forage at the Salton Sea, even though they breed elsewhere during the winter (US Fish and Wildlife Service 1996). Approximately 1,400 brown pelicans died from avian botulism in 1996, the largest die-offs to date of pelicans in the US (Rocke 1999).

As many as 33,000 American white pelicans (*Pelecanus erythrorhynchos*) have been counted at the Salton Sea during migration and during the winter (US Fish and Wildlife Service 1999). White pelicans are surface feeders, floating or swimming on the water and scooping up fish near the surface and sometimes cooperatively hunting in groups (Zeiner et al. 1990a). From the early 1900s to the late 1950s this species nested at the Salton Sea. Currently, it is unlikely that there is sufficient undisturbed habitat at the Salton Sea to support nesting colonies of American white pelicans. Nesting American white pelicans have declined in California in the last century because of degradation and loss of nesting habitat and the only remaining nesting colonies are at large lakes in the Klamath Basin. The white pelican population is vulnerable to decline because of its low annual reproductive output, colonial nesting, and dependence on isolated nesting sites. Drought, water diversion projects, and disruptive human activities at nesting colonies have adversely affected this species. Lowering water levels in lakes allows predators to destroy nesting colonies as nesting islands become connected to mainland shorelines. American white pelicans also are susceptible to persistent pesticides that pollute the watershed. An estimated 10% of the white pelican western population died from avian botulism in 1996 (Rocke 1999).

Double-crested cormorants (*Phalacrocorax auritus*) occur as a common year-round resident at the Salton Sea, with counts of up to 10,000 individuals (US Fish and Wildlife Service 1993; IID 1994). Small numbers of cormorants have nested at the Sea in the past, and small nesting colonies were documented at the north end of the Sea for the first time in 1995 (US Fish and Wildlife Service 1996). Over 7,000 double-crested cormorants and 4,500 nests were counted on Mullet Island in 1999, the largest breeding colony on the West Coast (Point Reyes Bird Observatory 1999). Cormorants dive under the surface of the water to varying depths to capture fish and feed in the open waters of the Salton Sea. They roost on dead trees, exposed rocks, and islands. Cormorants require undisturbed sites near the water for nesting. Double-crested cormorants throughout California have been compromised recently by loss of marsh nesting habitat, pesticides in the watershed, nest predation by gulls and crows, and human disturbance and egg collection activities at nesting colonies (Zeiner et al. 1990a). 1,957 double-crested cormorants, 1,500 of which were juveniles, died in 1997 part of a larger bird die-off that killed 6,845 birds. The juvenile cormorants died from Newcastle Disease (US Fish and Wildlife Service/National Wildlife Refuge 1997-1998; Rocke 1999). Double-crested cormorants have nested successfully on Mullet Island at the Salton Sea.

Reddish egret (*Dichromanassa rufescens*) is a casual visitor in the summer and fall. It has occurred at the Salton Sea and Colorado River, but most records in California are from coastal southern California.

Least bittern (*Ixobrychus exilis hesperis*) inhabits fresh and brackish water marshes, usually near open water sources, and desert riparian habitats (Zeiner et al. 1990a). Most of the California population winters in Mexico and migrates in the spring and the summer to scattered locations in the western US, including the Colorado River, Salton Sea, Central Valley, and coastal lowlands of southern California. At the Salton Sea, the least bittern population is estimated at about 550 individuals (IID 1994). This species nests in wetlands adjacent to the Sea that provide dense emergent vegetation, such as cattails or tules. Least bittern forage for fish, aquatic and terrestrial invertebrates, and small vertebrates in shallow waters and mudflats along the Salton Sea shoreline or in adjacent freshwater marshes. The primary threats to the species are marsh drainage, human disturbance, and pesticides (Zeiner et al. 1990a).

White-faced ibis (*Plegadus chihi*) is an uncommon summer resident to areas of southern California but is more widespread during migration (Zeiner et al. 1990a). At the Salton Sea this species is a year-round resident and nests in the area in small numbers (US Fish and Wildlife Service 1996). The Salton Sea provides habitat for the second largest wintering population of this species in California; in the winter there can be as many as 16,000 white-faced ibis at the Salton Sea (US Fish and Wildlife Service 1999) and over 24,000 were recorded in 1999 (Point Reyes Bird Observatory 1999). White-faced ibis probe for invertebrates and small vertebrates in freshwater marshes, in shallow waters along lakeshores, in wet agricultural fields and meadows, and occasionally in salt marshes. This species nests in extensive marshes amidst dense, tall marsh plants. White-faced ibis has declined in California, where breeding is very limited. Destruction of large marshes is attributed as the primary reason for decline, with persistent pesticides a secondary cause (Zeiner et al. 1990a).

Wood stork (*Mycteria americana*) is a common postbreeding visitor to the Salton Sea, with up to 275 individuals counted (US Fish and Wildlife Service 1993; IID 1994). Wood storks breed in Florida and Mexico but visit the Salton Sea to forage in wetlands and fields during the summer. This species primarily forages in shallow water for fish, small vertebrates, and aquatic invertebrates. The decline of this species is attributed to loss of breeding and foraging habitat in Florida.

Fulvous whistling-duck (*Dendrocygna bicolor*) historically occurred as a regular summer visitor in small numbers along the southern California coast north to Los Angeles and in greater numbers in the Central Valley (Garrett and Dunn 1981). This species no longer breeds in these areas. It also has declined along the Colorado River and at the Salton Sea and is now considered a rare summer visitor that may sporadically breed at the Salton Sea (US Fish and Wildlife Service 1993). The Salton Sea supports a population of about 200 individuals during the spring and summer, with a much smaller breeding population (IID 1994). Fulvous whistling-duck nest in dense freshwater wetlands near the south end of the Salton Sea and forage on wetland plants and submerged aquatic vegetation in freshwater habitats. Reasons for decline of the fulvous whistling-duck are draining and development of marsh habitats and hunting. Pesticides have been shown to cause declines in Fulvous whistling- duck populations in other

states and also may have adversely affected the California population (Zwank et al. 1988).

Ospreys (*Pandion haliaetus*) nest in northern California, and small numbers winter in southern California, with most of the population wintering in Central America and South America (Zeiner et al. 1990). At the Salton Sea, ospreys occur in small numbers as a nonbreeding visitor throughout the year (US Fish and Wildlife Service 1993). Ospreys are plunge divers, searching for fish from the air or from perches and, as a result, require clear open water to locate prey. Upon locating fish, ospreys dive to capture the fish, using their talons, near the surface of the water. This species uses large trees or snags near the water for roosting and hunting. Heavy logging has destroyed fisheries and nest sites, adversely affecting the osprey population in California (Zeiner et al. 1990a). Human disturbance and pesticides also have contributed to the decline of this species.

Southern bald eagle (*Haliaeetus leucocephalus leucocephalus*) is the subspecies of bald eagle found in California and it is the largest raptor in California. Although not nesting in the Salton Sea area, it is an occasional winter visitor and feeds on dead tilapia along the shoreline. Trees in the area provide important habitat for roosting.

Northern harrier (*Circus cyaneus hudsonius*) is a widespread winter resident and migrant in suitable habitat in California, although it has declined as a breeding species (Zeiner et al. 1990a). At the Salton Sea, this species is a common winter visitor (US Fish and Wildlife Service 1993). Harriers forage for small mammals, birds, and other small vertebrates along the shore of the Sea and in adjacent natural habitats and agricultural fields. This species has declined substantially in California in the last century because of loss of wetland nesting habitat and perennial grassland foraging habitat. Northern harrier nest on the ground and are vulnerable to nest destruction from agricultural and other human activities, nest predation, and heavy grazing, which reduces nesting cover and also can result in trampling of nests (Zeiner et al. 1990a). Reduced reproductive success has resulted from eggshell thinning caused by accumulated organochlorines and also has contributed to the decline of this species.

Sharp-shinned hawk (*Accipiter striatus*) is a fairly common migrant and winter resident in California, although its breeding distribution is poorly documented (Zeiner et al. 1990a). At the Salton Sea it is an uncommon winter visitor (US Fish and Wildlife Service 1993). Sharp-shinned hawks feed primarily on small birds in riparian and scrub habitats adjacent to the Sea.

Cooper's hawk (*A. cooperii*) is a breeding resident in wooded portions of the state, often nesting in deciduous trees near riparian areas and in oak and coniferous woodlands (Zeiner et al. 1990a). It occurs as an uncommon winter visitor to the Salton Sea (US Fish and Wildlife Service 1993). Cooper's hawk relies mainly on avian prey, which it hunts in riparian and shrubland habitats near the Sea. Cooper's hawk has declined as a breeding species in California because of pesticide-caused reproductive failure in the

1950s and 1960s, habitat loss and fragmentation, illegal shooting, and human encroachment and disturbance in nesting areas (Remsen 1978).

Northern goshawk (*A. gentilis*) feeds on ground-dwelling birds and ducks. Eggshell thinning in this species was reported from some areas in the early 1970s. Like Cooper's hawk, the northern goshawk is an uncommon winter visitor to the Salton Sea.

Swainson's hawk (*Buteo swainsoni*) occurs throughout much of the western half of the continent. It inhabits the open desert and agricultural areas of the Salton Sea and preys on small vertebrates and insects, some reptiles, and fledgling birds. Expanding agricultural lands has increased its breeding opportunities.

Breeding ferruginous hawk (*B. regalis*) is distributed throughout the Great Basin and Great Plains of the western United States and southern Canada (Johnsgard 1988). The winter range is expanded south to Mexico, west to California, and east to Texas. In California this species is distributed throughout southern California, the Central Valley, the deserts, the coast range, and the northeast corner of the state (Zeiner et al. 1990a). Ferruginous hawks in California occur in large expanses of grassland, agricultural, sagebrush flat, desert scrub, and pinyon-juniper habitats (Zeiner et al. 1990a). This hawk is a rare winter visitor to the Salton Sea (US Fish and Wildlife Service 1993).

