i>)	X			
Broad-billed Hummingbird (<i>Cynanthus latirostris</i>)	X			
Buff-bellied Hummingbird (<i>Amazilia yucatanensis</i>)	X			
Lucifer Hummingbird (<i>Calothorax lucifer</i>)	X			
Costa's Hummingbird (<i>Calypte costae</i>)	X			
Elegant Trogon (<i>Trogon elegans</i>)	X			
Eared Quetzal (<i>Euptilotis neoxenus</i>)			T	
Lewis's Woodpecker (<i>Melanerpes lewis</i>)	X			
Gila Woodpecker (<i>Melanerpes uropygialis</i>)	X			
Arizona Woodpecker (<i>Picoides arizonae</i>)	X			
Gilded Flicker (<i>Colaptes chrysoides</i>)	X			
Northern Beardless-Tyrannulet (<i>Camptostoma imberbe</i>)	X			
Greater Pewee (<i>Contopus pertinax</i>)	X			
Willow Flycatcher (<i>Empidonax traillii</i>)		E*		* <i>E. t. extimus</i>
Buff-breasted Flycatcher (<i>Empidonax fulvifrons</i>)	X			
Rose-throated Becard (<i>Pachyrhamphus aglaiae</i>)	X			
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	X	E*		* <i>L. l. mearnsi</i>
Bell's Vireo (<i>Vireo bellii</i>)	X	E*	T*	* <i>V. b. pusillus</i>
Black-capped Vireo (<i>Vireo atricapilla</i>)		E	E	
Gray Vireo (<i>Vireo vicinior</i>)	X			
Island Scrub-Jay (<i>Aphelocoma insularis</i>)	X			
Clark's Nutcracker (<i>Nucifraga columbiana</i>)			E	
Verdin (<i>Auriparus flaviceps</i>)	X			
Cactus Wren (<i>Campylorhynchus brunneicapillus</i>)	X			
Sedge Wren (<i>Cistothorus platensis</i>)	X			
California Gnatcatcher (<i>Polioptila californica</i>)		T*	T	* <i>P. c. californica</i>
Bendire's Thrasher (<i>Toxostoma bendirei</i>)	X			
Curve-billed Thrasher (<i>Toxostoma curvirostre</i>)	X			

TABLE 2. CONTINUED.

Species	USFWS and BCC ^a	ESA ^b	NOM ^c	Notes ^d
Crissal Thrasher (<i>Toxostoma crissale</i>)	X			
Le Conte's Thrasher (<i>Toxostoma lecontei</i>)	X			
Sprague's Pipit (<i>Anthus spragueii</i>)	X			
Olive Warbler (<i>Peucedramus taeniatus</i>)	X			
Colima Warbler (<i>Vermivora crissalis</i>)	X			
Tropical Parula (<i>Parula pitiayumi</i>)	X			
Yellow Warbler (<i>Dendroica petechia</i>)	X*			* <i>D. p. sonora</i>
Black-throated Gray Warbler (<i>Dendroica nigrescens</i>)	X			
Golden-cheeked Warbler (<i>Dendroica chrysoparia</i>)		E	T	
Grace's Warbler (<i>Dendroica graciae</i>)	X			
MacGillivray's Warbler (<i>Oporornis tolmiei</i>)			T	
Common Yellowthroat (<i>Geothlypis trichas</i>)	X*			* <i>G. t. sinuosa</i>
Altamira Yellowthroat (<i>Geothlypis flavovellata</i>)			T	
Red-faced Warbler (<i>Cardellina rubrifrons</i>)	X			
Spotted Towhee (<i>Pipilo maculatus</i>)	X*			* <i>P. m. clementae</i>
Rufous-winged Sparrow (<i>Aimophila carpalis</i>)	X			
Cassin's Sparrow (<i>Aimophila cassinii</i>)	X			
Botteri's Sparrow (<i>Aimophila botterii</i>)	X			
Worthen's Sparrow (<i>Spizella wortheni</i>)			T	
Black-chinned Sparrow (<i>Spizella atrogularis</i>)	X			
Sage Sparrow (<i>Amphispiza belli</i>)		T*		* <i>A. b. clementae</i>
Lark Bunting (<i>Calamospiza melanocorys</i>)	X			
Savannah Sparrow (<i>Passerculus sandwichensis</i>)			T*	* <i>P. s. beldingi</i>
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	X			
Baird's Sparrow (<i>Ammodramus bairdii</i>)	X			
Seaside Sparrow (<i>Ammodramus maritimus</i>)	X*			* <i>A. m. sennetti</i>
Song Sparrow (<i>Melospiza melodia</i>)	X*			* <i>M. m. graminea</i>
Harris's Sparrow (<i>Zonotrichia querula</i>)	X			
McCown's Longspur (<i>Calcarius mccownii</i>)	X			
Chestnut-collared Longspur (<i>Calcarius ornatus</i>)	X			
Pyrrhuloxia (<i>Cardinalis sinuatus</i>)	X			
Varied Bunting (<i>Passerina versicolor</i>)	X			
Painted Bunting (<i>Passerina ciris</i>)	X			
Dickcissel (<i>Spiza americana</i>)	X			
Tricolored Blackbird (<i>Agelaius tricolor</i>)	X			
Orchard Oriole (<i>Icterus spurius</i>)	X			
Hooded Oriole (<i>Icterus cucullatus</i>)	X			
Altamira Oriole (<i>Icterus gularis</i>)	X			
Audubon's Oriole (<i>Icterus graduacauda</i>)	X			
Lawrence's Goldfinch (<i>Carduelis lawrencei</i>)	X			

^a An X in the USFWS-BCC column means that this species is listed in at least one borderlands bird conservation region and is found in the borderlands portion of that region. Note: BCC list does not include species listed as Endangered under the ESA unless it is a population or subspecies not included under the ESA that is of concern.

