

DEPARTMENT OF THE INTERIOR**Fish and Wildlife Service****50 CFR Part 17**

[Docket No. FWS-R8-ES-2010-0008; MO 92210-0-0008]

RIN 1018-AX07

Endangered and Threatened Wildlife and Plants; Withdrawal of Proposed Rule To List the Flat-Tailed Horned Lizard as Threatened**AGENCY:** Fish and Wildlife Service, Interior.**ACTION:** Proposed rule; withdrawal.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine that the listing of the flat-tailed horned lizard (*Phrynosoma mcallii*) as a threatened species under the Endangered Species Act of 1973, as amended (Act), is not warranted, and we therefore withdraw our November 29, 1993, proposed rule to list it under the Act. We made this determination in this withdrawal because threats to the species as identified in the 1993 proposed rule are not as significant as earlier believed, and available data do not indicate that the threats to the species and its habitat, as analyzed under the five listing factors described in section 4(a)(1) of the Act, are likely to endanger the species in the foreseeable future throughout all or a significant portion of its range.

DATES: The November 29, 1993 (58 FR 62624), proposal to list the flat-tailed horned lizard as a threatened species is withdrawn as of March 15, 2011.

ADDRESSES: This withdrawal of the proposed rule is available on the Internet at <http://www.regulations.gov>. Comments and materials received, as well as supporting documentation for this rulemaking is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Carlsbad Fish and Wildlife Office, 6010 Hidden Valley Road, Suite 101, Carlsbad, CA 92011; telephone 760-431-9440; facsimile 760-431-9624.

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

SUPPLEMENTARY INFORMATION:**Background**

The flat-tailed horned lizard (*Phrynosoma mcallii*) is a small, spiny

lizard found in the Sonoran Desert of the southwestern United States and northwestern Mexico. All of the species of lizards in the genus *Phrynosoma*—the horned lizards—have dorso-ventrally flattened, “pancake-like” bodies; spiny scales; head spines or “horns”; cryptic coloration; and certain similar behavioral traits (Sherbrooke 2003, pp. 4–17; Stebbins 2003, p. 299; Leaché and McGuire 2006, p. 629).

Among horned lizard species, the flat-tailed horned lizard has particularly long and sharp horns (Funk 1981, p. 281.1; Sherbrooke 2003, p. 40; Young *et al.* 2004a, p. 65). Other characteristics that help distinguish flat-tailed horned lizards from other members of the genus include a dark line down the middle of the back (vertebral stripe), lack of external ear openings, two rows of fringe scales, an unspotted vent, and—as indicated by its common name—a long, broad, flattened tail (Funk 1981, p. 281.1; Sherbrooke 2003, p. 40). The flat-tailed horned lizard is average in size when compared to other horned lizard species. Flat-tailed horned lizards become adults when about 60 to 64 millimeters (mm) (2.4 to 2.5 inches (in)) long, not including the tail (snout-to-vent length), and may grow to be about 87 mm (3.4 in) long (Young and Young 2000, p. 34; Rorabaugh and Young 2009, p. 182). The dorsal coloration of flat-tailed horned lizards varies and closely matches the colors of the desert soils on which they live, ranging from pale gray to light rust-brown, while their ventral coloration is white or cream-colored (Funk 1981, p. 281.1; Flat-tailed Horned Lizard Interagency Coordinating Committee [FTHLICC] 2003, p. 1; Stebbins 2003, p. 304). First described by Hallowell in 1852, no subspecies have been described or are recognized for the flat-tailed horned lizard (Crother *et al.* 2008, p. 35).

The flat-tailed horned lizard occurs within the range of the desert horned lizard (*Phrynosoma platyrhinos*). Additionally, Goode’s horned lizard (*P. [platyrhinos] goodie*), which Klauber (1935, p. 179) considered to be a subspecies of the desert horned lizard (Klauber 1935, p. 179), also occurs within the range of the flat-tailed horned lizard in the portion southeast of the confluence of the Gila and Colorado Rivers (Mulcahy *et al.* 2006, p. 1823). Recent genetic analyses support Goode’s horned lizard as a differentiable evolutionary species (Mulcahy *et al.* 2006, pp. 1807–1826). Hybrids between flat-tailed and Goode’s horned lizards, exhibiting a mix of morphological and genetic characters, have been observed southeast of Yuma, Arizona (Mulcahy *et al.* 2006, p. 1810), while apparent

hybrids between flat-tailed and desert horned lizards have been observed in the vicinity of Ocotillo, California (Stebbins 2003, p. 302). Additionally, the regal horned lizard (*P. solare*) also occurs in northwestern Sonora, Mexico (Rorabaugh 2008, p. 39); we are not aware of hybridization with this species.

Life History

Flat-tailed horned lizards are oviparous (egg-laying), are early maturing, and may produce multiple clutches within a breeding season (Howard 1974, p. 111; Turner and Medica 1982, p. 819), which, when it occurs, results in two groups of individuals in a single year that are all generally the same age (that is, two cohorts). However, some authors question whether the observed two cohorts is the result of individual females producing two clutches in a year or whether different groups of females lay eggs at different times (Muth and Fisher 1992, p. 46; Young and Young 2000, p. 11). Flat-tailed horned lizards produce relatively small clutches of eggs (mean clutch size = 4.7; range = 3 to 7) (Howard 1974, p. 111) compared to most other horned lizards (Sherbrooke 2003, p. 139). The first cohort hatches in July to August (Muth and Fisher 1992, p. 19; Young and Young 2000, p. 13), and when it occurs, the second cohort may be produced in September (Howard 1974, p. 111; Muth and Fisher 1992, p. 19). Hatchlings from the first cohort may reach sexual maturity after their first winter season, whereas individuals that hatch later may require an additional growing season to mature (Howard 1974, p. 111). Flat-tailed horned lizards typically live for 4 years, or rarely even 6 years, in the wild (FTHLICC 2003a, p. 10).

A *home range* is the area in which an animal (as an individual) typically lives. Flat-tailed horned lizards can have relatively large home ranges compared to other species of lizards of similar size (FTHLICC 2003a, p. 9). Muth and Fisher (1992, p. 34) found the mean home range size was 2.7 hectares (ha) (6.7 acres (ac)) on the West Mesa, California. In the Yuma Desert of Arizona, Young and Young (2000, p. 54) found mean home ranges for males differed between drought and wet years, while those of females did not. The mean home range size for males was 2.5 ha (6.2 ac) during a dry year versus 10.3 ha (25.5 ac) during a wet year. Female mean home ranges were smaller at 1.3 ha (3.2 ac) and 1.9 ha (4.7 ac) in dry and wet years, respectively (Young and Young 2000, p. 54). Young and Young (2000, p. 55) noted a wide variation in movement

patterns, with a few home ranges estimated at greater than 34.4 ha (85 ac).

Flat-tailed horned lizards are not known to drink standing water (FTHLICC 2003a, p. 8), but they apparently do rain-harvest (Grant 2005, pp. 66–67), which is a behavior that some horned lizard species use to channel precipitation or condensation collected on the lizard's body to its mouth for consumption (Sherbrooke 2003, p. 104). Thus, nearly all of the water consumed by flat-tailed horned lizards is from the food they eat (preformed water) (FTHLICC 2003a, p. 8; Grant 2005, pp. 66–67). Most horned lizard species, including the flat-tailed horned lizard, are ant-foraging specialists (Pianka and Parker 1975, pp. 141–162; Sherbrooke and Schwenk 2008, pp. 447–459). More than 95 percent of the diet of flat-tailed horned lizards is composed of ants, with species of harvester ants (genera *Messor* and *Pogonomyrmex*) predominating in most areas of the lizard's range, but species of *Dorymyrmex*, *Pheidole*, and *Myrmecocystus* are also consumed (Pianka and Parker 1975, p. 148; Turner and Medica 1982, p. 820; Young and Young 2000, p. 38; FTHLICC 2003a, p. 8).

Flat-tailed horned lizards, typical of reptiles, obtain their body heat from the surrounding environment (ectothermic) (Mayhew 1965, p. 104; Sherbrooke 2003, pp. 75–81). To gain body heat, they bask in the sun, often on rocks or other substrates that are warmed by insolation. During the heat of the day, to escape extreme surface temperatures, flat-tailed horned lizards may bury themselves just below the surface (Norris 1949, pp. 178–179) or retreat to a burrow made by other organisms (Young and Young 2000, p. 12). Adult flat-tailed horned lizards are reported to be obligatory hibernators (*i.e.*, an organism that must enter a dormant period regardless of environmental conditions) (Mayhew 1965, p. 103). Hibernation may begin as early as October and end as late as March (Muth and Fisher 1992, p. 33), although individuals have been noted on the surface during January and February (FTHLICC 2003a, p. 9). Hibernation burrows appear to be self-constructed (as opposed to using burrows constructed by other animals) and are typically within 10 centimeters (cm) (3.9 in) of the surface (Muth and Fisher 1992, p. 33). Mayhew (1965, p. 115) found that the majority of lizards hibernated within 5 cm (2 in) of the surface, with one as deep as 20 cm (8 in) below the surface.

Flat-tailed horned lizards generally lie close to the ground and remain

motionless when approached (Wone and Beauchamp 1995, p. 132); however, they may occasionally bury themselves in loose sand if it is available (Norris 1949, p. 176), and even more rarely, flee (Young and Young 2000, p. 12). Their propensity to remain motionless and bury in the sand, along with their cryptic coloration and flattened body, make them difficult to detect visually, which serves as a way to evade predators but also makes them difficult for surveyors to find in the field (FTHLICC 2003a, pp. 9, 65; Grant and Doherty 2007, p. 1050) (see also “Population Dynamics” section, below).

Additional life-history information is available in the Flat-tailed Horned Lizard Rangewide Management Strategy (FTHLICC 2003a, pp. 6–11).

Setting and Habitat

The flat-tailed horned lizard is endemic (restricted) to the Salton Trough and the region north of the Gulf of California in northwest Sonora, Mexico, both of which lie within the Lower Colorado Subdivision of the Sonoran Desert (Shreve and Wiggins 1964, p. 6). The climatic conditions over the range of the flat-tailed horned lizard are characterized by hot summer temperatures, mild winter temperatures, and little rainfall. Winter rainfall predominates in the western portion of the species' range while summer rainfall predominates in the eastern portion of the species' range (Shreve and Wiggins 1964, pp. 17–20, 49, 50; Johnson and Spicer 1985, p. 14). Periods of drought are not uncommon (Shreve and Wiggins 1964, p. 18).

Although the region in northwest Sonora, Mexico, represents roughly half of the current range of the flat-tailed horned lizard, its distribution within the Salton Trough has been more dynamic. As discussed below, the geologic and land use changes in the Salton Trough have substantially shaped the status of the species today.

To better understand population trends of the flat-tailed horned lizard relative to the geologic setting and its current distribution within sandy habitat, we are providing a summary of the recent geologic history of the area in the following paragraphs (summarized from Parish 1914, pp. 85–114; Sykes 1914, pp. 13–20; Durham and Alison 1960, pp. 47–91; van de Kamp 1973, pp. 827–848; Waters 1983, pp. 373–387; Blount and Lancaster 1990, pp. 724–728; Blount *et al.* 1990, pp. 15,463–15,482; Stokes *et al.* 1997, pp. 63–75; Patten *et al.* 2003, pp. 1–6; Li *et al.* 2008, pp. 182–197).

The Salton Trough (Trough) is a low-elevation valley that represents the

northwestward continuation of the Gulf of California. During the period starting at least several million years ago, as sea levels rose and fell, the Gulf of California filled the present-day Salton Trough, often extending the Gulf northward into the present-day San Geronio Pass, east of Cabazon, California. The Colorado River flowed into the Gulf at roughly the same geographical area as today, but with the Gulf extending to a more northerly point, the river flowed into the Gulf mid-way along its length.

The Colorado River, which originates in the Rocky Mountains and flows through the Grand Canyon, historically transported large quantities of fine-grained sediment. Where the river joined the Gulf, sediments were deposited forming a broad delta. These sediments continued to increase and created a barrier that divided the Gulf into a land-locked northern portion (the Trough) and a marine-linked southern portion (the Gulf). The northern portion, which remains below sea level but without a direct connection with the ocean, eventually dried out. However, the Colorado River continued to meander across its delta and seasonal flooding promoted avulsion (*i.e.*, abandonment of an old river channel and the creation of a new one). Thus, the river would sometimes flow into the Gulf and sometimes into the Trough, the lowest point of which—referred to as the Salton Basin—is about minus 84 meters (m) elevation (277 feet (ft) below sea level).

Water from the meandering Colorado River periodically filled the Salton Basin to varying depths (and areal extent), depositing sediments in the process. The lake that periodically formed, especially in its recent but prehistoric incarnations, is referred to by most authors as Lake Cahuilla. Its maximum depth depended on elevation of the delta, which is now about 12 m elevation (39 ft above sea level). The Lake was full as recently as the early 1600s, but smaller, shallower manifestations were present at various times since then (including the modern Salton Sea, discussed below). When Lake Cahuilla was full, the Colorado River water flowed into the Basin from the southeast, marked today by the Alamo River and New River channels, and exited the Basin farther west along a southerly route, marked today by the Río Hardy channel, ultimately emptying into the Gulf of California. Floodwaters and sediments also periodically flowed into Laguna Salada, in northwestern Baja California, Mexico. Thus, even areas of the present-day Imperial, Mexicali, and San Luis Valleys that

were never or were less-frequently inundated by Lake Cahuilla, were regularly influenced by hydrologic forces associated with the Colorado River. Despite being in the middle of one of the driest deserts in North America, some of these areas were, at least periodically, part of an intricate water distribution system of channels, sloughs, and lagoons.

Water also flowed into the Trough from surrounding highlands, bringing locally derived sediments with it. One notable inflow is marked by the present-day Whitewater River that flows into the Basin from the north. Water from the local sources would occasionally result in standing water in the Basin, but these sources could not compete with the sheer volume the Colorado River periodically provided.

After flowing into the Trough for a period of time, the Colorado River would eventually meander back and once again flow into the Gulf. Over time, Lake Cahuilla would then become dry and the transported sediments would become exposed, with local sediment sources predominating the north end of the Trough, and Colorado River-derived sediments predominating the south end of the Trough. During dry periods, the fine-grained sediments in the Trough would be transported and sorted by prevailing winds. Thus, much of the Trough outside of those areas that were regularly influenced by the flooding and meandering of the Colorado River was ultimately blanketed with soft, friable (crumbly) or arenaceous (sandy) soils. Similarly, sediments deposited in the Colorado River delta and along the northeast shore of the Gulf of California were transported by winds where they formed areas of soft, friable (crumbly) or arenaceous (sandy) soils, including the "sand sea" of the Gran Desierto de Altar.

As a result, typical flat-tailed horned lizard habitat today includes areas of these sandy flats as well as the associated valleys created by these geologic events. Turner *et al.* (1980, p. 14) stated the best habitats are generally low-relief areas with surface soils of packed, fine sand or low-relief areas of pavement (hardpan) overlain with loose, fine sand. However, the available scientific information indicates that flat-

tailed horned lizards may occur in areas with soil substrates and plant associations that differ from these generalizations, as described below.

Flat-tailed horned lizards are also known to occur at the edges of vegetated sand dunes, on barren clay soils, and within sparse *Atriplex* spp. (saltbush) plant communities. Although Turner *et al.* (1980, p. 15) suspected that these recorded occurrences were actually individuals that had dispersed from more suitable habitats, Wone *et al.* (1991, p. 16) questioned this conclusion (see also Wone and Beauchamp 1995, p. 132; Beauchamp *et al.* 1998, p. 213), suggesting instead that flat-tailed horned lizards regularly occupy at least some of these areas.

Within a creosote plant community in the West Mesa area, Muth and Fisher (1992, p. 61) found that flat-tailed horned lizards preferred sandy substrates with white bursage and *Psoralea emoryi* (Emory dalea), and avoided areas with creosote and *Tiquilia plicata* (fanleaf crinklemat). In Arizona, Rorabaugh *et al.* (1987, p. 103) found flat-tailed horned lizard abundance correlated with *Pleuraphis rigida* (big galleta grass) and sandy substrates, but they suggested that the presence of sandy substrates was more important than grass.

Several researchers have investigated the relationship between density of perennial plants and flat-tailed horned lizard abundance. The observed relationships varied among studies. For example, Altman *et al.* (1980, p. ii) and Turner and Medica (1982, p. 815) found the relative abundance of flat-tailed horned lizards was significantly and positively correlated with perennial plant density in creosote-white bursage plant communities (that is, horned lizard abundance increased as perennial plant density increased). In contrast, Beauchamp *et al.* (1998, p. 210) found flat-tailed horned lizards to be present in higher densities in sparsely vegetated areas with large patches of concretions (i.e., a volume of sedimentary rock in which a mineral cement fills the spaces between the sediment grains), gravel, and silt, than in areas that were sandy or densely vegetated. Altman *et al.* (1980, p. 7) also reported finding flat-tailed horned lizards in desert pavement

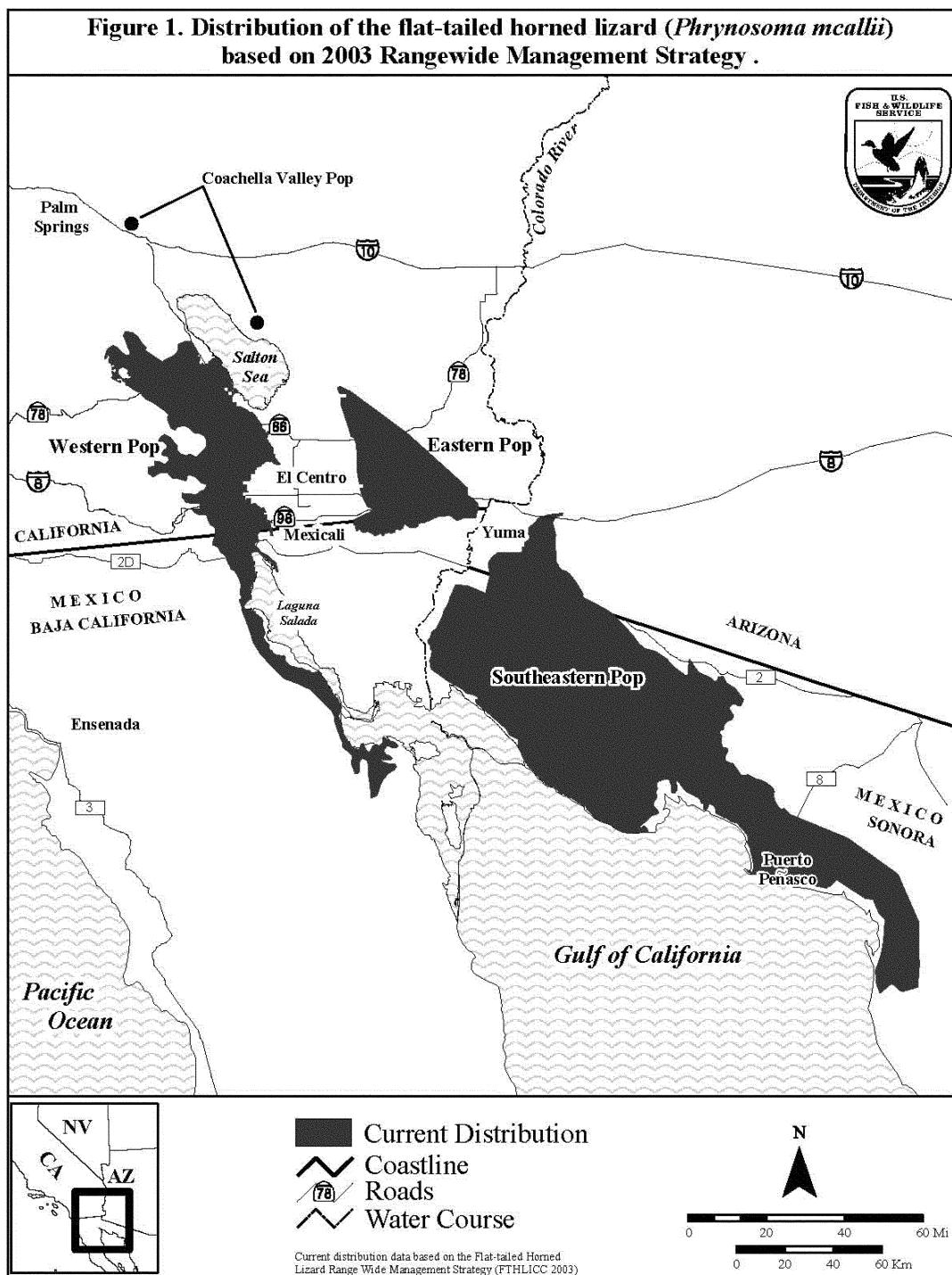
areas. Foley (2002, p. 54) found little correlation in substrate texture and distribution of flat-tailed horned lizards, when using three experimental treatments consisting of sandy, rocky and mixed substrates. However, Wright and Grant (2003, p. 3) found flat-tailed horned lizard abundance was positively correlated with percentage of sand cover. Thus, flat-tailed horned lizard habitat includes a variety of soils and other plant associations, but the habitat is best characterized as sandy flats and valleys in a creosote-white bursage plant association.

Plants and harvester ants are important components to flat-tailed horned lizard habitat because they comprise its primary food chain. Seeds make up the primary food of harvester ants (Johnson 2000, p. 92). The ants often collect seeds from annual plants, including some nonnative species (Rissing 1988, p. 362), but they also gather seeds from perennial plants (Gordon 1980, p. 72). Thus, a simplified food chain for the flat-tailed horned lizard may be described as follows: Plants produce seeds, harvester ants eat the seeds, and flat-tailed horned lizards eat harvester ants.

Range and Distribution

A species' range is the region over which it is distributed. The range of the flat-tailed horned lizard includes the Salton Trough and the region north of the Gulf of California. In general, this range includes portions of southeastern California (eastern San Diego County, central Riverside County, and southwestern Imperial County) and southwestern Arizona (southwestern Yuma County) in the United States, and northeastern Baja California and northwestern Sonora in Mexico (Turner and Medica 1982, p. 815) (Figure 1). Within its range, the flat-tailed horned lizard is limited to areas below an upper elevation. Although the species has been recorded as high as 520 m (1,706 ft) above sea level (Turner *et al.* 1980, p. 13), flat-tailed horned lizards are more commonly found below about 230 m (about 750 ft) in elevation (FTHLIC 2003a, p. 3).

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Extensive manmade changes, chiefly for agriculture, have occurred over a large portion of the land within the Salton Trough. Below we present a summary of the history of agricultural development in the Salton Trough (summarized from Furnish and Ladman 1975, pp. 83–107; Woerner 1989, pp. 109–112; Imperial Irrigation District [IID] 2002, pp. 3.1–66 to 3.1–77; Patten *et al.* 2003, pp. 1–6).

Near the start of the 20th century, a canal was built to import water to the Salton Trough from the Colorado River. The Salton Basin is below sea level and much of the rest of the Salton Trough is at a lower elevation than where the head of the canal was located. Thus, with the regionally abundant sunshine and river-sediment soils, the importation of water by a gravity-fed system allowed agriculture to proliferate. For example, by 1904 approximately 60,700 ha (150,000 ac) were in cultivation.

Unlike the current canal, the original canal was poorly designed because it had no headgate to regulate flows into the canal. Prior to extensive dams on the Colorado River, the river was prone to flooding. The high waters of one such flood during the winter of 1904–05 flowed into the canal. Soon, nearly the entire Colorado River flowed through the canal, releasing water into the Salton Basin. Part of the flow followed the two historical riverbeds (the Alamo River and the New River) that were deepened and widened by the torrent. Despite heroic efforts, the flow continued until 1907. The Salton Basin filled to a depth of about 22 m (72 ft) (at its deepest point) and covered about 121,400 ha (300,000 ac), thus creating the modern Salton Sea.

Although the “creation” of the Salton Sea is often times described as an accident, the inundation of the Salton Basin by water flowing from the Colorado River from 1905 to 1907 was merely the most recent of many such inundations over historical and prehistorical times (*see “Setting and Habitat”* section above). Even without the canal, the flood of 1905 may have naturally flowed into the Basin.

Since the formation of the modern Salton Sea, agricultural practices in the region have maintained the water levels of the Salton Sea. If too much irrigation water is allowed to evaporate in the fields, salt levels, which are high in Colorado River water, build up in the soil, making it inhospitable for crops. To prevent this hypersalinization of the soils, a surplus of water is used for irrigation. The excess water drains by gravity from the fields through a network of ditches into the Salton Sea. Even with the high evaporation rates in

the desert climate, inflow rates of drainage water have been high enough to maintain, and, for a time, even increase, the surface water elevation of the Salton Sea.

Efforts to bring irrigation water to the region continued through the 1900s, and the system of irrigation canals was eventually improved and expanded. In addition to the Imperial Valley, the Coachella Canal was constructed to bring water to the southern Coachella Valley, allowing irrigated agriculture to develop north of the Salton Sea. Similar canal systems were built in Mexico, allowing agriculture to develop and expand in the Mexicali and San Luis Valleys. Because these systems were gravity fed, the distribution canals within the region were dictated by elevation, which in turn, determined where irrigated agricultural development occurred. Thus, the majority of agricultural development was confined within the outer-most (highest elevation) canals. Moreover, croplands (and associated urbanization and infrastructure) were contiguous in the Salton Trough region, with little to no intervening undeveloped natural areas. Additionally, smaller amounts of agricultural development using pumped groundwater have occurred on a smaller scale outside these areas.

The geographically confined agricultural growth in the region is currently limited by the amount of water available from the Colorado River, which is dependent on annual precipitation in the Upper and Lower Colorado River Basins. The amount of irrigation water that can be delivered to the Salton Trough from the Colorado River is limited by interstate and international agreements (Furnish and Ladman 1975, pp. 83–107). Water conservation and transfer agreements completed in 2003 with the San Diego County Water Authority, Imperial Irrigation District, Metropolitan Water District of Southern California, and Coachella Valley Water District has reduced the amount of water available in the Imperial Valley and some fields have been fallowed, resulting in a decrease in the amount of irrigated agriculture in this region (IID 2006, p. 1).

Aerial and satellite imagery (Carlsbad Fish and Wildlife Office geographic information system (GIS) files) illustrates the development of active cultivation and associated urbanization and infrastructure extending from the present-day delta of the Colorado River, with a longer fork extending north-northwest through the Mexicali and Imperial Valleys to the Coachella Valley (punctuated by the Salton Sea), and a

smaller fork extending northeast through the eastern Mexicali Valley and the San Luis Valley (Lower Colorado River Valley) to Yuma. Although there are specimens of flat-tailed horned lizards collected historically from within the now-altered region (Funk 1981, p. 281.1; Johnson and Spicer 1985, pp. 14–24), areas of agricultural and urban development do not constitute habitat for the flat-tailed horned lizard, and this continuous swath of altered land use is no longer occupied by flat-tailed horned lizards.

