part of the valley. Previous surveys by the USFWS of the Holtville Main Drain reported as many as 12 Yuma clapper rails (5 pairs and 2 individuals) using this drain.

TABLE A-3
Number of Yuma Clapper Rails Found at Traditional Survey Locations at the Salton Sea and Surrounding Areas from 1994 to 2000

Location	1994	1995	1996	1997	1998	1999	2000
Salton Sea NWR Unit 1							
Trifollium 1 Drain	4	3	1	1	1	0	1
A-1 Pond	2	N/S	6	4	3	6	6
B-1 Pond	N/S	N/S	4	9	11	10	10
Reidman 3	7	8	17	N/S	N/S	2	1
Reidman 4	9	8	N/S	N/S	1	3	7
Bruchard Bay	7	6	3	5	3	0	0
New River Delta	7	0	1	0	0	0	N/S
Salton Sea NWR Unit 2 and Hazard							
HQ 'B' Pond	5	3	4	2	2	2	3
Union Pond	9	9	12	15	15	9	6
Barnacle Bar Marsh	N/S	0	0	2	0	2	1
McKindry Pond	N/S	N/S	N/S	0	0	2	N/S
Hazard 5	3	N/S	N/S	N/S	N/S	N/S	N/S
Hazard 6	23	22	18	11	11	12	10
Hazard 7	6	3	10	7	5	6	10
Hazard 8 (east) (south)	2	N/S	N/S	N/S	N/S	2	1
Hazard 9 and Ditch	3	4	3	3	3	2	4
Hazard 10	7	7	N/S	N/S	2	6	6
Alamo River (east and delta)	5	4	4	4	4	3	4
Imperial Wildlife Area Wister Unit	309	307	239	211	185	191	N/A
Off-Refuge Areas							
Lack and Grumble	2	3	3	2	2	2	0
'T' Drain Marsh	N/S	N/S	10	15	10	6	6
Walt's Club (McDonald Rd.)	N/S	N/S	N/S	N/S	N/S	2	N/S
Barnacle Beach	N/S	20	20	7	8	3	N/S
Holtville Main Drain	N/S	12	10	5	6	5	1
Boyle and Martin Road	1	N/S	N/S	N/S	N/S	N/S	N/S

Return to Contents

TABLE A-3
Number of Yuma Clapper Rails Found at Traditional Survey Locations at the Salton Sea and Surrounding Areas from 1994 to 2000

Location	1994	1995	1996	1997	1998	1999	2000
Total On-Refuge	408	384	322	274	246	258	N/A
Total Off-Refuge	3	35	43	29	26	18	7

Source: USFWS unpublished data
N/S: No surveys
N/A: Not available

Greater Sandhill Crane (*Grus canadensis tabida*)

Range and Distribution

With the exception of those that nest in Siberia or Cuba, sandhill cranes are restricted to North America. Six subspecies are currently known. The lesser (*G. c. canadensis*), Florida (*G. c. pratensis*), and greater (*G. c. tabida*) are migratory. Historically, the migratory subspecies nested in wetland habitats over much of eastern Siberia, Alaska, Canada, and the northern U.S. as far south as northern Arizona, Utah, western Colorado, central Nebraska, northern and eastern Iowa, southern Illinois, central Indiana and Ohio, and the southern borders of Lake St. Claire and Lake Erie (Drewien and Lewis 1987).

Several populations of greater sandhill cranes (*G. c. tabida*) are now recognized in North America. The eastern population nests in Minnesota, Michigan, and Wisconsin and migrates through Illinois, Indiana, Ohio, Tennesee, Kentucky, and Georgia. The Rocky Mountain population nests from northwestern Colorado and northeastern Utah northward through eastern Idaho, western Wyoming, and southwestern Montana, wintering in New Mexico. The Central Valley population nests in eastern and central Oregon and northeastern California and winters in the Central Valley of California south to Tulare County. The LCR Valley population nests in northeastern Nevada and northwestern Utah and southwestern Idaho. This population winters along the Colorado River with a major wintering site near Poston, Arizona.

Population Status and Threats

The eastern population of greater sandhill cranes contains some 15,000 birds and is increasing (Lovvorn and Kirkpatrick 1982). The Rocky Mountain population consists of approximately 16,500 birds (Drewien and Lewis 1987), and its future seems secure because considerable portions of the nesting grounds are in publicly owned national forests, parks, and wildlife refuges. The Central Valley population is estimated at more than 3,000 birds and has been static for some time (Drewien and Lewis 1987). The LCR Valley population is small at about 1,500 birds and appears to be increasing (Drewien and Lewis 1987). Sandhill cranes are susceptible to nest disturbance. No other threats to this species have been identified.

Habitat Requirements

Greater sandhill cranes breed in open, isolated wetlands surrounded by shrubs or forestland. Diverse structural and compositional vegetation, including species such as

bulrush, cattails, and burreed, are used for nesting sites (Tacha et al. 1992). Habitats such as meadows, irrigated pastures and fields, bogs, fens, and marshes are used as foraging areas. Wintering populations roost in shallow open water, marshes, rivers, and lakes where they flock together at night for safety (Eckert and Karalus 1981). Wintering populations feed primarily in irrigated croplands and pastures. Moist sites are commonly used, but this species also feeds on dry plains far from water. Food items include crops such as wheat, sorghum, barley, oats, corn, and rice as well as insects, snails, reptiles, small mammals, seeds, and berries (Tacha et al. 1992).

Habitat in the Proposed Project Area

In the proposed project area, sandhill cranes find suitable roosting habitat in the managed wetlands of the state and federal wildlife refuges and private duck clubs. Sandhill cranes are known to winter at roost sites located in shallow flooded ponds of a private duck club near Imperial (Radke 1992). Sandhill cranes have also been observed at other private ponds in the Imperial Valley, sometimes in association with white-faced ibis. Wheat and sudangrass fields as well as other agricultural crops may be used for foraging.

Proposed Project Area Occurrence

Both the greater and lesser subspecies have been detected in Imperial Valley, with most observations being of the greater subspecies. Greater sandhill cranes regularly winter in the Imperial Valley although in small numbers of 200 to 300 individuals (IID 1994). A flock of approximately 100 to 200 birds regularly winters in the area between Brawley and El Centro, primarily in the area east of Highway 86 (IID and BLM 1987).

Western Snowy Plover *(Charadrius alexandrinus nivosus)*

Range and Distribution

The western snowy plover is one of two subspecies of snowy plover recognized in North America. It breeds on the Pacific Coast from southern Washington to southern Baja California, Mexico, and the interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma, north-central Texas, coastal areas of extreme southern Texas, and possibly, extreme northeastern Mexico (USFWS 1993c). The western snowy plover is a resident throughout most of its range, except populations on the northern Pacific Coast that withdraw south in winter (Terres 1980). In California, the inland wintering populations are concentrated in the San Joaquin Valley and at the Salton Sea, with small numbers of birds occurring at alkali lakes and sewage ponds in the Great Basin, Mojave, and Colorado Deserts (Shuford et al. 1995).

Population Status and Threats

The Pacific Coast population of the western snowy plover is considered demographically isolated from populations of the western snowy plover breeding in interior regions (USFWS 1993c). The Pacific Coast population of western snowy plovers has declined precipitously and is listed as federally threatened. The decline of this population is attributed to the loss of suitable breeding habitat and by disturbance and destruction of nests in the species' remaining habitat (USFWS 1993c; Ehrlich et al. 1992). The loss of breeding habitat and disturbance continue to threaten this species. The coastal population in the U.S. is estimated

at 1,900 birds (Shuford et al. 1995). The coastal population in Mexico was determined to be 1,344 birds occurring along barrier beaches and salt flats along the peninsula in Baja California (Palacios et al. 1994). The interior population of western snowy plovers has also declined, but not as severely as the coastal populations. It is estimated that the interior population in Washington, Oregon, and California is 7,900 birds (Page et al. 1991). The inland snowy plover population in California is estimated at between 300 and 500 birds (Shuford et al. 1995).

Habitat Requirements

Western snowy plovers are found on beaches; open mudflats; salt pans and alkaline flats; and sandy margins of rivers, lakes, and ponds. Interior populations favor shores of salt or alkaline lakes, evaporation ponds, and sewage ponds (Shuford et al. 1995; Terres 1980; Kaufmann 1996; and Ehrlich et al. 1988). Western snowy plovers forage in plowed agricultural fields and on exposed mudflats and shorelines (Rosenberg et al. 1991). At inland sites, snowy plovers forage on the ground primarily for insects, including various flies and beetles (Ehrlich et al. 1988; Kaufmann 1996). Western snowy plovers nest on undisturbed flat, sandy, or gravelly beaches. Snowy plovers tend to be site faithful, with the majority of birds returning to the same breeding locations in subsequent years (USFWS 1993c).

Habitat in the Proposed Project Area

Nesting habitat for the western snowy plover in the proposed project area is limited to the shoreline of the Salton Sea where they are known to nest on undisturbed, flat, sandy, or gravelly beaches (Salton Sea Authority and Reclamation 2000). For foraging, snowy plovers use the shoreline of the Salton Sea but may also forage in agricultural fields in the valley.

Proposed Project Area Occurrence

Western snowy plover are year-round breeding residents and winter migrants at the Salton Sea. The Salton Sea supports the largest wintering population of snowy plovers in the interior western U.S. and is one of only a few key breeding populations in interior California (Shuford et al. 1999). The summer breeding population typically consists of more than 200 individuals (IID 1994 and Shuford et al. 1995).

Mountain Plover *(Charadrius montanus)*

Range and Distribution

Mountain plovers breed from the high plains and plateaus of the central U.S. south through eastern New Mexico and western Oklahoma to western Texas. They winter from central California, western and southern Arizona, and southern Texas south to Baja California, Mexico, and central Mexico. Currently, northeast Colorado is the breeding stronghold of this species with only small breeding populations remaining in Montana, Wyoming, Oklahoma, and New Mexico (Knopf 1996; Terres 1980; and Kaufmann 1996).

In California, they are fairly common but very local winter visitors, with the largest numbers occurring in grasslands and agricultural areas of interior California. Winter flocks regularly occur on the Carrizo Plain in San Luis Obispo County, the western San Joaquin

Valley, Antelope Valley, and Imperial Valley. This species also occurs along the Colorado River, mainly near Blythe (Garrett and Dunn 1981).

Population Status and Threats

Although once abundant throughout its range, the mountain plover is believed to have suffered a 61 percent population decrease between 1966 and 1987. Mountain plovers have disappeared from much of their former breeding range because of agricultural conversion of former shortgrass prairie. Populations of this species now appear to be relatively small and highly restricted in a patchy distribution. In 1995, the North American population of this species was estimated at 8,000 to 10,000 birds (Knopf 1996). The decline of the mountain plover is primarily attributed to human-related disturbances on breeding grounds, including the loss of native habitat to agriculture and urbanization, hunting, range management, gas and oil development, mining, prairie dog control, environmental contamination, and vehicle disturbance (Leachman and Osmundson 1990; Knopf 1996). Habitat loss remains the primary threat to this species.

Habitat Requirements

Mountain plovers are associated with dry, open plains. They nest primarily on shortgrass prairie and grazed grassland. In winter, they occur in flocks of 15 to several hundred individuals, feeding on desert flats, alkaline flats, grazed pastures, plowed ground, and sprouting grain fields (Knopf 1996; Hayman et al. 1986; Kaufmann 1996; and Terres 1980). Mountain plovers eat mostly insects, including grasshoppers, beetles, flies, and crickets (Kaufmann 1996). A sample of six plover stomachs contained beetles and larva, weevils, earwigs, and maggots (Rosenberg et al. 1991). On their wintering grounds, mountain plovers have been successfully attracted to burned grasslands for use as night roost sites (Knopf 1996).

Habitat in the Proposed Project Area

In the Imperial Valley, wintering flocks of mountain plovers frequent bare plowed agricultural fields that have not been irrigated. Bermuda grass crops are also used (Reclamation and IID 1994).

Proposed Project Area Occurrence

Mountain plover is a common winter visitor to the Salton Sea Basin. The Imperial Valley has one of the mountain plover's largest wintering populations in the Pacific Flyway, with between 700 and 1,000 individuals (USFWS 1999). During February 1999 surveys, 2,486 individuals were counted in the valley. This number represents approximately half of the California population and approximately one-quarter of the North American population (Point Reyes Bird Observatory 1999).

Long-billed Curlew (*Numenius americanus*)

Range and Distribution

The long-billed curlew nests from southern Canada south to Utah, New Mexico, and Texas, and formerly in Kansas, Iowa, Minnesota, Wisconsin, and Illinois. The species winters in California, western Nevada, Arizona, Texas, and Louisiana south to Baja California and

Guatemala, returning north in March to April. In California, the long-billed curlew is an uncommon to fairly common breeder from April to September in wet meadow habitat in Siskiyou, Modoc, and Lassen Counties. There is one recent nesting record for Owens Valley, Inyo County (CDFG 1999a). This species is uncommon to locally very common as a winter visitor along most of the California coast and in the Central and Imperial Valleys, where the largest flocks occur. Small numbers of nonbreeders remain on the coast in summer, and larger numbers remain in some years in the Central Valley (Cogswell 1977; Page et al. 1979; and Garrett and Dunn 1981).

Population Status and Threats

The long-billed curlew is currently on the Audubon Society's Blue List because of declining numbers, probably caused by agricultural practices (Tate 1981). This species once nested throughout the grasslands of the west, east to the prairies of southern Wisconsin and Illinois, but disappeared from many places with the plowing of plains and prairies for agriculture in the 1930s. The species was also decimated by hunters along the Atlantic coast in the fall. The long-billed curlew is a proposed candidate for federal endangered status. Breeding range has retracted considerably in the last 80 years, but western populations have not decreased as much as those in the eastern U.S. Agricultural conversion and loss of breeding habitat continue to threaten this species.

Habitat Requirements

The long-billed curlew breeds on grazed, mixed-grass, and shortgrass prairies. Habitats on gravelly soils and gently rolling terrain are favored over others (Stewart 1975). Nests are usually located in relatively flat areas with grass cover 4 to 8 inches high. The nest is a sparsely lined depression, often remote from water (Palmer 1967). Nests are often placed close to cover such as a grass clump, rock, or soil mound (Johnsgard 1981). In California, the long-billed curlew nests on elevated interior grasslands and wet meadows, usually adjacent to lakes or marshes (Grinnell and Miller 1944). Upland shortgrass prairies and wet meadows are used for nesting; coastal estuaries, open grasslands, and croplands are used in winter. When migrating, the curlew frequents shores of lakes, rivers, salt marshes, and sandy beaches.

Habitat in the Proposed Project Area

The Salton Sea and adjacent wetlands, state and federal wildlife refuges, private duck clubs, and areas along the New and Alamo Rivers may provide suitable habitat for this species. Agricultural fields of alfalfa, wheat, and sudangrass may also provide habitat and foraging areas for the long-billed curlew.

Proposed Project Area Occurrence

The long billed curlew is a common, year-round resident at the Salton Sea with large flocks of as many as 1,000 birds observed during the winter. Summer numbers are lower, with flocks of around 150 birds (CDFG 1970).

Black Tern *(Childonias Niger)*

Range and Distribution

In Canada, the black tern breeds from southwestern and east-central British Columbia and the southwestern portion of the Northwest Territories southward to Southern Quebec and New Brunswick (DeGraaf and Rappole 1995). Its breeding range extends to California, Utah, Nebraska, Illinois, and Maine in the U.S. (DeGraaf and Rappole 1995). Nonbreeding birds may occur along the Pacific Coast and in eastern North America to the Gulf Coast. In winter, black terns migrate to Central and South America. In California, nesting populations occur only in the northeastern part of the state (Ehrlich et al. 1992).

Population Status and Threats

Black terns were once a very common spring and summer visitor to fresh emergent wetlands of California (Grinnell and Miller 1944). Numbers have declined throughout its range, especially in the Central Valley (Cogswell 1977). Currently, it is a fairly common migrant and breeder on wetlands of the northeastern plateau area but is absent from some historic nesting localities, such as Lake Tahoe (Cogswell 1977). Despite the presence of apparently suitable habitat in rice farming areas, breeding is questionable in the Central Valley (Gaines 1974). It remains fairly common in spring and summer at the Salton Sea, but evidence of nesting there is lacking (Garrett and Dunn 1981).

Populations in North America have declined sharply since the 1960s. Contributing factors are believed to include loss of wetland habitat, runoff of farm chemicals into wetlands resulting in reduced hatching success, and loss of food supply on wintering grounds due to overfishing (Kaufman 1996). Campgrounds and marinas on the shorelines of large lakes and wetlands also may be partially responsible for population declines (Marcot 1979). These factors continue to threaten populations of this species.

Habitat Requirements

For breeding, black terns are associated with freshwater marshes and lakes, but favor coastal waters during migration. They prefer freshwater marshes with extensive marsh vegetation intermixed with open water. Black terns typically nest in small, scattered colonies (CDFG 1999a). The nest site is situated low in the marsh on a floating mat of vegetation or debris, or on the ground close to the water (Kaufman 1996). The terns may also take over coot and grebe nests for nesting.

Black terns forage primarily on insects and fish, but tadpoles, frogs, spiders, earthworms, and crustaceans are also taken. Their diet shifts seasonally with insects forming a greater portion of the diet during the breeding season, and small fish become the predominant prey during migration and in winter (Kaufman 1996). Black terns forage by hovering above wet meadows and fresh emergent wetlands. Insects are captured in the air or are plucked from the water surface or vegetation (CDFG 1999a). They also frequent agricultural fields for foraging.

Habitat in the Proposed Project Area

Potential nesting habitat occurs in the proposed project area in the wetlands along the Salton Sea and in the managed wetlands of the state and federal wildlife refuges such that

nesting could be supported in the future. Beaches or mudflats of the Salton Sea and agricultural fields in the valley are known foraging areas in the proposed project area.

Proposed Project Area Occurrence

Black terns are common at the Salton Sea during the spring, summer, and fall; they rarely occur at the sea during the winter (USFWS 1997b). In the Imperial Valley, black terns are common residents and migrants with up to about 10,000 individuals inhabiting the valley at some times (IID 1994). Although they occur at the Sea throughout the summer, there is no evidence that nesting takes place (CDFG 1999a). The Salton Sea watershed is thought to be the most important staging area for black terns in the Pacific Flyway (Shuford et al. 1999).

Laughing Gull (*Larus atricilla*)

Range and Distribution

In the U.S., laughing gulls range along the Atlantic coast from Nova Scotia south to Florida and along the Gulf Coast. In the western U.S., the species generally occurs along the coast in the extreme southwest, with its range extending southward into Baja California and Mexico through Central America and the northern coast of South America. Laughing gulls also inhabit the West Indies (DeGraaf and Rappole 1995).

Population Status and Threats

The National Biological Survey shows laughing gulls to be increasing in most locations along the Gulf and Atlantic Coasts. Kaufman (1996) considers the current population of laughing gulls in North America to be stable. DeGraaf and Rappole (1995) consider the species common and showing a long-term increase.This species is susceptible to nest disturbance and predation. No other threats to this species have been identified.

Habitat Requirements

Laughing gulls are typically associated with coastal areas, frequenting salt marshes, coastal bays, beaches, and piers. They may also move farther inland and use rivers, fields, dumps, and lakes. The species nests in colonies on beaches in areas supporting grasses or shrubs. Nests are on the ground and consist of a scrape with a sparse lining or a shallow cup lined with grasses, sticks, and debris. Migration is primarily along the coast where birds roost on inland lakes, bays, estuaries, and the open ocean. Optimal habitat is sparse to dense vegetation that provides protection from predators as well as some protection from inclement weather (Burger 1996). Laughing gulls exploit a variety of food resources, but their diet primarily consists of crustaceans, insects, and fish.

Habitat in the Proposed Project Area

In the HCP area, laughing gulls are expected to principally occur at the Salton Sea. The shoreline of the Salton Sea provides suitable habitat for roosting and foraging. Nesting opportunities for laughing gulls have largely been eliminated due to rising water levels of the Salton Sea, resulting in the loss of islets used as nesting sites (Small 1994). Laughing gulls concentrate feeding along the water edge of the Salton Sea but may also use agricultural fields and managed wetlands in the valley as additional foraging areas (Burger 1996).

Proposed Project Area Occurrence

Laughing gulls are a common postbreeding visitor (up to 1,000 individuals) at the Salton Sea and previously nested in the area (USFWS 1997b; IID 1994). Most laughing gulls occur along the shoreline at the south end of the Salton Sea and occasionally in adjacent wetland habitats. The average seasonal population at the Salton Sea is around 400 to 500 birds (Small 1994).

Black Skimmer (*Rhynchops niger*)

Range and Distribution

Black skimmers range approximately from about Massachusetts on the Atlantic Coast south through the Gulf Coast and Central and South America to Argentina (DeGraaf and Rappole 1995). On the Pacific Coast, skimmers occur as far north as the Los Angeles, with breeding documented at the Salton Sea and in San Diego (Kaufman 1996). Its range in the west is currently expanding (Kaufman 1996).

Population Status and Threats

The population of black skimmers declined on the Atlantic Coast in the late 19th century as eggs were harvested and adults were killed for their feathers. Their numbers subsequently have recovered. Black skimmers have been expanding in the west, but nesting colonies are still sensitive to disturbance (Kaufman 1996). In California, nesting distribution is limited. Nesting colonies are located only at the Salton Sea, San Diego Bay, and the Bolsa Chica Refuge in Orange County (Salton Sea Authority and Reclamation 2000). Rising levels of the Salton Sea may threaten continued survival there (Grant and Hogg 1976; Garrett and Dunn 1981). High water levels threaten existing nest sites. Nesting colonies are vulnerable to human disturbance on mainland beaches (Terres 1980). When forced into low sites, entire colonies can be washed away by high tides (Pough 1951).

Habitat Requirements

Skimmers typically occur in coastal areas protected from open surf, such as lagoons, estuaries, inlets, and sheltered bays (Kaufman 1996). They nest in single-species colonies, often near nesting gulls or terns. This is evident at the Salton Sea where nesting colonies are almost always near nesting gull-billed terns or Caspian terns (Molina 1996). Nest sites are on gravel bars, low islands, or sandy beaches. Dredge spoils and dikes are also used for nesting. Skimmers use similar habitats for roosting. Because skimmers are sensitive to human disturbance, suitable nesting areas must be free from human disturbance (CDFG 1999a). The nest itself is simple scrape located above high water (Terres 1980).

Black skimmers begin arriving from wintering grounds in Mexico in April with numbers increasing through June. Upon arrival, skimmers form loose aggregations and often roost in areas that are subsequently used for nesting (Molina 1996). Nesting at the Salton Sea generally starts in June or later; rarely it has continued into October. Nesting dates are probably a function of the level of the sea since this determines the availability of nest sites (Garrett and Dunn 1981).

Skimmers forage on small fish, crustaceans, and aquatic insects. Prey are captured by skimming low over the surface of the water, scooping up fish and aquatic invertebrates. As

skimmers never dive for fish, only prey that occurs in surface waters is accessible. Skimmers concentrate foraging activities in calm shallow waters and commonly forage in groups.

Habitat in the Proposed Project Area

In the proposed project area, habitat for the black skimmer is restricted to the Salton Sea and Ramer Lake. At the Salton Sea, black skimmers forage over open water and along beaches and mudflats (Salton Sea Authority and Reclamation 2000). Often, they concentrate foraging where the New and Alamo Rivers as well as agricultural drains empty into the Salton Sea (Garrett and Dunn 1981). Skimmers nest on bare earthen slopes, terraces, and levees along the Salton Sea. Often nests are placed upslope of barnacle bars, 3 to 4 meters from the edge of the water to avoid inundation by wave action (Molina 1996).

Proposed Project Area Occurrence

The black skimmer is a breeding resident at the Salton Sea, with a population of 600 individuals (IID 1994). In some years, the breeding population of skimmers at the Salton Sea may constitute 40 percent of the breeding population in California (Shuford et al. 1999). Skimmer colonies form at the north and south end of the Salton Sea in most years (Shuford et al. 1999). Molina (1996) monitored nesting success of skimmers at the Salton Sea during 1993 and 1995. Hatch rate was found to vary substantially among these years. Nesting success was lowest in 1994 when only 27 percent of the nests were successful as compared to 1993 when 71 percent of the nests were successful.

Between 1991 and 1995, skimmers nested at seven sites. Locations of nesting colonies are Mullet Island, the Whitewater River delta, Morton Bay, Rock Hill, Obsidian Butte, Ramer Lake, and Elmore Ranch (Molina 1996). The Rock Hill site occurs on the Salton Sea NWR and is the only nesting site under active management. However, the suitability of nesting habitat at Rock Hill may be compromised by the heavy recreational use this area receives (Molina 1996). Many of the nesting sites are susceptible to wave action, erosion, and inundation; the past and continuing increase in the elevation of the Salton Sea may have inundated suitable nesting areas (Molina 1996).

California Least Tern (*Sterna antillarum browni*)

Range and Distribution

The discontinuous breeding range of the California least tern extends from Baja California, Mexico, to San Francisco Bay. The majority of the population apparently nests in coastal Southern California. Two nesting colonies are also known in the San Francisco Bay area.

Population Status and Threats

The California least tern was formerly widespread and “common to abundant” (Grinnell and Miller 1944) along the central and Southern California coast. Human use of beaches for recreational, residential, and industrial development has severely diminished the availability of suitable nesting areas in California (Grinnell and Miller 1944; Garrett and Dunn 1981; and Ehrlich et al. 1992) and has led to isolated, small colony sites that artificially concentrate breeding terns. Episodic losses in least terns have occurred due to cold, wet weather; extreme heat; dehydration and starvation; unusually high surf or tides; the El Niño warm sea current; and human disturbance of least tern colonies (Massey 1988). California

least terns may also be susceptible to pesticide contamination and bioaccumulation (Boardman 1987a and 1987b). Habitat loss and human disturbance continue to threaten populations of this species.

The California least tern population declined to a known low of between 623 and 763 breeding pairs in the early 1970s (Bender 1974). Because of a variety of management efforts, the California least tern population has increased to an estimated California breeding population of about 2,160 pairs in 1992.

Habitat Requirements

California least terns nest in open sand, salt pans, or dried mudflats near lagoons or estuaries. They feed almost exclusively on small fish captured in shallow, nearshore areas, particularly at or near estuaries and river mouths (Massey 1974; Collins et al. 1979; Massey and Atwood 1981; Atwood and Minsky 1983; Atwood and Kelly 1984; Minsky 1984; and Bailey 1984). California least terns are opportunistic in their foraging strategy and known to take many different species of fish. They also take crustaceans and insects (Ehrlich et al. 1988).

Habitat in the Proposed Project Area

In the proposed project area, California least terns are known to occur only at the Salton Sea. Use of the sea is likely limited to foraging in the open water and resting on the shore (USFWS 1999). Mudflats along the shore of the Salton Sea may provide suitable resting areas and could be suitable for nesting, although nesting by California least terns is unknown at the Salton Sea. Shallow nearshore areas as well as shoreline pools formed by barnacle bars may be used for foraging.

Proposed Project Area Occurrence

The California least tern occurs at the Salton Sea only accidentally. Less than 10 records of this species exist at the Salton Sea NWR (USFWS 1997b). Nesting has not been reported, and based on the low level of use of the Salton Sea by California least terns, nesting is not currently expected.

Elegant Tern (*Sterna elegans*)

Range and Distribution

The elegant tern breeds along both coasts of Baja California, Mexico, and intermittently in northwestern Mexico and extreme southwestern California (DeGraaf and Rappole 1995). The elegant tern's range in North America is extremely limited; it occurs only in a few places in California, including the Salton Sea and San Diego Bay. In winter, it migrates to the west coast of South America (DeGraaf and Rappole 1995).

Population Status and Threats

Formerly, elegant terns were a rare and irregular postnesting visitor to coastal California (Grinnell and Miller 1944). During the 1950s, numbers increased; large flocks now can be seen in most years off the southern coast (Cogswell 1977). Elegant terns breed primarily in Mexico, but a nesting colony was established at San Diego Bay in 1959 (Cogswell 1977). This colony persisted and may have facilitated the recent range extension of nonbreeders

northward to the coast of central California (Cogswell 1977). More recently, in 1987, another breeding colony became established in Orange County (Kaufman 1996). However, the elegant tern is considered vulnerable in the U.S. due to the limited number of breeding sites (Kaufman 1996).

Habitat Requirements

The elegant tern typically inhabits inshore coastal water, bays, estuaries, and harbors. It forages for fish in shallow water areas (CDFG 1999a). It captures fish by diving into the water (Ehrlich et al. 1988; Scott 1987). When not foraging, elegant terns often congregate on beaches and mudflats (CDFG 1999a). Roosting occurs on high beaches.

The elegant tern nests in colonies often in association with other terns. In California, nesting colonies are often near Caspian tern colonies that may help deter predators (Kaufman 1996). Nest sites are a simple scrape typically located on upper beaches (about 60 feet from the water line), although the San Diego colony nests on dikes between salt ponds (CDFG 1999a). Elegant tern colonies are sensitive to disturbance, and nesting locations need to be free from human intrusion.

Habitat in the Proposed Project Area

In the proposed project area, elegant terns would be expected to occur only at the Salton Sea. Elegant terns are rarely found at inland locations, but the Salton Sea and adjacent mudflats provide potentially suitable foraging and roosting areas for elegant terns. Breeding has not been reported at the Salton Sea, but potentially suitable conditions exist along the Salton Sea.

Proposed Project Area Occurrence

Elegant terns occur only accidentally at the Salton Sea during spring. Only three records of the species exist at the Salton Sea NWR (USFWS 1997b).

