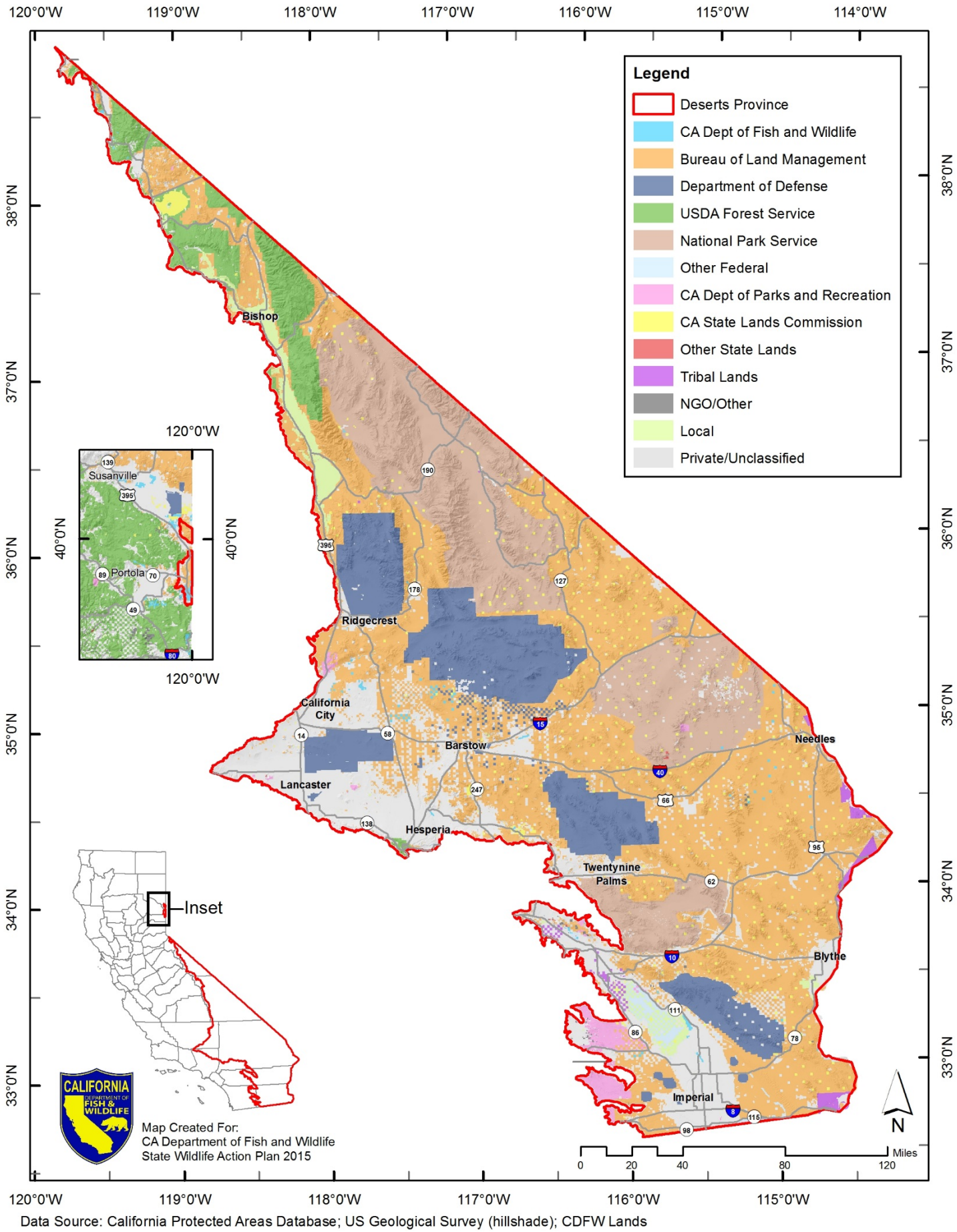
5.6 Deserts Province

5.6.1 Geophysical and Ecological Description of the Province

The Deserts Province extends from the California-Mexico border on the south and Colorado River on the southeast north to Topaz Lake on the California-Nevada border (Figure 5.6-1). The province's western border is formed by the Peninsula Mountain Ranges and Transverse Mountain Range in southern California, and the Sierra Nevada in central California. The province is the extension of desert regions located to the east and south of California in the states of Nevada and Arizona, and in Mexico. The Deserts Province has five different subregions: from north to south these are the Mono subregion, the Southeastern Great Basin, Mojave Desert, Sonoran Desert, and Colorado Desert. Each subregion has unique combinations of climate, topography, ecology, and land-use patterns.

The province as a whole is in the rain shadow of mountain ranges that form the western border. The dry landscape created by this barrier is characterized by unique geologic features composed of cliffs, peaks, canyons, dry washes, sand dunes, and large dry lake playas. Elevations are generally low in the southern portion of the province and rise to the north. The elevation in the south (Sonoran and Colorado deserts subregion) is generally below 1,000 feet with the lowest point at 275 feet below sea level in the Salton Trough. The topography of the more northerly portion of the province (Mojave Desert subregion) is characterized by a moderately high plateau: elevations range from 282 feet below sea level in Death Valley to 11,000 feet above sea level in the Panamint Mountains. The northernmost portion of the province (the Mono subregion) is comprised of isolated mountain ranges separated by alluvial fans and basins. Elevations range from 4,400 to more than 14,200 feet in the White Mountains. The Southeastern Great Basin subregion is characterized by basin and range topography (i.e., widely-separated short ranges in desert plains) and contains isolated mountains, plateaus, alluvial fans, basins, and dunes; elevations range from approximately 1,000 to 11,000 feet.

The climate of the province varies from cooler and wetter in the north to hotter and drier in the south. The climate of the southern portion of the province (Sonoran and Colorado deserts) is distinct in that it experiences higher daytime temperatures than high desert regions to the north, and has two rainy seasons per year: winter and late summer. Its hydrology is characterized by groundwater springs and runoff from seasonal rains that form canyon-mouth alluvial fans, desert arroyos, desert fan palm oases, freshwater marshes, brine lakes, desert washes, and ephemeral and perennial streams. Perennial streams in the Panamint Range are found in Surprise Canyon and Cottonwood Creek, and the Amargosa and Mojave rivers. Major rivers and hydrologic features in the northern portion of the province include Owen's River, Owens Dry Lake, Crowley Lake (reservoir), Mono Lake, and Walker River. The most significant aquatic systems in the southern portion of the province are the Salton Sea and the Colorado River. These aquatic features provide vital wet habitats that support wildlife diversity in the province.



Data Source: California Protected Areas Database; US Geological Survey (hillshade); CDFW Lands

Figure 5.6-1 Land Ownership of the Deserts Province

The variations in elevation, soil composition, and sun and wind exposure, along with desert springs, seeps, and riparian corridors provide isolated microclimates and ecosystems throughout the province.

Common habitats in the province are big sagebrush, creosote bush scrub, desert saltbush, Joshua tree scrub, desert wash, alkali scrub, mixed scrub (including yucca and cholla cactus), sandy soil grasslands and desert dunes, and juniper-pinyon woodlands in the Mojave desert region. Aquatic and wetland habitats support cottonwood, willow, and non-native tamarisk. Desert fan palm oases are found only in the southern portion of the province where permanent water sources are available (e.g., springs). Higher elevation habitats include pinyon pine and California juniper, with areas of manzanita and Coulter pine.

Dave Feliz, CDFW

The harsh and diverse environment found in this province has resulted in the evolution of numerous endemic species adapted to specialized desert habitats. Among these are the Joshua tree, barred and prickly pear cacti, and pinyon pine. The province provides habitat for burrowing owl, Gambel's quail, greater sage-grouse, rosy boa, red diamond rattlesnake, desert horned lizard, collared and leopard lizard, Mohave ground squirrel, desert kangaroo rat, cactus mouse, Mojave and Amargosa vole, black-tailed jackrabbit, bobcat, kit fox, mountain lion, mule deer, and desert bighorn sheep. Sensitive species include flat-tailed horned lizard, Coachella Valley fringe-toed lizard, desert tortoise, prairie falcon, Andrew's dune scarab beetle, Peninsular bighorn sheep, and California leaf-nosed bat. Species reliant on aquatic and wetland habitats include arroyo toad, desert pupfish, Yuma clapper rail, and southwestern willow flycatcher. Fan palm oases host endemic species such as the blue-black giant palm-boring beetle and species such as the western yellow bat, which is strongly associated with this habitat.

The wildlife of the province is affected by ecosystem degradation from urban growth, off-highway vehicle activity, large-scale renewable energy development, cattle and sheep grazing, groundwater overdraft, illegal harvesting or commercialization of resources, and dominance of introduced invasive plants. These activities and conditions have resulted in and continue to result in fragmentation of the landscape, degradation of habitat, and disruption of ecosystems.

In the Mojave Desert subregion of the province, 80 percent of the region is managed by federal agencies (U.S. Bureau of Land Management [BLM], National Park Service [NPS], and U.S.

Department of Defense [DOD]); 18 percent of the region belongs to private landowners or municipalities. In the Colorado Desert and Sonoran Desert subregions of the province, the federal government manages approximately fifty percent of the region (BLM and DOD). Other public land management agencies within the region are California State Parks, CDFW, and U.S. Fish and Wildlife Service (USFWS). Joshua Tree National Park spans the transition zone from the Mojave to the Colorado Desert. Anza Borrego Desert State Park encompasses nearly nine percent of the Colorado and Sonoran desert subregion. Together, Joshua Tree National Park, Anza Borrego Desert State Park, and the Santa Rosa Wildlife Area, along with other protected lands in the Mojave Desert, are part of the Mojave and Colorado Deserts Biosphere Reserve, designated by the United Nations as an important global site for preservation of the biological and cultural resources of these desert regions.

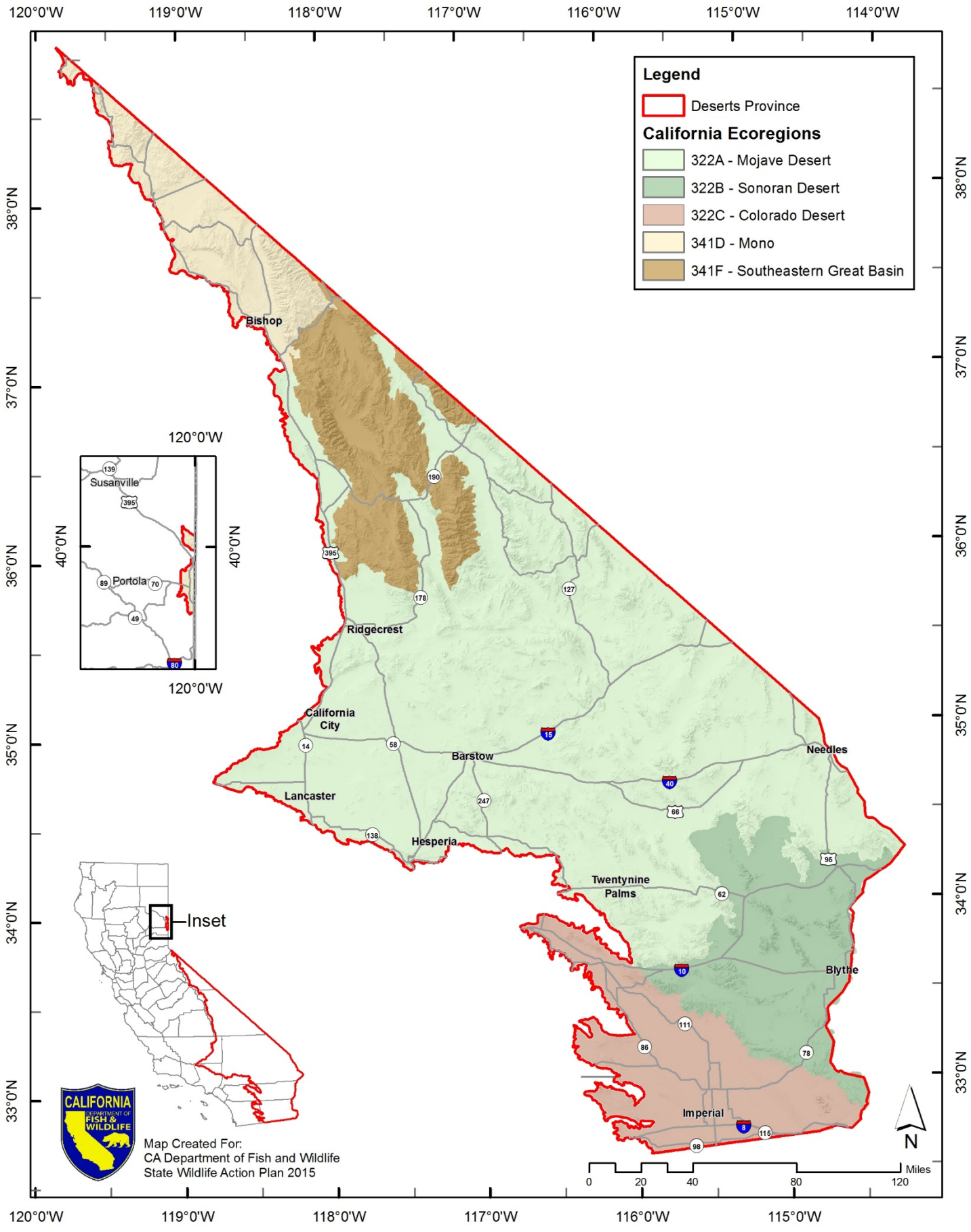
Human activities have had substantial impacts on the province's habitats and wildlife. Some of the greatest human-caused effects on the region have resulted from the water diversions and flood control measures along the Colorado River. These measures have dramatically altered the region's hydrology by redistributing the province's water supply to large expanses of irrigated agriculture and metropolitan coastal areas. Of the province's species at risk, many are dependent on habitats that have limited distribution. Pressures from population growth and development are particularly acute for species that depend on restricted habitats, such as Peninsular bighorn sheep.

5.6.2 Conservation Units and Targets

The conservation units associated with the Deserts Province are the Mono, Mojave Desert, Sonoran Desert, Colorado Desert, and Southeastern Great Basin ecoregions (Figure 5.6-2), as well as portions of the Central Lahontan (HUC 1605), Northern Mojave-Mono Lake (HUC 1809), and the Southern Mojave-Salton Sea (HUC 1810) hydrologic units (Figure 5.6-3). HUC 1503 (Lower Colorado Subregion), shown on Figure 5.6-3, is not specifically addressed in SWAP 2015, but conservation actions for HUC 1503 are being implemented via the Lower Colorado River Multi-Species Conservation Plan.

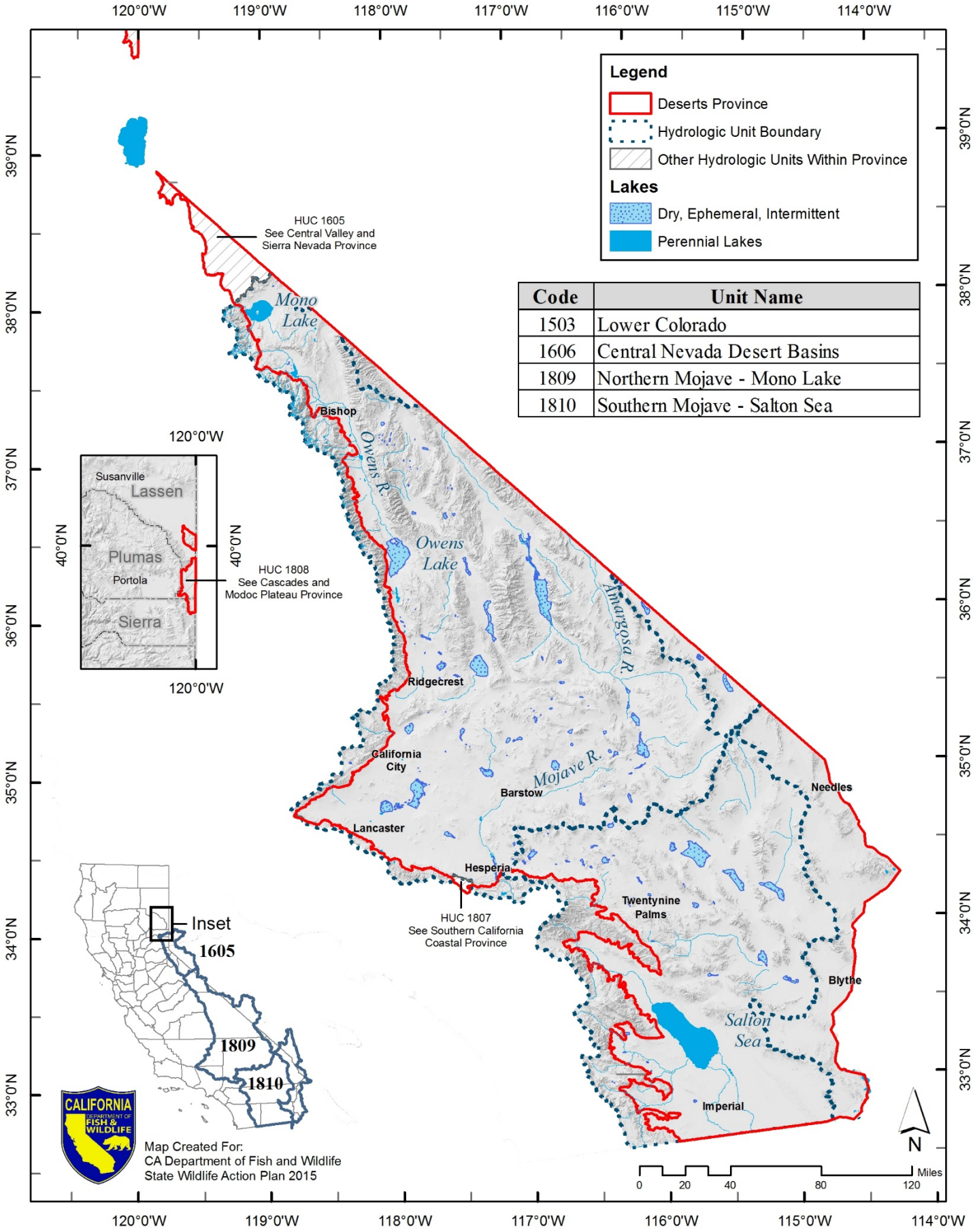
Twelve conservation targets were selected in this province as important communities for conservation planning: Big Sagebrush Scrub, Great Basin Pinyon-Juniper Woodland, Shadscale-Saltbush Scrub, Mojave and Sonoran Desert Scrubs, Desert Wash Woodland and Scrub, Sparsely Vegetated Desert Dunes, American Southwest Riparian Forest and Woodland, High Desert Wash and "Rangeland" Scrub/Great Basin Upland Scrub, Walker River Native Fish Assemblage, Cienegas, Springs and Spring Brooks, and Anthropogenically-Created Aquatic Features. The selected targets for each of the conservation units are summarized in Table 5.6-1.