In California, prairie falcons (*F. mexicanus*) inhabit open grassland, desert, and agricultural habitats away from the coast, and they nest in cliffs overlooking open areas (Zeiner et al. 1990a). Prairie falcons are rare migrants (about 30 migrants annually) at the Salton Sea and in the Imperial Valley (US Fish and Wildlife Service 1993). Prairie falcons forage for avian and mammalian prey in open desert and grassland habitats surrounding the Salton Sea, as well as along the shores of the Sea. Prairie falcon declines in California are attributed to loss of foraging habitat, human disturbance at nest sites, rodent control programs that decrease the falcon's prey base (e.g., ground squirrels), and potential reproductive impacts from pesticides (Remsen 1978).

California black rail (*Laterallus jamaicensis*) occurs as a scarce yearlong resident in the San Francisco Bay Area, Sacramento-San Joaquin Delta, a few locations along the coast of California, the Salton Sea, and lower Colorado River (Zeiner et al. 1990a). This species inhabits saline, freshwater, and brackish water marshes. The California black rail's decline throughout its range is attributed to the loss of saltwater and freshwater wetlands to urban and agricultural development (Wilbur 1974). It hides its nest in dense wetland vegetation and forages for insects from the surface of mud and vegetation (Zeiner et al. 1990a). At the Salton Sea this species has been reported at a number of locations, including Finney Lake, near Seeley, near Niland, Calipatria, Salt Creek, and seepage areas associated with the Coachella and All American canals (Garrett and Dunn 1981). The status of this species is uncertain at the Salton Sea, with some locations having numerous calling birds over periods of several weeks in the spring, which suggests a breeding population.

Yuma clapper rail (*Rallus longirostris yumanensis*) is a rare, year-round resident at the Salton Sea and along the lower Colorado River into Mexico (US Fish and Wildlife Service 1993; Zeiner et al. 1990a). Since 1990 and average of 365 rails have been counted around the Sea which represents an estimated 40 percent of the entire US population of this species (Point Reyes Bird Observatory 1999; US Fish and Wildlife Service 1999). Yuma clapper rails occur at the south end of the Salton Sea near the New and Alamo river mouths, at the Salton Sea Wildlife Refuge, at the Wister Waterfowl Management Area, the Imperial Wildlife Area, and other locations. A population of 400 rails has been documented from the Salton Sea area (IID 1994). This rail probes in freshwater and saltwater emergent wetlands for aquatic and terrestrial invertebrates and occasionally for small fish. Nests are built in emergent vegetation. Yuma clapper rails have declined because of loss of marsh habitat. Actions to preserve and increase the freshwater marsh habitat are critical to the recovery of this species (US Fish and Wildlife Service 1999).

Sandhill cranes (*Grus canadensis tabida*) are uncommon winter migrants at the Salton Sea, with fewer than 300 in the Imperial Valley (US Fish and Wildlife Service 1993; IID 1994). Both the greater and lesser subspecies have been detected, with most observations being of the greater subspecies. This species probes for a variety of invertebrates, small vertebrates, plants, and seeds in agricultural fields near the Salton Sea.

Western snowy plover (*Charadrius alexandrinus nivosus*) occurs along the Pacific Coast, from southern Washington to Baja California. Western snowy plover are year-round breeding residents and summer migrants at the Salton Sea, with a summer population of over 200 individuals (US Fish and Wildlife Service 1993; IID 1994). The Salton Sea supports the greatest number of western snowy plovers in the interior of California (US Fish and Wildlife Service 1999). Snowy plovers nest on undisturbed, flat, sandy or gravelly beaches at the Salton Sea. They glean food from the wet sand at the beach-water interface, feeding on terrestrial and aquatic invertebrates. The species is declining because of increased human disturbance, loss of feeding and nesting areas, and increased predation by birds and mammals.

Mountain plover (*C. montanus*) is a fairly 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 (US Fish and Wildlife Service 1999). During February 1999 surveys 2,486 individuals were counted which represents approximately half of the California population (Point Reyes Bird Observatory 1999). This species gleans terrestrial invertebrates from the ground and is found in agricultural fields and pastures near the Salton Sea. Mountain plovers have declined principally because of loss of nesting habitat.

Laughing gull (*Larus atricailla*) is a common post-breeding visitor (up to 1,000 individuals) at the Salton Sea and previously nested in the area (US Fish and Wildlife Service 1993; IID 1994). Most laughing gulls occur at the south end of the Sea and

adjacent habitats, where they scavenge for food along shorelines and forage for invertebrates and fish.

Van Rossem's gull-billed tern (*Sterna nilotica vanrossemi*) is an uncommon summer breeding resident at the Salton Sea with a population of 300 (US Fish and Wildlife Service 1993; IID 1994). The only other nesting location in California is at San Diego Bay, which has a small colony. This species nests on open sandy flats often near the colonies of other terns (Zeiner et al. 1990a). Gull-billed terns hawk for insects over beaches and mudflats at the Salton Sea and in adjacent wetlands and agricultural fields. They also forage to a lesser degree for aquatic invertebrates, small vertebrates, fish, and bird eggs. This species was nearly exterminated in the early 1900s because of egg and feather collection (Zeiner et al. 1990a). Numbers of nesting birds at the Salton Sea have declined because of rising Sea elevation flooded nests.

Elegant tern's (*S. elegans*) range in North America is extremely limited, and it occurs in a few places in California, two of them being the Salton Sea and San Diego Bay. The elegant tern inhabits salt marsh dikes, sand beaches, and flats. It forages for fish by plunge diving from high altitudes into the water (Erlich et al. 1988; Scott 1987).

California least tern (*S. antillarum browni*) nests in open sand, salt pans, or dried mudflats near lagoons or estuaries. It is an occasional visitor to the Salton Sea, where its activity is likely limited to foraging in the open water and resting on the shore (US Fish and Wildlife Service 1999). California least terns may be susceptible to the effects of pesticide contamination and bioaccumulation (Boardman 1987a and 1987b).

Black tern (*Childonias niger*) inhabits freshwater marshes, sloughs, lakeshores, and wet meadows. It is declining in many areas because of a loss of wetland habitat. The Salton Sea watershed is thought to be the most important staging area for black terns in the Pacific Flyway (US Fish and Wildlife Service 1999). The black tern forages for insects by hawking and also takes aquatic invertebrates and fish (Ehrlich et al. 1988).

Black skimmer (*Rynchops niger*) is an uncommon summer breeding resident at the Salton Sea, with a population of 600 individuals (US Fish and Wildlife Service 1993; IID 1994). Skimmers prefer to build nesting colonies on gravel bars, low islands, and sandy beaches (Zeiner et al. 1990a). This species forages by skimming low over the surface of the water, scooping up fish and aquatic invertebrates. At the Salton Sea, black skimmers forage over open water and along beaches and mudflats. Skimmers are sensitive because of their extremely limited nesting distribution and abundance in California. Nesting colonies are located only at the Salton Sea, San Diego Bay, and the Bolsa Chica Refuge in Orange County. This species also is losing nesting sites because of rising water levels at the Salton Sea and because of human disturbance at beaches.

The western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) once nested from Mexico to southern British Columbia. In California remnant populations breed along sections of seven rivers, including the Colorado River in the southern part of the state. The yellow-billed cuckoo suffered from wholesale destruction of riparian habitat in

California over the last 100 years. Although the yellow-billed cuckoo has not been seen recently in the Salton Sea area, suitable habitat does exist in some of the upper reaches of streams draining into the Sea, such as Whitewater River.

The breeding range of the North American subspecies of burrowing owl (*Athene cunicularia*) extends south from southern Canada into the western half of the United States and down into Baja California and central Mexico (Johnsgard 1988). This species is a common year-round resident adjacent to the Salton Sea and in the surrounding Imperial Valley (Garrett and Dunn 1981; US Fish and Wildlife Service 1993). Their density in Imperial County surpasses that in any other single county in California (Sturm 1999). Burrowing owls inhabit open areas, such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agriculture fields. At the Salton Sea, burrowing owls are concentrated along the edges of agricultural fields, especially where the banks of irrigation ditches provide suitable nesting burrows. There are fewer owls inhabiting areas of open desert scrub (Garrett and Dunn 1981). Burrowing owls have declined through much of their range because of habitat loss due to urbanization and agricultural conversion (Remsen 1978). The incidental poisoning of burrowing owls and the destruction of their burrows during eradication programs aimed at rodent colonies also has been a large factor in their decrease (Collins 1979; Remsen 1978).

The normal range of the short-eared owl (*A. flammeus*) extends from the central United States to Alaska, although occasional nesting has been reported as far south as central Mexico and Cuba (Johnsgard 1988). Short-eared owls are rare winter visitors to the Salton Sea area (US Fish and Wildlife Service 1993; Garrett and Dunn 1981). The species typically nests in well-vegetated open areas, including grasslands, grain fields, riparian edges, and marshes. Many populations of short-eared owls are migratory, and juveniles have been recorded dispersing over great distances (Johnsgard 1988).

The elf owl (*Micrathene whitneyi*) breeds in arid regions of southeastern California along the Colorado River riparian corridor, from just north of Needles to near Palo Verde in Imperial County. Owls also have been sighted at Corn Springs near Desert Center in Riverside County.

The range of the loggerhead shrike (*Lanius ludovicianus*) encompasses most of the lower 48 states and an area extending northward from Montana and North Dakota into Canada. It the Salton Sea it inhabits open farmland and urban areas with trees. The loggerhead shrike is found year around in the Salton Sea area and is uncommon, though can be found with a little searching. The shrike nests in the area. Its diet consists of mostly large insects, and small vertebrates including small birds, mice and lizards. Due to habitat loss and pesticides, the loggerhead shrike's populations are declining everywhere especially in the United States (Ehrlich et al. 1988; Scott 1987).

In California, gila woodpeckers (*Melanerpes uropygialis*) are distributed along the lower Colorado River and occur locally near Brawley in the Imperial Valley (Zeiner et al. 1990a). This species typically occurs in desert riparian and desert wash habitats but also is found in orchard-vineyard and residential habitats. Near Brawley it depends on trees

in date palm groves and ranch yards (Garrett and Dunn 1981). It formerly was common in the Imperial Valley and was recorded as far north as Coachella Valley at the north end of the Salton Sea. The decline of this species may be attributed to the clearing of riparian woodlands and to competition with introduced European starlings for nesting cavities (Remsen 1978). Gila woodpeckers eat insects, berries, and cactus fruits, and they nest in cavities of saguaro cacti or riparian trees.