Van Rossem's Gull-Billed Tern (*Sterna nilotica vanrossemi*)

Range and Distribution

The breeding range of Van Rossem's gull-billed tern extends from the extreme southwestern U.S. to Sonora, and Baja California, Mexico. During winter, it migrates to coastal areas of Central and South America (DeGraaf and Rappole 1995). The species colonized Southern California, apparently from Mexico, and began nesting at the Salton Sea in the 1920s (Kaufman 1996). Breeding occurred in San Diego in the 1980s (Kaufman 1996). These two locations are the only known breeding areas of Van Rossem's gull-billed tern in the U.S.

Population Status and Threats

This species as a whole was once common in the eastern U.S. and Gulf States but was nearly exterminated in the early 1900s because of egg and feather collection (DeGraaf and Rappole 1995; Zeiner et al. 1990a), and the populations have not recovered. The status of the Van Rossem subspecies is uncertain, but its limited breeding locations and requirement for undisturbed nesting sites suggest the population may be vulnerable. Numbers of gull-billed terns at the Salton Sea have declined due to flooding of nest sites by rising water levels

(Garrett and Dunn 1981). No other threats to the survival of this species have been identified.

Habitat Requirements

Gull-billed terns are typically associated with salt marshes and coastal bays but also frequent open habitats such as pastures and farmlands for foraging. They primarily feed on insects, such as grasshoppers and beetles, but will also prey earthworms, fish, frogs, lizards, small mammals, eggs, and young of other birds (CDFG 1999a). Prey are captured on the ground, in the air, or off the surface of water. Foraging is typically concentrated over marshes (Kaufman 1996). Rarely, gull-billed terns will dive for fish.

This species breeds in small colonies on open sandy flats, often near nesting colonies of other terns (CDFG 1999a). Dredge spoils, shell mounds, and mudflats may also be used for nesting. Nests are a shallow depression in soft sand, soil, or dry mud (CDFG 1999a).

Habitat in the Proposed Project Area

At the Salton Sea, gull-billed terns nest on sandy flats amid shells and debris around the south end (CDFG 1999a; Shuford et al. 1999). Foraging likely occurs at the mudflats along the sea as well as in adjacent wetland areas and agricultural fields.

Proposed Project Area Occurrence

Van Rossem's gull-billed tern is an uncommon summer breeding resident at the Salton Sea, with up to 160 pairs nesting at the Salton Sea each year (USFWS 1997b; Shuford et al. 1999). The largest breeding colonies are at the southeast corner of the Salton Sea and to the south of Salton City (CDFG 1999a). Numbers of nesting birds at the Salton Sea have declined from earlier estimates of approximately 500 as the rising sea has flooded nests (CDFG 1999a).

Western Yellow-Billed Cuckoo *(Coccyzus americanus occidentalis)*

Range and Distribution

Historically, the western yellow-billed cuckoo was a fairly common breeding species throughout the river bottoms of the western U.S. and southern British Columbia (Gaines and Laymon 1984). Because of the loss of riparian woodland habitat, particularly cottonwood-willow habitat, the cuckoo has become an uncommon to rare summer resident in scattered locations throughout its former range. In California, remnant populations breed along sections of seven rivers, including the Colorado River in the southern part of the state.

Population Status and Threats

Yellow-billed cuckoos were fairly common and widespread in riparian systems throughout the western U.S. until the early 1900s. Since then, this species has decreased substantially in abundance. Surveys conducted in California during 1986 and 1987 found 31 to 42 breeding pairs along the Upper Sacramento River, the Feather River, the south fork of the Kern River, and along the Santa Ana, Amargosa, and LCRs (CDFG 1991). This represents a 66 to 81 percent decline from 1977 surveys when there were an estimated 122 to 163 pairs. Along the LCR, there was a 93 percent decline in cuckoos between the 1976 surveys, which documented 242 individuals, and the 1986 survey in which only 18 individuals were found

(Rosenberg et al. 1991). At Bill Williams Delta, cuckoos decreased about 75 percent during the same surveys, with only 50 to 60 cuckoos remaining in 1986.

The population trend for the western yellow-billed cuckoo is considered to be declining primarily due to the continued loss of cottonwood-willow riparian habitats (CDFG 1991; Rosenberg et al. 1991). Major threats to this species include habitat loss due to reclamation, flood control, and irrigation projects; habitat loss due to urbanization and agricultural activities; and the continued invasion of non-native salt cedar into riparian areas. Exposure to pesticides and other contaminants on wintering and breeding grounds, as well as livestock grazing and off-road vehicle use in riparian habitats, also continues to threaten this species' survival (Rosenberg et al. 1991; CDFG 1991; and Gaines and Laymon 1984).

Habitat Requirements

Mature stands of cottonwood-willow provide the primary habitat for this species. Willows or isolated cottonwoods mixed with tall mesquites are used to a lesser extent (Rosenberg et al. 1991). Monotypic stands of salt cedar are generally uninhabited by cuckoos. The cuckoo arrives on its breeding grounds in mid- to late June and departs by the end of August, spending only about one-quarter of its annual cycle on its breeding territory. As a midsummer breeder, the cuckoo faces extremely high temperatures that could easily kill eggs not protected by behavioral or physiological cooling mechanisms. To counter these midsummer temperatures, the cuckoo is a nest-site specialist, choosing stands of mature cottonwoods that have a subcanopy layer of willows that provide thermal refuge for the nest. Cuckoos maintain larger territories than many birds of comparable size (Platt 1975). Gaines (1974) found very few cuckoos where suitable habitat was less than 330 feet wide and patch size was less than 25 acres. Galli et al. (1976) found cuckoos were rarely present in patches of suitable habitat less than 60 acres.

The restriction of this species' breeding to the midsummer period is thought to be in response to a seasonal peak in large insect abundance (e.g., cicadas, which dominate the cuckoo's diet). Mantids, grasshoppers, and caterpillars are also important food resources for the cuckoo. Cuckoos will occasionally consume lizards and tree frogs (Rosenberg et al. 1991).

Habitat in the Proposed Project Area

The cottonwood-willow habitat that yellow-billed cuckoos require is largely absent from the proposed project area. Riparian areas in the proposed project area are dominated by tamarisk, which yellow-billed cuckoos are not known to use. Seepage areas along the AAC support localized areas of cottonwoods and willows; however, these areas are limited in size and distribution. While these areas provide potential habitat, the small size of these patches and fragmented distribution are unlikely to support any breeding population of yellow-billed cuckoos.

Proposed Project Area Occurrence

Most occurrences are from eastern Imperial County near the LCR near Laguna Dam, Winterhaven, and Bard. Yellow-billed cuckoos have been observed along the AAC across from the mission wash flume, 3 miles north-northeast (NNE) of Bard in stands of mature

cottonwoods with a dense understory of cattails and introduced palm trees. Two records of yellow-billed cuckoos exist for the Salton Sea NWR (USFWS 1997b).

Short-Eared Owl (*Asio flammeus*)

Range and Distribution

The short-eared owl breeds from northern Alaska south through most of Canada and the central U.S., and from northern Ohio west to central California. It also breeds in Eurasia, South America, and Cuba. In North America, northern populations of the short-eared owl are strongly migratory, wintering in the Southern U.S. and south to Guatemala (Johnsgard 1988; Terres 1980). In California, the short-eared owl is a year-round resident commonly found in low-lying areas of agricultural lands, estuaries, emergent wetlands, and marshes (Zeiner et al. 1990).

Population Status and Threats

The short eared-owl is currently thought to be declining in most portions of its range, especially in the prairie provinces of Canada, along the Pacific Coast, and in parts of the Southeast (Ehrlich et al. 1988). The range of short-eared owls has decreased over the recent decades. It has disappeared from many locations in the southern U.S. where it previously nested (Kaufman 1996). The loss and fragmentation of grassland and wetland habitats due to agricultural expansion, increased grazing, and urbanization have been implicated as contributors to this range reduction (Remsen 1978). Pesticides may have contributed to declines as well (Marti and Marks 1989). Small (1994) reports the breeding population has declined in California and attributes this decline to a combination of shooting and habitat loss due to marsh drainage, agriculture, recreational development, and expansion of urban development. Habitat loss remains the primary threat to this species.

Habitat Requirements

Short-eared owls breed in open habitats, such as prairies, marshes, grassy plains, and tundra, that support high numbers of small mammals and provide opportunities to roost, nest, and forage. In winter, stubble fields, coastal dunes, meadows, marshes, and pastures are commonly occupied (Johnsgard 1988; Terres 1980; Ehrlich et al. 1988; and Kaufmann 1996). Dense nonwoody vegetation (grasses, reeds, sedges, rushes), brush, and open wetlands are required for roosting and nesting.

Short-eared owls eat mostly rodents, preferring voles over smaller mice. A variety of open-country and marsh-associated birds, such as western meadowlarks, horned larks, and red-winged blackbirds, are also commonly eaten by this species. Other prey includes rabbits, gophers, rats, shrews, insects, and bats (Johnsgard 1988; Terres 1980; Ehrlich et al. 1988; and Kaufmann 1996). It searches by flying low (3 to 20 feet) over the ground, hovering, and swooping down on prey. It uses large mounds and fence posts as perches. Where prey is abundant, large aggregations of short-eared owls often roost and hunt communally.

Habitat in the Proposed Project Area

In the LCR Valley, the short-eared owl is most often associated with agricultural fields (primarily, tall alfalfa); marshes; and grassy edge habitats (Rosenberg et al. 1991). It most likely uses similar habitats in the Imperial Valley, such as the managed wetlands of the state

and federal wildlife refuges, wetlands adjacent to the Salton Sea, and agricultural fields throughout the valley.

Proposed Project Area Occurrence

Short-eared owls are rare winter visitors to the Salton Sea area (USFWS 1997b; Garrett and Dunn 1981) but are more common in the fall (USFWS 1997b). Short-eared owls have been observed along the Alamo River, and Hurlbert et al. (1997) observed one owl during surveys of selected drains in the Imperial Valley. Short-eared owls have also been observed near the towns of Calipatra and Westmorland.

Long-Eared Owl (*Asio otus*)

Range and Distribution

Long-eared owls are widely distributed throughout Eurasia, North Africa, and North America. In North America, the species breeds from central Canada south to northern Baja California, Mexico. Although it is a resident species in most of its breeding range, some populations of long-eared owls withdraw from northern areas and winter from Southern Canada south to southern Mexico (Johnsgard 1988; Terres 1980; and Kaufmann 1996).

Population Status and Threats

Although the status of this species is not well known, there is evidence that the overall population of long-eared owls in North America is declining, probably as a result of forest cutting and the destruction of grovelands and riparian habitats, especially in the western states (Kaufmann 1996; Johnsgard 1988). Habitat loss remains the primary threat to this species.

Habitat Requirements

Long-eared owls live in a variety of habitats that contain dense trees for nesting and roosting, and open areas for foraging. Coniferous and mixed coniferous forests containing extensive meadows, prairies supporting groves of trees, and streamside woodlands in desert areas are some of this species' preferred habitats (Kaufmann 1996; Ehrlich et al. 1988; Terres 1980; and Johnsgard 1988). In the southwest, long-eared owls can be found in dense stands of tall cottonwood or tamarisk and in densely vegetated desert washes (Rosenberg et al. 1991). During the breeding season, long-eared owls are territorial and widely dispersed throughout the landscape. The normal breeding density of this species is 10 to 50 pairs per 60 square miles (Johnsgard 1988). Long-eared owls nest in trees, usually in the abandoned nests of corvids. The nests of other large birds, such as herons and hawks, are also commonly used. When nest sites are scarce, long-eared owls occasionally nest in tree cavities or on the ground in heavy cover (Ehrlich et al. 1988; Kaufmann 1996; Johnsgard 1988; and Terres 1980). During the nonbreeding season, aggregations of long-eared owls will often cluster at favored roosting sites (Bent 1938).

The diet of long-eared owls overwhelmingly consists of rodents, but they will also eat small birds, bats, insects, snakes, and other small animals, with prey size being the most important factor in food selection (Ehrlich et al. 1988; Kaufmann 1996; Johnsgard 1988; and Terres 1980).

Habitat in the Proposed Project Area

Long-eared owls are associated with forested habitats, particularly adjacent to a stream or meadow. In the proposed project area, tamarisk scrub is the only potential habitat. Long-eared owls are known to use tamarisk in the southwest. Potential habitat for long-eared owls in the proposed project area consists mainly of tamarisk scrub habitat along the New and Alamo Rivers, Salton Sea, agricultural drains, and in areas receiving seepage from water delivery canals. Long-eared owls could use the agricultural fields throughout the Imperial Valley for foraging.

Proposed Project Area Occurrence

Long-eared owls are occasional winter visitors to the Salton Sea area (USFWS 1997b). They are not known to breed in the area.

Western Burrowing Owl (*Athene cunicularia*)

Range and Distribution

The breeding range of the western burrowing owl extends south from southern Canada into the western half of the U.S. and down into Baja California and central Mexico. The winter range is similar to the breeding range, except most owls from the northern areas of the Great Plains and Great Basin migrate south (Haug et al. 1993).

Population Status and Threats

Burrowing owls have declined in abundance throughout most of their range (Haug et al. 1993). In the western states, 54 percent of 24 jurisdictions reported burrowing-owl populations decreasing; there were no reported increases. Local populations are especially prone to extinction in this species (Haug et al. 1993). The species is listed as endangered or sensitive in 14 states in the U.S. and as threatened or endangered in four provinces in Canada. In California, the burrowing owl is currently considered a federal sensitive and a state species of special concern.

Burrowing owls were once a common, locally abundant species throughout much of California, although a decline in abundance was noticed by the 1940s (Grinnell and Miller 1944). This decline has rapidly continued throughout most of California (Remsen 1978). However, breeding bird surveys between 1980 and 1989 indicate the burrowing owl is increasing in southeastern California, the lower Sonoran deserts, and LCR Valley of western Arizona (Haug et al. 1993).

DeSante and Ruhlen (1995) reported the results of surveys for burrowing owls conducted throughout California, except for the Great Basin and desert areas during 1991 to 1993. During the 3-year census period, 9,450 breeding pairs of burrowing owls were estimated to occur in the area surveyed (95 percent confidence limits for this estimate are 7,206 and 11,695 pairs). This survey also found a 37 to 60 percent decrease in the number of breeding groups since the early 1980s, with the burrowing owl being extirpated from several counties (Marin, San Francisco, Santa Cruz, Napa Ventura, and coastal San Luis Obispo) and nearly extirpated from several additional counties (Sonoma, Orange, and coastal Monterey). Development is believed to have been the primary cause of the extirpation and decline of burrowing owls in these counties. In agricultural regions, removal of ground

squirrels, use of chemical herbicides on levees and irrigation canals, and use of chemical insecticides and rodenticides on agricultural fields may have contributed to declines in burrowing owls (DeSante and Ruhlen 1995). Gervais et al. (2000) found low but detectable levels of DDE (n = 7; range = 0.20 – 3.4; mean = 0.62 milligrams per kilogram DDE, fresh weight) and no eggshell thinning in eggs collected from areas around the Salton Sea. In this same study, selenium concentrations in burrowing owl eggs (n = 7; range = 1.6 – 2.4; mean = 1.8 milligrams per kilogram Se, dry weight) were below background levels (less than 3 milligrams per kilogram Se, dry weight; Skorupa et al. 1996).

Burrowing owls have declined through much of their range because of habitat loss associated with urbanization, agricultural conversion, and rodent control programs (Remsen 1978; Johnsgard 1988). Pesticides, predators, and vehicle collisions have also contributed to their decline (Haug et al. 1993; James and Espie 1997). Survival and reproductive success are adversely affected by spraying insecticides over nesting colonies (James and Fox 1987). Burrowing owls also have been incidentally poisoned and their burrows destroyed during eradication programs aimed at rodent colonies (Collins 1979; Remsen 1978; and Zarn 1974). Although burrowing owls are relatively tolerant of lower levels of human activity, there are human-related impacts, such as shooting, burrow destruction, and the introduction of non-native predators, that adversely affect the owls (Zarn 1974; Haug et al. 1993). Populations of native predators (e.g., gray foxes and coyotes) artificially enhanced by development (i.e., availability of artificial food sources and shelter) and introduced predators (e.g., red foxes, cats, and dogs) near burrowing owl colonies adversely impact this species (Zeiner et al. 1990).

Habitat Requirements

Burrowing owls inhabit open areas, such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agricultural fields. They also inhabit golf courses, airports, cemeteries, vacant lots, and road embankments or wherever there is sufficient friable soil for a nesting burrow (Haug et al. 1993). In the Imperial Valley, burrowing owls typically inhabit agricultural fields with extensive dirt embankments. Burrowing owls eat a variety of different prey items, including rodents, frogs, small birds, terrestrial and aquatic invertebrates, and carrion (Zarn 1974; Johnsgard 1988; and Gervais et al. 2000).

Burrowing owls use burrows created by other animals for nesting and shelter. The most commonly used rodent burrow in California is that of the California ground squirrel (Collins 1979). In other locations, burrows of badgers, prairie dogs, tortoises, and other animals may be used (Haug et al. 1993).

Burrowing owl nesting is strongly dependent on local burrow distribution. Nesting densities in the LCR Valley vary from eight pairs per 0.6-square mile in optimal habitat to one pair per 36 square miles in poor quality habitat (Johnsgard 1988). Home range and foraging area may overlap between different pairs, with only the burrow being actively defended (Coulombe 1971; Johnsgard 1988). Telemetry studies of foraging ranges of nesting burrowing owls conducted at three California sites (including Salton Sea) showed a mean range of 300 acres around the burrow (Gervais et al. 2000). Not all individuals capable of breeding do so every year. Breeding is initiated in early March (Coulombe 1971). Eggs are laid from late March to July (Terres 1980). Young fledge in the late summer to fall (Coulombe 1971).

DeSante and Ruhlen (1995) investigated the relationship between various habitat characteristics and the probability that a burrowing owl population at a particular locale significantly increased or decreased over surveys conducted during 1991 to 1993. No habitat characteristics were associated with the probability of the population decreasing. However, the probability that a population would increase was significantly related to several habitat characteristics. Populations with a high probability of increasing were generally associated with undisturbed habitat types, particularly pastures, large distances to the nearest irrigation canal, and the occurrence of a large number of ground squirrels. Populations with a low probability of increasing were associated with linear habitat types (e.g., roadsides and ditches), areas subject to soil disturbance, proximity to irrigation canals, and low numbers of ground squirrels. Crop type was not related to the probability that a population would increase.

Habitat in the Proposed Project Area

In the proposed project area, burrowing owls commonly inhabit the earthen banks of agricultural canals and drains. They concentrate along the edges of agricultural fields, especially where the banks of irrigation ditches provide suitable nesting burrows. Canal embankments are more commonly used for nesting than drains because vegetation is maintained at lower levels in the canals. Burrowing owls at the Salton Sea NWR also use artificial nest burrows placed along roadsides and forage in the surrounding agricultural fields both on and off the refuge (Gervais et al. 2000).

Proposed Project Area Occurrence

Burrowing owls are a common year-round resident adjacent to the Salton Sea and in the Imperial Valley (Garrett and Dunn 1981; USFWS 1997b). Burrowing owls occur at a very high density in the Imperial Valley, and the density of burrowing owls in Imperial County surpasses that of any other single county (Sturm 1999). The Institute of Bird Populations estimated that 6,429 pairs of burrowing owls inhabit the Imperial Valley, a number that represents 69 percent of the estimated total population in California (Shuford et al. 1999). This population level translates into a density of about 236 pairs per 60 square miles (DeSante and Ruhlen 1995). For comparison, the average density of burrowing owls in other lowland areas in California was estimated at 11.9 pairs per 60 square miles (DeSante and Ruhlen 1995).

Elf Owl *(Micrathene whitneyi)*

Range and Distribution

The elf owl breeds in the southwestern U.S.; Baja California, Mexico; and northern mainland Mexico (Terres 1980). In the U.S., it is found in extreme southern Nevada, central Arizona, southwestern New Mexico, western Texas, and the southeastern corner of California (Johnsgard 1988). In winter, it migrates south to Baja California, Mexico; mainland Mexico; and the Rio Grande Valley in Texas. In California, it is a very rare and local summer resident in riparian habitats along the LCR, which lies at the western edge of its range (Rosenberg et al. 1991). Small numbers of elf owls can be found at Bill William's Delta, near Needles, near Blythe, the Fort Mohave area, and at Cibola National Wildlife Refuge. It used to be present south of Yuma. West of the Colorado River, there are records at the oases of Cottonwood Springs and Corn Springs, in Riverside County.

Population Status and Threats

Once more numerous along the length of Colorado River, elf owls have been nearly extirpated from loss of habitat. The population status of the elf owl is directly dependent on available nesting holes made by woodpeckers and on sufficient insects during the breeding season (Johnsgard 1988). In California, at the extreme northwest edge of its range, the elf owl is likely declining in the few desert riparian habitats that it occupies (Johnsgard 1988). There may also be a general decline in Arizona, although it may be increasing its range in north-central Arizona and western New Mexico. It is difficult to determine the species' overall status in the southwest. The elf owl was never a common or widespread species along the LCR, where 1987 surveys of riparian habitats reported between 17 and 24 owls at 10 different sites (CDFG 1991). Population estimates in California for the early 1990s were 17 to 25 breeding pairs (CDFG 1991; Rosenberg et al. 1991).

Although the elf owl has probably never been common, it has declined due to the loss of mature riparian and saguaro habitats (CDFG 1991; Rosenberg et al. 1991). The habitat loss is attributed to agricultural development, river channeling, and flooding (CDFG 1991) and continues to threaten this species. The elf owl is a California state endangered species.

Habitat Requirements

The elf owl occupies desert riparian habitat of moderate to open canopy, often with a moderate to sparse shrub understory, and typically bordering desert wash, desert scrub, or grassland habitats. Taller trees with a shrub understory seem to be required (Grinnell and Miller 1944). This owl uses perches overlooking open ground or grassland (Marshall 1956). Foraging perches are typically in moderately tall cottonwood, sycamore, willow, mesquite, and saguaro cactus. Moderately tall trees and snags, such as cottonwood, sycamore, willow, mesquite, and saguaro cactus, afford perches and woodpecker-excavated or other cavities. Elf owls are dependent on woodpecker-excavated holes for nest sites, usually 15 to 20 feet from the ground (Bent 1938). In California, elf owls have nested in cottonwood (Miller 1946) and saguaro (Brown 1903); this owl is also known to nest in willow, sycamore, and mesquite trees or snags of moderate height.

Habitat in the Proposed Project Area

Little potential habitat for elf owls occurs in the HCP area. Most riparian habitats are dominated by dense stands of tamarisk that are not suitable for elf owls. Cottonwood / willow habitat and mesquite habitats are primarily restricted to scattered and isolated seepage areas adjacent to the AAC.

Proposed Project Area Occurrence

Since 1970, elf owls have been reported only north of Needles, San Bernardino County, 22 miles north of Blythe, Riverside County, and at Corn Springs (Gaines 1977a; Garrett and Dunn 1981). They have not been reported in the HCP area. The general lack of habitat makes it unlikely that elf owls would occur in any portion of the HCP area.

Vaux's Swift (*Chaetura vauxi*)

Range and Distribution

The Vaux's swift breeds in western North America and winters in Mexico and Central America. In California, it primarily nests in the Coast Ranges south to Monterey County but is also likely breed in low densities in Lake, Butte, Tehama, Plumas, and other interior California counties.

Population Status and Threats

Significant population declines of the Vaux's swift have been documented in Oregon and Washington (Sharp 1992), and most populations are believed to be declining throughout the species' range (Bull and Collins 1993). The removal of large, broken-top trees and large, hollow snags, most of which are found in late-seral stage forests, has been suggested as contributing to population declines (Sharp 1992). Habitat loss remains the primary threat to this species.

Habitat Requirements

The Vaux's swift nests in coniferous forests along the central and northern California coast, and mixed oaks and conifers in the interior mountain ranges. Natural cavities and burned-out hollow trees are preferred nest sites (Small 1994). Nests are typically built on the inner wall of a large, hollow tree or snag, especially those charred by fire (Bent 1940). Large-diameter, hollow trees or snags are also important for roosting nonbreeders, recently fledged young, and postbreeding adults. Vaux's swifts feed primarily on insects and spiders (Bull and Collins 1993). Foraging occurs above the forest canopy and at lower levels in meadows, over lakes, rivers and ponds, and above burned areas (Grinnell and Miller 1944; Bull and Collins 1993; and Small 1994).

Habitat in the Proposed Project Area

There is no suitable nesting habitat in the proposed project area. Migrating birds may forage over the Salton Sea, wetlands, streams, agricultural fields, and in residential areas. While less desirable, the desert scrub habitat may also provide some foraging habitat for this species (Sanders and Edge 1998; Zeiner, et al. 1990).

Proposed Project Area Occurrence

Vaux's swifts occur in the HCP area as a migrant during the spring and fall. It is relatively common at the Salton Sea during the spring but considered uncommon in the fall (USFWS 1997b). Thousands of migrating birds have been reported at the north end of the Salton Sea during the spring but are relatively uncommon elsewhere in the Salton Basin during spring migration (Garrett and Dunn 1981).

Black Swift *(Cypseloides niger)*

Range and Distribution

The black swift occurs in western North America, breeding from southeastern Alaska through western Canada and the U.S. and into Mexico (DeGraaf and Rappole 1995). It ranges as far east as Colorado (Kaufman 1996). The black swift's winter range is poorly

known, but it may be found in northern South America and in the West Indies (DeGraaf and Rappole 1995). In California, black swifts breed very locally in the Sierra Nevada and Cascade Range, the San Gabriel, San Bernardino, and San Jacinto Mountains and in coastal bluffs and mountains from San Mateo County south probably to San Luis Obispo County (CDFG 1999a).

Population Status and Threats

The current status of black swifts is uncertain. Kaufman (1996) characterized the population as probably stable, but DeGraaf and Rappole (1995) consider the species to be experiencing a long-term decline. Nests are inaccessible to terrestrial predators and human disturbance, with the exception of rockclimbers, who rarely use these wet cliffs. No current threats to the survival of this species have been identified.

Habitat Requirements

Black swifts are associated with mountainous country and coastal cliffs. This association reflects their use of cliffs, often behind waterfalls, for nesting (Kaufman 1996). Foraging, however, occurs over a wide variety of habitats (CDFG 1999a). Like other swifts, black swifts are insectivores that capture insects in flight, and foraging locations reflect the occurrence and availability of insect prey. Common prey items include wasps, flies, mayflies, caddisflies, beetles, leafhoppers, and beetles. When available, black swifts will also feed on emerging swarms of winged adult ants and termites (Kaufman 1996).

Habitat in the Proposed Project Area

The proposed project area does not support nesting habitat for black swifts. However, much of the proposed project area could be used by black swifts for foraging, given this species' preference for open habitats. The Salton Sea, as well as other waterbodies, such as managed wetlands, the New and Alamo Rivers, and major canals, are likely to provide abundant insect prey for foraging black swifts. Agricultural fields may also provide suitable foraging habitat depending on the abundance of flying insects.

Proposed Project Area Occurrence

Black swifts occur accidentally in the proposed project area during the spring. Only two records of this species exist for the Salton Sea NWR (USFWS 1997b).

Gilded Flicker *(Colaptes chrysoides)*

Range and Distribution

The gilded flicker occurs along the LCR Valley in southern Arizona and southeastern California (Rosenberg et al. 1991). In California, the gilded flicker is an uncommon resident along the Colorado River north of Blythe (Garrett and Dunn 1981; CDFG 1991). It was historically widespread in riparian habitat all along the Colorado River Valley. It also used to inhabit saguaro deserts near Laguna Dam, above Yuma (CDFG 1991). Until the late 1970s, a small number of gilded flickers were resident in Joshua Tree woodlands of the eastern Mojave Desert near Cima Dome in California (Garrett and Dunn 1981; CDFG 1991).

Population Status and Threats

The gilded flicker was historically common throughout the LCR Valley. In 1983, however, the entire population along the LCR Valley in Arizona and California was estimated to be about 270 individuals. In the Arizona Sonoran desert east of the Colorado River, the gilded flicker is still common. In California, there were an estimated 40 individuals along the LCR in 1984 (Hunter 1984; CDFG 1991); however, during 1986 surveys, there were no gilded flickers observed in this area. Rosenberg et al. (1991) reported "scattered pairs" between Imperial and Laguna Dams. Gilded flickers were last observed in the eastern Mojave Desert at Cima Dome in 1978.

The decline of the gilded flicker in the LCR Valley is attributed to the loss of upland saguaro habitats and mature riparian forests (CDFG 1991). Other threats to the flicker include water and flood control proposed projects, agricultural operations, livestock grazing, the introduction of exotic plants into native systems, and off-road vehicle activity.

Habitat Requirements

Desert-dwelling gilded flickers are found in saguaro habitats, mature cottonwood-willow riparian forests, and occasionally in mesquite habitats with tall snags during the breeding season (CDFG 1991; Rosenberg et al. 1991). They forage primarily on the ground for ants and termites (Rosenberg et al. 1991). They will also eat mistletoe berries, cactus fruits, and other wild berries but seldom forage in trees for insects as other woodpecker species often do (Terres 1980; Rosenberg et al. 1991). Breeding begins in February, and two broods are usually raised in a year, with fledglings in late May and in July (Rosenberg et al. 1991). Cavities for nesting are usually excavated in saguaros, cottonwoods, and willows. Saguaros are preferred nesting sites, and riparian trees are usually used only when saguaros are unavailable. Gilded flickers rarely nest near human dwellings.