Figure 5.6-4 shows the distribution of the plant communities within the province.



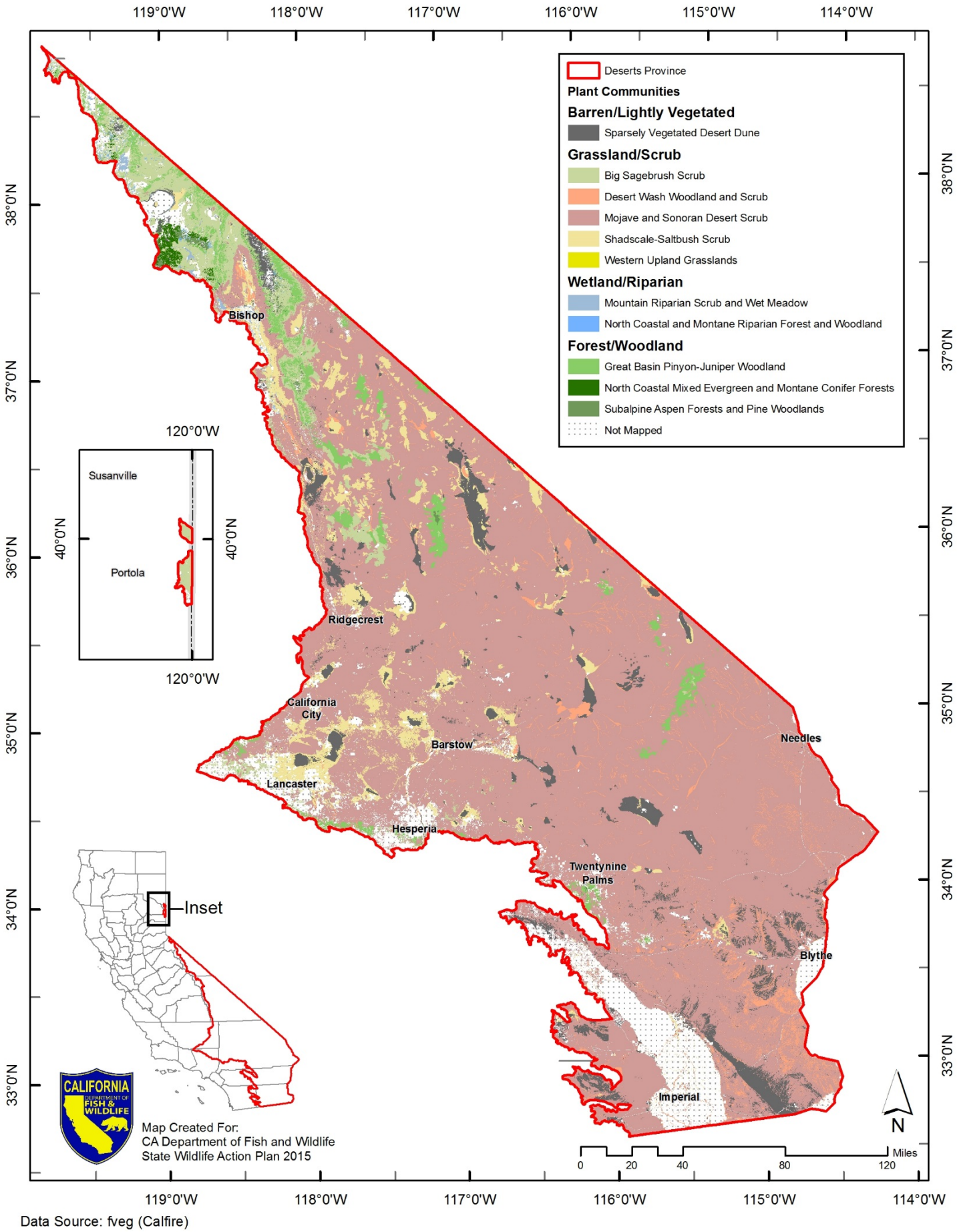
Data Source: USDA Forest Service (ecoregions); US Geological Survey (hillshade)

Figure 5.6-2 Ecoregions of the Deserts Province



Data Source: National Hydrologic Dataset (NHD); US Geological Survey (hillshade)

Figure 5.6-3 Hydrologic Units of the Deserts Province



Data Source: fveg (Calfire)

Figure 5.6-4 Plant Communities of the Deserts Province

Table 5.6-1 Summary of Conservation Units and Targets – Deserts Province*

Conservation Unit	Geographic and Ecological Summary	Conservation Target	Target summary	Focal CWHR types associated with target
Mono Ecoregion	This ecoregion is in the western part of the Great Basin, just east of the Sierra Nevada. Elevation range: 4,400 to 14,200	Great Basin Pinyon-Juniper Woodland	Includes all mixed and pure pinyon and juniper stands in trans-montane California. These are largely found in the Mojave Desert mountains, and in the mountains of the Modoc Plateau and great basin. They also occur on the eastern slopes of the Sierra Nevada and the Peninsular Ranges and the northern slopes of the Transverse Ranges.	Pinyon-juniper, Juniper
		Big Sagebrush Scrub	Emblematic of the valleys and lower slopes of the great basin desert and enters California in the Modoc Plateau, south and east of the Cascades and Sierra Nevada, into the higher mountains of the Mojave desert. It also occurs in isolated patches in the Transverse and Peninsular ranges, the south and the inner north Coast Ranges sporadically northward to the eastern Klamath Mountains.	Sagebrush
Mojave Desert Ecoregion	This section is the hot part of the Basin and ranges from the southern end of the Sierra Nevada and the north-northeastern side of the Transverse Ranges to Nevada and Arizona. Elevation range: –280 to 7,900	Shadscale-Saltbush Scrub	The shrubby cool-desert saltbush species often form distinct bands above closed basins and below extensive sagebrush belts in the great basin desert. This conservation target addresses those saltbush scrubs, which typically do not grow in strongly saline or alkaline soils, but do tolerate higher pH (alkalinity) and often finer soil texture than *Artemisia tridentata* and related taxa of sagebrush.	Alkali desert scrub, Desert wash, Desert scrub
Sonoran Desert	This section is the hot part of the Basin and Range geomorphic province, from the eastern end of the Transverse Ranges and the Salton Trough east to Arizona. Elevation range: 250 to 4,400	Mojave and Sonoran Desert Scrubs	Upland desert scrub found on hill slopes and alluvial fans throughout the arid southwest where winter temperatures are not as cold as in the great basin desert and summer temperatures are very hot. The Mojave desert has frost and occasional winter snows; the Sonoran desert rarely has any frost. The warmer Sonoran desert tends to have more summer rain, and more distinctive emergent arborescent species, such as saguaro, ocotillo, and the Mojave is cooler with fewer large cacti and large thorny trees, but has Joshua trees and other Yucca species.	Desert scrub, Desert succulent shrub, Joshua tree
Colorado Desert Ecoregion	This section is a very hot part of the Basin and Range geomorphic province that is sometimes called the Salton Trough. The surface of sediments in the middle of the trough is about 275 feet below sea-level. Elevation range: –230 to 2,200	Desert Wash Woodland and Scrub	Includes the warm desert washes of the Sonoran and Colorado desert. These have trees and large shrubs associated with them while the cooler Mojave desert has fewer trees but several shrub species. Stands vary depending upon subsurface water availability, minimum winter temperature, and intensity and frequency of flooding.	Desert wash, Desert scrub
		Sparsely vegetated desert dunes	Characteristic of the desert dunes and contains both annual and perennial species with special strategies to deal with the shifting sands and the dry and unpredictable climate. Vegetation cover is variable depending upon unpredictable rainfall patterns.	Barren

Table 5.6-1 Summary of Conservation Units and Targets – Deserts Province*

Conservation Unit	Geographic and Ecological Summary	Conservation Target	Target summary	Focal CWHR types associated with target
Southeastern Great Basin Ecoregion	This section comprises the southern Great Basin in the Basin and Range geomorphic province. Characterized by basin and range topography (i.e., widely-separated short ranges in desert plains) and contains isolated mountains, plateaus, alluvial fans, basins, and dunes. Elevation range: 1,000 to 11,000	American Southwest Riparian Forest and Woodland	The Great Valley, South Coast, and warm desert riparian forests and thickets are included in this target. The range of the main indicator trees and shrubs are the southwestern U.S. and northern Mexico. Most stands of this target occur below 4,000 feet elevation and are replaced by the cool-temperate version of riparian (Montane and North Coast Riparian Forest and Scrub) in the mountains and on the north coast. Diagnostic species include Fremont cottonwood, black and red willow, California sycamore, California wild grape, arroyo willow, narrow-leaf willow, button-bush, spice bush and California fan palm (native stands in the warm desert). Most stands are found in permanently moist settings or riparian settings where sub-surface water is available year-round.	Palm oasis, Valley foothill riparian
		Great Basin Upland Scrub	Occurs in the cooler Mojave desert mountains, the uplands of the Great Basin and Modoc Plateau, and in isolated pockets of the inner South Coast Ranges such as Temblor Range and Carrizo Plains. It is composed of shrublands with cool desert affinities but has been segregated from the short and tall species of sagebrush (*Artemisia* spp.). Most of the vegetation in this plant community occurs well beyond the eastern borders of California into the Great Basin Province. Successional relationships exist between the several groups of alliances in this community; some are disturbance followers and may also occur in episodic washes. Some are persistent resprouting shrubs, which recover well after fire, and some are fire and browsing-sensitive with longer recovery times. Some perennial desert grasslands are also part of this community and increase with short fire intervals.	Bitterbrush Sagebrush Low sage
		High Desert Wash and "Rangeland" Scrub	This is a cool desert plant community that is most common in the eastern portions of the state from Modoc Plateau, southward and east of the Cascades and Sierra Nevada into the mountains of the Mojave Desert. Stands form when fire or other clearing and disturbance remove stands of *Artemisia* (in big sagebrush scrub) or other shrubs characteristic of the Great Basin Upland Scrub community.	Bitterbrush Sagebrush Low sage
Central Lahontan HUC 1605	Includes the Central Lahontan Basin, consisting of the Carson, Truckee, and Walker River Basins in California and Nevada. Covers an area of 12,500 square miles. Elevation range: 4,230-to 11,385	Walker River Native Fish Assemblage	SGCN associated with target are Lahontan cutthroat trout, mountain sucker, and mountain whitefish. Other, non-SGCN species include freshwater mussels.	N/A
Northern Mojave-Mono Lake HUC 1809	Includes the closed desert basins of eastern California that discharge into South Central California, including Mono Lake, Owens Lake, Death Valley, and the Upper Mojave Desert in	Anthropogenically-Created Aquatic Features	Various man-made features including: agricultural drainage ditches, irrigation canals, roadside ditches, flood control basins, borrow pits, railroad berms, golf course ponds, cattle stock ponds, and duck club ponds. These features were not created with the intent of providing fish or amphibian habitat.	N/A

Table 5.6-1 Summary of Conservation Units and Targets – Deserts Province*

Conservation Unit	Geographic and Ecological Summary	Conservation Target	Target summary	Focal CWHR types associated with target
Northern Mojave-Mono Lake HUC 1809 (continued)	California and Nevada. Covers an area of 28,000 square miles. Elevation range: –195 to 12,530	Cienegas	Includes springs and marshy areas at the base of a mountain, in a canyon, or on edges of grasslands where groundwater flows to the surface. Cienegas are often isolated features (i.e., not draining into a stream) and evaporate, forming a small playa. Species of Greatest Conservation Need associated with target are Long Valley speckled dace, Owens speckled dace, and Owens pupfish.	N/A
		Springs and Spring Brooks	Species of Greatest Conservation Need associated with target are Cabin Bar tui chub, Cottonball Marsh pupfish, Long Valley speckled dace, Owens pupfish, Owens tui chub, Owens speckled dace, Shoshone pupfish, Saratoga Springs pupfish, southwestern pond turtle, black toad, Hydrobiidae springsnails, and arroyo toad.	N/A
Southern Mojave-Salton Sea HUC 1810	Includes the closed desert basins in southeastern California, including the lower Mojave Desert and the Salton Sea in California. Covers an area of 16,000 square miles. Elevation range: –230 to 10,040	Anthropogenically-Created Aquatic Features	Various man-made features including: agricultural drainage ditches, irrigation canals, roadside ditches, flood control basins, borrow pits, railroad berms, golf course ponds, cattle stock ponds, and duck club ponds. These features were not created with the intent of providing fish or amphibian habitat. Species of Greatest Conservation Need associated with target is desert pupfish.	N/A
		Cienegas	Includes springs and marshy areas at the base of a mountain, in a canyon, or on edges of grasslands where groundwater flows to the surface. Cienegas are often isolated features (i.e., not draining into a stream) and evaporate, forming a small playa. Species of Greatest Conservation Need associated with target is desert pupfish.	N/A

* Description referenced from CDFG 1988, USDA 1994, USDA 2007 and Keeler-Wolf 2010.

5.6.3 Key Ecological Attributes

Key ecological attributes (KEAs) were identified for each conservation target. These attributes are considered the most important for the viability of the targets and their associated species. The KEAs for the Deserts Province are listed in Table 5.6-2. The most commonly identified attributes for the Deserts Province are:

- area and extent of community,
- connectivity among communities and ecosystems,
- successional dynamics,
- native versus non-native diversity,
- hydrological regime,
- surface water flow regime,
- water yield, and
- soil and sediment deposition regime.

Table 5.6-2 Key Ecological Attributes – Deserts Province

Key Ecological Attribute	Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave - Salton Sea HUC 1810	
	Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash woodland and scrub	Sparsely Vegetated Desert Dune	American Southwest Riparian Forest and Woodland	Great Basin Upland Scrub	High Desert Wash and "Rangeland" Scrub	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Area and extent of community		X	X	X	X	X	X	X	X	X	X	X	X		X
Fire regime	X	X										X			X
Connectivity among communities and ecosystems			X	X	X	X				X	X		X	X	
Successional dynamics	X		X	X				X	X				X		
Community structure and composition															
Key species population levels				X	X										
Structural diversity	X				X			X	X						
Endemic Diversity			X		X										
Native versus non-native diversity	X	X	X	X		X	X	X	X	X	X	X	X	X	X
Age class heterogeneity		X													
Hydrological regime			X			X				X		X	X		X
Soil and sediment deposition regime			X		X	X				X	X		X	X	
Surface water flow regime					X		X			X	X		X	X	
Water quality										X	X		X	X	
Weather regime				X											

5.6.4 Species of Greatest Conservation Need in the Deserts Province

The SWAP regional team identified species that would benefit from the conservation strategies for each target within the province. These species are the focus of the conservation strategies and will benefit from the actions taken to implement the conservation strategies. Not all of the focal species meet the criteria to be considered SGCN. The criteria used to determine SGCN are described in Section 2.4 and the complete list of SGCN for California is presented in Appendix C. Table 5.6-3 lists the focal species for each conservation unit and target within the Deserts Province. SGCN are indicated with an asterisk.

Table 5.6-3 Focal Species of Conservation Strategies Developed for Conservation Targets – Deserts Province

Common Name	Scientific Name	Conservation Units and Targets[1]														
		Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave - Salton Sea HUC 1810	
		Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash woodland and scrub	Sparsely vegetated Desert Dune	High Desert Wash and "Rangeland" Scrub	Great Basin Upland Scrub	American Southwest Riparian Forest and Woodland	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Invertebrates																
California floater	*Anodonta californiensis*										X					
Western pearlshell	*Margaritifera falcata*										X					
Wong's springsnail	*Pyrgulopsis wongi*													X		
Fishes																
Lahontan cutthroat trout*	*Oncorhynchus clarkii henshawi*										X					
Mountain whitefish	*Prosopium williamsoni*										X					
Long Valley speckled dace	*Rhinichthys osculus*													X		
Amargosa Canyon speckled dace*	*Rhinichthys osculus ssp. 1*													X		
Owens speckled dace*	*Rhinichthys osculus ssp. 2*													X		
Mohave tui chub*	*Siphateles bicolor mohavensis*													X		
Lahontan Lake tui chub*	*Siphateles bicolor pectinifer*													X		
Owens tui chub*	*Siphateles bicolor snyderi*													X		
Owens sucker*	*Catostomus fumeiventris*													X		
Mountain sucker*	*Catostomus platyrhynchus*										X					
Tahoe sucker	*Catostomus tahoensis*										X					
Desert pupfish*	*Cyprinodon macularius*														X	X
Amargosa pupfish*	*Cyprinodon nevadensis amargosae*													X		
Saratoga Springs pupfish*	*Cyprinodon nevadensis nevadensis*													X		
Shoshone pupfish*	*Cyprinodon nevadensis shoshone*													X		
Owens pupfish*	*Cyprinodon radiosus*													X		
Cottonball Marsh pupfish*	*Cyprinodon salinus milleri*													X		
Salt Creek pupfish*	*Cyprinodon salinus salinus*													X		
Paiute sculpin	*Cottus beldingi*										X					
Amphibians																
Inyo Mountains slender salamander*	*Batrachoseps campi*									X						

Table 5.6-3 Focal Species of Conservation Strategies Developed for Conservation Targets – Deserts Province