The current distribution of the flat-tailed horned lizard is often described within four, geographically descriptive “populations.” We use the term population in this document to refer to a loosely bounded, regionally distributed collection of individuals of the same species. These four populations are defined as:

(1) The Coachella Valley Population, including those individuals northwest of the Salton Sea, California;

(2) The Western Population, including those individuals in the areas west of the Salton Sea and the Imperial Valley, California, and west of the Mexicali Valley, Baja California, Mexico;

(3) The Eastern Population, including those individuals in the areas east of the Salton Sea and the Imperial Valley but west of the Colorado River; and

(4) The Southeastern Population, including those individuals in the areas east of the Colorado River, extending from Yuma south into Mexico and east to the Gulf of California.

These current designations closely follow the description of populations discussed in our January 3, 2003, analysis (68 FR 331), although in that document we used the United States-Mexico border to further divide the populations (*see Figure 1* above). Additionally, these populations roughly correspond to those used by Mulcahy *et al.* (2006, pp. 1807–1826) in their analysis of flat-tailed horned lizard genetic data (*see below* for details). At the end of the Background section, below, we summarize these four populations in greater detail. We also use these four population names to identify the geographical habitat they occupy.

Populations and Genetics

The separation of the four populations of flat-tailed horned lizards described above in the “Range and Distribution” section is supported by genetic data, to varying degrees. Analyses of mitochondrial DNA data (Mulcahy *et al.* 2006, pp. 1807–1826; *see also* Mendelson *et al.* 2004, pp. 1–42) and nuclear microsatellite data (Culver and

Dee 2008, pp. 1–14) revealed significant differences in the prevalence of certain alleles in flat-tailed horned lizard populations on either side of the Colorado River; that is, the Southeastern Population differs from the other three populations. These analyses also showed that more gene flow has occurred near the Colorado River delta, suggesting the shifting course of the river over time in this area posed less of a barrier than the more stable portions of the river channel farther north (Mulcahy *et al.* 2006, p. 1822; Culver and Dee 2008, p. 11). Although Culver and Dee (2008, p. 10) noted genetic variation in some individuals across the Southeastern Population, they found that flat-tailed horned lizards in Arizona are “not genetically isolated from neighboring populations in Mexico.” Thus, the flat-tailed horned lizards east of the Colorado River (i.e., the Southeastern Population) may be considered one population that is significantly and genetically distinct from the populations west of the river (i.e., the Coachella Valley, Western, and Eastern Populations).

The three populations west of the Colorado River also showed varying levels of genetic differentiation. Mulcahy *et al.* (2006, p. 1821) noted the Eastern Population “was significantly differentiated from [the Western and Coachella Valley Populations], suggesting that there has not been substantial gene flow across the Imperial Valley since the drying of Lake Cahuilla.” However, the difference between the Coachella Valley and Western Populations was less pronounced. Although their difference was supported by the presence of haplotypes unique to the Coachella Valley Population (Mulcahy *et al.* 2006, Table 1 on p. 1811, and p. 1817), the difference between the Western and Coachella Valley Populations was not statistically significant (the other populations had unique haplotypes, too). This lack of significant difference suggested to the authors that the Coachella Valley Population “had more recent gene flow” with the Western Population (Mulcahy *et al.* 2006, p. 1821). Thus, genetic data readily support three of the four geographic populations described above, but the distinction between the Western and Coachella Valley Populations is weak or equivocal. This suggests that the Coachella Valley Population was not a

separate population historically, but is one now because it was “created” by an artificial barrier resulting from past agricultural and urban development.

Management and Populations

Three notable management mechanisms are in place within the U.S. portion of the flat-tailed horned lizard range: the Interagency Conservation Agreement, which includes the Flat-tailed Horned Lizard Rangewide Management Strategy (Rangewide Management Strategy); the Coachella Valley Multiple Species Habitat Conservation Plan (Coachella Valley MSHCP); and the Lower Colorado River Multi-Species Conservation Plan (Lower Colorado MSCP). Implementation of the Interagency Conservation Agreement has recently positively affected and is anticipated to continue to positively affect the status of flat-tailed horned lizard populations in the United States and, to a lesser extent, in Mexico. The recently permitted Coachella Valley MSHCP is also worth noting because it is a regional habitat conservation plan (HCP) developed under section 10 of the Act that covers the flat-tailed horned lizard in the Coachella Valley, an area addressed at length in our previous withdrawals. Additionally, the Lower Colorado MSCP is also an HCP that addresses the flat-tailed horned lizard.

Interagency Conservation Agreement and Flat-tailed Horned Lizard Rangewide Management Strategy

In June of 1997, the Service, Bureau of Land Management (BLM), Bureau of Reclamation (BOR), U.S. Marine Corps, U.S. Navy, Arizona Game and Fish Department, California Department of Fish and Game (CDFG), and California Department of Parks and Recreation (CDPR) entered into an Interagency Conservation Agreement. All signatories agreed to:

- (1) Further develop and implement the objectives, strategies, and tasks of the Flat-tailed Horned Lizard Rangewide Management Strategy [original, FTHLIC 1997, pp. 1–106; revised: FTHLIC 2003a, p. 104; see below];
- (2) As needed for the conservation effort, and as available, provide program personnel with facilities, equipment, logistical support, and access to lands under their control;
- (3) Participate regularly in Interagency Coordinating Committee and Management Oversight Group meetings

to enhance communication and cooperation, and to help develop annual or other work plans and reports;

(4) Develop and distribute public information and educational materials on the conservation effort;

(5) Provide ongoing review of, and feedback on, the conservation effort;

(6) Cooperate in development of major media releases and media projects;

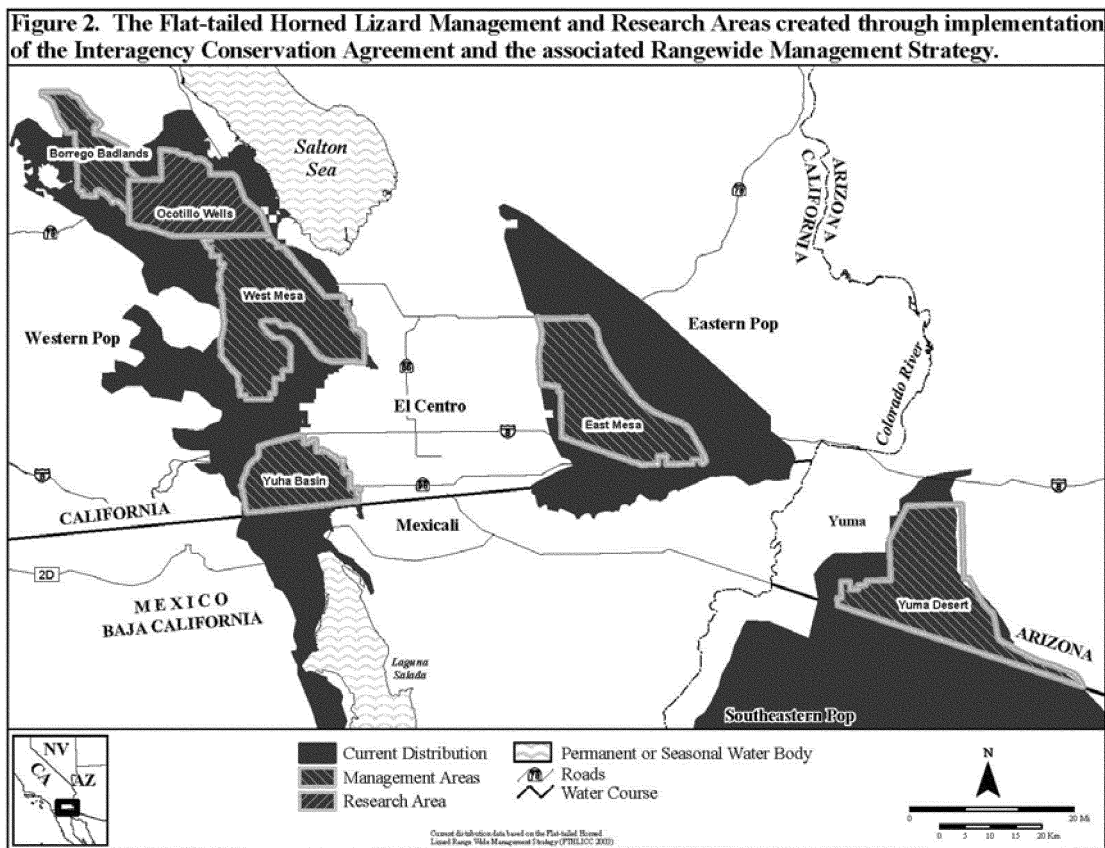
(7) Keep local governments, communities, the conservation community, citizens, and other interested and affected parties informed on the status of the conservation effort, and solicit their input on issues and actions of concern or interest to them;

(8) Whenever possible, develop voluntary opportunities and incentives for local communities and private landowners to participate in the conservation effort; and

(9) Assist in generating the funds necessary to implement the conservation effort.

The purpose of the Rangewide Management Strategy is to provide a framework for conserving sufficient habitat to maintain several viable populations of the flat-tailed horned lizard throughout the range of the species in the United States. The Rangewide Management Strategy was developed by an interagency working group over a 2-year period. Despite being a voluntary agreement, many of the measures to conserve flat-tailed horned lizards are formally incorporated into planning documents of participating agencies, such as the Bureau of Land Management’s California Desert Conservation Area Plan.

As part of the Interagency Conservation Agreement, agencies delineated specific areas under their jurisdiction as Management Areas. As of 2009, approximately 185,653 ha (458,759 ac) of the flat-tailed horned lizard habitat managed by signatories of the Interagency Conservation Agreement exists within five Management Areas (see Table 1 below) (FTHLIC 2009, p. 10). These Management Areas include the Borrego Badlands, West Mesa, and Yuha Desert (also referred to as the Yuha Basin) in the Western Population, the East Mesa in the Eastern Population, and the Yuma Desert in the Southeastern Population (Figure 2). Additionally, the Ocotillo Wells State Vehicular Recreation Area (SVRA) was designated as a research area.



The five Management Areas were designed to include large areas of public land in the United States where flat-tailed horned lizards have been found, and to include most flat-tailed horned lizard habitat identified by the FTHLICC (1997, p. 35) as “key” areas for survival as determined in previous studies (Turner *et al.* 1980, pp. 1–47; Turner and Medica 1982, pp. 815–823; Rorabaugh *et al.* 1987, pp. 103–109). Management Areas were proposed based on standard principles of preserve design, utilizing the best information available at the time (FTHLICC 2003a, p. 47).

The Management Areas were delineated to include areas as large as possible, while avoiding extensive, existing and predicted management conflicts (such as off-highway vehicle (OHV) open areas). The Management Areas are meant to be the core areas for maintaining self-sustaining populations of flat-tailed horned lizards in the United States (FTHLICC 2003a, p. 24). The Management Areas constitute roughly 42 percent of the U.S. current distribution. Although the majority of lands within each Management Area are State or federally owned, some private

inholdings occur within Management Area boundaries.

The 2003 Rangewide Management Strategy includes measures to avoid, minimize, and compensate impacts to the flat-tailed horned lizard and its habitat from construction projects and other development activities permitted by signatory agencies. As described in detail in the Rangewide Management Strategy (FTHLICC 2003a, pp. 58–60), the avoidance and minimization measures include (in part) avoidance of flat-tailed horned lizard Management Areas and the Research Area, project oversight and compliance measures, minimized project footprint, use of existing roads rather than creating new roads, use of barrier fencing, and project-specific habitat restoration. The Rangewide Management Strategy outlines avoidance, minimization, and mitigation measures intended to limit the impacts from permitted projects within the Management Areas to a maximum of 1 percent of the total area of each Management Area (FTHLICC 2003a, pp. 24–43). Additionally, the Rangewide Management Strategy (FTHLICC 2003a, pp. 60–62) describes compensation measures for projects within and outside the Management

Areas where residual effects would occur after all reasonable on-site mitigation has been applied. The goal of compensation under the Rangewide Management Strategy is to “prevent the net loss of [flat-tailed horned lizard] habitat and make the net effect of a project neutral or positive to [flat-tailed horned lizards] by maintaining a habitat [baseline]” (FTHLICC 2003a, p. 61). Compensation funds may be used “to acquire, protect, or restore [flat-tailed horned lizard] habitat both within and contiguous with [Management Areas]” (FTHLICC 2003a, p. 60). Compensation ratios range from one-to-one to six-to-one (meaning, in latter ratio for instance, that six acres-worth of compensation will be required for every one acre of impact), depending on the location and nature of the impacts (FTHLICC 2003a, p. 61). Funds obtained through compensation associated with implementation of the Rangewide Management Strategy are being used to consolidate land ownership within the Management Areas or to enhance flat-tailed horned lizard habitat (FTHLICC 2003a, p. 25; FTHLICC 2010, p. 8). The original and current acreages of each Management Area are listed in Table 1.

TABLE 1—AREA (HECTARES AND ACRES) OF FLAT-TAILED HORNED LIZARD MANAGEMENT AREAS OWNED BY SIGNATORIES TO THE INTERAGENCY CONSERVATION AGREEMENT IMPLEMENTING THE FLAT-TAILED HORNED LIZARD RANGEWIDE MANAGEMENT STRATEGY AND AREA OWNED BY NON-SIGNATORIES (PREDOMINANTLY PRIVATE) IN 1997 AND THROUGH 2009, PLUS AREA AND PERCENTAGE OF PROJECT-RELATED IMPACTS PERMITTED BY SIGNATORIES WITHIN EACH MANAGEMENT AREA (SOURCES: FTHLICC 1997, P. 74; FTHLICC 2003A, P. 48; FTHLICC 2009, P. 10; FTHLICC 2010, P. 8)

Management area	Area of signatory lands in 1997	Area of non-signatory lands in 1997	Area of non-signatory lands added to signatory lands since 1997	Total area of signatory lands in 2009	Total area of management area	Total area permitted for impact as of 2009	Percent of total area of management area permitted for impact as of 2009 (percent)
Borrego Bad-lands.	14,771 ha (36,500 ac).	2,388 ha (5,900 ac).	592 ha *(1,464 ac).	15,363 ha (37,964 ac).	17,159 ha (42,400 ac).	0 ha (0 ac)	0.0
West Mesa	46,256 ha (114,300 ac).	8,822 ha (21,800 ac).	2,624 ha (6,483 ac).	48,880 ha (120,785 ac).	55,078 ha (136,100 ac).	86.77 ha (214.42 ac).	0.16
Yuha Desert	23,148 ha (57,200 ac).	1,214 ha (3,000 ac).	0 ha (0 ac)	23,148 ha (57,200 ac).	24,362 ha (60,200 ac).	35.90 ha (88.70 ac).	0.15
East Mesa	43,868 ha (108,400 ac).	2,792 ha (6,900 ac).	1,380 ha (3,410 ac).	45,248 ha (111,810 ac).	46,660 ha (115,300 ac).	38.40 ha (94.90 ac).	0.08
Yuma Desert	46,741 ha (115,500 ac).	6,273 ha (15,500 ac).	6,273 ha (15,500 ac).	53,014 ha (131,000 ac).	53,014 ha (131,000 ac).	10.50 ha (25.95 ac).	0.02
Total	174,784 ha (431,900 ac).	21,489 ha (53,100 ac).	10,869 ha (26,857 ac).	185,653 ha (458,759 ac).	196,273 ha (485,000 ac).	171.57 ha (423.97 ac).	0.09

* Includes 350 ha (864 ac) owned by the Anza-Borrego Foundation.

Representatives from the agencies participating on the Rangewide Management Strategy (also known as the Interagency Coordinating Committee) meet several times a year to coordinate and implement management actions (FTHLICC 2003a, pp. 1–104). The Interagency Coordinating Committee regularly documents progress made to conserve the flat-tailed horned lizard collectively or by participating agencies (FTHLICC 1998, pp. 1–11; FTHLICC 1999, pp. 1–13; FTHLICC 2001, pp. 1–24; FTHLICC 2003b, pp. 1–32; FTHLICC 2004, pp. 1–33; FTHLICC 2005, pp. 1–37; FTHLICC 2006, pp. 1–34; FTHLICC 2007, pp. 1–33; FTHLICC 2008a, pp. 1–35; FTHLICC 2009, pp. 1–38; FTHLICC 2010, pp. 1–33). These reports document and summarize the progress member agencies have made towards implementation of the Planning Actions identified in Rangewide Management Strategy (FTHLICC 2003a, pp. 25–32). The reports indicate that progress by signatory agencies has been made in the following areas: (1) Designation of the five Management Areas and the one Research Area; (2) requiring actions by permittees to follow the avoidance, minimization, and mitigation measures outlined in the Rangewide Management Strategy; (3) rehabilitating damaged and degraded habitat within the Management Areas; and (4) purchase of lands for flat-tailed horned lizard conservation from willing sellers. Although some lower priority actions (tasks), such as research on natural

barriers, remain outstanding, the committee reports that nearly all tasks, many of which are ongoing or multi-year actions, are on schedule (FTHLICC 2010, pp. 21–25). Thus, despite being a voluntary agreement, the signatory agencies generally have been implementing the Interagency Conservation Agreement and associated Rangewide Management Strategy by meeting regularly, working to implement the measures of the Rangewide Management Strategy including providing personnel, developing and distributing public information, and providing ongoing review and feedback.

Coachella Valley Multiple Species Habitat Conservation Plan (Coachella Valley MSHCP)

Our past assessments of the status of the flat-tailed horned lizard, particularly the 2003 withdrawal (68 FR 331), addressed the Coachella Valley in detail; thus, for consistency we again address the Coachella Valley here and elsewhere in this document. Since the 2003 withdrawal, and even since our June 28, 2006, withdrawal (71 FR 36745), we have issued an incidental take permit for a large, regional HCP in the Coachella Valley. The Coachella Valley MSHCP is a large-scale, multi-jurisdictional habitat conservation plan encompassing about 445,156 ha (1.1 million ac) in the Coachella Valley of central Riverside County. An additional 27,923 ha (69,000 ac) of Tribal reservation lands distributed within the

plan area boundary are not included in the Coachella Valley MSHCP. The Coachella Valley MSHCP addresses 27 listed and unlisted “covered species,” including the flat-tailed horned lizard. On October 1, 2008, the Service issued a single incidental take permit (TE–104604–0) under section 10(a)(1)(B) of the Act to 19 permittees under the Coachella Valley MSHCP for a period of 75 years. Participants in the Coachella Valley MSHCP include eight cities (Cathedral City, Coachella, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage); the County of Riverside, including the Riverside County Flood Control and Water Conservation District, Riverside County Parks and Open Space District, and Riverside County Waste Management District; the Coachella Valley Association of Governments; Coachella Valley Water District; Imperial Irrigation District; California Department of Transportation; California State Parks; Coachella Valley Mountains Conservancy; and the Coachella Valley Conservation Commission (the created joint powers regional authority). The Coachella Valley MSHCP was designed to establish a multiple species habitat conservation program that minimizes and mitigates the expected loss of habitat and incidental take of covered species, including flat-tailed horned lizard (USFWS 2008, pp. 1–207, and Appendix A, pp. 298–328). The Coachella Valley MSHCP is also a “Subregional Plan” under the State of

California's Natural Community Conservation Planning (NCCP) Act, as amended.

The permit covers incidental take resulting from habitat loss and disturbance associated with urban development and other proposed covered activities. These activities include public and private development within the plan area that require discretionary and ministerial actions by permittees subject to consistency with the Coachella Valley MSHCP policies. An associated Management and Monitoring Program is also included in the Coachella Valley MSHCP and identifies specific management actions for the conservation of the flat-tailed horned lizard and its habitat.

The Coachella Valley MSHCP identifies a reserve system that, upon full implementation, will establish 21 conservation areas that are either adjacent to each other or are linked by biological corridors. The acquisition program for the plan's reserve system is designed to conserve 52,484 ha (129,690 ac) during the first 30 years. This program is to be implemented such that acquisitions occur commensurate (in "rough step") with impacts from urban development that is covered under the plan.

The flat-tailed horned lizard is now known to occur only at two locations

within the Coachella Valley MSHCP area, the Thousand Palms and Dos Palmas conservation areas (CVCC 2010, p. 13) (see also *Description of Specific "Populations"* section below). Table 2 describes the amount of flat-tailed horned lizard habitat conserved and identified to be conserved through implementation of the Coachella Valley MSHCP. Additionally, plan implementation is expected to limit impacts of development and other covered activities on lands within conservation areas but that have not yet been acquired for conservation as part of the Coachella Valley MSHCP reserve system. The plan also designates one core habitat area (as used in that plan, this refers to an area that is large enough to maintain a self-sustaining population)—the Thousand Palms conservation area—and commits to establishing two more self-sustaining populations in other parts of the reserve system, if feasible, to benefit the flat-tailed horned lizard. Because of the distances separating appropriate parts of the reserve system, relocation of flat-tailed horned lizards will be required to re-establish or enhance populations in suitable habitat areas that have the potential to, but currently do not, support self-sustaining populations. Additionally, the plan calls for

Management and Monitoring Programs that are expected to conserve this species in the plan area. Required management activities include limiting activities that degrade flat-tailed horned lizard habitat, evaluation and management of edge effects and other impacts through adaptive management, control of invasive species where necessary, and restoration and enhancement of degraded habitat as necessary according to monitoring results (CVAG 2007, p. 9–123). In our evaluation of the potential impacts of the plan's implementation on the flat-tailed horned lizard (USFWS 2008, p. 178), we concluded: "After reviewing the current status of this species, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the flat-tailed horned lizard. Loss of the Coachella Valley population would have a negligible [effect] on the status of the species as a whole, since it makes up approximately 1 percent of the current range of the flat-tailed horned lizard. Persistence of the species in the Plan area is likely only with effective Plan implementation."

TABLE 2—AREA OF FLAT-TAILED HORNED LIZARD HABITAT CONSERVED, ANTICIPATED TO BE CONSERVED, IMPACTED, AND ANTICIPATED TO BE IMPACTED THROUGH IMPLEMENTATION OF THE COACHELLA VALLEY MSHCP

Criterion (source)	Thousand Palms	Dos Palmas
Flat-tailed horned lizard habitat area conserved at permit issuance in 2008 (CVAG 2007, p. 9–115).	1,318 ha (3,256 ac)	608 ha (1,503 ac)
Additional flat-tailed horned lizard habitat area conserved in 2008 (CVCC 2009, p. 79).	274 ha (678 ac)	107 ha (265 ac)
Additional flat-tailed horned lizard habitat area conserved in 2009 (CVCC 2010, pp. 39 & 51).	8 ha (20 ac)	0 ha (0 ac)
Total flat-tailed horned lizard habitat area under conservation through 2009 (calculated).	1,600 ha (3,954 ac)	715 ha (1,768 ac)
Total flat-tailed horned lizard habitat area expected to be conserved by MSHCP implementation (CVAG 2007, p. 9–115).	1,707 ha (4,219 ac)	2,078 ha (5,134 ac)
Percent flat-tailed horned lizard habitat area conserved through 2009 compared to amount required upon full implementation of the plan (calculated).	94%	34%
Area of flat-tailed horned lizard habitat impacted by permitted activities through 2009 (CVCC 2009, p. 79; CVCC 2010, pp. 39 & 51).	0 ha (0 ac)	0 ha (0 ac)
Area of flat-tailed horned lizard habitat anticipated to be impacted by permitted activities (CVAG 2007, p. 9–115).	44 ha (108 ac)	163 ha (403 ac)
Percent flat-tailed horned lizard habitat area anticipated to be impacted compared to total area of flat-tailed horned lizard habitat in conservation area (calculated).	2%	7%

Lower Colorado River Multi-Species Conservation Plan (Lower Colorado River MSCP)

The Lower Colorado River MSCP is a joint effort by Federal and non-Federal (State, local, and private) entities with management authority for storage,

delivery, and diversion of water; hydropower generation, marketing, and delivery; and land management or Native American Trust responsibilities along the Lower Colorado River, to address regulatory requirements under sections 7, 9, and 10 of the Act for their

activities. We issued the 50-year permit (TE–086834) on April 4, 2005. Most of the activities addressed by the Lower Colorado MSCP are outside the range of the flat-tailed horned lizard. The flat-tailed horned lizard habitat contained within the Lower Colorado River MSCP

planning area is under control of agencies, especially the Bureau of Reclamation, that have agreed to implement the Rangewide Management Strategy (USFWS 2005, p. 202).

Implementation of the Lower Colorado River MSCP is expected to provide for the acquisition and long-term protection of 230 acres of existing flat-tailed horned lizard habitat that is currently unprotected. This action is compensation for anticipated impacts to approximately 128 acres of flat-tailed horned lizard habitat (USFWS 2005, pp. 201–202). Purchase of protected habitat, potentially near the Dos Palmas reserve area, is scheduled to start in 2011 (BOR 2010, p. 274). Additionally, activities covered under the permit will be designed to avoid or minimize effects to the species and its habitat in accordance with the conservation needs identified in the Rangewide Management Strategy (USFWS 2005, pp. 201–202).

We found that implementation of the Lower Colorado River MSCP was “Not Likely to Jeopardize the Continued Existence of the Species” (USFWS 2005, p. 202), noting “The habitat area that would be included [under the plan] is not a significant amount of the available habitat for the species. * * * Research and monitoring of the species within the [Lower Colorado River MSCP] area will contribute to understanding the species, its distribution, and habitat needs. * * * [and] There are not likely to be any adverse effects to the species’ conservation elsewhere in the range from the issuance of an incidental take permit for the [Lower Colorado River MSCP]” (USFWS 2005, p. 202).

Population Dynamics

Flat-tailed horned lizards are difficult to detect, which limits the effectiveness of surveys for the species (FTHLIC 2003a, pp. 9, 65; Grant and Doherty 2007, p. 1050). As a result, not only is presence and especially absence difficult to determine, but determining the size, trend, and demography of populations is problematic as well. The history of flat-tailed horned lizard monitoring and the shortcomings of the techniques used are described in the Rangewide Management Strategy (FTHLIC 2003a, p. 64) and our 2003 withdrawal document (68 FR 332–333). Monitoring using more rigorous data collection and analytical methodologies has been conducted as part of the implementation of the Rangewide Management Strategy (FTHLIC 2003a, pp. 64–66; FTHLIC 2008b, pp. 1–38). The results from this monitoring effort are described below.