Habitat in the Proposed Project Area

The proposed project area does not contain areas supporting saguaros, the preferred nesting substrate of gilded flickers. Suitable habitat for gilded flickers is generally lacking in the Imperial Valley because most of the riparian habitat is dominated by tamarisk. Large trees potentially suitable for nesting principally occur in urban areas that gilded flickers generally avoid for nesting. The scattered patches of cottonwoods and willows supported by seepage adjacent to the AAC are likely to provide only minimal habit value because of their small size and limited distribution.

Proposed Project Area Occurrence

In California, gilded flickers are generally restricted to rare occurrences along the LCR (CDFG 1999a) and are not known to occur in the Imperial Valley.

Gila Woodpecker *(Melanerpes uropygialis)*

Range and Distribution

Gila woodpeckers occur in the extreme southwestern U.S. and south into Baja California and central Mexico (Terres 1980). In the U.S., they occur in Arizona, southeastern California, southwestern Nevada, and southwestern New Mexico. In California, Gila woodpeckers are a common year-round resident in mature riparian forest in the LCR Valley (Rosenberg et al.

1991). They also occur in groves and ranch yards having tall trees south of the Salton Sea and near Brawley, Imperial County (Garrett and Dunn 1981). Along the LCR, they are now limited to several localities between Needles and Yuma (CDFG 1991).

Population Status and Threats

The Gila woodpecker was formerly widespread and abundant but now is primarily found in remnant native riparian habitats with tall trees in the LCR Valley (Rosenberg et al. 1991). In 1984, an estimated 200 individuals occurred in California along the LCR (CDFG 1991). Relatively low reproductive success was documented for 27 monitored pairs during this time. The total population along the LCR is estimated at approximately 1,000 individuals (Rosenberg et al. 1991).

The Gila woodpecker is declining in California due to the loss and degradation of mature riparian habitats and saguaro habitats in the LCR Valley (Garrett and Dunn 1981; CDFG 1991; and Rosenberg et al. 1991). Other potential threats faced by this species include water and flood control proposed projects, agricultural operations, introduced predators, livestock grazing, and the introduction of exotic plants into riparian systems (CDFG 1991).

Habitat Requirements

Gila woodpeckers are closely associated with saguaros or large trees that they use for nesting (Rosenberg et al. 1991). They are most common in the desert mesas of Arizona (Terres 1980). In California, they are found primarily in mature riparian habitats, although they also use mesquite stands, orchards, and tall cultivated trees and utility poles for nesting (Garrett and Dunn 1981; Rosenberg et al. 1991; and Tierra Madre Consultants 1998). Gila woodpeckers appear to need large blocks of riparian habitat for nesting; isolated patches of riparian habitat less than 50 acres do not support this species (Rosenberg et al. 1991). Although several woodpeckers may occur in residential and park areas with tall trees, they have low reproductive success in these areas because of competition for nesting cavities with the introduced European starling.

Nesting cavities are excavated high in trees or saguaros and may be used for more than one season unless taken over by owls or European starlings. Breeding begins in February with pairing and territorial chasing. Young are dependent on parents for an extended period of time after fledging, although two to three broods can be raised in a season (Rosenberg et al. 1991). Pairs in riparian areas tend to successfully raise more than one brood, each with three to four young. In other habitats, Gila woodpeckers tend to have high rates of nest failure because of the eviction of adults and eggs from nesting cavities by aggressive starlings.

The Gila woodpecker forages by using its sharp bill to search for and chisel prey items from tree trunks and branches. Gila woodpeckers eat mostly insects, such as grasshoppers, beetles, ants, and grubs (Terres 1980). They also eat bird eggs, fruit from orchards, mistletoe berries, cactus pulp, saguaro fruits, and corn (Ehrlich et al. 1988; Scott 1987; and CDFG 1991).

Habitat in the Proposed Project Area

The proposed project area does not contain areas supporting saguaros, a commonly used nesting substrate of Gila woodpeckers. Cottonwoods and willows supported by seepage adjacent to the AAC are limited in size and distribution but may provide suitable habitat for

Gila woodpeckers. Gila woodpeckers may use telephone poles as nesting substrates (Tierra Madre Consultants, Inc. 1998); these occur throughout the proposed project area. Garrett and Dunn (1981) reported Gila woodpeckers also using groves and ranch yards having tall trees south of the Salton Sea and near Brawley, Imperial County. Although Gila woodpeckers use these areas for nesting, reproductive success may be poor due to competition with European starlings.

Proposed Project Area Occurrence

Gila woodpeckers may breed locally but are listed as rare to very uncommon on the Salton Sea Wildlife Refuge, occupying habitats near houses and towns where larger trees are found (USFWS 1997b). They have also been observed in areas near Brawley and along the Alamo River. Gila woodpeckers are also known to occur between the Laguna and Imperial Dams along the LCR. Gila woodpeckers have been observed at two locations along the AAC; across from the mission wash flume in a mature stand of cottonwoods and 6.5 miles to the northeast of Yuma in an area dominated by salt cedar, mesquite, and palo verde. A biological survey that Tierra Madre Consultants, Inc., conducted along the south side of the AAC in 1998 noted several Gila woodpeckers, including one pair nesting in a cottonwood (Tierra Madre Consultants, Inc. 1998). None of the Gila woodpeckers were seen using holes in powerline poles, rather they appeared to use poles as song perches and foraging sites (Tierra Madre Consultants, Inc. 1998).

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Range and Distribution

The southwestern willow flycatcher is recognized as one of five subspecies of the willow flycatcher. Willow flycatchers were once widespread and locally common throughout the southwest, and were distributed across southern California, southern Nevada, southern Utah, Arizona, New Mexico, and western Texas (Hubbard 1987; Unitt 1987; and Browning 1993). At present, the willow flycatcher is believed to be extirpated as a breeding species along the lower reaches of most southwestern riverine systems. The largest breeding populations of southwestern willow flycatchers in California occur along the San Luis Rey and Santa Margarita Rivers in San Diego County and along the south fork of the Kern River at the southwest end of the Sierra Nevada Mountains (Salton Sea Authority and Reclamation 2000). Although historical records indicate this species was once abundant along the LCR, recent surveys have found breeding willow flycatchers persisting very locally in small, widely scattered locations, including Grand Canyon National Park, Lake Mead Delta, Adobe Lake, Topock Marsh, the Virgin River Delta, and Mormon Mesa (USFWS 1995a; Sogge et al. 1997; McKernan 1997; McKernan and Braden 1999; and AGFD 1997e). Large numbers of willow flycatchers pass through Southern California deserts during spring and fall migration (Garrett and Dunn 1981).

Population Status and Threats

Since the 1800s, the willow flycatcher has experienced extensive population reductions throughout its range (USFWS 1995a; AGFD 1997e). Based on recent censuses and population estimates throughout the range of the southwestern willow flycatcher, the USFWS (1995a) estimated the total number of remaining flycatchers at approximately 300 to 500 pairs. The population of southwestern willow flycatchers in Southern California was

estimated at fewer than 80 pairs in the early 1980s (Unitt 1984). Declines are continuing in most populations that have been monitored since that time (USFWS 1995a). The primary factors responsible for the decline of the southwestern willow flycatcher are the loss and degradation of native riparian habitats, particularly cottonwood-willow associations (USFWS 1995a; AGFD 1997e). Related factors contributing to the decline of this species include brood parasitism by brown-headed cowbirds, increased predation, salt cedar invasion, urban and agricultural development, livestock grazing, water diversion and impoundment, channelization, off-road vehicle use and recreation, floods, pesticides, forest practices, and possible gene pool limitations (USFWS 1995a; AGFD 1997e). These factors continue to threaten the survival of this species. The small size of remaining flycatcher populations (most populations contain fewer than five pairs) suggests that environmental stochasticity, demographic stochasticity, and genetic deterioration may also be playing an increasing role in the species' decline. Recent observations of physical deformities, including crossed bills and missing eyes, in conjunction with the discovery of high levels of several toxic chemicals (e.g., lead, arsenic, and selenium) in or near breeding sites, suggest that environmental contamination may also be threatening this species (Paxton et al. 1997). The willow flycatcher is a California state endangered species.

Habitat Requirements

The southwestern willow flycatcher is a neotropical migrant that is strongly associated with riparian habitats. It is considered a partial obligate on cottonwood-willow riparian systems throughout southwestern riverine systems. Its association with cottonwood-willow habitats is strongest at low elevations (Hunter et al. 1987). Invasion of cottonwood-willow habitats by exotic species, principally tamarisk, may reduce habitat value for southwestern willow flycatchers. In particular, tamarisk may not provide the thermal cover necessary for the southwestern willow flycatcher to nest successfully. At higher elevations, willow flycatchers often use tamarisk stands (Hunter et al. 1987), suggesting that under some circumstances, these altered riparian habitats may support this species.

Breeding habitat consists of dense stands of intermediate-size shrubs or trees, such as willow, Coyote bush, ash, boxelder, and alder, with an overstory of larger trees, such as cottonwood. Exotic species, such as Russian olive and tamarisk, may also be present in composition. Both even- and uneven-aged sites are used by this subspecies for nesting habitat. Typically, nesting habitat for the willow flycatcher has extensive canopy coverage and is structurally homogenous (USFWS 1995a). Occupied habitat is generally associated with surface water or saturated soil (Sogge et al. 1997) and dominated by shrubs and trees 10 to 30 feet tall that provide dense lower and mid-story vegetation, with small twigs and branches for nesting. Apparently, habitat structure and the presence of surface water or saturated soils may be more important than plant species composition in defining suitable flycatcher habitat (USFWS 1995a).

The willow flycatcher is present and singing on its breeding territory by mid-May, and young are fledged by early to mid-July (USFWS 1995a). Territory sizes for the willow flycatcher are not well known due to the subspecies' rarity and variable habitat utilization. However, habitat patches as small as 1.2 acres have been found to support one or two nesting pairs (USFWS 1995a). Nesting success rates for the willow flycatcher appear to be affected by habitat fragmentation, resulting in increased rates of predation and high levels of brood parasitism by the brown-headed cowbird (USFWS 1995a; AGFD 1997e).

This species is insectivorous and forages for insects both within and above dense riparian vegetation. Prey items are taken on the wing and gleaned from foliage. This species also forages along water edges, backwaters, and sandbars adjacent to nest sites.

Habitat in the Proposed Project Area

Cottonwood-willow habitat is largely absent from the proposed project area. Between Drops 3 and 4, seepage from the AAC supports a localized area of cottonwood / willow habitat. Tamarisk also occurs in areas receiving seepage from the AAC and is dominant along the New and Alamo Rivers. Because of the lower structural diversity of tamarisk stands and poor thermal cover, these low-elevation riparian areas are likely to provide marginal nesting habitat at best for willow flycatchers. Tamarisk and common reed supported along the agricultural drains may be used by migrating willow flycatchers.

Proposed Project Area Occurrence

The occurrence and distribution of southwestern willow flycatchers in the proposed project area is poorly known. Willow flycatchers of an undetermined subspecies have been reported at the Salton Sea NWR and are considered an uncommon spring migrant and common fall migrant (USFWS 1997b). These birds may include other subspecies of willow flycatchers that migrate through the area between northern breeding areas and wintering grounds in South America. Willow flycatchers have been reported in the Imperial Valley in residential areas near Niland, in riparian and desert scrub habitats, and along agricultural drains. In addition, 10 agricultural drains were surveyed in the Imperial Valley during 1994 to 1995. Single willow flycatchers were observed along the Holtville Main, Trifolium 2, and Nettle Drains (Hurlbert et al. 1997). Willow flycatchers are also known to use seepage communities along the AAC near the mission wash flume 3 miles NNE of Bard.

These observations show a low but consistent use of the area by willow flycatchers during migration. Nesting has not been reported in the proposed project. However, recent surveys have found willow flycatchers along on the Whitewater River (a tributary to the Salton Sea) during the breeding season, suggesting that nesting could occur in the proposed project area in the future (B. McKernan pers. comm.).

Brown-Crested Flycatcher (*Myiarchus tyrannulus*)

Range and Distribution

The brown-crested flycatcher is a fairly common summer resident (May to July) in desert riparian habitat along the Colorado River. A few flycatchers nest at Morongo Valley, San Bernardino County; birds may nest very locally at other desert oases and riparian habitats northwest to Mojave River near Victorville, San Bernardino County. Vagrants have been recorded west to the South Fork Kern River near Weldon, Kern County, north to Furnace Creek Ranch, Death Valley, Inyo County, and on the Farallon Islands (Gaines 1977a; Garrett and Dunn 1981; and McCaskie et al. 1988).

Population Status and Threats

Numbers of brown-crested flycatchers have declined in recent decades, apparently in response to destruction of desert riparian habitat and to competition for nest cavities from European starlings (Remsen 1978). However, DeGraaf and Rappole (1995) still consider the

species common throughout its range. Habitat destruction and competition with exotic species remain the primary threats to this species.

Habitat Requirements

Brown-crested flycatchers are most numerous in riparian groves of cottonwood, mesquite, and willow, which afford suitable nest sites, but often forage in adjacent desert scrub or tamarisk (Garrett and Dunn 1981). This species requires riparian thickets, trees, snags, and shrubs for foraging perches, cavities, and other cover. Brown-crested flycatchers also require woodpecker-excavated cavities for nesting and are thus secondarily dependent on snags; trees with rotten heart-wood; utility poles; and fence posts, in which ladder-backed and Gila woodpeckers, and other primary excavators, dig nesting cavities.

Habitat in the Proposed Project Area

Nesting habitat is minimal in the proposed project area, because cottonwood / willow habitat is rare, occurring only in small isolated patches along the AAC. Where nest sites are present, salt cedar and creosote shrubs provide suitable foraging habitat. Wetland areas on the state and federal refuges and agricultural drains may provide suitable foraging habitat for migrating brown-crested flycatchers.

Proposed Project Area Occurrence

The brown-crested flycatcher is known to occur in riparian areas along the LCR between the Laguna and Imperial Dams and has been observed along the AAC in scattered mature cottonwoods across from the mission flume 3 miles NNE of Bard. Birds have also been observed along the northern shoreline of the Salton Sea.

Vermilion Flycatcher (*Pyrocephalus rubinus*)

Range and Distribution

Vermilion flycatchers occur in the southwestern U.S., southern portions of New Mexico, Arizona, and western Texas (Kaufman 1996). In California, the vermilion flycatcher is a rare, local, year-long resident along the Colorado River, especially in the vicinity of Blythe in Riverside County. A few birds still breed sporadically in desert oases west and north to Morongo Valley and the Mojave Narrows in San Bernardino County (CDFG 1999a). Outside the U.S., they occur throughout much of Central and South America (DeGraaf and Rappole 1995).

Population Status and Threats

Surveys have shown declines in the population in Texas (Kaufman 1996), although the species remains common throughout most of its range (DeGraaf and Rappole 1995). In California, it was formerly much more common and widespread and is now rare in the Imperial and Coachella Valleys. Numbers have declined drastically along the Colorado River, primarily the result of habitat loss; the species faces extirpation in California if the present trend continues (Grinnell and Miller 1944; Gaines 1977b; Remsen 1978; and Garrett and Dunn 1981). Habitat loss remains the primary threat to this species.

Habitat Requirements

Vermilion flycatchers are closely associated with water and inhabit streamside habitats in arid regions. Breeding birds use riparian habitats consisting of cottonwood, willow, mesquite, and other riparian plant species. The use of tamarisk is restricted to high-elevation riparian systems only (Hunter et al. 1987). Often nest sites are adjacent to irrigated fields, irrigation ditches, pastures, or other open and mesic areas (CDFG 1999a). Nests are located in large trees or shrubs, generally 8 to 20 feet above the ground (CDFG 1999a).

Vermilion flycatchers forage on insects, particularly beetles, flies, wasps, bees, and grasshoppers. They forage by sallying from perch sites. Foraging is concentrated over water in other mesic habitats.

Habitat in the Proposed Project Area

The proposed project area supports little cottonwood / willow / mesquite habitat. Seepage from the AAC supports a small amount of this habitat between Drops 3 and 4. Tamarisk scrub habitat is widespread in the proposed project area and may provide suitable habitat for vermilion flycatchers. Tamarisk scrub occurs along the New and Alamo Rivers, Salton Sea, agricultural drainage canals, and in areas receiving seepage from water delivery canals. Wetland areas on the state and federal refuges and agricultural drains could be used for foraging and nesting.

Proposed Project Area Occurrence

Vermilion flycatchers are known to occur in the proposed project area but are considered rare (Shuford et al. 1999). While breeding populations presumably occurred in the proposed project area at one time, no nesting populations are currently known (USFWS 1997b).

Purple Martin (*Progne subis*)

Range and Distribution

The purple martin nests west of the Cascade Range and Sierra Nevada from southwestern British Columbia south to Baja California, Sonora, and Arizona. Nesting occurs east of the Rocky Mountains from northeastern British Columbia and central Alberta east through northern Minnesota, Wisconsin, southern Ontario to central Nova Scotia and south to the Gulf coast and central Florida. In fall, it migrates to and winters in South America.

Population Status and Threats

Purple martins began to decline in California in the late 1950s (Small 1994). Observed declines have been attributed to nest site competition with the introduced European starling, and the loss of suitable nest and roost trees (Remsen 1978). Currently, the purple martin is a California state species of special concern. Habitat loss and competition with exotic species remain the primary threats to this species.

Habitat Requirements

Purple martins are not strongly associated with a particular habitat type. Factors influencing their occurrence and distribution appear to be insect abundance and diversity, presence of open water, humidity, wind speed, and visibility around nest sites. Only the nest substrate

itself appears to strongly affect where they occur during the breeding season (Williams 1996). Purple martins typically nest along rivers, estuaries, and other large water bodies and sometimes in old burns or urban situations (Marshall 1992). This species usually nests in old woodpecker cavities, often in tall, large-diameter trees and snags but also uses nest boxes, cornices of old buildings, and occasionally rock cavities (Marshall 1992). In some locations (e.g., Sacramento), hollow box bridges are used for nesting (Williams 1996).

Purple martins forage by capturing insects in flight. Foraging can occur over any habitat type where insects are abundant.

Habitat in the Proposed Project Area

Purple martins could use most of the proposed project area for foraging. Purple martins will forage in most areas with abundant flying insects. In the proposed project area, the Salton Sea as well as other waterbodies, such as managed wetlands, the New and Alamo Rivers, and major canals, may provide these conditions. Agricultural fields may also provide suitable foraging habitat, depending on the abundance of flying insects.

Proposed Project Area Occurrence

Purple martins are occasional visitors to the Salton Sea area as spring and fall migrants (USFWS 1997b). No published records exist of purple martins nesting in the southeastern portion of California (Williams 1996), and purple martins are not expected to nest in the proposed project area.

Bank Swallow (*Riparia riparia*)

Range and Distribution

Bank swallows are a migratory species that ranges throughout much of the U.S. and Canada during the spring and summer. In California, the majority of its habitat is concentrated along the Upper Sacramento River and several tributaries (CDFG 1990). Some small, isolated populations occur at a few sites in northwestern California (CDFG 1990). In winter, it migrates to South America.

Population Status and Threats

In California, the bank swallow's population and range have been declining (Small 1994). Historically, the bank swallow was found throughout the state, but the current distribution is primarily limited to areas along the Upper Sacramento River and several tributaries (CDFG 1990). Garrison et al. (1987) reported a total breeding population in California of about 16,000 pairs in 1987. In 1990, the estimated breeding population was 4,500 pairs (Small 1994). Erosion and flood control measures are considered the primary causes of observed declines (Garrison et al. 1987) and continue to threaten this species. In other portions of the species' range, population numbers are high and appear stable (Kaufman 1996).

Habitat Requirements

The bank swallow is usually found foraging over or near open water and open land areas. While considered a riparian species, the bank swallow does not have specific associations with riparian plant communities (Garrison et al. 1987). Foraging takes place during coursing flights over grasslands, along rivers, and other open areas (Sharp 1992).

Habitat in the Proposed Project Area

Bank swallows do not breed in the proposed project area, and their use of habitats in the proposed project area is restricted to foraging. Bank swallows could use most of the proposed project area for foraging since they will forage in any habitat with abundant flying insects. In the proposed project areas, the Salton Sea and other waterbodies, such as managed wetlands, the New and Alamo Rivers, and major canals, may provide these conditions. Agricultural fields may also provide suitable foraging habitat, depending on the abundance of flying insects.

Proposed Project Area Occurrence

The bank swallow migrates through the Salton Sea area in April and again in September on its way between wintering areas in South America and its nesting areas in Northern California. It is considered a casual visitor to the proposed project area with only a few records (Garrett and Dunn 1981).

Crissal Thrasher (*Toxostoma crissale*)

Range and Distribution

The crissal thrasher is a resident of southeastern deserts. It is found from southeastern California to southern Nevada, southwestern Utah to west-central Texas, and Baja California south to central Mexico. In California, it occurs in the eastern Mojave Desert of San Bernardino and southeastern Inyo counties up to 5,900 feet in elevation. It is also a resident in Imperial, Coachella, and Borrego Valleys.

Population Status and Threats

The crissal thrasher appears to be localized and uncommon throughout much of its range. While it is still fairly common in the Colorado River Valley, population numbers have declined markedly in recent decades (Grinnell and Miller 1944; Remsen 1978; and Garrett and Dunn 1981). Removal of mesquite brushland for agricultural development and introduction of tamarisk are the primary causes of the population reductions (Remsen 1978). Off-road vehicle activity also may also threaten this species by degrading habitat and disturbing these thrashers.

Habitat Requirements

The crissal thrasher occupies dense thickets of shrubs or low trees in desert riparian and desert wash habitats. It also occurs in dense sagebrush and other shrubs in washes in juniper and pinyon-juniper habitats. Cover for this species is provided by thickets of dense, shrubby vegetation along streams and in washes and frequently, mesquite, screwbean mesquite, ironwood, catclaw acacia, and arrowweed willow. Crissal thrashers forage mostly on the ground, especially between and under shrubs. The crissal thrasher nests in thickets of desert shrubs or on forked branches of a small trees.

Habitat in the Proposed Project Area

Dense thickets of tamarisk along canals, drainages, agricultural fields and rivers in the proposed project area may provide suitable nesting and foraging habitat for this species.

Limited stands of mesquite, willow, and cottonwoods found in seepage areas of the AAC may also provide suitable habitat for the crissal thrasher.

Proposed Project Area Occurrence

The crissal thrasher is a resident of the Imperial, Coachella, and Borrego Valleys. Breeding pairs have been observed along the Alamo River and near the towns of Niland and Brawley. Birds have also been observed across from the mission wash flume 3 miles north northeast of Bard and in areas around the Laguna Dam.

Le Conte's Thrasher (*Toxostoma lecontei*)

Range and Distribution

The Le Conte's thrasher is a year-round resident throughout its range (Sheppard 1996). The species can be found from central California to southwestern Utah, south to western Arizona, and Baja California and northwestern Mexico (Terres 1980). Specifically, it is found in the San Joaquin Valley and Mojave and Colorado Deserts of California and Nevada southward into northeast Baja California, Mexico, and farther south into central and coastal Baja California. It is found in the Sonoran Desert from extreme southwest Utah and western Arizona south into west Sonora, Mexico. Within its range, its distribution is patchy with the southernmost occurrence in Mexico at about 26ºN latitude and northernmost in northwestern Sonora, Colorado (Sheppard 1970). In California, the species occurs in southern California deserts and in western and southern San Joaquin Valley (Garret and Dunn 1981). The species may have historically extended north to Fresno and Mono Counties (Zeiner et al. 1990).

Population Status and Threats

Numbers of Le Conte's thrasher have declined in recent decades. The species is vulnerable to off-road vehicle activity and other mechanical disturbances, including agriculture and development (Zeiner et al. 1990). Shooting may be a factor in human-related deaths (Sheppard 1996). Habitat loss due to degradation, fragmentation, agricultural conversion, irrigation, urbanization, oil and gas development, fire, and over-grazing are the primary reasons for the decline of the species (Brown 1996). Thse factors continue to threaten the survival of this species.

Habitat Requirements

Le Conte's thrasher occurs in open desert wash, desert scrub, alkali desert scrub, and desert succulent shrub habitats on sandy and often alkaline soils (Zeiner et al. 1990; Unitt 1984; and Sheppard 1970). Desert shrubs and cacti are frequently used for cover (Sheppard 1970). This species often inhabits areas where soil is fine alluvium or sandy and topography is flat and open, including dunes and gently rolling hills (Sheppard 1996; Miller and Stebbins 1964). Le Conte's thrasher requires areas with an accumulated leaf litter under most plants as diurnal cover for its mostly arthropod prey. Surface water rarely exists anywhere within several miles of most of its territories except temporarily after infrequent rains. Le Conte's thrashers nest in dense, spiny shrubs or densely branched cactus. Typical nest sites are characterized by shade above the nest and may be located in an arroyo in relatively deep shade from overhanging branches and roots (Sheppard 1996). Nests are known to persist for several years and are often easier to find than the birds (Miller and Stebbins 1964).

Habitat in the Proposed Project Area

The creosote bush scrub community is widespread throughout the nonirrigated areas of the Sonoran Desert. In the HCP area, the occurrence of this community is limited to the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

The USFWS (1997) reports LeConte's thrasher as an extirpated breeder at the Salton Sea NWR with no recent breeding records. Breeding pairs have been observed in desert scrub habitat east of the Coachella Canal, suggesting the potential for them to occur in desert scrub habitat adjacent to the AAC as well.

Loggerhead Shrike (*Lanius ludovicianus*)

Range and Distribution

Loggerhead shrikes formerly nested throughout much of North America, from Canada south through the Great Basin, along the Gulf Coast, and south to Florida and Mexico (Terres 1980; Cade and Woods 1997). Their range is currently more restricted, encompassing mainly the southern portions of the historic range.

Population Status and Threats

The loggerhead shrike underwent northeastern and north-central range expansions in the late 1800s and early 1900s that were attributed to deforestation and expansion of agriculture (Cade and Woods 1997). Since the 1940s, there has been a contraction of the range, especially in the north, and an overall decrease in abundance that is associated with reforestation, loss of pasture lands, and expansion of intensive row crop agriculture. Christmas Bird Count and breeding bird survey data show that since 1966, there has been an overall decreasing trend in the abundance of loggerhead shrikes across North America, although some locations have stable or increasing populations. Loggerhead shrikes have always been most abundant in the southern and western parts of their range. They appear to be increasing, especially as a winter resident, in the LCR Valley (Rosenberg et al. 1991). The increase in abundance during the winter is attributed to the expansion of agriculture in the valley, which provides suitable wintering habitat.

The primary reasons loggerhead shrikes are thought to have declined are loss and degradation of breeding habitat (Cade and Woods 1997). The pattern of historical range expansion and contraction indicates that natural successional changes in vegetation and human-caused landscape changes have made habitat suitable or unsuitable and that loggerhead shrike populations have tracked these habitat suitability changes. With the decreasing availability of farmland in the Northeast, there has been a decline in the range and abundance of breeding loggerhead shrike. Pasture lands, which have declined even more than other types of farmlands, are especially important to shrikes. Certain types of agriculture do not produce suitable loggerhead shrike habitat, such as intensive, chemically treated row crop monocultures. In the West, localized declines are usually attributed to habitat loss from urbanization and intensive modern agriculture practices. Habitat loss remains the primary threat to this species.

Other causes of decline that have been suggested include possible adverse effects from pesticides, especially organochlorines that can cause eggshell thinning and reduced reproductive success (Cade and Woods 1997). However, at this time, there is no evidence for a direct impact from pesticides; rather, it may be that pesticides have a stronger indirect effect by reducing insect prey abundance. Other factors contributing to the decline of loggerhead shrike populations include collisions with automobiles and predation by domestic and feral cats.

Habitat Requirements

Loggerhead shrikes prefer open country, such as grasslands, meadows, scrublands, deserts, pastures, and certain ruderal or agricultural lands (Terres 1980; Cade and Woods 1997). For nesting, they require suitable nesting shrubs or small trees and hunting perches in an open area with grassy or herbaceous ground cover and bare areas where food is often found (Cade and Woods 1997). Loggerhead shrikes breed in sparse riparian woodland and desert washes in the Colorado River area. Loggerhead shrikes nest in shrubs or trees, and eggs are laid from February to July.

Shrikes are carnivorous, eating a variety of prey including mice, small birds, reptiles, insects (e.g., grasshoppers, crickets, and beetles), and spiders (Terres 1980; Rosenberg et al. 1991). Prey is hunted from perches, the ground, or in aerial pursuit. Thorny trees and bushes or barbed wire are used to impale and store prey.

Recommended management strategies for the loggerhead shrike include providing a mosaic of disturbed grassland patches or pasture lands the size of typical territories within monocultures of row crops (Gawlik and Bildstein 1993; Cade and Woods 1997). Habitat should be managed away from major roads, given the propensity for shrikes to be killed by automobiles (Cade and Woods 1997). Other recommendations include fencing shrub patches from livestock to provide nesting sites and increasing the number of hunting perches where they are scarce (Yosef 1996).

Habitat in the Proposed Project Area

In the proposed project area, habitat for loggerhead shrikes consists mainly of agricultural fields. Vegetation along agricultural drains may be used as perch sites from which loggerhead shrikes forage in adjacent agricultural fields. Nesting may also occur in these habitats. Loggerhead shrikes use urban areas with trees in the Imperial Valley.

Proposed Project Area Occurrence

The loggerhead shrike is a year-round resident at the Salton Sea and Imperial Valley known to occur near the town of Clipatria and areas south of the Salton Sea. The species is known to breed in the vicinity (USFWS 1997b). Ten drains were surveyed in the Imperial Valley during 1994 to 1995. Loggerhead shrikes were detected along 7 of the 10 drains. Numbers recorded ranged from 1 to 11 individuals.