Southwestern willow flycatcher (*Empidonax traillii extimus*) is a summer breeding resident in riparian habitats in southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (US Fish and Wildlife Service 1999). The largest breeding populations of southwestern willow flycatcher 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. This subspecies is restricted to dense riparian woodlands of willow, cottonwood, and other deciduous shrubs and trees. Egg laying occurs in southern California from the end of May through the end of June. Dense willow thickets are required for nesting, and nests are often near standing water (Zeiner et al. 1990a). The southwestern willow flycatcher was listed as endangered by the US Fish and Wildlife Service in February 1995 because of "extensive loss of riparian breeding habitat, brood parasitism by the brown-headed cowbird *(Molothrus ater)*, and lack of adequate protective regulations". This subspecies previously was listed as endangered by the California Department of Fish and Game in December 1990. The population of southwestern willow flycatcher in southern California was estimated to be fewer than 80 pairs in the early 1980s (Unitt 1984).

Large numbers of willow flycatcher pass through southern California deserts during spring and fall migration (Garrett and Dunn 1981). It is difficult to differentiate between the endangered subspecies that breeds in southern California and the nonendangered subspecies *(E. t. brewsteri)* that breeds to the north in the Sierra Nevada and Cascade mountain ranges. There is a period of overlapping occurrence in southern California riparian habitats for these two very similar looking subspecies during spring and fall migration. At the Salton Sea, willow flycatcher, undetermined subspecies status, is an uncommon spring migrant and common fall migrant (US Fish and Wildlife Service 1993). It occurs in residential areas and in riparian and desert scrub habitats.

Olive-sided flycatcher (*Contopus cooperi*) is a transient and summer visitor, breeding in montane and subalpine forests. They can be found throughout the state in appropriate habitat of tall trees.

Bank swallow (*Riparia riparia*) historically was considered locally common in the lowland regions of California. The species today is extirpated from much of its former range, including all known historical locations in southern California. The bank swallow migrates through the Salton Sea area in April and again in September on its way between South American and its remaining nesting areas in northern California.

Yellow warbler (*Dendroica petechia*) is a summer visitor that nests only in mature riparian woodland when in California. It is a common spring and fall migrant and a rare winter visitor to the Salton Sea area (US Fish and Wildlife Service 1993). Yellow warbler has declined considerably in the coastal lowlands and may be extirpated as a breeding visitor from the Colorado River (Garrett and Dunn 1981). Decline of the yellow warbler is attributed to loss of riparian nesting habitat and nest parasitism by the brown-headed cowbird.

Yellow-breasted chat (*Icteria virens auricollis*) is an uncommon summer resident and migrant in coastal California and in the foothills of the Sierra Nevada Mountains (Zeiner et al. 1990a). At the Salton Sea, yellow-breasted chats are occasional migrants and breeding summer visitors to riparian habitats (US Fish and Wildlife Service 1993). Yellow-breasted chat is restricted to nesting in riparian woodland, where it frequents dense undergrowth. The decline of this species in California can be attributed to the loss and degradation of riparian habitats and to nest parasitism by the brown-headed cowbird (Zeiner et al. 1990a).

Least Bell's vireo (*Vireo belli pusillus*) 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. They inhabit meandering rivers with riparian vegetation, feeding almost entirely on insects. Believed to have been historically abundant, the breeding populations north of the US-Mexico border now numbers 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 spread of agriculture, excessive livestock grazing, and recreational activities continue to put pressure on the remaining population.

Tri-colored blackbird (*Agelaius tricolor*) is a resident within the state but nomadic in fall and winter. They breed in freshwater marshes of tules, cattails, bulrushes, and sedge.

In California, large-billed savannah sparrow (*Passerculus sandwichensis rostratus*) is a winter visitor to saline emergent wetlands at the Salton Sea and along the southern coast (Zeiner et al. 1990a). It breeds at the Colorado River Delta in Mexico (Garrett and Dunn 1981). This subspecies of savannah sparrow has become a rare to uncommon post breeding and winter visitor to salt cedar scrub near river mouths at the Salton Sea (Garrett and Dunn 1981). It occurs from mid-July through the winter. Large-billed savannah sparrow was once widespread in salt marshes and on beaches along the coast of southern California. Its decline may be partially caused by the drying up of marshes at the mouth of the Colorado River.

## 3.8 VEGETATION AND WILDLIFE

### 3.8.1 Introduction

The affected environment discussion for vegetation and wildlife includes plant communities, wildlife, special-status wildlife species, sensitive habitats, and sensitive plants. Animal abundance and diversity is closely linked with the habitat types present

in a particular area and also depend on the season. Special status wildlife species are delineated by invertebrates, amphibians, reptiles, and mammals. The phase I study area for vegetation and wildlife is defined as parts of Imperial and Riverside counties adjacent to the Sea and associated land. Preliminary data from studies being conducted on the Salton Sea through the Salton Sea Science Subcommittee has been included in this section and Section 4.8, as applicable. Once the studies are completed, the data will be used to analyze future phases of the project.

### 3.8.2 Plant Communities

Vegetation in the Salton Sea region can be divided into two types: aquatic and terrestrial. Aquatic vegetation is important to aquatic species in the Salton Sea and consists of primarily nonnative species. Terrestrial vegetation is generally sparse and consists mostly of xerophytes, or plants adapted to habitats with limited water, except in areas that have a perennial source of ground water or surface water. The primary vegetation communities in the Salton Sea region are discussed below and include freshwater marsh, cismontane alkali marsh, open water and mudflat habitat, urban, agricultural land, Sonoran desert scrub, Mojavean desert scrub, chaparral, non-native grassland, alkali playa, southern riparian forest, desert dry wash woodland, and oak forest. Figure 3.8-1 shows the primary vegetation found in the Salton Trough.

#### *Freshwater Marsh*

Freshwater marsh consists of scattered stands dominated by weedy nonnative species, such as common reed (*Phragmites australis*), cattail (*Typha* sp.), golden dock (*Rumex maritimus*), and rabbitfoot grass (*Polypogon monspeliensis*). Freshwater marsh is limited primarily to linear stands along unlined drainage canals and appears to have developed as a result of agricultural irrigation. Extensive freshwater marsh areas are found on the adjacent Imperial Waterfowl Management Area, Sonny Bono Salton Sea National Wildlife Refuge, and private hunting clubs around the Sea. These support large numbers of waterfowl and a variety of sensitive species, particularly Yuma clapper rail and black rail. The freshwater wetlands (Figure 3.8-2) are further divided as shoreline strand, adjacent wetlands, managed wetland and riparian wetland. The shoreline strand is found immediately adjacent to the Sea and is composed of predominantly salt-tolerant species such as iodine bush and tamarisk. There are approximately 348 acres of shoreline strand. Adjacent wetlands are those above the shoreline and shoreline strand and include mudflats, diked wetlands that are below the Sea level and are sustained by a combination of seepage from the Sea and agricultural drainage and total 7,393 acres. Managed wetlands can be found on California Department of Fish and Game and US Fish and Wildlife refuges. Managed wetlands can also be found duck clubs and aquaculture ponds along the southern shore and near the mouth of the Whitewater River to the North. These wetlands are managed as freshwater to brackish wetlands or agricultural lands for forage crops and total 7,416 acres. The riparian wetland includes riverine plant communities along the New, Alamo and Whitewater Rivers, and wetland plant communities along the San Felipe, Salt and Thiery Creeks and totals 2,555 acres. The vegetation varies from tamarisk along the New River; cattails and bulrush along the Alamo River; to highly altered wetlands of willow and cottonwood along the Whitewater River (Kranz et al, 1999).

### *Cismontane Alkali Marsh*

Cismontane alkali marsh in the area consists of excavated, low-lying areas supporting a dense cover of salt grass (*Distichlis spicata*), with scattered clumps of alkali bulrush (*Scirpus robustus*), cattail, common reedgrass, spreading alkali-weed (*Cressa truxillensis*), verrucose sea-purslane (*Sessuvium verrucosum*), saltmarsh sand spurrey (*Spergularia marina*), and seaside heliotrope (*Heliotropium curassavicum*), among others. Cismontane alkali marsh occurs on alkaline soils in areas with high water tables. It is found primarily in disturbed sites, such as borrow areas adjacent to dikes and along unlined drainage canals.

### *Open Water and Mudflat Habitats*

Interspersed throughout the Salton Sea are areas of open water and mudflats. Open water habitat is differentiated from mudflats in that it is more or less permanently flooded and may support submerged or emergent vegetation. Mudflats are unvegetated areas that are periodically flooded and exposed.

### *Urban*

Urban plant communities include developed areas (towns and cities) that contain disturbed areas and landscaping around dwellings, businesses, and parks.

### *Agricultural Land*

Agricultural land is found extensively throughout the Imperial and Coachella valleys and consists of cultivated, irrigated, and drained land. Agriculture is one of the most important habitat components in the Salton Trough. Absent other sources of adequate flow into the Salton Sea, the continued agricultural production in the Imperial and Coachella valleys ensures not only the Salton Sea's very existence but also provides fields of abundant food resources for a variety of wildlife species (US Fish and Wildlife Service 1999). A ruderal community typically occurs along agricultural field borders, canals, drains, riverbanks, roadsides, and railroad crossings where human activities have removed natural vegetative cover. Ruderal areas are vegetated by weedy and early successional species that can survive regular disturbance. Agricultural land generally offers poor habitat, although some species forage there for agricultural pests, and a number of small mammals, songbirds, and raptors, such as burrowing owls and red tailed hawks, feed on insects and rodents attracted to crops (US Fish and Wildlife Service 1999).