^b In the ESA column, E = Endangered, T = Threatened, and C = Candidate species.

^c In the NOM column, the two categories most similar to the ESA were selected, E = Endangered (in Spanish, P = En Peligro de Extinción), and T = Threatened (in Spanish, A = Amenazada).

^d Provides additional information about listed subspecies or population for columns marked with an asterisk*; DPS = distinct population segment.

present information about the distribution and status of Royal Tern (*Thalasseus maximus*) in the borderlands along the Pacific coast; Royal Tern is a species listed as of moderate conservation concern in the North American Waterbird Conservation Plan (Kushlan et al. 2002).

In the arid southwestern borderlands region, where water is extremely limited, the presence of surface water and near-surface ground water provides valuable year-round habitats. Riparian woodlands support the highest diversity of landbird species of any habitat type in the region and provide critical habitat for

breeding species, as well as for migrating and wintering species from other regions (Rich et al. 2004). The region also includes a wide range of aquatic habitats that support a diverse array of waterbird and shorebird species, including some high-priority species (Brown et al. 2001, Kushlan et al. 2002). Understanding the ecology and population trends of bird species using these scarce but valuable habitats in an arid landscape is critical to management and conservation. In the section on population trends and ecology of riparian and wetland birds, Villaseñor-Gómez presents a study on

the importance of Sonoran riparian habitat for wintering birds; he found that riparian avian communities were different from communities in surrounding non-riparian habitats and that riparian habitat was particularly important for migratory species. Hinojosa-Huerta et al. present data on the avian community along the Colorado River, Mexico, and its habitat relationships; they found that surface water was the most important habitat feature related to avian species richness and density, and that in the breeding season, cottonwood and willow cover was also important. Hinojosa-Huerta et al., in another paper, present information about population trends of the Yuma Clapper Rail (*Rallus longirostris yumanensis*) in the Colorado River delta; this subspecies is listed as Threatened in Mexico and Endangered in the US (Table 2).

Endemic grassland bird populations have shown steeper, more consistent, and more widespread declines than any other guild of North American species (Knopf 1996). Peterjohn and Sauer (1999) found that 13 of 25 grassland bird species showed significant decreases in continental populations between 1966 and 1996, and only three species showed significant increases. The grasslands of the borderlands region support a high number of breeding species of conservation concern and provide critical wintering habitat for resident grassland birds and short-distance migrants from the northern prairies. These grasslands support the highest number of priority land-bird species with declining population trends of any southwestern habitat type (Rich et al. 2004). The section on population trends and ecology of grassland birds includes two papers about the wintering (non-breeding) ecology of grassland bird communities. Agudelo et al. present information about the responses of wintering grassland and shrubland birds to habitat fragmentation and shrub encroachment in the northern Chihuahuan Desert in New Mexico; they found that numbers of shrubs was the most consistent predictor of grassland bird abundance, with abundance being negatively correlated. Desmond et al. present a diet study of granivorous birds in the grasslands of southwestern New Mexico; they document the most important seeds in the seedbank and compare the most abundant and most preferred seeds in bird diets among species within and between sites. The section also contains a species-specific paper (Ruth) on the abundance and distribution of a subspecies

of Grasshopper Sparrow (*Ammodramus sava-narum ammoregus*) found only in the borderlands region; the species is a National Bird of Conservation Concern for USFWS in the Sierra Madre Occidental BCR (BCR 34) (Table 2) and the subspecies is listed as Endangered for the state of New Mexico.

The last section features two very different papers. Felix et al. present information about bird migration patterns in the borderlands region developed through the application of weather surveillance radar technology and analyses. Radar technologies are being used in many ways to address management and conservation issues related to migratory wildlife (e.g., birds, bats, insects) and new applications show great promise (Ruth 2007). Finally, Mehlman describes the conservation by design framework used by The Nature Conservancy as a model for applied bird conservation planning in the borderlands region and elsewhere. This information is particularly important in light of the challenges posed by working cooperatively across borders for international conservation. The development of cross-border conservation efforts, through both the bird conservation initiatives (Partners in Flight, Waterbird Conservation for the Americas, North American Waterfowl Management Plan, US Shorebird Conservation Plan, and the North American Bird Conservation Initiative) and regional conservation initiatives in the borderlands (e.g., the Sonoran Joint Venture, the Rio Grande Joint Venture), demonstrates the need for us to understand how best to work across biological, geographic, political, and cultural boundaries to meet our common goals of bird conservation.

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