Arizona Bell's Vireo (*Vireo bellii arizonae*)

Range and Distribution

The Arizona Bell's vireo is distributed throughout the river systems of the desert Southwest from the Colorado River in southeastern California to the Grand Canyon. It is a summer resident along the LCR.

Population Status and Threats

Since 1900, populations of this subspecies of Bell's vireo have declined along the lower reaches of the Colorado River where it is now a rare to locally uncommon summer resident from Needles south to Blythe (Brown et al. 1983; Zeiner et al. 1990; and Rosenberg et al. 1991). This subspecies has also declined along the lower reaches of the Gila, Santa Cruz, and Salt Rivers. At higher elevations, it has remained common throughout its range (Hunter et al. 1987). Since the completion of Glen Canyon Dam in 1963, the Arizona Bell's vireo has been expanding its range eastward along the Colorado River into Grand Canyon National Park (Brown et al. 1983). Construction of Glen Canyon Dam has prevented seasonal flooding that formerly scoured the banks of the river and has allowed an extensive riparian scrub to develop in the old high-water zone. This newly created habitat is largely composed of salt cedar and willow species and supports significant populations of Arizona Bell's vireo (Brown et al. 1983). Grand Canyon populations of the Arizona Bell's vireo are regionally significant due to the substantial decline of this subspecies at lower elevations. Elsewhere along the LCR, the Arizona Bell's vireo is now a rare to locally uncommon summer resident from Needles south to Blythe (Zeiner et al. 1990; Rosenberg et al. 1991).

The decline of this subspecies is primarily due to extensive habitat loss and degradation and heavy nest parasitism by brown-headed cowbirds (Rosenberg et al. 1991; CDFG 1992). Current threats to this subspecies include the continued loss and degradation of habitat due to urbanization, water and flood control proposed projects, agriculture, livestock grazing, introduced competitors, exotic invasive plants, off-road vehicles, and nest parasitism by brown-headed cowbirds (Brown 1993; CDFG 1992; and Rosenberg et al. 1991). Populations of the Arizona Bell's vireo appear to be regulated primarily by the availability of suitable nesting habitat and secondarily by the rate of cowbird parasitism (Brown 1993). The Arizona Bell's vireo is a California state endangered species.

Habitat Requirements

The Arizona Bell's vireo is an insectivorous, neotropical migrant that breeds in summer in riparian scrub habitats (Brown 1993; Rosenberg et al. 1991; and CDFG 1992). Bell's vireos are insectivorous, gleaning insects from foliage and branches close to the ground (CDFG 1999a). At low elevations, this subspecies is largely associated with early successional cottonwood-willow. Serena (1986) found that Goodding willow was the most important plant contributing to cover around vireo nest sites in the LCR Valley. The near dependence of this subspecies on cottonwood-willow habitats at low elevations may be due to the extremely high mid-summer temperatures that exist outside these habitats (Walsberg and Voss-Roberts 1983; Hunter et al. 1987). At higher elevations (above 427 meters [1,400 feet]), the Arizona Bell's vireo uses tamarisk and honey mesquite, as well as cottonwood-willow habitats (CDFG 1992; Hunter et al. 1987; and Rosenberg et al. 1991). The elevational differences this subspecies exhibits in its breadth of habitat use is typical of many

southwestern riparian birds and appears to be related to the availability of appropriate nest-site environments that may be constrained by restricted thermal tolerances (Hunter et al. 1987). Most nests are located 1.5 to 4.5 feet above ground and are generally suspended from small, lateral, or terminal forks of low branches in dense bushes; small trees; and, occasionally, herbaceous vegetation. In the Grand Canyon, 77 (64 percent) of 121 vireo nests were located in shrub salt cedar and 29 (24 percent) in honey mesquite (Brown 1993).

The Arizona Bell's vireo is a frequent host of the brown-headed cowbird. Although the percentage of cowbird eggs hatched relative to the number laid in vireo nests is low, cowbird parasitism significantly reduces vireo productivity through nest abandonment, the destruction or removal of both eggs and young, and nestling competition (Brown 1993; CDFG 1992; and Rosenberg et al. 1991).

Habitat in the Proposed Project Area

Cottonwood-willow habitat is largely absent from the proposed project area. Seepage from the AAC supports a small area of this habitat between Drops 3 and 4. Tamarisk is also common in this area and other areas receiving seepage from the AAC and along the New and Alamo Rivers. In addition to these areas, tamarisk stands develop along agricultural drains and in areas receiving seepage from unlined canals in the Imperial Valley. While tamarisk provides habitat in parts of the Arizona Bell's vireo range, the extreme temperatures that occur in summer months in the proposed project areas likely preclude extensive utilization of this habitat.

Proposed Project Area Occurrence

Arizona Bell's vireos are not known to occur in the Imperial Valley, and the potential for this species to occur in the Imperial Valley in the future is low (IID 1994). Arizona Bell's vireos have been observed in eastern Imperial County near Bard Lake and Laguna Dam. In the proposed project area, Arizona Bell's vireo is most likely to occur in habitats supported by seepage from the AAC.

Least Bell's Vireo (*Vireo bellii pusillus*)

Range and Distribution

Least Bell's vireos migrate from their wintering ground in Southern Baja California to Southern California between mid-March and early April to Southern California, where they remain until July or August.

Population Status and Threats

The breeding populations north of the U.S.-Mexico border now number only about 400 pairs. Least Bell's vireo currently breeds in only a few scattered areas of riparian habitat in Southern California along the coast and western edge of the Mojave Desert. The decline in least Bell's vireo is related to the loss of riparian habitat. As much as 90 percent of the original extent of riparian woodlands in California has been eliminated, and most of the remaining 10 percent is in a degraded condition. Additionally, widespread habitat losses have fragmented most remaining populations into small, disjunct, widely dispersed subpopulations (Franzreb 1989). The spread of agriculture, excessive livestock grazing,

recreational activities, and brown-headed cowbirds continue to threaten the remaining populations.

Habitat Requirements

For breeding, least Bell's vireos are associated with riparian woodlands consisting of willows, cottonwoods, and wild blackberry, and, in desert locations, mesquite. Dense thickets of willow and other low shrubs are used for nesting and roosting sites (CDFG 1999a). Areas containing a high proportion of degraded habitat result in lower reproductive success than areas with high quality riparian woodlands (Pike and Hays 1992). Least Bell's vireos glean insects from foliage and branches, and usually forage close to the ground (CDFG 1999a). Least Bell's vireos are highly territorial and sensitive to many forms of human disturbance including noise, night lighting, and consistent human presence in an area. Excessive noise can cause least Bell's vireo to abandon an area.

Habitat in the Proposed Project Area

High quality breeding habitat for least Bell's vireo does not occur in the proposed project area. Tamarisk thickets along the New and Alamo Rivers and irrigation canals and drains could be used by least Bell's vireo during migration. Habitats that least Bell's vireos use while migrating are not well known, but least Bell's vireos are assumed to use riparian habitats similar to those used for breeding during migration, if such habitats are available. In addition, small wetland areas that support some willows and cottonwoods along the AAC could also be used temporarily by least Bell's vireo but are not expected to support breeding pairs.

Proposed Project Area Occurrence

The least Bell's vireo is a rare and local summer resident in lowland riparian woodlands along the LCR (Garrett and Dunn 1981). In the proposed project area, the subspecies is known to occur accidentally only during migration. Only two records of the least Bell's vireo exist at the Salton Sea NWR (USFWS 1997b). Breeding has not been reported at the Salton Sea or elsewhere in the proposed project area.

Tricolored Blackbird (*Agelaius tricolor*)

Range and Distribution

The tricolored blackbird occurs primarily in California's Central Valley in coastal districts from Sonoma County south. In this portion of its range, it is a year-round resident. In northeastern California, where the species is present only during summer, it occurs regularly only at Tule Lake; but breeding pairs have been observed in some years as far south as Honey Lake. In southern deserts, tricolored blackbirds are found regularly only in Antelope Valley, Los Angeles County (CDFG 1999a). In winter, tricolored blackbirds become more widespread along the central coast and San Francisco Bay area (Grinnell and Miller 1944; McCaskie et al. 1979; and Garrett and Dunn 1981).

Population Status and Threats

Tricolored blackbird populations have declined in recent decades, probably due to habitat loss (Kaufman 1996; DeHaven et al. 1975). Because tricolored blackbirds nest in large, dense

colonies, they are vulnerable to nest destruction by mammalian and avian predators (Bent 1958). Currently, the tricolored black bird is a federal sensitive species and a California state species of special concern. Habitat loss remains the primary threat to this species.

Habitat Requirements

Tricolored blackbirds roost in large flocks in areas with emergent wetland vegetation, especially cattails and tules, and in trees and shrubs adjacent to wetland areas (Terres 1980). Tricolored blackbirds forage on the ground in croplands, grassy fields, flooded lands, and along edges of ponds (CDFG 1999a). In California, insects and spiders composed 86 to 91 percent of the nestling and fledgling diet, and 28 to 96 percent of adult diet in spring and summer (Skorupa et al. 1980). The fall and winter diet is composed primarily of seeds and cultivated grains, such as rice and oats.

Tricolored blackbirds nest near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, and tall herbs. The nest is usually located a few feet over, or near, fresh water or may be hidden on the ground among low vegetation (CDFG 1999a). This species is highly colonial often nesting in a minimum colony of about 50 pairs (Grinnell and Miller 1944).

Habitat in the Proposed Project Area

Potentially suitable habitat for tricolored blackbirds occurs in the managed wetlands of the state and federal wildlife refuges, in other wetlands adjacent to the Salton Sea, along agricultural drains, and in marsh communities supported by seepage from the main water delivery canals. The wetlands on the state and federal refuges probably provide the greatest habitat value since these areas support more cattails and bulrushes in larger patches than other areas of marsh vegetation in the proposed project area. The agricultural drains support only limited amounts of cattails and bulrushes in small patches. More commonly, vegetation along the agricultural canals consists of common reed and tamarisk. Red-winged blackbirds and yellow-headed blackbirds are common and abundant in common reeds along drains in Imperial Valley (Hurlbert et al. 1997), and tricolored blackbirds may similarly find suitable habitat conditions in these areas. Agricultural fields in the area provide suitable foraging habitat.

Proposed Project Area Occurrence

Tricolored blackbirds are rare in the proposed project area. They are not known to breed in the proposed project area, but may occur during spring and winter (USFWS 1997b; Garrett and Dunn 1981). Two records for this species exist for the Salton Sea NWR (USFWS 1997b; Reclamation and IID 1994), and one tricolored blackbird was observed along the Holtville Main Drain during surveys of selected drains in the Imperial Valley in the mid-1990s (Hurlbert et al. 1997).

Yellow Warbler *(Dendroica petechia)*

Range and Distribution

During its summer breeding season, the yellow warbler can be found throughout the U.S. into Canada and Alaska (Kaufman 1996). Yellow warblers migrate to Central and South America where they winter. Their current breeding range in California includes the Great

Basin, Sierra Nevada, Cascade Ranges, Klamath Mountains, Coast Ranges, and northern Sacramento Valley (Zeiner et al. 1990). The yellow warbler is locally common in the central and northern Coast Ranges (Remsen 1978).

Population Status and Threats

Small (1994) reports that the breeding population of yellow warblers in California has been declining since the 1930s. The two primary reasons for declines in yellow warbler populations are the loss of riparian forests, particularly in the Sacramento and San Joaquin Valleys, and nest parasitism by the introduced brown-headed cowbird (Remsen 1978). Along the north coast and Cascade region, populations are thought to be relatively stable, not having experienced similar declines as those in the interior lowlands. A negative trend (nonsignificant) in abundance was noted in the western states by Robbins et al. (1986). The yellow warbler has declined considerably in the coastal lowlands and may be extirpated as a breeder from the Colorado River (Garrett and Dunn 1981). Pesticide use and habitat loss on wintering grounds in South America may have also played a role in the observed declines of this species. Habitat loss and nest parasitism continue to threaten this species.

Habitat Requirements

Yellow warblers nest in riparian scrub and riparian forest habitats from lowland riparian areas up to the mixed north-slope forest zone. Breeding birds are closely associated with alder-cottonwood-willow stands (Harris 1991), but they will apparently also nest in the shrub-sapling stage of Douglas-fir forest (Meslow and Wight 1975). Nests are typically placed low (3 to 6 feet) in shrubs and trees in deciduous riparian habitat (Beedy and Granholm 1985; Zeiner et al. 1990). The species forages mainly in deciduous riparian habitat, but also in adjacent stands of woodlands and conifer forests (Marcot 1979). On the Colorado River, transients are found in any dense riparian vegetation including salt cedar, as well as other exotic trees (Rosenberg et al. 1991). Insects are the primary food item, but yellow warblers will occasionally eat berries.

Habitat in the Proposed Project Area

Cottonwood / willow habitat is largely absent in the proposed project area. It is primarily limited to a seepage area between Drops 3 and 4 along the AAC. Agricultural drains support tamarisk as well as dense stands of common reed that potentially provide suitable habitat for yellow warblers. Tamarisk scrub habitat along the Salton Sea and the New and Alamo Rivers could similarly support yellow warblers. In addition to these areas, chats may use tamarisk and common reed thickets that have invaded areas of the state and federal refuges.

Proposed Project Area Occurrence

The yellow warbler is a common spring and fall migrant and a rare winter visitor to the Salton Sea area (USFWS 1997b). Small numbers regularly winter in the Imperial Valley (Garrett and Dunn 1981) and have been observed near the towns of Niland and Calexico. Yellow warblers were detected along 6 of the 10 drains surveyed in the Imperial Valley during 1994 to 1995, where numbers recorded ranged from 1 to 20 individuals (Hurlbert et al. 1997).

Yellow-Breasted Chat (*Icteria virens*)

Range and Distribution

The yellow-breasted chat's range extends throughout most of the western U.S. and into Mexico (Kaufman 1996). The winter range of this migratory species extends south into Central and South America. This species is a summer resident in Imperial County.

Population Status and Threats

Small (1994) reports that the species has declined throughout California. The loss of riparian forests and nest parasitism by the introduced brown-headed cowbird have been implicated as the primary contributors to this decline (Small 1994). Both these factors have affected populations in the interior lowlands and southern coast of California. Along the north coast, populations are thought to be relatively stable, not having suffered from similar declines (Remsen 1978). Habitat loss on wintering grounds in South America may have also played a role in the observed decline of this species. Habitat loss and nest parasitism continue to threaten this species.

Habitat Requirements

In Northern California, the yellow-breasted chat occurs in well-developed riparian habitats (Harris 1991). Nesting habitat consists of very dense scrub; brushy thickets; and briery tangles (usually willows, blackberry, and grapevines), which are generally adjacent to streams, ponds, or swamps (Zeiner et al. 1990; Kaufman 1996). This species prefers various types of edge habitat, including grass-shrub, shrub-forest, and water-shrub. Occasionally, they will nest in dry overgrown pastures and in upland thickets along the margins of wooded areas (Kaufman 1996). Hunter et al. (1988) found that chats will use the exotic salt cedar; however; they do not report the frequency of nest placement in salt cedar. Brown and Trosset (1998) report that chats nest in tamarisk and native shrubs in proportion to the occurrence of the different types of vegetation. Territory size is up to 4 acres (Brown 1985). Dennis (1958) noted that nesting chats never occupied habitat patches less than 3 acres. Up to half of their diet may be berries and fruit, which explains their preference for shrubby thickets in nonforested areas (Kaufman 1996).

Habitat in the Proposed Project Area

Well developed riparian habitat is largely absent from the proposed project area. Willows and mesquite occur in seepage areas adjacent to the AAC and in a few areas adjacent to the Salton Sea. Agricultural drains and areas along the New and Alamo Rivers support tamarisk as well as dense stands of common reed that potentially provide suitable habitat for yellow-breasted chats. In addition to these areas, chats may use tamarisk and common reed thickets that have invaded areas of the state and federal refuges.

Proposed Project Area Occurrence

Yellow-breasted chats are occasional migrants and summer residents in the proposed project area. They are known to breed in riparian and wetland areas around the Salton Sea (Salton Sea Authority and Reclamation 2000). The species also occurs in Eastern Imperial County near Bard and the Laguna Dam. The species has been observed along the AAC across from the mission wash flume, 3 miles NNE of Bard in scattered mature cottonwoods

with a dense understory of cattails and introduced palm trees, surrounded by salt cedar and agricultural fields (CNDDB).

Large-Billed Savannah Sparrow *(Passerculus sandwichensis rostratus)*

Range and Distribution

The large-billed savannah sparrow is a Mexican subspecies of savannah sparrow that breeds in marshes around the head of the Gulf of California, particularly in the delta of the Colorado River (Unitt 1984). It was formerly common in winter along the California coast, primarily from Santa Barbara south, and was recorded as far north as San Luis Obispo County. Its winter range also included the Channel Islands. In California, this subspecies is now a rare to uncommon postbreeding visitor to the Salton Sea and Southern California coast from mid-July through March or April, when it returns to the Colorado River Delta to breed (Garrett and Dunn 1981).

Population Status and Threats

The large-billed savannah sparrow was once widespread in salt marshes and on beaches along the coast of Southern California. The decline of the large-billed Savannah sparrow is attributed to breeding habitat alterations in the Gulf of California and the lower reaches of the Colorado River (Unitt 1984; Garrett and Dunn 1981). The status of the large-billed Savannah sparrow in California is uncertain. It has been stated that "many" of these birds migrate to Southern California marshes (Zink et al. 1991), but also that the migrating portion of that population is "reduced or extinct" (Wheelwright and Rising 1993). Its decline may be partially caused by the drying up of marshes at the mouth of the Colorado River. Habitat loss remains the primary threat to this species.

Habitat Requirements

In winter, large-billed Savannah sparrows are generally associated with saltmarsh, mudflats, and low coastal strand vegetation. At the Salton Sea, they are found primarily in tamarisk scrub (Garrett and Dunn 1981). Like other Savannah sparrows, the large-billed Savannah sparrow is omnivorous and probably eats mostly insects, seeds, tiny crustaceans, and mollusks. Grasses and other weeds are also likely consumed (Kaufmann 1996; Rosenberg et al. 1991).

Habitat in the Proposed Project Area

In the proposed project area, large-billed savannah sparrows are known to use only tamarisk scrub near mouths of the New and Alamo Rivers at the Salton Sea (Garrett and Dunn 1981). However, given this association with tamarisk at the Salton Sea, large-billed Savannah sparrows may also use tamarisk scrub throughout the proposed project area.

Proposed Project Area Occurrence

This subspecies of Savannah sparrow is a rare to uncommon postbreeding and winter visitor to the Salton Sea area. It occurs in the proposed project area from mid-July through the winter, migrating to the Colorado River Delta and Mexico to breed (Garrett and Dunn 1981).

Summer Tanager (*Piranga rubra*)

Range and Distribution

The summer tanager is a neotropical migrant that breeds throughout most of the southeastern and southwestern U.S., including New Mexico, Arizona, southern Nevada, and southeast California. This species winters from Southern Baja California and central Mexico south to South America (Terres 1980; Robinson 1996).

Population Status and Threats

Although summer tanagers are still common and widespread in many areas, their range may be contracting in the eastern U.S.; they have experienced sharp declines along the LCR (Ehrlich et al. 1988; Kaufmann 1996; and Robinson 1996). Elsewhere in the Southwest, summer tanagers are believed to have been extirpated from the lower Gila, Santa Cruz, and Salt Rivers (Hunter et al. 1987). Along the LCR, the severe decline of this species since the 1970s is attributed to the continuing loss of mature cottonwood-willow habitat. Summer tanagers were still fairly abundant in the area until the early 1980s, when severe flooding at Bill Williams Delta and along the Colorado River mainstream resulted in a 36 percent population decrease. After the flooding, only 138 individuals were estimated to occur in the entire valley, while population densities at Bill Williams Delta dropped from 16 to 24 birds per 100 acres to 6 to 10 birds per 100 acres (Rosenberg et al. 1991). Based on these trends, it appears that the summer tanager may become extirpated as a breeding species along the LCR (Rosenberg et al. 1991). The continuing loss of structurally well developed stands of cottonwood-willow riparian forest is the primary threat to this species in the Southwest (Rosenberg et al. 1991; Hunter et al. 1987). However, the summer tanager is still common and abundant elsewhere within its range (Kaufman 1996). The summer tanager is a California state species of special concern.

Habitat Requirements

In the southwestern U.S., summer tanagers occur primarily in cottonwood-willow forests along rivers and streams but can also occur in tamarisk stands along the Colorado River. The species is generally found in association with tall riparian trees, suggesting that canopy height may be a more important factor than species composition in the tanager's selection of foraging and nesting habitats (Rosenberg et al. 1991). Summer tanagers forage mainly in the tops of tall riparian trees for insects. In the Southwest, this species feeds heavily on cicadas, bees, and wasps. It also eats a variety of other insects (e.g., caterpillars, beetles, spiders, and flies) and berries and small fruits (Kaufmann 1996; Terres 1980; and Rosenberg et al. 1991).

Habitat in the Proposed Project Area

Cottonwood/willow habitat is of limited size and distribution in the proposed project area, occurring primarily in the seepage areas along the AAC between Drops 3 and 4. Most riparian areas in the proposed project area are dominated by tamarisk, which may provide suitable habitat along the New and Alamo Rivers, adjacent to the Salton Sea, and along agricultural drains.

Proposed Project Area Occurrence

Summer tanagers are rare in the proposed project area during summer and winter. They are more common in winter but are still considered only occasional visitors (USFWS 1997b). The summer tanager breeds along the Colorado River and has been observed between the Laguna and Imperial Dams in areas with willow, mesquite, and salt cedar (CDFG 1999b). Known or suspected nesting localities outside the Colorado River are Brock Ranch (Imperial County), Borrego Springs (San Diego), Thousand Palms Oasis (Riverside), Palm Springs (Riverside), Whitewater Canyon (Riverside), Morongo Valley (San Benito), Tecopa (Inyo), Mohave River, and Valyermo (Lassen) (Garrett and Dunn 1981). These reports of breeding in arid regions outside the Colorado River indicate that summer tanagers could breed in the proposed project area.

Mammals

Mexican Long-Tongued Bat (*Choeronycteris mexicana*)

Range and Distribution

This species is known from Venezuela northward through Central America and Mexico to southeastern Arizona, southwestern New Mexico, and San Diego, California.The Mexican long-tongued bat reaches the northern limit of its range just across the U.S.–Mexico international border. Only adult females migrate into the U.S., but juvenile bats of both sexes wander widely after they leave the maternity roost (AGFD 1997). In New Mexico and Arizona, long-tongued bats have been found at elevations ranging from sea level to 6,000 feet, occupying desert and montane riparian, desert succulent shrub, desert scrub, and pinyon-juniper habitats. In California, the long-tongued bat is known only from San Diego County. An invasion in 1946 provided most of the California records for long-tongued bats (Olson 1947). California records largely have been in urban habitat in San Diego (Olson 1947).

Population Status and Threats

No information is currently available regarding the density of natural populations. Populations fluctuate as this species is only a summer resident of Arizona (AGFD 1997). Since 1906, fewer than 1000 individuals have been documented throughout the range of this species (Cryan and Bogan 2000). While the biology and population status remain poorly understood, some authors believe that numbers are declining for this species (AGFD 1997) and roost disturbance by human activity is thought to be an important factor. Other authors believe that there is no evidence to support the idea that numbers are declining (Cryan and Bogan 2000). Threats to this species include recreational caving; natural and intentional mine closures; renewed mining activity; mine reclamation; and loss of food plants as a result of development, agriculture, and grazing (Noel 1998). Agave harvests in Mexico may affect *C. mexicana*, as the nectar and pollen of agave and saguaro flowers comprise a major portion of their diet (AGFD 1988). Fluctuations in food resources, both natural and anthropogenic, may influence the seasonal distribution of this species and may result in changes in numbers in any given region (Cryan and Bogan 2000).

Habitat Requirements

The Mexican long-tongued bat occurs in a variety of habitats, ranging from arid scrub habitats to mixed oak-conifer forests (Arroyo-Cabrales et al. 1987) and semidesert grasslands (Cryan and Bogan 2000). It favors desert canyons with riparian vegetation. In Mexico, New Mexico, and Arizona, this bat occupies deep canyons of desert mountain ranges. A variety of roost sites is used, including caves, mines, buildings, and trees. Most roost sites are located near a water source and near areas of riparian vegetation (Cryan and Bogan 2000). Caves, mines, and probably buildings are used as nursery sites. This species forages in desert and montane riparian, desert scrub, desert succulent shrub, and pinyon-juniper habitats. The long-tongued bat feeds mainly on nectar, fruit, and pollen.

Habitat in the Proposed Project Area

Desert scrub is widespread throughout the nonirrigated areas of the Sonoran Desert. This habitat type surrounds the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community. Succulent shrubs comprise a minor component of the vegetation community, and foraging habitat may be limited. The only portion of the HCP area that supports desert scrub habitat is in the right-of-way of IID on the AAC.

While mining activity has occurred throughout Imperial County, the nearest abandoned mine shafts are located near Hedges at the southwestern tip of the Cargo Muchacho Mountains, well outside of the proposed project area. Areas along the AAC supporting cottonwoods, landscape trees, and buildings may provide roosting sites.

Proposed Project Area Occurrence

This species has not been reported to occur in Imperial County; however, the area is within the distributional range of the species. The limited availability of roosting sites and potentially sparse forage makes the occurrence of this species unlikely in the proposed project area.

California Leaf-Nosed Bat (*Macrotus californicus*)

Range and Distribution

California leaf-nosed bats range from coastal and eastern California to western New Mexico, and from southeastern Nevada south into Baja California, northern Sinaloa, and southwestern Chihuahua, Mexico (AGFD 1997d; Hall 1981).

Population Status and Threats

The status of this bat remains unknown (USFWS 1994). In Southern California, this species has disappeared from most coastal basins and declined in many other areas. In Nevada, no recent sightings of this species have been reported (NNHP 1997). Like many cave dwelling bats, loss of foraging habitat and disturbances at roost sites are thought to be responsible for the declines (Williams 1986). Filling or plugging of cave and abandoned mine entrances, intrusion by explorers, and renewal of historic mining sites may also be contributing factors.

This species is particularly susceptible to human disturbance that may cause abandonment of roosts during the breeding season. The impact of human disturbance on roost sites may be significant due to the specific thermal regime required for maternity roosts. Closing of

mines and caves or improper gating of entrances can also affect colonies (AGFD 1996). The AGFD (1997b) describes modification of cave conditions, including changes in air movement, humidity, and temperature, as potentially serious concerns for this species. In some situations, roosting sites remain intact, but nearby foraging habitat is lost due to development, agriculture, or grazing. Habitat loss and human disturbance remain the primary threats to this species.

Habitat Requirements

California leaf-nosed bats occur in arid regions, using habitats such as desert scrub, alkali scrub, desert washes, riparian associations, and palm oases (Zeiner et al. 1990). The California leaf-nosed bat is known from caves, mines, and rock shelters, mostly in Sonoran desert scrub (AGFD 1997d). Like most bats, this species often forages near open water where greater quantities of insects are available. The species uses separate daytime and nighttime roosts. During winter months, the California leaf-nosed bat forms large colonies in only a few geothermally heated mines in the deserts of the Southwest (Brown and Berry 1991). Day roosts are often in deeper caves or mines and occasionally in abandoned structures (Zeiner et al. 1990). This species requires warm roosts with temperatures of 80.6°F or more due to its inability to lower its body temperature and become torpid (Bell 1985). Maternity colonies are generally located in mines with temperatures that reach 80.6° to 89.6°F. California leaf-nosed bat roost sites typically have high ceilings and room for flight. Roosting takes place far enough from the entrance (30 to 80 feet) to take advantage of the humidity and moderate temperatures of the cave (Vaughan 1959). Night roosts are in bridges, mines, buildings, overhangs, or other structures with overhead protection (Zeiner et al. 1990). The species may form colonies of up to 500 individuals (Zeiner et al. 1990).

California leaf-nosed bats forage for insects within 3 feet of the ground by hovering and picking prey off vegetation or the ground. This species feeds on large flying insects, such as grasshoppers, moths, and beetles (AGFD 1997b). Foraging ranges are small, with most activity within a mile of day roosts in winter months and up to 5 miles during summer months (Brown, pers. comm.). The presence of woody riparian vegetation, such as mesquite, ironwood, and palo verde, is required in foraging areas. California leaf-nosed bats do not hibernate, and some populations migrate south for the winter.

Habitat in the Proposed Project Area

California leaf-nosed bats use caves and mines as day roosts. The only mine shafts in the area occur near Hedges, at the southwestern tip of Cargo Muchacho Mountains. Plant species preferred for foraging (mesquite, palo verde, ironwood) are rare in the proposed project area and restricted to scattered patches along the AAC. It is unknown whether they forage in riparian areas dominated by tamarisk.

Proposed Project Area Occurrence

Leaf-nosed bats are known to feed on grasshoppers, beetles, cicadas, and moths in various places along the Colorado River (Hoffmeister 1986). Roost sites have been reported in several abandoned mines in the Chocolate and Carago Muchacho Mountains. However, the lack of daytime roost sites along with the scarcity of suitable foraging habitat makes the occurrence of this species in the proposed project area unlikely.

Pallid Bat *(Antrozous pallidus)*

Range and Distribution

The pallid bat has a wide range extending from southern British Columbia and Montana into Central Mexico and east to Texas, Oklahoma, and Kansas (Sherwin 1998). It is a year-round resident of grassland and desert habitats in the southwestern U.S. (Hermanson and O'Shea 1983). The pallid bat is a locally common species of low elevations in California where it occurs throughout most of the state, except the high Sierra Nevada from Shasta to Kern Counties and the northwestern corner of the state from Del Norte and western Siskiyou Counties to northern Mendocino County.