### *Sonoran Desert Scrub*

Sonoran desert scrub includes Sonoran creosote bush scrub, Sonoran desert mixed scrub, and Sonoran mixed and woody and succulent scrub. Sonoran creosote bush scrub, described as the basic creosote scrub of the Colorado Desert, is found throughout deserts of the southwest on well-drained secondary soils of slopes, fans, and valleys (Holland 1986). This community occurs on well-drained secondary soils of slopes, alluvial fans, bajadas, and lowlands and intergrades with partially stabilized desert dunes and sand fields (US Fish and Wildlife Service 1999). This community is dominated by creosote bush (*Larrea divaricata*). Other subdominant species include burro weed (*Ambrosia dumosa*), brittle brush (*Encelia farinosa*), and ocotillo (*Fouquieria*

*splendens*). Ephemeral herbs flower in late February and March when winter rains are sufficient (Holland 1986).

This community type supports low numbers of mammals. Both migrating and resident bird species are known to use the mesquite (*Prosopis juliflora*) thickets in this community for feeding, resting, and roosting cover.

### *Mojavean Desert Scrub*

Mojavean desert scrub includes Mojave desert bush scrub, Mojave mixed woody scrub, Mojave mixed steppe, and blackbush scrub within the Salton Trough. Mojave desert bush scrub is found on well-drained secondary soils with very low available water holding capacity on slopes, fans, and valleys rather than upland sites with thin, residual soils or sites with high soil salinity.

Mojave mixed woody scrub generally is found on very shallow, overly drained soils on rolling to steep slopes, usually derived from granitic parent materials. These sites have extremely low water holding capacity and mild alkalinity and are not very saline.

Mojave mixed steppe occurs on dry, sandy, or gravelly places from 2,000 to 7,000 feet in upper bajadas and lower residual slopes. It is fairly dense grassland, with several shrubby species from Mojave mixed woody scrub scattered throughout.

Blackbush scrub occurs on well-drained slopes and flats with shallow, often calcareous soils of very low water-holding capacity. Low, often intricately branched shrubs with bare ground between plants are found in blackbush scrub communities.

### *Chaparral*

Semi-desert chaparral occurrence falls between that of northern mixed chaparral and red shank chaparral. Its growth is similar to northern mixed chaparral but is more open and not quite so tall.

Interior live oak chaparral is fairly mesic and is found in valleys and foothills away from the immediate coast, especially in lower montane coniferous forests. It forms a dense tall chaparral dominated by *Quercus corneliusmulleri* and *Q. wislizenii*, with several other sclerophylls also in the canopy and a sparse understory.

### *Nonnative Grassland*

Nonnative grassland is generally found on fine-textured, usually clay soils that are moist or even waterlogged during the winter rainy season and very dry during the summer and fall. It forms a dense to sparse cover of annual grasses with flowering culms 0.7 to 1.6 feet high. It is often associated with numerous species of showy, flowered, native annual forbs.

### *Alkali Playa*

Alkali playa occurs in poorly drained soils with high salinity or alkalinity due to evaporation of water that accumulates in closed drainages, often with a high water table

and a salt crust on the surface. It usually is composed of low, grayish, microphyllous and succulent shrubs to up to approximately three feet tall. Total cover is usually low due to wide spacing between shrubs and minimally developed understory.

#### *Southern Riparian Forest*

Southern riparian forest includes southern arroyo willow riparian forest and southern cottonwood willow riparian forest within the Salton Trough. Southern cottonwood willow riparian forest occurs in subirrigated lands and those subject to frequent overflow from rivers and streams. The dominant species require moist, bare, mineral soil for germination and establishment. It is composed of tall, open, broadleafed, winter-deciduous riparian forests dominated by *Populus fremontii*, *P. trichocarpa*, and several tree willows. The understory is usually composed of shrubby willows.

#### *Desert Dry Wash Woodland*

Desert dry wash woodland habitat occurs in sandy/gravelly washes and arroyos of the lower Mojave and Colorado deserts. Surface sheet flows typically form braided channels that move or wander with every flow event. It forms an open to dense, drought-deciduous, microphyllous riparian thorn scrub woodland 30 to 60 feet tall, dominated by any of several trees of the pea family.

### 3.8.3 Wildlife

Nearly fifty species of wildlife can be found in the Salton Sea Basin. Most are resident species. High average temperatures, sparse precipitation and limited vegetation cover limit the numbers of species and populations at the Salton Sea. The highly saline conditions of the Sea itself limit its value as a water source for wildlife. Most species found are those adapted to severe desert conditions of heat, drought, and wind. Most flora is composed of annual species, and wildlife responds to the seasonal changes in the vegetation. The most consistent wildlife populations can be found associated with the more permanent vegetation found along the Salton Sea shoreline and riparian vegetation along streams and agricultural drains.

#### *Reptiles*

Over 24 species of reptiles are known to occur in the area. The side-blotched lizard (*Uta standburiana*), western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), long-tailed brush lizard (*Urosaurus graciosus*), desert horned lizard (*Phrynosoma platyrhinos*), and desert iguana (*Dipsosaurus dorsalis*) are common and widely distributed throughout the area. The desert spiny lizard (*Sceloporus magister*) depends on the presence of large ironwoods, and lizards, including the western chuckwalla (*Sauromalus obesus*), use rocky outcrops and slopes. There are five special status reptile species found in the area, and they are described in more detail in Section 3.8.4, Special Status Species.

#### *Mammals*

Over twenty mammal species are found in the study area, the most common of which include the desert pocket mouse (*Perognathus peniciflatus*), pocket mouse (*P. longimembris*), desert kangaroo rat (*Dipodomys deserti*), Merriam's kangaroo rat (*D. merriam*), black-tail

jackrabbit (*Lepus californicus*), Audubon's cottontail rabbit (*Sylvilagus audubonii*), mule deer (*Odocoileus hemionus*), and coyote (*Canis latrans*). Most mammal species are expected to occur, for the most part, in the woodland, desert riparian, and creosote bush scrub habitat where cover, food, and prey are most abundant.

### 3.8.4 Special Status Wildlife Species

Table 3.8-1 lists the special status wildlife species found in the Salton Sea Basin in Imperial and Riverside counties.

**Table 3.8-1**
**Special Status Wildlife Species of Imperial and Riverside County**

| Species | | Status | | |
|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Federal*** | **State*** | **Other*** |
| **Invertebrates** | | | | |
| *Lytta inseparata* | Mojave desert blister beetle | Species of Concern | | |
| *Macrobaenetes valgum* | Coachella giant sand treader cricket | Species of Concern | | |
| *Oliarces clara* | cheeseweed moth lacewing | Species of Concern | | |
| *Pseudocotalpa andrewsi* | Andrew's dune scarab beetle | Species of Concern | | |
| *Stenopelmatus cahuilaensis* | Coachella Valley Jerusalem cricket | Species of Concern | | |
| **Amphibians** | | | | |
| *Batrachoseps aridus* | desert slender salamander | Endangered | Endangered | |
| *Bufo microscaphus californicus* | arroyo southwestern toad | Endangered | | CDFG: SC |
| *Rana aurora* ssp. *draytoni* | California red-legged frog | Threatened | | CDFG: SC |
| *R. yavapaiensis* | lowland leopard frog | Species of Concern | | |
| **Reptiles** | | | | |
| *Anniella pulchra pulchra* | silvery legless lizard | Species of Concern | | CDFG: SC |
| *Crotalus ruber ruber* | Northern red-diamond rattlesnake | Species of Concern | | CDFG: SC |
| *Gopherus agassizi* | desert tortoise | Threatened | Threatened | |
| *Phrynosoma mcalli* | flat-tailed horned lizard | | | CDFG: SC |
| *Sauromalus obesus obesus* | western chuckwalla | Species of Concern | | |
| *Uma inornata* | Coachella Valley fringe-toed lizard | Threatened | Endangered | |
| *U. notata notata* | Colorado fringe-toed lizard | Species of Concern | | CDFG: SC |
| *Xantusia henshawi gracilis* | sandstone night lizard | Species of Concern | | CDFG: SC |
| **Mammals** | | | | |
| *Antrozous pallidus* | pallid bat | | | CDFG: SC |
| *Chaetodipus fallax pallidus* | pallid San Diego pocket mouse | Species of Concern | | CDFG: SC |
| *Choeronycteris mexicana* | Mexican long-tongued bat | Species of Concern | | CDFG: SC |
| *Corynorhinus townsendii pallescens* | pale western big-eared bat | | | CDFG: SC |
| *Euderma maculatum* | spotted bat | Species of Concern | | CDFG: SC |
| *Eumops perotis californicus* | Greater western mastiff bat | Species of Concern | | CDFG: SC |
| *Felis concolor browni* | Yuma puma | Species of Concern | | CDFG: SC |
| *F. onca arizonensis* | jaguar | Endangered | | |

**Table 3.8-1**
**Special Status Wildlife Species of Imperial and Riverside County** *(continued)*

| Species | | Status | | |
|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Federal** | **State** | **Other** |
| *Glaucomys sabrinus californicus* | San Bernardino northern flying squirrel | Species of Concern | | |
| *Macrotus californicus* | California leaf-nosed bat | Species of Concern | | CDFG: SC |
| *Myotis ciliolabrum* | western small-footed myotis | Species of Concern | | |
| *M. lucifugus occultus* | occult little brown bat | Species of Concern | | CDFG: SC |
| *M. velifer brivis* | southwestern cave myotis | Species of Concern | | CDFG: SC |
| *Nyctinomops femorosacca* | pocketed free-tailed bat | | | CDFG: SC |
| *N. macrotis* | big free-tailed bat | | | CDFG: SC |
| *Onychomys torridus ramona* | southern grasshopper mouse | Species of Concern | | CDFG: SC |
| *Ovis canadensis cremnobates* | peninsular bighorn sheep | Endangered | Threatened | |
| *Perognathus longimembris bangsi* | Palm Springs pocket mouse | Species of Concern | | CDFG: SC |
| *P. longimembris internationalis* | Jacumba little pocket mouse | Species of Concern | | CDFG: SC |
| *Sigmodon hispidus eremicus* | hispid cotton rat | Species of Concern | | CDFG: SC |
| *Spermophilus tereticaudus chlorus* | Palm Springs round-tailed ground squirrel | Species of Concern | | CDFG: SC |

Sources: California Department of Fish and Game 1999.; US Fish and Wildlife Service 1999

* Federal and State Status have legal consequence. CDFG:SC (California Department of Fish and Game, Species of Concern) are assigned for information only.