As detailed in the Flat-tailed Horned Lizard Monitoring Plan (FTHLIC

2008b, pp. 1–38), flat-tailed horned lizard monitoring consists of two surveys used in tandem: (1) Occupancy estimation surveys and (2) demographic plot surveys. Occupancy estimation was designed to determine whether the distribution (but not numbers of individuals or densities) of flat-tailed horned lizards in the management and research areas is stable, increasing, or decreasing. This component of the monitoring was meant to detect large-scale changes in the status of flat-tailed horned lizard distribution in the Management Areas. The monitoring of demographic plots was designed to delineate flat-tailed horned lizard population dynamics and trends by estimating abundance each summer and yearly survival, recruitment, and population growth rate between years. This component was meant to gather more in-depth information on a smaller number of plots. However, the demographic plots were non-randomly established within areas known or suspected to support greater densities of flat-tailed horned lizards. The Management Areas overall were selected because they provided generally high-quality flat-tailed horned lizard habitat. However, the use of the two complementary survey types, one dispersed and coarse and the other focused and narrow, allows managers to draw, with caution, more detailed conclusions about an entire Management Area than they could have otherwise done by interpreting just one of the survey types alone. Below we summarize the information available from these monitoring efforts (source: USFWS 2010a, pp. 1–76).

Occupancy surveys were conducted at West Mesa (2005 and 2009), East Mesa (2006), Yuha Desert (2008), and Ocotillo Wells State Vehicular Recreation Area (SVRA) (2006–2009). Separate occupancy analyses of these areas were conducted based on three survey methodologies: visual observations of flat-tailed horned lizards, lizard scat observations, and a combination of visual and scat observations. Multi-year analyses also were conducted for a subset of 53 plots in Ocotillo Wells SVRA that were surveyed annually from 2006 to 2009. Our analysis indicates the combined visual-and-scat surveys were the most likely to correctly yield a statistically significant result (i.e., this survey methodology had the greatest statistical power). Although there are no comparable historical data with which to provide context, our analysis suggests that the level of occupancy of flat-tailed horned lizards within the surveyed areas seemed relatively high at all sites.

For example, visual-and-scat survey results show that flat-tailed horned lizards occupied at least 80 percent of the Management Areas in the years surveyed, except in the West Mesa Management Area in 2005, which had a low level of survey effort that year. Additionally, results from the 53-plot subset with multi-year data from 2006 to 2009 suggested that the level of flat-tailed horned lizard occupancy stayed about the same or may have even increased slightly over time. Moreover, our analysis showed considerable support to conclude that there was no linear decline in the proportion of survey plots occupied by flat-tailed horned lizards. These results only reflect the occupancy of flat-tailed horned lizards within the areas surveyed and do not necessarily reflect the level of occupancy throughout the range of the species; nevertheless, we conclude from the above results that the level of occupancy within the survey areas is not low, and that there is no indication of a decline.

Data from the demographic plots were gathered from six 9-hectare (22.2-acre) plots at the following flat-tailed horned lizard Management Areas: East Mesa (1 plot, 2007–2009), West Mesa (1 plot, 2007–2009; 1 plot, 2008–2009), Yuha Desert (1 plot, 2007–2009), and Yuma Desert (2 plots, 2008–2009). Hatchlings were captured at all Management Areas except East Mesa (which was surveyed prior to the time that flat-tailed horned lizards eggs would have been likely to have hatched), indicating that flat-tailed horned lizards were reproducing. The presence of hatchlings during 2008, and especially 2009, suggested that reproductive conditions were favorable in those years.

Because of the complexities of analyzing a cryptic species, we used two methodologies to calculate flat-tailed horned lizard abundance. Because the surveyed plots were not closed (meaning flat-tailed horned lizards could move in and out of the areas being surveyed), we used two different methods (calculations) to estimate the “effective survey area” so that we could translate abundance (number of individuals) into densities (number of individuals per unit area). Using the first method (using a mean maximum distance moved buffer strip to estimate effective survey area), the density of adult flat-tailed horned lizards ranged from 0.3 to 3.3 individuals per ha (0.1 to 1.3 individuals per ac), while the second method (using a hierarchical, spatially indexed capture-recapture model to estimate effective survey area) yielded a range from 0.7 to 4.4 individuals per ha (0.3 to 1.8

individuals per ac). The results from the second method are likely to be more realistic because they incorporated additional spatial information.

Other estimates of density of flat-tailed horned lizards are available in the scientific literature, but comparisons between and among the different studies (including the recent monitoring) are confounded by differing survey and analysis methodologies. Nevertheless, the above densities at the three California Management Areas were generally within the range of estimates reported by Grant (2005, pp. 39–40) during 2002–2004. Similarly, the densities of adult flat-tailed horned lizards at the Yuma Desert Management Area reported above were generally similar to the ranges of estimates presented by Young and Young (2000, p. 28) during 1997–1998, Young *et al.* (2004b, p. i) during 2003, and Young and Royle (2006, p. 9) in 2005. Comparisons to even earlier estimations of flat-tailed horned lizard densities, although even more tenuous because of differing methodologies, are also within similar ranges. Despite similar ranges in densities reported from the various studies through time, the increased statistical and methodological rigor of recent efforts has reduced the level of uncertainty in the results. Thus, these recent density estimates are an improvement over older estimates.

The available data indicate that flat-tailed horned lizard abundances and densities have remained relatively stable from 2007 to 2009; however, with only 3 years of standardized monitoring, these data cannot yet provide meaningful inferences about long-term trends. Additionally, no abundance or density information is available for the lower-quality habitat areas outside the demographic plots. However, the complementary coarse-scale occupancy survey data mentioned above suggests flat-tailed horned lizards are widely distributed spatially and, in at least at one Management Area, temporally consistent. This conclusion suggests that flat-tailed horned lizard population trends in the surveyed lower-quality habitat areas are not dissimilar to those of the surveyed higher-quality habitat areas. Moreover, because the recent (2007–2009) and older (1997–2005) density estimates are all generally within similar ranges, this suggests the overall density of flat-tailed horned lizards within the surveyed Management Areas has not markedly decreased over the past decade or so. Thus, with the previously mentioned caveats in mind, we conclude that flat-tailed horned lizard populations in the Management Areas are not low and have

not declined since 2007, and probably not declined since 1997.

Description of Specific “Populations”

As stated earlier, we have divided the current range of the flat-tailed horned lizard into four populations based on geographic locales. The 2003 Rangewide Management Strategy includes a GIS-based map (FTHLICC 2003a, p. 5) of the “current distribution” of the flat-tailed horned lizard. Except for the Coachella Valley Population, where the flat-tailed horned lizard is now limited to two occurrences, we used the GIS data as a basis for our assessment of the distribution of flat-tailed horned lizard populations. A summary of these populations is presented below.

Coachella Valley Population (California)—The “current distribution” within the Coachella Valley as defined by the Rangewide Management Strategy (FTHLICC 2003a, pp. 3–5) does not represent the best scientific distribution information available for this region. Urban and agricultural development has continued in the Coachella Valley, and there are many areas of unsuitable or degraded habitat. In addition to areas of unsuitable habitat, many of which serve as a barrier to flat-tailed horned lizard movement, other potential manmade barriers exist, including several major highways, a railway, and canals. The only area within the Coachella Valley proper that is now known to be occupied by flat-tailed horned lizards is in the Thousand Palms reserve (CVCC 2010, p. 13). Other areas of potentially suitable habitat occur in the region, including areas that were formerly known to be occupied (Barrows *et al.* 2008, p. 1891), although recent surveys have not detected any flat-tailed horned lizards (CVCC 2010, p. 13). Thus, the “current distribution” as defined by the Rangewide Management Strategy (FTHLICC 2003a, pp. 3–5) does not accurately reflect the area occupied by flat-tailed horned lizards in the Coachella Valley; as such, we do not use a GIS-based assessment for the Coachella Valley as we do for the other geographical “populations.”

The Coachella Valley MSHCP is the primary driver of monitoring and management activities for the Coachella Valley Population of the flat-tailed horned lizard because the Rangewide Management Strategy does not include any Management Areas in this region. The Coachella Valley Population area is the smallest of the four geographic “populations,” and we primarily identify it as a separate population to be consistent with our past analyses. Flat-tailed horned lizards also occur in the vicinity of the Dos Palmas Preserve near

the northeast shore of the Salton Sea (Turner and Medica 1982, p. 817; FTHLICC 2003a, pp. 2–6; CVCC 2010, p. 13). The Dos Palmas population is small and likely isolated from other populations because of the presence of the Salton Sea to the west; canals, roads and urban and agricultural development to the northwest; and canals, roads and urban and agricultural development to the southeast. However, not all of these barriers are likely to completely restrict flat-tailed horned lizard movement (see the Factor E discussion, below). The genetic affinities of the Dos Palmas population are not known. Geographically, the flat-tailed horned lizards at Dos Palmas Preserve could arguably be considered part of either the Western Population or Eastern Population (see below); however, because the true affinities of this population are not known, and because the Dos Palmas reserve area is covered under the Coachella Valley MSHCP and its associated monitoring and management, herein we consider the Dos Palmas flat-tailed horned lizards to be part of the Coachella Valley Population. The area of flat-tailed horned lizard habitat in the Coachella Valley Population is about 3,785 ha (9,353 ac) (see Table 2).

Western Population (California and Baja California)—This population includes flat-tailed horned lizards in the areas west of the Salton Sea, the Imperial Valley, and the Mexicali Valley. Using a GIS-based assessment to estimate the area of this portion of the “current distribution” as defined by the Rangewide Management Strategy (FTHLICC 2003a, pp. 3–5), we estimated that the Western Population occupies 341,989 ha (845,073 ac). Of this acreage, approximately 253,020 ha (625,226 ac) is within the United States. Within the U.S. portion of the Western Population, approximately 48,262 ha (119,258 ac), or about 19 percent, is non-Federal or non-State owned, or is more likely to be developed. The habitat within this area is mostly intact except for a few developed areas, but as discussed in the “Barriers and Small Populations” section under Factor E, potential manmade barriers to flat-tailed horned lizard movement (in addition to areas of urban and agricultural development) include Interstate 8; State Routes 78, 86, and 98; two railways; the fence and other activities along the international border in the United States, and Mexico Federal Highway 2 in Mexico. The Rangewide Management Strategy designates three Management Areas in this population area, including Borrego Badlands, West Mesa, and Yuha Desert

(see Table 1), and a research area at the Ocotillo Wells SVRA. Much of the westernmost portion of this population is within Anza-Borrego Desert State Park. Additionally, private lands are scattered throughout the U.S. portion, with large aggregations in the Borrego Springs area and in the vicinity of (but outside of) Ocotillo Wells SVRA. The range of the flat-tailed horned lizard in this population also extends southward into Mexico, crossing the international border at the Yuha Desert and continuing south along the east side of the Peninsular Ranges and west of Laguna Salada in Baja California (FTHLICC 2003a, pp. 2–5). The status of the population in this portion of the range in Mexico is poorly known, but there have been few substantive changes to the landscape in this area. Additionally, flat-tailed horned lizards were observed recently near Cerro Prieto, Baja California, which is east of the Sierra de Los Cucapahs (Sierra Cucapá) and west of the agricultural areas of the Mexicali Valley (A. Calvo Fonseca, Pronatura Noroeste, *in litt.* 2010). This recent detection is outside of the current distribution as depicted in the Rangewide Management Strategy (FTHLICC 2003a, p. 5).

Eastern Population (California and Baja California)—This population includes flat-tailed horned lizards in the areas east of the Salton Sea and the Imperial Valley but west of the Colorado River. While the isolated population at Dos Palmas Preserve could be included as part of either the Eastern Population or the Coachella Valley Population based on its geographic location, for the purposes of our analysis of threats to the species we consider the Dos Palmas Preserve population to be part of the Coachella Valley Population because of the similarity of potential threats when compared to the populations in the Coachella Valley, and its inclusion within the Coachella Valley MSHCP plan area. Using a GIS-based assessment to estimate the area of the Eastern Population portion of the “current distribution” (as defined by the Rangewide Management Strategy (FTHLICC 2003a, pp. 3–5)), we estimated that the Eastern Population occupies 169,617 ha (419,133 ac). Of this acreage, approximately 146,121 ha (361,073 ac) is within the United States. Within the U.S. portion of the Eastern Population, approximately 5,844 ha (14,441 ac), or about 4 percent, is non-Federal or non-State owned, or is more likely to be developed. The area occupied by the Eastern Population is mostly intact except for a few developed areas, but potential manmade barriers to

flat-tailed horned lizard movement (in addition to areas of urban and agricultural development) include Interstate 8, State Routes 78 and 98, the All-American Canal and the Coachella Canal, and the international border fence in the United States (see “Barriers and Small Populations” section under Factor E, below). The Rangewide Management Strategy designated the East Mesa Management Area within the area occupied by the Eastern Population (see Table 1). The geographic extent of the Eastern Population also includes the Algodones Dunes (also known as the Imperial Sand Dunes or Glamis Sand Dunes), a portion of which is designated Wilderness, and a narrow strip of habitat south of the international border at the southern edge of the Algodones Dunes (FTHLICC 2003a, pp. 2–5). The portion of the Eastern Population area in Mexico is bound by agricultural development (unsuitable habitat) on the west, south, and east. The status of the portion of the Eastern Population in Mexico is poorly known, but flat-tailed horned lizards were observed recently in this area (A. Calvo Fonseca, *in litt.* 2010).

Southeastern Population (Arizona and Sonora)—This population includes flat-tailed horned lizards in the areas east of the Colorado River, extending from Yuma, Arizona, south and east to the Gulf of California in northwestern Mexico. In Arizona, the flat-tailed horned lizard occurs in Yuma County, ranging over the Yuma Desert south of the Gila River and west of the Gila and Butler Mountains (Rorabaugh *et al.* 1987, p. 104; FTHLICC 2003a, pp. 2–6). The Rangewide Management Strategy designated the Yuma Desert Management Area within the area occupied by the Southeastern Population (see Table 1). In Mexico, the flat-tailed horned lizard ranges from the international border in the Yuma Desert south and east through the Pinacate Region to the sandy plains around Puerto Peñasco and Bahía de San Jorge along the Gulf of California (Johnson and Spicer 1985, p. 13; Gonzáles-Romero and Alvarez-Cardenas 1989, p. 519; FTHLICC 2003a, pp. 2–5). About 60 percent of the flat-tailed horned lizard habitat in Sonora lies within two Mexican Federal natural protected areas: the Upper Gulf of California and Colorado Delta Biosphere Reserve, and the Pinacate and Gran Desierto de Altar Biosphere Reserve (CEDO 2001, p. 3).

Using a GIS-based assessment to estimate the area of this portion of the “current distribution” as defined by the Rangewide Management Strategy (FTHLICC 2003a, pp. 3–5), we estimated that the area occupied by the

Southeastern Population is 1,073,551 ha (2,652,802 ac), by far the largest of the four population areas. Of this acreage, approximately 67,922 ha (167,839 ac) is within the United States. Within the U.S. portion of the Southeastern Population, approximately 5,158 ha (12,746 ac), or about 8 percent, is privately owned; an additional 5,832 ha (14,411 ac), or about 9 percent, is State of Arizona-owned lands. The habitat within the Southeastern Population area is mostly intact except for a few developed areas, but potential barriers to flat-tailed horned lizard movement (in addition to areas of urban and agricultural development) include Interstate 8 and the Yuma Areas Service Highway in the United States; the international border (combined with Mexico Federal Highway 2); Mexico Federal Highway 8; and a railway in Mexico (see “Barriers and Small Populations” section under Factor E, below).

In summary, using a GIS-based assessment to estimate the size of the current distribution of the flat-tailed horned lizard as defined by the Rangewide Management Strategy (FTHLICC 2003a, p. 5), we estimated that the three population areas (excluding the Coachella Valley Population) comprise roughly 1,585,000 ha (3,916,600 ac), of which approximately 467,000 ha (1,154,000 ac) (less than 30 percent) is within the United States and approximately 1,100,000 ha (2,718,000 ac) (more than 70 percent) is within Mexico. The area of flat-tailed horned lizard habitat occupied or likely to be occupied that already is or is expected to be conserved in the Coachella Valley Population is about 3,785 ha (9,353 ac) (see Table 2).

Previous Federal Actions

In 1982, we first identified the flat-tailed horned lizard as a category 2 candidate species for listing under the Act (47 FR 58454; December 30, 1982). Category 2 candidate species were “taxa for which information now in possession of the Service indicates that proposing to list the species as Endangered or Threatened is possibly appropriate, but for which sufficient data on are not currently available to biologically support a proposed rule” (47 FR 58454). We again identified the flat-tailed horned lizard as a category 2 candidate species in our 1985 notice of review (50 FR 37958; September 18, 1985). In 1989, we elevated the species to category 1 status (54 FR 554; January 6, 1989). Category 1 included species “for which the Service currently has substantial information on hand to support the biological appropriateness

of proposing to list as endangered or threatened" (54 FR 554). We maintained the category 1 status for the flat-tailed horned lizard in our 1991 notice of review (56 FR 58804; November 21, 1991).

On November 29, 1993, we published in the **Federal Register** a proposed rule to list the flat-tailed horned lizard as a threatened species under the Act (58 FR 62624). On February 22, 1994 (59 FR 8450), we published a notice reopening the public comment period and announcing that we had scheduled a public hearing on March 22, 1994, in Imperial, California, in response to a request from the public. Our November 15, 1994, candidate notice of review stated that we had proposed to list the species as threatened (59 FR 58982).

Subsequently, the passage of Public Law 104–6, 109 Stat. 73 on April 10, 1995, resulted in a delay in our final listing determination for the flat-tailed horned lizard. Although the statute's primary purpose was to provide additional funds for overseas military operations, it also included a rider that withdrew funding for listing determinations. Through a series of moratoria, funding restrictions, and continuing resolutions, this restriction in use of funds remained in effect until April 26, 1996, when the Omnibus Appropriations Act was enacted (Pub. L. 104–134, 110 Stat. 1321, (1996)), which contained a moratorium on certain listing activities but allowed the President to waive the moratorium. On April 26, 1996, President Clinton suspended the provision limiting implementation of Section 4 of the Act (61 FR 24667; May 16, 1996). Earlier in 1996, our notice of review had indicated that we had proposed to list the species as threatened (61 FR 7596; February 28, 1996).

On January 21, 1997, the Bureau of Land Management (BLM) announced in the **Federal Register** that the draft Flat-tailed Horned Lizard Rangewide Management Strategy was available for public comment (62 FR 3052). On May 16, 1997, in response to a lawsuit filed by the Defenders of Wildlife and other plaintiffs to compel us to make a final listing determination on the flat-tailed horned lizard, the District Court in Arizona ordered us to issue a final listing decision within 60 days. In June 1997, several State and Federal agencies, including the Service, signed an Interagency Conservation Agreement committing to implement the recently finalized Flat-tailed Horned Lizard Rangewide Management Strategy (FTHLICC 1997, pp. 1–106). Pursuant to the Interagency Conservation Agreement, cooperating parties agreed

to take voluntary steps aimed at "reducing threats to the species, stabilizing the species' populations, and maintaining its ecosystem" (see FTHLICC 2003a, p. 80).

On July 15, 1997, we issued a final decision to withdraw the proposed rule to list the flat-tailed horned lizard as a threatened species (62 FR 37852). We based the withdrawal on three factors: (1) Population trend data did not conclusively demonstrate significant population declines; (2) Some of the threats to the flat-tailed horned lizard habitat had abated since the proposed rule was issued; and (3) Our conclusion that the recently approved Interagency Conservation Agreement would ensure further reductions in threats (62 FR 37852).

On December 30, 1997, the Defenders of Wildlife and others filed a complaint in the U.S. District Court for the Southern District of California challenging our 1997 withdrawal of the proposed rule. On June 16, 1999, the District Court upheld our decision to withdraw the proposed listing rule. The District Court's decision was appealed and on July 31, 2001, the Ninth Circuit Court of Appeals vacated the previous ruling of the District Court. The case was remanded back to the Secretary because: (1) The withdrawal of the proposed rule did not expressly consider whether the flat-tailed horned lizard is likely to become an endangered species within the foreseeable future in a significant portion of its range; and (2) The withdrawal of the proposed rule did not "address the lizard's viability in a site-specific manner with regard to the putative benefits of the Interagency Conservation Agreement." In accordance with the Appeals Court's ruling, we published a document in the **Federal Register** on December 26, 2001, reinstating the 1993 proposed rule and opening a 120-day public comment period (66 FR 66384).

On May 30, 2002, we published a document in the **Federal Register** reopening the public comment period for an additional 60 days (67 FR 37752) and announced that we would be holding public hearings in El Centro, California, on June 19, 2002. On September 24, 2002, we published in the **Federal Register** another document (67 FR 59809) announcing the reopening of the public comment period for an additional 15 days to allow for peer review, additional public comment on the proposed rule, and submittal of information that became available since our 1997 withdrawal.

On January 3, 2003, we again published in the **Federal Register** a decision to withdraw the November 29,

1993, proposed rule to list the flat-tailed horned lizard as a threatened species (68 FR 331). The Service found the lizard to be "in danger of extirpation in the Coachella Valley" (68 FR 348); however, we determined that the Coachella Valley is not a significant portion of the species' range. We concluded in the January 3, 2003, withdrawal that the flat-tailed horned lizard populations on either side of the Imperial Valley-Salton Sea and in Arizona were not likely to become endangered in the foreseeable future and that listing the species was not warranted.

The Tucson Herpetological Society and others filed a complaint with the District Court for the District of Arizona challenging the January 3, 2003, withdrawal of the proposed rule. In a ruling issued on August 30, 2005, the District Court for the District of Arizona issued an order granting plaintiffs' motion for summary judgment, citing our failure to specifically evaluate the lost habitat of the flat-tailed horned lizard, and whether the amount of lost habitat represented a significant portion of the species' range. On December 7, 2005, we published a document in the **Federal Register** reinstating the 1993 proposed rule (70 FR 72776). On March 2, 2006, we announced in the **Federal Register** that we were reopening the public comment period on the 1993 proposed rule for 14 days for the purpose of soliciting comments and information relevant to the specific issue identified in the District Court's November 2005 ruling (*i.e.*, whether the flat-tailed horned lizard's lost historical habitat rendered the species likely to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range) (71 FR 10631). On April 21, 2006, we announced in the **Federal Register** an additional public comment period on the 1993 proposed rule from April 21, 2006, to May 8, 2006 (71 FR 20637).

After re-examining the lost historical habitat of the flat-tailed horned lizard in relation to our January 3, 2003, withdrawal, we determined that the lost historical habitat is not a significant portion of the species' range, and its loss does not result in the species likely becoming endangered in the foreseeable future throughout all or a significant portion of its range. We published our decision in the **Federal Register** on June 28, 2006, to once again withdraw the November 29, 1993, proposed rule to list the flat-tailed horned lizard as a threatened species (71 FR 36745).

Following a supplemental complaint from Tucson Herpetological Society and others challenging the 2006 withdrawal

of the proposed rule to list the flat-tailed horned lizard under the Act, the United States District Court for the District of Arizona (the District Court) granted summary judgment in favor of the Secretary of the Interior (*Tuscon Herpetological Society v. Kempthorne*, 04-CV-00075-PHX-NVW); however, this ruling was appealed to the Court of Appeals for the Ninth Circuit. In a ruling issued on May 18, 2009, the Court of Appeals for the Ninth Circuit reversed the District Court's ruling when it determined that in the context of the analysis of whether the lizard's lost historical range constituted a significant portion of the species' range, the administrative record did not support what the Court of Appeals for the Ninth Circuit viewed as the Service's conclusion that flat-tailed horned lizard populations were stable and viable throughout most of its current range.

On November 3, 2009, the District Court remanded the 2006 withdrawal to the Service for further consideration and reinstated the 1993 proposal to list the species. The District Court ordered the Service to complete this reconsideration in accordance with the deadlines set forth in 16 U.S.C. 1533(b). On March 2, 2010, we published a notice in the **Federal Register** announcing the reinstatement of the 1993 proposed rule, the reopening of the public comment period for 60 days, and the scheduling of public hearings (75 FR 9377). Public hearings were held in Palm Desert, California, on March 23, 2010, and Yuma, Arizona, on March 24, 2010.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1531 *et seq.*) and the regulations that implement the listing provisions of the Act (50 CFR part 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act (Factors A through E).

We evaluated threats to the flat-tailed horned lizard under the five listing factors in the 1993 proposed rule to list the flat-tailed horned lizard as threatened under the Act (58 FR 62624). Subsequent documents in 1997 and 2003 withdrawing the proposed rule to list the species included additional evaluations (62 FR 37852; 68 FR 331). The 2003 document withdrawing the proposed rule was the most comprehensive and the most recent five-factor analysis. The 2006 document

withdrawing the proposed rule (71 FR 36745) did not address the five factors in detail because its scope was limited by a court order (*see* Previous Federal Actions section). In this document, we use the best scientific and commercial data available to evaluate current potential threats to flat-tailed horned lizard and its habitat rangewide per the five listing factors, and we provide brief summaries of the 1993 and 2003 evaluations for context.

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

For this factor, we evaluated the present (current) or threatened (anticipated) impacts that may be affecting the habitat or range of the flat-tailed horned lizard. This factor does not address historical or past actions that resulted in destruction, modification, or curtailment of the species' habitat or range. Past actions that destroyed, modified, or curtailed the species' habitat or range are not threats in and of themselves. Any persisting ramifications of such past actions that may be threats to the species are addressed under Factor E (other natural or manmade threats), below. However, for Factor A, we do look to past actions to inform our evaluation of potential future threats affecting the species' habitat or range in that the history of past actions allows us to predict the likelihood of such actions continuing into the foreseeable future.

In the 1993 proposed rule (58 FR 62625–62626), we identified historical flat-tailed horned lizard habitat losses that resulted in the curtailment of the species' range under Factor A. We noted threats that were current or anticipated at that time, including agricultural and urban development, off-highway vehicle (OHV) use, geothermal energy development, sand and gravel extraction operations, military training activities, and construction of roads and utility corridors. We also mentioned that flat-tailed horned lizard habitat had been fragmented, causing isolation of populations (curtailment of the species' range) (*see* below for additional discussion on fragmentation). Additionally, the 1993 proposed rule also mentioned gold mining as a potential threat. There are currently no gold mines in flat-tailed horned lizard habitat, and we are not aware of any proposals for new gold mines; therefore, we do not expect gold mines to become a threat in the foreseeable future.