Common Name	Scientific Name	Conservation Units and Targets[1]														
		Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave - Salton Sea HUC 1810	
		Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash woodland and scrub	Sparsely vegetated Desert Dune	High Desert Wash and "Rangeland" Scrub	Great Basin Upland Scrub	American Southwest Riparian Forest and Woodland	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Couch's spadefoot*	*Scaphiopus couchii*				X	X						X			X	X
Arroyo toad*	*Anaxyrus californicus*			X										X		
Black toad*	*Anaxyrus exsul*									X						
Sonoran desert toad	*Incilius alvarius*				X											
Northern leopard frog	*Lithobates pipiens*		X									X				
Lowland leopard frog	*Lithobates yavapaiensis*				X											
Reptiles																
Sonora mud turtle	*Kinosternon sonoriense*				X											
Southern western pond turtle*	*Actinemys pallida*			X										X		
Mohave Desert tortoise*	*Gopherus agassizii*			X	X	X		X	X							
Flat-tailed horned lizard*	*Phrynosoma mcallii*			X			X									
Coachella Valley fringe-toed lizard*	*Uma inornata*						X									
Colorado Desert fringe-toed lizard*	*Uma notata*						X									
Mohave fringe-toed lizard*	*Uma scoparia*			X	X		X									
sandstone night lizard*	*Xantusia gracilis*						X									
Panamint alligator lizard*	*Elgaria panamintina*		X							X						
Southern California legless lizard*	*Anniella stebbinsi*			X		X										
Gila monster*	*Heloderma suspectum*			X	X	X										
Regal ring-necked snake	*Diadophis punctatus regalis*			X												
Red diamond rattlesnake*	*Crotalus ruber*			X	X	X										
Birds																
Greater sage-grouse*	*Centrocercus urophasianus*	X	X													
Least bittern*	*Ixobrychus exilis*									X						
California condor*	*Gymnogyps californianus*			X												
Cooper's hawk (nesting)	*Acciptier cooperii*		X			X										
Golden eagle*	*Aquila chrysaetos*	X	X	X	X	X		X	X							
Ferruginous hawk	*Buteo regalis*	X						X	X							
Swainson's hawk*	*Buteo swainsoni*			X												

Table 5.6-3 Focal Species of Conservation Strategies Developed for Conservation Targets – Deserts Province

Common Name	Scientific Name	Conservation Units and Targets[1]														
		Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave - Salton Sea HUC 1810	
		Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash woodland and scrub	Sparsely vegetated Desert Dune	High Desert Wash and "Rangeland" Scrub	Great Basin Upland Scrub	American Southwest Riparian Forest and Woodland	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Northern harrier*	*Circus cyaneus*		X	X	X			X	X	X						
Snowy plover (interior population)*	*Charadrius nivosus*			X	X											
Short-eared owl*	*Asio flammeus*		X	X												
Long-eared owl	*Asio otus*		X		X			X	X							
Burrowing owl*	*Athene cunicularia*	X		X	X	X		X	X							
Prairie falcon (nesting)	*Falco mexicanus*		X													
American peregrine falcon*	*Falco peregrinus anatum*	X						X	X							
Willow flycatcher*	*Empidonax traillii*			X	X											
Vermilion flycatcher*	*Pyrocephalus rubinus*			X	X											
Loggerhead shrike*	*Lanius ludovicianus*	X	X	X	X	X		X	X	X						
Least Bell's vireo*	*Vireo bellii pusillus*			X	X											
Gray vireo*	*Vireo vicinior*			X	X					X						
Bank swallow*	*Riparia riparia*			X				X	X							
Bendire's thrasher*	*Toxostoma bendirei*			X	X											
Crissal thrasher*	*Toxostoma crissale*			X	X	X	X									
Le Conte's thrasher (San Joaquin population)*	*Toxostoma lecontei*					X	X									
Common yellowthroat*	*Geothlypis trichas**							X	X							
Yellow-breasted chat*	*Icteria virens*			X	X					X						
Lucy's warbler*	*Oreothlypis luciae*			X	X											
Yellow warbler*	*Setophaga petechia*			X	X					X						
Sage sparrow	*Artemisiospiza spp.*							X	X							
Inyo California towhee*	*Melozone crissalis eremophilus*							X	X	X						
Savannah sparrow*	*Passerculus sandwichensis*							X	X							
Large-billed savannah sparrow*	*Passerculus sandwichensis rostratus*				X											
Summer tanager*	*Piranga rubra*			X	X					X						
Vesper sparrow	*Pooecetes gramineus*							X	X							
Brewer's sparrow	*Spizella breweri*		X													
Chipping sparrow	*Spizella passerina*		X													

Table 5.6-3 Focal Species of Conservation Strategies Developed for Conservation Targets – Deserts Province

Common Name	Scientific Name	Conservation Units and Targets[1]														
		Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave - Salton Sea HUC 1810	
		Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash woodland and scrub	Sparsely vegetated Desert Dune	High Desert Wash and "Rangeland" Scrub	Great Basin Upland Scrub	American Southwest Riparian Forest and Woodland	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Tricolored blackbird*	*Agelaius tricolor*			X	X											
Yellow-headed blackbird*	*Xanthocephalus xanthocephalus*			X	X					X						
Gray-crowned Rosy-Finch*	*Leucosticte tephrocotis*	X														
Mammals																
Broad-footed mole*	*Scapanus latimanus*							X	X							
California leaf-nosed bat*	*Macrotus californicus*			X	X	X										
Pallid bat*	*Antrozous pallidus*		X	X	X	X		X	X	X						
Townsend's big-eared bat	*Corynorhinus townsendii*			X												
Western yellow bat*	*Lasiurus xanthinus*			X	X	X										
Long-eared bat*	*Myotis evotis*	X	X			X										
Fringed myotis*	*Myotis thysanodes*	X	X			X				X						
Cave myotis*	*Myotis velifer*					X										
Arizona cave myotis*	*Myotis velifer velifer*					X										
Long-legged myotis*	*Myotis volans*		X			X				X						
Western mastiff bat*	*Eumops perotis californicus*			X	X	X		X	X	X						
American pika*	*Ochotona princeps*	X														
Pygmy rabbit*	*Brachylagus idahoensis*		X													
White-tailed jackrabbit	*Lepus townsendii*									X						
Western white-tailed jackrabbit*	*Lepus townsendii townsendii*		X					X	X							
Sierra Nevada mountain beaver*	*Aplodontia rufa californica*		X													
Mohave ground squirrel*	*Spermophilus [=Xerospermophilus] mohavensis*			X												
Palm Springs round-tailed ground squirrel*	*Xerospermophilus tereticaudus chlorus*					X										
American beaver	*Castor canadensis*		X	X												
Owens Lake pocket gopher	*Ithomomys bottae operarius*			X		X										
Little pocket mouse	*Perognathus longimembris*							X	X							
Great Basin pocket mouse	*Perognathus parvus*							X	X							

Table 5.6-3 Focal Species of Conservation Strategies Developed for Conservation Targets – Deserts Province

Common Name	Scientific Name	Conservation Units and Targets[1]														
		Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave - Salton Sea HUC 1810	
		Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash woodland and scrub	Sparsely vegetated Desert Dune	High Desert Wash and "Rangeland" Scrub	Great Basin Upland Scrub	American Southwest Riparian Forest and Woodland	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Mohave river vole*	*Microtus californicus mohavensis*			X												
Owens Valley vole*	*Microtus californicus vallicola*			X												
Desert woodrat	*Neotoma lepida*							X	X							
Southern grasshopper mouse*	*Onychomys torridus ramona*			X	X					X						
Porcupine*	*Erethizon dorsatum*		X													
Kit fox	*Vulpes macrotis*			X		X										
Sierra Nevada red fox	*Vulpes vulpes necator*	X	X													
California wolverine*	*Gulo gulo*		X													
American badger*	*Taxidea taxus*	X	X	X	X	X		X	X							
Western spotted skunk	*Spilogale gracilis*	X														
Pronghorn*	*Antilocapra americana*		X	X	X											
Mule deer	*Odocoileus hemionus*			X	X	X										
Bighorn sheep*	*Ovis canadensis*		X	X	X					X						
Desert bighorn sheep*	*Ovis canadensis nelsoni*					X		X	X							

[1] A species is shown for a particular conservation unit only if it is associated with specific conservation targets identified for the unit.
* Denotes a species on the SGCN list. Non-asterisked species are not SGCN but are identified as important species by CDFW staff.

5.6.5 Pressures on Conservation Targets

If the KEAs are degraded, then the target is experiencing some type of stress. Stresses are caused by pressures, anthropogenic (human-induced) or natural drivers that could result in impacts to the target by changing the ecological conditions. Pressures can be positive or negative depending on intensity, timing, and duration. The priority pressures identified as affecting the viability of conservation targets in the Deserts Province are summarized in Table 5.6-4. The most commonly addressed pressures identified for the province (i.e., those that affect several targets) are discussed below. The relationship between the stresses and pressures are unique for each conservation target and are identified in Section 5.6.6.

Table 5.6-4 Key Pressures on Conservation Targets – Deserts Province

Pressure	Conservation Unit and Target														
	Mono		Mojave Desert	Sonoran Desert	Colorado Desert		Southeastern Great Basin			Central Lahontan HUC 1605	Northern Mojave-Mono Lake HUC 1809			Southern Mojave – Salton Sea HUC 1810	
	Great Basin Pinyon-Juniper Woodland	Big Sagebrush Scrub	Shadscale-Saltbush Scrub	Mojave and Sonoran Desert Scrub	Desert Wash Woodland and Scrub	Sparsely Vegetated Desert Dune	American Southwest Riparian Forest and Woodland	Great Basin Upland Scrub	High Desert Wash and "rangeland" Scrub	Walker River Native Fish Assemblage	Anthropogenically Created Aquatic Features	Cienegas	Springs and Spring Brooks	Anthropogenically Created Aquatic Features	Cienegas
Agricultural and forestry effluents											X			X	
Airborne pollutants			X												
Annual and perennial non-timber crops			X	X								X	X		X
Climate change	X					X		X	X						
Commercial and industrial areas			X		X								X		
Dams and water management/use					X					X	X	X	X	X	X
Earthquakes/tsunamis											X	X	X	X	X
Fire and fire suppression	X	X						X	X			X			X
Household sewage and urban waste water															
Housing and urban areas		X	X	X	X	X						X			X
Industrial and military effluents			X												
Introduced genetic material										X		X	X		X
Invasive plants/ animals	X	X	X	X		X	X	X	X	X		X	X	X	X
Livestock, farming, and ranching	X		X			X		X	X	X		X	X		X
Marine and freshwater aquaculture											X		X	X	
Mining and quarrying			X		X			X	X						
Military activities			X		X										
Other ecosystem modifications	X														
Parasites/pathogens/diseases		X					X					X			X
Recreational activities			X		X	X					X		X	X	
Renewable energy			X	X	X	X		X	X		X	X	X	X	X
Roads and railroads			X	X	X					X	X			X	
Tourism and recreation activities					X	X									
Utility and service lines			X	X	X										

Most Commonly Addressed Pressures in the Deserts Province

- Dams and Water Management/Use
- Housing and Urban Areas
- Roads and Railroads
- Invasive Plants/Animals
- Livestock, Farming, and Ranching
- Recreational Activities
- Renewable Energy
- Fire and Fire Suppression
- Climate Change

Dams and Water Management/Use

The primary pressures to aquatic habitats in the Deserts Province are the diversion of the Colorado River, decline of the Salton Sea, diversion of water from the Mono and Owens basins, and groundwater pumping and diversion for agricultural, industrial, and domestic uses.

Colorado River

The Colorado River is the region's largest perennial waterway, with aquatic species inhabiting the river's main stem and backwaters. Numerous bird species and other wildlife are dependent on the Colorado River riparian areas and the river delta at the Sea of Cortez.

The diversion of the Colorado River for agricultural and urban water uses substantially affects the region's wildlife and ecosystems. More than a dozen large dams control, store, divert, and allow for the consumptive use of nearly all the water in the Colorado River. These dams, as well as channelization, flood control structures, and flow regulation practices have drastically altered the river's flows and sediment transport processes. Flows are much reduced and have less variation. The delta wetlands at the Sea of Cortez have been reduced to about one-tenth of their original two million acres. Additionally, water is not available to recharge the groundwater table. In many locations, groundwater levels in riparian areas along the Colorado River have receded from historical levels of less than three feet to more than ten feet below the surface. Historically, sediment was deposited at the river delta or along the river's banks by flood events, creating deep floodplain soils. Over-bank flooding also flushed the soils of built-up salts, creating more favorable conditions for vegetation. Today, however, sediment transport is blocked by dams, and natural flooding is prevented along most of the river's length (CDFG 2005).

Salton Sea

The Salton Sea is the most recent in a series of inland lakes that have historically occupied the Salton Basin. Created by inadvertent flooding resulting from anthropogenic activities and partly sustained today by agricultural drainage water, the Salton Sea can be considered neither a natural nor an entirely artificial ecosystem. It is clear, however, that the sea provides critical resources for the region's wildlife, particularly for a great diversity of birdlife. More than 400 bird species have been recorded in the Salton Sea area, including approximately 100 locally breeding species.

The sea's importance stems from its status as the major remaining aquatic habitat of inland Southern California, from its location on the Pacific Flyway, and from the diverse array of habitat

types it provides. The sea's proximity to the Imperial Valley's canals and fields creates a landscape mosaic uniquely able to fulfill multiple habitat requirements for nesting, foraging, and breeding.

The Salton Sea is vital to migratory, wintering, and breeding waterbirds (Shuford et al. 2002). Birds may number in the millions during the winter. In some years, eared grebe numbers alone have been as high as 3.5 million. Several waterbirds of high conservation concern inhabit the sea, including brown pelican, American bittern, white-faced ibis, and ruddy duck. A significant portion of the North American populations of several sensitive species, including the eared grebe, American white pelican, and Ridgway's rail, are supported by the sea. Threatened by a number of environmental problems, ranging from reduced freshwater inflows and increasing salinity to eutrophication, avian disease outbreaks, and the presence of toxic contaminants, the sea's health is declining, and birds that rely on the sea are at risk. The sea's decline prompted local agencies in 1993 to establish the Salton Sea Authority (composed of Imperial Irrigation District, Coachella Valley Water District, Imperial County, Riverside County, and the Torres Martinez Tribe) to address both biological and economic recovery. Most recently, the state of California established a Salton Sea Restoration Fund and took on responsibility for selecting a method for its restoration. At the federal level, the need to restore the sea was recognized with the enactment of the 1998 Salton Sea Reclamation Act, which charged the U.S. Department of the Interior (DOI) and U.S. Bureau of Reclamation (USBR) with the responsibility for restoring the sea.

The Salton Sea flooded several springs in the Salton Basin, which were inhabited by desert pupfish. The Sea and the agricultural drains that feed it now act as habitat for desert pupfish, and a conduit for connecting all remaining wild populations, including the spring-fed San Felipe Creek and Salt Creek. Without restoration, however, the Salton Sea will become too saline to support desert pupfish, and the creeks and agricultural drain habitats will become isolated from one another.

Groundwater Pumping

Groundwater pumping for agricultural, industrial, and domestic uses has lowered groundwater levels. Throughout the Mojave River basin, springs and riparian areas have dried up, causing water-stressed cottonwoods, willows, and mesquite to perish. In some areas, where groundwater levels dropped seven to ten feet, more than 50 percent of the cottonwood trees have perished. Where the water table has dropped by 20 feet beneath the Mojave River, 95 percent of the riparian forest has died. Many of the remaining areas of the riparian corridor are dominated by tamarisk (saltcedar), an exotic plant that invades areas where the native riparian habitat is stressed. Tamarisk roots can reach deeper for water, causing groundwater to recede farther (CDFG 2005).

Although population growth has slowed over the past several years, development and demand for water have still grown. While natural inflows to the basin during the last decade have exceeded the long-term average, studies indicate that groundwater levels have continued to drop. Pressure to further overdraft groundwater, especially in the Mojave basin will be intense,

as the projected annual water deficit for the area will reach 57,200-79,600 acre-feet (AF) by the year 2020 (Mojave Water Agency 2004).

Stabilizing and increasing groundwater levels, in part by recharging overdrafted sub-basins, are essential to maintaining riparian habitats and allowing riparian-dependent wildlife to return to several areas of the Mojave River and adjacent streambeds. For example, the Mojave Water Agency has developed a plan to recharge the groundwater basin that would require importing about 59,000 AF of water per year by 2020 to maintain groundwater at levels that would support riparian habitats along the river and its tributaries. Recharging the region will likely require increasing water purchases from the State Water Project (SWP) and other outside sources.

Groundwater overdrafting also imperils the Amargosa River basin riparian habitat and wetlands. Also, groundwater pumping in the Amargosa Valley and in the upstream watershed is expected to increase. Increasing water use by expanding small residential communities is projected in the upper basin region of Amargosa Valley and Pahrump, Nevada. Ten thousand new homes have already been approved for construction in the small community of Pahrump. In addition, the city of Las Vegas also is seeking to tap into the groundwater basins of the surrounding rural areas in Nye County, Nevada. The Pahrump Valley is itself short of water for predicted local growth and is among the areas being examined to export water to Las Vegas (CDFG 2005). If the Amargosa River Basin is overdrafted, wildlife diversity will decline in Ash Meadows, the Amargosa Canyon, and in Death Valley National Park as the Amargosa riparian corridor withers.

Water Transfers and Diversions

With the natural aquatic and wetland systems of the desert dramatically altered and diminished, wildlife species in the region must depend on the water features related to irrigated agricultural lands. The once-arid landscape is now transected by a network of water delivery and drainage canals. Imperial Valley's 475,000 irrigated acres and Coachella Valley's 75,000 acres receive 3.2 million AF of Colorado River water annually (Cohn 2000, Cohen et al. 1999). Orchards and date palm plantations in the Coachella Valley and fields of cotton, alfalfa, Sudan grass, lettuce, sugar beets, onions, and melons in the Imperial Valley have replaced native desert communities. The New and Alamo rivers, created when the Colorado River formed the Salton Sea, are now fed principally by agricultural drainage water and provide isolated pools, marshlands, and mudflats used by shorebirds. The drains and canals used to transport water now support wetland vegetation communities and a number of sensitive species, including California black rail, western burrowing owl, and desert pupfish. Agricultural fields also provide wintering habitat for mountain plover, long-billed curlew, and sandhill crane (CDFG 2005).

In recent years, a number of regional agreements have been negotiated to transfer water from agricultural use to meet growing urban needs in other parts of the state. These water transfers will help the state to reduce its use of Colorado River water to its federal apportionment of 4.4 million AF/year.

In 2003, the Quantification Settlement Agreement (QSA) and related agreements allowed the transfer of 300,000 acre-feet/year of Colorado River water from the Imperial Irrigation District (IID) to urban areas, primarily in coastal Southern California. The parties to these agreements included the IID, San Diego County Water Authority, the Metropolitan Water District of Southern California, USBR, and the state of California. Ultimately, water conservation through irrigation efficiency measures and lining canals with concrete (to prevent water loss through seepage) will supply the water for the transfer. Initially, however, large-scale fallowing of agricultural fields will provide surplus water for transfer. Litigation was quickly brought against the QSA, including a lawsuit to determine the validity of the agreements. Most recently, in July 2013, a Sacramento Superior Court judge entered a final judgment validating the QSA and rejecting all of the remaining legal challenges. Another round of appeals is anticipated in the near future (San Diego County Water Authority 2014).