### *Sensitive Invertebrate Species*

Coachella giant sand treader cricket (*Macrobaenetes valgum*) is a federal sensitive species and is endemic to the Coachella Valley. Damp sand dunes are the permanent preferred habitat for this species. In very dry years, the species disappears over most of the sandy areas (Tinkham 1962). Winter rains regulate the abundance of the treader cricket. This species is likely to occur in the Salton Sea Trough.

Coachella Valley Jerusalem cricket (*Stenopelmatus cahuilaensis*) is a federal sensitive species. It has a large, round head, no wings, heavily spined hind legs, and black rings around its abdomen. Jerusalem crickets can grow to two inches, are nocturnal and live in the soil. They generally require high humidity and are most active in the spring, after the winter rains. In the dry summer months, Jerusalem crickets burrow to escape the heat. This species is likely to occur in the Salton Sea Trough.

Cheeseweed moth lacewing (*Oliarces clara*) is a federal sensitive species. Its distribution is restricted to the southern California counties of Imperial, Riverside, and San Bernardino and to Yuma County in western Arizona (US Fish and Wildlife Service 1999). This species is rarely observed in the field. Upon hatching, larvae for this species burrow into the ground and seek out the roots of a creosote bush. The cheeseweed moth lacewing is a weak flyer and therefore easy prey for birds and other insects. This species is known to occur in the Salton Sea Trough.

Andrew's dune scarab beetle (*Pseudocotalpa andrewsi*) is a federal sensitive species endemic to the creosote bush scrub habitats of the Algodones Dunes in Imperial County, California. This species inhabits both surface and subsurface sand, using the wet sand to protect it from the heat of the day. Andrew's dune scarab beetle primarily occurs at elevations between 98 and 492 feet in desert dune and Sonoran desert scrub habitats. Adults of this species generally swarm from April to mid-May. This species is known to occur in the Salton Sea Trough.

### *Sensitive Amphibian Species*

Arroyo southwestern toad (*Bufo microscaphus californicus*) is restricted to rivers that have shallow, gravelly pools adjacent to sandy terraces. Arroyo toads historically were found along the entire drainages in southern California from San Luis Obispo to San Diego County, but are now found only in the headwaters of a few streams in small isolated populations. They have been extirpated from an estimated 75 percent of their former range in the United States. In the Salton Trough there is a population of arroyo toads near the community of Bonniebelle, north of I-10.

California red-legged frog (*Rana aurora draytoni*) adults require dense riparian vegetation associated with deep still or slow moving water (Jennings et al. 1992). Heavily vegetated, terrestrial riparian areas may provide important wintering habitat, as they estivate in small mammal burrows and moist leaf litter within riparian vegetation up to 85 feet from water's edge (Rathburn et al. 1993).

Habitat loss and alteration are the primary factors in the decline of the red-legged frog. Wetland alterations include stream channelization, vegetation clearing, water diversions, and reservoirs. Livestock grazing and off-road vehicle activities also have contributed to red-legged frog decline. Grazing contributes to streambank erosion, resulting in sedimentation of riparian and aquatic habitats (Lusby 1970; Winegar 1977; Jennings et al. 1992). Additionally, removing vegetation can raise water temperature levels and promote bullfrog breeding. Off-road vehicle use affects red-legged frogs in ways similar to livestock grazing by damaging riparian vegetation and increasing erosion and siltation.

Currently, red-legged frogs are known from about 190 streams or drainages in 15 counties in central and southern California. In southern California, only four population localities are currently extant as compared with more than 80 historic locality records. The red-legged frog was listed as threatened under the Endangered Species Act of 1973, as amended, on June 24, 1996 (Federal Register 61(101):25813) due to past decline and current threats, including urban encroachment, reservoir construction, water diversion, and introduced predators and competitors.

Lowland leopard frog (*Rana yavapaiensis*) is distributed primarily throughout the lower Colorado River drainage, southern Arizona, and southwest New Mexico (Stebbins 1985). However, there is an isolated population southwest of the Salton Sea at San Felipe Creek (California Department of Fish and Game 1999). This species is usually found near water in deserts, grasslands, and oak or oak/pine woodlands. Lowland

leopard frogs use permanent pools in streams, overflow ponds, and side channels of main rivers.

Desert slender salamander (*Batrachoseps aridus*) is isolated to palm oases, where they occur under limestone slabs and talus in the moist canyon bottoms (Stebbins 1985). Little is know about the conservation and recovery of this species. In the Salton Trough, the desert slender salamander is known to occur in Hidden Palms near Highway 74.

### *Sensitive Reptile Species*

Desert tortoise (*Gopherus agassizi*) is widely distributed in the deserts of California, southern Nevada, extreme southwestern Utah, western and southern Arizona, and throughout most of Sonora, Mexico. In the Salton Trough, desert tortoise occurs near San Gorgonio Pass and on the alluvial fans of Coachella Valley (US Fish and Wildlife Service 1999). This widespread and once common taxon is rapidly decreasing in numbers due to habitat destruction from off-road vehicle use, agriculture, mining, and urban and residential development. Other factors contributing to the overall decline of desert tortoise include the spread of a fatal respiratory disease and from increases in raven populations that prey on juvenile tortoises. Recent data has indicated that many local subpopulations have declined precipitously. The appearance of Upper Respiratory Disease Syndrome, not identified in wild tortoises before 1987, may be a contributing factor (US Fish and Wildlife Service 1999).

Desert tortoises require friable, well-drained, sandy soil to construct nesting burrows (Zeiner et al. 1988). They are not found in areas of very cobbly soil, soil too soft to construct a burrow, or in dry lakes. In the Mojave Desert, the tortoise most often is found in association with creosote bush, Joshua tree woodland, and saltbush scrub vegetation communities. The species generally occurs below 4,000 feet elevation (Stebbins 1985). In the western Mojave Desert population, which includes the Salton Sea area, home ranges are five to 38 acres (Zeiner et al. 1988).

Western chuckwalla (*Sauromalus obesus obesus*) is a large-bodied lizard that inhabits rock outcrops and crevices in desert regions. It is widely distributed throughout the Mojave and Colorado deserts, from sea level to 4,000 feet (Zeiner et al. 1988). Often found in rock outcrops and boulder piles in creosote bush scrub, the chuckwalla is most active, depending on temperature levels, from mid-spring to fall. Sandy friable soil near boulders is required for egg laying (Stebbins 1985). The distribution of the chuckwalla includes appropriate habitats in the Salton Basin.

Colorado Desert fringe-toed lizard (*Uma notata notata*) occurs in the Colorado Desert south of the Salton Sea, from Imperial and San Diego counties south into northeast Baja California (Zeiner et al. 1988; Stebbins 1985). It is found in fine, loose, substrates of sand dunes, dry lakebeds, sandy beaches, riverbanks, desert washes, and sparse desert scrub, usually from below sea level to 300 feet elevation. Colorado fringe-toed lizard habitat is characterized by sparse vegetation, usually consisting of creosote bush or other shrubs (Stebbins 1985). This species is diurnal and hibernates from November to

February (Zeiner et al. 1988). To avoid predators, the lizard burrows into the sand and often appears to be "swimming" in the sand.

Silvery legless lizard (*Anniella pulchra pulchra*) prefers sparse vegetation occurring on sandy or loose loamy soils. Historical records (Klauber 1932) show the species in the San Felipe drainage. Little is known about this species or its distribution within the study area. Any further deterioration of potential habitat could eliminate it from the study area.

Coachella Valley fringe-toed lizard (*Uma inornata*) is found only in sand dunes in the Coachella Valley in Riverside County (Zeiner et al. 1988). It occurs from near sea level to 1,600 feet elevation in sparse desert scrub, alkali scrub, and desert washes and may be locally common in these habitats (Stebbins 1985; Zeiner et al. 1988). Coachella Valley fringe-toed lizards are insectivorous and escape from enemies by "swimming" in the sand. This species has lost over 75 percent of its habitat to development and other human activities (Stebbins 1985).

Flat-tailed horned lizard (*Phrynosoma mcalli*) inhabits areas of fine sand in washes and flats in the desert areas of San Diego, Imperial, and Riverside counties in California, southwestern Arizona, and northern Baja California and Sonora in Mexico. In the Salton Sea area it is distributed from the Coachella Valley south through the Salton Basin at elevations from below sea level to 600 feet. Documented locations for flat-tailed horned lizard near the Salton Sea include the vicinity of Cave Buttes east of the Salton Sea, Tarantula Wash west of the Sea, and near San Felipe Creek southwest of the Sea (California Department of Fish and Game 1999). The flat-tailed horned lizard is the subject of a multi-agency conservation agreement.

This lizard typically occurs in flat sparse desert scrub habitats dominated by creosote and bursage on fine, sandy, alkaline soils. Turner and Medica (1982) found that over 97 percent of total food intake was composed of ants. Harvester ants (*Veromessor pergandei, Polonomyrex californicus, and P. magnacantha*) composed 75 percent and *Conomyrma insana* composed 15 percent of the lizard's diet. Flat-tailed horned lizards are declining because of habitat loss from development and off-road vehicle use. It is estimated that up to 90 percent of the lizard's original geographic range is subject to or potentially subject to some form of human disturbance (Turner and Medica 1982).

### *Sensitive Mammalian Species*

Mexican long-tongued bat (*Choeronycteris mexicana*) occurs in a variety of habitats ranging from arid thorn scrub to mixed oak-conifer forests (Arroyo-Cabrales et al. 1987). This species typically roosts in caves, mines, buildings, trees, or other dimly lit areas. Its diet apparently consists primarily of fruits, pollen, and nectar, with limited foraging on insects (Gardner 1977). Suitable habitat for this species occurs within the study area.