In the 2003 withdrawal document (68 FR 341–345), we found that current and anticipated urban and agricultural development was limited to a few, small

areas and did not constitute a significant threat to the species. However, we did state that past agricultural, urban, and associated infrastructural development (such as canals and roads) had fragmented the species' range, which we discuss below as a separate threat under Factor A.

Fragmentation and Past Habitat Loss

Because of our past treatment of fragmentation in our previous rules, we are providing a discussion of *fragmentation* as a term and its application to the five-factor analysis for the flat-tailed horned lizard. This discussion should: (1) Provide a clear definition of the term that we use in this document, and (2) acknowledge that our lack of clarity for this term in past documents may have resulted in unanswered questions as to how the flat-tailed horned lizard may have been affected by historical development in the Salton Trough. Because of the connection between fragmentation and historical habitat loss, we also describe how historical habitat loss was addressed in past assessments.

In the 2003 withdrawal document, we defined fragmentation as the "breaking up of a habitat or ecosystem into smaller parcels" (68 FR 341). This definition is similar to the more detailed version used by Wilcove *et al.* (1986, p. 237) who defined habitat fragmentation as occurring "when a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original." Thus, fragmentation is a process, one that inextricably involves habitat loss (Fahrig 1999, p. 87). However, in addition to the effects associated with habitat loss, fragmentation also includes the effects associated with the fractured nature of that habitat *after its transformation* (Fahrig 2003, p. 487). The implication is that the biological properties of the remaining, small, isolated patches of habitat have changed during or as a result of the fragmentation of the habitat (van den Berg *et al.* 2001, p. 225). In other words, after some portion of the habitat of a species has been destroyed, that species may be impacted by one or more secondary effects (threats) associated with reduction in the size of remaining habitat patches (or the populations of the species therein) and the isolation of those patches (and populations) from each other (Andrén 1994, p. 355). Thus, the effects of fragmentation include: (1) The effects associated with the ongoing loss of habitat; and (2) the subsequent, secondary effects that are the current ramifications of past habitat loss.

Because multiple secondary effects may be related or correlated to each other (Fahrig 2003, pp. 491–492), the term fragmentation, as it has been used in the scientific literature and by the Service in past assessments of this species, is ambiguous (Haila 2002, p. 321). Because of this ambiguity, in applying the Act's five listing factors to the flat-tailed horned lizard, we will address current and anticipated habitat loss under Factor A, and the relevant, identifiable secondary effects (including threats associated with fragmentation) to the species under Factor E.

Our past assessments describe in detail and attempted to quantify the historical development in the Salton Trough (58 FR 62626; 62 FR 37857; 68 FR 341–345; 71 FR 36751), as did the scientific literature (such as Johnson and Spicer 1985, p. 38, 45–48; Rorabaugh *et al.* 1987, p. 106; Hodges 1995, pp. 1–18; Hodges 1997, pp. 1–16; Piest and Knowels 2002, pp. 1–4; FTHLICC 2003a, pp. 2–3; Piest and Knowels 2006, pp. 1–4). These documents have, to a greater or lesser extent, estimated the areal extent of current and historical flat-tailed horned lizard habitat in all or certain portions of its range. One of the more detailed of such analyses was Hodges (1997, pp. 15–16), who concluded that 503,161 ha (1,243,341 ac) out of 979,016 ha (2,419,200 ac), or about 51 percent, of flat-tailed horned lizard habitat in the United States had been destroyed by past development.

However, such calculations, no matter how carefully crafted, are necessarily based on assumptions of what areas constituted historical habitat for the species (such as Hodges 1997, p. 10). Because much of the area within the range of the flat-tailed horned lizard was converted to agricultural and urban development during the early half of the 20th century (*see* Background section, above) prior to any systematic surveys for the flat-tailed horned lizard, little reliable information exists on the historical distribution of the species (Barrows *et al.* 2008, p. 1886).

We questioned the validity of such assumptions in our past assessments. For example, Hodges (1997, pp. 5, 7, and 16) included the area now inundated by Salton Sea as historical habitat, but we stated in our 2003 withdrawal that the Salton Sea area could arguably be considered ephemeral historical habitat. In our 2006 withdrawal, we concluded that the former lakebed of historical Lake Cahuilla (including and beyond the present-day Salton Sea) likely was not habitat important to the flat-tailed horned lizard (71 FR 36750–36751). The

information on the genetics of flat-tailed horned lizard populations raises further doubts about the validity of the assumptions made in earlier assessments, both by us and by others, of historical flat-tailed horned lizard habitat.

As discussed above (*see* Background section), genetic data readily support three of the four geographic populations as distinct, indicating that these populations generally had little genetic interchange among each other (Mulcahy *et al.* 2006, pp. 1807–1826; Culver and Dee 2008, pp. 1–14). This lack of genetic exchange suggests a barrier separated, and likely still separates, these populations. As discussed in the Background section, the areas within the present-day Imperial Valley, Mexicali Valley, and San Luis Valley were historically interlaced by a network of Colorado River-influenced water courses, including the Alamo River, the New River, and the Río Hardy (or their precursors or equivalents). Historically, these “rivers” were dependent upon the Colorado River for water and only transported water periodically. Prior to the increase of agricultural development and prior to the digging of the irrigation canal and subsequent flood that created the Salton Sea early in the 20th century (*see* Background section), some areas along these river channels were characterized by Parish (1914, p. 88) as having “channels, sloughs, and lagoons.” These hydrologically influenced areas likely did not contain flat-tailed horned lizard habitat, as defined in the Background section. As such, not all of the area between the present-day Salton Sea and the Gulf of California, including areas outside the lakebed of historical Lake Cahuilla, historically supported flat-tailed horned lizard habitat. This information further supports our conclusion presented in our 2006 withdrawal that the “area of the historical range periodically inundated by Lake Cahuilla was not important to the long-term viability of the flat-tailed horned lizard because this area was frequently unavailable and likely contained little quality habitat” (71 FR 36750).

Because of the extensive manmade changes to the landscape, we cannot precisely determine with any degree of specificity how much of the area was historically flat-tailed horned lizard habitat. Moreover, we maintain that much uncertainty exists with any attempt to precisely quantify the amount of flat-tailed horned lizard habitat that has been destroyed by historical agricultural development, as has been attempted in the past. We

agree with the conclusions of previous assessments, both by us and by others, that portions of the Coachella, Imperial, Mexicali, Yuma, and San Luis Valleys once provided suitable areas of flat-tailed horned lizard habitat. We also agree that historical agricultural development (and, to a lesser extent, urban development) destroyed large areas with flat-tailed horned lizard habitat, thus curtailing the size of the Coachella Valley, Western, Eastern, and Southeastern flat-tailed horned lizard populations in both the United States and Mexico. However, the effects of past actions are better addressed under Factor E.

In the sections below, we address the present or threatened destruction, modification, or curtailment of the habitat or range of the flat-tailed horned lizard. We evaluate the current and anticipated effects associated with several types of land development, the invasion of nonnative plants, OHV activity, and military training. We first describe the respective threats in general terms and then assess those threats to the habitat or range of the flat-tailed horned lizard, focusing on subareas (such as identified populations or Management Areas) within the species' range, where appropriate.

Development

We define development as commercial and residential development (*i.e.*, urban development), and the conversion of land for any agricultural purpose. Such development not only includes the obvious associated infrastructure (e.g., roads, pipelines, canals, and power lines), but also reservoirs, power generation facilities, and resource extraction operations such as drilling and mining.

For the purpose of evaluating the threats to a species and its habitat, we focus on the developmental activities that threaten to convert land from a natural or undeveloped state to land no longer suitable as habitat for the species. We consider both the direct and, where appropriate (within the context of Factor A), the indirect effects of such developmental activities. While land development typically has a similar effect, that is the destruction or modification of habitat, differing land uses resulting from development activities can lead to different indirect effects. We therefore distinguish among the types of development when evaluating the effects of such development on a species or its habitat.

For this evaluation of flat-tailed horned lizard under Factor A, we determine whether development is a current or anticipated threat to flat-

tailed horned lizard habitat. Below, we address agricultural and urban development, as well as development associated with energy generation projects.

Agricultural Development

Within the dry Colorado Desert, agricultural activity is substantially dependent upon irrigation water imported from the Colorado River. As discussed in the Background section, most of the agricultural development within the range of the flat-tailed horned lizard occurred early in the 20th century. Because Colorado River water is a finite resource, agricultural development is no longer expanding into new areas and destroying flat-tailed horned lizard habitat to any substantial degree. Information available from the Coachella Valley Water District (CVWD 2002, p. 1; 2003, p. 1; 2004, p. 1; 2005, p. 25; 2006, p. 27; 2007, p. 25; 2008, p. 25; 2009, p. 25) indicates a slight decline in the amount of irrigable acres and a fairly steady though variable amount of water delivered from 2001 to 2008, indicating that new agricultural development has not occurred in the Coachella Valley within the past decade or so. Also, fields are being fallowed in the Imperial Valley because less water is available for irrigation in this area (IID 2006, p. 1). Thus, conversion of land for agriculture is no longer considered a threat to flat-tailed horned lizard habitat in the Coachella Valley and in the Imperial Valley portions of the Western and Eastern Populations, and is not considered to be a threat in the foreseeable future.

In contrast, recent agricultural development has destroyed flat-tailed horned lizard habitat in other areas. Between 2002 and 2006, an unreported but minority fraction of 1,534 ha (3,790 ac) of flat-tailed horned lizard habitat was developed for agricultural use in Arizona (Piest and Knowles 2006, p. 1). Rodriguez (2002, p. 21) also recorded recent agricultural development in Mexico; however, the majority of the agricultural development in the Mexicali and San Luis Valleys occurred in the early to mid-20th century, closely following the historical agricultural development north of the border (Furnish and Ladman 1975, pp. 84–88). Additionally, about 60 percent of the flat-tailed horned lizard habitat in Mexico lies within two Mexican Federal natural protected areas, the Upper Gulf of California and Colorado Delta Biosphere Reserve (la Reserva de la Biosfera del Alto Golfo de California y Delta del Río Colorado), and the Pinacate and Gran Desierto de Altar Biosphere Reserve (la Reserva de la

Biosfera El Pinacate y Gran Desierto de Altar) (CEDO 2001, p. 3), where agricultural development is limited by Mexican law.

Agricultural activities outside of the areas receiving Colorado River water are severely restricted by the climate of the Salton Trough region, including in Mexico. Thus, while recent agricultural development destroyed areas of flat-tailed horned lizard habitat in the Southeastern Population, the overall acreages were small, especially compared to the amount of habitat available in the Southeastern Population.

Agricultural development, most of which occurred between 1945 and the 1980s (Mills 2009, p. 28), occurred in the Borrego Springs area of the habitat occupied by the Western Population. The Borrego Springs area uses a local aquifer for irrigation, and the area does not receive Colorado River water; however, the aquifer is overdrawn (County of San Diego 2008, p. 8; Mills 2009, p. 4). We do not anticipate substantial amounts of agriculture to expand into adjoining natural lands in this area (see Mills 2009, pp. 40–42). Moreover, the area of private lands in the Borrego Valley is constrained within Anza-Borrego Desert State Park. As a result, we believe that agricultural development no longer threatens flat-tailed horned lizard habitat in the Borrego Springs portion of the Western Population, nor will it in the foreseeable future.

In conclusion, the available information indicates that the vast majority of the agricultural development within the range of the flat-tailed horned lizard took place in the historical past and only a small amount of development has been documented in recent times. Because conversion of land to agriculture in the region is limited by the availability of irrigation water and that water is limited, we do not expect agriculture to expand significantly into adjoining flat-tailed horned lizard habitat in the future. Moreover, increased demand for water outside the region has resulted in a decreased amount of Colorado River water available for agriculture in the Imperial Valley, which has resulted in the fallowing of fields in this area. Therefore, we conclude that agricultural development is not a substantial threat to the flat-tailed horned lizard throughout its range, nor is it anticipated to be in the foreseeable future.

Urban Development

Like agricultural development, urban development largely occurred in the

historic past. Many of the urban centers in the region that serve agricultural communities are contained within agricultural areas. While urbanization has continued as the human population within the region has grown (FTHLICC 2003a, p. 12; Indrelunas 2010, pp. 1–3), most of this urban development associated with these urban centers has come at the expense of former croplands. As such, this development is not currently destroying substantial amounts of available flat-tailed horned lizard habitat (FTHLICC 2003a, p. 12). However, certain areas of urban development not associated with active or past agriculture have resulted in the destruction of flat-tailed horned lizard habitat. This impact is most evident in the Coachella Valley where urban development not associated with agricultural communities continues today (Indrelunas 2010, pp. 1–3). This growth is corroborated by the number of domestic water meter services, which grew by over 25 percent from 2001 to 2008 (CVWD 2002, p. 1; 2003, p. 1; 2004, p. 1; 2005, p. 25; 2006, p. 27; 2007, p. 25; 2008, p. 25; 2009, p. 25). This urban growth is occurring in the surrounding desert areas, which likely include flat-tailed horned lizard habitat. Our interpretation of past and recent aerial imagery supports this trend.

The flat-tailed horned lizard now appears to be restricted to two occurrences within the Coachella Valley MSHCP plan area, the Thousand Palms conservation area and the Dos Palmas conservation area (CVCC 2010, p. 13). The Coachella Valley MSHCP includes numerous measures to minimize and mitigate impacts of urban development on the flat-tailed horned lizard (see Coachella Valley Multiple Species Habitat Conservation Plan (Coachella Valley MSHCP) section above for a detailed discussion). Approximately 94 percent of the potential habitat where flat-tailed horned lizards are known to occur in the Thousand Palms conservation area is land that is already protected (Table 2), including about 62 percent that is part of the Coachella Valley National Wildlife Refuge. Similarly, approximately 34 percent of the habitat at Dos Palmas is protected (Table 2). The high level of protection of flat-tailed horned lizard habitat at the Thousand Palms conservation area translates into a low magnitude of threat from urban development at this location. In contrast, because only about one-third of the flat-tailed horned lizard habitat at the Dos Palmas conservation area is currently in protected status, the potential magnitude of urban development at the latter location is

greater. However, because this area of habitat is farther away from existing urban areas, the immediacy of the threat of urban development is likely lower, even without the protections for flat-tailed horned lizard included in the Coachella Valley MSHCP plan (which requires the protection of the Dos Palmas conservation area). Therefore, the overall threat from urban development of flat-tailed horned lizard habitat in the Coachella Valley Population is low.

Most of the area occupied by the U.S. portion of the Western Population of flat-tailed horned lizards is owned by the State of California (more than 27 percent) or by the Federal government (more than 52 percent), and the vast majority of the U.S. portion of the Eastern Population is federally owned (more than 95 percent). Much of the State of California land in the Western Population is administered by California State Parks, including Anza-Borrego Desert State Park and Ocotillo Wells State Vehicular Recreation Area. We do not expect any substantive urban development activities on State Park-administered lands. However, such development, should it occur, would likely follow the avoidance, minimization, and compensation measures of the Rangewide Management Strategy because California State Parks is a signatory agency to the Interagency Conservation Agreement.

Additionally, much of the Federal land is administered by the BLM, which is a signatory to the Interagency Conservation Agreement. Moreover, the BLM has incorporated the Rangewide Management Strategy into the California Desert Conservation Area (CDCA) Plan under the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 *et seq.*) (FLPMA). The CDCA Plan directs BLM's permitting of development projects on the lands the plan covers, including the U.S. portions of the Western and Eastern Populations. Thus, the avoidance, minimization, and compensation measures in the Rangewide Management Strategy are implemented by BLM on these lands, which reduces the impact such development to flat-tailed horned lizard habitat. Other federally owned lands in these areas are lands owned by the Navy, which is also a signatory to the Interagency Conservation Agreement. Not only do we anticipate that the Navy's participation in the Rangewide Management Strategy will continue, which will limit the amount of impact to flat-tailed horned lizard habitat, but the Navy's use of these lands, largely as bombing ranges, will result in little urban development on these lands. As

such, we expect the amount of impact from urban development on areas of flat-tailed horned lizard habitat owned by the State of California and the Federal government in the Western and Eastern Population to be small now and within the foreseeable future because little urban development is likely on State Park lands and most military lands, and what development that may occur on Federal lands will be minimized through implementation of the Rangewide Management Strategy, including through implementation of the CDCA Plan on BLM lands.

Moreover, the designation of the Borrego Badlands, West Mesa, and Yuha Desert Management Areas offer protective mechanisms for 96,599 ha (238,700 ac) (Table 1) of flat-tailed horned lizard habitat within this population. Impacts from permittee actions are limited to 1 percent of the area within Management Areas (FTHLICC 2003a, p. 33). As described above, we expect minimal or no urban development on Federal and California State lands within the area occupied by the Western Population and Eastern Population, but urban development may occur within private lands. Although private inholdings are scattered throughout the Federal and State lands in the region, few concentrations of private land exist. The largest concentration of private inholdings within the areas occupied by the Western Population occurs in and around the community of Borrego Springs, California. Urban development in this area is limited to a finite area within the Borrego Springs area, which is an area of private lands completely surrounded by Anza-Borrego Desert State Park. Additionally, development in this area may be further restricted by a limitation in the amount of available groundwater (Mills 2009, p. 4). As we concluded in 2003 (68 FR 342), even if urban development continues, this area is small enough that it is unlikely that the combined urban or agricultural development in or around this geographically limited area poses a significant threat to the flat-tailed horned lizard throughout its range. Moreover, limited water and isolation of the remaining private lands scattered within the public lands likely will prevent any large-scale urban development in the region, further reducing the effects that urbanization may have on the Western Population of the flat-tailed horned lizard. Because the Mexican portion of the Western Population is isolated from other inhabited areas by the Sierra de Los Cucapahs and the dry lakebed of Laguna

Salada, we believe urban development in this area is likely similarly limited by available resources and isolation. Thus, we conclude that urban development is not a threat to the species in the Western Population, nor is it likely to become a threat in the foreseeable future.

As discussed above, we expect impacts from urban development on Federal lands in the Eastern Population to be limited. Moreover, the designation of the East Mesa Management Area offers protective mechanisms for 45,248 ha (111,810 ac) (Table 1), or about 27 percent of the Eastern Population, of flat-tailed horned lizard habitat within this population. Impacts from permittee actions are limited to 1 percent of the area within each Management Area (FTHLICC 2003a, p. 33). Additionally, 10,654 ha (26,327 ac), or about 6 percent of the Eastern Population, is designated as a Wilderness Area where urban development is prohibited. Most urban development occurs on private property, and less than 5 percent of the U.S. portion of the Eastern Population area occurs on private property. Limited water and isolation of the private lands likely prevent any substantive urban development in the region, including the small amount of habitat in Mexico. Thus, we conclude that urban development is not a threat to the species in the Eastern Population, nor is it likely to become a threat in the foreseeable future.

Urban development has occurred recently in the Southeastern Population of flat-tailed horned lizards. Areas of recent urbanization include development near the communities of Yuma, Arizona (Piest and Knowles 2006, p. 1); San Luis Río Colorado, Sonora, Mexico (Rodriguez 2002, p. 23); and Puerto Peñasco, Sonora, Mexico (Rodriguez 2002, p. 23). Most (about 84 percent) of the flat-tailed horned lizard habitat in Arizona is federally owned, where urban development is less likely, and most of the U.S. Federal land in the Southeastern Population is within the 53,014-ha (131,000-ac) Yuma Desert Management Area (Table 1), where impacts from permittee actions are limited to 1 percent of the area (FTHLICC 2003a, p. 26). Additionally, avoidance and minimization measures are in place within the Barry M. Goldwater Range, Arizona, to prevent or limit impact to the flat-tailed horned lizard and its habitat from military development (USFWS 1996, pp. 18 and 58). Nevertheless, development impacts may occur. For example, construction by Marine Corps Air Station, Yuma, of a new aircraft landing field and associated infrastructure for the F-35B

Joint Strike Fighter at the Barry M. Goldwater Range is expected to permanently remove 33.5 ha (82.7 ac) of flat-tailed horned lizard habitat, plus have additional long-term adverse effects on a 17.8 ha (44 ac) (USFWS 2010b, p. 46). Even so, this project includes minimization measures called for by Rangewide Management Strategy, thereby reducing the impact of this development to the species and its habitat (USFWS 2010b, pp. 10–12, 45). Thus, we conclude that urban development in Arizona is not a significant threat to the species, nor is it likely to become a threat in the foreseeable future.

In Mexico, urban development is likely within the foreseeable future around San Luis Río Colorado, Puerto Peñasco, and elsewhere along the Gulf of California coast. Despite an increase in accessibility to remote areas (Búrquez and Martínez-Yrizar 1997, p. 390), the vast majority of the habitat for the Southeastern Population in Mexico remains isolated with respect to urban development, because urban development requires access to other resources, which are not necessarily available with mere physical access. Moreover, compared to the 1,005,630 ha (2,484,966 ac) of flat-tailed horned lizard habitat in the Mexican portion of the Southeastern Population, roughly 60 percent of which lies within two Mexican Federal natural protected areas where development is limited (CEDO 2001, p. 3), we expect the amount of urban development to be relatively small. Thus, we conclude that urban development is not a significant threat to the species in the Mexican portion of the Southeastern Population, nor is it likely to become a threat in the foreseeable future.

Therefore, despite some urban development occurring in the Southeastern Population, we believe that this development is small relative to the overall amount of flat-tailed horned lizard habitat in the Southeastern Population and is unlikely to significantly increase in the foreseeable future; thus, this development does not pose a substantial threat to the species in the Southeastern Population, nor is it likely to become a threat in the foreseeable future.

In conclusion, flat-tailed horned lizard habitat has been lost to urban development in the Coachella Valley, and we expect urbanization to continue there. The available information indicates the distribution of the species in the Coachella Valley is now limited to two occurrences that are within two Coachella Valley MSHCP conservation areas (CVCC 2010, p. 8); although nearly

all of the flat-tailed horned lizard habitat in the Thousand Palms reserve is already protected, most of the Dos Palmas reserve is not (see Table 2). Implementation of the Coachella Valley MSHCP is expected to limit the impacts to the flat-tailed horned lizard and its habitat (USFWS 2008, Appendix A, p. 317). Furthermore, in our evaluation of the potential impacts of the plan's implementation on the flat-tailed horned lizard (USFWS 2008, p. 178), we concluded: "After reviewing the current status of this species, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the flat-tailed horned lizard. Loss of the Coachella Valley population would have a negligible [effect] on the status of the species as a whole, since it makes up approximately 1 percent of the current range of the flat-tailed horned lizard. Persistence of the species in the Plan area is likely only with effective Plan implementation." Because of the limited amount of private land, urban development is also only likely to destroy relatively small amounts of flat-tailed horned lizard habitat in the Western, Southeastern, and Eastern Populations. Additionally, in areas of flat-tailed horned lizard habitat in the United States and Mexico where urbanization has the potential to occur, it is likely that the amount of urban development will be limited by the availability of water and the isolated nature of many of these areas. The implementation of the Rangewide Management Strategy further restricts development in the United States, limiting impacts inside designated flat-tailed horned lizard Management Areas to 1 percent of the area. In Mexico, urban development is likely to be limited within the Federal natural protected areas (Rodríguez 2002, p. 25). Therefore, we conclude that urban development is not a significant threat to flat-tailed horned lizard habitat throughout its range, nor is it anticipated to become a significant threat in the foreseeable future.

Energy Generation Facility Development

The analyses in the 1993 proposed rule and 2003 withdrawal document both identified development of geothermal energy facilities as a potential threat to flat-tailed horned lizard habitat. Since then, increased interest in renewable forms of electrical generation has resulted in a greater number of proposed energy development facilities and their associated infrastructure. Recent

proposals not only include geothermal facilities, but also projects harnessing solar radiation and wind. Examples of recent proposals that may affect flat-tailed horned lizard habitat include the following: geothermal projects near the Superstition Mountains (Navy 2008, pp. 1–40) and the Truckhaven area west of Salton City (BLM 2007a, pp. 1–3), solar projects near Plaster City (BLM and CEC 2010, p. ES–1), and a wind project west of the community of Ocotillo (Ocotillo Express 2009, p. 1). Because the development of energy generation facilities occurs within the range of the flat-tailed horned lizard habitat, we assess the magnitude of this development to the species below.

Similar to other forms of development, energy generation projects may result in destruction or modification of flat-tailed horned lizard habitat. These projects can include buildings, roads, power lines, and pipelines, although they differ in the details. For example, geothermal plants typically include wells and pipelines (often aboveground), solar plants typically include solar collecting arrays (using various technologies to convert solar energy to electrical energy), and wind farms have lines or arrays of wind turbines.

The total acreage of potential development for renewable energy facilities is small compared to the overall range of the species. For example, in California, the BLM maintains a GIS database of rights-of-way applications for energy generation facilities. Additional permits are needed before the potential facilities listed in the database can be built, and even if they obtain all of the necessary permits, it is not guaranteed that all of them will be built. Moreover, some of these rights-of-way applications have been rejected, denied, or withdrawn. However, assuming that the facilities in the BLM database are built, the total area of development on BLM land for all of the applications on file as of December 2010 would be about 2,585 ha (6,387 ac) in the Eastern Population, and 18,841 ha (46,556 ac) in the Western Population. The BLM data only include areas of BLM (Federal) land and do not include what, if any, nearby private land that may also be developed as part of these energy projects. We do not have data for the potential impacts to private lands adjacent to these areas, but we made a rough assessment of the adjacent private land that may potentially be included in these projects which may add about 260 ha (about 640 ac) to the impacts in the Eastern Population and about 10,600 ha (about 26,000 ac) to the impacts in the Western Population. Using these values,

the energy development in the Eastern Population may impact roughly 2,845 ha (7,030 ac) of BLM and private lands, which is about 1.7 percent of the Eastern Population area, and the energy development in the Western Population may impact roughly 29,441 ha (72,750 ac) of BLM and private lands, which is about 8.6 percent of the Western Population area. Combined, these projects—assuming that they are all built, which is not likely—would impact a total of about 2 percent of the nearly 1.6 million ha (3.9 million ac) of the total range of the species (using 2003 “current distribution”).

Although we expect additional energy development facilities may be constructed elsewhere within the range of the species, including in Arizona and Mexico, we are not aware of any specific proposals that are as large as those proposed in California. Therefore, we conclude that the total acreage of potential development for renewable energy facilities is small compared to the overall range of the species. Additionally, on lands managed by signatory agencies to the Interagency Conservation Agreement, we expect the impacts to flat-tailed horned lizard habitat (whether inside or outside of designated Management Areas) will be further reduced because of the avoidance, minimization, and compensation measures of the Rangewide Management Strategy.