In addition to the water transfers covered by the QSA agreements, other changes in the management of Colorado River water are planned in California and in the lower Colorado River basin states. These changes include additional agriculture-to-urban water transfers, increased water-transport efficiency, and changes in diversion points and dam release schedules to meet water supply and power generation needs. The environmental effects of these changes are addressed in the 2005 Lower Colorado River Multi-Species Conservation Program (Lower Colorado River Program). The federal Lower Colorado Program allows changes in diversion points and dam release schedules on the Colorado River by water and power agencies in California, Arizona, and Nevada, as well as by USBR and sovereign Native American tribes. The program allows total water transfers of up to 1.574 million AF of Colorado River water per year. In California, the program allows up to 800,000 AF of Colorado River water to be transferred annually. These include transfers to urban areas, including some areas in Coachella Valley, from the IID, the Palo Verde Irrigation District, and the Bard Water District.

If unmitigated, these water transfers would have substantial effects on the region's aquatic habitats and the wildlife species that depend on them. With less water applied to agricultural fields, less tailwater will flow through drains and be available to sustain the Salton Sea. Canal, drain, and irrigation-fed river habitats will be reduced. Lining canals with concrete will prevent groundwater recharge, reducing the amount of water that feeds seeps and springs as well as the Salton Sea. At the sea, lower water levels will affect shoreline habitat, and salinity will increase more rapidly with less incoming fresh water. Additionally, changes in water diversion points and in the timing of dam releases in the upper Colorado River basin will affect flows, habitats, and species in the lower Colorado River.

To address these effects, parties to the QSA and the Lower Colorado River Program committed to a number of conservation measures to mitigate for the water transfers. Permits issued in conjunction with these agreements will allow for the take of protected species under the California and Federal Endangered Species Acts (CESA, ESA) that results from the water

management activities covered by these agreements. The QSA also includes commitments to work toward restoration of the Salton Sea.

Housing and Urban Areas; Roads and Railroads

The western Mojave region has experienced growth as residential development spread eastward from the Los Angeles Basin. Existing local government General Plans provide for residential growth in the western Mojave to reach a population of 5 million (CDFG 2005). Significant growth is not anticipated in the eastern Mojave of California, where there is little infrastructure. But growth across the California-Nevada state border, in Pahrump and Las Vegas, will likely have an increasing effect on California's eastern Mojave Desert.

Mojave Desert

In the western Mojave, sprawling development replaces and fragments desert habitat. Growing communities require additional rights-of-way for power lines, pipelines, and roads, which further fragments habitat. This pattern and density of growth dramatically increases the severity of development's effects on wildlife (CDFG 2005). Development also increases pressure to overdraw groundwater. Groundwater levels began dropping as a result of overdrafting in the 1950s, drying up riverbeds, springs, and seeps and diminishing riparian ecosystems that depend on flowing water and saturated soils. The new water demands of rapid growth also reduce the options for recharging and restoring groundwater levels.

For more than a decade, federal, state, and local wildlife- and land-management agencies have worked to develop a multispecies regional conservation plan for the rapidly growing western Mojave. Its purpose is to conserve and protect the threatened desert tortoise, Mohave ground squirrel, and nearly 50 other sensitive plants and animals and their corresponding natural communities, while accommodating anticipated rapid growth and development in the region (BLM 2005). The challenge of developing the Plan is to design scientifically supported conservation measures and land-use restrictions that will ensure the long-term survival of all native species. The West Mojave Plan, as currently proposed, envisions that the conservation of species would occur primarily on existing public lands managed by BLM. A very limited amount of additional private lands within the proposed conservation area would be purchased or protected, in conjunction with facilitating development and expansion of desert cities and communities. This is not consistent with the other Southern California regional conservation planning efforts, because it will provide BLM funding to be used for conservation of species on lands they already manage rather than securing protection of species on important lands at risk of being developed (CDFG 2005).

Colorado and Sonoran Deserts

As a whole, the Colorado Desert region does not face the level of population and development pressures experienced across most of California, and it remains the state's second-least populous region (CERES 2015). However, some areas of the Colorado Desert have seen

significant growth in recent decades and are facing the resulting challenges to regional wildlife. The two most notable examples are the Coachella Valley and southern Imperial County near the U.S.-Mexico border cities of Calexico and Mexicali.

Despite California's recession, communities stretching from Palm Springs eastward to Indio, including outlying communities of Mecca, Coachella, Thermal, and North Shore in the southeast, have continued to expand. For example, Cathedral City continued to grow by 2.7 percent between 2010 and 2014; Palm Desert grew by 4.1 percent (California Department of Finance [CDOF] 2014). New residential development, resort complexes, and golf courses have expanded, moving further up the canyons onto the lower slopes of the Peninsular Mountain Range and spreading across the natural communities and agricultural areas of the valley floor. Population in the valley's nine cities and surrounding unincorporated areas is projected to increase from approximately 330,000 in 2000 to between 475,000 and 518,000 residents in 2020 (Coachella Valley Association of Governments 2007).

The Coachella Valley's unique and diverse habitats host a number of sensitive, rare, and endemic species. Conflicts between these species and the rapid pace of development and recreational uses are at the forefront of wildlife agencies' concerns. Federal, state, and local agencies, along with conservation organizations, are addressing these issues through the regional habitat conservation plan, the Coachella Valley Multi-Species Habitat Conservation Plan.

Growth is also noteworthy in southern Imperial County, near the border cities of El Centro and Calexico on the U.S. side and Mexicali on the Mexico side. Some residents, drawn from coastal areas by affordable housing, commute up to two hours to the San Diego area. El Centro grew by 4 percent to 44,311 residents between 2010 and 2014; Calexico grew by 5.17 percent to a population of 40,564 (CDOF 2014). Conversion of agricultural fields to residential development is a major pressure on wildlife populations. As previously described, irrigated agricultural fields are a critical component of the habitat mosaic that sustains the great diversity and number of birds in this region. Among the species most reliant upon the Imperial Valley's agricultural fields are mountain plover and western burrowing owl, California black rail, and sandhill crane.

Expanding communities also increase the need for infrastructure, including roads, powerlines, and water supply. As in other areas of the state, pressures on wildlife populations include direct destruction of habitat, pollution, fragmentation of habitats, blockage of migratory corridors, and introduction of non-native and potentially invasive species. Population growth in neighboring regions, especially along the South Coast and across the larger Sonoran Desert, also puts demands on the resources of the Colorado Desert. Utility corridors that traverse the desert—including electric lines, gas and oil pipelines, aqueducts, and supporting service roads—are continually expanded; increasing amounts of Colorado River water are directed to growing urban areas; and visitors seek recreation opportunities in the desert's open landscapes.

Invasive Plants/Animals

Mojave Desert

Numerous exotic non-native plants have altered plant communities across large areas of the Mojave Desert, outcompeting native species and degrading upland and riparian habitats for native wildlife. Invasive annual grasses and forbs have displaced native plants, often greatly diminishing the native forage for the desert tortoise, lizards, birds, and small mammals. These exotic grasses and forbs now dominate plant communities throughout the region. In desert tortoise critical habitat of the western Mojave, exotic plants account for more than 60 percent of the annual vegetative biomass (CDFG 2005). Some invasive plants, such as Saharan mustard, continue to spread across the region.

The abundance of exotic forbs and annual grasses (particularly *Schismus barbatus*, *S. arabicus*, and *Bromus madritensis rubens*) increases the fuel and continuity of fuels, facilitating more-frequent and hotter fires. This changes the fire frequency and fire intensity that native plants evolved with and favors other exotic plants that thrive in disturbed areas, further transforming the plant communities (CDFG 2005).

Imported tamarisk, a plant of inferior habitat value for native wildlife, has replaced native cottonwoods and willows in much of the riparian habitat of the Mojave River and of other watercourses in the region. A 1995 survey found that tamarisk dominated half of the 10,000 acres of riparian corridor along the Mojave River (CDFG 2005, Lines 1999). The leaves of tamarisk concentrate and shed salts, thus degrading soil conditions for native plants (Smith 1999). Tamarisk is more drought tolerant than native cottonwood trees and willows. In areas where groundwater levels are receding, tamarisk outcompetes water-stressed native plants (Cleverly et al. 1997; CDFG 2005).

In 2002, local, state, and federal agencies signed the Mojave Weed Management Area Memorandum of Understanding (MOU), which spells out a coordinated planning effort to prevent, control, and eradicate weeds and to educate the public about weed control in the region (Desert Managers Group [DMG] 2002). The MOU identifies a priority list of species to control in the Mojave.

The Mohave tui chub is an endangered fish that occurs only in the Mojave River. One primary cause of its population decline has likely been hybridization with arroyo chub, which was introduced into the headwaters of the Mojave River in the 1930s. Hybridization with arroyo chub has likely caused elimination of genetically pure Mohave tui chub species. The arroyo chub also competes with Mohave tui chub for food.

Colorado and Sonoran Deserts

In the Colorado and Sonoran Desert regions tamarisk presents the greatest challenge. Tamarisk is virtually ubiquitous in riparian areas along the Colorado River. Alteration of the river's natural

flow regime favors invasive tamarisk over native vegetation, in part because some native species are adapted to the historical seasonal flooding regime for dispersal and germination. Decreased flooding frequency results in salt buildup in riparian soils, and native species are less salt-tolerant than tamarisk. Tamarisk can also withstand reduced sediment deposition and lowered groundwater levels. In many places, tamarisk has completely replaced native cottonwood, willow, and mesquite and grows in dense mono-species stands. Even where native riparian trees remain, tamarisk usually grows among them (Glenn et al. 2001). It can also be found along most of the region's other waterways and aquatic habitats, including irrigation canals and drains and some springs. Tamarisk provides lower-quality habitat than native trees for nesting birds and other wildlife (including the southwestern willow flycatcher) and uses larger quantities of water than native vegetation, lowering groundwater levels and drying up desert springs while raising soil salinity.

In dune habitats, invasive plant species stabilize dunes with extensive root systems or block sand movement prevents natural migration and shifting. These invasive species often spread from adjacent development or along road corridors. Principle species of concern include Russian thistle, Saharan mustard, annual grasses of the genus *Schismus*, and tamarisk.

Non-native burros were introduced to the Colorado Desert more than a century ago and now range throughout the region. They can be particularly damaging to riparian areas and springs. Along the Colorado River and around springs in the Chocolate Mountains where they congregate, burros consume available forage, increase sediment runoff, and compete with bighorn sheep and other native wildlife for access to drinking water. Under the BLM North Eastern Colorado Desert Plan, target limits were set for burro herd size. Because of the requirement under the Wild Horse and Burro Act that burros be managed through capture and relocation, herd control is time-consuming, labor-intensive, and costly. Burros have high reproduction rates. Thus, even where target herd-size limits have been set, herd sizes exceed target numbers.

Brown-headed cowbirds thrive in many human-altered habitats, including fragmented landscapes like suburban developments and golf courses, as well as in agricultural and grazing lands, where they are attracted to livestock droppings and feed. With the expansion of these land uses over the last century, cowbird populations have increased substantially in the Colorado Desert region, particularly in the Imperial and Coachella valleys. Brown-headed cowbirds lay eggs in flycatcher nests, and the flycatcher parent birds may desert the nest or raise the cowbird young at the expense of their own. In California, brown-headed cowbirds have been reported using from 50 percent to 80 percent of flycatcher nests (Coachella Valley Association of Governments 2007). Parasitism of southwestern willow flycatcher nests by brown-headed cowbirds has been identified as a major cause of the flycatcher's decline.

Four of five endemic fishes in the Owens River basin have been excluded from nearly their entire natural habitat by the presence of introduced sport fishes, particularly largemouth bass and

several species of imported trout. Competitive exclusion by mosquitofish is believed to play an important role in the imperilment of Long Valley speckled dace.

Another regionally sensitive species threatened by exotic species is the desert pupfish, state and federally listed as endangered. Competition, disturbance, and predation by introduced fish species, particularly sailfin molly, mosquito fish, and tilapia and crayfish species, threaten desert pupfish populations.

Livestock, Farming, and Ranching

Excessive livestock grazing has altered ecosystems across the desert. Grazing has been particularly detrimental to the wetland and riparian habitats important for maintaining wildlife diversity in the desert, denuding and eroding fragile soils around rivers, springs, and seeps and polluting scarce surface water. Livestock reshape streambeds and trample and consume vegetation and seedlings of native trees and shrubs, preventing regeneration. Grazing has also altered the desert scrub ecosystems, reducing preferred native shrubs and herbaceous plants that support the desert tortoise and other reptiles, the Mohave ground squirrel, and other small mammals, birds, and butterflies (Avery 1999). Heavy grazing also facilitates the spread of cheatgrass and other invasive annual grasses, replacing native grasses, herbs, and perennial shrubs, further diminishing habitat conditions for wildlife (CDFG 2005). In turn, fires are more frequent where invasive annual grasses are abundant, preventing the natural restoration of native vegetation and further disturbing habitat for native wildlife. In addition, livestock may spread certain diseases to desert bighorn sheep populations, causing massive die-offs.

Public agencies are altering grazing management on public lands to benefit desert species. For example, BLM removed grazing on nearly 1,214,000 hectares (3,000,000 acres) within the California portions of the Mojave and Sonoran deserts (USFWS 2011). The NPS has also dramatically reduced grazing in the Mojave National Preserve and sheep grazing has been halted in tortoise habitat of San Bernardino County, based on agreement among scientists and resource agencies that sheep grazing significantly degraded feed and habitat for the threatened desert tortoise. However, sheep and cattle continue to graze in wildlife habitats, including desert tortoise habitat, in the western Mojave areas within Inyo and Kern Counties. Cattle graze within Areas of Critical Environmental Concern (ACEC) and in areas designated as critical habitat for the desert tortoise, and they continue to degrade riparian habitats vital to numerous birds and mammals (CDFG 2005).

The 1971 Wild Free-Roaming Horses and Burros Act requires BLM to manage wild free-roaming horses and burros "in a manner designed to achieve and maintain a thriving natural ecological balance on public lands." The bureau is also required to remove horses and burros where overpopulation exists "in order to restore a thriving ecological balance to the range." Although they have inhabited the West since the end of the 16th century, burros and horses have likely grazed the California desert in significant numbers because they were released by settlers and

miners in the 1800s (Beever 2003; McKnight 1958). Descendants of wild asses from northeastern Africa, burros are well-adapted to the desert environment, and they readily propagate in Mojave Desert habitats where water and forage occur. Horses, although less adapted to the desert, have established herds in a few areas. BLM established appropriate management levels for burro and horse herds in the Mojave Desert pursuant to the amended California Desert Plan of 1980. The levels were mostly established in the 1980s, based on the range capacity for grazing rather than on limits that would protect wildlife habitat and sensitive plant and animal species.

The appropriate management levels (AML) for burro and horse numbers are often greatly exceeded. Between 1981 and 1987, 18,700 burros were removed from the desert, but, since 1987, efforts to control burros have been limited because of lack of funding. Today there are 13 burro- and a few horse-herd areas in the Mojave region. Burro numbers exceed the AML in five of the 13 herd areas. In one management area, there are 280 horses where the AML is 168 horses (CDFG 2005). Excessive burro numbers have led to overgrazing and degradation of desert resources. Riparian habitats associated with seeps and springs are often denuded and trampled by burros and horses. Water quality at seeps and springs frequented by burros or horses is usually poor because of accumulated sediment, urine, and feces. Feral burros and horses, exotic animals in the desert, place additional stress on the natural ecological balance of sensitive desert habitats (CDFG 2005).

Recreational Activities

Jim Rorabaugh, USFWS

The impacts of off-highway vehicles (OHVs) on fragile desert landscapes have been described by scientists and resource managers for more than 30 years. The 1980 California Desert Conservation Area Plan referred to off-highway vehicles as the "most pervasive management issue in the area." Along with direct collisions with desert tortoises and other wildlife, and the crushing of animal burrows, OHVs compact soils, induce erosion, spread invasive plant species, trigger ill-timed emergence of toads from their hibernacula, and denude the landscape of vegetation. Off-highway driving or riding has essentially a nonrestorable impact on some desert habitat; damaged soils and perennial vegetation are not likely to recover for several hundred years or more (CDFG 2005).

The number of OHV registrations in California has more than doubled since 1980, and the rapid growth of the numbers of OHV recreationists continues. In addition to resident recreationists, the Mojave Desert attracts millions of OHV visitors annually. While the vast majority of motorcyclists and all-terrain vehicle riders are responsibly recreating at designated off-highway vehicle parks or on designated trails and roads on public lands, many others are carving new trails across threatened desert tortoise and Mohave ground squirrel habitat, often across sensitive habitats in closed portions of designated ACEC. For example, BLM closed the 18,000-acre West Rand ACEC to

off-highway vehicle use in 2002 because of extensive damage to critical habitat for the desert tortoise. However, OHV users have routinely violated the closure (DMG 2002).

While desert planning efforts attempt to minimize OHV damage to natural resources by designating open, limited use, and closed areas, damage to natural resources continues. The lack of public education regarding the rules and road networks, lack of adequate enforcement staff, and outright defiance by a small segment of the OHV community have thwarted efforts to protect wildlife and vegetation, including areas around desert springs and other sensitive sites.

There are a limited number of BLM rangers per the million acres they are assigned to patrol, so the risk of receiving a citation for riding in restricted areas is very small. Agencies have posted signs indicating where vehicles are prohibited, but in many areas this is futile. BLM concluded in the June 2003 Decision Record for the Western Mojave Desert Off-Road Vehicle Designation Project:

"The least effective short-term action taken in the Ord Mountains was signing the closed route network. Not only did this effort consume a great deal of staff time; in addition, signs were removed almost as quickly as they were put up. The need to resign routes placed additional demands on scarce staff time and material."

The Decision Record also revealed that BLM was unable to keep OHVs out of sensitive areas. The frequent destruction of signs led BLM to sign the open route network and to cease signing the closed areas, reasoning that people are less likely to destroy "open area" signs than "closed area" signs. While this saves signs, this policy makes it difficult to inform recreationists where OHV activities are prohibited, providing less protection for important habitats.

Sensitive habitats are particularly at risk where OHV parks or open areas are located on lands adjacent to those habitats. For example, riparian vegetation in the Jawbone-Butterbredt ACEC is routinely crossed by vehicles straying from the Jawbone and Dove Spring Canyon off-highway vehicle open areas. The El Mirage and the Spangler Hills OHV open areas are contiguous to the Fremont-Kramer Desert Wildlife Management Area (DMG 2002).