California leaf-nosed bat (*Macrotus californicus*) occurs in southern California, southern Nevada, southwestern Arizona, northern Sonora, and Baja California in Mexico (Williams 1986). In southern California it is found in Riverside, Imperial, San Diego,

and San Bernardino counties (Zeiner et al. 1990a, 1990b). Coastal populations of this species have disappeared, and desert populations have declined, but it is still relatively common along parts of the Colorado River. It is found in desert riparian, desert wash, desert scrub, and palm oasis habitats. Preferred day roosts include caves or abandoned mines. California leaf-nosed bat occurs at up to 2,000 feet elevation in California, although in other states it can range up to 4,200 feet. It forages for insects by flying close to the ground.

The greater western mastiff bat (*Eumops perotis californicus*) occurs from central California southward into central Mexico. It occurs in many open, semi-arid to arid habitats, including coastal and desert scrub, annual and perennial grasslands, palm oases, chaparral, and urbanized areas. The greater western mastiff bat is detected most frequently over desert washes. Although the majority of the greater western mastiff bat populations are resident in California, some are thought to migrate from the colder areas and winter in lowland areas (Williams 1986). This species may travel up to 25 miles (40 kilometers) between roosting and foraging grounds. Although there are no known occurrences, suitable habitat does exist within the Salton Sea.

The range of the spotted bat (*Euderma maculatum*) extends from southern and eastern California north to southern Montana, west to central New Mexico, and south into northern Mexico. In California it is primarily found in foothills, mountains, and deserts of the southern part of the state (Zeiner et al. 1990a, 1990b). It is considered to be one of the rarest of North American mammals, and little is known about its habitat needs and natural history. The spotted bat is small (13- to 14-inch wingspan) and is black with three white spots on its back. It feeds primarily on moths, often over water. Spotted bats usually roost singly in rock crevices but occasionally use caves and buildings.

Western small-footed myotis (*Myotis ciliolabrum*) is a year-round resident in California that occurs in a wide variety of habitat types throughout the state. In the lower deserts of southern California, this species may forage on flies, moths, ants, and beetles over open desert scrub habitats. Habitat and historical records for this species occur within the study area.

Southwestern cave myotis (*Myotis velifer brivis*) prefers arid habitats dominated by creosote bush, palo verde, brittlebush, cactus, and desert riparian. Roosts are typically in caves or mines, but buildings and bridges also have been used. Although this species may have been extirpated from the study area by agricultural practices and habitat conversion, some habitat still exists but no recent surveys have been conducted (US Fish and Wildlife Service 1999).

Pale western big-eared bat (*Corynorhinus townsendii pallescens*) ranges from Mexico to British Columbia and the Rocky Mountain states and is found throughout California (Jameson and Peeters 1988). Within California, the distribution of the big-eared bat is not well delineated. It is found in a variety of habitats, except for alpine and subalpine habitats, and is most numerous in mesic habitats (Zeiner et al. 1990a, 1990b). The big-

eared bat requires caves, mines, tunnels, or buildings for roosting and can use different locations for night, day, hibernation, and maternity roosts. The big-eared bat was once common in California but is now considered uncommon. The species is especially sensitive to disturbance, and bats may abandon a roost after a single visit by a person. Habitat in the study area is marginal for this species, but it could occur there.

Pallid bat (*Antrozous pallidus*) is a locally common species at low elevations in California (Zeiner et al. 1990a, 1990b). The sub-species *(A. pallidus pallidus*) most likely occurs in the Salton Trough. Pallid bats use a wide variety of open, dry habitats with rocky areas for roosting. It is a year-round resident in most of its range and hibernates in the winter. This species roosts colonially in caves, mines, crevices, and abandoned buildings. Pallid bats are very sensitive to disturbance at roost sites.

In California, pocketed free-tailed bat (*Nyctinomops femorosacca*) is rare in Riverside, San Diego, and Imperial counties but is more common to the south in Mexico (Zeiner et al. 1990 a, b). Habitats used by this bat include piñon juniper woodlands, desert scrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. Pocketed free-tailed bats roost in small groups in rock crevices in cliffs during the day and use rock crevices, caves, or buildings for maternity roosts. The species is thought to be active yearlong and forages over ponds, streams, and desert habitats for flying insects, especially large moths.

Big free-tailed bat (*Nyctinomops macrotis*) ranges from western Texas to southern California, and as far north as central Colorado and western Utah (Hall 1981). Big free-tailed bats typically occupy rugged rocky country but will forage over and migrate through most habitats throughout its range that are below 5,905 feet in elevation (Easterla and Whitaker 1973; Findley et al. 1975). Roosts are often in buildings, caves, and rock crevices. Although habitat for this species is limited within the study area, it likely occurs there at least during migration in the spring and fall.

Palm Springs round-tailed ground squirrel *(Spermophilus treticaudus chlorus*) is restricted to habitats with sandy substrates in the Coachella Valley. Vegetation communities occupied by the ground squirrel include creosote bush scrub, creosote-palo verde scrub, and saltbush/alkali scrub that support herbaceous growth (Ryan 1968; Williams 1986; Dodero 1995). According to the Wildlife Habitat Relationships System, sparse to open desert wash habitat with medium sized trees/shrubs is considered to be of high importance to round-tailed ground squirrels (Dodero 1995).

According to Williams (1986) the habitat for the ground squirrel has been substantially reduced by urbanization, cultivation, and construction of roads, railroads, airports, and golf courses. Additional threats include off-highway vehicle use that disturbs and degrades its habitat. The most extensive area in the Coachella Valley that still supports native habitat for the ground squirrel is found east of Interstate 10, from north of Indio to Desert Hot Springs and North Palm Springs; this is within the study area. Suitable habitat for this species also occurs in smaller patches throughout other portions of the study area.

The range of the pallid San Diego pocket mouse (*Chaetodipus fallax pallidus*) extends from San Bernardino County south to the US/Mexico border (Hall 1981). This species occurs in a wide variety of habitats, including alluvial fans, dry desert slopes, and piñon juniper woodlands. At lower desert elevations, pallid San Diego pocket mouse densities may have been recorded as high as 39 per hectare (Lackey 1996). This species is known to occur within the study area.

Palm Springs pocket mouse (*Perognathus longimembris bangsi*) is a subspecies of *Perognathus longimembris*. Little quantitative information is available on the ecology and life history of the Palm Springs pocket mouse. Palm Springs pocket mice are rather sedentary, with home ranges varying in size from 0.12 ha. to 0.56 ha. (Chew and Butterworth 1964). Habitat requirements for the Palm Springs pocket mouse are not well understood, but it is known to occupy sandy habitats on the desert floor. Its range extends from Joshua Tree National Park, Riverside County, southward through the Coachella Valley to Borrego Springs in San Diego County (Hall 1981). It is likely that this species occurs in many undeveloped portions of the study area.

The range of the Jacumba little pocket mouse (*Perognathus longimembris internationalis*) is generally more southerly then the Palm Springs pocket mouse, extending from Jacumba to approximately 62 miles south of the US/Mexico border. Habitat requirements for this subspecies are similar to those described above for the Palm Springs pocket mouse. Suitable habitat for this species occurs within the study area.

Southern grasshopper mouse (*Onychomys torridus ramona*) is common in the Mojave Desert and the southern Central Valley in California (Zeiner et al. 1990b). It prefers alkali desert scrub and desert scrub habitats and is less abundant in other desert habitats, such as desert riparian and wash areas. The grasshopper mouse feeds almost entirely on arthropods, and favored prey items include grasshoppers, crickets, scorpions, moths, and beetles. This species of mouse nests in abandoned burrows of other rodents, usually in dry friable soil with low to moderate shrub cover. The mice occur in pairs and are highly territorial and often widely spaced. The southern grasshopper mouse is considered beneficial to farmers because it eats potentially harmful insects (Zeiner et al. 1990a, 1990b).

Hispid cotton rat (*Sigmodon hispidus eremicus*) was first recorded in Imperial County in 1922 (Dixon 1922). This species primarily occurs in grassland and mixed grassland/scrub habitats but may also occur in agricultural fields. Habitat and historical records for this species occur within the study area.

Peninsular bighorn sheep (*Ovis canadensis cremnobates*) occupies the eastern escarpment of the Peninsular Mountain Ranges, from the San Jacinto Mountains in Riverside County, California, south about 100 miles to the US/Mexico border. The distribution of the bighorn sheep is defined in large part on the basis of available water and its use of two general habitat categories: mountain slope and canyon bottom (Schwartz et al. 1986; Bleich et al. 1990, 1997). Mountain slopes provide three types of necessary cover for the bighorn sheep: escape, thermal, and lambing (Welles and Welles 1961; Wilson et al.

1980). Suitable habitat for bighorn sheep occurs along the slopes, alluvial fans, and desert floor between the Salton Sea and the northwestern boundary of the study area.

### 3.8.5 Sensitive Habitats

Sensitive habitats are those that are considered rare within the region, that are considered critical habitat for special status species, or that have legal protection. Sensitive habitats found in the Sea area are wetlands and nonvegetated aquatic habitats ("waters of the US"), which include freshwater marsh, cismontane alkali marsh, Sonoran cottonwood-willow riparian forest/nonnative tamarisk scrub intermediate, open water, and mud flat habitats.

The wetlands and open water of the Salton Sea are included as regulated waters of the US. Wetlands are areas of land that, either permanently or seasonally, are wet and that support specially adapted vegetation. To regulate activities in wetlands, federal and state agencies have developed specific definitions and methods for identifying wetland boundaries. "Waters of the US" is the broadest category of regulated water bodies and includes navigable waters and wetlands. The US Army Corps of Engineers (ACOE) has jurisdiction over waters of the US, which include territorial seas and tidal and nontidal waters. Wetlands and waters of the US are subject to Clean Water Act permit provisions regulating their filling. The ACOE and USEPA have enforcement authority, with technical input from the US Fish and Wildlife Service. Wetland habitat is naturally limited, and remaining acreages are important habitats for migrant birds. Many bird species are restricted to riparian habitat and depend on it for breeding. Overall wildlife diversity is normally higher in riparian zones than in surrounding habitats. Such habitat, by occupying natural drainages, also functions to control water quality and erosion and often functions as a wildlife corridor. The CDFG considers riparian habitat a sensitive resource. Riparian habitat is specifically addressed by the CDFG Code Sections 1600-1606 (Streambed Alteration Agreement). The US Fish and Wildlife Service defines this habitat as a wetland (Cowardin et al. 1979).