Population Status and Threats

The pallid bat is a California state species of concern due to limited population numbers. Current threats include mine closures; human disturbance of roost sites; extermination in buildings; pesticides; and loss of foraging areas due to urban development, logging activities, and vineyard development (Sherwin 1998).

Habitat

The pallid bat typically roosts in rock crevices but will also use caves, mines, buildings, and trees. It primarily forages on ground-dwelling arthropods, such as scorpions, crickets, and grasshoppers (Hermanson and O'Shea 1983).

The pallid bat is most often found in arid, low-elevation habitats, including grasslands, shrublands, woodlands, and forests. These bats are nocturnal and emerge up to an hour after sunset. Day roosts include caves, crevices, mines, trees, and buildings. Night roosts are generally in more open sites and are near day roosts. Horizontal crevices with stable temperatures are preferred day roosts in summer; vertical crevices with fluctuating temperatures are preferred during cooler periods. Pallid bats are relatively inactive during the winter and may hibernate. Migrational patterns include local movements to hibernacula and a postbreeding season dispersal.

Habitat in the Proposed Project Area

Pallid bats are well adapted to human environments and frequently use buildings, bridges, and trees as roosts. Thus, they could roost throughout the proposed project area. Foraging may also occur throughout the proposed project area in any habitat where insect prey is abundant, including agricultural areas, wetlands, riparian areas, canal drains, and desert scrub.

Proposed Project Area Occurrence

While specific populations have not been identified in the proposed project area, roosts have been identified in the general proposed project vicinity at the Mary Lode Mine in the Chocolate Mountains and in the Queen Incline and the Mesquite Adit near the Tumco wash in the Carago Muchacho Mountains.

Pale Western Big-Eared Bat *(Corynorhinus townsendii pallescens)*

Range and Distribution

The big-eared bat occurs throughout the western U.S., from southern British Columbia southward to southern California on the west and the Black Hills of South Dakota and West Texas on the east through the Mexican uplands to the Isthmus of Tehuantepec in southern Mexico. Isolated, relict populations of this species are found in the southern Great Plains and Ozark and Appalachian Mountains (AGFD 1998a; Noel and Johnson 1993). The pale western subspecies (*C. t. pallescens*) occurs in Washington, Oregon, California, Nevada, Idaho, Arizona, Colorado, New Mexico, Texas, and Wyoming (Handley 1959).

Population Status and Threats

The results of a survey performed by Pierson and Rainey (1994) suggest that drastic population declines for the pale western big-eared bat have occurred in California throughout the last 40 to 60 years. Among these declines are a 52 percent loss in the number of maternity colonies, a 44 percent decline in the number of roosts, a 55 percent decline in the number of animals, and a 32 percent decrease in the average size of remaining colonies in the state. The lower Colorado desert along the Colorado River, an area that experiences heavy recreational use, is one of three areas in California in which marked declines in the numbers of pale western big-eared bat colonies have taken place. The overall population trend appears to be declining in Arizona, as well. Currently, there are only 13 verified maternity roosts in the state, representing 10 separate colonies, with a total population of about 1,000 adult females (Pierson and Rainey 1994). More than half of the known maternity roosts are in mines, and only 4 of these roosts contain 200 or more individuals. There may be losses or reductions of maternity colonies, which are easily disturbed; these disturbances often result in abandonment (AGFD 1996). In the absence of human disturbance, maternity colonies tend to remain stable over time (Pierson and Rainey 1994).

This species is threatened by human disturbance at major maternity roosts; renewed mining; closure and sealing of abandoned mines naturally or for hazard abatement; and, possibly, the use of nontarget pesticides (AGFD 1996). Pale western big-eared bats are extremely sensitive to human disturbance, and simple entry into a maternity roost can result in the abandonment of the site (Pierson et al. 1991). This bat feeds heavily on noctid moths, which require wetland habitats. The significant loss of wetlands has resulted in a decrease in prey base for the pale western big-eared bat (ISCE 1995).

Habitat Requirements

Pale western big-eared bats can be found in a variety of habitats but are most commonly associated with Mohave mixed scrub (e.g., sagebrush, sagebrush-grassland, blackbrush, and creosote-bursage) and lowland riparian communities. It has been found in Sonoran Desert Scrub, Madrean evergreen woodland (oak woodland, oak/pine, and pinyon/juniper), and coniferous forests in Arizona. Separate day and night roosts are used. Day roosts are in caves, mines, or tunnels. Hibernation roosts are cold, but stay above freezing (Zeiner et al. 1990) and must be quiet and undisturbed. Pale western big-eared bats usually hibernate singly or in small groups and are almost always found in ceiling pockets (Pierson et al. 1991). In climatically moderate areas, this species appears to arouse from torpor frequently on warm nights to feed and changes roost locations often. In these areas, roosts are often L-

shaped, with both a vertical and a horizontal entrance that creates a cold sink and generates a strong airflow (Pierson et al. 1991). Maternity roosts are generally located in mines and caves, with the favored roost for clusters of mothers and young often in a ceiling pocket or along the walls just inside the roost entrance, well within the twilight zone (Pierson et al. 1991). The determining factor for maternity roost site selection may be temperature related. In California, maternity roosts are generally warm; the species appears to select the warmest available sites, some of which reach 30˚C (86˚F) (Pierson et al. 1991). Night roosts may be in buildings or other structures. Separate hibernation and maternity roosts are often used.

Foraging takes place over desert scrub, riparian habitats, or open water with 15 miles of the roost sites. Small moths are the primary food of this species, but other insects are also sometimes eaten (AGFD 1998a). This species has poor urine concentrating abilities compared to other bats of the region and, therefore, requires access to a nearby water supply (Zeiner et al. 1990).

Habitat in the Proposed Project Area

Pale western big-eared bats use caves and mines for roosting. The only mine shafts in the area occur near Hedges, at the southern extent of the Cargo Muchacho Mountains, which are well outside the proposed project area. Pale western big-eared bats could forage throughout the proposed project area, although they probably would concentrate foraging activities along the LCR, Salton Sea, New and Alamo Rivers, agricultural drains, and water conveyance canals, given this species' association with water. Tall tress, bridges, and buildings could be used as night roosting sites.

Proposed Project Area Occurrence

The species has been observed in eastern Imperial County near Bard. It has been reported to roost in the Senator Mine and Picacho Mine in the Chocolate Mountains. This species is known to occur in the project area.

Spotted Bat *(Euderma maculatum)*

Range and Distribution

The spotted bat has been reported from scattered locations from southern British Columbia to Montana and from coastal California, Texas, and northern Mexico (Hall 1981). In California, it is found primarily in foothills, mountains, and deserts in the southern part of the state (Zeiner et al. 1990a and 1990b). It is generally considered widespread, but rare.

Population Status and Threats

The population status of the spotted bat is not well known because of the low number of sightings reported. The spotted bat is considered one of the rarest North American mammals. The species appears linked to riparian habitats in many areas, which are generally declining throughout the species' range. The spotted bat is a federal and California state species of special concern. Current threats to this species' survival have not been identified.

Habitat Requirements

Spotted bats have been found foraging in many different habitats, especially in arid or ponderosa pine forests and marshlands. The habitat requirements and preferences of this species are varied and not well understood. It is known to occur in the openings of conifer forests in montane habitats, riparian woodlands, and desert scrub (Hoffmeister 1986; NMDGF 1997; and AGFD 1998b). Roost site localities are poorly known. This species is thought to use crevices and cracks in cliff faces, and occasionally caves and buildings for roost sites. Roots are often in the vicinity of open water (AGFD 1998b). Moths seem to be the primary food item of this species, although other insects may be consumed (AGFD 1998b).

Habitat in the Proposed Project Area

The types of habitats potentially used by spotted bats in the proposed project area are uncertain because this species' ecology is poorly known. Spotted bats could use much of the proposed project area since this species appears to be associated generally with open habitats. Foraging may be concentrated along waterways, such as the Salton Sea, New and Alamo Rivers, large canals, and agricultural drains. Potentially, spotted bats could roost at gravel quarries, highway bridges, or in buildings.

Proposed Project Area Occurrence

No information is available on the occurrence of spotted bats specifically in the proposed project area. Male spotted bats are often observed foraging near the Colorado River in and near the Grand Canyon; however, females are usually observed at higher elevations (Herder, pers. comm.). Occurrences have also been reported from the Yuma area (Hoffmeister 1986).

Western Small-Footed Myotis (*Myotis ciliolabrum*)

Range and Distribution

The small-footed myotis ranges from southern Canada south to central Mexico and from California eastward to west Texas. It is a year-round resident in California, occurring in a variety of habitat types.

Population Status and Threats

In 1996, this species was delisted as threatened by the U.S. Fish and Wildlife Department. It remains a federal species of concern. Threats to this species include loss of suitable roosting sites, habitat destruction and disturbance, and pesticide use.

Habitat Requirements

The small-footed myotis is a common bat of arid uplands in the upper Sonoran Desert. It occurs in a wide variety of habitats, primarily in relatively arid, open stands in forests, woodlands, and brushy uplands near water. The small-footed myotis feeds on a variety of small flying insects, including moths, flies, and beetles, while flying over water and among trees. It requires more water than most other bats and can be found drinking shortly after night emergence. The small-footed bat can be found roosting in caves, buildings, crevices, and under loose bark. Occasionally, it will also roost under bridges (Zeiner 1990).

Hibernation takes place in caves and mines. Summer roosts are in crevices, cracks, holes, under rocks, and in buildings (AGFD 1997). Colonies can be as large as 50 or more individuals (Zeiner et al. 1990).

Habitat in the Proposed Project Area

Areas adjacent to the Salton Sea and along the New and Alamo Rivers, agricultural drains, and possibly the water conveyance canals may be used for foraging. Because this species uses a wide variety of natural and constructed structures for roosts, suitable roost sites could occur throughout the proposed project area.

Proposed Project Area Occurrence

Historic records indicate this species has been present in the Salton Sea area (SSA and Reclamation 2000). However, the only known roost in the vicinity of the proposed project area is the Mary Lode Mine, located in the Chocolate Mountains to the northeast of the Algodones Dunes (CDFG 1999b). Still, because this bat will use buildings for roosts and forages in a diversity of habitats, it may occur throughout the HCP area.

Occult Little Brown Bat (*Myotis lucifugus occultus*)

Range and Distribution

The occult little brown bat occurs locally throughout most of the U.S. and Canada, as far north as Alaska and as far south as central Mexico. The subspecies *M. l. occultus* (identified as a separate species, *M. occultus*, by Hoffmeister [1986]) occurs throughout Arizona and into eastern California, western New Mexico, and central Mexico.

Population Status and Threats

This species is declining due to using pesticides, disturbance of nesting colonies, collecting by researchers, humans disturbing hibernating individuals, and harvesting timber that removes mature or dead trees and snags (Williams 1986; Fenton and Barclay 1980). Disturbance of hibernating colonies can cause mortality due to use of remaining fat reserves; disturbance to maternity roosts may cause abandonment. Increased exploration of caves and mines has probably caused a decrease in population numbers. Pesticide use has also caused drastic declines in some areas (Kunz et al. 1977; Clark et al. 1978). One and possibly two of the three or four known maternity roosts of this species in Arizona have been eliminated. The status of a third colony on the Verde River is unknown (AGFD 1997g). The occult little brown bat is a federal and California state species of special concern. Human disturbance and habitat loss remain the primary threats to this species.

Habitat Requirements

In the southwest, the occult little brown bat occurs in a variety of habitats, including ponderosa pine forests, oak-pine woodlands (near water), and along permanent water or in riparian forests in some desert areas (AGFD 1997g). It is usually closely associated with open water sources, such as rivers, ponds, or reservoirs, and it flies low along shorelines while foraging (Hoffmeister 1986). It often feeds over open water habitats (Zeiner et al. 1990). This species generally hunts low over water for flying insects, including mosquitoes and midges (AGFD 1997g). It roosts in hollows in living or dead trees, under rocks or wood,

or sometimes in buildings or mines (NMDGF 1997). This species seems to prefer human structures to natural ones for maternity roosts, and may use mines or caves for hibernation (AGFD 1997g). Separate day, night, hibernation, and nursery roosts are used. Seasonal movement of several hundred miles between summer roosts and winter hibernacula have been recorded (NMDGF 1997). Site fidelity is correlated to the permanence of the roost (e.g., cave verses foliage roosts). Colonies can be very large with up to 300,000 individuals (Cockrum 1956).

Habitat in the Proposed Project Area

The Salton Sea, lakes, wetlands, rivers, canals, and agricultural drains may provide suitable foraging habitat for this species. Because this species uses a wide variety of natural and constructed structures for roosts, suitable roost sites could occur throughout the proposed project area.

Proposed Project Area Occurrence

The occult little brown bat has been known to use riparian areas along the LCR (Reclamation and IID 1994); however, no recent records exist for this species in this area, and it may be extirpated in this portion of its range (Brown, pers. comm.).

Southwestern Cave Myotis (*Myotis velifer brevis*)

Range and Distribution

In the U.S., the cave myotis is found in the southwestern half of Arizona and immediately adjacent areas of California, Nevada, and New Mexico (AGFD 1997c). It is also found in west and south Texas and Oklahoma, then southward through Mexico to Guatemala. In California, the southwestern subspecies is restricted to lowlands of Colorado River and adjacent mountain ranges and in San Bernardino, Riverside, and Imperial Counties, although it is more common farther east.

Population Status and Threats

Population trends for this species are not well understood, but populations of cave myotis appear to be declining. Large colonies, each containing approximately 1,000 individuals, have been observed in the past in the Riverside Mountains of Riverside and San Bernardino Counties; however, more recent examinations in this area suggest a significant decline in population size (Williams 1986). Like many other cave-dwelling bats, declines in populations of this species are probably due to pesticide use, mining, and loss of riparian habitats, as well as disturbances to roost sites by humans exploring caves or mines or by the filling or plugging of cave and abandoned mine entrances (Williams 1986). The species is particularly vulnerable at maternity roosts, where they congregate in large numbers (AGFD 1997c). The southwestern cave myotis is a federal and California state species of special concern. Habitat loss and human disturbance remain the primary threats to this species.

Habitat Requirements

This species prefers arid habitats dominated by creosote bush, palo verde, brittlebrush, cactus, and desert riparian. Roosts are typically in caves or mines, but buildings and bridges have also been used. The diet of the southwestern cave myotis consists primarily of moths

and beetles that are taken over open washes and near vegetational boundaries. Dense, linear stands of mesquite, salt cedar, and catclaw acacia bordering the still water of oxbow ponds are considered optimal foraging areas (Vaughan 1959; Hoffmeister 1986). The southwestern cave myotis is a colonial cave dweller, occurring in colonies of several thousand individuals in most of its range. Mines, buildings, and bridges may also be used as roosting sites. Hibernation caves have high humidity, often with standing or running water and little air movement. Hibernating cave myotis may form clusters. This species uses temporary night roosts. Nursery colonies are in the hibernation cave or another cave. Occasionally, other sites, such as bridges, are used. Optimal sites are relatively warm, with little human disturbance.

Habitat in the Proposed Project Area

The extensive stands of salt cedar bordering the Alamo and New Rivers could provide foraging habitat for this species. Some agricultural drains that support dense tamarisk and common reed could also provide suitable foraging habitat. Bridges and buildings throughout the area could be used as temporary roosting sites.

Proposed Project Area Occurrence

This species may have been extirpated from the proposed project area by agricultural practices and habitat conversion (USFWS 1999). No recent surveys have been conducted in the area to determine the occurrence of this species.

Yuma Myotis *(Myotis yumanensis)*

Range and Distribution

The range of the Yuma myotis extends across western North America from British Columbia to central Mexico, and from the West Coast to as far east as Idaho and west Texas. It is thought to migrate seasonally throughout much of its range. The Yuma myotis is known to roost in caves, abandoned buildings, and other structures. The Yuma myotis is uncommon in Mojave and Colorado Desert regions, except for the mountain ranges bordering the Colorado River Valley. Found in a wide variety of habitats ranging from sea level to 11,000 feet, it is uncommon to rare above 8,000 feet. It is not known where the Yuma bat goes for winter, but it has been captured in Arizona in February.

Population Status and Threats

Breeding has not been studied, except for a couple of isolated sites in Colorado. At that site, the colony was estimated to number around 100 adult individuals and is the first western record of a breeding site for this species. Elsewhere throughout its range, this species is known to form maternity colonies upwards of several thousand individuals in caves or attics (Hoffmeister 1986; Hall 1981; Findley et al. 1975). Threats include mine closure, human disturbance to roost sites, and pesticides.

Habitat Requirements

The Yuma myotis prefers cliffs and rocky walls near desert scrub, pinyon-juniper woodlands, and other open woodlands and forests. Like many bat species, it is closely tied to an open water source for foraging and drinking (Zeiner et al. 1990) and tends to be found

near permanent watercourses (AGFD 1997). Small moths, midges, termites, and other insects that fly over water are preferred food items of this species. Insects are caught while foraging low over rivers, irrigation canals, permanent ponds, streams, or creeks (AGFD 1997). The Yuma myotis roosts in narrow crevices in rock; bridges; buildings; and, occasionally, mines (Hoffmeister 1986). Preferred roosting habitats, however, are buildings and abandoned cliff swallows' mud nests (AGFD 1997). This species is somewhat tolerant of human activity, as evidenced by roosts in attics of inhabited houses or other human-occupied structures (Hoffmeister 1986). Colonies can be as large as several thousand individuals (Zeiner et al. 1990). Separate daytime and night roosts are used.

Habitat in the Proposed Project Area

The canals, rivers, lakes, and streams throughout the proposed project area offer suitable foraging habitat for the Yuma myotis. This species is relatively tolerant of human activity and may roost in houses, under bridges, or in other natural and artificial structures throughout the proposed project area.

Proposed Project Area Occurrence

This species is known to occur in Imperial County and has historically been reported to occur in the proposed project area (Hall 1981). No recent surveys have been conducted for this species in the proposed project area, but suitable roosting and foraging habitats are present.

Western Mastiff Bat *(Eumops perotis californicus)*

Range and Distribution

The greater western mastiff bat ranges from San Francisco Bay east to Arizona and Texas, then south to northwestern and central Mexico (AGFD 1997e). The majority of the western mastiff bats in California are year-round residents; however, some are believed to migrate in the winter to warmer, lowland climates (Williams 1986).

Population Status and Threats

Threats to this species reportedly include human disturbances at roost sites, limited numbers of adequate watering sites, cultivation of major foraging areas, and poisoning and reduction of insects by insecticide use (AGFD 1996; Williams 1986). Populations in California are believed to have undergone significant declines in recent years, primarily due to extensive loss of habitat and the widespread use of insecticides (Williams 1986). Populations in Arizona may also be declining, and some roost sites are no longer occupied (AGFD 1996 and 1997e). In other areas, greater western mastiff bat populations appear fairly stable (NMDGF 1997). This western mastiff bat is a federal and California state species of special concern.

Habitat Requirements

Mastiff bats favor rugged, rocky areas in Sonoran Desert scrub habitats, where suitable crevices are available for day roosts (AGFD 1996). They inhabit crevices in cliff faces, high buildings, trees, and tunnels (Zeiner et al. 1990). Colonies prefer deep crevices up to 10 feet or more (AGFD 1997e). Because of their large size and long wings, these bats require

considerable space to launch themselves into flight, so roosting sites are usually situated to permit a free downward fall for at least 6.5 to 10 feet.

Western mastiff bats forage in open areas, generally over mesquite as far as 25 miles from roost sites (Vaughan 1959; Jameson and Peeters 1988). They require long or unobstructed waterways for drinking and feed on moths, bees, wasps, and flying ants that get caught in thermal currents (AGFD 1996). Mastiff bats roost singly or in small colonies, sometimes with other bat species; several alternate day roosts may be used (Zeiner et al. 1990). Movement among different roost sites is thought to be influenced by temperature, as well as human disturbance (AGFD 1996). Colonies often support two to several dozen individuals but typically number fewer than 100 individuals (AGFD 1996).

Habitat in the Proposed Project Area

Western mastiff bats are generally associated with open desert habitats near unobstructed waterways. In the proposed project area, these types of habitats occur adjacent to the Salton Sea and along the All American, East Highline, and Westside Main Canals. The availability of suitable roost sites in the proposed project area is unknown. Gravel quarries near the Salton Sea could provide roost sites. Other types of potential roost sites in the proposed project area include bridges, buildings, and trees.

Proposed Project Area Occurrence

Western mastiff bats are known to occur in Imperial County, and roost sites have been found in several abandoned mine sites in the Carago Muchacho Mountains; occurrences in the proposed project have not been reported. Because of the extensive foraging range and availability of habitat in the proposed project area, the western mastiff bat could potentially occur there.

Pocketed Free-Tailed Bat (*Nyctinomops femorosacca*)

Range and Distribution

The pocketed free-tailed bat occurs in western North America, from Southern California, central Arizona, southern New Mexico, and western Texas south into Mexico, including Baja California (Navo 1998a). The pocketed free-tailed bat is found in Riverside, San Diego, and Imperial Counties. This species is rare in California, but is more common in Mexico.

Population Status and Threats

The pocketed free-tailed bat is currently a California state species of special concern due to limited population size and rarity of occurrences. No known threats have been identified for this species; however, human disturbance to roosting sites, loss of foraging habitat, and pesticides could pose potential threats to this species (Navo 1998a).

Habitat Requirements

The pocketed free-tailed bat prefers arid lowlands, especially desert canyons, dominated by creosote bush or chaparral vegetation. Habitats used include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. This species prefers rock crevices in cliffs as roosting sites. It must drop

from the roost to gain flight speed. The pocketed free-tailed bat reproduces in rock crevices, caverns, or buildings and primarily feeds on moths and beetles.

Habitat in the Proposed Project Area

Creosote scrub habitat is found in areas adjacent to the Salton Sea and along the All American, Coachella, and Westside Main Canals. Areas along the New and Alamo Rivers and along larger drainages and canals may also provide foraging habitat. The availability of suitable roost sites in the proposed project area is unknown. Gravel quarries near the Salton Sea may provide suitable roost sites.

Proposed Project Area Occurrence

The pocketed free-tailed bat is known to occur in Imperial County, but this species has not been reported in the proposed project area. Foraging habitat occurs in the proposed project area, but roosting sites may limit the occurrence of this species.

Big Free-Tailed Bat (*Nyctinomops macrotis*)

Range and Distribution

The big free-tailed bat is a migratory species. It ranges from most of South America northward to include Mexico, Arizona, New Mexico, southern and western Texas, Southern California, southeastern Nevada, northeastern Utah, and as far north as central Colorado (Navo 1998; Hall 1981).

Population Status and Threats

This species is a California state species of special concern due to its rarity. The big free-tailed bat is common in parts of its range and does not appear to be threatened. No known threats have been identified for this species; however human disturbance to roosting sites, loss of forage habitat, and pesticides are likely to have negative impacts on this species (Navo 1998b).

Habitat Requirements

Big free-tailed bats generally inhabit rugged rocky habitats, although a wide range of habitats– including desert scrub, woodlands, and evergreen forests– are visited during foraging and migration (Navo 1998b). Roosts are usually in buildings, caves, and rock crevices. This bat feeds almost exclusively on moths, but crickets, grasshoppers, flying ants, and stinkbugs are occasionally taken (Easterla 1973; Easterla and Whitaker 1972).

Habitat in the Proposed Project Area

The preferred rocky habitat of the big free-tailed bat does not occur in the proposed project area. Desert scrub, agricultural fields, wetlands, lakes, rivers, canals, and drainages where insects are abundant could provide suitable foraging habitat for migrating bats.

Proposed Project Area Occurrence

Big free-tailed bats are known to migrate through the proposed project area during the spring and fall (USFWS 1997). No roost sites are known to occur in the proposed project area.

Jacumba Little Pocket Mouse *(Perognathus longimembris internationalis)*

Range and Distribution

The range of the Jacumba little pocket mouse is restricted to the deserts of extreme Southern California and northern Mexico. Its range extends from Jacumba, California, approximately 62 miles south of the U.S.–Mexican border.

Population Status and Threats

This subspecies has an extremely limited range and is endemic to Southern California. The population status of this subspecies is unknown at this time. Current threats have not been identified but may include habitat destruction by off-road vehicle activities and predation by introduced species.

Habitat Requirements

Habitat requirements are not well understood, but it is known to occupy sandy habitats on the desert floor. Preferred habitats include desert riparian, desert scrub, desert wash, and sagebrush. Little pocket mice generally dwell in burrows and may stay underground for up to 5 months in winter. Burrow systems are rarely occupied by more than one mouse, and some animals may use more than one burrow (Kenagy 1973). Sandy soils are preferred for burrowing (Hall 1946), but burrows are also found on gravel washes and on stony soils (Beatley 1976; Miller and Stebbins 1964).

Habitat in the Proposed Project Area

Desert scrub habitats occur in the proposed project area only within the right-of-way of IID on the AAC. No native desert riparian habitat occurs in the HCP area because tamarisk has invaded riparian areas of the New and Alamo Rivers. It is uncertain whether Jacumba little pocket mice would use these areas.

Proposed Project Area Occurrence

While potential habitat does occur in the area, the known range of the Jacumba little pocket mouse does not extend into the proposed project area.

Colorado River Hispid Cotton Rat (*Sigmodon arizonae plenus*)

Range and Distribution

The Colorado River hispid cotton rat occurs in the vicinity of the Colorado River and its tributaries in southeastern California. In Arizona, it occurs along the Colorado River from Parker to Ehrenberg (Hoffmeister 1986). One additional locality has been reported in Nevada, along the Nevada-California border (Hall 1946); however, populations once occurring in Nevada are now thought to be extinct (Hall 1946; Bradley 1966). The distributional limits of the Colorado River cotton rat have not been established, and the southern limits of its range are not known (Hafner et al., in press). McKernan (unpublished data) has provided records for this species at Topock Marsh, Parker Dam, near Parker, Arizona; on the Colorado River Indian Tribe (CRIT) Reservation north of the Palo Verde Division Dam, near Blythe, California; and on and near Cibola National Wildlife Refuge. The dates of these observations range from 1974 to 1998.

Population Status and Threats

The population status and reasons for decline of this species are not well understood. The Colorado River hispid cotton rat has a limited range and occurs along an area of the river that is subject to a number of human disturbances. Agricultural and urban development, draining of wetlands, livestock grazing, and water diversion proposed projects have probably all contributed to the species' decline. The Colorado River hispid cotton rat is a federal and California state species of concern. Current threats to this species' survival have not been identified.

Habitat Requirements

This species primarily occurs in grassland and mixed grassland/scrub habitats but may also occur in agricultural fields. It is most common in grassland and cropland habitats near water (Fleharty and Mares 1973; Kaufman and Fleharty 1974), including grass-forb understories in early successional stages of other habitats (McClenaghan and Gaines 1978). Tall, dense grass is preferred. The species also occurs in overgrown clearings and herbaceous borders of fields and brushy areas (Hall and Dalquest 1963). Trapping success for this subspecies occurs most often in areas dominated by common reed (Zimmerman pers. comm.). Runways are made through dense herbaceous growth and are similar in appearance to vole runways but much larger. The hispid cotton rat sometimes feeds on sugar beets, citrus, and other crops. Nests of woven grass are constructed either in burrows or on the surface (Baar et al. 1974).

Habitat in the Proposed Project Area

Habitat for this species is widespread throughout the proposed project area. Irrigated agricultural fields of alfalfa, wheat, sudangrass, and sugar beets provide suitable habitat for the cotton rat. Many drainages and ditches adjacent to agricultural fields include dense patches of common reed, a habitat known to be used by this species.

Proposed Project Area Occurrence

Habitat and historical records for this species occur in the proposed project area (SSA and Reclamation 2000). Populations have also been reported near the Colorado River, a few miles above the Laguna Dam and near Bard. Establishment of cotton rats in the Imperial Valley was apparently in response to agricultural irrigation practices (Dixon 1922).

Yuma Hispid Cotton Rat *(Sigmodon hispidus eremicus)*

Range and Distribution

The Yuma hispid cotton rat is known from Yuma County, Arizona; Imperial County, California; and northern Baja California, Mexico (Hall 1981; Hoffmeister 1986). The distributional range of the Yuma hispid cotton rat has increased as agricultural development has expanded along the LCR (Hafner et al. in press).

Population Status and Threats

The status of Yuma hispid cotton rat populations is unknown. It is believed this species has adapted to agricultural conditions along the LCR and expanded its range. The Yuma hispid

cotton rat is a federal and California state species of special concern. Current threats to this species' survival have not been identified.

Habitat Requirements

Hispid cotton rats occupy moist, grassy habitats where they cut runways through the grass. Hoffmeister (1986) indicates that cotton rats in Yuma County have been found mostly along the Colorado River and adjacent sloughs in brushy areas. Cotton rats have been reported from habitats vegetated with common reed, arrowweed, and cattails. Agricultural fields, especially Bermuda grass farms, also provide habitat (Hoffmeister 1986). Hispid cotton rats eat many grasses and forbs and are more vegetarian than most native mice (Jameson and Peeters 1988). The Yuma hispid cotton rat has benefited from the expansion of irrigated fields and shown success in using agricultural areas. (Zimmerman pers. comm.). Yuma hispid cotton rats prefer tall, dense grasses close to water. The AAC may serve as a dispersal corridor for cotton rats to move from the LCR into the Imperial Valley.

Habitat in the Proposed Project Area

Potentially suitable habitat for the Yuma hispid cotton rat is abundant throughout the proposed project area. Irrigated agricultural fields of Bermuda grass, alfalfa, wheat, sudangrass, and sugar beets provide suitable habitat for the cotton rat. Many drainages and ditches adjacent to agricultural fields include dense patches of cattails, arrowweed, and common reeds.