In the Colorado Desert region, some of the greatest levels of OHV use occur in sand dune habitats. OHV use and trespass also has substantial effects on areas along the U.S.-Mexico border in Anza Borrego Desert State Park, and in stream beds and washes surrounding the Salton Sea. OHVs are particularly problematic in dune environments because compaction can inhibit the sand movement that is vital to dune replenishment and migration. Sand compaction may also negatively affect fringe-toed lizards, which can only burrow in fine, loose sand.

Renewable Energy

Renewable energy projects, including geothermal energy, wind energy, and solar energy, have been constructed and are proposed throughout the Deserts Province. Siting, construction, decommissioning and operational activities associated with windmill development and solar array

installations, as well as transmission facilities result in loss of native vegetation and habitat for wildlife. California's deserts contain some of the highest rated, solar energy resources in the world.

BLM and county planners have received a large numbers of applications for wind and solar energy development projects, many of which are located in remote parts of the region, raising concerns over the possible negative environmental effects associated with construction, maintenance, and access. Wind power expansion is a particular concern for birds and bats, because poorly designed or sited windmills and transmission lines can interfere with flight corridors and cause direct mortality (CDFG 2005).

Recognizing the pressures exerted on the desert ecosystem by industrial-scale solar energy plants, preparation of the Desert Renewable Energy Conservation Plan (DRECP) was initiated in 2008 with a MOU between the California Energy Commission (CEC), CDFW, BLM, and USFWS, also known as the Renewable Energy Action Team (REAT). DRECP is a major conservation planning effort underway in the province, is intended to help provide effective protection and conservation of desert ecosystems while allowing for the appropriate development of renewable energy projects. The DRECP is being prepared through a collaborative effort between REAT agencies. Approximately 22.5 million acres of federal and non-federal California desert land are in the DRECP Plan Area (CEC et al. 2014).

Bird collisions with power towers, heliostats, solar arrays, and injury or mortality from exposure to concentrated solar flux, are all known impacts of solar generation facilities (CEC et al. 2014). Based on planned development most collision and injury risk to avian and bat species would occur in the Colorado Desert and western edge of the Mojave Desert portions of the Province.

Both large transmission lines and networks of smaller collector lines present collision and electrocution hazards to bird species. In particular, lines running perpendicular to migratory corridors or close to bird refuges represent greater hazards.

Fire and Fire Suppression

Human-caused ignitions of fires that result from operational and maintenance activities associated with renewable energy facilities can destroy the natural communities found in the surrounding area. Desert scrub natural communities are naturally slow to recover from fire episodes and are more vulnerable to proliferation of non-native grasses that can often successfully compete with and overcome native assemblages (CEC et al. 2014). This pressure has come to the forefront as frequency of wildfire because of the invasion of desert habitats by non-native plant species has increased (USFWS 1994; Brooks 1998). Changes in plant communities caused by non-native plants and recurrent fire can negatively affect the desert tortoise by altering habitat structure and species available as food plants (Brooks and Esque 2003). OHV activity, roads, livestock grazing, agricultural uses, and other activities contribute to the spread of non-native species (or the displacement of native species) and the direct loss and

degradation of habitats (Brooks 1995; Avery 1998). For example, unmanaged livestock grazing, especially where plants are not adapted to large herbivorous mammals or where the non-native species are less palatable than the natives, can preferentially remove native vegetation, leaving non-native plants to grow under reduced competition (Wittenberg and Cock 2005:228).

Climate Change

Temperature

Average annual temperatures within the Mojave, Sonoran, and Colorado Deserts are expected to increase between 1.9 to 2.6°C (3.4 to 4.7°F) by 2070 (PRBO 2011). January average temperatures are projected to increase 2°F to 4°F by 2050 and 5°F to 8°F by 2100, while July average temperatures are projected to increase 3°F to 5°F by 2050 and 6°F to 9°F by 2100 (California Emergency Management Agency [CalEMA] 2012).

Precipitation and Snowpack

The Deserts province is projected to experience little to no change in annual rainfall (CalEMA 2012).

Wildfire Risk

Most areas are projected to have the same or slightly increased likelihood of wildfire risk. The major exceptions are the Mecca San Gorgonio and San Jacinto Mountains, where wildfire will be 1.5 and 2.0 times more likely (CalEMA 2012).

5.6.6 Conservation Strategies

Conservation strategies were developed for 12 conservation targets in the Deserts Province. The goals for each target are listed below. The strategies to achieve the goals for the target are provided, along with the objectives of the strategies and the pressures intended to be reduced by implementing the strategies. When specific actions have been identified for the strategies, they are also listed. Tables 5.6-5 through 5.6-16 show the relationships between the stresses and the pressures for each target. Table 5.6-17 summarizes conservation strategies for the province.

Target: Big Sagebrush Scrub

Goals:

- By 2025, acres of habitat are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired age class heterogeneity are increased by at least 5 percent from 2015 acres.
- By 2025, acres where native species are dominant are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired fire regime are increased by at least 5 percent from 2015 acres.

Conservation Strategy 1 (Land Acquisition/Easement/Lease): Protect land through acquisition and easements and identify for protection high-quality sagebrush habitat within the Desert Creek/Fales, Bodie, and Long Valley population management units (PMUs).

Objective(s):

- Identify high quality sagebrush habitat for protection within the Fales, Bodie, and Long Valley PMUs.
- Acquire 1,000 acres in fee title, conservation easement, or lease with the goal of protecting high priority sagebrush habitat within the Fales, Bodie, and Long Valley PMUs.

Intended pressure(s) reduced: Housing and urban areas.

Conservation action(s):

- Identify conservation and funding partners.
- Coordinate with Wildlife Conservation Board (WCB).
- Coordinate with state and federal agencies and private landowners.
- Develop inter-disciplinary team to facilitate land acquisition and conservation.
- Determine what areas are already conserved, identify gaps.
- Develop regionally appropriate criteria for conservation.
- Identify and prioritize potential areas for acquisition and conservation.
- Identify willing landowners of suitable habitat.
- Prepare Conceptual Area Protection Plan (CAPP) or Land Acquisition Evaluation (LAE).
- Develop conservation plans or agreements.
- Identify and obtain funding for implementation of strategy.
- Acquire land or conservation easements.

Conservation Strategy 2 (Data Collection and Management): Prioritize and coordinate sage grouse research efforts with landowners and land managers, and monitor pinyon juniper and cheatgrass invasions.

Objective(s):

- Prioritize and coordinate sage grouse research efforts with landowners and land managers.
- Monitor pinyon juniper and cheatgrass invasions.

Intended pressure(s) reduced: Invasive plants/animals; parasites/pathogens/diseases.

Conservation action(s):

- Participate with efforts to map cheatgrass and pinyon Juniper encroachment in sage scrub habitat.
- Coordinate with land management agencies and private landowners.
- Coordinate use of decision support tools to guide restoration and enhancement efforts.
- Set priorities for treatment of invasive species.

- Coordinate with stakeholder/expert groups.
- Identify and obtain funding to implement strategy.
- Conduct management treatments in high priority areas.
- Coordinate research with Bi-State Cooperative.

Conservation Strategy 3 (Economic Incentives): Provide economic incentives and purchase leases, acquisitions, or conservation easements on important sage grouse habitat with various funding sources.

Objective(s):

- Purchase leases, acquisitions, or conservation easements on 1,000 acres of important sage grouse habitat with various funding sources.

Intended pressure(s) reduced: Housing and urban areas.

Conservation action(s):

- Coordinate with state and federal agencies.
- Identify and evaluate incentive programs applicable to private and public lands.
- Identify willing landowners/lease holders.
- Identify funding sources and obtain funding for implementation of strategy.
- Design or support existing incentive programs.
- Create coalition of conservation partners to help implement strategy.

Conservation Strategy 4 (Direct Management): Implement resource management to promote healthy sagebrush ecosystems through controlled burns (where appropriate and not in conflict with sage-grouse conservation), control of invasive species, and removal of pinyon-juniper.

Objective(s):

- Implement management actions to promote healthy sagebrush ecosystems, including controlled burns, invasive species control, and removal of pinyon-juniper on 1,000 acres.

Intended pressure(s) reduced: Fire and fire suppression; invasive plants/animals; parasites/pathogens/diseases.

Conservation action(s):

- Coordinate with state and federal agencies and private landowners to implement grazing BMPs.
- Coordinate with state and federal agencies and private landowners to conduct controlled burns.
- Manage pinyon-juniper encroachment through thinning.
- Develop management plan for invasive species.
- Identify and prioritize areas for habitat restoration.
- Obtain funding to implement strategy.

Conservation Strategy 5 (Partner Engagement): Establish partnerships, coordinate efforts, and identify and combine funding sources with other agency funding, for protecting, restoring, and enhancing sagebrush habitat.

Objective(s):

- Local agencies and counties coordinate efforts for protecting, restoring, and enhancing sagebrush habitat.
- Funding sources are identified and combined with other agency funding for protection, restoration, and enhancement of sagebrush habitat.

Intended pressure(s) reduced: Fire and fire suppression; invasive plants/animals; parasites/ pathogens/diseases; housing and urban areas.

Table 5.6-5 Stresses and Pressures for Big Sagebrush Scrub

Priority Pressures	Stresses	
	Ecosystem Changes	
	Changes succession processes and ecosystem development	Change in community structure or composition
Fire and fire suppression	X	X
Housing and urban areas	X	X
Invasive plants/animals	X	X
Parasites/pathogens/diseases	X	X

Target: Great Basin Pinyon-Juniper Woodland

Goals:

- By 2025, the area with desired native species dominance and desired structural diversity is increased by at least 5 percent within the presettlement range of pinyon-juniper and juniper habitats in the ecoregion.
- By 2025, the area of desired successional stage is increased by at least 5 percent from presettlement habitat area.
- By 2025, the area desired fire return is increased by at least 5 percent from 2015 levels.

Conservation Strategy 1 (Data Collection and Analysis): Research impacts of climate change on pinyon-juniper woodland viability and distribution.

Objective(s):

- Conduct research and increase CDFW knowledge on climate change impacts on target habitat.
- Land management agencies, Non-governmental Organizations (NGOs), and research scientists are able to research initiation and access data.
- Areas have been prioritized for restoration, protection, or fuels treatments; and findings are used to design management actions.

Intended pressure(s) reduced: Climate change.

Conservation action(s):

- Collect additional information on climate change projections on habitat health and distribution within the ecoregion.
- Collect data that answers relevant questions on climate change impacts on ecoregional habitat.
- Prepare and publish papers on research of underlying mechanisms or climate change emission impacts.

Conservation Strategy 2 (Direct Management): Identify highest priority areas for restoration and rehabilitation to manage and protect from annual grass and weed invasion.

Objective(s):

- Restoration is implemented in burn areas and invasive species are treated.

Intended pressure(s) reduced: Climate change; invasive plants/animals.

Conservation action(s):

- Restore areas of burned presettlement macrogroup habitats by planting native shrub, forbs and grasses to restrict invasion by annual invasive species.
- Treat invasive species for removal.

Conservation Strategy 3 (Direct Management): Identify highest priority areas and manage for restoration and rehabilitation to lower or eliminate fire risk: conduct controlled burns and managed thinning in areas of post-settlement (1860) pinyon-juniper and juniper expansion or old growth stands with high canopy cover and fire risk; protect old growth pinyon-juniper and juniper; and continue implementation of Bi-State Action Plan.

Objective(s):

- Implement management actions, and prioritize for management the highest fire-risk areas. Management actions include:
  - identify and remove 10 percent of priority areas of post-settlement habitat that threaten other targets,
  - identify and thin 10 percent of areas of presettlement and old growth habitats requiring thinning to protect them from high intensity fire
  - identify areas of old growth pinyon-juniper and juniper and place fuels treatments around 10 percent of them for protection.

Intended pressure(s) reduced: Fire and fire suppression.

Conservation Strategy 4 (Partner Engagement): Maintain partnerships through the Bi-state Action Plan, BLM, USFS, NPS, and USGS to help coordinate data collection and implement management plan.

Objective(s):

- Current partnerships such as the Bi-State Action plan are maintained, management plan is being implemented, and data are being collected for plan.
- Areas of removal, restoration, or protection of target habitat are prioritized and implemented.

Intended pressure(s) reduced: Climate change; invasive plants/animals; fire and fire suppression.

Conservation action(s):

- Prioritize and implement areas of removal, restoration or protection of macrogroup habitat.
- Collect data in coordination with partnership groups.

Table 5.6-6 Stresses and Pressures for Great Basin Pinyon-Juniper Woodland

	Stresses								
	Climate Factors		Changes in geophysical and disturbance regime		Changes in Soil Characteristics	Ecosystem Changes			
Priority Pressures	Change in CO_2 levels	Change in annual average precipitation	Change in natural fire regime	Change in extreme events	Change in soil moisture	Change in spatial distribution of habitat types	Change in community structure or composition	Changes succession processes and ecosystem development	Change in biotic interactions (altered community dynamics)
Climate change	X	X		X	X				
Fire and fire suppression			X			X		X	X
Invasive plants/animals			X				X	X	
Livestock, farming, and ranching			X			X	X	X	
Other ecosystem modifications						X			

Target: Shadscale-Saltbush Scrub

- By 2025, at least 5 percent of the disturbed areas show signs of successional dynamics.
- By 2025, acres of habitat are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired endemic plant/animal diversity increase from at least 5 percent from 2015 acres.
- By 2025, acres where native species are dominant are increased by at least 5 percent from 2015 acres.
- By 2025, acres connected are increased by at least 5 percent from 2015 acres.
- By 2025, acres/miles with natural hydrologic regime have increased by at least 5 percent from acres/miles.
- By 2025, acres with suitable soil characteristics are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired stages of succession are increased by at least 5 percent from 2015 acres.

Conservation Strategy 1 (Land Acquisition/Easement/Lease): Protect high-quality alkali desert scrub habitat through acquisition and easements.

Objective(s):

- Increase the amount of acreage that is protected through purchase or conservation easement by 20 percent, and identify high quality habitat for protection through purchase or easement.

Intended pressure(s) reduced: Roads and railroads; renewable energy; commercial and industrial areas; utility and service lines.

Conservation action(s):

- Identify and prioritize potential areas for acquisition/easement.
- Identify areas already conserved.
- Evaluate availability of suitable habitat.
- Acquire land or conservation easements.
- Develop habitat conservation plan.
- Develop advance mitigation plan.
- Establish criteria for minimum and maximum habitat size (conserved).
- Evaluate feasibility of acquisition/easement.
- Create interdisciplinary team to facilitate land acquisition and conservation.
- Develop database to track acquisition/tracking.
- Develop standard protection criteria for conservation easement.
- Obtain funding for acquisition/easements.

Conservation Strategy 2 (Data Collection and Analysis): Gather and analyze data, particularly on the distribution of invasive species and their impacts on shadscale-saltbush scrub.

Objective(s):

- The distribution of invasive species and impacts to the target habitat are understood through research, and the distribution of invasive species within conserved lands is understood.

Intended pressure(s) reduced: Housing and urban areas; invasive plants/animals; annual and perennial non-timber crops; recreation activities.

Conservation action(s):

- Identify basic tools needed for data and analysis.
- Gather baseline information.
- Develop scope of involvement.
- Develop survey design and implementation plan.
- Conduct economic impact analysis.
- Evaluate ecosystem impacts.
- Evaluate species impacts.
- Identify and evaluate existing data.
- Obtain funding to implement strategy.
- Integrate climate change influence and modeling.
- Conduct Geographic Information Systems (GIS) analysis.
- Evaluate impacts to other ecoregions.

Conservation Strategy 3 (Data Collection and Analysis): Gather data and conduct research to better understand alkali desert scrub ecology (e.g., population size, distribution, habitat relationships), pressures, and climate change effects; and collect and analyze baseline assessment information for alkali desert scrub.

Objective(s):

- Alkali desert scrub ecological parameters are better understood, and baseline assessment information have been collected and analyzed.

Intended pressure(s) reduced: Roads and railroads; renewable energy; commercial and industrial areas; utility and service lines.

Conservation action(s):

- Identify goals and objectives.
- Coordinate with state and federal agencies and universities.
- Design monitoring and implementation plan.
- Prepare summary reports.

- Obtain funding for strategy implementation.
- Evaluate feasibility/efficacy of study design.

Conservation Strategy 4 (Education and Outreach): Develop and implement an outreach program on the impacts of invasive species.

Objective(s):

- Desert land managers are more knowledgeable about the impacts of invasive species.

Intended pressure(s) reduced: Housing and urban areas; invasive plants/animals; annual and perennial non-timber crops; recreational activities.

Conservation Strategy 5 (Education and Outreach): Provide outreach and education on resource conservation practices.

Objective(s):

- Desert managers and users are more knowledgeable, aware, concerned and participating in resource conservation practices.

Intended pressure(s) reduced: Roads and railroads; renewable energy; commercial and industrial areas; utility and service lines.

Conservation Strategy 6 (Management Planning): Develop and implement management plans to guide maintaining or restoring connectivity for alkali desert scrub and SGCN.

Objective(s):

- Develop and implement management plans to guide maintaining or restoring connectivity for alkali desert scrub and SCGN.

Intended pressure(s) reduced: Roads and railroads; renewable energy; commercial and industrial areas; utility and service lines.

Conservation Strategy 7 (Partner Engagement): Establish joint partnerships with desert land managers, particularly to manage invasive species on conserved lands.

Objective(s):

- Establish joint partnerships with desert land managers to manage invasive species on conserved lands.
- Develop a mutually agreeable project after engaging with the partners.

Intended pressure(s) reduced: Airborne pollutants; military activities; industrial and military effluents; housing and urban areas; invasive plants/animals; annual and perennial non-timber crops; recreational activities.

Conservation Strategy 8 (Partner Engagement): Establish and develop co-management partnerships, use partnerships with desert land managers to manage invasive species on conserved lands, and integrate climate change considerations into management plans for species and habitats.

Objective(s):

- Establish joint partnerships with desert land managers to manage invasive species on conserved lands.

Intended pressure(s) reduced: Roads and railroads; renewable energy; commercial and industrial areas; utility and service lines.

Conservation Strategy 9 (Partner Engagement): Partner for joint advocacy, increase political awareness for conservation of alkali desert scrub in the Mojave ecoregion through education and outreach, and secure additional funding through grants or legislation; and ensure renewable energy development is consistent with DRECP conservation strategies.