Moreover, because of the avoidance and minimization measures, including the 1-percent impact limit in flat-tailed horned lizard Management Areas, most of the energy generation facilities have been proposed outside of the Management Areas, although some impacts to Management Areas are anticipated resulting from related infrastructure development (FTHLICC/MOG 2010, p. 2). For example, the 2,454-ha (6,063-ac) Imperial Valley Solar project site is proposed outside of the flat-tailed horned lizard Management Areas called for by the Rangewide Management Strategy, but an associated transmission line is expected to run for about 12 kilometers (km) (7.5 miles (mi)) within the Yuha Desert Management Area. However, this proposed transmission line was routed along an existing powerline corridor to minimize effects to flat-tailed horned lizard habitat in the Management Area (BLM and CEC 2010, pp. B.1–18, C.2–9, and C.2–42).

While project sites may be proposed within flat-tailed horned lizard Management Areas, the Rangewide Management Strategy limits the total acreage of impacts for a given Management Area to no more than 1

percent. As of 2009, signatory agencies control approximately 196,273 ha (485,000 ac) of flat-tailed horned lizard habitat in the designated Management Areas and have collectively permitted activities on 171.57 ha (423.97 ac), or 0.09 percent (Table 1). Thus far, signatory agencies have consistently implemented the Rangewide Management Strategy, even in permitting development electrical generation facilities. Moreover, the implementation of the Rangewide Management Strategy is not completely voluntary at this point; aspects of the Rangewide Management Strategy have been incorporated into documents that implement regulatory mechanisms, including the Federal Land Policy and Management Act (43 U.S.C.1701 *et seq.*) (FLPMA), which affects development on BLM lands (*see* Factor D). Many of the anticipated energy development facilities are on BLM lands or otherwise would require easements or access across BLM lands; thus, the development of these energy generation facilities would be subject to the provisions of the Rangewide Management Strategy through implementation of FLPMA.

In sum, the overall acreage of potential impacts from development of energy facilities is likely to be small compared to the total range of the species, including private lands likely to be developed. Moreover, because of the prevalence of Federal and State lands in the U.S. portions of the range of the flat-tailed horned lizard and because most of this land is managed by signatories to the Interagency Conservation Agreement implementing the Rangewide Management Strategy, we expect that the vast majority of proposed energy development projects that are likely to affect flat-tailed horned lizard habitat in the United States will be subject to the avoidance, minimization, and compensation measures incorporated into the Rangewide Management Strategy, including in areas outside of designated Management Areas. The signatories to the Interagency Conservation Agreement have been actively implementing the Rangewide Management Strategy since its inception, and have committed to its continued implementation. Additionally, the Rangewide Management Strategy has been incorporated into the CDCA Plan, which means it will be implemented as a regulatory mechanism (as opposed to a voluntary agreement). Although the Rangewide Management Strategy is not in effect in Mexico, the amount of habitat that is likely to be destroyed by

energy development projects in that country is likely to be small relative to the total amount of habitat. Therefore, we anticipate the development of energy generation facilities does not now nor in the foreseeable future pose a significant threat to flat-tailed horned lizard and its habitat.

Invasive, Nonnative Plants

In our 2003 withdrawal document, we included the effects of invasive, nonnative plants as a potential threat to flat-tailed horned lizard habitat (68 FR 345). However, we concluded that nonnative plants did not pose a substantial threat because of the limited extent to which such plants had established themselves in flat-tailed horned lizard habitat (68 FR 345). The available literature also suggests invasive, nonnative plants are a potential threat to flat-tailed horned lizard habitat (such as Hodges 1997, pp. 4, 5, and 9; CEDO 2001, p. 2; FTHLICC 2003a, pp. 18–19; Hammerson *et al.* 2007, p. 4), but specifics on how nonnative species are impacting flat-tailed horned lizard habitat are generally lacking.

The perennial nonnative tree, *Tamarix aphylla* (athel pine), has been planted as a windbreak in the Coachella Valley. This tree can reduce or prevent wind-transport of sand, thereby reducing available flat-tailed horned lizard habitat there (England 1983, p. 152). Although *T. aphylla* typically spreads vegetatively by adventitious roots or submerged stems, the species can spread sexually by seed following flood events (Walker *et al.* 2006, pp. 191–201). While perhaps not as invasive as other species of *Tamarix* (Cal-IPC 2003, p. 4), *T. aphylla* trees have been removed in some Coachella Valley MSHCP reserve areas in the Coachella Valley as management to improve habitat (FTHLICC 1999, p. 4). Moreover, the population of flat-tailed horned lizards in the Coachella Valley proper is now found only in the Thousand Palms reserve area (CVCC 2010, p. 8), where the plan's habitat management is focused. Therefore, we do not consider *T. aphylla* to be an invasive, nonnative species that is threatening flat-tailed horned lizard habitat.

Nonnative annual plants, such as *Brassica tournefortii* (Saharan mustard), *Schismus barbatus* (common Mediterranean grass), and *Salsola kali* (Russian thistle), can blanket certain areas of the Colorado Desert in years with higher amounts of rainfall (Brown and Minnich 1986, pp. 411–422; Lovich and Bainbridge 1999, p. 318; FTHLICC 2003a, p. 18; Yurkowsky 2005, *in litt.*, Anza-Borrego Desert State Park; Barrows

et al. 2009, pp. 673–686). Such nonnative plants may adversely affect flat-tailed horned lizard habitat throughout its range by altering fire regimes (Brown and Minnich 1986, pp. 418–421; Brooks and Esque 2002, pp. 334–336); stabilizing Aeolian soils (i.e., soil that is transported from one place to another by wind; Barrows *et al.* 2009, p. 684); changing plant assemblages (Barrows *et al.* 2009, p. 683); and changing the availability of seeds for harvester ants, the primary food source for the flat-tailed horned lizard (Gordon 1980, p. 70). Dense stands of plants, which are typical of invasive, nonnative plant species in years of higher amounts of rainfall, also may challenge the locomotor abilities of the wide-bodied flat-tailed horned lizard (Newbold 2005, p. 17).

Plant growth will vary annually in the Colorado Desert because of the variable amount and timing of rainfall that the region receives. Moreover, annual plants die by the end of spring, and in the harsh desert climate the amount of standing biomass of the annual plants, once dead, quickly decreases (Barrows *et al.* 2009, p. 684). We expect the amount and timing of rainfall within the range of the species will continue to be variable into the foreseeable future, even with the potential effects of climate change (Field *et al.* 1999, pp. 8–10). As a result, the effects of invasive, nonnative plants are generally short-lived in areas of flat-tailed horned lizard habitat (Barrows *et al.* 2009, p. 673), and because of the likelihood of continued variability in precipitation, we expect the potential effects of invasive, nonnative plants to continue to be short-lived into the foreseeable future. With the potential exception of increased occurrence of wildland fires, we do not believe that the growth of invasive, nonnative plants poses a lasting, significant threat to flat-tailed horned lizard habitat now or in the foreseeable future. We examine the potential threat of wildland fire below.

Fires typically are rare events in the western Sonoran Desert because of the natural “limited biomass, wide spacing between shrubs and sparse ground cover” (Brown and Minnich 1986, p. 411). However, the periodic increase in the amount of available fuel from nonnative, annual plants in years of heavy precipitation has allowed the frequency, size, and intensity of fires in desert plant communities to increase (Brown and Minnich 1986, p. 411; Brooks and Berry 2006, pp. 117–118; Trader *et al.* 2006, p. 314; see also Rorabaugh 2010, p. 191). Moreover, many of the native perennial plants within the range of the flat-tailed

horned lizard typically take a long time to recover after a fire (O’Leary and Minnich 1981, pp. 61–66; Brown and Minnich 1986, p. 411; Brooks and Esque 2002, p. 330). Thus, fire can change the species composition of the perennial and annual plant communities. Moreover, provided enough water (rainfall) is available, annual plants, especially nonnative species, proliferate after a fire (Minnich 1994, p. 104), which may provide additional fuel and promote additional wildfires. Plant communities in areas with recurrent fires may convert from vegetation types dominated by native shrubs into types dominated by nonnative annual grasses and forbs (type conversion) (Brown and Minnich 1986, p. 411). Type conversion appears to be occurring near the highly urbanized areas, such as the Coachella Valley (Brown and Minnich 1986, p. 411), where increased human activity offers higher numbers of ignition sources (Brooks and Esque 2002, p. 337), but not in the more remote areas of flat-tailed horned lizard habitat. Moreover, the amount of rainfall is a critical factor in how much plant growth occurs (Barrows *et al.* 2009, p. 673). The amount of rainfall is unpredictable within the range of the flat-tailed horned lizard, and is likely to be so for the foreseeable future. It is not clear how the fire regime will be affected long term, but in the foreseeable future, wildland fire does not appear to be a threat.

Additionally, it is unclear whether this localized change in vegetation affects the specific habitat components upon which flat-tailed horned lizards rely. For example, flat-tailed horned lizards take refuge under perennial shrubs for shade and to avoid predators (Muth and Fisher 1992, pp. 1–77; Sherbrooke 2002, pp. 109–120). Fire typically kills the existing desert shrubs, but shrubs do regrow after a fire, although the plant species composition is likely to have changed (Brown and Minnich 1986, pp. 411). Thus, during the period of time following fire while shrubs are regrowing, flat-tailed horned lizards will have fewer options for thermoregulation and predator avoidance. While this condition is not permanent, it remains unclear if the change in plant species composition will have a lasting effect on the flat-tailed horned lizard, especially if type conversion were to occur. Nonetheless, because this change in plant species composition is localized, we conclude any potential effects are low in magnitude at the species level, likely temporary, and thus not a significant threat to the species.

Another potential threat to the flat-tailed horned lizard that may arise from a change in plant species composition after a fire is that harvester ants, the primary food of the flat-tailed horned lizard, could be affected. Fire likely kills individual harvester ants on the surface at the time of the fire, but evidence suggests the underground colonies survive (Zimmer and Parmenter 1998, p. 282; Underwood and Christian 2009, p. 325). As described in the Background section, harvester ants eat seeds of annual and perennial plant species. Although changes in plant composition may alter the type and quantities of available seeds consumed by ants, ant forage likely will not be eliminated, and may even increase because of the increase in annual plants (Zimmer and Parmenter 1998, p. 282; Underwood and Christian 2009, p. 325). For example, several of the species found by Gordon (1980, p. 72) to be important to harvester ants were also species of plants found by Brown and Minnich (1986, p. 416) to do well after a fire. Therefore, wildland fire does not appear to pose a threat to harvester ants.

In conclusion, the spread of invasive, nonnative plants does not appear to be a significant threat to flat-tailed horned lizard habitat throughout its range at this time, nor is it likely to become a significant threat in the foreseeable future.

Off-Highway Vehicles (OHVs)

The analyses in the 1993 proposed rule and 2003 withdrawal document included OHV activity as a potential threat to the flat-tailed horned lizard. The Rangewide Management Strategy also describes off-highway (OHV) or off-road vehicle activity as a potential threat (FTHLIC 2003a, pp. 12–14). We consider OHVs to be all vehicles used off-road, including, but not limited to, automobiles, dune buggies, motorcycles, all-terrain-cycles, four-wheelers, and military vehicles. OHV activity includes, but is not limited to, recreational, military, law-enforcement (such as Border Patrol), and trans-border trafficking activities. As discussed in the Background section, flat-tailed horned lizard habitat typically consists of sandy flats and valleys occupied by plant species that are typical of the creosote-white bursage plant association. The presence of ants as a food source is also important.

OHV activity may modify flat-tailed horned lizard habitat because of impacts to vegetation (Luckenbach 1975, p. 4; Vollmer *et al.* 1976, p. 115; Bury *et al.* 1977, p. 7; Lathrop 1983, p. 164; Luckenbach and Bury 1983, p. 280; Groom *et al.* 2007, p. 133), soil

disturbance (Luckenbach 1975, p. 4; Bury *et al.* 1977, pp. 16–18; Webb 1983, pp. 51–79), and introduction of nonnative plants (Brooks and Lair 2005, p. 8). Additionally, some but not all areas with high OHV activity have been shown to have fewer harvester ant colonies (McGrann *et al.* 2006, p. 77).

Past studies of OHV impacts on lizards (Busack and Bury 1974, p. 182; Bury *et al.* 1977, p. 10; Luckenbach and Bury 1983, p. 273; Klinger *et al.* 1990, pp. 1–17; Beauchamp *et al.* 1998, p. 214; Gardner 2002, p. 14; Wright and Grant 2003, p. 30) have been largely inconclusive or cannot be readily applied across the range of the flat-tailed horned lizard (that is, they have limited “inference space” (Ratti and Garton 1994, pp. 1–23)). Luckenbach and Bury (1983, p. 278) reported that a pronounced reduction in flat-tailed horned lizard abundance around the Algodones Dunes had been anecdotally noted by scientists. Marked declines in herbaceous and perennial plants, arthropods, lizards, and mammals in OHV-used areas compared with nearby control areas were also reported by Luckenbach and Bury (1983, p. 265). The declines, however, were for the Colorado Desert fringe-toed lizard (*Uma notata*) and beetles, and did not include flat-tailed horned lizards or ants. Additionally, research has been conducted in creosote-dominated habitats in the Mojave Desert. Researchers compared reptile metrics (measures) between sites used differentially by OHVs and control sites (Bury *et al.* 1977, pp. 1–23). Bury *et al.* (1977, p. 11) found a significant decrease in numbers of reptiles on OHV-used areas compared to numbers on control sites in the Mojave Desert. However, the highest number of desert horned lizards on any one plot occurred on a moderately used OHV site (Bury *et al.* 1977, p. 10). In research conducted by both Busack and Bury (1974, p. 182) and Bury *et al.* (1977, p. 1), there appeared to be an inverse relationship between increased use of OHVs and the abundance of lizards; this means that, as OHV use increased, lizard abundance decreased. Additionally, McGrann *et al.* (2006, pp. 77–79) found that the density of flat-tailed horned lizards was lower in areas of high OHV activity, as was the average body mass of individual flat-tailed horned lizards, suggesting the habitat quality—including harvester ant abundance—in some high-use OHV areas was not as good; however, the authors also noted that small sample size may have allowed qualitative differences between sites sampled to affect their results.

Research in the Ocotillo Wells SVRA found flat-tailed horned lizards at higher densities in non-sandy habitats than sandy habitats within the SVRA, which differed from most other research findings (Beauchamp *et al.* 1998, pp. 213–214). However, it was unclear if flat-tailed horned lizards were found in these atypical habitat types because they are more variable in habitat use than previously thought, because these habitat types are more available in the Ocotillo Wells SVRA than other areas in which flat-tailed horned lizards have been studied, or as a response to OHV activity (Beauchamp *et al.* 1998, p. 214).

OHV activity occurs in the Western, Eastern, and Southeastern Populations, but the amount (intensity, frequency) of OHV activity varies across the landscape, with greater amounts of activity in areas designated for OHV use and areas near existing roads, and lesser amounts in areas where OHV use is not permitted or areas that are away from easy access. In the Coachella Valley, OHV activity is expected to be controlled in protected habitat areas through implementation of the Coachella Valley MSHCP (CVAG 2007, pp. 9–117) and OHV activity is not identified as a conservation issue in the annual report for 2009 (CVCC 2010, p. 14). In our evaluation of the potential impacts of the plan’s implementation on the flat-tailed horned lizard (USFWS 2008, p. 178), we concluded: “After reviewing the current status of this species, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the flat-tailed horned lizard. Loss of the Coachella Valley population would have a negligible [effect] on the status of the species as a whole, since it makes up approximately 1 percent of the current range of the flat-tailed horned lizard. Persistence of the species in the Plan area is likely only with effective Plan implementation.” Additionally, approximately 94 percent of the potential habitat where flat-tailed horned lizards are known to occur in the Thousand Palms conservation area is land that is already protected (Table 2), including about 62 percent that is part of the Coachella Valley National Wildlife Refuge.

OHV activity along the United States-Mexico international boundary (border) was identified as a potential threat to the flat-tailed horned lizard and its habitat (FTHLIC 2003a, p. 12). The amount of impact to flat-tailed horned lizard habitat along the border is not clear. To put the potential impact in

context of the range of the species, we assumed an area of high impact from border-related OHV activity to be within a 1-km (0.6-mi)-wide zone north of the border. We estimate that the total area of flat-tailed horned lizard habitat within that “zone” is about 12,662 ha (31,288 ac), or about 0.8 percent of the range of the species, comprising 2,318 ha (5,728 ac), 5,012 ha (12,385 ac), and 5,332 ha (13,176 ac) of the Western, Eastern, and Southeastern Populations, or about 0.7 percent, 3 percent, and 0.5 percent of those populations, respectively. This zone of assumed high activity is a broad-brush assessment (for example, the All-American Canal runs along the border in the Eastern Population, likely confining any border-related OHV activities in certain areas to less than 1 km (0.6 mi)). Nevertheless, the zone is small compared to the range of the species and the three populations, individually. Moreover, since 2008, the U.S. Customs and Border Protection constructed the “border fence,” which is a vehicle and, in some areas, pedestrian barrier, plus associated infrastructure, in certain areas between the United States and Mexico. Although some areas of the border are not fenced, the areas of flat-tailed horned lizard habitat along the border are fenced (USCBP 2008a, p. 1–5; USCBP 2008b, p. 2–4; Rorabaugh 2010, p. 181). Prior to construction of the border fence, the new fence and associated infrastructure was anticipated to result in reduction of the amount of illegal, cross-border traffic (USCBP 2008b, p. 3–18). Additionally, as part of the installation of the border fence, a stabilized patrol road on the U.S. side was constructed. The use of the road was also expected to result in an overall decrease in ground disturbance because Border Patrol agents would patrol from vehicles on the road rather than through OHV activity (USCBP 2008a, p. 2–7). Indeed, evidence suggests the border fence has reduced illegal cross-border traffic and associated OHV activity (Rorabaugh 2010, p. 190), thereby reducing the amount of potential impact to flat-tailed horned lizard habitat along the border from illegal trans-border OHV activity and subsequent law-enforcement OHV activity by the Border Patrol.

Moreover, the scientific literature is mixed and inconclusive with respect to the impact of OHV activity on the flat-tailed horned lizard and its habitat. Setser and Young (2000, p. 11) and Setser (2001, p. 12) found flat-tailed horned lizards avoided areas disturbed by OHVs. However, there was no difference in flat-tailed horned lizard habitat use between areas within 10 m

(33 ft) of OHV trails and sites farther away from OHV trails (Setser and Young 2000, p. 11; Setser 2001, p. 12). Setser and Young (2000, p. 11) and Setser (2001, p. 12) concluded that: (1) OHV use might render sites less suitable to flat-tailed horned lizard use, because of the impacts of OHV activity on vegetation and soil characteristics; or (2) OHV trails occur on sites not preferred by flat-tailed horned lizards (e.g., barren ground with no plants or rocks). However, Gardner (2002) and Setser (2004, p. 54) suggested that OHV activity did not have an effect on flat-tailed horned lizards at different areas in the Ocotillo Wells SVRA, on the basis of observations.

In summary, while there has been some research on the adverse effects of OHV activity on vegetation, soils, and flat-tailed horned lizards, its applicability to flat-tailed horned lizard populations is limited and unreliable because of the lack of scientific rigor associated with the research designs. Additionally, the effects of OHV activity on flat-tailed horned lizard populations were not the primary research questions. Nevertheless, these studies have utility in generating hypotheses concerning variation in degree of OHV use and flat-tailed horned lizard abundance. At this time, we conclude that the available studies do not collectively show that OHV activity causes declines in flat-tailed horned lizard populations throughout the range of the species or that adverse OHV impacts pose a significant threat to flat-tailed horned lizard habitat. Management activities, including efforts to reduce conflicts with actions that impact flat-tailed horned lizard habitats, would be enhanced by focused research. Impacts of OHV activity on flat-tailed horned lizard populations should be studied using rigorous research designs to yield conclusions with high degrees of certainty (Ratti and Garton 1994, pp. 1–23) regarding the effects of OHV activity on flat-tailed horned lizard populations across the range of the species. In conclusion, OHV activity does not appear to be a significant threat to flat-tailed horned lizard habitat throughout its range at this time, nor is it likely to become a significant threat in the foreseeable future.

Military Training Activities

The Rangewide Management Strategy (FTHLICC 2003a, p.15) summarizes military activity within the range of the flat-tailed horned lizard. The species occurs on two military installations: (1) The western Barry M. Goldwater Range, administered by Marine Corps Air Station (MCAS) Yuma, and (2) Naval

Air Facility (NAF) El Centro. MCAS Yuma manages approximately 46,458 ha (114,800 ac) within the 53,014–ha (131,000–ac) Yuma Desert Management Area, while NAF El Centro manages approximately 12,060 ha (29,800 ac) within the 55,078–ha (136,100–ac) West Mesa Management Area and 3,440 ha (8,500 ac) in the 46,660–ha (115,300–ac) East Mesa Management Area. The U.S. Marine Corps and U.S. Navy are signatories to the Interagency Conservation Agreement implementing the Rangewide Management Strategy.

The training ranges are primarily used for aircraft-related training. Activities that have the potential to impact flat-tailed horned lizard habitat include non-exploding bombing practice, ground-based training, target maintenance, clean up of target sites, road maintenance, mobile target activity, and target and run-in-line grading. Most military activities are confined to previously disturbed areas, so the amount of destruction or modification of flat-tailed horned lizard habitat is limited (FTHLICC 2003a, p.15). Additionally, the military is committed to be good stewards of lands they control, and the two installations have incorporated measures to benefit the flat-tailed horned lizard and other wildlife resources into their planning, training, and management activities (Navy 2001, chapter 3; USAF and USMC 2007, p. 1–8 and chapter 5). Therefore, we do not anticipate military training activities to substantially affect flat-tailed horned lizard habitat now or in the foreseeable future.

Summary of Factor A Threats

Flat-tailed horned lizard habitat could potentially be impacted by urban or agricultural development. However, due to the remote location and increasingly limited availability of water, urbanization and agricultural conversion of flat-tailed horned lizard habitat will likely be limited in the United States and Mexico over the foreseeable future. We note that development of energy facilities is increasing, especially in the southwestern United States; however, the overall acreage of impact from these projects, assuming all of the proposed right-of-way applications are constructed, is small compared to the range of the species. In the United States, we expect development impacts to occur outside of the existing Management Areas due to avoidance and minimization measures that result from implementation of the Rangewide Management Strategy. As of 2009, signatory agencies control approximately 185,653 ha (458,757 ac),

or about 40 percent of flat-tailed horned lizard habitat in the United States, within the Management Areas, of which only 0.09 percent has been permitted for impacts. Furthermore, in the United States, most of the species' habitat is federally or State (such as California State Park) owned, where impacts to habitat from development are anticipated to be minimal. In Mexico, the amount of development that may occur in flat-tailed horned lizard habitat is small relative to the large amount of habitat that is available, and thus the effects to the species are expected to be low in magnitude. Therefore, current or anticipated future urban, agricultural, or energy development throughout the species' range is not currently a substantial threat to the flat-tailed horned lizard, nor do we expect it to become a substantial threat in the foreseeable future.

Invasive, nonnative plants could increase the potential for wildland fire in a desert environment where wildland fire is naturally infrequent. Research suggests that invasive, nonnative plant conversion of flat-tailed horned lizard habitat is limited to urbanized and adjacent areas, and is not a substantive threat to the species' habitat throughout its range. Also, frequent OHV activity has the potential to affect flat-tailed horned lizard habitat; however, the available studies do not collectively show that OHV activity causes declines in flat-tailed horned lizard populations throughout the range of the species or that adverse OHV impacts pose a significant threat to flat-tailed horned lizard habitat. Lastly, military training activities have limited impacts on the ground and are not expected to substantially affect flat-tailed horned lizard habitat. We do not consider the potential threats analyzed above to be substantial threats to the flat-tailed horned lizard, either individually or in combination. Therefore, based on our review of the best available scientific and commercial information, we find the flat-tailed horned lizard is not threatened by the present or threatened destruction, modification, or curtailment of its habitat or range, either now or in the foreseeable future.

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

Within the context of this listing factor, overutilization is the capture or collection of individuals of a species to an extent (at a high enough rate) to affect the status of the species. Historically, in the United States, flat-tailed horned lizards may have been among the species of horned lizard

collected for the curio trade (Bolster and Nicol 1989, pp. 2 and 7). Flat-tailed horned lizard were identified by Stewart (1971, p. 33) as utilized in the pet trade. This species was also collected for scientific and educational purposes (Bolster and Nicol 1989, p. 9). However, the collection of the flat-tailed horned lizard is now prohibited except by permit in California (California Administrative Code 40.10, Title 14) and Arizona (Arizona Game and Fish Regulation, Title 17, R12-4-443, Commission Order 43). The flat-tailed horned lizard is also listed in the Official Mexican Norm NOM-059-ECOL-2001, Mexico's threatened species law, as a threatened species in Mexico (SEMARNAT 2002, p. 134), and collection is prohibited without a permit. Because of the difficulty in locating these cryptically colored lizards, we expect unauthorized recreational collection to be rare. In Mexico, Hammerson *et al.* (2007, p. 5) noted that the species may be utilized in the pet trade. As noted in Rodriguez (2002, p. 26), some people in Mexico have flat-tailed horned lizards in their yards, but it is unclear whether those lizards are prevented from moving out. We have no information on the magnitude of the pet trade, but horned lizards in general are known to be difficult to keep alive as captive pets (Stewart 1971, p. 34), including in Mexico (Rodriguez 2002, p. 26). This suggests that the pet trade is small. The information we have, although limited, does not suggest that the amount of utilization that has occurred recently, regardless of purpose, has significantly affected the status of the flat-tailed horned lizard. Therefore, based on our review of the best scientific and commercial information, we find that overutilization for any purpose is not a threat to the flat-tailed horned lizard, now or in the foreseeable future.

C. Disease or Predation

Disease occurs to some extent in nearly all wildlife populations, but it is only a threat if the disease is virulent to the extent that it significantly impacts the population. We are not aware of any reports of disease in flat-tailed horned lizards. Thus, we do not consider disease to be a threat to the flat-tailed horned lizard anywhere within its range, nor is there any evidence to suggest it is likely to become a threat in the foreseeable future.