Proposed Project Area Occurrence

Dixon (1922) reported this species in the Imperial Valley earlier this century, and the subspecies is commonly found along roadsides adjacent to alfalfa and clover fields (Zimmerman pers. comm.).

Nelson's Bighorn Sheep (*Ovis canadensis nelsoni*)

Range and Distribution

Bighorn sheep are well distributed in the mountainous regions of North America from Canada to Mexico. The desert subspecies (*O. c. nelsoni*) is found in the mountainous desert regions of Utah, Nevada, Arizona, and California south into Mexico.

Population Status and Threats

Historic hunting, disease introduced from domestic sheep, and competition from domestic livestock resulted in dramatic declines in bighorn sheep populations throughout the 1800s. While hunting was banned in the early 1900s, poaching continues to threaten the survival of this species. It is estimated that 90 percent of the historic population has been eliminated, and recovery has been slow (Banfield 1974; Darymple 1985; Geist 1979; and Nowak and Paradiso 1983). The Nelson's bighorn sheep is a federal species of concern.

Habitat Requirements

Habitats used by bighorn sheep include alpine dwarf-shrub, low sage, sagebrush, bitterbrush, pinyon-juniper, palm oasis, desert riparian, desert succulent shrub, desert scrub, subalpine conifer, perennial grassland, montane chaparral, and montane riparian

(DeForge 1980; Monson and Sumner 1980; Wehausen 1980). Bighorn sheep graze and browse on a wide variety of plant species; green, succulent grasses and forbs are preferred; and browse is important all year, especially for populations in arid habitats. Some populations use mineral licks, and some may be limited by phosphorus. Bighorn sheep feed in open habitats, such as rocky barrens, meadows, and low, sparse brushlands (Dunaway 1972; Monson and Sumner 1980; Wehausen 1980; Ginnett and Douglas 1982; and Lawson and Johnson 1982); they use rocky, steep terrain for escape and bedding. Steep, rugged slopes and canyons are used for lambing areas (Wehausen 1980). Water is critical in arid regions.

Habitat in the Proposed Project Area

No suitable habitat occurs in the proposed project area. While desert scrub habitat does occur, there are no adjacent mountainous regions to offer escape and breeding habitat. In addition, the desert scrub habitat in the proposed project areas occurs in proximity to significant human activity, such as off-road vehicle recreation sites and major highways.

Proposed Project Area Occurrence

Approximately 120 Nelson's bighorn sheep are known to inhabit area the Chocolate Mountains (CDFG 1999b). There is, however, no suitable habitat in the proposed project area for bighorn sheep, and, given the sensitivity of this species to human disturbance, their occurrence is unlikely.

Plants

Algodones Dunes Sunflower (*Helianthus niveus* ssp*. tephrodes*)

Range and Distribution

The Algodones Dunes sunflower occurs in southwestern Arizona, the Southern Sonoran Desert of Imperial County, California, and northern Mexico. In California, it is restricted to the Algodones Dunes. The main distribution of this species is in the Algodones Dunes system in California and, secondarily, in the Yuma dunes in Arizona. Although these stands may not be large in terms of numbers of individuals, they are potentially significant in maintaining genetic flow between populations of this subspecies in California and Arizona.

Population Status and Threats

This subspecies is naturally limited throughout its range by the availability of suitable dune habitat and is considered rare throughout its range. It occurs on the Barry M. Goldwater Air Force Range in Arizona (USFWS 1992), where it may be threatened by military activities. In California, this species is threatened primarily by off-road vehicles (Skinner and Pavlik 1994).

Habitat Requirements

The Algodones Dunes sunflower is restricted to active sand dunes or sandy desert areas, typically below 700 feet in elevation, and is also found in association with creosote bush scrub.

Habitat in the Proposed Project Area

Potential habitat occurs where the AAC traverses the Algodones Dunes.

Proposed Project Area Occurrence

On the Algodones Dunes, it is generally found only on the central axis of the dunes. During the 1984 surveys, a total of 885 plants was found evenly distributed along the survey area between Interstate 8 and Drop 1 along the north side of the AAC (Reclamation and IID 1994). No plants were observed along the AAC corridor to the east of Interstate 8.

Giant Spanish Needle (*Palafoxia arida* var. *gigantea*)

Range and Distribution

The giant Spanish needle occurs in southwestern Arizona, southeastern California, and northeastern Baja California, Mexico. In Arizona, this variety is currently known only in the vicinity of Yuma. In California, it is restricted to southeastern Imperial County, where it is found primarily in the Algodones Dunes system. In Baja California, it has been noted in sand dunes along or near the international border with California.

Population Status and Threats

The giant Spanish needle is naturally limited throughout its range by the availability of suitable dune or sandy habitat. While it is not considered endangered, potential threats to the populations include military activities; off-road vehicle use; habitat degradation; and direct impacts resulting from highway improvements, utility corridors, and quarry and stockpile operations.

Habitat Requirements

The giant Spanish needle is restricted to active or stable sand dunes or sandy desert areas, typically below 350 feet, and is also found in association with creosote bush scrub.

Habitat in the Proposed Project Area

Potential habitat occurs where the AAC traverses the Algodones Dunes.

Proposed Project Area Occurrence

The giant Spanish needle occurs primarily in the Algodones Dunes system. As part of the AAC Lining Proposed Project, a 600-foot-wide corridor along the portion of the AAC that passes through the Algodones Dunes was surveyed for special-status plant species (Reclamation and IID 1994). These surveys identified 2,908 individuals in the corridor to the west of Interstate 8, and 787 individuals were found east of Interstate 8.

Orcutt's Aster *(Xylorhiza orcuttii)*

Range and Distribution

Orcutt's aster occurs in Imperial, Riverside, and San Diego Counties in California and Baja California, Mexico.

Population Status and Threats

Orcutt's woody aster is considered extremely rare because of limited populations. The plant is considered endangered in parts of its range; however, many of the known populations lie within Anza-Borrego State Park boundaries and are well protected. Populations are presumed stable on the Southern deserts. Outside of protected areas, threats to the populations include off-road vehicle use.

Habitat Requirements

Orcutt's aster occurs primarily in Sonoran creosote scrub habitats in rocky canyons and sandy washes at elevations between 65 and 1,200 feet. Generally, this species has been observed in areas with little shrub cover.

Habitat in the Proposed Project Area

This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

No plants have been observed in the proposed project area, although potential habitat exists. The nearest known populations are in Anza-Borrego Desert State Park to the west of the HCP area.

Foxtail Cactus *(Escobaria vivipara var. alversonii)*

Range and Distribution

The foxtail cactus occurs in the Sonoran and southern Mojave deserts of Arizona and California. In California, it occurs along the border between the Mojave and Colorado Deserts in Riverside, San Bernardino, and Imperial Counties.

Population Status and Threats

The current population status of the foxtail cactus is not definitively known, although it has been reported as occurring in "large, healthy populations" throughout much of its range (Warren and Laurenzi 1987). This species is uncommon, but is not considered to be threatened or endangered at this time. It appears to have a relatively restricted geographic distribution, and populations have been affected primarily by horticultural collecting. No other threats to the survival of this species have been identified.

Habitat Requirements

The foxtail cactus occurs in both sandy and rocky areas but seems to prefer heavy, rocky soils with decomposing granite or basalt and is often found on basalt between 250 and 5,000 feet in elevation. It may also occur in association with creosote bush scrub.

Habitat in the Proposed Project Area

Potential habitat occurs in the creosote scrub habitat along the AAC and Coachella Canal and potentially in scrub habitat adjacent to the Salton Sea between the higher rock hillsides and the more saline desert saltbrush community.

Proposed Project Area Occurrence

While no plants have been observed in the proposed project area, this variety is known from upland habitats primarily west of the LCR. At least one population occurs in the vicinity of the Palo Verde Dam quarry site.

Munz's Cactus (*Opuntia munzii*)

Range and Distribution

Munz's cactus occurs in the Sonoran Desert where the species occurrences are primarily from the Chocolate and Chukwalla Mountains in Riverside and Imperial Counties.

Population Status and Threats

This species is endemic to California and considered extremely rare, with only a few known small populations. Due to the general inaccessibility of the habitats, the plant is not considered endangered, and no current threats have been identified.

Habitat Requirements

Munz's cactus grows at elevations between 500 and 2,000 feet in sandy or gravelly soils found in washes and along canyon walls associated with creosote scrub.

Habitat in the Proposed Project Area

This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

No plants have been reported to occur in the proposed project area. Known locations for this species are primarily washes below the Chocolate Mountains along the eastern edge of the Imperial Valley.

Flat-Seeded Spurge *(Chamaesyce platysperma)*

Range and Distribution

The flat-seeded spurge is generally restricted to Southern California occurring in Imperial, San Diego, Riverside, and San Bernardino Counties. Rare occurrences outside California have been reported from Arizona and Sonora, Mexico.

Population Status and Threats

The present status of this species is poorly known. Population occurrences are typically highly restricted, but presumably stable. The Coachella Valley has been heavily impacted in recent years; however, lack of sufficient collection data precludes determination of the effects on this species (Reiser 1994). No threats to this species have been identified.

Habitat Requirements

The flat-seeded spurge is an annual herb found on sandy flats, dunes, and in creosote bush scrub. It flowers from February to September and is undetectable during other times of the year or in years when environmental conditions are less than optimum.

Habitat in the Proposed Project Area

This species is associated with creosote scrub. The only portion of the HCP area that supports this plant community is the right-of-way of IID along the AAC.

Proposed Project Area Occurrence

While potential habitat is present in the proposed project area, no plants have been observed.

Wiggin's Croton (*Croton wigginsii*)

Range and Distribution

Wiggin's croton occurs in the southwest portion of Imperial County, Arizona, and Baja California and Sonora, Mexico.

Population Status and Threats

Occurrences of Wiggin's croton in California are confined to several populations, some of which may be endangered. Outside California, the plant is more common and widespread. No threats to this species have been identified.

Habitat Requirements

Wiggin's croton is a woody shrub that occurs primarily in stable and active dunes, and sandy washes at elevations ranging from 160 to 350 feet. Although less common, it also occurs on sandy sites in the Sonoran Desert creosote scrub habitat. Like all croton species, Wiggin's croton prefers areas with sandy and/or loose soils.

Habitat in the Proposed Project Area

Potential habitat for Wiggin's croton in the HCP area occurs in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

In California, Wiggin's croton occurs in the Algodones Dunes system. As part of the AAC Lining Proposed Project, a 600-foot-wide corridor along the portion of the AAC that passes through the Algodones Dunes was surveyed for special-status plant species (Reclamation and IID 1994). These surveys identified 1,447 individuals in the corridor to the west of Interstate 8, and 43 individuals were found east of Interstate 8. Results of the 1993 surveys indicated occurrences of this species in the high dune system as well as isolated populations in the smaller dunes. A total of 338 individuals was observed in the proposed canal right-of-way. Wiggin's croton was also observed south of Power Drop Station No. 1 between transmission poles 8191 and 8178 (Reclamation and IID 1994).

Peirson's Milk-Vetch *(Astragalus magdalenae var. peirsonii)*

Range and Distribution

The current distribution of Peirson's milk vetch is thought to be restricted to the Algodones Dunes in Imperial County, California; northeastern Baja California; and the Gran Desierto in Sonora, Mexico. The historic occurrence reported from the Borrego Valley in San Diego

County, California, has not been observed for several decades and is presumed to have been extirpated (USFWS 1998).

Population Status and Threats

Peirson's milk-vetch is currently state and federally listed as endangered. The species' population is believed to be declining (CDFG 2000). Approximately 25 percent of the known populations are in the North Algodones Dunes Wilderness, managed by the Bureau of Land Management. The remaining populations continue to be threatened by off-road vehicles, grazing and trampling by livestock and feral burros, trampling by recreational users, competition from non-native plants, urban development, construction related to fisheries development, and alteration of soil hydrology.

Habitat Requirements

Peirson's milk-vetch is a short-lived perennial that occurs on the slopes and hollows of well developed dune systems at elevations between 150 and 800 feet. It is adapted to habitats with specific substrate or hydrologic conditions that occur as inclusions within creosote bush scrub or sagebrush dominated communities.

Habitat in the Proposed Project Area

Potential habitat occurs in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

In the Algodones Dunes area, Peirson's milk-vetch tends to grow in the west and central portions of the dunes. During the 1984 surveys, 1,422 plants were found in the sand dune habitat between Interstate 8 and Drop 1 of the AAC (Reclamation and IID 1994). Results of the 1993 surveys found more than 1,300 individuals within a 1-mile reach of the proposed canal right-of-way in the high dunes area (USFWS 1996b).

Sand Food *(Pholisma sonorae)*

Range and Distribution

The sand food occurs scattered in a roughly 3,900-square-mile area that includes habitat surrounding the Gulf of Mexico in southwestern Arizona, the Sonoran Desert of California, northeastern Baja California, and northwestern Mexico. In Arizona, the species occurs in Southern Yuma County along the U.S.-Mexico boundary. In California, it occurs in southeastern Imperial County, in or near the Algodones Dunes. Its southernmost extent is Bahia Adair on the Sea of Cortez coast of Sonora, Mexico.

Population Status and Threats

Considered rare throughout its range, this species is naturally limited by the availability of suitable habitat and host plants. Both habitat and host plants have been reduced in extent or degraded by a variety of land uses, including military maneuvers, recreational vehicles, agriculture, bulldozing and clearing of native dune vegetation, litter, and invasion of dunes by nondune species (AGFD 1998d and CDFG 1999b).

Habitat Requirements

The sand food is a perennial root parasite that lacks chlorophyll and occurs on sand dunes or in sandy areas in association with creosote bush scrub below 650 feet. It is parasitic on dune buckwheat, Palmer coldenia, plicate coldenia, white bursage, and arrowweed (Hickman 1993; and Yatskievych and Mason 1986).

Habitat in the Proposed Project Area

Potential habitat occurs in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

Major populations of this species are found in the Algodones Dunes system. As part of the AAC Lining Proposed Project, a 600-foot-wide corridor along the portion of the AAC that passes through the Algodones Dunes was surveyed for special-status plant species (Reclamation and IID 1994). These surveys identified 208 individuals in the corridor to the west of Interstate 8, and 363 individuals were found east of Interstate 8.

Orocopia Sage (*Salvia greatae*)

Range and Distribution

Endemic to southeastern California, orocopia sage occurs in San Bernardo, Riverside, and Imperial Counties. The largest known populations occur in the Orocopia Mountains to the Chocolate Mountains, in Riverside County.

Population Status and Threats

Orocopia sage is a federal species of concern and is considered extremely rare throughout its range but not endangered. Threats to this species have not been identified.

Habitat Requirements

Orocopia sage occurs in creosote bush scrub, in desert dry washes, on alluvial fans, and woodlands below 590 feet.

Habitat in the Proposed Project Area

Potential habitat occurs only in the creosote scrub and dune habitats along the AAC.

Proposed Project Area Occurrence

There are no known occurrences of this species in the proposed project area. Most of the suitable habitat is found north and east of the proposed project area.

References

Allan, R. C. and D. L. Roden. 1978. *Fish of Lake Mead and Lake Mohave: Base Fisheries Data, Boulder Canyon to Davis Dam.* Nevada Department of Wildlife, Biological Bulletin No. 7.

Anderson, B. W. and R. D. Ohmart. 1985. "Habitat Use by Clapper Rails in the LCR Valley." *Condor* 87: 116-126.

Anderson, D. W. 1993. Personal communication with Harry Ohlendorf, CH2M HILL.

Anderson, S. H. 1983.*Yuma Clapper Rail Recovery Plan*. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Arizona Game and Fish Department (AGFD). 1998. *Status Designations: Biological Elements of Arizona.* Report dated 28 April compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1998a. Spotted Bat *(Euderma maculatum).* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1998b. Pale Townsend's Big-Eared Bat *(Plecotus townsendii pallescens).* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997. Flat-Tailed Horned Lizard (*Phrynosoma mcallii*). Draft unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. Page 4.

AGFD. 1997. Mexican Long-Tongued Bat (*Choeronycteris mexicana*). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997a. Lowland Leopard Frog *(Rana yavapaiensis).* Draft unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997b. Nongame Field Notes - Southwestern Willow Flycatcher. (http://www.gf.state.az.us/fishwild/ngame_b.htm).

AGFD. 1997c. Greater Western Mastiff Bat *(Eumops perotis californicus).* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997c. Nongame Field Notes – Harris' Hawk (http://www.gf.state.az.us).

AGFD. 1997d. California Leaf-Nosed Bat *(Macrotus californicus).* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997e. Occult Little Brown Bat *(Myotis lucifugus occultus).* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997f. Small-Footed Myotis *(Myotis ciliolabrum)*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1997g. Yuma Myotis *(Myotis yumanensis*). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix.

AGFD. 1996. *Wildlife of Special Concern in Arizona: Public Review Draft*. Nongame and Endangered Wildlife Program, Arizona Game and Fish Department, Phoenix, Arizona.

AGFD. 1995. *Status Designations Notebook*. Heritage Data Management System (HDMS). Phoenix, Arizona**.** February.

AGFD. 1988. *Threatened Native Wildlife in Arizona.* Arizona Game and Fish Department Publication, Phoenix.

Arroyo-Cabrales, J., R. R. Hollander, and J. K. Jones, Jr. 1987. *Choeronycteris mexicana. Mammalian Species No. 291*. pp. 1-5. Published by the American Society of Mammologists.

Asay, C. E. 1987. "Habitat and Productivity of Cooper's Hawks Nesting in California." *California Fish and Game* 73: 80-87.

Atwood, J. L. and D. E. Minsky. 1983. "Least Tern Foraging Ecology at Three Major California Breeding Colonies." *Western Bird* 14 (2): 57-72.

Atwood, J. L. and P. R. Kelly. 1984. "Fish Dropped on Breeding Colonies as Indicators of Least Tern Food Habits." *Wilson Bulletin* 96 (1): 1-19.

Baar, S. L., E. D. Fleharty, and M. F. Artman. 1974. "Utilization of Deep Burrows and Nests by Cotton Rats in West-central Kansas." *Southwest. Nat*. 19: 440-444.

Baily, S. F. 1984. *California Least Tern Foraging and Other Off-Colony Activities Around Alameda Naval Air Station During 1984*. Department of Ornithology and Mammalogy, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Banfield, A. W. F. 1974. *The Mammals of Canada.* University of Toronto Press, Toronto.

Barlow, G. W. 1958. "Daily Movements of Desert Pupfish, *Cyprinodon macularius*, in Shore Pools of the Salton Sea, California." *Ecology* 39: 580-587.

Barlow, G. W. 1961. "Social Behavior of the Desert Pupfish, *Cyprinodon macularius*, in the Field and in the Aquarium." *American Midland Naturalist* 65 (2): 339-359.

Beatley, J. C. 1976. "Rainfall and fluctuating plant populations in relation to distributions and numbers of desert rodents in southern Nevada." *Oecologia* (Berlin) 24: 21-42.

Bednarz, J. C. and J. D. Ligon. 1988. "A Study of the Ecological Bases of Cooperative Breeding in the Harris' Hawk." *Ecology* 69: 1,176-1,187.

Bednarz, James C. 1995. "Harris' hawk **:** *Parabuteo unicinctus***."** *The Birds of North America.* No. 146. Washington, D.C.

Beedy, E. C. and S. L. Granholm. 1985. *Discovering Sierra Birds.* Yosemite and Sequoia Natural History Association. Yosemite, California.

Belkin, J. N. 1954. "Additional Records of *Oliarces clara* in California and Arizona (Neuroptera, Ithonidae)." *Bulletin of the Southern California Academy of Science* 53 (2): 65-68.

Bell, G. P. 1985. "The Sensory Basis of Pey Location by the California Leaf-Nosed Bat *Macrotus californicus* (Chiroptera: Phyllostomatidae)." *Behavioral Ecology and Sociobiology* 16: 343-347.

Bender, K. 1974. *California Least Tern Census and Nesting Survey 1973*. Nongame Wildlife Investigation, Final Report. California Department of Fish and Game.

Bennett, W. W. and R. D. Ohmart. 1978. *Habitat Requirements and Population Characteristics of the Clapper Rail (*Rallus longirostris yumaensis*) in the Imperial Valley of California.* Submitted to the University of California Lawrence Livermore Laboratory.

Bent, A. C. 1958. *Life Histories of the North American Blackbirds, Orioles, Tanagers, and Allies*. U.S. National Museum Bulletin 211: 1-549.

Bent, A. C. 1940. *Life Histories of North America Cuckoos, Goatsuckers, Hummingbirds, and Their Allies.* U.S. National Museum Bulletin 176.

Bent, A. C. 1938. *Life Histories of North American Birds of Prey. Part 2.* U.S. National Museum Bulletin 170.

Black, G. F. 1980. Status of the Desert Pupfish, *Cyprinodon macularius* (Baird and Girard), in *California.* California Department of Fish and Game, Inland Fisheries, Endangered Species Program Special Publication 80-1, Sacramento, California.

Blair, W. F. and D. I. Pettus. 1954. "The Mating Call and Its Significance in the Colorado River Toad (*Bufo alvarius* Girard)." *Tex. Journal of Science* 6: 72-77.

Boardman, C. J. 1987a. *Organochlorine Pollutants in the California Least Tern.* Pacific Seabird Group Bulletin. Volume 14 (1): 23.

Boardman, C. J. 1987b. *Organochlorine Pollutants in the California Least Tern.* M.S. Thesis. California State Long Beach.

Boellstorff, D. E., D. W. Anderson, H. M. Ohlendorf, and E. J. O'Beill. 1988. "Reproductive Effects of Nest-Marking Studies in an American White Pelican Colony." *Colonial Waterbirds* 11: 215-219.

Bogert, C. M. and R. M. del Campo. 1956. *The Gila Monster and Its Allies; the Relationships, Habits, and Behavior of the Lizards of the Family Helodermatidae***.** Bulletin of the American Museum of Natural History Volume. 109: Article 1.

Bolster, B. B. 1990. *Desert Pupfish, Five Year Status Report.* Inland Fisheries Division, California Department of Fish and Game, Rancho Cordova.

Bosakowski, T., D. G. Smith, and R. Speiser. 1992. "Nest Sites and Habitat Selected by Cooper's Hawks, *Accipiter cooperii*, in Northern New Jersey and Southeastern New York." *Canadian Field-Naturalist* 106: 474-479.

Bradford, R. H. and B. R. Vlach. 1995. *Razorback Ducker Habitat Assessment Indices for the Lower Colorado River*. Report prepared for Bureau of Reclamation, Yuma, Arizona. Cooperative Agreement No. 3-FC-34-08243.

Bradford, R. H., S. D. Gurtin, and B. R. Vlach. 1998. *Habitat Use by Razorback Suckers Implanted with Ultra-sonic Transmitters and Released into the Lower Imperial Division, Colorado River*. Contract Report No. 03. Cooperative Agreement No. 3-FC-34-08243. U.S. Department of the Interior, Bureau of Reclamation and Arizona Game and Fish Department.

Brown, B. T. and M. W. Trosset. 1998. "Nesting Habitat Relationships of Riparian Birds along the Colorado River in Grand Canyon, Arizona." *Southwestern Naturalist* 34: 260-270.

Brown, B. T. 1993. "Bell's Vireo." In *The Birds of North America.* No. 35 (Poole, A., P. Stettenheim, and F. Gill, eds.). Philadelphia, Pennsylvania. The Academy of Natural Sciences; Washington, D.C. The American Ornithologists' Union.

Brown, B. T., S. W. Carothers, and R. R. Johnson. 1983. "Breeding Range Expansion of Bell's Vireo in Grand Canyon, Arizona." *Condor* 85: 499-500.

Brown, E. R. 1985. Technical Ed. *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington*. USDA Forest Service, Pacific Northwest Region, R6-F&WL-192. Portland, Oregon.

Brown, H. 1903. "Arizona Bird Notes." *Auk* 20 (1903): 43-50.

Brown, L. H. and D. Amadon. 1968. *Eagles, Hawks and Falcons of the World*. Two Volumes. McGraw-Hill. New York, NY.

Brown, N. L. 1996. San Joaquin Le Conte's Thrasher, *Toxostoma lecontei macmillanoura.* CSU Stanislaus Foundation.

Brown, P. E., and R. D. Berry. 1991. "Bats: Habitat, Impacts and Mitigation." In *Proceedings V: Issues and Technology in the Management of Impacted Wildlife*. Thorne Ecological Institute, Snowmass, Colorado. Pages 26-30.

Browning, M. R. 1993. "Comments on the Taxonomy of *Empidonax traillii* (Willow Flycatcher)." *Western Birds* 24 (1993): 241-257.

Bruce, A. M., R. J. Anderson, and G. T. Allen. 1982. "Observations of Golden Eagles Nesting in Western Washington." *Raptor Research* 16: 132-134.

Bulkley, R. V. and R. Pimental. 1983. "Temperature Preference and Avoidance by Adult Razorback Suckers." *Transactions of the American Fisheries Society* 112: 601-607.

Bull, E. L. and C. T.Collins. 1993. "Vaux's Swift." *Birds of North America* 77: 1-12.

Bureau of Land Management (BLM). 1990. *Management Strategy for the Flat-Tailed Horned Lizard* (Phrynosoma mcallii) *on Bureau of Land Management Administered Lands in the California Desert Conservation Area*. Copy on File with the Bureau of Land Management El Centro Resource Area Office, California. 36 pp. + appendix.

Burger, J. and L. M. Miller. 1977. "Colony and Nest Site Selection in White-Faced and Glossy Ibises." *Auk* 94 (664): 676.

Burnett, E. E. Kandl, and F. Croxen. 1993. *Cienega de Santa Clara: Geologic and Hydrologic Comments.* U.S. Bureau of Reclamation, Yuma projects office, Yuma, Arizona.

Cade, T. J. and C. P. Woods. 1997. "Changes in Distribution and Abundance of the Loggerhead Shrike." *Conservation Biology* 11 (1997): 21-31.

California Department of Fish and Game (CDFG). 1985. Golden Eagle Status Review. Nongame Wildlife Investigations (W-65R-2, Job No. II-17). Unpublished report.

CDFG. 2000. *The Status of Reare, Threatened, and Endangered Animals and Plants of California 2000.* State of California, The Resources Agency.

CDFG. 1999a. *California Wildlife Habitat Relationships System, Version 7.0.* Produced by California Department of Fish and Game and the California Interagency Wildlife Task Group.

CDFG. 1999b. *California Natural Diversity Database.*

CDFG. 1992. *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants.* State of California, The Resources Agency.

CDFG. 1991. *1990 Annual Report on the Status of California's State Listed Threatened and Endangered Plants and Animals.* March. State of California, The Resources Agency.

CDFG. 1990. *Bank Swallow Recovery Plan. A Management Strategy for the Recovery of the Bank Swallow* (Riparia riparia). Draft.

Clark D. R., Jr., T. H. Kunz, and T. E. Kaiser. 1978. "Insecticide Applied to a Nursery Colony of Little Brown Bats (*Myotis lucifugus*): Lethal Concentrations in Brain Tissues." *Journal of Mammology* 59: 84-91.

Clarkson and J. C. Rorabaugh. 1989. Status of Leopard Frogs (*Rana yavapaiensis* Complex: Ranidae) in Arizona and Southwestern California [USA]. *Southwestern Naturalist* 34 (4): 531-538.

Cockrum, E. L. 1956. "Homing, Movements, and Longevity of Bats." *Journal of Mammology* 37: 48-57.

Cogswell, H. L. 1977. *Water Birds of California.* University of California Press. Berkeley.

Collins, C. T. 1979. "The Ecology and Conservation of Burrowing Owls." In *Proceedings of the National Audubon Society Symposium of Owls of the West, Their Ecology and Conservation.* Scheaffer, P. P. and S. M. Ehlers, eds. National Audubon Society Western Education Center, Tiburon, California. October. Pages 6-17.

Collins, C. T., K. E. Bender and D. D. Rypka. 1979. *Report on the Feeding and Nesting Habits of the California Least Tern in the Santa Ana River Marsh Area, Orange County California.* U.S. Army Corps of Engineers.

Conway, C. J., W. R. Eddleman, S. H. Anderson, and L. R. Hanebury. 1993. "Seasonal Changes in Yuma Clapper Rail Vocalization Rate and Habitat Use." *Journal of Wildlife Management* 57 (2): 282-290.

Coulombe, H. N. 1971. "Behavior and Population Ecology of the Burrowing Owl, *Speotyto cunicularia*, in the Imperial Valley of California." *Condor* 73: 162-176.

Courtois, L. A. and S. Hino. 1979. "Egg Deposition of the Desert Pupfish, *Cyprinodon macularius*, in Relation to Several Physical Parameters." *California Fish and Game* 65: 100-105.

Cox, T. J. 1972. "The Food Habits of Desert Pupfish (*Cyprinodon macularius*) in the Quitobaquito Springs, Organ Pipe Cactus National Monument." *Journal of the Arizona-Nevada Academy of Science* 7: 25-27.

Crear, D. and I. Haydock. 1971. "Laboratory Rearing of the Desert Pupfish, *Cyprinodon macularius*." *Fishery Bulletin* 69 (1): 151-156.

Cryan, P. M. and M. A. Bogan. 2000. Recurrence of the Mexican Long-Tongued Bat (*Choeronycteris mexicana*) at Historical Sites in Arizona and New Mexico. Unpublished report to Cooperators, Midcontinent Ecological Science Center, U.S. Geological Survey, Albuquerque, New Mexico.

Darymple, B. W. 1985. *North American Big-Game Animals*. Outdoor Life Books, New York.

DeForge, J. R. 1980. Population Biology of Desert Bighorn Sheep in the San Gabriel Mountains of California. *Desert Bighorn Counc. Trans*. 24: 29-32.