Objective(s):

- Increase political awareness of conservation of alkali desert scrub in the Mojave ecoregion through education and outreach.
- Establish additional funding through grants or legislation.
- Ensure that renewable energy development is consistent with Desert Renewable Energy Conservation Plan strategies.

Intended pressure(s) reduced: Roads and railroads; renewable energy; commercial and industrial areas; utility and service lines.

Conservation action(s):

- Coordinate with WCB, Office of Communication, Education, and Outreach, Legislative Office.
- Conduct bill analysis related to renewable energy.
- Identify partners such as NGOs to advocate position.
- Advocate science based decisions and process.
- Develop renewable energy BMPs.
- Identify and prioritize conservation areas.
- Conduct economic impact analysis.
- Identify existing funding options.
- Obtain funding to implement strategy.

Conservation Strategy 10 (Training and Technical Assistance): Provide training on invasive species control and management.

Objective(s):

- Increase the knowledge of mangers about invasive species management and control techniques.
- Conduct regular training (e.g., annually) for CDFW staff and make available to other organizations.

Intended pressure(s) reduced: Invasive plants/animals.

Table 5.6-7 Stresses and Pressures for Shadscale-Saltbush Scrub

Priority Pressures	Stresses										
	Changes in geophysical and disturbance regime		Changes in Soil Characteristics			Changes in Hydrology and Water Characteristics		Ecosystem Changes			
	Change in natural fire regime	Change in sediment erosion-deposition regime	Change in soil chemistry	Change in soil moisture	Change in soil temperature	Change in groundwater tables	Change in flood occurrence, frequency, intensity, and area flooded (including hydroperiod)	Change in spatial distribution of habitat types	Change in community structure or composition	Changes succession processes and ecosystem development	Habitat fragmentation
Airborne pollutants								X	X	X	X
Annual and perennial non-timber crops								X	X	X	X
Commercial and industrial areas								X	X	X	X
Housing and urban areas								X	X	X	X
Industrial and military effluents								X	X	X	X
Invasive plants/animals	X	X	X			X		X	X	X	X
Military activities								X	X	X	X
Recreational activities								X	X	X	X
Renewable energy	X			X	X	X	X	X	X	X	X
Roads and railroads								X	X	X	X
Utility and service lines								X	X	X	X

Target: Desert Wash Woodland and Scrub

Goals:

- By 2025, acres of (desert wash) habitat are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired endemic plant/animal diversity increase at least 5 percent from 2015 acres.
- By 2025, population of key species (Couch's spadefoot) is increased by at least 5 percent from 2015 population levels.
- By 2025, acres with desired structural diversity are increased from at least 5 percent from 2015 acres.
- By 2025, miles connected (desert wash habitat) are increased by at least 5 percent from 2015 miles.
- By 2025, miles with stable bank (desert wash) are increased by at least 5 percent from 2015 miles.
- By 2025, miles with desired stream stage (water volume and flow) are increased by at least 5 percent from 2015 miles.

Conservation Strategy 1 (Data Collection and Analysis): Gather biological data and conduct research on SGCN and response to disturbance.

Objective(s):

- Collect ecological/biological data on SGCN and responses to disturbance.

Intended pressure(s) reduced: Roads and railroads.

Dave Feliz, CDFW

Conservation action(s):

- Identify partner agencies and organizations.
- Conduct literature review-develop study design.
- Develop budget.
- Identify funding sources and apply for funding.
- Determine SGCN-friendly structure designs.
- Determine extent of disturbance from railroad use.
- Define movement and habitat use patterns of SGCN.
- Define distribution of SGCN.

Conservation Strategy 2 (Outreach and Education): Provide education, including to BLM and USFWS on impacts from operations and maintenance activities within railroad right-of-ways.

Objective(s):

- BLM and USFWS are knowledgeable about the impacts from operations and maintenance activities within railroad right-of-ways.

Intended pressure(s) reduced: Roads and railroads.

Conservation Strategy 3 (Land Use Planning): Develop BMPs for roads and railroads.

Objective(s):

- BMPs for road maintenance and construction are implemented.
- Agreement is reached with Caltrans on construction and repair of roads to minimize sediment effects.
- Railroad employees become knowledgeable about seasonality of conditions and presence of listed and other sensitive species.

Intended pressure(s) reduced: Roads and railroads.

Conservation Strategy 4 (Partner Engagement): Partner for joint advocacy, with focus on conservation of SGCNs that use railroad right-of-ways (ROW), and development of BMPs for ROW maintenance activities.

Objective(s):

- BLM offices are more knowledgeable about SGCN that use railroad right-of-ways.
- BMPs to protect SGCN are established for right-of-way maintenance practices.

Intended pressure(s) reduced: Roads and railroads.

Table 5.6-8 Stresses and Pressures for Desert Wash Woodland and Scrub

Priority Pressures	Stresses				
	Changes in geophysical and disturbance regime	Changes in Hydrology and Water Characteristics	Ecosystem Changes		
	Change in sediment erosion-deposition regime	Change in runoff and river flow	Change in spatial distribution of habitat types	Change in community structure or composition	Habitat fragmentation
Commercial and industrial areas			X		
Dams and water management/use	X	X			
Housing and urban areas			X		X
Military activities			X		
Mining and quarrying			X		
Recreational activities			X	X	X
Renewable energy			X		
Roads and railroads	X		X		X
Tourism and recreation areas			X		X
Utility and service lines	X		X		X

Target: Sparsely Vegetated Desert Dune

Goals:

- By 2025, acres of habitat free of invasive non-native species are increased by at least 5 percent from 2015 acres.
- By 2025, acres of habitat are maintained or increased by at least 5 percent from 2015 acres.
- By 2025, acres of habitat with suitable soil characteristics regimes are increased by at least 5 percent from 2015 acres.
- By 2025, acres of habitat with desired ground water levels are increased by at least 5 percent from 2015 acres.
- By 2025, acres of habitat with desired connectivity are increased by at least 5 percent from 2015 acres.

Conservation Strategy 1 (Data Collection and Analysis): Collect data on plant community and SGCN status within ecoregion through range-wide surveys, climate change studies, and monitoring invasive species population trends.

Objective(s):

- Appropriate audiences are accessing data.
- Data are being used to inform conservation actions.
- Research clearly provides answers to relevant questions on needs identified.
- Research informs conservation actions.

Intended pressure(s) reduced: climate change; invasive plants/animals.

Conservation action(s):

- Collect data on macrogroup and SCGN status within ecoregion through range-wide surveys, climate change studies, and monitoring invasive species population trends.
- Study climate impacts and invasive species impacts.

Conservation Strategy 2 (Land Use Planning): Continue to provide input on local land use plans.

Objective(s):

- At each annual review, the behaviors of local entities are consistent with input.
- Local land use planners receive input on land use plans.
- A land use plan is approved that is consistent with the input provided. Relevant land use plans include Imperial Sand Dunes Regional Advance Mitigation Plan (RAMP), Heber Dunes (State Vehicular Recreation Area (SVRA) General Plan, Lower Colorado Multiple Species Conservation Plan (MSCP), San Diego East County MSCP, Coachella Valley Multiple Species Habitat Conservation Plan (MSHCP), IID, and DRECP.

Intended pressure(s) reduced: Climate change; housing and urban areas; recreational activities; invasive plants/animals.

Conservation Strategy 3 (Direct Management): Support implementation of existing habitat conservation plans (HCPs) to protect, restore, or enhance those areas of target habitat that are prioritized for such or have been degraded by invasive species or OHV; and enhance enforcement of existing HCPs, including illegal OHV use. Existing HCPs include Imperial Sand Dunes RAMP, Heber Dunes SVRA General Plan, Lower Colorado River MSCP, San Diego East County MSCP, Coachella Valley MSHCP, IID, and the DRECP.

Objective(s):

- Implement management actions.

Intended pressure(s) reduced: Recreational activities; invasive plants/animals.

Conservation action(s):

- Prioritize plant communities requiring invasive weed treatment or restoration from OHV or grazing impacts.
- Remove invasive weeds with mechanical, manual or other means from target habitats.
- Plant prioritized areas denuded of vegetation or invaded with weeds with appropriate plants.
- Enhance enforcement activities.
- Fund the activities identified in any HCPs.

Conservation Strategy 4 (Management Planning): Support the development and implementation of ongoing/existing management plans.

Tomás Castelazo, CDFW

Objective(s):

- Ensure that management plans include strategies, actions, and monitoring plans for SGCN, habitats, and natural processes.
- The plan recommendations are being used to inform conservation actions.

Intended pressure(s) reduced: Climate change; housing and urban areas; recreational activities; invasive plants/animals.

Conservation action(s):

- Acquire funding for planning, implementation, monitoring and management of the planning area.
- Identify priorities for management plan development.
- Create management and monitoring plans for priority areas.

Conservation Strategy 5 (Partner Engagement): Maintain partnership presence in the planning process of HCPs to ensure the conservation of this target.

Objective(s):

- The HCP/Natural Community Conservation Plan (NCCP) continues to be implemented.

Intended pressure(s) reduced: Climate change; renewable energy; housing and urban areas; recreational activities; invasive plants/animals.

Conservation action(s):

- Active engagement by CDFW in HCPs and NCCPs in the planning and implementation process.

Table 5.6-9 Stresses and Pressures for Sparsely Vegetated Desert Dune

Priority Pressures	Stresses								
	Climate Factors			Changes in geophysical and disturbance regime	Changes in Soil Characteristics	Changes in Hydrology and Water Characteristics	Ecosystem Changes		
	Change in annual average temperatures	Change in temperature extremes	Change in annual average precipitation	Change in sediment erosion-deposition regime	Change in soil moisture	Change in groundwater tables	Changes succession processes and ecosystem development	Habitat fragmentation	Change in community structure or composition
Climate change	X	X	X	X	X	X	X	X	X
Housing and urban areas				X		X	X	X	X
Invasive plants/animals				X			X		X
Livestock, farming, and ranching									X
Recreational activities					X		X	X	X
Renewable energy				X			X	X	

Target: American Southwest Riparian Forest and Woodland

Goals:

- By 2025, acres where native species are dominant are increased by at least 5 percent from 2015 acres.
- By 2025, acres of target habitat are increased by at least 5 percent from 2015 acres.
- By 2025, miles with desired stream stage are increased by at least 5 percent from 2015 miles.

Conservation Strategy 1 (Data Collection and Analysis): Identify critical or sensitive riparian habitats in areas that may require special protections.

Objective(s):

- Identify critical or sensitive riparian habitats in areas that may require special protections.

Intended pressure(s) reduced: Invasive plants/animals; parasites/pathogens/diseases.

Conservation action(s):

- Identify degraded riparian habitats.
- Inventory riparian habitats within the range of Inyo California towhee.
- Monitor riparian habitats within the range of Inyo California towhee.
- Obtain funding to implement strategy.

Conservation Strategy 2 (Direct Management): Manage invasive species: control invasive and problematic vegetation, control invasive mammals (feral horse and burro), and prevent degradation of riparian habitat and springs from feral horses and burros.

Objective(s):

- Implement procedures (e.g., vegetation removal projects and long-term monitoring) to control invasive and problematic native vegetation.
- Implement procedures to control invasive mammals (e.g., feral horse and burro populations).
- Implement procedure to prevent riparian (springs) habitat degradation (e.g., construct feral horse and burro exclusion fencing around severely degraded riparian habitat).

Intended pressure(s) reduced: Invasive plants/animals; parasites/pathogens/diseases.

Conservation action(s):

- Conduct invasive and problematic native plant removal projects.
- Conduct invasive animal roundups (e.g., feral horse and burro).
- Construct exclusion fencing.
- Monitor post-project habitat conditions.
- Obtain funding to implement strategy.

Conservation Strategy 3 (Partner Engagement): Establish co-management partnership to conserve target habitat.

Objective(s):

- Establish cooperative partnership with all interested groups to conserve target habitat target.

Intended pressure(s) reduced: Invasive plants/animals; parasites/pathogens/diseases.

Conservation action(s):

- Identify and contact NGOs interested in conserving target habitat (riparian springs).
- Create working alliance between all interested parties (e.g., BLM, CDFW, NGOs, NPS, China Lake Naval Weapons Station [CLNWS]).
- Identify conservation needs of riparian (springs) habitat.
- Identify funding sources to implement projects.

Conservation Strategy 4 (Land Use Planning): Engage in decision-making process, and share information and agency priorities.

Objective(s):

- Share information and agency priorities. Pool all entity information and conservation priorities to formulate a more comprehensive, complete habitat conservation strategy that satisfies all entity conservation concerns.

Intended pressure(s) reduced: Invasive plants/animals; parasites/pathogens/diseases.

Conservation action(s):

- Create a list of conservation goals from each partner in the group.
- Prioritize the conservation goals from the list.
- Develop a collaborative conservation management plan.

Table 5.6-10 Stresses and Pressures for American Southwest Riparian Forest and Woodland

Priority Pressures	Stresses					
	Ecosystem Changes					
	Change in spatial distribution of habitat types	Change in community structure or composition	Changes succession processes and ecosystem development	Habitat fragmentation	Change in biotic interactions (altered community dynamics)	Change in functional processes of ecosystem
Invasive plants/animals	X	X	X	X	X	X
Parasites/pathogens/diseases	X	X	X	X	X	X

Target: High Desert Wash and "Rangeland" Scrub; Great Basin Upland Scrub

Goals:

- By 2025, acres of habitat are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired stages of succession are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired structural diversity are increased at least 5 percent from 2015 acres.
- By 2025, miles of river where native species are dominant are increased by at least 5 percent from 2015 miles.

Conservation Strategy 1 (Data Collection and Analysis): Monitor and map invasive species, and study fire and climate-related effects on target habitats.

Objective(s):

- Identify the locations of priority invasive species.
- Ensure that NGOs, land managers, and land owners can access data and are using it to design management actions.
- By the end of the project, data are being used to prioritize areas of restoration, rehabilitation, and protection.

Intended pressure(s) reduced: Climate change; fire and fire suppression; invasive plants/animals.

Conservation action(s):

- Prioritize areas for restoration, rehabilitation, and protection.
- Protect intact target habitat areas from fire.
- Restore and rehabilitate target habitat areas.

Conservation Strategy 2 (Direct Management): Restore and protect priority areas: identify highest priority areas for restoration, rehabilitation, and protection from fire, invasive species, or wild burros.

Objective(s):

- Implement management actions.

Intended pressure(s) reduced: Fire and fire suppression; invasive plants/animals.

Conservation action(s):

- Identify and remove pockets of invasive species from otherwise intact target habitat in 10 percent of prioritized areas within ecoregion.
- Conduct managed thinning in pinyon juniper encroached areas, as well as decadent bitterbrush and mahogany groups in 10 percent of prioritized areas in the ecoregion.
- Restore and rehabilitate target habitat areas after 50 percent of fires.
- Identify intact stands of target habitats and identify and implement fuels reduction and protection treatment areas for 10 percent of these areas.
- Fence around areas of wild burrow damage or remove wild burros from 10 percent of prioritized areas.

Conservation Strategy 3 (Management Planning): Comment on and amend plans.

Objective(s):

- By 2025, maintain current partnerships such as the Bi-State Action Plan
- By 2025, implement management actions consistent with the management plans.

Intended pressure(s) reduced: Climate change; fire and fire suppression; invasive plants/animals.

Conservation Strategy 4 (Partner Engagement): Maintain and enhance partnerships, particularly with NPS; form a collaborative group for data collection and research, especially with BLM.

Objective(s):

- Maintain current partnerships such as the Bi-State Action Plan.
- Implement management plan, and collect data.
- Form a collaborative group aimed at conservation and management of target habitat and collect data on climate-related impacts.

Intended pressure(s) reduced: Climate change; fire and fire suppression; invasive plants/animals.

Conservation action(s):

- Identify and contact NGOs interested in conserving target habitat (riparian springs).
- Create working alliance between all interested parties (e.g., BLM, CDFW, NGOs, NPS, and CLNWS).
- Identify conservation needs of riparian (springs) habitat.
- Identify funding sources to implement projects.

Table 5.6-11 Stresses and Pressures for High Desert Wash and "Rangeland" Scrub, Great Basin Upland Scrub

Priority Pressures	Stresses									
	Climate Factors			Changes in geophysical and disturbance regime		Changes in Soil Characteristics	Ecosystem Changes			
	Change in CO_2 levels	Change in annual average temperatures	Change in average winter precipitation	Change in natural fire regime	Change in extreme events	Change in soil moisture	Change in spatial distribution of habitat types	Habitat fragmentation	Change in community structure or composition	Changes succession processes and ecosystem development
Climate change	X	X	X	X	X	X	X	X	X	X
Fire and fire suppression							X	X	X	X
Invasive plants/animals							X	X	X	X
Livestock, farming, and ranching							X	X		
Mining and quarrying							X	X		
Renewable energy							X	X		

Target: Mojave and Sonoran Desert Scrub

Goals:

- By 2025, acres of habitat are increased by at least 5 percent from 2015 acres.
- By 2025, acres connected are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired stages of succession are increased by at least 5 percent from 2015 acres.
- By 2025, populations of key species are increased by at least 5 percent from 2015 population.
- By 2025, acres where native species are dominant are increased by at least 5 percent from 2015 acres.

Conservation Strategy 1 (Land Acquisition/Easement/Lease): Conserve lands to maintain long-term viability of SGCN.

Tony Hisgett, CDFW

Objective(s):

- Maintain long-term viability of SGCN through conservation of land.

Intended pressure(s) reduced: Renewable energy.

Conservation action(s):

- Identify availability of prime habitat.
- Prioritize acquisition.
- Evaluate feasibility of acquisition.
- Evaluate connectivity to existing conserved or preserved lands.
- Consider protection using conservation easement.
- Conduct appropriate project/document review.
- Establish/foster partnerships with conservation NGO.
- Ensure coordination with HCPs/NCCPs.
- Collect data on SCGN to identify priority lands.
- Identify and address data gaps.
- Implement interagency coordination/acquisition.

Conservation Strategy 2 (Outreach and Education and Partner Engagement): Partner for joint advocacy, increase political awareness for conservation of desert scrub in the Sonoran Desert ecoregion, secure additional funding through grants or legislation, and advocate for development consistent with strategy.

Objective(s):

- Increase political awareness for conservation of desert scrub in the Sonoran Desert ecoregion.
- Solicit additional funding through grants or legislation.
- Advocate for development consistent with strategy.

Intended pressure(s) reduced: Housing and urban areas; invasive plants/animals; utility and service lines; annual and perennial non-timber crops.