Predation occurs naturally, and nearly all populations of wildlife species are subject to some level of predation. Predation of flat-tailed horned lizards is known to occur. For example, 16 of 42 radio-tagged flat-tailed horned lizards

were depredated in a 2-year study (Muth and Fisher 1992, p. 33), although the rate of predation they observed may have been affected by the presence of the radio tags themselves by making the otherwise cryptically colored lizard more apparent to predators. For predation to be a significant threat to the flat-tailed horned lizard, predation rates must be high enough to affect the status of the species such that mortality from predation outpaces births resulting in an overall population decline. Predation has been identified as a potential threat to the flat-tailed horned lizard (FTHLICC 2003a, pp. 16–17). A summary from multiple sources in the scientific literature is presented in the Rangewide Management Strategy (FTHLICC 2003a, p. 16), which identifies known or likely predators to be six species of birds, five species of reptiles, two species of mammals, and one arthropod. Of these, the round-tailed ground squirrel (*Spermophilus tereticaudus*) and the loggerhead shrike (*Lanius ludovicianus*) were highlighted as major predators (FTHLICC 2003a, p. 16; see also Young and Young 2000, p. 60; Young *et al.* 2004a, p. 65). Most of these predators occur naturally (including historically) in areas occupied by flat-tailed horned lizards; thus, predation is not a threat that has emerged recently.

However, information from the scientific literature suggests that the populations of some of these predators are now higher as a result of manmade changes to the landscape, resulting in increased predation of flat-tailed horned lizards in these areas (FTHLICC 2003a, pp. 16–17; Young and Young 2005, p. 8). For example, Barrows *et al.* (2006, pp. 492–493) found evidence suggesting that loggerhead shrikes and other avian predators were responsible for reduced populations of flat-tailed horned lizards near wildland-urban interface, and Young and Young (2005, p. 8) suspected round-tailed ground squirrel populations are similarly augmented with manmade changes to landscape, resulting in similar declines in flat-tailed horned lizard populations in and around urban areas. Additionally, the cryptic coloration that allows flat-tailed horned lizards to blend in with desert soils may be of little use on paved roads, allowing increased levels of predation (Young and Young 2000, p. 62). However, much of the range of the flat-tailed horned lizard is remote, away from areas of manmade change. Thus, for the flat-tailed horned lizard, predation does not appear to be excessively high throughout its range but instead localized near developed

areas. This suggests that the observed high level of predation of flat-tailed horned lizards is an “edge effect” associated with the interface between natural areas and areas of urban and agricultural development. Because the proportion of developed areas within the range of the species is small in comparison to the undeveloped areas, we do not consider increased predation associated with urbanization to be a significant threat to the species. We further consider predation as a secondary effect of development, which is discussed under Factor E, below.

Summary of Factor C Threats

Disease does not appear to be a threat at this time, nor is it likely to become a significant threat in the foreseeable future. Predation likely occurs in some human-altered areas at higher than typical rates; however, compared to the distribution of the species, relatively few flat-tailed horned lizards are likely subjected to increased predation. Therefore based on our review of the best scientific and commercial information, we find the flat-tailed horned lizard is not threatened by disease or predation, now or in the foreseeable future.

D. The Inadequacy of Existing Regulatory Mechanisms

In the 1993 proposed rule to list the species, we identified several State (Arizona and California), U.S. Federal, and Mexican Federal laws and other existing regulatory mechanisms that could provide benefits to the flat-tailed horned lizard (58 FR 62627), and we concluded that these regulatory mechanisms were inadequate to protect the species or its habitat (58 FR 62628). In 1997, we also noted several State (Arizona and California), U.S. Federal, and Mexican Federal laws, but particularly noted the benefits provided to the flat-tailed horned lizard by the Interagency Conservation Agreement implementing the Rangewide Management Strategy (62 FR 37858–37859). In 2003, we again noted several State (Arizona and California), U.S. Federal, and Mexican Federal laws and other existing regulatory mechanisms that could provide benefits to the flat-tailed horned lizard (68 FR 346).

Because the Interagency Conservation Agreement implementing the Rangewide Management Strategy is voluntarily implemented on the part of the signatories, we do not consider it to be a regulatory mechanism *per se*. Some entities have incorporated the Interagency Conservation Agreement into other regulatory mechanisms; in such cases, the Interagency

Conservation Agreement is mentioned in the context of those regulatory mechanisms. Additionally, two habitat conservation plans (HCPs) within the range of the flat-tailed horned lizard cover the species and provide mitigation for and conservation of habitat. While implementation of these HCPs will provide localized benefits to the flat-tailed horned lizards populations within the HCP boundaries, these HCPs cover a very small portion of the flat-tailed horned lizard's range and will not substantially influence the overall status of the species. The Interagency Conservation Agreement and the two HCPs are discussed in greater detail in the Background section above.

In the preceding analyses of the threats to the flat-tailed horned lizard under Factors A, B, and C, and in our analysis of threats under Factor E, below, all of the threats presented are of low magnitude, are non-imminent, and/or cover very small portions of the species' range. In the sections that follow, we first discuss the existing regulatory mechanism(s) that would be removed as a result of the withdrawal of the proposed rule to list the species. Then we review the existing regulatory mechanisms that would remain in effect to address the potential threats discussed herein under the other listing factors.

U.S. Federal Laws

Section 7(a)(4) of the Act

The Act contains provisions for Federal agencies to confer with the Secretary on any action that is likely to jeopardize the continued existence of any species proposed to be listed under the Act. Commonly called a "conference," this requirement would no longer apply to the flat-tailed horned lizard once the withdrawal of the proposed listing rule is finalized. A conference opinion is an advisory mechanism by which the Service recommends measures to avoid adverse effects or jeopardy to the species. There are no requirements to implement reasonable and prudent measures and terms and conditions or for adoption of reasonable and prudent alternatives to avoid impacts to species or habitat. In this regard, the conference opinion requirement under the Act provides little if any additional regulatory protection for this species; although it may provide some benefits to the flat-tailed horned lizard by informing Federal agencies of potential adverse effects to the species that may result from their activities. However, the survival of the flat-tailed horned lizard is not dependent on any protections

afforded by the application of section 7(a)(4) of the Act because the potential threats facing the flat-tailed horned lizard are not substantial (see the other listing factors).

Incidental Protection Via Other Listed Species

The withdrawal of the proposed rule to list the flat-tailed horned lizard will not affect the listing status of other listed species, and the flat-tailed horned lizard may receive some level of protection in the United States through implementation of the Act because of overlapping ranges or proximity to other federally listed species. These associated federally listed species include Coachella Valley fringe-toed lizard (*Uma inornata*), *Astragalus lentiginos* var. *coachellae* (Coachella Valley milk-vetch), *Astragalus magdalenae* var. *peirsonii* (Peirson's milk-vetch), bighorn sheep in the Peninsular Ranges (*Ovis canadensis nelsoni*), and desert tortoise (*Gopherus agassizii*).

The federally threatened Coachella Valley fringe-toed lizard is restricted to the Coachella Valley, but its distribution overlaps with the northern portion of the flat-tailed horned lizard's range in the Coachella Valley. However, the flat-tailed horned lizard may use additional habitat within the Coachella Valley in which the fringe-toed lizard does not occur. The Coachella Valley MSHCP addresses the Coachella Valley fringe-toed lizard, Coachella Valley milk-vetch, and the flat-tailed horned lizard. Federal actions not covered by the Coachella Valley MSHCP that may affect the Coachella Valley fringe-toed lizard, the Coachella Valley milk-vetch, or both are subject to consultation with the Service under section 7 of the Act. These consultations may include avoidance or minimization measures that benefit the listed species and, where they co-occur, the flat-tailed horned lizard. Similarly, consultations on the federally endangered bighorn sheep of the Peninsular Ranges may include measures that benefit flat-tailed horned lizards in the Western and Coachella Valley Populations where suitable habitat for both species is in close proximity at the toe of slope of the mountains; however, the amount of such overlap is likely to be minimal. Likewise, the flat-tailed horned lizard may marginally benefit from consultations addressing the federally threatened *Astragalus magdalenae* var. *peirsonii* and the federally threatened desert tortoise where they co-occur, but these areas of overlap are also likely minimal. When the flat-tailed horned lizard overlaps with other listed species,

we anticipate impacts to the species and its habitat may be avoided or minimized.

Approved Habitat Conservation Plans—Section 10(a)(1)(B) of the Act

Under section 10(a)(1)(B) of the Act, the Service may issue "incidental take" (i.e., taking of endangered species that is incidental to, but not the purpose of, carrying out of an otherwise lawful activity, see 50 CFR 402.02) permits for listed animal species to non-Federal applicants, which provide exemptions to the take prohibitions under section 9 of the Act. To qualify for an incidental take permit, applicants must develop, fund, and implement a Service-approved habitat conservation plan that, among other requirements, does not jeopardize the continued existence of covered species, and details measures to minimize and mitigate the impact of the approved incidental taking on covered species. As discussed in the Background section and under Factor A, there are two existing incidental take permits that include the flat-tailed horned lizard as a covered species: the Coachella Valley MSHCP and the Lower Colorado MSCP. Regardless of the withdrawal of the proposed rule to list the species, the existing HCPs, and the conservation they provide, would remain in effect.

Additional U.S. Federal Mechanisms

Federal Land Policy and Management Act

The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 *et seq.*) (FLPMA), which provides overall direction to the BLM for conservation and management of public lands, allows the agency to participate in Interagency Conservation Agreements. Section 601 required the preparation of the California Desert Conservation Area (CDCA) Plan. The CDCA Plan was amended to formally incorporate the Rangeland Management Strategy into BLM's land use planning, including formal adoption of the BLM-controlled Management Areas comprising the East Mesa Flat-tailed Horned Lizard Management Area, West Mesa Flat-tailed Horned Lizard Management Area, and Yuha Desert Flat-tailed Horned Lizard Management Area (BLM 2004, p. 2). Additionally, section 103(a) of the FLPMA defines an Area of Critical Environmental Concern (ACEC), which allows creation of areas "where special management attention is required * * * [for] fish and wildlife resources." BLM lands comprise much of the U.S. range of the flat-tailed horned lizard, including the aforementioned Management Areas.

Additionally, the BLM has designated ACECs for wildlife resources within the range of the flat-tailed horned lizard. The BLM's implementation of FLPMA, through land management plans that incorporate certain provisions of the Rangewide Management Strategy including the avoidance, minimization, mitigation (compensation), and management measures, helps to reduce the severity of existing potential threats to the flat-tailed horned lizard, especially development and OHV activity. We conclude FLPMA is an adequate regulatory mechanism within the confines of its applicability—that is, allowing BLM to better manage flat-tailed horned lizard habitat and implement the Rangewide Management Strategy on BLM lands. Because much of the U.S. portion of the range of the flat-tailed horned lizard is comprised of BLM land, FLPMA is an important regulatory mechanism that helps to reduce the already low-level threats to the species in these areas. Implementation of the CDCA Plan, as amended, and the incorporated provisions of the Rangewide Management Strategy will continue regardless of the withdrawal of the proposed listing rule for the species.

National Environmental Policy Act

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

Fish and Wildlife Coordination Act

Through the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*) (FWCA), we may recommend discretionary conservation measures to avoid, minimize, and offset impacts to fish and wildlife resources resulting from Federal projects and water development projects authorized by the U.S. Army Corps of Engineers. Therefore, FWCA may provide some protection for the species and its habitat through avoidance and minimization

measures that may be incorporated into Federal projects. We conclude FWCA is an adequate regulatory mechanism within the confines of its applicability, but its applicability is limited. The minor benefits provided by FWCA will continue regardless of the withdrawal of the proposed rule to list the flat-tailed horned lizard.

Sikes Act

In 1997, section 101 of the Sikes Act (16 U.S.C. 670a) was revised by the Sikes Act Improvement Act to authorize the Secretary of Defense to implement a program to provide for the conservation and rehabilitation of natural resources on military installations. To do so, the Department of Defense was required to work with Federal and State fish and wildlife agencies to prepare an Integrated Natural Resources Management Plan (INRMP) for each facility with significant natural resources. The INRMPs provide a planning tool for future improvements; provide for sustainable multipurpose use of the resources, including activities such as hunting, fishing, trapping, and non-consumptive uses; and allow some public access to military installations to facilitate their use. Implementation of the measures included in these plans is subject to funding availability. The primary purpose for military lands, including most areas of flat-tailed horned lizard habitat, is to provide for military support and training.

Two major military installations are within the U.S. range of the flat-tailed horned lizard, the MCAS Yuma (within the Barry M. Goldwater Range) and the NAF El Centro, both are signatories to the Interagency Conservation Agreement and are implementing the Rangewide Management Strategy. Both installations have incorporated aspects of the Rangewide Management Strategy into their respective INRMPs, including avoidance and minimization measures, plus monitoring and management activities (Navy 2001, pp. 3–14 to 3–16; USAF and USMC 2007, pp. 6–2 and 6–8; see also USAF *et al.* 2006 entire). Additionally, areas designated as Flat-tailed Horned Lizard Management Areas under the Rangewide Management Strategy include military-owned areas (FTHLICC 2003a, pp. 51–53). Regardless of the withdrawal of the proposed rule to list the species, the application of the Sikes Act would continue and the benefits to the flat-tailed horned lizard would continue within the confines of its applicability—that is, providing benefits to the flat-tailed horned lizard and its habitat on military facilities and implementing the Rangewide Management Strategy on military lands.

California State Laws

California Endangered Species Act

The flat-tailed horned lizard is not listed under the California Endangered Species Act (CESA), the State's primary regulatory mechanism to protect species. Therefore, CESA provides no benefit to the flat-tailed horned lizard.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) requires State and local government agencies to consider and disclose environmental impacts of projects and to avoid or mitigate them where possible. Under CEQA, public agencies must prepare environmental documents to disclose environmental impacts of a project and to identify conservation measures and project alternatives. Section 15380 of the CEQA Guidelines indicates that species designated as “species of special concern” (see below) should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein (Comrack *et al.* 2008, p. 2). However, CEQA itself does not guarantee that conservation measures will be implemented; the lead agency may either require mitigation through changes to a project, or determine that overriding considerations make mitigation infeasible (CEQA Sec. 21002). In the latter case, projects may be approved that cause significant environmental damage, such as impacts to species or their habitat. Therefore, whether CEQA is an adequate regulatory mechanism within the confines of its applicability depends on the law's application and the determination of the lead agency involved. The minor benefits provided by CEQA will continue regardless of the withdrawal of the proposed rule to list the species.

Natural Community Conservation Planning Act

The NCCP program is a cooperative effort involving the State of California and numerous private and public partners to protect regional habitats and species. The primary objective of NCCPs is to conserve natural communities at the ecosystem scale while accommodating compatible land use, including urban development (<http://www.dfg.ca.gov/habcon/>). Natural Community Conservation Plans help identify and provide for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. Many NCCPs are developed in

conjunction with habitat conservation plans prepared under the Act, including the Coachella Valley MSHCP. Regardless of the withdrawal of the proposed rule to list the flat-tailed horned lizard, the existing NCCPs, and the protections they provide, would remain in effect.

California Administrative Code

California Administrative Code 40.10, Title 14, prohibits the collection of flat-tailed horned lizards without a permit. Therefore, we conclude the California Administrative Code is an adequate regulatory mechanism within the confines of its applicability—that is, limiting or preventing overutilization of the flat-tailed horned lizard in California. The benefits provided by California Administrative Code 40.10, Title 14, will continue regardless of the withdrawal of the proposed rule to list the flat-tailed horned lizard.

Species of Special Concern

The State's Species of Special Concern (SSC) designation is an administrative designation that carries no formal legal status. According to Comrack *et al.* (2008, pp. 1–4), its intent is to focus attention on animals deemed to be at conservation risk, stimulate research, and achieve conservation and recovery of these animals before they meet California Endangered Species Act criteria for listing as a State endangered or threatened species. The flat-tailed horned lizard is on the list of reptile and amphibian species of special concern in California (Jennings and Hays 1994, pp. 134–141).

As stated in Comrack *et al.* (2008, p. 2), sections 15063 and 15065 of the CEQA Guidelines, which address how an impact is identified as significant, are particularly relevant to SSCs. Project-level impacts to listed (endangered, threatened, or rare species) species are generally considered significant, thus requiring lead agencies to prepare an Environmental Impact Report to fully analyze and evaluate the impacts. Moreover, section 15380 of the CEQA Guidelines indicates that SSCs should be included in an analysis of project impacts if they can be shown to meet the criteria of sensitivity outlined therein (Comrack *et al.* 2008, p. 2). In assigning “impact significance” to populations of non-listed species, analysts usually consider factors such as population-level effects, proportion of the taxon's range affected by a project, regional effects, and impacts to habitat features.

Therefore, we conclude the State's Species of Special Concern designation is an adequate regulatory mechanism

within the confines of its applicability—that is, an administrative designation that increases the level of awareness and analysis (such as under CEQA) for flat-tailed horned lizard in California. The benefits provided by the Species of Special Concern designation will continue regardless of the withdrawal of the proposed rule to list the flat-tailed horned lizard.

Arizona State Laws

Arizona Game and Fish Regulation

Arizona Game and Fish Regulation, Title 17, R12–4–443, Commission Order 43 prohibits the collection of flat-tailed horned lizards without a permit by indicating that there is no “open season” to collect the species (AGFD 2009, p. 8). Additionally, the Arizona Game and Fish Department has included the flat-tailed horned lizard on the draft List of Wildlife of Special Concern in Arizona, which the State uses to prioritize species for planning and funding purposes, although State regulations do not exist in Arizona to protect this species' habitat at this time. We conclude Arizona Game and Fish Regulation is an adequate regulatory mechanism within the confines of its applicability—that is, limiting or preventing overutilization of the flat-tailed horned lizard in Arizona. The benefits provided by the Arizona Game and Fish Regulation, Title 17, R12–4–443, Commission Order 43 will continue regardless of the withdrawal of the proposed rule to list the flat-tailed horned lizard.

Mexican Federal Law

Official Mexican Norm

The Official Mexican Norm NOM–059–ECOL–2001, Mexico's threatened species law, lists the flat-tailed horned lizard as a threatened species (SEMARNAT 2002, p. 134). The Mexican law may be implemented to modify development projects or support creation of Natural Protected Areas, but successful implementation occurs by individuals or groups outside of the Mexican government. We conclude Official Mexican Norm may be an adequate regulatory mechanism within the confines of its applicability—that is, reducing threats to the species in Mexico. The benefits provided by the Official Mexican Norm NOM–059–ECOL–2001 will continue regardless of the withdrawal of the proposed rule to list the flat-tailed horned lizard in the United States.

Summary of Factor D

With the withdrawal of the proposal to list the flat-tailed horned lizard, the

only change in regulatory protections would be the removal of the conference requirement under section 7(a)(4) of the Act. Since a conference opinion is only advisory in nature, we do not expect this change to have any significant effect on the status of the species. The remainder of the existing regulatory mechanisms summarized above will remain in place and will continue to provide benefits to the species. The aforementioned existing regulatory mechanisms provide some level of protection for the species and its habitat. This includes several laws or mechanisms that reduce potential threats, such as State laws that restrict the collection of flat-tailed horned lizards, or planning documents developed under FLPMA or the Sikes Act that incorporate measures from the Rangewide Management Strategy. Therefore, we conclude the existing regulatory mechanisms are not inadequate and do not threaten the species throughout all or a significant portion of its range, now or in the foreseeable future.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

For Factor E, we assess the natural or manmade threats to the species that were not addressed under the previous four factors. In the 1993 proposed rule to list the species as threatened and in the 2003 withdrawal document, we considered the potential effects of pesticide spraying and prolonged drought under this factor. Also in these two **Federal Register** publications, we addressed the effects of OHV use on the species and its habitat under Factor A. Similarly, in those earlier assessments, we addressed the potential effects associated with fragmentation on the species and its habitat under Factor A. Also, in our 2006 withdrawal document (71 FR 36750–36751), the scope of which was limited by court order, we addressed historical habitat loss as a component of Factor A on the grounds that Factor A addresses the curtailment of a species' habitat or range as a threat to its continued existence, but this rationale was flawed because Factor A, as discussed here and under Factor A in the present document, is limited to current and anticipated losses of habitat, not *past* losses. Because of the confusion presented in previous analyses, we have emphasized in the current analysis the differences between present and future habitat loss from past habitat loss, including how “fragmentation” as a concept interacts with the topic of habitat loss.

To address explicitly the previously identified threat of “fragmentation,” we

need to address the specific threats encompassed by that ambiguous term. However, these threats include ones that are best addressed under separate listing factors under the Act. As mentioned previously, the term fragmentation includes habitat loss. Factor A addresses present (current) or threatened (anticipated) destruction, modification, or curtailment of a species' habitat or range. Factor A does not address threats posed by *past* losses of habitat. How the *species* is affected by past habitat loss—or in other words, the present-day ramifications of those past actions of habitat destruction—is better addressed under Factor E. The effects of past habitat loss include in particular the effects of manmade barriers on populations and edge effects. Barriers may divide otherwise intact populations into smaller populations, and those smaller populations may be more susceptible to other effects (see below).

Thus, below, we assess the effects of barriers and small populations and edge effects. We also assess the previously identified potential effects to the species from pesticide spraying, OHV use, and prolonged drought; we also address the potential effects associated with global climate change not previously identified.

Barriers and Small Populations

As mentioned previously, as used herein a “population” refers to a loosely bounded, regionally distributed collection of individuals of the same species. Thus, individuals of a given species when considered together within some boundary may be considered a population. For example, the group of individuals bounded within the entire range of the species may be considered a population, sometimes referred to as the “entire population” or “population as a whole.” Similarly, groups of individuals within the entire population may be considered to occur separately from each other, forming multiple populations. In typical usage, a separation is often a literal separation—that is a physical division, by a barrier for instance—but it may also be a figurative separation; for example, an arbitrary grouping of individuals for the purposes of discussion. Regardless of the criteria used to separate and group individuals, a species may be considered to comprise one or more populations, depending on how the term is used. Moreover, because the term is loosely defined, a given population could be considered to consist of other smaller populations, sometimes hierarchically referred to as “subpopulations.” For the purposes of our discussion of barriers and small

populations, below, we primarily refer to populations as being *physically* separated, or potentially so.

Barriers prevent or severely limit contact (genetic interchange) between populations. Thus, an artificial barrier can split a population into two (or more) populations (Jackson 2000, p. 4). For animals that can move freely (vagile animals), like the flat-tailed horned lizard, barriers prevent individuals from moving from one area into another. Barriers not only include physical hindrances that prevent movement (e.g., a wall or a river), but may also include areas that a species may be disinclined to enter (e.g., unsuitable habitat) or areas of increased mortality (e.g., busy roads, or areas with an elevated number of predators) across which individuals would be unlikely to successfully traverse.

The division of populations into other, smaller populations may or may not be deleterious; it largely depends on the size of the resulting populations, with small populations more likely to experience problems than large populations, as discussed below. Moreover, small populations may be disproportionately affected by other natural and manmade factors compared to large populations, such as edge effects, also discussed below. Thus, the creation of artificial barriers results in habitat loss (see Factor A) and may also affect the species through potential effects associated with the subsequent isolation, which largely depends upon the size of the resulting populations. Because the threats from barriers and small populations are connected, we discuss the potential threats faced by small populations generally and then discuss the potential effects of barriers and small population sizes on the flat-tailed horned lizard.

The decline of a population is determined by a number of forces and factors that are often grouped into intrinsic and extrinsic. As described by Soulé and Simberloff (1986, pp. 27–28), “extrinsic forces include deleterious interactions with other species (increases in predation, competition, parasitism, disease or decreases in mutualistic interactions) and deleterious events or changes to habitat or the physical environment. Intrinsic factors include random variation in genetically based traits of the species and interactions of these traits with the environment. These include: (1) Demographic stochasticity, which is random variation in sex ratio [and] in birth and death rates, * * * (2) social dysfunction or behaviors that become maladaptive at small population sizes; [and] (3) genetic deterioration brought

on by inbreeding, genetic drift and other factors.” For a population to become extirpated (locally extinct), these extrinsic and intrinsic forces and factors must significantly affect the population. These forces and factors are more likely to be significant to small populations (Goodman 1987, pp. 11–34; Pimm *et al.* 1988, pp. 757–785; Lande 1993, pp. 911–927; Frankham 1996, pp. 1500–1508; Henle *et al.* 2004, pp. 207–251).

Our 1993 and 2003 assessments of the flat-tailed horned lizard have described flat-tailed horned lizard populations as “fragmented.” As discussed previously, fragmentation is an imprecise term, but one that clearly is associated with the breaking up of populations into smaller populations through the introduction of artificial barriers. As discussed in the Background section, historical agricultural development (and its associated urban development) has largely occurred in contiguous blocks. These large swaths of human-created non-habitat have, for the most part, exacerbated natural barriers separating the Western, Eastern, and Southeastern Populations, and severed the somewhat tenuous connection between the Coachella Valley Population and the Western Population. As a consequence of the past development, the geographical area occupied by these four populations became smaller. With the decrease in the amount of habitat area, we expect populations of flat-tailed horned lizards in those areas to also be smaller (a decrease in the abundance of individuals) (such as Hokit and Branch 2003, p. 261).

The point at which a population becomes a “small population” is not clear and varies by species-specific or situational-specific factors. There is disagreement among scientists and considerable uncertainty as to the population size adequate for long-term persistence of wildlife populations; however, there is agreement that population viability over the long term is more likely to be ensured if population sizes are in the thousands of individuals rather than hundreds (Traill *et al.*, 2010, p. 32, see also Reed *et al.* 2003, p. 30, Table 3 therein). In vertebrates, a population of 5,000 is often used as a minimum number needed for high likelihood of viability over the long term (Traill *et al.*, 2010, p. 32), while Reed *et al.* (2003, p. 30) estimated that roughly 7,000 breeding-age adults is the minimum number necessary for a vertebrate population to likely remain viable over the long term. However, as stated by Thomas (1990, p. 324), “there is no ‘magic’ population size that guarantees the persistence of animal populations.” He went on to note

that populations of some vertebrates have survived for decades with population sizes of hundreds or even dozens of individuals, adding “populations that occupy habitat fragments that are far too small to hold thousands of individuals may still possess great conservation potential” (Thomas 1990, p. 326). Moreover, the amount of time that most authors consider to be “long term” is many decades or even centuries (for example, see Shaffer 1981, p. 132; Soule and Simberloff 1986, p. 28; Traill *et al.* 2010, p. 31; see also Reed *et al.* 2003, p. 30, Table 3 therein). Although minimum population sizes for shorter time periods would be correspondingly smaller (see Figure 1 in Traill *et al.* 2010, p. 31), we use the long-term population size to be conservative.