Seepage along regional canals and intermittent waterways has induced wetland habitats in areas that were previously desert. These wetland areas are limited in size and number and do not support large numbers of species (see Figure 3.8-2).

### 3.8.6 Special Status Plant Species

Sensitive plant species include those listed as endangered, threatened, or rare by the US Fish and Wildlife Service, the California Department of Fish and Game (CDFG), or the California Native Plant Society (CNPS) (Skinner and Pavlik 1994). The CNPS listing is sanctioned by the CDFG and serves essentially as its list of "candidate" plant species; the CDFG recommends that all taxa listed by the CNPS be addressed in CEQA documents.

Thirty-six sensitive plant species are known to occur within the general area of the Salton Sea and are recorded in the (California Department of Fish and Game 1999). These species are listed in Table 3.8-2. Federal and state listed species that may occur in the Project affected areas are discussed below.

Coachella Valley milkvetch (*Astragalus lentiginosus var coachellae*) is a short-lived perennial herb that may behave as an annual (producing a single crop of seeds before dying) in years when environmental conditions are less than optimum. This plant is restricted to the Coachella Valley and is found in the windblown sand flats and dune hummocks. It is known from fewer than twenty occurrences (CNPS 1997) and is threatened by increasing urban development, grazing and trampling by livestock and feral burros, off-road vehicles, wind energy development, competition from nonnative plants, fisheries-related construction activities, and alteration of soil hydrology. This species is known to occur within the study area. Pierson's milk-vetch (*Astragalus magdalenae var peirsonii*) occurs within the deserts of California and Nevada. It is adapted to habitats with specific substrate or hydrologic conditions that occur as inclusions within creosote bush (*Larrea tridentata*) scrub or sagebrush (*Artemesia* spp.) dominated communities. This species also occurs on slopes and hollows of windblown dunes in the Sonora Desert. Populations of this species are threatened by grazing and trampling by livestock and feral burros, off-road vehicle use, military training, trampling by recreational users, competition from nonnative plants, urban development, construction related to fisheries development, and alteration of soil hydrology. Pierson's milk-vetch is known to occur within the study area.

Flat-seeded spurge (*Chamaesyce platysperma*) is endemic to sandy flats and dunes. It is known in California from only four collections (CNPS 1997). It flowers from

**Table 3.8-2**
**Special Status Plants of Imperial and Riverside County**

| Species | | Status | | |
|---|---|---|---|---|
| **Scientific Name** | **Common Name** | **Federal*** | **State*** | **Other*** |
| *Astragalus insularis* var. *harwoodii* | Harwood's milk-vetch | | | CNPS: 2 |
| *A. lentiginosus* var. *coachellae* | Coachella Valley milk-vetch | Endangered | | CNPS:1B |
| *A. magdalenae* var. *peirsonii* | Peirson's milk-vetch | Threatened | Endangered | CNPS:1B |
| *A. tricarinatus* | triple-ribbed milk-vetch | Endangered | | CNPS:1B |
| *Ayenia compacta* | ayenia | | | CNPS: 2 |
| *Calochortus palmeri* var. *munzii* | Munz's mariposa lily | Species of Concern | | CNPS:1B |
| *Carlowrightia arizonica* | Arizona carlowrightia | | | CNPS: 2 |
| *Castela emoryi* | crucifixion thorn | | | CNPS: 2 |
| *Chaenactis carphoclinia* var. *peirsonii* | Peirson's pincushion | | | CNPS:1B |
| *Chamaesyce arizonica* | Arizona spurge | | | CNPS: 2 |
| *C. platysperma* | flat-seeded spurge | Species of Concern | | CNPS:1B |
| *Croton wigginsii* | Wiggins's croton | | Rare | CNPS: 2 |
| *Cryptantha ganderi* | Gander's cryptantha | Species of Concern | | CNPS:1B |
| *Ditaxis californica* | California ditaxis | Species of Concern | | CNPS:1B |
| *D. clariana* | glandular ditaxis | | | CNPS: 2 |
| *Erigeron parishii* | Parish's daisy | Threatened | | CNPS:1B |
| *Escobaria vivipara* var. *alversonii* | foxtail cactus | Species of Concern | | CNPS:1B |
| *Euphorbia misera* | cliff spurge | | | CNPS: 2 |
| *Gilia maculata* | little San Bernardino Mtns. gilia | Species of Concern | | CNPS:1B |

| | | | | |
|---|---|---|---|---|
| *Helianthus niveus* ssp. *tephrodes* | Algodones Dunes sunflower | Species of Concern | Endangered | CNPS: 1B |
| *Lepidium flavum* var. *felipense* | Borrego Valley peppergrass | Species of Concern | | CNPS:1B |
| *Lessingia glandulifera* var. *tomentosa* | Warner Springs lessingia | Species of Concern | | CNPS: 2 |
| *Linanthus floribundus* ssp. *halli* | Santa Rosa Mtns. linanthus | | | CNPS:1B |
| *Lycium parishii* | Parish's desert-thorn | | | CNPS: 2 |
| *Marina orcuttii* var. *orcuttii* | California marina | Species of Concern | | CNPS:1B |
| *Matelea parvifolia* | spearleaf | | | CNPS: 2 |
| *Monardella robisonii* | Robison's monardella | Species of Concern | | CNPS:1B |
| *Opuntia munzii* | Munz's cholla (cactus) | Species of Concern | | CNPS:1B |
| *Palafoxia arida* var *gigantea* | giant Spanish-needle | Species of Concern | | CNPS:1B |
| *Phaseolus filiformis* | slender-stem bean | | | CNPS: 2 |
| *Pholisma sonorae* | sand food | Species of Concern | | CNPS:1B |
| *Salvia greatae* | Orocopia sage | Species of Concern | | CNPS:1B |
| *Selaginella eremophila* | desert spike-moss | | | CNPS: 2 |
| *Streptanthus campestris* | southern jewel-flower | | | CNPS:1B |
| *Xylorhiza cognata* | Mecca aster | Species of Concern | | CNPS:1B |
| *X. orcuttii* | Orcutt's aster | Species of Concern | | CNPS:1B |

Sources:
Skinner, Mark W., and Bruce M. Pavlik. 1994. Inventory of Rare and Endangered Vascular Plants of California. CNPS, Sacramento, California; California Department of Fish and Game 1999.; US Fish and Wildlife Service 1999

* Federal and State Status have legal consequence. CNPS status are assigned for information only.

February to September and is undetectable during other times of the year or in years when environmental conditions are less than optimum. It has been found in the flats near Thousand Palms and may occur in other portions of the study area as well.

Wiggins's croton (*Croton wigginsii*) generally occurs at elevations of 164 and 328 feet in desert dune and Sonoran desert scrub habitats. Like all croton species, Wiggins's croton prefers areas with sandy or loose soils. It flowers from March to May. This species is known to occur within the study area.

Gander's cryptantha (*Cryptantha ganderi*) generally occurs at elevations of 525 to 1,312 feet in desert dune and Sonoran desert scrub habitats. It flowers from February to May. The primary threats to this species are development and off-road vehicle use (CNPS 1997). This species may occur in suitable habitats within the study area.

California ditaxis (*Ditaxis californica*) is found on rocky alluvial slopes around Palm Desert, Indian Wells, and La Quinta. The ecology of this species is poorly known. It appears to be an annual or a short-lived perennial that germinates and accomplishes most of its growth in summer after summer rains. If winter rains provide sufficient soil moisture, plants may continue to grow and flower during winter or early spring. This species is known to occur within the study area.

Foxtail cactus (*Escobaria vivipara* var. *alversonii*) generally occurs in sandy or rocky areas within Mohavean or Sonoran desert scrub habitats. It occurs between 246 and 4,921 feet elevation and flowers from April to June. One of the major threats to this species is horticultural collecting. This species is known to occur within the study area.

Little San Bernardino Mountain gilia (*Gilia maculata*) flowers from April to May. It is found in open sandy washes and along gravelly benches above the wash. Known populations occur in several washes in the vicinity of Desert Hot Springs. Because of its annual habit, populations are highly unstable from year to year. In years of low rainfall it may not germinate at all. It may be present within the study area where suitable habitat exists.

Algodones Dunes sunflower (*Helianthus niveus* ssp. *tephrodes*) is a perennial herb restricted to desert dune habitats in southeastern California. This species grows at elevations between 164 to 328 feet and blooms between September and May. This species may occur within the study area.

Munz's cactus (*Opuntia munzii*) is a shrub known from fewer than 10 occurrences (CNPS 1997). This species grows at elevations between 492 and 1,969 feet and blooms in May. It grows in sandy or gravelly soils in Sonoran desert scrub habitat. Known locations for this species are primarily in washes below the Chocolate Mountains along the eastern edge of the Imperial Valley. This species may occur within the study area.

Giant Spanish needle (*Palafoxia arida* var. *gigantea*) is an annual/perennial herb that grows primarily on desert dunes. This species grows at elevations between 49 and 326 feet and blooms between February and May. This species is likely to occur within the study area.

Sand food (*Pholisma sonorae*) is a perennial parasitic herb that occurs primarily in desert dunes. This species grows at elevations between 0 and 656 feet and blooms between April and May. It is parasitic to many species, including members of the genuses *Eriogonum*, *Tiquilia*, *Ambrosia*, and *Pluchea*. This species is likely to occur within the study area.

Orocopia sage (*Salvia greatae*) is an evergreen shrub that flowers from March to April. It is found locally in the vicinity of Dos Palmas and the Orocopia and Chocolate mountains. It occurs on alluvial slopes between 98 and 787 feet in elevation. This species is known to occur within the study area. Surveys for Orocopia sage should be conducted only during its flowering period.

Mecca aster (*Xylorhiza cognata*) is endemic to the Mecca and Indio Hills of the Coachella Valley and occurs mostly on steep sedimentary slopes and along washes. Its primary threat is off-road vehicle use and associated recreational impacts. This species is known to occur within the study area.

Orcutt's aster (*Xylorhiza orcuttii*) is a perennial herb that flowers from March to April. It occurs primarily in Sonoran desert scrub habitats in Imperial, Riverside, and San Diego counties. This species grows at elevations between 66 and 1,181 feet. This species is known to occur within the study area.