Conservation Strategy 3 (Land Use Planning): Provide input on project planning and decision making process, and conserve stream habitats and flows through participation in the planning and decision making process.

Objective(s):

- Conserve stream habitats and flows through participation in the planning and decision making processes.

Intended pressure(s) reduced: Housing and urban areas; invasive plants/animals; utility and service lines; annual and perennial non-timber crops.

Conservation action(s):

- Conduct environmental (California Environmental Quality Act [CEQA]/National Environmental Policy Act [NEPA]) review.
- Participate in review of general plans/amendments.
- Develop master Section 1600 permit (Lake and Streambed Alteration [LSA] Agreement) template consistent with strategy.
- Develop standard permit requirements/criteria.
- Identify and prioritize areas for conservation/protection.
- Encourage establishment of mitigation banks.
- Develop mitigation alternatives consistent with strategy.
- Define success criteria for adaptive management.
- Obtain funding to maintain mitigation areas and implement strategy.
- Conduct Property Analysis Record analysis for mitigation sites.
- Maintain mitigation and project tracking data base.

Conservation Strategy 4 (Management Planning): Develop HCP, NCCP, and management plans, with an emphasis on minimizing impacts of housing and urban growth.

Objective(s):

- Minimize the impact of housing and urban growth through the establishment of conservation plans.

Intended pressure(s) reduced: Housing and urban areas; roads and railroads; invasive plants/animals; utility and service lines; annual and perennial non-timber crops.

Conservation Strategy 5 (Partner Engagement): Establish co-management partnership.

Objective(s):

- Establish cooperative partnership with all interested groups to conserve target habitat.
- Increase funding opportunities through combined funding and resources.
- Share management responsibilities.
- Develop and share baseline data for conservation of SGCN and target habitat.

Intended pressure(s) reduced: Renewable energy.

Conservation action(s):

- Identify and contact NGOs interested in conserving target habitat.
- Create working alliance between all interested parties (e.g., BLM, CDFW, NGOs, NPS, and CLNWS).
- Identify conservation needs of desert scrub habitat.
- Identify funding sources to implement projects.

Conservation Strategy 6 (Training and Technical Assistance): Provide training to agency staff on renewable energy issues, including technology, relevant research, ecological impacts, and conservation strategies.

Objective(s):

- Educate agency staff on new renewable energy technology, current scientific research, and conservation strategies.
- Provide training to renewable energy companies/contractors on pre-project planning process and ecological needs, areas to avoid, and mitigation.

Intended pressure(s) reduced: Renewable energy.

Conservation action(s):

- Identify target audience.
- Conduct interagency coordination.
- Develop training curriculum.
- Obtain funding for strategy implementation.

Table 5.6-12 Stresses and Pressures for Mojave and Sonoran Desert Scrub

Priority Pressures	Stresses			
	Ecosystem Changes			
	Change in spatial distribution of habitat types	Change in community structure or composition	Change in biotic interactions (altered community dynamics)	Habitat fragmentation
Annual and perennial non-timber crops	X	X	X	X
Housing and urban areas	X	X	X	X
Invasive plants/animals	X	X	X	X
Renewable energy	X	X	X	X
Roads and railroads	X	X	X	X
Utility and service lines	X	X	X	X

Target: Walker River Native Fish Assemblage

Goals:

- By 2025, miles of streams with target fish population (SGCNs) are increased by at least 5 percent from 2015 miles.
- By 2025, miles of river where native species are dominant are increased by at least 5 percent from 2015 miles.
- By 2025, miles connected (i.e., past barriers) are increased by at least 5 percent from 2015 miles.
- By 2025, miles with desired stream stage (mimics natural hydrograph) are increased by at least 5 percent from 2015 miles.
- By 2025, miles with desired level of water quality (meeting total daily maximum load [TMDL] standards) are increased by at least 5 percent from 2015 miles.
- By 2025, miles with desired age class heterogeneity are increased by at least 5 percent from 2015 acres.

Conservation Strategy 1 (Data Collection and Analysis): Collect data on the impacts of diversions, water management, water use, and the distribution of introduced genetic material on the native fish community.

Objective(s):

- Understand the impacts of diversions, water management and water use to the native fish community.
- Understand the distribution of introduced genetic material and impacts to the native fish community within the hydrologic unit.

Intended pressure(s) reduced: Introduced genetic material; invasive plants/animals; dams and water management/use.

Conservation Strategy 2 (Outreach and Education): Provide outreach and education on native aquatic resource conservation efforts.

Objective(s):

- Ensure that the public is aware, concerned, and participating in native aquatic resource conservation efforts within the hydrologic unit.

Intended pressure(s) reduced: Invasive plants/animals.

Conservation Strategy 3 (Law and Policy): Implement effective enforcement of laws.

Objective(s):

- Increase Law Enforcement Division capacity to allow greater enforcement of water laws.

Intended pressure(s) reduced: Dams and water management/use.

Conservation action(s):

- Identify laws and regulations governing riparian areas and work with governing agencies to apply effectively.
- Design and implement instream flow studies to collect empirical evidence to support/defend enforcement actions to protect aquatic public trust resources.
- Increase the number of branch and regional scientific staff working on water rights and instream flow studies.
- Make recommendations to enhance enforcement of existing laws and regulations.
- Provide law enforcement with maps of critical problem areas.
- Provide funding for CDFW enforcement to enforce laws protecting streams and flows.
- Obtain funding for strategy implementation.
- Develop Law Enforcement Division Academy curriculum emphasizing water law.
- Conduct Office of Training and Development (OTD) training for non-enforcement water policies.

Conservation Strategy 4 (Direct Management): Manage water for beneficial uses by native aquatic species.

Objective(s):

- State and federal agencies manage water for beneficial uses by native species (e.g., provide adequate water for species survival). Engage with the Walker Lake Acquisition/Transfer Program under desert terminal lakes program.

Intended pressure(s) reduced: Dams and water management/use; recreational activities; invasive plants/animals.

Conservation action(s):

- Coordinate with water agencies.
- Identify/coordinate with key stakeholders.
- Collaborate with state and federal agencies for management plan development and review.
- Identify and quantity water needs for native SGCN, non-SGCN, and introduced trout species.
- Evaluate existing occupied habitats.

Conservation Strategy 5 (Direct Management): Translocate or reintroduce native fish species.

Objective(s):

- Establish self-sustaining and genetically viable native fish populations in the basin.

Intended pressure(s) reduced: Dams and water management/use; recreational activities; invasive plants/animals.

Conservation action(s):

- Identify source populations.
- Remove invasive or problematic species from historic native fish habitat.
- Create georeferenced map/data base for native fish habitats.
- Complete basin-wide native fish surveys, and develop basin plan for native fish management.
- Obtain funding for strategy implementation.
- Coordinate management actions with natural resource agencies, NGOs and private landowners.
- Collect/analyze genetic data to define priorities.

Conservation Strategy 6: (Direct Management) Remove introduced brook trout in the context of recovery of listed Lahontan cutthroat trout.

Objective(s):

- The extent and distribution of invasive species are known and a plan is developed by federal agencies and land owners to remove or control invasive species within the hydrologic unit.

Intended pressure(s) reduced: Invasive plants/animals.

Conservation action(s):

- Update data on extent and distribution of native and non-native species.
- Develop strategy for removal.
- Coordinate with USFS and private landowners.
- Secure permits and conduct environmental review.
- Apply for funding.

- Conduct treatments.
- Conduct post-treatment monitoring.
- Initiate long-term monitoring and management plan.
- Monitor for re-establishment of invasive species.
- Develop a management and control plan for invasive species.

Conservation Strategy 7 (Direct Management): Implement direct management activities to restore aquatic habitats and ensure that SGCNs are maintained or enhanced.

Objective(s):

- Direct management activities to restore aquatic habitats are implemented to ensure SCGN are maintained or enhanced within the watershed.

Intended pressure(s) reduced: Introduced genetic material.

Conservation Strategy 8 (Management Planning): Ensure that planning and decision-making processes support the conservation of stream habitats and flows as a result of CDFW input.

Objective(s):

- Ensure that planning and decision-making processes support the conservation of stream habitats and flows as a result of CDFW input.

Intended pressure(s) reduced: Dams and water management/use.

Conservation Strategy 9 (Management Planning): Develop and implement grazing BMPs.

Objective(s):

- Land managers within the watershed implement BMPs for grazing practices that reduce impacts to aquatic habitats.

Intended pressure(s) reduced: Livestock, farming, and ranching.

Conservation action(s):

- Identify partners and stakeholders.
- Identify and review existing grazing management policies.
- Develop MOU/MOA between partners.
- Schedule regular working group meetings.
- Develop BMPs including enforcement policy.
- Provide input to land management agencies on grazing policies.
- Implement BMPs.
- Link to education and outreach strategy.
- Identify funding sources, apply for funding.

Conservation Strategy 10 (Management Planning): Reduce impacts to native fish as a result of roads and railroads and invasive species through development and use of BMPs.

Objective(s):

- Land managers implement BMPs to reduce impacts to native fish community from roads and railroads.
- BMPs for road and rail maintenance activities are established and used by land managers to reduce impacts to native fish community from invasive species.

Intended pressure(s) reduced: Invasive plants/animals; roads and railroads.

Conservation action(s):

- Collaborate with partner in development of BMPs.
- Collaborate with state and federal agencies and land owners.
- Identify existing BMPs, develop BMPs database.
- Establish working group to define BMPs.
- Obtain funding to implement strategy.

Conservation Strategy 11 (Partner Engagement): Establish and develop co-management partnership to affect change in dams and/or water management and use following interagency agreement.

Objective(s):

- Establish a joint partnership to affect change in dams and/or water management and use following interagency agreement.

Intended pressure(s) reduced: Dams and water management/use.

Table 5.6-13 Stresses and Pressures for Walker River Native Fish Assemblage

Priority Pressures	Stresses									
	Changes in geophysical and disturbance regimes		Changes in hydrology and water characteristics					Ecosystem Changes		
	Changes in sediment erosion-deposition regime	Change in natural fire regime	Change in runoff and river flow	Change in water chemistry	Change in water levels and hydroperiod	Change in groundwater tables	Change in nutrientts	Change in spatial distribution of habitat types	Change in succession processes and ecosystem development	Habitat fragmentation
Dams and water management/use	X		X	X	X	X	X	X	X	X
Introduced genetic material								X	X	X
Invasive plants/animals		X	X	X	X	X	X	X	X	X
Livestock, farming, and ranching	X	X	X	X	X	X	X	X	X	X
Roads and railroads	X		X	X	X	X	X	X	X	X

Target: Cienegas

Goals:

- By 2025, acres of cienegas habitat are increased by at least 5 percent from 2015 acres.
- By 2025, miles of river where native species are dominant are increased by at least 5 percent from 2015 miles.
- By 2025, acres with desired fire regime (frequent low-intensity fire) are increased by at least 5 percent from 2015 acres.
- By 2025, acres/miles with desired inches of groundwater (stable depth) are increased by at least 5 percent from 2015 acres/miles.

Conservation Strategy 1 (Land Acquisition/Easement/Lease): Protect high-quality cienegas through acquisition/easement/lease.

Objective(s):

- Increase the protection of high quality cienegas habitat through acquisition/easement/lease.

Intended pressure(s) reduced: Livestock, farming, and ranching.

Conservation action(s):

- Identify potential areas.
- Identify what is already conserved.
- Prioritize acquisition sites.
- Determine availability of suitable habitat.
- Acquire conservation easements.
- Develop habitat conservation plan.
- Develop advance mitigation plan.
- Determine minimum and maximum habitat size (conserved).
- Determine feasibility.
- Develop interdisciplinary team to facilitate land acquisition and conservation.
- Develop database to track acquisition/tracking.
- Develop protection criteria for conservation easement language.

Conservation Strategy 2 (Data Collection and Analysis): Gather and analyze data on impacts of water management and water use, renewable energy projects, groundwater use for farming and livestock, and invasive species on native species within cienegas.

Objective(s):

- Understand impacts of water management and water use, renewable energy projects, groundwater use for farming and livestock, and invasive species to cienegas and associated species.

Intended pressure(s) reduced: Annual and perennial non-timber crops; livestock, farming, and ranching; renewable energy; invasive plants/animals.

Conservation Strategy 3 (Outreach and Education): Provide outreach and education about the need for resource management of cienegas.

Objective(s):

- The public is aware of the need for resource management of cienegas.

Intended pressure(s) reduced: Invasive plants/animals; fire and fire suppression.

Conservation Strategy 4 (Direct Management): Translocate or reintroduce native aquatic SGCN and establish genetically viable populations.

Objective(s):

- Self-sustaining and genetically viable populations of native aquatic SGCN species established are reintroduced and reproduced one generation in the wild.

Intended pressure(s) reduced: Invasive plants/animals.

Conservation action(s):

- Identify source population.
- Remove invasive or problematic species.
- Map suitable habitats.
- Develop management plan.
- Secure funding.
- Connect to barrier aspects.
- Engage in cooperative management with agencies and NGOs.
- Perform genetic analysis.
- Develop a genetic management plan.

Conservation Strategy 5 (Direct Management): Manage water use, particularly groundwater withdrawals.

Objective(s):

- Reduce groundwater withdrawals through agreements with water agencies and private landowners.

Intended pressure(s) reduced: Dams and water management/use; housing and urban areas; annual and perennial non-timber crops; livestock, farming, and ranching; renewable energy.

Conservation Strategy 6 (Partner Engagement): Establish and develop co-management partnerships.

Objective(s):

- Establish a joint partnership with USFS and Cal Fire to affect change in fire management and fire suppression.
- Develop a joint partnership with water agencies focused on management of impacts from water use.
- Establish a joint partnership with CIPC, USDA, and NRCS to address management of invasive species.
- Develop a joint partnership with BLM focused on managing impacts from renewable energy projects.

Intended pressure(s) reduced: Dams and water management/use; renewable energy; invasive plants/animals; fire and fire suppression

Table 5.6-14 Stresses and Pressures for Cienegas

Priority Pressures	Stresses					
	Changes in geophysical and disturbance regimes	Changes in Hydrology and Water Characteristics			Ecosystem Changes	
	Change in natural fire regime	Change in water chemistry	Change in water levels and hydroperiod	Change in groundwater tables	Change in spatial distribution of habitat types	Change in community structure or composition
Annual and perennial non-timber crops	X			X	X	X
Dams and water management/use			X	X	X	X
Earthquakes/tsunami		X	X	X	X	
Fire and fire suppression				X	X	X
Housing and urban areas				X	X	X
Introduced genetic material	X	X			X	X
Invasive plants/animals	X	X			X	X
Livestock, farming, and ranching	X			X	X	X
Parasites/pathogens/ diseases	X				X	X
Renewable energy			X		X	X

Target: Springs and Spring Brooks

Goals:

- By 2025, acres of habitat are increased by at least 5 percent from 2015 acres.
- By 2025, miles of river with native species dominant are increased by at least 5 percent from 2015 miles.
- By 2025, miles connected are increased by at least 5 percent from 2015 miles.
- By 2025, acres/miles with desired inches of groundwater are increased by at least 5 percent from 2015 acres/miles.
- By 2025, acres/miles with desired water yield are increased by at least 5 percent from 2015 acres/miles.
- By 2025, acres with suitable soil characteristics are increased by 5 percent from 2015 acres.
- By 2025, acres with desired stages of succession are increased by at least 5 percent from 2015 acres.

Conservation Strategy 1 (Land Acquisition/Easement/Lease): Protect high-quality springs and spring brooks through acquisition/easement/lease.

Objective(s):

- Protect high-quality springs and spring brooks.

Intended pressure(s) reduced: Annual and perennial non-timber crops; livestock, farming, and ranching.

Conservation action(s):

- Identify potential areas.
- Identify what is already conserved.
- Prioritize acquisition sights.
- Determine availability of suitable habitat.
- Acquire conservation easements.
- Develop habitat conservation plan.
- Develop advance mitigation plan.
- Determine minimum and maximum habitat size (conserved).
- Determine feasibility.
- Develop interdisciplinary team to facilitate land acquisition and conservation.
- Develop database to track acquisition/tracking.
- Develop protection criteria for conservation easement language.

Conservation Strategy 2 (Data Collection and Analysis): Study and document impacts of invasive species, renewable energy projects, and dams and water management and use on spring ecosystems and associated species for future management actions.

Objective(s):

- Document the impacts of invasive species on spring systems and aquatic species.
- Impacts of renewable energy projects to spring systems and species.
- Impacts of dams, water management, and water use to the spring systems for future management actions.

Intended pressure(s) reduced: Livestock, farming, and ranching; recreational activities; commercial and industrial areas; renewable energy; introduced genetic material; invasive plants/animals; marine and freshwater aquaculture.

Conservation Strategy 3 (Outreach and Education): Provide outreach and education, with emphasis on improving public awareness, concern, and participation in resource conservation that leads to improved conditions for native fish.

Objective(s):

- Improve public awareness, concern, and participation in resource conservation within the watershed, leading to improved conditions for native fish.

Intended pressure(s) reduced: Livestock, farming, and ranching; recreational activities; commercial and industrial areas; renewable energy; invasive plants/animals; marine and freshwater aquaculture.

Conservation Strategy 4 Direct Management): Translocate or reintroduce native aquatic SGCN and establish genetically viable populations.

Objective(s):

- Establish self-sustaining and genetically viable populations of native fish species within the watershed.

Intended pressure(s) reduced: Livestock, farming, and ranching; recreational activities; commercial and industrial areas; renewable energy; introduced genetic material; invasive plants/animals; marine and freshwater aquaculture.

Conservation action(s):

- Identify source populations.
- Remove invasive or problematic species from historic native fish habitat.
- Create georeferenced map/data base for native fish habitats.
- Develop basin plan for native fish management.
- Obtain funding for strategy implementation.

- Coordinate management actions with natural resource agencies, NGOs and private Landowners.
- Collect/analyze genetic data to define priorities.

Conservation Strategy 5 (Direct Management): Manage dams and other barriers to control fish passage.

Objective(s):
- Agreement is reached by state and federal agencies, and water agencies, to modify management of Mono Lake springs, brooks, dams, and barriers to encourage fish passage and prevent genetic mixing with exotic non-native fish.

Intended pressure(s) reduced: Invasive plants/animals.

Conservation action(s):
- Create/develop geospatial data base of barriers and dams.
- Conduct literature review, consult with experts to gather species distribution information.
- Conduct viability study of barrier designs to determine optimal design.
- Obtain required permits for installation of barriers.
- Evaluate barrier design and efficiency.
- Develop manmade barrier maintenance protocol.
- Obtain funding to implement strategy.