As discussed in the Background section, and discussed further in the present section, the distribution of the flat-tailed horned lizard is divided into discrete populations. Thus, to assess the threat implied by the term “fragmentation,” it is more appropriate to consider the individual populations than to assess the population-as-a-whole. Below we assess the four geographical Populations. We first examine the Western, Eastern, and Southeastern Populations, each as a whole. Then, looking at those three Populations further, we note that potential barriers within the larger Populations may divide each Population into smaller subpopulations. Lastly, we examine the Coachella Valley Population. We treat the Coachella Valley Population separately from the other three Populations because the current distribution of flat-tailed horned lizards in the Coachella Valley occurs in two widely isolated areas and are more like the subpopulations created by barriers within the Western, Eastern, and Southeastern Populations. Thus, we take advantage of the concepts developed in our discussion of barrier-created subpopulations to assess the Coachella Valley Population.

Western, Eastern, and Southeastern Populations

There are no direct, reliable estimates of flat-tailed horned lizard population size for the four geographically separated populations. The size of the Western Population, Eastern Population, and Southeastern Population areas are 341,989 ha (845,073 ac), 169,617 ha (419,133 ac), and 1,073,551 ha (2,652,802 ac) respectively (Coachella Valley Population area is discussed separately, below). Even at the lowest (most conservative) estimated density of adult flat-tailed horned lizard of 0.3

individuals per ha (0.1 individuals per ac) (see Background section) there are likely more than 50,000 adult flat-tailed horned lizards in the Western Population, 85,000 in the Eastern Population, and 322,000 in the Southeastern Population. We acknowledge that there are numerous assumptions in these calculations that limit accuracy of the extrapolated population sizes; however, even using the most conservative density value, these three populations are of sufficient size such that any threats associated with small populations would be unlikely. However, there are potential barriers that may subdivide the otherwise apparently continuous Western, Eastern, and Southeastern Populations. We examine subdivisions within these three populations, below.

Subpopulations Within the Western, Eastern, and Southeastern Populations

For the flat-tailed horned lizard, as a diminutive terrestrial animal, a number of manmade changes to the landscape may serve as barriers (see FTHLIC 2003a, p. 14). These include: (1) Railways, canals, and certain types of roadways that are physical hindrances to the movement of flat-tailed horned lizards; (2) developed areas (unsuitable habitat) into which flat-tailed horned lizards may be disinclined to enter; and (3) busy roadways, powerline corridors, and areas adjacent to developed areas (that have artificial perches and nearby artificial food sources resulting in higher densities of predators) that are areas of increased mortality for flat-tailed horned lizards (FTHLIC 2003a, p. 14; see also Boarman *et al.* 1997, pp. 54–58; Fagan *et al.* 1999, pp. 165–182; Jackson 2000, pp. 1–14; Germaine and Wakeling 2001, pp. 229–237; Young and Young 2005, pp. 1–11; Barrows *et al.* 2006, pp. 486–494; Shepard *et al.* 2008, pp. 288–296).

We expect these potential barriers will be variable in how thoroughly they prevent movement of flat-tailed horned lizards, and thus variable in the extent to which they prevent contact between individuals and separate populations. Canals generally extend for long distances without overcrossings, and flat-tailed horned lizards may be reluctant to use (go over) what few crossings exist (bridges); as such, canals are likely impermeable barriers in the same way the Colorado River has separated populations. However, as discussed below, roadways and railways, and the infrastructure associated with border security may or may not constitute complete barriers.

Depending on how roads are constructed, they may serve as physical hindrances to the movement of flat-tailed horned lizards. For example, raised roadbeds, steep curbs, and roadway dividers may contribute to making a roadway a physically impassible barrier for flat-tailed horned lizards. Similarly, railways may serve as physical barriers. However, bridges and culverts, especially those with larger-sized openings, may allow flat-tailed horned lizards to cross under the physical impediments along roads and railways (Painter and Ingraldi 2007, p. 17). Although it is not known whether the openings under such structures are used regularly by the species in the wild, it is likely that the undercrossings with natural substrates created by larger culverts, and especially bridges, are used to some extent. Additionally, blowing sand, which is not atypical for much of the range of the flat-tailed horned lizard, may build up along roadways and railways. Thus, it is possible that accumulated sand, at least until the sand is cleared by maintenance crews, may provide a “bridge” over the physical structures that prevent flat-tailed horned lizard movement. For example, the railway through the sandy Gran Desierto de Altar may be less of a barrier than railways in less sandy portions of the species’ range due to blowing and drifting sands that may provide passage over tracks.

Additionally, roads that do not serve as physical hindrances may be barriers for other reasons. Flat-tailed horned lizards, particularly males (Young and Young 2000, p. 19), are often sighted on paved roads (Mayhew 1965, p. 104; Turner and Medica 1982, p. 822; Johnson and Spicer 1985, p. 40; Stebbins 2003, p. 304). This, combined with their propensity to not flee from oncoming traffic (Young and Young 2000, p. 60), may make flat-tailed horned lizards particularly susceptible to traffic-related road mortality (Nicola and Lovich 2000, p. 211; Gardner *et al.* 2001, p. 10). The stretches of multi-lane highways (Interstate 8 and State Route 86) that cross areas within the current range of the flat-tailed horned lizard have, on average, over 25,000 vehicles pass over them daily, while the smaller, two-lane highways of State Routes 78 and 98 within the species’ range have roughly 3,500 to 5,500 vehicles per day, on average (Caltrans 2008, electronic data). The increased level of vehicle traffic on the multi-lane highways along with the greater number of physical hindrances that may result from multiple lanes is more likely to serve as a barrier than the smaller, two-lane

highways. For example, the population of flat-tailed horned lizards occupying the small part of the Southeastern Population north of Interstate 8 (1,018 ha (2,516 ac)) (see below) is small enough and isolated enough to exhibit some evidence of inbreeding or genetic drift (Culver and Dee 2008, p. 2), suggesting Interstate 8 in this area is an effective barrier preventing movement of flat-tailed horned lizards (see below). However, Interstate 8 likely poses less of a physical hindrance where it crosses the Eastern Population where blowing sand fills in gaps along the road edge, although the traffic volume remains high. Another way roadways may be barriers is that the cryptic coloration that allows flat-tailed horned lizards to blend in with desert soils may be of little use on paved roads, allowing increased levels of predation (Young and Young 2000, p. 62) (see Factor C, *Disease and Predation*). Thus, even though flat-tailed horned lizards may be able to physically cross two-lane roads (Barrows 2006, p. 119), these roads may be barriers to flat-tailed horned lizards for other reasons.

However, it is not clear whether roadways or other potential barriers are complete barriers. They may instead be “semipermeable” barriers, reducing contact between populations, but not stopping it. This may be especially true for small roads, especially gravel and unsurfaced roads and OHV “routes.” Although the amount of contact needed to maintain population connectivity of flat-tailed horned lizards is not known, Mills and Allendorf (1996, p. 1517) suggested that if 1 to 10 individuals per generation successfully cross a semipermeable barrier, that level of movement is likely sufficient to maintain the connection between populations, provided the overall population is of sufficient size. Thus, a potential barrier would have to severely limit flat-tailed horned lizard movement throughout its length and at all times for it to be a complete barrier; as such, only a few potential barriers are likely complete barriers.

The “tactical infrastructure,” including fencing, lighting, and access and patrol roads (collectively, the “border fence”), along portions of the international border has the potential to serve as a barrier. The actual fencing in these areas includes vehicle and pedestrian fences that are constructed to allow movement of small animals (USCBP 2008a, pp. 1–4 to 1–6 and Appendix B; USCBP 2008b, pp. 2–5 and 8–9). Although the shifting sand has meant some of the small slots that were incorporated into fine-mesh pedestrian fence to allow movement of flat-tailed

horned lizards are no longer at ground level (FTHLICC 2010, p. 10), the shifting sand has also resulted in gaps under the fence that flat-tailed horned lizards may use to cross under the fence (Rorabaugh 2010, p. 190). Thus, we do not anticipate the fence proper to be a complete physical hindrance to flat-tailed horned lizard movement. The additional infrastructure and activity may deter flat-tailed horned lizard movement or allow for increased mortality. However, in total, we do not believe the level of activity to be high enough to be a complete barrier to flat-tailed horned lizard movement (see also Rorabaugh 2010, p. 190). For example, genetic data from both sides of the border in the Southeastern Population suggests that populations of flat-tailed horned lizards in Arizona are not genetically isolated from neighboring populations in Mexico (Culver and Dee 2008, p. 10). As such, the border fence is likely a semipermeable barrier, not a complete barrier, for the species.

To assess the threat of barriers to the flat-tailed horned lizard, we examined maps of the region, including GIS data and aerial and satellite imagery. The areas in which flat-tailed horned lizards are currently distributed contain numerous potential manmade barriers. As mentioned above, the Coachella Valley Population area has numerous barriers, and the flat-tailed horned lizard is only known from two relatively small areas. Thus, as summarized below, we focused our attention on the three relatively contiguous Western, Eastern, and Southeastern Populations.

For this analysis, we used GIS data of the species’ “current distribution” as delineated by the 2003 Rangewide Management Strategy to examine the size of the areas between those features we considered likely barriers. Barriers divide the areas of habitat into subareas—termed herein as “parts.” Similarly, barriers divide populations of flat-tailed horned lizards into smaller populations, or subpopulations. Features we considered potential likely barriers included: (1) The All-American Canal and the Coachella Canal, which are likely to be complete barriers throughout their lengths; and (2) Interstate 8; State Routes 78, 86, and 98; Mexico Federal Highways 2 and 8; the (old) coastal highway (which is being upgraded to a multi-lane highway, but we do not have GIS data for the new route); the international border; and several railways, which are likely to be semipermeable barriers to varying degrees along their lengths.

For the purposes of dividing the areas into “parts,” we assumed all potential barriers were complete barriers;

however, in the analysis that follows we discuss the situations in which such barriers may be semipermeable.

Additionally, for the purposes of the analysis, where two or more potential barriers are adjacent to each other (e.g., portions of Interstate 8 and the All-American Canal), we mapped them as a single barrier. All of the area values (hectares and acres) are approximate and are not as precise as the values given; however, we believe they are sufficiently accurate for this coarse-scale analysis (especially because we used conservative estimates of flat-tailed horned lizard densities).

We used the conservative estimated density of 0.3 adult flat-tailed horned lizards per ha (0.1 per ac) to determine whether potentially isolated parts between barriers were likely to contain more than 7,000 adults, in other words, to be large enough to avoid threats that may be associated with small population size (see above). Where populations were “small,” we also present other potential population sizes using higher densities, including the still-conservative, but perhaps more realistic (for certain “parts”), value of 0.7 individuals per ha (0.3 per ac) (see *Population Dynamics* section, above).

As described in the *Population Dynamics* section in the Background, these density estimates were derived from data that were collected at sites in the northern portion of the species’ range. As a result, we are confident that the density estimates used are conservative. We do not have density estimates for the southern portion of the species’ range; thus, we do not know if 0.3 or 0.7 individuals per ha (0.1 or 0.3 per ac) are as conservative. Nevertheless, because these values are at the low end of a fairly wide range (0.3 to 4.4 adults per ha (0.1 to 1.8 per acre)), we believe them to be within the density range even in the southern areas of the species’ distribution.

Additionally, as discussed near the beginning of the “Barriers and Small Populations” section, above, the point at which a population becomes “small” varies from species to species and from situation to situation. Stated another way, the forces and factors that are *more likely* to be significant threats to a “small” population of a given species are *not guaranteed* to be significant threats to a given population of a given size. We have limited information on the effects such forces and factors may have on the flat-tailed horned lizard. For example, even though information in the scientific literature suggests the previously mentioned population north Interstate 8 is exhibiting some evidence of inbreeding or genetic drift (Culver

and Dee 2008, p. 2), we do not have specific information as to whether or to what degree that population's status is being affected; the information in the scientific literature (as discussed above) suggests that this population is likely facing a greater *risk* from threats associated with genetic deterioration, but we have no data (one way or the other) to assess that particular population's status. Thus, for the purposes of evaluating the potential threats associated with the implied meaning of "fragmentation" to the flat-tailed horned lizard, we have assumed that the populations of flat-tailed horned lizards in areas that we

identified as small, isolated parts are likely to experience adverse effects associated with small population size.

Western Population

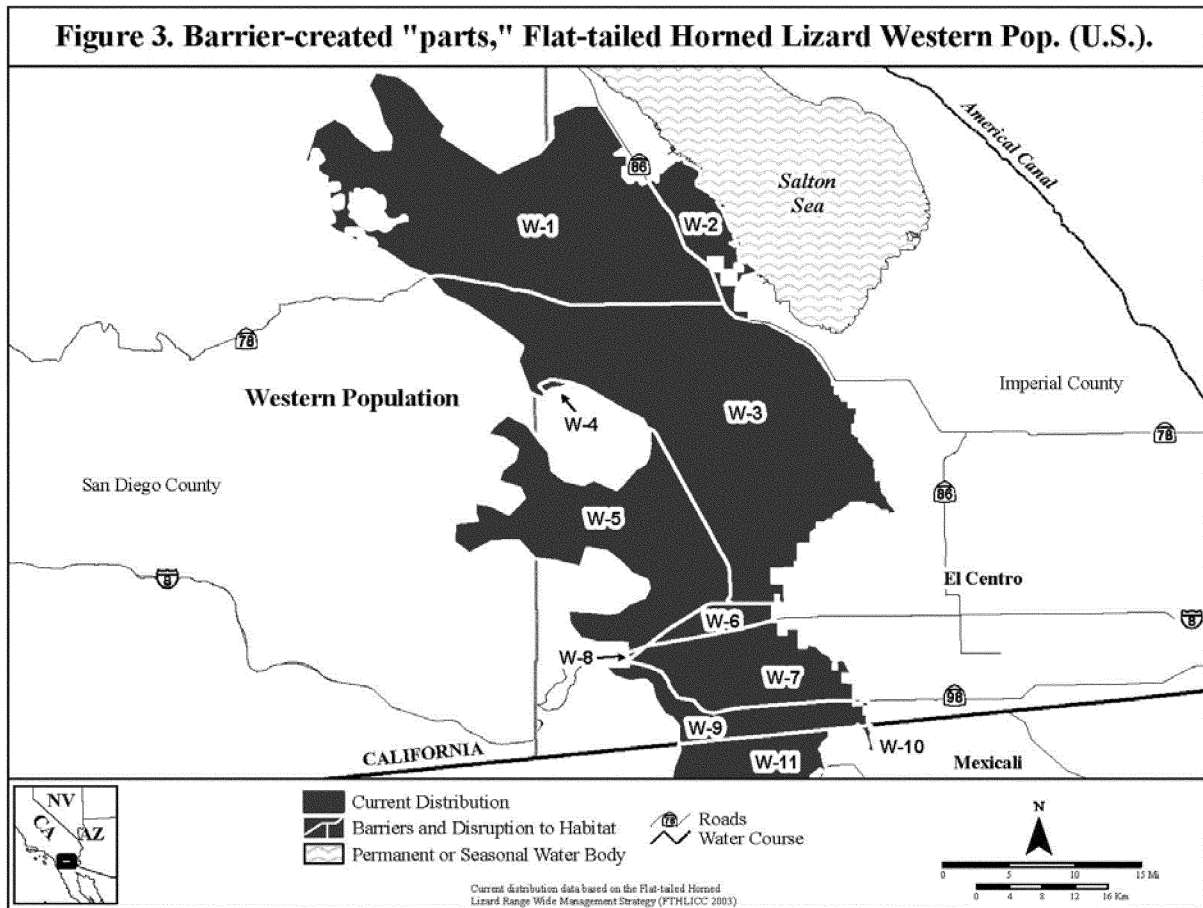
The potential barriers listed above split the Western Population area into 12 parts (Table 3, Figures 3 and 4), four of which are likely to support populations greater than 7,000 individuals, even with the most conservative of the estimated densities. These include: (1) The area north of State Route 78 (77,566 ha (191,670 ac)) (Part W-1; Table 3), which includes the Borrego Badlands Management Area and Ocotillo Wells SVRA; (2) the area immediately south of State Route 78

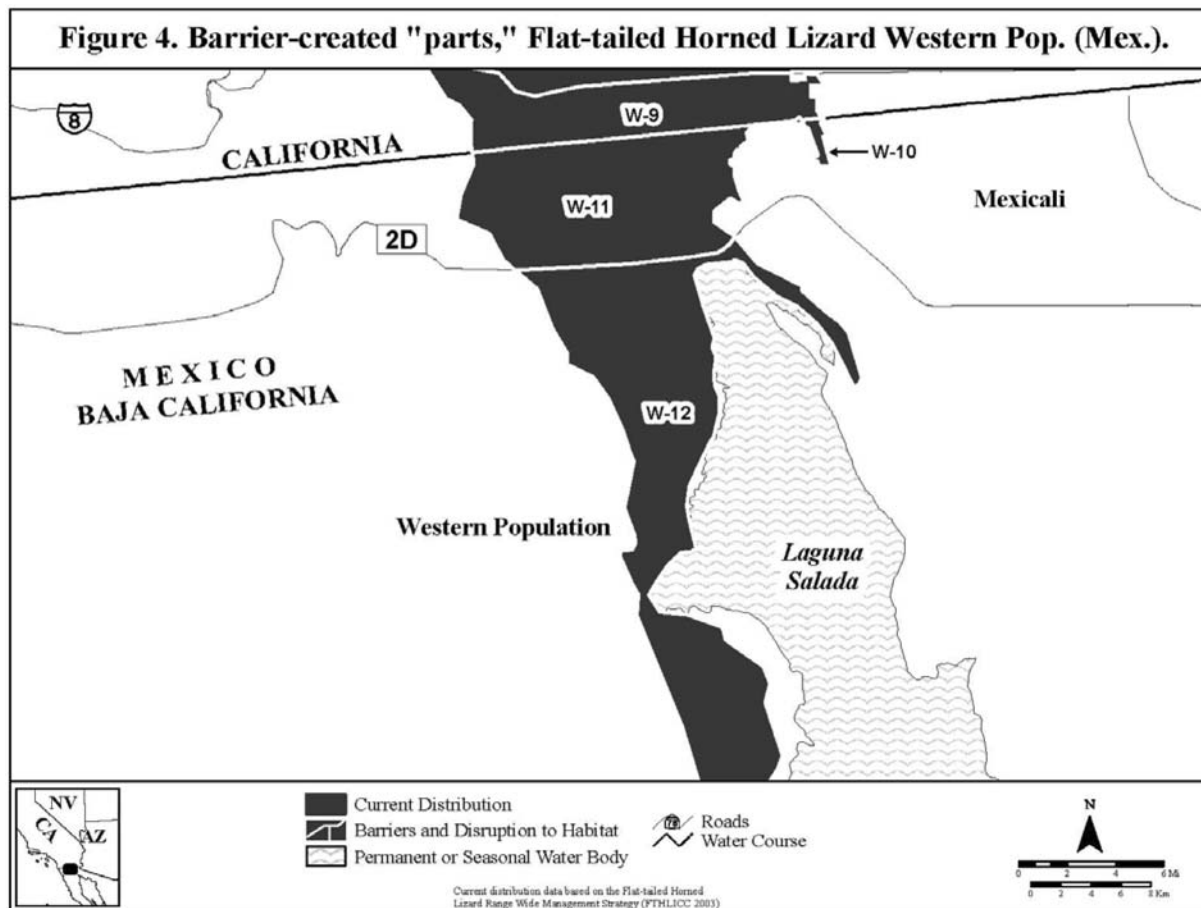
(89,105 ha (220,183 ac)) (Part W-3; Table 3), which includes the West Mesa Management Area; (3) the area in the vicinity of the southeastern corner of Anza-Borrego Desert State Park (42,443 ha (104,879 ac)) (Part W-5; Table 3); and (4) the long, narrow area south of Mexico Federal Highway 2 in Baja California (74,254 ha (183,486 ac)) (Part W-12; Table 3). Although the long, narrow nature of the area in Baja California may make threats more pronounced (Faaborg *et al.* 1995, p. 366), it remains a large habitat area. Thus, it is likely flat-tailed horned lizards in these four areas are not "small populations."

TABLE 3—THE SIZE (AREA) OF THE "PARTS" CREATED BY BARRIERS (SEE TEXT) WITHIN THE WESTERN POPULATION AND OUR DETERMINATION AS TO WHETHER THE SPECIFIED PART IS UNLIKELY TO BE AT RISK OF DELETERIOUS EFFECTS OF SMALL POPULATIONS AT THE CONSERVATIVE DENSITIES OF 0.3 OR 0.7 INDIVIDUALS PER HA (0.1 OR 0.3 PER AC)

Part identifier (country)	Area of part ¹	Is this part large enough to avoid deleterious effects associated with small populations when the density is assumed to be:	
		0.3 individuals per ha (0.1 per ac)	0.7 individuals per ha (0.3 per ac)
W-1 (U.S.)	77,566 ha (191,670 ac)	yes	yes.
W-2 (U.S.)	8,777 ha (21,688 ac)	no	no.
W-3 (U.S.)	89,105 ha (220,183 ac)	yes	yes.
W-4 (U.S.)	539 ha (1,331 ac)	no	no.
W-5 (U.S.)	42,443 ha (104,879 ac)	yes	yes.
W-6 (U.S.)	4,081 ha (10,083 ac)	no	no.
W-7 (U.S.)	19,527 ha (48,252 ac)	no	yes.
W-8 (U.S.)	110 ha (272 ac)	no	no.
W-9 (U.S.)	10,873 ha (26,867 ac)	no	yes.
W-10 (Mex.)	294 ha (726 ac)	no	no.
W-11 (Mex.)	14,420 ha (35,632 ac)	no	yes.
W-12 (Mex.)	74,254 ha (183,486 ac)	yes	yes

¹ Area values are estimated through a GIS-based assessment. Despite the level of precision presented, area values are approximate; however, we believe they are accurate enough to draw the conclusions presented.



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Of the remaining eight populations, three (Parts W-4, W-8, and W-10; Table 3) were remnants of a few hundred hectares each, totaling less than 1,000 ha (2,500 ac). If the flat-tailed horned lizards in these areas are isolated from other flat-tailed horned lizard populations, we expect they will be "small populations" and that they, therefore, are more likely to be negatively impacted by the deleterious effects associated with small populations sizes. Although the populations in these parts may have some connection to their respective adjacent parts, Parts W-4, W-8, and W-10 are very small and on the periphery, and any such connection would likely be tenuous at best.

Of the five remaining parts, three (located between Interstate 8 on the north and Mexico Federal Highway 2 to south) (Parts W-7, W-9, and W-11; Table 3) were large enough to likely support more than 7,000 flat-tailed horned lizards if the density of flat-tailed horned lizards was 0.7 individuals per ha (0.3 per ac). Given that the two U.S. areas contain the Yuha Desert Management Area, an area that was selected to be a Management Area

because it is likely to support higher densities of flat-tailed horned lizards and where one of the demographic plots from which the data for density estimates were gathered (*see Population Dynamics* section, above), and the one in Mexico is immediately adjacent to the Yuha Desert Management Area, we believe it is reasonable to conclude that the density of 0.7 individuals per ha (0.3 per ac) is a realistic but still conservative density estimate to use. Moreover, as mentioned above, the border fence is likely a semipermeable barrier, allowing some connectivity between the Yuha Desert Management Area and the areas of habitat south of the international border. Thus, it is likely flat-tailed horned lizards in these areas are not "small populations."

One of the last two remaining parts is the area between Interstate 8 and the railway to the north (Part W-6; Table 3); it is over 4,000 ha (9,900 ac). This part should have some connectivity with the areas to the north because it is unlikely the railway is a complete barrier, and it may even have limited connection to the south across Interstate 8 because of culverts and bridges, especially the large bridge that allows Interstate 8 to span the typically dry South Fork Coyote

Wash at the far west end of Part W-6 (BLM and CEC 2010, p. C.2-22; USFWS 2010c, p. 57). A 2,630-ha (6,500-ac) solar generation facility has been proposed in this area, which is likely to transform much of it into unsuitable habitat. However, requirements for the construction and operation of the solar generation facility include avoidance of impacts to the major washes that cross the site, which would allow the possibility of connectivity (USFWS 2010c, p. 57).

The last area, between State Route 86 and the Salton Sea, is over 8,000 ha (19,800 ac) (Part W-2; Table 3, Figure 3). The multi-lane State Route 86 is likely a substantial barrier, but our interpretation of aerial imagery suggests there are several bridges that may allow some connection. That connection, combined with the size of the area, may reduce the risk this population will suffer from threats associated with "small populations."

In sum, for the Western Population, assuming the identified potential barriers are complete barriers (which is not likely, as explained above, although we do not know how permeable they may be), and assuming the most conservative density of 0.3 flat-tailed

horned lizards per ha (0.1 per ac), we calculate that nearly 83 percent of the area is in parts of sufficient size such that the populations of flat-tailed horned lizards therein are not likely to be substantially affected by the factors associated with small population size. If we assume a slightly less conservative density (though still at the low end of the reported range) of 0.7 individuals per ha (0.3 per ac), we calculate about 96 percent of the area within the Western Population is in large enough blocks to not be substantially affected by

small population size. Thus, the Western Population is not substantially composed of “small populations.” Therefore, we conclude the flat-tailed horned lizards in the Western Population are not substantially threatened by effects associated with barriers that subdivide populations or the deleterious effects that may follow, nor do we expect barriers to be a threat in the foreseeable future.