DeGraaf, R. M. and J. H. Rappole. 1995. *Neotropical Migratory Birds: Natural History, Distribution and Population Changes*. Comstock Publishing Associates, Ithaca N.Y.

DeHaven, R. W., Crase, F. T., and Woronecki, P. P. 1975. "Breeding Status of the Tricolored Blackbird." *California Fish and Game* 61: 166-180.

Dennis, J. V. 1958. "Some Aspects of the Ecology of the Yellow-Breasted Chat (*Icteria virens*)." *Bird-Banding* 29: 169-183.

DeSante, D. F. and E. D. Ruhlen. 1995. *Draft Report– A Census of Burrowing Owls in California 1991-1993*. The Institute for Bird Populations. Point Reyes Station, California.

Dileanis, P. D., S. K. Sorenson, S. E. Schwarzbach, and T. C. Maurer. 1992. *Reconnaissance Investigation of Water Quality, Bottom Sediment, and Biota Association with Irrigation Drainage in the Sacramento National Wildlife Refuge Complex, California 1988-1989*. U.S. Geological Survey. Water Resources Investigations Report 92-4036.

Dimmitt, M. A., and R. Ruibal. 1980. "Exploitation of Food Resources by Spadefoot Toads (*Scaphiopus*)." *Copeia* (1980): 854-862.

Dixon, J. 1922. "Rodents and Reclamation in the Imperial Valley." *Journal of Mammalogy* 3: 136-146.

Dixon, J. B., Dixon, R. E., and Dixon, J. E. 1957. "Natural History of the White-Tailed Kite in San Diego County, California." *Condor* 59*:* 156-165.

Drewien, R. C. 1973. *Ecology of Rocky Mountain Greater Sandhill Cranes.* Ph.D. Dissertation, University of Idaho, Moscow.

Drewien, R. C. and E. G. Bizeau. 1974. "Status and Distribution of Greater Sandhill Cranes in the Rocky Mountains." *Journal of Wildlife Management* 38: 720-742.

Drewien, R. C. and J. C. Lewis. 1987. "Status and Distribution of Cranes in North America." In *Proceedings 1983 International Crane Workshop* (G. W. Archibald and R. F. Pasquier, eds.). Distributed by International Crane Foundation, Baraboo, Wisconsin. Pages 469-477.

Dunaway, D. J. 1972. "Winter Food Habits of California Bighorn Sheep in the Sierra Nevada." *Desert Bighorn Counc. Trans.* 16: 21-29.

Dunham, Jason B. and W. L. Minckley. 1998. "Allozymic Variation in Desert Pupfish from Natural and Artificial Habitats: Genetic Conservation in Fluctuating Populations." *Biological Conservation* 84 (1): 7-15.

Dunk, J. R. 1995. White-Tailed Kite *(Elanus leucurus*). In *The Birds of North America*, No. 178 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Easterla, D. A. 1973. "Ecology of the 18 Species of Chiroptera at Big Bend National Park, Texas." *Northwestern Missouri State University Studies* 34: 1-165.

Easterla, D. A. and J. O. Whitaker. 1972. "Food Habits of Some Bats from Big Bend National Park, Texas." *Journal of Mammalogy* 53: 887-890.

Echelle, A. A. 1999. *Genetic Variation in Desert Pupfish.* Final Report to U.S. Fish and Wildlife Service.

Eckert, A. W. and K. E. Karalus. 1981. *The Wading Birds of North America.* Garden City, New York: Doubleday and Co.

Eddleman, W. R. 1989. *Biology of the Yuma Clapper Rail in the Southwestern U.S. and Northwestern Mexico.* U.S. Bureau of Reclamation, IA No. 4-AA-30-020060.

Eddleman, W. R., R. E. Flores, and M. L. Legare. 1994. "Black Rail (*Laterallus jamaicensis*)." In *The Birds of North America,* No. 123, (Poole, A. and F. Gill, eds.). Philadelphia, Pennsylvania. The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds.* New York, New York. Simon and Schuster, Inc.

Ehrlich, P. R., D. S. Dobkin, and D. White. 1992. *Birds in Jeopardy: The Imperiled and Extinct Birds of the U.S. and Canada Including Hawaii and Puerto Rico.* Stanford, California. Stanford University Press.

Ellison, L. N., and L. Cleary. 1978. "Effects of Human Disturbance on Breeding of Double-Crested Cormorants." *Auk* 95: 510-517.

Evans, D. L. 1982. *Status Reports on Twelve Raptors.* U.S. Department of the Interior, Fish and Wildlife Service, Wildlife 238.

Evans, J. G., G. W. Page, S. A. Laymon, and R. W. Stallcup. 1991. "Distribution, Relative Abundance and Status of the California Black Rail in Western North America." *Condor* 93: 952-966.

Evermann, B. W. 1930. "Report of the Director of the Museum and of the Aquarium for the Year 1929." H. W. Clark (ed.). *Proceedings of the California Academy of Sciences.* Volume XVIII, No. 18: 542-586.

Faulkner, D. K. 1990. Current Knowledge on the Biology of the Moth Lacewing *Oliarces clara* Banks (Insecta: Neuroptera: Ithonidae). M. W. Mansell and H. Aspock eds.: *Proceedings of the Third International Symposium on Neuroptology* 197-203. Paper presented in Pretoria, South Africa.

Federal Register (FR). 1986. *Endangered and Threatened Wildlife and Plants; Determination of Endangered Status and Critical Habitat for the Desert Pupfish.* U.S. Fish and Wildlife Service. Vol. 51, No. 61. Pages 10,842-10,851.

Fenton, M. B. and R. M. R. Barclay. 1980. "*Myotis lucifugus.*" *Mammalian Species* 142: 1-8.

Findley, J. S., A. H. Harris, D. E. Wilson, and C. Jones. 1975. *Mammals of New Mexico*. Univ. New Mexico Press. Albuquerque.

Fleharty, E. D., and M. A. Mares. 1973. "Habitat Preference and Spatial Relations of *Sigmodon hispidus* on a Remnant Prairie in West-Central Kansas." *Southwestern Naturalist*. 18: 21-29.

Flores, R. E. and W. R. Eddleman. 1995. "California Black Rail Use of Habitat in Southwestern Arizona." *Journal of Wildlife Management* 59 (2): 357-363.

Flores, R. E. and W. R. Eddleman. 1991. *Ecology of the California Black Rail in Southwestern Arizona: Final Report*. Submitted to the U.S. Bureau of Reclamation, Yuma Projects Office, and the Arizona Department of Game and Fish. Interagency Agreement No. 7-AA-30-05910.

Flores-Villela, O. 1998. Herpetofauna Mexicana Carnegie Museum of Natural History Spel. Publ. 17. iv + 73 pp. Per C. W. Painter. March 16 1997. NMDGF Memo Regarding Mexican Species of Herp Fauna in BISON-M.

Flores-Villela, O. 1993. Herpetofauna Mexicana Carnegie Museum of Natural History Spel. Publ. 17. iv + 73 pp. Per C. W. Painter. March 16 1997. NMDGF Memo Regarding Mexican Species of Herp Fauna in BISON-M.

Fouquette, M. J., Jr. 1970. "Bufo alvarius." *Catalogue of American Amphibians and Reptiles.* Pages 93.1-93.4.

Franzreb, K. 1989. "Ecology and Conservation of the Endangered Least Bell's Vireo." *U.S. Fish and Wildlife Biological Report* 89 (1).

Gaines, D. 1977a. *Birds of the Yosemite Sierra : A Distributional Survey*. Oakland, California.

Gaines, D. 1977b. *The Status of Selected Riparian Forest Birds in California. A Preliminary Survey and Review*. California Department of Fish and Game, Sacramento.

Gaines, D. 1974. *Distribution, Density, and Habitat Requirements of the California Yellow-Billed Cuckoo in the Sacramento Valley: 1972-1973.* California Department of Fish and Game, Nongame Wildlife Investigations, Progress Report W-54-R.

Gaines, D. and S. A. Laymon. 1984. "Decline, Status, and Preservation of the Yellow-Billed Cuckoo in California." *Western Birds* 15: 49-80.

Galli, A. E., C. F. Leck, and R. T. T. Foreman. 1976. "Avian Distribution Patterns in Forest Islands of Different Sizes in Central New Jersey." *Auk* 93: 356-364.

Garrett, K. and J. Dunn. 1981. *Birds of Southern California: Status and Distribution.* Los Angeles, California. The Artisan Press.

Garrison, B. A., J. M. Humphrey, and S. A. Laymon. 1987. "Bank Swallow Distribution and Nesting on the Sacramento River, California." *Western Birds* 18: 71-76.

Gawlik, D. E. and K. L. Bildstein. 1993. "Seasonal Habitat Use and Abundance of Loggerhead Shrikes in South Carolina." *Journal of Wildlife Management* 57: 352-357.

Geist, V. 1979. "Hoofed Mammals." In *Wild Animals of North America.* National Geographic Society, Washington, D.C.

Gerrard, J. M. and G. R. Bortolotti. 1988. *The Bald Eagle: Haunts and Habits of a Wilderness Monarch.* Washington, D.C. Smithsonian Institution Press.

Gervais, J. 2000. Home Range Values for California Burrowing Owls at Three California Sites. Oregon State University. Personal Communication to Gary Santolo of CH2M HILL on July 9.

Gervais, J. A., D. K. Rosenberg, D. M. Fry, L. Trulio, and K. K. Sturm. 2000. "Burrowing Owls and Agricultural Pesticides: Evaluation of Residues and Risks for Three Populations in California, USA." *Environmental Toxicology and Chemistry* 19: 337-343.

Ginnett, T. F., and C. L. Douglas. 1982. "Food Habits of Feral Burros and Desert Bighorn Sheep in Death Valley National Monument." *Desert Bighorn Counc. Trans.* 26: 81-87.

Glenn, E. P., C. Lee, R. Felger, and S. Zengel. 1996. "Effects of Water Management on the Wetlands of the Colorado River Delta, Mexico." *Conservation Biology* 10 (4): 1,175-1,186.

Glenn, E. P., L. Thompson, J. Riley, and D. Baumgartner. 1995. "Salinity Effects on Growth and Evapotranspiration of *Typha domingensis.*" *Pers. Aquatic Botany* 52: 75-91.

Gould, G. I., Jr. 1975. *Yuma Clapper Rail Study– Censuses and Distribution, 1973-1974.* Wildlife Management Branch, Administrative Report No. 75-2, California Department of Fish and Game.

Grant, G. S. and N. Hogg. 1976. "Behavior of Late-Nested Black Skimmers at Salton Sea, California." *Western Birds* 7: 73-80.

Grinnell, J. and A. H. Miller. 1944. "The Distribution of the Birds of California." *Pacific Coast Avifauna* No. 27.

Hafner, D. J., E. Yensen, and G. L. Kirkland, Jr., eds. In press. *North American Rodents: Action Plan for Species of Conservation Concern*.

Hall, E. R. 1981. *Mammals of North America.* Volume II, second edition. New York, NY: John Wiley and Sons.

Hall, E. R. 1946. *Mammals of Nevada.* University of California Press, Berkeley.

Hall, E. R., and W. W. Dalquest. 1963. "The Mammals of Veracruz." *Univ. Kans. Publ., Mus. Nat. Hist.* 14: 165-362.

Handley, C. O., Jr. 1959. "A Revision of American Bats of the Genera Euderma and Plecotus." *Proceedings of the U.S. National Museum* 110: 95-246.

Hardy, A. R. and F. G. Andrews. 1980. *An Inventory of Selected Coleoptera from the Algodones Dunes : A Report to the Bureau of Land Management***.** Insect Taxonomy Laboratory, Division of Plant Industry, California Dept. of Food and Agriculture, Sacramento.

Harlow, D. L. and P. H. Bloom. 1989. "Buteos and Golden Eagle." In *Proceedings of the Western Raptor Management Symposium and Workshop.* National Wildlife Federation, Scientific and Technical Series No. 12. October 26-28 1987, Boise, Idaho. Washington, D.C. Pages 102-117.

Harris, S. W. 1991. *Northwestern California Birds.* Humboldt State University Press. Arcata, California.

Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. "Burrowing Owl (*Speotyto cunicularia*)." In *The Birds of North America,* No. 61 (Poole, A. and F. Gill, eds.). Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C. The American Ornithologist's Union.

Hayman, P., J. Marchant, and T. Prater. 1986. *Shorebirds: An Identification Guide.* Boston, Massachusetts: Houghton Mifflin Company.

Henny, C. J. and G. B. Herron. 1989. "DDE, Selenium, Mercury, and White-Faced Ibis Reproduction at Carson Lake, Nevada." *Journal of Wildlife Management* 53: 1,032-1,045.

Henny, C. J. and H. M. Wright. 1972. "Population Ecology of Red-Tailed and Cooper's Hawks." *Population Ecology of Migratory Birds.* U.S. Department of the Interior, Fish and Wildlife Service. Laurel, Maryland: Patuxent Wildlife Research Center. Pages 229-250.

Hermanson, J. W. and T. J. O'Shea. 1983. "*Antrozous pallidus*." *Mammalian Species* No. 213. Published by the American Society of Mammalogists. Pages 1-8.

Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. University of California Press. Berkeley, California.

Hoffmeister, D. F. 1986. *Mammals of Arizona.* Tucson, Arizona: University of Arizona Press.

Holden, P. B., P. D. Abate, and J. B. Ruppert. 1999. *Razorback Sucker Studies on Lake Mead, Nevada, 1997-1998 Annual Report*, PR-578-2. Submitted to Department of Resources, Southern Nevada Water Authority, Las Vegas, Nevada.

Holden, P. B., P. D. Abate, and J. B. Ruppert. 1997. *Razorback Sucker Studies on Lake Mead, Nevada, 1996-1997 Annual Report*, PR-578-1. Submitted to Department of Resources, Southern Nevada Water Authority, Las Vegas, Nevada.

Hubbard, J. P. 1987. *The Status of the Willow Flycatcher in New Mexico.* Status report to the New Mexico Department of Game and Fish.

Hubbs, C. and N. Armstrong. 1961. "Minimum developmental temperature tolerance of two anurans, *Scaphiopus couchi* and *Microhyla olivaea.*" *Tex. J. Sci.* 13: 358-362.

Hunt, W. G., D. E. Driscoll, E. W. Bianchi, and R. E. Jackman. 1992. *Ecology of Bald Eagles in Arizona. Part A: Population Overview.* Report to U.S. Bureau of Reclamation. Contract 6-CS-30-04470. BioSystems Analysis, Inc., Santa Cruz, California.

Hunter, W. C. 1984. *Status of Nine Bird Species of Special Concern Along the Lower Colorado River.* Non-Game Wildlife Investigations, Wildlife Management Branch, Administrative Report 84-2, California Department of Fish and Game, Sacramento.

Hunter, W. C., R. D. Omart, and B. W. Anderson. 1988. *Use of Exotic Saltcedar (Tamarix chinensis) by Birds in Arid Riparian Systems.*

Hunter, W. C., B. W. Anderson, and R. D. Ohmart. 1987. "Avian Community Structure in a Mature Floodplain Forest After Extensive Flooding." *Journal of Wildlife Management* 51 (2): 495-502.

Hurlbert, A., M. Clary, M. Hunnicut, J. McGinnis, K. Sturm, J. Tinsman, and J. Vasquez. 1997. *Wildlife Use of Agricultural Drains in the Imperial Valley, California.* U.S. Fish and Wildlife Service, Salton Sea National Wildlife Refuge.

Idaho State Conservation Effort (ISCE). 1995. Habitat Conservation Assessment and Conservation Strategy for the Townsend's Big-Eared Bat. Draft Unpublished Report No. 1. Boise, Idaho.

Imperial Irrigation District (IID). 1994. *Final Environmental Impact Report for Modified East Lowline and Trifolium Interceptors and the Completion Projects of the Water Conservation Program (Volume 1).* Published by the Imperial Irrigation District. May.

Imperial Irrigation District and Bureau of Land Management (BLM). 1987. *Draft Environmental Impact Report and Environmental Assessment, Coachella Valley-Niland-El Centro 230 kV Transmission Project.*

Jackson, J. 1988. *Surveys for the Yuma Clapper Rail and the California Black Rail Along the 38-Mile Unlined Portion of the Coachella Canal and Adjacent Wetlands, Imperial and Riverside Counties.* California Admin. Rpt. USDI, Bureau of Reclamation. Boulder City, Nevada.

James, P. C. and G. A. Fox. 1987. "Effects of Some Insecticides on Productivity of Burrowing Owls." *Blue Jay* 45: 65-71.

James, P. C. and R. H. M. Espie. 1997. Current Status of the Burrowing Owl in North America: An Agency Survey. In *The Burrowing Owl: Its Biology and Management* (J. L. Lincer and K. Steenhof, eds.). Raptor Research Report 9. Allen Press, Lawrence, Kansas, Pages 3-5.

Jameson, E. W. and H. J. Peeters. 1988. *California Mammals.* University of California Press, Berkeley.

Jaramillo, A. P. 1993. "Wintering Swainson's Hawks in Argentina: Food and Age Segregation." *Condor* 95: 475-479.

Jennings, M. R. 1985. *Behavioral Interactions Between Desert Pupfish (Cyprinodon macularius) and Mosquitofish (Gambusia affinis) in Systems Open to Egress.* Dissertation, University of Arizona, Tucson.

Jennings, M. R., M. P. Hayes, and Animal Management Division Research Section, Metro Washington Park Zoo. 1994. *Amphibian and Reptile Species of Special Concern in California; Final Report.* Submitted to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova. Contract no. 8023.

Johnsgard, P. A. 1990. *Hawks, Eagles, and Falcons of North America*. Smithsonian Institution Press. Washington, D.C.

Johnsgard, P. A. 1988. *North American Owls: Biology and Natural History*. Smithsonian Institution Press. Washington, D.C.

Johnsgard, P. A. 1981. *The Plovers, Sandpipers, and Snipes of the World*. Univ. Nebraska Press, Lincoln.

Johnson, J. E. 1997. *Predator Recognition by Endangered Fishes*. Final Report to the U.S. Bureau of Reclamation, Boulder City, Nevada.

Johnson, S. 2000. Salton Sea National Wildlife Refuge. Telephone conversation with Kelly Nielsen, CH2M HILL, July 7.

Jurek, R. M. 1975. *Survey of Yuma Clapper Rails and California Black Rails Along Coachella Canal, Imperial County, May 1975.* California Department of Fish and Game, Nongame Wildlife Investigations. June 6.

Kasprzyk, M. R., R. Smith, and R. Bransfield. 1987. *Avian Species Composition and Densities of a Wetland Community Along the AAC, Imperial County, California. Environmental Appendix, AAC Relocation Study, California.* U.S. Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada.

Kaufman, D. W., and E. D. Fleharty. 1974. "Habitat Selection by Nine Species of Rodents in North-Central Kansas." *Southwest. Nat*. 19: 443-452.

Kaufman, K. 1996. *Lives of North American Birds*. Houghton Mifflin Company. Boston, Massachusetts.

Kaufman, D. W., and E. D. Fleharty. 1974. "Habitat Selection by Nine Species of Rodents in North-Central Kansas." *Southwest. Nat*. 19: 443-452.

Kenagy, G. J. 1973. "Daily and Seasonal Patterns of Activity and Energetics in a Heteromyid Rodent Community." *Ecology* 54: 1201-1219.

King T. and M. Robbins. 1991. *A Status Survey of Kinosternon sonoriense and Bufo alvarius Along the California Side of the Lower Colorado River Basin*. State of California Resources Agency, Department of Fish and Game, Inland Fisheries.

Kinne, O. 1960. "Growth, Food Intake, and Food Conversion in a Euryplastic Fish Exposed to Different Temperatures and Salinities." *Physiological Zoology* 33: 288-317.

Klauber, L. M. 1934. "An Annotated List of the Amphibians and Reptiles of the Southern Border of California." *Bulletin of the Zoological Society of San Diego* 11: 1-28.

Knight, R. L., D. G. Smith, and A. Erickson. 1982. "Nesting Raptors Along the Columbia River in North-Central Washington." *Murrelet* 63: 2-8.

Knopf, F. L. 1996. "Mountain Plover (*Charadrius montanus*). " In *The Birds of North America* No. 211 (A. Poole and F. Gill, eds.). Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kunz, T. H., E. L. P. Anthony, and W. T. Rumage, 1977. "Mortality of Little Brown Bats Following Multiple Pesticide Applications." *Journal of Wildlife Management* 41: 476-483.

Langhorst, D. R. and P. C. Marsh. 1986. *Early Life History of Razorback Sucker in Lake Mohave. Final Report to the U.S. Bureau of Reclamation*. Arizona State University, Tempe.

Lau, S. and C. Boehm. 1991. *A Distribution Survey of Desert Pupfish (Cyprinodon macularius) Around the Salton Sea, California. Department of Fish and Game, Region 5, Final Report Project EF90XII-1*.

Lawson, B., and R. Johnson. 1982. " Mountain Sheep. " In *Wild Mammals of North America* (J. A. Chapman, and G. A. Feldhamer, eds.). Johns Hopkins Univ. Press, Baltimore, Maryland. Pages 1036-1055.

Leachman, B. and B. Osmundson. 1990. *Status of the Mountain Plover: A Literature Review*. U.S. Fish and Wildlife Service, Golden, Colorado.

Lovvorn, J. R. and C. M. Kirkpatrick. 1982. "Field Use by Staging Eastern Greater Sandhill Cranes." *Journal of Wildlife Management* 46: 99-108.

Lowe, C. H., D. S. Hinds, and E. A. Halpern. 1967. "Experimental Catastrophic Selection and Tolerances to Low Oxygen Concentrations in Native Arizona Freshwater Fishes." *Ecology* 48 (6): 1013-1017.

Lowe, C. H. and W. G. Heath. 1969. "Behavioral and Physiological Responses to Temperature in the Desert Pupfish, *Cyprinodon macularius*." *Physiological Zoology* 42: 53-59.

Luckenbach, R. A. 1982. Ecology and Management of the Desert Tortoise (*Gopherus agassizii*) in California. In *North American Tortoises: Conservation and Ecology*, R.B. Bury (ed.). U.S. Fish and Wildlife Service, Wildlife Research Report 12, Pages 1-37.

MacWhirter, R. B., and K. L. Bildstein. 1996. "Northern Harrier *(Circus cyaneu*s). " In *The Birds of North America,* No. 210 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Marcot, B. G. 1979. *California Wildlife Habitat Relationships Program: North Coast-Cascades Zone. Volume II. Bird Narratives*. USDA Forest Service, Pacific Southwest Region. San Francisco, California.

Marsh, P. C. 1995. "Abundance, Movements, and Status of Adult Razorback Sucker, *Xyrauchen texanus* in Lake Mohave, Arizona and Nevada." *Proceedings of the Desert Fishes Council* 1994: 25-35.

Marsh, P. C. and D. R. Langhorst. 1988. "Feeding and Fate of Wild Larval Razorback Sucker." *Environmental Biology of Fishes* 21 (1): 59-67.

Marsh, P. C. and W. L. Minckley. 1989. "Observations on Recruitment and Ecology of Razorback Sucker: Lower Colorado River, Arizona-California-Nevada." *Great Basin Naturalist* 49: 71-78.

Marsh, Paul, C. and Donald W. Sada. 1993. *Desert Pupfish (Cyprinodon macularis) Recovery Plan*. Region 2. U.S. Fish and Wildlife Service.

Marshall, D. B. 1992. *Threatened and Sensitive Wildlife of Oregon's Forests and Woodlands.* Audubon Society of Portland, Oregon.

Marshall, J. T., Jr. 1956. "Summer Birds of the Rincon Mountains, Saguaro National Monument, Arizona." *Condor* 58: 81-97.

Marti, C. D. and J. S. Marks. 1989. "Medium-Sized Owls." In *Proceedings of the Western Raptor Management Symposium and Workshop. National Wildlife Federation, Scientific and Technical Series No. 12.* October 26-28 1987, Boise, ID. Washington, D.C. Pages 124-133.

Massey, B. W. 1988. *California Least Tern Field Study 1988 Breeding Season*. A report to the California Department of Fish and Game. Final report FG 7660.

Massey, B. W. 1974. "Breeding Ecology of the California Least Tern." *Proc. Linn. Soc. N.Y.* 72: 1-24.

Massey, B. W. and J. Atwood. 1981. "Second-Wave Nesting of the California Least Tern: Age Composition and Reproductive Success." *Auk* 98: 596-605.

Mayhew, W. W. 1965. "Adaptations of the Amphibian *Scaphiopus couchii* to Desert Conditions." *Am. Midl. Nat*. 74: 95-109.

McAda, C. W. and R. S. Wydoski. 1980. *The Razorback Sucker, Xyrauchen texanus, in the Upper Colorado River Basin*. U.S. Fish and Wildlife Service Technical Paper 99: 1-15.

McCaskie, G., P. De Benedictis, R. Erickson, and J. Morlan. 1988. *Birds of Northern California, an Annotated Field List*. Second edition. Golden Gate Audubon Society, Berkeley. Reprinted with supplementary.

McCaskie, G., P. De Benedictis, R. Erickson, and J. Morlan. 1979. *Birds of Northern California, an Annotated Field List*. Second edition. Golden Gate Audubon Society, Berkeley.

McClenaghan, L. R., Jr., and M. S. Gaines. 1978. *Reproduction in Marginal Populations of the Hispid Cotton Rat (Sigmodon hispidus) in Northern Kansas.* University of Kansas Museum of Natural History. Publication No. 74.

McKernan, R. L. 1997. *Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the LCR. Year 1 - 1996.* Submitted to U.S. Bureau of Reclamation, LCR Region, Boulder City, Nevada and U.S. Fish and Wildlife Service, Carlsbad, California.

McKernan, R. L. and G. Brandon. 1999. *Status, Distribution, and Habitat Affinities of the Southwestern Willow Flycatcher Along the LCR. Year 3 - 1998.* Submitted to U.S. Bureau of Reclamation, LCR region, Boulder City, Nevada and U.S. Fish and Wildlife Service, Carlsbad, California.

Meier, T. I. 1981. *Artificial Nesting Structures for the Double-Crested Cormorant.* Wisconsin Department of Natural Resources, Technical Bulletin No. 126. Madison. pp 1-13.

Meslow, E. C. and W. M. Wight. 1975. Avifauna and Succession in Douglas-fir Forests of the Pacific Northwest. In Smith, D. R., technical coordinator, Proceedings of a Symposium: Management of Forest and Range Habitats for Nongame Birds, May 6-9, Tuscon, Arizona. USDA Forest Service, Gen. Tech. Report WO1. Washington, D.C. Pages 266-271.

Miller, A. H., and R. C. Stebbins. 1964. *The Lives of Desert Animals in Joshua Tree National Monument.* University of California Press, Berkeley.

Miller, L**.** 1946. "The Elf Owl Moves West." *Condor* 48: 284-285.

Miller, R. R. and L. A. Fuiman. 1987. "Description and Conservation Status of *Cyprinodon macularius eremus*, a New Subspecies of Pupfish from Organ Pipe Cactus National Monument, Arizona." *Copeia* 3: 593-609.

Minckley, W. L. 1980. "*Cyprinodon macularius* Baird and Girard. Desert Pupfish. " In *Atlas of North American Freshwater Fishes*, (D. S. Lee, C. R. Gilbert, C. H. Hocutt, R. E. Jenkins, D. E. McAllister, and J. R. Stauffer, eds.). North Carolina Museum of Natural History, Raleigh. Page 497.

Minckley, W. L. 1973. *Fishes of Arizona.* Arizona Game and Fish Department, Phoenix.

Minckley, W. L., P. C. Marsh, J. E. Brooks, J. E. Deacon, and B. L. Jensen. 1991. "Management Toward Recovery of Razorback Sucker. " In *Battle Against Extinction*, (W. L. Minckley and J. E. Deacon, eds.). University of Arizona Press, Tucson. Pages 303-358.

Minsky, D. 1984. *A Study of the Foraging Ecology of the California Least Tern at Camp Pendleton, Season of 1984.* U.S. Naval Facility Engineering Command, San Bruno, California.

Modde, T., K. P. Burnham, and E. J. Wick. 1996. "Population Status of the Razorback Sucker in the Middle Green River (U.S.A.)." *Conservation Biology* 10 (1): 110-119.

Molina, K. C. 1996. "Population Status and Breeding Biology of Black Skimmers at the Salton Sea." *Western Birds* 27: 143-158.

Monson, G. and A. Phillipis. 1981. *Revised Checklist of Arizona Birds*. University of Arizona Press, Tucson.

Monson, G., and L. Sumner, eds. 1980. *The Desert Bighorn: Its Life History, Ecology, and Management.* Univ. Arizona Press, Tucson.

Mora, M. A. 1997. "Transboundary Pollution: Persistent Organochlorine Pesticides in Migrant Birds of the Southwestern U.S. and Mexico." *Environmental Toxicology and Chemistry* 16: 3-11.

Moyle, P. B. 1976. *Inland Fishes of California.* University of California Press, Berkeley.

Naiman, R. J. 1979. "Preliminary Food Studies of *Cyprinodon macularius* and *Cyprinodon nevadensis* (*Cyprinodontidae*)." *Southwestern Naturalist* 24: 538-541.

Navo, Kirk. 1998. Big Free-Tailed Bat. Ecology, Conservation and Management of Western Bat Species. Workshop of Western Bat Working Group, Reno, Nevada. February.

Navo, Kirk. 1998a. Pocketed Free-Tailed Bat. Ecology, Conservation, and Management of Western Bat Species. Workshop of Western Bat Working Group, Reno, Nevada. February.

Navo, Kirk. 1998b. Big Free-Tailed Bat. Ecology, Conservation, and Management of Western Bat Species. Workshop of Western Bat Working Group, Reno, Nevada. February.