Conservation Strategy 6 (Direct Management): Manage invasive species to expand range of native fishes.

Objective(s):
- Treat 20 percent of acres having invasive species within the watershed.

Intended pressure(s) reduced: Invasive plants/animals.

Conservation action(s):
- Update data on extent and distribution of native and non-native species.
- Develop strategy for removal.
- Coordinate with USFS and private landowners.
- Obtain permits and environmental review.
- Apply for and obtain funding.
- Conduct treatments.
- Conduct post treatment monitoring.
- Initiate long-term monitoring and management plan.
- Monitor for re-establishment of invasive species.
- Develop a management and control plan for invasive species.

Conservation Strategy 7 (Management Planning): Provide input on local planning decisions.

Objective(s):

- Ensure that local plans account for the need to conserve Mono Lake tributary stream habitats and flows.

Intended pressure(s) reduced: Livestock, farming, and ranching; recreational activities; commercial and industrial areas; renewable energy; introduced genetic material; invasive plants/animals; marine and freshwater aquaculture.

Conservation action(s):

- Coordinate early and often with lead agencies.
- Identify and prioritize areas of conservation emphasis (ACE) and refine ACE for aquatic and riparian communities.
- Identify existing conserved areas.
- Direct project mitigation to priority areas needing conservation.
- Direct and use conservation banking.
- Create ACE database viewable by all CDFW staff.
- Incorporate conservation goals and BMPs into CEQA comment letters.
- Provide input at meetings.
- Obtain funding for plan implementation.
- Participate in CEQA review, General Plan review.
- Develop standard permit requirements, master Section 1600 LSA Agreement permit template.

Conservation Strategy 8 (Partner Engagement): Establish and develop co-management partnerships.

Objective(s):

- Establish a joint partnership with water agencies and users to affect change in dams and/or water management and use.
- Establish a joint partnership with land managers and land owners to manage invasive species.
- Establish a joint partnership with state and federal agencies to manage renewable energy project impacts and mitigation.

Intended pressure(s) reduced: Livestock, farming, and ranching; recreational activities; commercial and industrial areas; renewable energy; invasive plants/animals; marine and freshwater aquaculture.

Table 5.6-15 Stresses and Pressures for Springs and Spring Brooks

Priority Pressures	Stresses				
	Changes in Hydrology and Water Characteristics		Ecosystem Changes		
	Change in groundwater tables	Changes in nutrients	Change in community structure or composition	Habitat fragmentation	Change in spatial distribution of habitat types
Commercial and industrial areas	X	X	X	X	X
Dams and water management/use	X	X	X	X	X
Introduced genetic material	X	X	X	X	X
Invasive plants/animals	X	X	X	X	X
Livestock, farming, and ranching	X	X	X	X	X
Marine and freshwater aquaculture	X	X	X	X	X
Recreational activities	X	X	X	X	X
Renewable energy	X	X	X	X	X

Target: Anthropogenically Created Aquatic Features

Goals:

- By 2025, acres where native species are dominant are increased by at least 5 percent from 2015 acres.
- By 2025, acres with desired genetic connectivity are increased (between Salton Sea drains) by at least 5 percent from 2015 acres.
- By 2025, miles with stable bank are increased by at least 5 percent from 2015 miles.
- By 2025, miles with desired stream stage (mimic natural flow hydrograph) are increased by at least 5 percent from 2015 miles.

Conservation Strategy 1 (Data Collection and Analysis): Collect data on the distribution of invasive species and impacts to the target habitat, species utilization of anthropogenic waterways, and the distribution of temporary aquatic habitats associated with roads and railroads to inform management.

Objective(s):

- Scientifically study the distribution of invasive species and impacts to the target and use study results to inform management.
- Understand species utilization of anthropogenic waterways and sources through surveys and reporting.
- Study the distribution of aquatic species in temporary aquatic habitats associated with roads and railroads and use study results to inform management.

Intended pressure(s) reduced: Roads and railroads; dams and water management/use; invasive plants/animals; agricultural and forestry effluents.

Conservation Strategy 2 (Outreach and Education): Provide outreach and education, with emphasis on improving public awareness, concern, and participation in resource conservation.

Objective(s):

- Improve public awareness, concern, and participation in resource conservation.

Intended pressure(s) reduced: Dams and water management/use; invasive plants/animals; agricultural and forestry effluents.

Conservation Strategy 3 (Law and Policy): Develop and implement BMPs for managed grazing, maintenance of drains/canals, and road and railway maintenance.

Objective(s):

- Establish BMPs for maintenance of drains/canals, and for road and railway maintenance.

Intended pressure(s) reduced: Roads and railroads; agricultural and forestry effluents.

Conservation action(s):

- Coordinate with USFS, NRCS, and private landowners.
- Consult with UC Extension.
- Conduct education and outreach.
- Create stakeholder group.
- Review and update BMPs.

Conservation Strategy 4 (Land Use Planning): Provide input on project planning and decision making process; conserve anthropogenic aquatic habitats through participation in the planning and decision making process.

Objective(s):

- Conserve 20 percent more anthropogenic aquatic habitats through participation in the planning and decision making process.

Intended pressure(s) reduced: Roads and railroads; dams and water management/use; invasive plants/animals.

Conservation action(s):

- Conduct environmental (CEQA/NEPA) review.
- Participate in review of general plans/amendments.
- Develop master Section 1600 LSA permit template consistent with strategy.
- Develop standard permit requirements/criteria.
- Identify and prioritize areas for conservation/protection.
- Encourage establishment of mitigation banks.

- Develop mitigation alternatives consistent with strategy.
- Define success criteria for adaptive management.
- Obtain funding to maintain mitigation areas and implement strategy.
- Conduct Property Analysis Report for mitigation sites.
- Maintain mitigation and project tracking data base.

Conservation Strategy 5 (Direct Management): Manage invasive species to expand range of aquatic/semi-aquatic SGCNs.

Objective(s):

- Manage invasive species on public lands and right-of-ways.

Intended pressure(s) reduced: Roads and railroads; dams and water management/use; invasive plants/animals; agricultural and forestry effluents.

Conservation action(s):

- Update data on extent and distribution of native and non-native species.
- Develop strategy for removal.
- Coordinate with USFS and private landowners.
- Obtain permits and conduct environmental review.
- Apply for funding.
- Conduct treatments.
- Conduct post-treatment monitoring.
- Initiate long-term monitoring and management plan.
- Monitor for re-establishment of invasive species.
- Develop a management and control plan for invasive species.

Conservation Strategy 6 (Partner Engagement): Establish co-management partnerships and cooperative management plans with land management agencies, water agencies, private landowners, regional land trusts, environmental organizations, railroads, and transportation agencies.

Objective(s):

- Establish cooperative management plans with water agencies, railroads, and transportation agencies.

Intended pressure(s) reduced: Roads and railroads; dams and water management/use; invasive plants/animals.

Table 5.6-16 Stresses and Pressures for Anthropogenically Created Aquatic Features

Priority Pressures	Stresses				
	Changes in geophysical and disturbance regimes	Changes in Hydrology and Water Characteristics		Ecosystem Changes	
	Changes in sediment erosion-deposition regime	Change in runoff and river flow	Changes in nutrients	Change in spatial distribution of habitat types	Change in community structure or composition
Agricultural and forestry effluents		X	X		
Dams and water management/use	X	X		X	
Invasive plants/animals				X	X
Marine and freshwater aquaculture					X
Recreational activities				X	
Renewable energy	X	X		X	
Roads and railroads	X	X		X	

Table 5.6-17 Conservation Targets and Strategies for the Deserts Province

Target	Goals	Key Ecological Attributes (KEAs)	Pressures[1]	Strategy Categories
Big Sagebrush Scrub	▪ By 2025, acres of habitat are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired age class heterogeneity are increased by at least 5% from 2015 acres. ▪ By 2025, acres where native species is dominant are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired fire regime are increased by at least 5% from 2015 acres.	▪ Area and extent of community ▪ Fire regime ▪ Native versus non-native diversity ▪ Age class heterogeneity	▪ Fire and fire suppression ▪ Housing and urban areas ▪ Invasive plants/animals ▪ Parasites/pathogens/diseases	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Direct Management ▪ Economic Incentives ▪ Land Acquisition/ Easement/ Lease
Great Basin Pinyon-Juniper Woodland	▪ By 2025, acres with desired native species dominance and desired structural diversity are increased by at least 5% within the presettlement range of pinyon-juniper and juniper habitats in the ecoregion. ▪ By 2025, acres of desired successional stage are increased by at least 5% from presettlement habitat area. ▪ By 2025, acres desired fire return are increased by at least 5% from 2015 levels.	▪ Fire regime ▪ Successional dynamics ▪ Structural diversity ▪ Native versus non-native diversity	▪ Climate change ▪ Fire and fire suppression ▪ Invasive plants/animals ▪ Livestock farming and ranching ▪ Other ecosystem modifications	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Direct Management
Shadscale-Saltbush Scrub	▪ By 2025, at least 5% of the disturbed areas show signs of improved successional dynamics. ▪ By 2025, acres of habitat are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired endemic plant/animal diversity are increased from at least 5% from 2015 acres. ▪ By 2025, acres where native species are dominant are increased by at least 5% from 2015 acres. ▪ By 2025, acres connected are increased by at least 5% from 2015 acres. ▪ By 2025, acres/miles with natural hydrologic regime have increased by at least 5% from acres/miles. ▪ By 2025, acres with suitable soil characteristics are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired stages of succession are increased by at least 5% from 2015 acres.	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Successional dynamics ▪ Endemic diversity ▪ Native versus non-native diversity ▪ Hydrological regime ▪ Soil and sediment deposition regime	▪ Airborne pollutants ▪ Annual and perennial non-timber crops ▪ Commercial and industrial areas ▪ Housing and urban areas ▪ Industrial and military effluents ▪ Invasive plants/animals ▪ Military activities ▪ Recreational activities ▪ Renewable energy ▪ Roads and railroads ▪ Utility and service lines	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Management Planning ▪ Land Acquisition/ Easement/ Lease ▪ Outreach and Education ▪ Training and Technical Assistance
Desert Wash Woodland and Scrub	▪ By 2025, acres of (desert wash) habitat are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired endemic plant/animal diversity are increased at least 5% from 2015 acres. ▪ By 2025, population of key species (Couch's spadefoot) is increased by at least 5% from 2015 population levels. ▪ By 2025, acres with desired structural diversity are increased from at least 5% from 2015 acres. ▪ By 2025, miles connected (desert wash habitat) are increased by at least 5% from 2015 miles. ▪ By 2025, miles with stable bank (desert wash) are increased by at least 5% from 2015 miles. ▪ By 2025, miles with desired stream stage (water volume and flow) are increased by at least 5% from 2015 miles.	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Key species population levels ▪ Structural diversity ▪ Endemic diversity ▪ Soil and sediment deposition regime ▪ Surface water flow regime	▪ Commercial and industrial areas ▪ Dams and water management/use ▪ Housing and urban areas ▪ Military activities ▪ Mining and quarrying ▪ Recreational activities ▪ Renewable energy ▪ Roads and railroads ▪ Tourism and recreation areas ▪ Utility and service lines	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Land Use Planning ▪ Outreach and Education
Sparsely Vegetated Desert Dune	▪ By 2025, acres of habitat free of invasive non-native species are increased by at least 5% from 2015 acres. ▪ By 2025, acres of habitat are maintained or increased by at least 5% from 2015 acres. ▪ By 2025, acres of habitat with suitable soil characteristics regimes are increased by at least 5% from 2015 acres. ▪ By 2025, acres of habitat with desired ground water levels are increased by at least 5% from 2015 acres. ▪ By 2025, acres of habitat with desired connectivity are increased by at least 5% from 2015 acres.	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Native versus non-native diversity ▪ Hydrological regime ▪ Soil and sediment deposition regime	▪ Climate change ▪ Housing and urban areas ▪ Invasive plants/animals ▪ Livestock farming and ranching ▪ Recreational activities ▪ Renewable energy	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Management Planning ▪ Direct Management ▪ Land Use Planning
American Southwest Riparian Forest and Woodland	▪ By 2025, acres where native species are dominant are increased by at least 5% from 2015 acres. ▪ By 2025, acres of target habitat are increased by at least 5% from 2015 acres. ▪ By 2025, miles with desired stream stage are increased by at least 5% from 2015 miles.	▪ Area and extent of community ▪ Native versus non-native diversity ▪ Surface water flow regime	▪ Invasive plants/animals ▪ Parasites/pathogens/diseases	▪ Data Collection and Analysis ▪ Direct Management ▪ Land Use Planning

Table 5.6-17 Conservation Targets and Strategies for the Deserts Province (continued)

Target	Goals	Key Ecological Attributes (KEAs)	Pressures[1]	Strategy Categories
High Desert Wash and "Rangeland" Scrub Great Basin Upland Scrub	▪ By 2025, acres of habitat are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired stages of succession are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired structural diversity are increased at least 5% from 2015 acres. ▪ By 2025, miles of river with native species dominant are increased by at least 5% from 2015 miles.	▪ Area and extent of community ▪ Successional dynamics ▪ Structural diversity ▪ Native versus non-native diversity	▪ Climate change ▪ Fire and fire suppression ▪ Invasive plants/animals ▪ Livestock farming and ranching ▪ Mining and quarrying ▪ Renewable energy	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Management Planning ▪ Direct Management
Mojave and Sonoran Desert Scrub	▪ By 2025, acres of habitat are increased by at least 5% from 2015 acres. ▪ By 2025, acres connected are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired stages of succession are increased by at least 5% from 2015 acres. ▪ By 2025, populations of key species are increased by at least 5% from 2015 population. ▪ By 2025, acres where native species are dominant are increased by at least 5% from 2015 acres. ▪	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Successional dynamics ▪ Key species population levels ▪ Native versus non-native diversity ▪ Weather regime	▪ Annual and perennial non-timber crops ▪ Housing and urban areas ▪ Invasive plants/animals ▪ Renewable energy ▪ Roads and railroads ▪ Utility and service lines	▪ Partner Engagement ▪ Management Planning ▪ Land Acquisition/ Easement/ Lease ▪ Land Use Planning ▪ Outreach and Education ▪ Training and Technical Assistance
Walker River Native Fish Assemblage	▪ By 2025, miles of streams with target fish population (SGCNs) are increased by at least 5% from 2015 miles. ▪ By 2025, miles of river where native species are dominant are increased by at least 5% from 2015 miles. ▪ By 2025, miles connected (i.e., past barriers) are increased by at least 5% from 2015 miles. ▪ By 2025, miles with desired stream stage (mimics natural hydrograph) are increased by at least 5% from 2015 miles. ▪ By 2025, miles with desired level of water quality (meeting TMDL standards) are increased by at least 5% from 2015 miles. ▪ By 2025, miles with desired age class heterogeneity are increased by at least 5% from 2015 acres.	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Native versus non-native diversity ▪ Hydrological regime ▪ Soil and sediment deposition regime ▪ Surface water flow regime ▪ Water quality	▪ Dams and water management/use ▪ Introduced genetic material ▪ Invasive plants/animals ▪ Livestock farming and ranching ▪ Roads and railroads	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Management Planning ▪ Direct Management ▪ Law and Policy ▪ Outreach and Education
Cienegas	▪ By 2025, acres of cienaga habitat are increased by at least 5% from 2015 acres. ▪ By 2025, miles of river where native species are dominant are increased by at least 5% from 2015 miles. ▪ By 2025, acres with desired fire regime (frequent low-intensity fire) are increased by at least 5% from 2015 acres. ▪ By 2025, acres/miles with desired inches of groundwater (stable depth) are increased by at least 5% from 2015 acres/miles.	▪ Area and extent of community ▪ Fire regime ▪ Native versus non-native diversity ▪ Hydrological regime	▪ Annual and perennial non-timber crops ▪ Dams and water management/use ▪ Earthquakes/tsunami ▪ Fire and fire suppression ▪ Housing and urban areas ▪ Introduced genetic material ▪ Invasive plants/animals ▪ Livestock farming and ranching ▪ Parasites/pathogens/diseases ▪ Renewable energy	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Direct Management ▪ Land Acquisition/ Easement/ Lease ▪ Outreach and Education
Springs and Spring Brooks	▪ By 2025, acres of habitat are increased by at least 5% from 2015 acres. ▪ By 2025, miles of river where native species are dominant are increased by at least 5% from 2015 miles. ▪ By 2025, miles connected are increased by at least 5% from 2015 miles. ▪ By 2025, acres/miles with desired inches of groundwater are increased by at least 5% from 2015 acres/miles. ▪ By 2025, acres/miles with desired water yield are increased by at least 5% from 2015 acres/miles. ▪ By 2025, acres with suitable soil characteristics are increased by 5% from 2015 acres. ▪ By 2025, acres with desired stages of succession are increased by at least 5% from 2015 acres.	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Successional dynamics ▪ Native versus non-native diversity ▪ Hydrological regime ▪ Soil and sediment deposition regime ▪ Surface water flow regime ▪ Water quality	▪ Commercial and industrial areas ▪ Dams and water management/use ▪ Introduced genetic material ▪ Invasive plants/animals ▪ Livestock farming and ranching ▪ Marine and freshwater aquaculture ▪ Recreational activities ▪ Renewable energy	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Management Planning ▪ Direct Management ▪ Land Acquisition/ Easement/ Lease ▪ Outreach and Education
Anthropogenically Created Aquatic Features	▪ By 2025, acres where native species are dominant are increased by at least 5% from 2015 acres. ▪ By 2025, acres with desired genetic connectivity are increased (between Salton Sea drains) by at least 5% from 2015 acres. ▪ By 2025, miles with stable bank are increased by at least 5% from 2015 miles. ▪ By 2025, miles with desired stream stage (mimic natural flow hydrograph) are increased by at least 5% from 2015 miles.	▪ Area and extent of community ▪ Connectivity among communities and ecosystems ▪ Native versus non-native diversity ▪ Soil and sediment deposition regime ▪ Surface water flow regime ▪ Water quality	▪ Agricultural and forestry effluents ▪ Dams and water management/use ▪ Invasive plants/animals ▪ Marine and freshwater aquaculture ▪ Recreational activities ▪ Renewable energy ▪ Roads and railroads	▪ Data Collection and Analysis ▪ Partner Engagement ▪ Direct Management ▪ Land Use Planning ▪ Law and Policy ▪ Outreach and Education

[1] Pressures can be positive or negative depending on the intensity, timing, and duration of the action on the target habitat.