## 3.9 SOCIOECONOMICS

### 3.9.1 Introduction

The affected environment discussion for socioeconomics includes regional employment, income, recreational related expenditures, finance, demographics, and housing. The Phase I study area is composed of Imperial and Riverside counties in California. This area was selected because the Salton Sea is within the boundaries of both counties, and most economic effects from the use of and management of the Sea are within the two-county region. Businesses within Imperial and Riverside counties provide most of the goods and services required by activities and industries that depend on the Salton Sea. Likewise, most employees of these businesses reside in the region, with few people commuting from other counties.

The Salton Sea has two important functions for the economies of the study area. First, it is a recreational resource, attracting visitors primarily from southern California and secondarily from other areas of the United States. Thus, the Sea generates tourist-based income and employment for the surrounding communities. Second, it represents an essential infrastructure for the local economy by serving as a repository for stormwater and agricultural runoff from the Imperial and Coachella valleys. Historically, this agricultural repository function was the primary purpose of the Salton Sea (Development Research Associates 1969). The sea also provides a number of other functions that influence the local economies, including providing subsistence fishing for local Native Americans and serving as an aesthetic asset to the region.

There are differences in the relative importance of the Salton Sea to the economies of the two counties. Coachella Valley of eastern Riverside County drains to the Sea, but the more populous areas of Riverside County, west of the San Jacinto Mountains, are more closely tied to the industrial economies of coastal communities, primarily the Los Angeles metropolitan area. Most economic activities in Imperial County, including agricultural production, occur in the Imperial Valley, making the Salton Sea an important component of the local economy. Therefore, most direct economic effects from restoring the Salton Sea are expected to occur in communities within the immediate vicinity of the Sea. This region is considered the area of primary influence and includes the communities of Westmorland, Mecca, Coachella, Calipatria, Niland, and Salton City and other unincorporated areas within 15 miles of the Sea.

Data for this section was obtained from the US Census Bureau (1998), the Bureau of Economic Analysis (1998), the California Department of Finance (1998), and the California Board of Equalization (1998) and from other regional economic studies. Two specific studies are incorporated by reference. First, the Salton Sea Management Project Economic Profile Study (Onaka Planning and Economics et al. 1995) provides a detailed account of the economic characteristics of the region between 1980 and 1995. Second, Economic Benefits Derived from Water and Lands Surrounding the Salton Sea (Development Research Associates 1969) provides a historical record of economic conditions prior to the degradation of the Sea.

Data for this section are provided for the most recent year available. Due to time lags in data collection and processing, most data series are for 1996 and 1997. Current conditions are expected to be similar in scale and magnitude because no major events have occurred in the area to substantially affect economic trends. Most sources aggregate data on a county level; therefore, data are provided for Imperial and Riverside counties and more specifically for the area of primary influence, where relevant and where data is available.

## 3.9.2 Regional Economics

### *Employment*

The civilian labor force within the study area is about 697,900 people, 92 percent of who reside in Riverside County. In 1997, Riverside County had an average unemployment rate of 7.5 percent, while the more rural Imperial County had a unemployment rate of 26.5 percent (California Department of Finance 1998). The primary employment sectors in the study area include the service sector, retail trades, and government employment. Major employment sectors for 1994 and 1996 are shown on Table 3.9-1.

Government employment consisted of over 90,000 jobs during 1996, representing approximately 16 percent of the study area employment. Within the study area, approximately 90 percent of the jobs are in Riverside County, mostly in urban areas. While both Imperial and Riverside counties have diversified economies, the proportion of persons employed in farming in Imperial County (approximately 15 percent) is higher than in Riverside County (approximately five percent).

**Table 3.9-1**
**Selected Study Area Employment Data 1994 and 1996**

| | 1994 | 1996 | 1996 Percentage of Total | 1994-1996 Percentage Change |
|---|---|---|---|---|
| **TOTAL EMPLOYMENT** | 553,659 | 587,703 | 100.00% | 6.15% |
| **Private** | 446,212 | 476,951 | 81.16% | 6.89% |
| Agriculture, Forestry, Fisheries, & Other[1] | 26,982 | 28,349 | 4.82% | 5.07% |
| Mining | 1,726 | 999 | 0.17% | -42.12% |
| Construction | 37,073 | 42,511 | 7.23% | 14.67% |
| Manufacturing | 43,477 | 47,942 | 8.16% | 10.27% |
| Transportation & Public Utilities | 18,541 | 18,486 | 3.15% | -0.30% |
| Wholesale Trade | 17,084 | 18,293 | 3.11% | 7.08% |
| Retail Trade | 104,331 | 109,353 | 18.61% | 4.81% |
| Finance, Insurance, & Real Estate | 39,614 | 37,520 | 6.38% | -5.29% |
| Services | 157,384 | 171,320 | 29.15% | 8.85% |
| **Government and Govt. Enterprises** | 91,673 | 93,808 | 15.96% | 2.33% |
| Federal, Civilian | 7,660 | 7,859 | 1.34% | 2.60% |
| Military | 7,277 | 4,063 | 0.69% | -44.17% |
| State & Local | 76,736 | 81,886 | 13.93% | 6.71% |

Source: BEA 1998.

[1]Other: Number of jobs held by US residents employed by international organizations and foreign embassies and consulates in the US.

Agriculture is the dominant industry within the primary area of influence, providing one in three jobs. Operators and laborers is the next largest occupational category. When combined, these industries account for about half of all employment around the Salton Sea. Unemployment in the region is variable, due to seasonal jobs. Historically, unemployment in the area of primary influence has varied between eight and fourteen percent.

Less than two percent of persons in the area of primary influence are employed in businesses that cater to recreational visitors to the Salton Sea. This is a sharp decline from the 1960s when the recreational-based industry was second only to agriculture in employment (Development Research Associates 1969). According to a 1989 survey of 89 businesses in the immediate vicinity of the Salton Sea, of the 16,000 workers in the region, only 315 were full-time equivalent workers in recreational-based industries (Onaka Planning and Economics et al. 1995; CIC Research 1989). This number is not expected to have changed substantially over the last ten years.

### *Income Generation*

Income levels for 1990 and 1996 in the study area are shown in Table 3.9-2. Average per capita income for the study area was $19,442 in 1996, an increase of approximately 5.5 percent since 1994. Total personal income exceeded $30 billion, an increase of greater than nine percent between 1994 and 1996. The 1996 per capita income level for Riverside County was $19,950, which is average for the state, while Imperial County was at $14,394, one of the lowest in the state (BEA 1998). Average wages per job in Riverside County averaged $24,124 in 1996, and they were $20,630 in Imperial County (California Department of Finance 1998).

**Table 3.9-2**
**Summary of Study Area Income 1994 to 1996**

| | 1994 | 1996 | Percentage Change 1994 to 1996 |
|---|---|---|---|
| **Total Income**[1] | 27,580,257 | 30,270,190 | 9.7% |
| **Per Capita Income** | $18,427 | $19,442 | 5.5% |

Source: BEA 1998
[1] Thousands of dollars.

### *Recreational-related Expenditures*

Based on a 1989 telephone survey of southern California households, the residents of some 154,600 households visited the Salton Sea in 1987 (CIC Research 1989). The study estimated that the total use rate amounted to 2.6 million visitor-days. The study further estimated that visitors to the Salton Sea spent $99 million (1994 dollars) throughout southern California, of which $69 million was spent in Imperial and Riverside counties. On average, visitors to the Salton Sea spent $26 per person per day in the two counties. This spending created secondary effects, generating an estimated total economic impact of $385 million in southern California, of which $129 million was attributed to Imperial and Riverside counties. Total economic impact includes the

direct expenditures by visitors and secondary expenditures by residents and businesses providing goods and services to the visitors.

A 1995 study estimated local expenditures by bird-watchers visiting the Sonny Bono Salton Sea National Wildlife Refuge (Kerlinger 1995). About 54,000 of 60,000 annual visitors to the wildlife refuge engaged in bird watching. A survey of the visitors indicated that the average length of stay was 3.0 days, resulting in total use-rate of 162,000 visitor-days. The visitors spent a total of $3.1 million in the Salton Sea area for lodging, food, gasoline, and other items, or an average of $19 per person per day.

### 3.9.3 Finance

Taxable retail sales in the study area increased by 5.5 percent between 1996 and 1997, totaling $9.2 billion in 1997 (California Department of Finance 1998). This represents 3.8 percent of total state retail sales and is a 28 percent increase from 1990. Over 92 percent of the sales tax was collected in Riverside County. The sales tax rate in both Imperial and Riverside counties is 7.75 percent. Most cities within the area of primary influence have experienced growth in taxable retail sales, although generally at a lesser degree than the study area as a whole. Historically, there has been a low average retail sales per capita in the area of primary influence. This suggests that residents purchase many products outside the local area, resulting in a "leakage" of retail sales to other areas within the study area.

The assessed value of the property subject to property taxes within the study area totaled $2.5 billion in 1998. This represents an increase of 9.4 percent from 1997 for Imperial County and a decrease of 3.0 percent for Riverside County. Of the total assessed value of the property, just over 20 percent is within the area of primary influence. Of note, Calipatria has approximately $49 million in assessed property subject to property taxes, Coachella has $420 million, and Westmorland has $29 million (California Board of Equalization 1998).

In Imperial County, eight percent of property taxes goes to city governments, 20 percent to the county, 61 percent to school districts, and 11 percent to other districts. In Riverside County, six percent of property taxes goes to city government, 13 percent to the county, 48 percent to school districts, and 33 percent to other districts (California Board of Equalization 1998).

### 3.9.4 Demographics and Housing

The population of the 7.3 million-acre study area totaled 1,591,497 in 1997, representing a 21.96 percent increase since 1990. Approximately 91 percent of the study area population reside in Riverside County, mostly in urban areas west of the San Jacinto Mountains (US Census Bureau 1998). About 45,000 people, or three percent of the total study area population, reside in the area of primary influence. Three quarters live along the northern shore of the Salton Sea in Riverside County (California Department of Finance 1998).