Nevada Division of Wildlife (NDOW). 1998. Comments on LCR MSCP Preliminary Species Conservation Goals: Bird Species. Prepared by C. Tomlinson, Nongame Biologist, Nevada Division of Wildlife, Las Vegas.

Nevada Natural Heritage Program (NNHP). 1997. Nevada Natural Heritage Program Sensitive Species. Department of Conservation and Natural Resources, Carson City.

New Mexico Department of Game and Fish (NMDGF). 1997. Biota Information System of New Mexico. Revised September 1997 (http://www.fw.vt.edu/fishex/nmex_main/species.htm).

Nichol, K., L. Sabrina and C. Boehm. 1991. *A Distribution Survey of Desert Pupfish (Cyprinodon macularius) Around the Salton Sea, California.* Prepared for the California Department of Fish and Game, Inland Fisheries Division.

Noel, D., and T. B. Johnson. 1993. "Bats of Arizona." *Special Heritage Edition of Arizona Wildlife Views.* August. Arizona Game and Fish Department, Phoenix.

Noel, Debra. 1998. Pocketed Free-Tailed Bat. Ecology, Conservation, and Management of Western Bat Species. Workshop of Western Bat Working Group, Reno, Nevada. February.

Norris, K. S. 1958. "The Evolution and Systematics of the Iguanid Genus *Uma* and Its Relation to the Evolution of other North American Desert Reptiles." *Bulletin of the American Museum of Natural History* 114: 253-326.

Nowak, R. M. and J. L Paradiso. 1983. *Walker's Mammals of the World.* 4th edition. John Hopkins University Press, Baltimore, Maryland.

Ohmart, R. D. and R. E. Tomlinson. 1977. "Foods of Western Clapper Rails." *Wilson Bulletin* 89: 332-336.

Ohmart, R. D. and R. W. Smith. 1973. *North American Clapper Rail (Rallus longirostris) Literature Survey With Special Consideration Being Given to the Past and Present Status of yumanensis.* Reclamation, Contract No. 14-06-300-2409.

Olson, A. C., Jr. 1947. "First Records of *Choeronycteris mexicana* in California." *J. Mammal.* 28: 183-184.

Pacey, C. A. and P. C. Marsh. 1998. *Resource Use by Native and Non-Native Fishes of the Lower Colorado River: Literature Review, Summary and Assessment of Relative Roles of Biotic and Abiotic Factors in Management of an Imperiled Indigenous Ichthyofauna.* Prepared for the U.S. Bureau of Reclamation, Boulder City, Nevada. Arizona State University Department of Biology, Tempe.

Page, G. W., Stenzel, L. E., and Wolfe, C. M. 1979. "Aspects of the Occurrence of Shorebirds on a Central California Estuary." In *Shorebirds in Marine Environments* (F. A. Pitelka, ed.). Lawrence, Kansas: Cooper Ornithological Society, 15-32.

Page, G.W., L. E. Stenzel, W. D. Shuford, and C. R. Bruce. 1991. "Distribution and Abundance of the Snowy Plover on Its Western North American Breeding Grounds." *Journal of Field Ornithology* 62 (2): 245-255.

Palacios, E. P., L. Alfaro, and G. W. Page. 1994. "Distribution and Abundance of Breeding Snowy Plovers on the Pacific Coast of Baja California." *Journal of Field Ornithology* 65 (4): 490-497.

Palmer, R. S. 1967. Species Accounts. In *The Shorebirds of North America* (G. D. Stout, ed.). Viking Press, New York. Pages 143-267.

Palmer, R. S., ed. 1962. *Handbook of North American Birds*. Vol. 1. New Haven, Connecticut: Yale University Press.

Paxton, E., S. Langridge, and M. K. Sogge. 1997. *Banding and Population Genetics of Southwestern Willow Flycatchers in Arizona - 1997 Summary Report*. USGS Colorado Plateau Field Station / Northern Arizona University Report.

Peckham, Kathy. 1998. Cave Myotis. Ecology, Conservation, and Management of Western Bat Species. Workshop of Western Bat Working Group, Reno, Nevada.

Pierson, E. D. and W. E. Rainey. 1994. *Distribution, Status, and Management of Townsend's Big-Eared Bat (Corynorhinus townsendii) in California.* Submitted to California Department of Fish and Game, Wildlife Management Division, Bird and Mammal Conservation Program. Final Report Contract No. FG7129.

Pierson, E. D., W. E. Rainey, and D. M. Koonz. 1991. "Bats and Mines: Experimental Mitigation for Townsend's Big-Eared Bat at the McLaughlin Mine in California. " In *Proceedings V: Issues and Technology in the Management of Impacted Wildlife*. Thorne Ecological Institute, Boulder, Colorado. Pages 31-42.

Piest, L. and J. Campoy. 1998. Report of Yuma Clapper Rail Surveys at Cienega de Santa Clara, Sonora. Unpublished Report.

Pike, J. and L. Hays. 1992. The Status and Management of the Least Bell's Vireo Within the Prado Basin, California 1986-1991. Unpublished Report, California State University, Long Beach Foundation and U.S. Fish and Wildlife Service, Laguna Niguel, California.

Pister, E. P. 1974. "Desert Fishes and Their Habitats." *Transactions American Fisheries Society* 103 (3): 53-60.

Platt, D. R. 1975. "Breeding Birds of the Sand Prairie Natural History Reservation, Harvey County, KS." *American Birds* 29: 1,146-1,151.

Platz, J. E. and J. S. Frost. 1984. "*Rana yavapaiensis,* a New Species of Leopard Frog (*Rana pipiens* complex)." *Copeia* 4: 940-948.

Plumpton, D. L. and D. E. Andersen. 1997. "Habitat Use and Time Budgeting by Wintering Ferruginous Hawks." *Condor* 99: 888-893.

Point Reyes Bird Observatory 1999. Preliminary Findings of 1999 Bird Surveys Through August. Unpublished Data.

Poole, A. 1989. *Ospreys: A Natural and Unnatural History*. Cambridge: Cambridge University Press.

Pough, R. H. 1951. *Audubon Waterbird Guide.* Doubleday, New York.

Radke, W. 1992. U.S. Fish and Wildlife Service, Salton Sea National Wildlife Refuge. Telephone Conversation. December 9.

Reiser, C. 1994. Rare Plants of San Diego County. Unpublished. Aquafir Press, San Diego, California.

Remington, M. D. and P. Hess. 1993. *Results of Desert Pupfish Trapping in Imperial Irrigation District Drains, August 8 – September 21, 1993. Draft Report*. Environmental Compliance Section, Imperial Irrigation District.

Remsen, J. V., Jr. 1978. *Bird Species of Special Concern in California. California Department of Fish and Game, Wildlife Management Branch.* Administrative Report No. 78-1.

Repking, C. F. and R. D. Ohmart. 1977. "Distribution and Density of Black Rail Populations Along the LCR." *Condor* 79: 486-489.

Reynolds, R. T. 1983. *Management of Western Coniferous Forest Habitat for Nesting Accipiter Hawks.* USDA Forest Service, Gen. Tech. Report RM-102.

Robbins, C. S., D. Bystrak, and P. H. Geissler. 1986. *The Breeding Bird Survey: Its First Fifteen Years, 1965-1979.* U.S. Fish and Wildlife Service Resource Publication 157.

Robinson, W. D. 1996. "Summer Tanager (*Piranga rubra*). " In *The Birds of North America*, No. 248 (A. Poole and F. Gill, eds.). Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Rocke T. E. 1999. Disease Outbreaks in Wild Birds at the Salton Sea. An Abstract in Science for Salton Sea Ecosystem Management – A One-Day Symposium Featuring Invited Speakers on Salton Sea Ecology. Published by the Salton Sea Science Subcommittee, U.S. Geological Survey, and the University of California, Riverside. January 5.

Rosen, Philip C., Shawn S. Sartorius, Cecil R. Schwalbe, Peter A. Holm, and Charles H. Lowe. 1996. Herpetology of the Sulphur Springs Valley, Cochise County, Arizona. The Future of Arid Grasslands: Identifying Issues, Seeking Solutions. Tucson, Arizona and Selected Ranches in Southern Arizona, Southwestern New Mexico, and Northern Sonora. October 9-13.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. *Birds of the LCR Valley*. University of Arizona Press, Tucson.

Rosenfield, R. N. and J. Bielefeldt. 1993. "Cooper's Hawk. " In *The Birds of North America*, No. 75 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences of Philadelphia, Pennsylvania.

Rudolph, D. C. and C. D. Fisher. 1993. "Swainson's Hawk Predation on Dragonflies in Argentina." *Wilson Bulletin* 105: 365-366.

Ryden, D. W. and F. K. Pfeifer. 1995. *Monitoring of Experimentally Stocked Razorback Sucker in the San Juan River - 1994 Annual Progress Report*. U.S. Fish and Wildlife Service, Colorado River Fishery Project, Grand Junction.

Ryder, R. A. 1967. "Distribution, Migration, and Mortality of the White-Faced Ibis in North America." *Bird-Banding* 38: 257-277.

Ryder, R. A. and D. E. Manry. 1994. "White-Faced Ibis (*Plegadis chihi*)." In *The Birds of North America*, No. 130 (A. Poole and F. Gill, eds.). Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologist's Union.

Sanders, T. A., and D. W. Edge. 1998. "Breeding Bird Community Composition in Relation to Riparian Vegetation Structure in the Western U.S." *Journal of Wildlife Management* 62: 461-473.

Sauer, J. R., J. E. Hines, G. Gough, I. Thomas, and B. G. Peterjohn. 1997. *The North American Breeding Bird Survey Results and Analysis.* Version 96.4. Patuxent Wildlife Research Center, Laurel, Maryland (http://www.mbr.nbs.gov/bbs/bbs.html).

Savage, J. M., and F. W. Schuierer. 1961. "The Eggs of Toads of the *Bufo boreas* Group With Descriptions of the Eggs of *Bufo exul* and *Bufo nelsoni*." *Bull. So. Calif. Acad. Sci.* 60: 93-99.

Schamberger, M. and F. B. Turner. 1986. "The Application of Habitat Modeling to the Desert Tortoise (*Gopherus agassizi*)." *Herpetologica* 42 (1): 134-138.

Schmutz, J. K. 1987. "The Effect of Agriculture on Ferruginous and Swainson's Hawks." *Journal of Range Management* 40: 438-440.

Schmutz, J. K. 1984. "Ferruginous and Swainson's Hawk Abundance and Distribution in Relation to Land Use in Southeastern Alberta." *Journal of Wildlife Management* 48: 1,180-1,197.

Schoenherr, A.A. 1994. *1994 Fish Survey Along Proposed Cal-Trans Route at North End of Salton Sea.*

Schoenherr, A. A. 1990. *A Comparison of Two Populations of the Endangered Desert Pupfish (Cyprinodon macularius). First Annual Report.* California Department of Fish and Game.

Scott, S. L. ed. 1987. *Field Guide to the Birds of North America.* 2nd ed. National Geographic Society. Washington, D.C.

Serena, M. 1986. *Distribution, Habitat Preferences, and Reproductive Success of Arizona Bell's Vireo (Vireo bellii arizonae) Along the LCR in 1981.* Final Report to California Department of Fish and Game, Endangered, Threatened, and Rare Wildlife Project E-W-5, Job IV-38.I.

Setmire, J. G., R. A. Schroeder, J. N. Densmore, S. L. Goodbred, D. J. Audet, and W. R. Radke. 1993. *Detailed Study of Water Quality, Bottom Sediment, and Biota Associated with Irrigation Drainage in the Salton Sea Area, California 1988-90.* U.S. Geological Survey, Water-Resources Investigations Report 93-4014.

Sharp, B. E. 1992. *Neotropical Migrants on National Forests in the Pacific Northwest.* Prepared for USDA Forest Service by Ecological Perspectives, Portland, Oregon.

Shaw, C. E. 1950. "The Gila Monster in New Mexico." *Herpetologica* 6: 37-39.

Sheppard, J. M. 1996. "Le Conte's Thrasher." *Birds of North America* 230: 1-24.

Sheppard, J. M. 1970. "A Study of the Le Conte's Thrasher." *Calif. Birds* 1: 85-94.

Sherwin, Rick. 1998. Pallid Bat. Ecology, Conservation, and Management of Western Bat Species. Workshop of Western Bat Working Group, Reno, Nevada.

Shuford, W. D., C. M. Hickey, R. J. Safran, and G. W. Page. 1996. "A Review of the Status of the White-Faced Ibis in Winter in California." *Western Birds* 27: 169-196.

Shuford, W.D., G.W. Page, and C.M. Hickey. 1995. "Distribution and Abundance of Snowy Plovers Wintering in the Interior of California and Adjacent States." *Western Birds* 26: 82-98.

Shuford, W. D., N. Warnock, and K. C. Molina. 1999. *The Avifauna of the Salton Sea: A Synthesis.* Point Reyes Bird Observatory, Stinson Beach, California.

Siegel-Causey, D., and G. L. Hunt. 1981. "Colonial Defense Behavior in Double-Crested and Pelagic Cormorants." *Auk* 98: 522-531.

Sigler, W. F. and R. R. Miller. 1963. *Fishes of Utah*. Utah Department of Game and Fish, Salt Lake City.

Skaggs, R. W., D. H. Ellis, W. Graininger Hunt, and T. H. Johnson. 1988. "Peregrine Falcon. " In Proceedings of the Southwestern Raptor Management Symposium and Workshop (R. L. Glinski et al., eds.) Washington, D.C.: National Wildlife Federation.

Skinner, Mark W. and Bruce M. Pavlic (eds.). 1994. *Inventory of Rare and Endangered Vascular Plants of California*, Fifth Edition. California Native Plant Society.

Skorupa, J. P., R. L. Hothem, and R. W. DeHaven**.** 1980. "Foods of Breeding Tricolored Blackbirds in Agricultural Areas of Merced County, California." *Condor* 82: 465-467.

Skorupa, J. P., S. P. Morman, and J. S. Sefchick-Edwards. 1996. *Guidelines for Interpreting Selenium Exposures of Biota Associated with Nonmarine Aquatic Habitats*. Prepared for The National Irrigation Water Quality Program. March.

Small, A. 1994. *California Birds: Their Status and Distribution*. Ibis Publishing Company, Vista, California.

Smith, H. M. 1971. *Handbook of Lizards – Lizards of the U.S. and Canada*. Fifth Printing, Cornell University Press, Ithaca, New York.

Smith, P. M. 1975. *Habitat Requirements and Observations on the Clapper Rail (Rallus longirostris yumanensis).* M.S. Thesis, Arizona State University, Tempe.

Smith, P. M. 1974. *Yuma Clapper Rail Study*, Mojave County, Arizona. California Department of Fish and Game.

Snider, P. R. 1969. "Southwest Region." *Audubon Field Notes* 23: 681.

Sogge, M. K., T. J. Tibbitts, and J. R. Peterson. 1997. "Status and Breeding Ecology of the Southwestern Willow Flycatcher in the Grand Canyon." *Western Birds* 28: 142-157.

Sredl, M. J. 1997. *Ranid Frog Conservation and Management*. Technical Report 121, Nongame and Endangered Wildlife Program, Arizona Game and Fish Department, Phoenix.

Stebbins, R. C. 1985. *A Field Guide to Western Reptiles and Amphibians*. Boston: Houghton Mifflin Co.

Stebbins R. C. 1954. *Amphibians and Reptiles of Western North America*. McGraw-Hill Book Company, New York, New York.

Stewart, R. E. 1975. *Breeding Birds of North Dakota. Tri College Center for Environmental Studies.* Fargo, North Dakota.

Storer, T. I. 1925. "A Synopsis of the Amphibia of California." University of California Publications in *Zoology* 27: 1-342.

Sturm, K. 1999. Salton Sea National Wildlife Refuge. Personal Communication.

Sutton, R. 1999. *The Desert Pupfish of the Salton Sea: A Synthesis.* Prepared for the Salton Sea Authority.

Tacha, T. C., S. A. Nesbitt, and P. A.Vohs. 1992. "Sandhill Crane." *Birds of North America* 31: 1-24.

Tate, J. 1981. "The Blue List for 1981: The First Decade." *Am. Birds* 35: 3-10.

Terres, J. K. 1980. *The Audubon Society Encyclopedia of North American Birds*. Alfred A. Knopf, New York, New York.

Thelander, C. 1974. "Nest Site Utilization by Golden Eagles in 1974." California Department of Fish and Game, Wildlife Management Branch. Administrative Report Special Wildlife Investigation.

Tierra Madre Consultants, Inc. 1998. *Imperial Irrigation District USO-Line Biological Survey*. Prepared for ASM Affiliates, Inc. Encinitas, California, October 12.

Todd, R. L. 1980. *Wildlife Survey and Investigations*. Arizona Game and Fish Department, Federal Aid Project. W-53-R-30 Special Report. Phoenix.

Turnbull, R. E., F. A. Johnson, and D. A. Brakhage. 1989. "Status, Distribution, and Foods of Fulvous Whistling-Ducks in South Florida." *Journal of Wildlife Management*. 53: 1,046-1,051.

Turner, F. B., J. C. Rorabaugh, E. C. Nelson, and M. C. Jorgensen. 1980. *A Survey of the Occurrence and Abundance of the Flat Tailed Horned Lizard (Phrynosoma mcallii) in California.* Contract YA-512-CT8-58.

Turner, F. B. and P. A. Medica. 1982. "The Distribution and Abundance of the Flat Tailed Horned Lizard (*Phrynosoma mcallii*)." *Copeia* 1982 (4): 815-823.

Turner, R. M. 1982. "Mohave Desertscrub. " In *Biotic Communities of the American Southwest – U.S. and Mexico* (D. E. Brown, ed.). See also *Desert Plants* 4 (1-4): 157-168.

Turner, R. M. and D. E. Brown. 1982. "Sonoran Desertscrub. " In *Biotic Communities of the American Southwest – U.S. and Mexico* (D. E. Brown, ed.). See also *Desert Plants* 4 (1-4): 181-222.

Tyler, W. B., K. T. Briggs, D. B. Lewis, and R. G. Ford. 1993. "Seabird Distribution and Abundance in Relation to Oceanographic Processes in the California Current System. " In *The Status, Ecology, and Conservation of Marine Birds of the North Pacific* (K. Vermeer, K. T. Briggs, K. H. Morgan, and D. Siegel-Causey, eds.). Canadian Wildlife Service, Special Publication. Ottawa, Canada. Pages 61-69.

Tyus, H. M. 1991. "Management of Colorado River Fishes. " In *Warmwater Fisheries Symposium I.* USDA Forest Service, Gen. Tech. Rept. RM-207. Pages 175-182.

Tyus, H. M. 1987. "Distribution, Reproduction, and Habitat Use of the Razorback Sucker in the Green River, Utah 1979-1986." *Transactions of the American Fisheries Society* 116: 111-116.

Tyus, H. M. and C. A. Karp. 1990. "Spawning and Movements of Razorback Sucker, *Xyrauchen texanus*, in the Green River Basin of Colorado and Utah." *The Southwestern Naturalist* 35 (4): 427-433.

U.S. Army Corps of Engineers (Corps). 1996. *Imperial County Watershed Study*, California. Draft Reconnaissance Phase Study. U.S. Army Corps of Engineers, Los Angeles District.

U.S. Bureau of Reclamation (Reclamation). 1996. *Description and Assessment of Operations, Maintenance and Sensitive Species of the Lower Colorado River, Draft Biological Assessment, 226.* Prepared for the U.S. Fish and Wildlife Service and the Lower Colorado River Multi-Species Conservation Program.

Reclamation. 1996. Unpublished Data. Bonytail Chub and Razorback Sucker Larval Captures from Lake Mohave 1992-1996 (file data).

Reclamation. 1993. *Draft Environmental Impact Statement/Environmental Impact Report, Coachella Canal Lining Project*. December.

Reclamation. 1993. *Draft Environmental Impact Statement/Environmental Impact Report, Coachella Lining Project*. December.

Reclamation and IID. 1994. *AAC Lining Project, Imperial County, California. Final Environmental Impact Statement/Environmental Impact Report*. California State Clearinghouse No. SCH 90010472.

U.S. Fish and Wildlife Service (USFWS). 1999. *Planning Aid Report, Salton Sea Restoration Project, Imperial and Riverside Counties California.* Report Prepared by the USFWS for the Bureau of Reclamation, Boulder City, Nevada.

USFWS. 1998. *Draft Comprehensive Management Plan for Tijuana River National Estuarine Research Reserve and Tijuana Slough National Wildlife Refuge*. San Diego, California.

USFWS. 1997. *Watchable Wildlife*. Salton Sea National Wildlife Refuge.

USFWS. 1997a. *Draft Razorback Sucker Xyrauchen texanus Recovery Plan*. U.S. Fish and Wildlife Service, Denver, Colorado.

USFWS. 1996a. *Planning Aid Report: Imperial County Watershed Study*, Imperial, San Diego and Riverside Counties, California.

USFWS. 1996b. *Biological and Conference Opinion for the AAC Lining Project*. Imperial County, California. Carlsbad.

USFWS. 1995a. "Endangered and Threatened Wildlife and Plants; Final Rule Determining Endangered Status for the Southwestern Willow Flycatcher: Southern California, Southern Nevada, Southern Utah, Arizona, New Mexico, Western Texas, Southwestern Colorado, and Extreme Northwestern Mexico. " *Federal Register* 60 (38): 10,694-10,714. February 27.

USFWS. 1995b. "Endangered and Threatened Wildlife and Plants; Final Rule to Reclassify the Bald Eagle from Endangered to Threatened in all of the Lower 48 States. " *Federal Register* 60 (133): 36,000-36,010. July 12.

USFWS. 1994. *Environmental Contaminants Endangered Species Report – Yuma Clapper Rail.* Report No. CFO-ES-94-05.

USFWS. 1994a. "Endangered and Threatened Wildlife And Plants; Proposed Rule to Reclassify the Bald Eagle from Endangered to Threatened in Most of the Lower 48 States. " *Federal Register* 59: 35,584-35,604. July 12.

USFWS. 1994b. "Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Status; Proposed Rule. " *Federal Register* 59 (219): 58,986. November 15.

USFWS. 1993. *Colorado River Endangered Fishes Critical Habitat, Draft Biological Support Document*. Salt Lake City, Utah.

USFWS. 1993a. *Desert Pupfish Recovery Plan*. U.S. Fish and Wildlife Service, Region 2, Phoenix, Arizona.

USFWS. 1993b. *Wildlife of Salton Sea National Wildlife Refuge*, California. RF11630. September.

USFWS. 1993c. "Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Pacific Coast Population of the Western Snowy Plover. " *Federal Register* 58 (42): 12,864-12,874. March 5.

USFWS. 1993d. Letter with Information Regarding Piscivorous Bird Use of Salton Sea from M. F. Radke to Michael Concannon, CH2M HILL. July 16.

USFWS. 1992. *Biological Opinion for Drain Maintenance Plan, Salton Sea National Wildlife Refuge, Imperial County, California. Carlsbad, California.*

USFWS. 1986. "Endangered and Threatened Wildlife and Plants; Determination of Endangered Status and Critical Habitat for the Desert Pupfish." *Federal Register* 51 (61): 10,843-10,851, March 31.

USFWS. 1983. *Yuma Clapper Rail Recovery Plan*. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

USFWS. 1976. *The Southern Bald Eagle in Arizona* (a status report). Endangered Species Report 1. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

USFWS. No date. Yuma Clapper Rail Census Results: 1990-1995.

Unitt, P. 1987. "*Empidonax traillii extimus*: An Endangered Subspecies." *Western Birds* 18 (3): 137-162.

Unitt, P. 1984. *The Birds of San Diego County*. Memoir 13, San Diego Society of Natural History.

University of California, Los Angeles (UCLA). 1983. *Enhancements of Habitats for the Yuma Clapper Rail and Desert Pupfish in the Vicinity of the Salton Sea, California.* Environmental Science and Engineering Report No. 83-52. February.

Valdez, R. A. and S. W. Carothers. 1998. *The Aquatic Ecosystem of the Colorado River in Grand Canyon*. *Grand Canyon Data Integration Project Synthesis Report*. Final Report Prepared for U.S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City, Utah.

Vanicek, C. D., R. H. Kramer, and D. R. Franklin. 1970. "Distribution of Green River Fishes in Utah and Colorado Following Closure of Flaming Gorge Dam." *The Southwestern Naturalist* 14 (3): 297-315.

Vaughan, T. A. 1959. "Functional Morphology of Three Bats: Eumops, Myotis, and Macrotis." *University of Kansas Museum of Natural History Publication* 12: 1-153.

Viverette, C. B., S. Struve, L. J. Goodrich, and K. L. Bildstein. 1996. "Decreases in Migrating Sharp-Shinned Hawks (*Accipiter striatus*) at Traditional Raptor-Migration Watch Sites in Eastern North America." *Auk* 113: 32-40.

Waian, L. B**.** and R.C. Stendell, 1970. "The White-Tailed Kite in California with Observations of the Santa Barbara Population." *California Fish and Game* 56: 188-198.

Walker, B. W., R. R. Whitney, and G. W. Barlow. 1961. *The Fishes of the Salton Sea.* CDFG Fish Bulletin No. 113, Ecology of the Salton Sea, California, in Relation to the Sportfishery. Boyd W. Walker, ed. Pages 77-92.

Walsberg, G. and K. A. Voss-Roberts. 1983. "Incubation in Desert-Nesting Doves: Mechanisms for Egg Cooling." *Physiological Zoology* 56: 88-93.

Walters, L. L. and E. F. Legner. 1980. "The Impact of Desert Pupfish, *Cyprinodon macularis* and *Gambusia affinis affinis* on Fauna in Pond Ecosystems." *Hilgardia* 18: 1-18.

Walton, B., J. Linthicum, and G. Stewart. 1988. "Release and Reestablishment Techniques Developed for Harris' Hawks - Colorado River 1979-1986. " In *Proceedings of the Southwest Raptor Management Symposium and Workshop* (R. L. Glinski et al., eds.). National Wildlife Federation, Washington, D.C. Pages 318-320.

Warkentin, I. G. and P. C. James. 1988. "Trends in Winter Distribution and Abundance of Ferruginous Hawks." *Journal of Field Ornithology* 59: 209-214.

Weedman, D. A. and K. L. Young. 1997. *Status of the Gila Topminnow and Desert Pupfish in Arizona.* Nongame and Endangered Wildlife Program Technical Report 118. Arizona Game and Fish Department, Phoenix.

Wehausen, J. D. 1980. *Sierra Nevada Bighorn Sheep: History and Population Ecology*. Ph.D. Diss. Univ. Michigan, Ann Arbor.

Wheelwright, N. T. and J. D. Rising. 1993. "Savannah Sparrow (*Passerculus sandwichensis*). " In *The Birds of North America,* No. 45 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.

Wilbur, S. R. 1974. *The Literature of the California Black Rail.* U.S. Fish and Wildlife Service, Special Scientific Report – Wildlife No. 179, Washington D.C.

Williams, B. 1996. *Purple Martin*. Draft Report to the California Department of Fish and Game.

Williams, D. F. 1986. *Mammalian Species of Special Concern in California.* California Department of Fish and Game, Wildlife Management Division. Administrative Report 86-1. Sacramento.

Wright A. H. and A. A Wright. 1949. *Handbook of Frogs and Toads of the U.S. and Canada.* Comstock Publishing Company. Ithaca, New York.

Wydoski, R. S. and E. J. Wick. 1998. *Ecological Value of Floodplain Habitats to Razorback Suckers in the Upper Colorado River Basin*. Final Report Prepared for U.S. Fish and Wildlife Service, Denver, Colorado.

Yatskievych, G., and C. T. J. Mason. 1986. "A Revision of the Lennoaceae." *Systematic Botany* 11: 531-548.

Yosef, R. 1996. "Loggerhead Shrike (*Lanius ludovicianus*). " In *The Birds of North America,* No. 23, (A. Poole and F. Gill, eds.) Philadelphia, Pennsylvania: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologist's Union.

Zarn, M. 1974. *Habitat Management Series for Unique or Endangered Species. Report No. 1: Burrowing Owl (Speotyto cunicularia hypogaea).* U.S. Department of the Interior, Bureau of Land Management. Technical Note.

Zeiner, D.C., W. F. Laudenslayer, K. E. Mayer, and M. White, eds. 1990. *California's Wildlife. Volume II. Birds. California Statewide Wildlife Habitat Relationships Systems.* California Department of Fish and Game, Sacramento.

Zeiner, D. C., W. F. Laudenslayer, K. E. Mayer, and M. White, eds. 1990a. *California Wildlife Volume II: Birds.* California Department of Fish and Game. Sacramento.

Zeiner, D. C., W. F. Laudenslayer, K. E. Mayer, and M. White, eds. 1990b. *California Statewide Wildlife Habitat Relationships System. Volume 3: Mammals.* The Resources Agency. Sacramento.

Zengel, S. A., V. J. Meretsky, E. P. Glenn, R. S. Felger, and D. Ortiz. 1995. "Cienega de Santa Clara, a Remnant Wetland in the Rio Colorado Delta (Mexico): Vegetation Distribution and the Effects of Water Flow Reduction." *Ecological Engineering* 4: 19-36.

Zink, R. M., D. L. Dittman, and S. W. Cardiff. 1991. "Mitochondrial DNA Variation and the Taxonomic Status of the Large-Billed Savannah Sparrow." *Condor* 93: 1,016-1,019.

Zwank, P. J., P. M. McKenzie, and E. B. Moser. 1988. "Fulvous Whistling-Duck Abundance and Habitat Use in Southwestern Louisiana." *Wilson Bulletin* 100 (3): 488-494.