Eastern Population

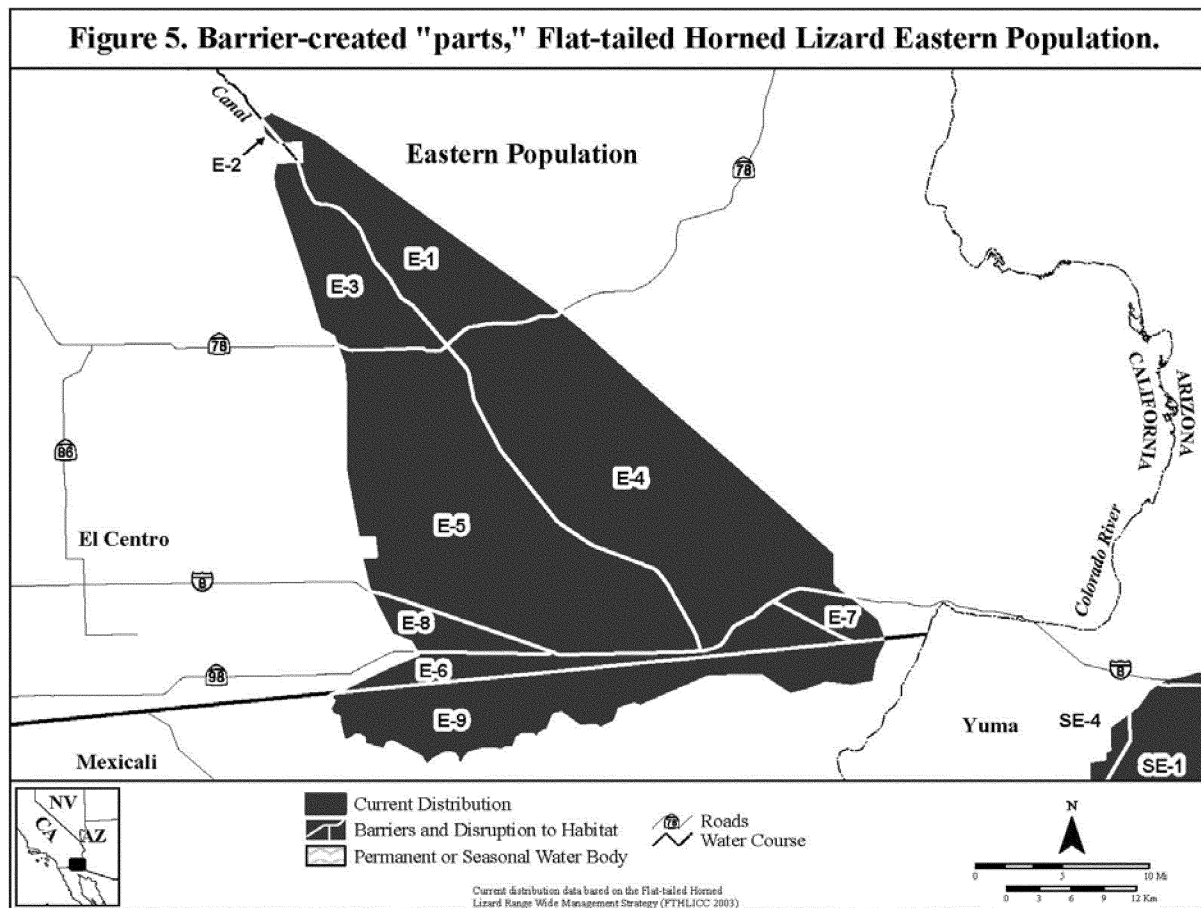
The potential barriers listed above split the Eastern Population area into

nine parts within three subareas (Table 4). Two major canals, which we expect are complete barriers, divide the overall area. The east-to-west-flowing All-American Canal isolates the southern roughly 20 percent (southern subarea) from the northern 80 percent, which in turn is divided by the southeast-to-northwest-flowing Coachella Canal, essentially splitting the northern area in half (East Mesa subarea on the west and the Algodones Dunes subarea to the east). We discuss parts within these three subareas separately below.

TABLE 4—THE SIZE (AREA) OF THE “PARTS” CREATED BY BARRIERS (SEE TEXT) WITHIN THE EASTERN POPULATION AND OUR DETERMINATION AS WHETHER THE SPECIFIED PART IS UNLIKELY TO BE AT RISK FROM DELETERIOUS EFFECTS OF SMALL POPULATIONS AT THE CONSERVATIVE DENSITIES OF 0.3 OR 0.7 INDIVIDUALS PER HA (0.1 OR 0.3 PER AC)

Part identifier (country)	Area of part ¹	Is this part large enough to avoid deleterious effects associated with small populations when the density is assumed to be:	
		0.3 individuals per ha (0.1 per ac)	0.7 individuals per ha (0.3 per ac)
E-1 (U.S.)	16,863 ha (41,669 ac)	no	yes.
E-2 (U.S.)	156 ha (385 ac)	no	no.
E-3 (U.S.)	12,135 ha (29,986 ac)	no	yes.
E-4 (U.S.)	50,270 ha (124,220 ac)	yes	yes.
E-5 (U.S.)	50,721 ha (125,334 ac)	yes	yes.
E-6 (U.S.)	8,968 ha (22,160 ac)	no	no.
E-7 (U.S.)	2,867 ha (7,085 ac)	no	no.
E-8 (U.S.)	4,140 ha (10,230 ac)	no	no.
E-9 (Mex.)	23,496 ha (58,060 ac)	yes	yes.

¹ Area values are estimated through a GIS-based assessment. Despite the level of precision presented, area values are approximate; however, we believe they are accurate enough to draw the conclusions presented.



The southern subarea of the Eastern Population—that is, south of the All-American Canal—is divided by the international border, with the part between the canal and border totaling 8,968 ha (22,160 ac) (Part E-6; Table 4), and the part on the Mexico side of the international border totaling 23,496 ha (58,060 ac) (Part E-9; Table 4). However, as mentioned previously, the border fence is probably a semipermeable barrier. As such, we expect the area of flat-tailed horned lizard habitat to the south of the All-American Canal (Parts E-6 and E-9 combined) could be considered together. However, we estimate that roughly 6,400 ha (15,800 ac) in the easternmost portions of these two parts contain areas of deep, actively shifting sands of the Algodones Dunes that are likely rarely used by flat-tailed horned lizards. Despite this, the area is large enough so as to likely not be affected by the deleterious effects associated with “small populations.”

The East Mesa subarea (the western half of the northern 80 percent) is divided into four parts. The smallest part (Part E-2; Table 4) is a very small, isolated remnant of potential habitat (156 ha (385 ac)) at the far northern end of the Eastern Population area; it is a

small population and may be at greater risk from the deleterious effects associated with small populations. The next smallest part is a triangle of flat-tailed horned lizard habitat between Interstate 8 and the All-American Canal (Part E-8; Table 4). It is 4,140 ha (10,230 ac), likely too small of an area to support a “large population,” and the busy, multi-lane Interstate 8 probably has low “permeability” for flat-tailed horned lizard movement. The third part in the East Mesa subarea (Part E-5; Table 4), the area north of Interstate 8, south of State Route 78 and west of the Coachella Canal, is 50,721 ha (125,334 ac) and includes the East Mesa Management Area, which is considered to be higher-quality flat-tailed horned lizard habitat. This part is large enough to support a large population; moreover, it is likely that the density in this area is at the higher end of the range of density estimates—thus, the population is likely much larger and not at risk of deleterious effects associated with small populations. The fourth part in the East Mesa subarea (Part E-3; Table 4), the area to the north of State Route 78 and west of the Coachella Canal, is 12,135 ha (29,986 ac) and unlikely to support a “large population” of flat-tailed horned

lizards at the most conservative density. However, because of this area's proximity to the East Mesa Management Area, it likely supports higher densities of flat-tailed horned lizards such that at 0.7 flat-tailed horned lizards per ha (0.3 per ac), this part would support a population that would not be at risk from threats associated with small population size. Moreover, State Route 78 in this area, because blowing sand has filled in any gaps along the road's edge such that it is not a physical hindrance and it has a lower traffic volume (Caltrans 2008, electronic data), is likely a semipermeable barrier, allowing contact of flat-tailed horned lizards between the two areas (north and south of the highway). As such, we expect the area of flat-tailed horned lizard habitat north of Interstate 8 and west of the Coachella Canal (Parts E-3 and E-5 combined) is large enough so as to not be affected now or in the foreseeable future by the deleterious effects associated with small populations.

The Algodones Dunes subarea (the eastern half of the northern 80 percent) is divided into three parts. The part north of Interstate 8, south of State Route 78 and east of the Coachella

Canal, is 50,270 ha (124,220 ac) (Part E-4; Table 4), large enough to support a large population at the most conservative density estimate. However, this area is mainly composed of the Algodones Dunes, which is an area of deep, actively shifting sand that is likely rarely used by flat-tailed horned lizards (Turner *et al.* 1980, p. 14). Flat-tailed horned lizards in this area are likely (naturally) restricted to the peripheral portions of the dunes. Moreover, large portions of this region include areas of intense recreational OHV activity, including portions of the peripheral areas of the dunes, which may reduce the habitat quality in those areas (see Factor A). The third part of this subarea (Part E-1; Table 4), the area north of State Route 78, is 16,863 ha (41,669 ac), at the most conservative density estimates supporting a population that may be at risk from the deleterious effects of small population size. This part is also mainly composed of the deep, actively shifting sands of the Algodones Dunes, suggesting that higher densities of flat-tailed horned lizards are unlikely. However, unlike the areas to the south of State Route 78, most of the area is designated as Wilderness and, as such, OHV activity is prohibited. Moreover, as in the East Mesa subarea, State Route 78 is likely a semipermeable barrier, allowing contact of flat-tailed horned lizards between the two areas (north and south of the highway). Thus, the areas on the periphery of the Algodones Dunes are likely used by flat-tailed horned lizards within parts E-1 and E-4, but the majority of these two parts, the areas of deep, shifting sands of the Algodones Dunes, likely contributes little to the Eastern Population, and likely contributed little even before the manmade barriers and OHV activity. The smallest part (Part E-7; Table 4), between the All-American Canal and Interstate 8, in the southeast corner of the Eastern Population area, is about 2,867 ha (7,085 ac). Using the conservative density estimate, the population of flat-tailed horned lizards in this part may be at risk of deleterious effects associated with small populations. This part, though sandy, is not dominated by the deep, actively shifting sands of the main dunes.

In sum, for the Eastern Population, assuming the identified potential

barriers are complete barriers (which is not likely, see above, although we do not know how permeable they may be), and assuming the most conservative density of 0.3 adult flat-tailed horned lizards per ha (0.1 per ac) for all the parts, we calculate that about 73 percent of the area is in large enough blocks that the populations of flat-tailed horned lizards therein are not likely to be affected by threats associated with small populations. However, the Eastern Population is divided by the All-American Canal and the Coachella Canal, which we expect are complete barriers to flat-tailed horned lizards. As such, the Eastern Population area is divided into three subareas. The size of the population in the portion east of the Coachella Canal, the Algodones Dunes subarea, is not clear because much of the area includes the deep-sand areas of the Algodones Dunes, which is likely low-quality habitat for the flat-tailed horned lizard. As such, even using our conservative density estimate, this area likely supports—naturally, even prior to any manmade effects—fewer flat-tailed horned lizards compared to the other subareas in the Eastern Population than would be expected from its size. For the subarea south of the All-American Canal, the border fence between part E-6 and E-9 is likely permeable to some extent, but roughly 6,400 ha (15,800 ac) in the easternmost portions of these two parts contain areas of deep, actively shifting sands of the Algodones Dunes that are likely rarely used by flat-tailed horned lizards. Thus we expect the populations of flat-tailed horned lizards in parts E-6 and E-9 are connected, and even subtracting the area of deep sand in the east of these two parts, the subarea south of the All-American Canal is large enough to likely support a population of flat-tailed horned lizards that is unlikely to be substantially affected by the threats associated with small population size. For the subarea west of the Coachella Canal and north of the All-American Canal, the populations of flat-tailed horned lizards in parts E-3 and E-5 are likely connected because State Route 78 likely is a semipermeable barrier. Moreover, Part E-5 contains the East Mesa Management Area where the density of flat-tailed horned lizards is likely greater than the most conservative 0.3

adults per ha (0.1 per ac) density estimate. Similarly, Part E-3 likely supports a population of flat-tailed horned lizards at a density greater than the most conservative 0.3 adults per ha (0.1 per ac). Thus, if we (1) exclude parts E-1, E-4, and the deep-sand areas at the east end of parts E-6 and E-9 because these areas are naturally poor-quality habitat and are likely rarely used by flat-tailed horned lizards; and (2) consider part E-3, E-5, and the non-deep-sand portions of E-6 and E-9 (combined; see above) as likely supporting large populations of flat-tailed horned lizards, then about 93 percent of the Eastern Population area likely supports populations of flat-tailed horned lizards that are large enough to be unlikely affected by threats associated with small populations. Therefore, we conclude that, overall, the flat-tailed horned lizards in the Eastern Population are not substantially threatened now or in the foreseeable future by effects associated with barriers that subdivide populations or the deleterious effects that may follow.

Southeastern Population

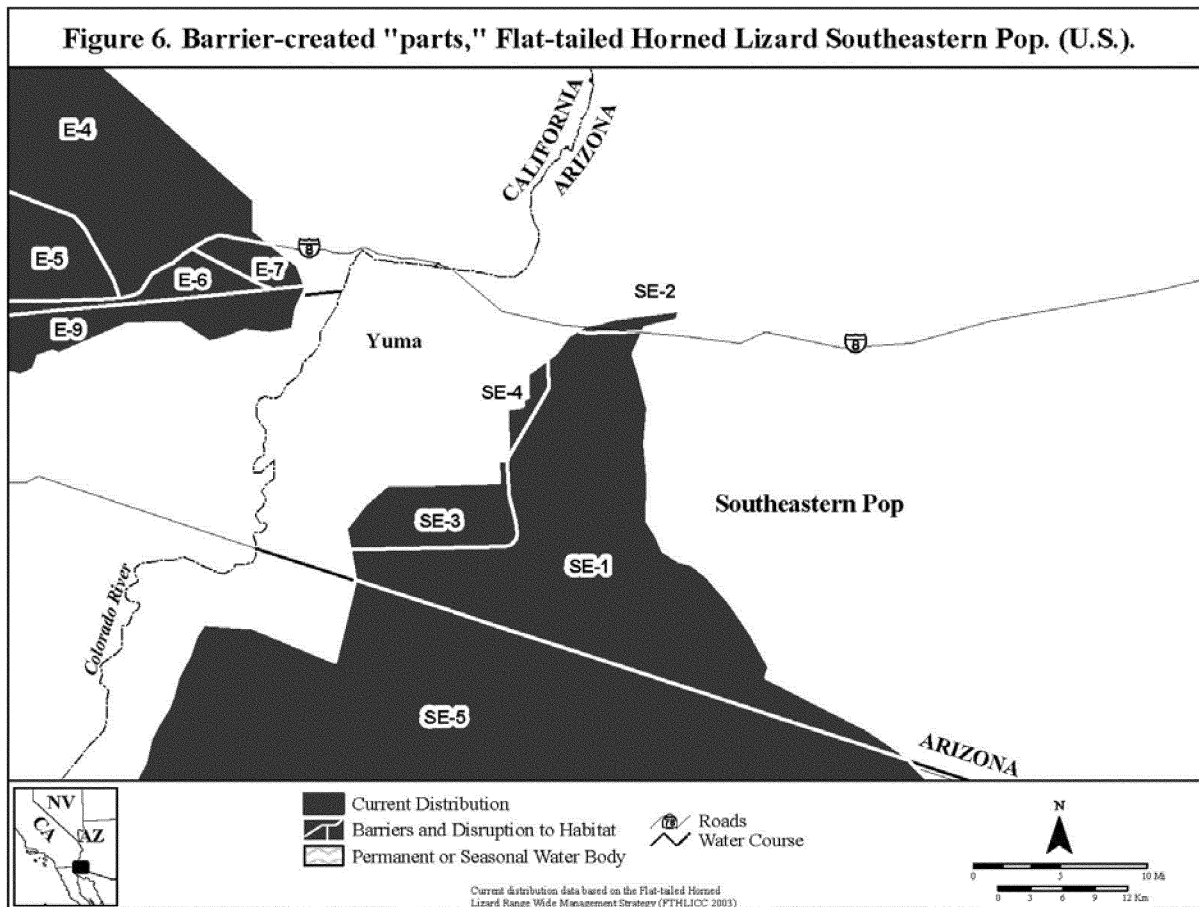
Identified potential barriers divide the Southeastern Population area into 13 parts (Table 5). By far, the largest single part (Part SE-5; Table 5, Figures 6 and 7) is in Mexico between the international border and the Mexicali to Puerto Peñasco railway, northwest of Mexico Federal Highway 8. It is over 720,000 ha (1,779,000 ac) and includes the bulk of the Gran Desierto de Altar where the species occurs in the sandy flats and low, more-stabilized dunes within this region (Rorabaugh 2008, p. 39; Rorabaugh and Young 2009, p. 183), but the deep, actively shifting sands of much of this area are likely rarely used by flat-tailed horned lizards (Rodriguez 2002, p. 18; Rorabaugh and Young 2009, p. 182). Nevertheless, the sheer size and limited manmade alterations to the area suggests that this area likely supports a population large enough to avoid the deleterious effects associated with small populations, even if they are limited to the peripheral portions of the “sand sea.” This large part touches nearly all of the other parts in the Southeastern Population, and in our discussion of the other parts, we refer to this large, central part as the Gran Desierto part.

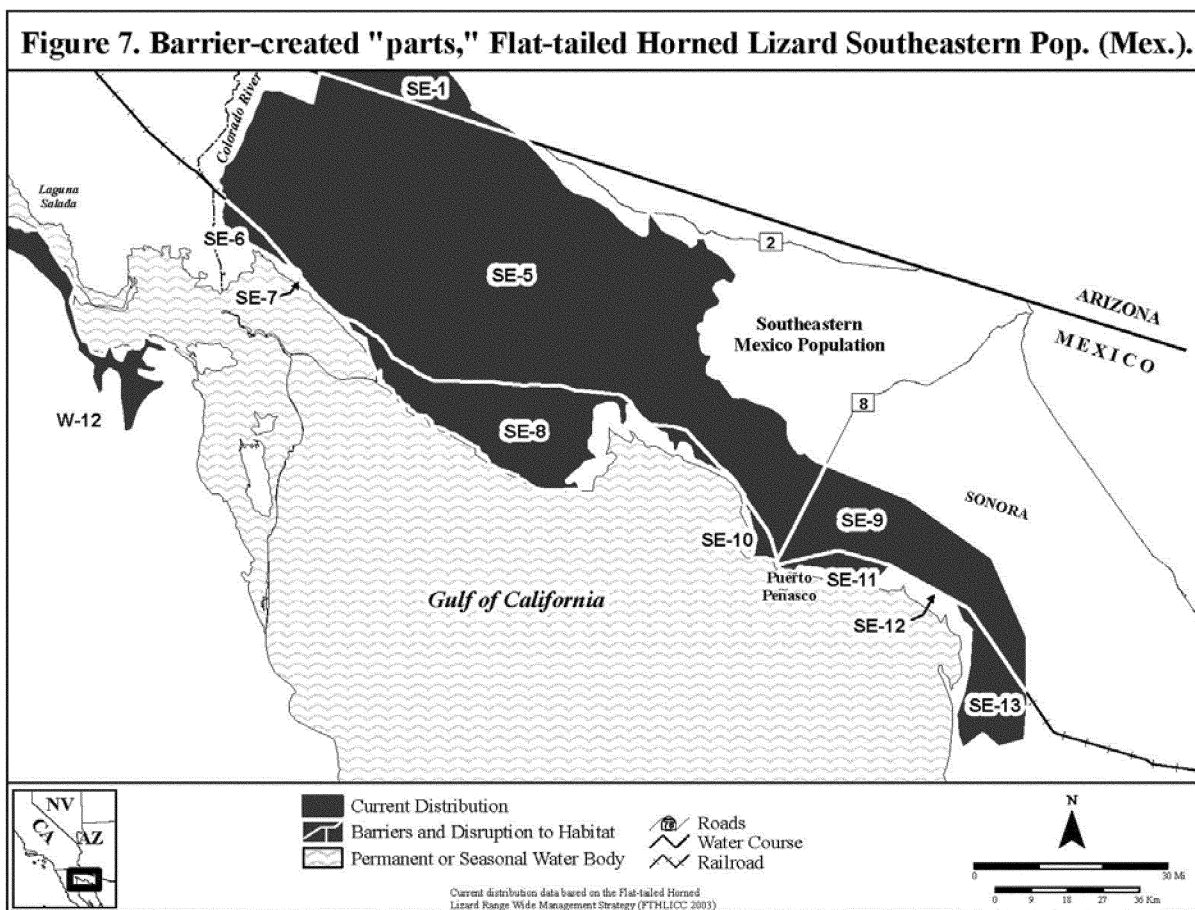
TABLE 5—THE SIZE (AREA) OF THE “PARTS” CREATED BY BARRIERS (SEE TEXT) WITHIN THE SOUTHEASTERN POPULATION AND OUR DETERMINATION AS WHETHER THE SPECIFIED PART IS UNLIKELY TO BE AT RISK OF DELETERIOUS EFFECTS OF SMALL POPULATIONS AT THE CONSERVATIVE DENSITIES OF 0.3 OR 0.7 INDIVIDUALS PER HA (0.1 OR 0.3 PER AC)

Part identifier (country)	Area of part ¹	Is this part large enough to avoid deleterious effects associated with small populations when the density is assumed to be:	
		0.3 Individuals per ha (0.1 per ac)	0.7 Individuals per ha (0.3 per ac)
SE-1 (U.S.)	56,736 ha (140,198 ac)	yes	yes.
SE-2 (U.S.)	1,018 ha (2,516 ac)	no	no.
SE-3 (U.S.)	8,804 ha (21,755 ac)	no	no.
SE-4 (U.S.)	1,364 ha (3,371 ac)	no	no.
SE-5 (Mex.)	720,168 ha (1,779,573 ac)	yes	yes.
SE-6 (Mex.)	8,354 ha (20,643 ac)	no	no.
SE-7 (Mex.)	496 ha (1,226 ac)	no	no.
SE-8 (Mex.)	110,242 ha (272,414 ac)	yes	yes.
SE-9 (Mex.)	110,857 ha (273,934 ac)	yes	yes.
SE-10 (Mex.)	5,175 ha (12,788 ac)	no	no.
SE-11 (Mex.)	10,585 ha (26,156 ac)	no	yes.
SE-12 (Mex.)	833 ha (2,058 ac)	no	no.
SE-13 (Mex.)	38,919 ha (96,171 ac)	yes	yes.

¹ Area values are estimated through a GIS-based assessment. Despite the level of precision presented, area values are approximate; however, we believe they are accurate enough to draw the conclusions presented.

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The railway that runs from Mexicali to Puerto Peñasco and south, along with the 'old' coastal highway (see above), create four parts, three small and one large, along the coast of the Gulf of California northwest of Puerto Peñasco. The three small parts along the coast are 8,354 ha (20,643 ac) (Part SE-6; Table 5), 496 ha (1,226 ac) (Part SE-7; Table 5), and 5,175 ha (12,788 ac) (Part SE-10; Table 5). These parts may be at risk from the deleterious effects associated with small populations; however, the road and railroad separating them from the Gran Desierto part are likely not complete barriers. We expect that blowing sand periodically covers the railway line and any gaps along the sides of the road, allowing some level of connectivity between flat-tailed horned lizard populations on the coast with those in the Gran Desierto part. Similarly, the one large coastal part northwest of Puerto Peñasco (110,242 ha (272,414 ac)) (Part SE-8; Table 5) is also likely connected with the Gran Desierto part; however, Part SE-8 is likely large enough by itself to support a population large enough that it would not be at risk from deleterious effects of small populations. Because we do not believe

these four parts are completely isolated, the population of flat-tailed horned lizards along the coast of the Gulf of California northwest of Puerto Peñasco is likely not at risk from the deleterious effects associated with small populations.

Mexico Federal Highway 8, the northeast to southwest-running highway from Sonoita (on the international border, outside of the range of the flat-tailed horned lizard) to Puerto Peñasco, separates the Gran Desierto part from the southeastern-most portion of the Southeastern Population. The southward continuation of the railway and the parallel-running coastal highway further divides this portion into a total of four parts. One of these parts is very small (833 ha (2,058 ac)) (Part SE-12; Table 5) and confined to a narrow strip along the coast. It may be at greater risk of deleterious effects associated with small populations. Another narrow coastal part is larger (10,585 ha (26,156 ac)) (Part SE-11; Table 5) and could support enough flat-tailed horned lizards to avoid deleterious effects of small populations if the densities were 0.7 individuals per ha (0.3 per ac). However, this area includes a portion of the urban

development of Puerto Peñasco, and densities may be lower. The southernmost (coastal) part (Part SE-13; Table 5) is also separated by the railway-highway combination, but it is large (38,919 ha (96,171 ac)) and is likely to support a population large enough to avoid deleterious effects from small populations size even at the most conservative density. These three coastal parts are separated from the large interior part (Part SE-9; Table 5), which is 110,857 ha (273,934 ac) and large enough to support considerably more than 7,000 flat-tailed horned lizards. Additionally, if the railway-highway combination separating the three coastal parts (Parts SE-11, SE-12, and SE-13) from the larger interior part is not a complete barrier, which is possible because of blowing sand, then the two larger coastal parts could receive dispersing flat-tailed horned lizards from the large interior part, which may help further reduce the likelihood of deleterious effects associated with "small populations." Moreover, Mexico Federal Highway 8 may also be permeable, suggesting that the southernmost portion of the Southeastern Population (Parts SE-9, SE-11, SE-12, and SE-13 combined)

may also be connected with the extremely large Gran Desierto part (Part SE-5).

Lastly, the portion of the Southeastern Population in the United States is divided into four parts, including one large part (see below) and three smaller parts, the latter including one north of Interstate 8 and two west of the Yuma Area Service Highway. The part north of Interstate 8 is 1,018 ha (2,516 ac) (Part SE-2; Table 5) and may be at risk of deleterious effects associated with small populations. We expect the multi-lane Interstate 8 to be nearly a complete barrier along this stretch of the road and, as mentioned above, the evidence suggests that the population there may be exhibiting inbreeding or genetic drift (Culver and Dee 2008, p. 2). The two small parts west of the Yuma Area Service Highway are 8,804 ha (21,755 ac) (Part SE-3; Table 5) and 1,364 ha (3,371 ac) (Part SE-4; Table 5); both may have small populations that could be at risk from the deleterious effects of small population size. The large part in Arizona (56,736 ha (140,198 ac)) (Part SE-1; Table 5) is mostly composed of the Yuma Desert Management Area and is large enough to avoid deleterious effects from small population size. Culver and Dee (2008, pp. 1–14) also sampled the Yuma Desert Management Area and did not report any evidence of inbreeding or genetic drift in flat-tailed horned lizards from this large part, in contrast to the small, isolated part (Part SE-2) north of Interstate 8.

In sum, for the Southeastern Population, assuming the identified potential barriers are complete barriers (which is not likely, see above, although we do not know how permeable they may be), and assuming the most conservative density of 0.3 flat-tailed horned lizards per ha (0.1 per ac), we calculate that about 97 percent of the area is in large enough blocks that the populations of flat-tailed horned lizards therein are not likely to be affected by threats associated with small populations. However, much of the dune areas of the Gran Desierto de Altar are likely to have few, if any, flat-tailed horned lizards. Nevertheless, given the limited amount of manmade development within large areas of the Southeastern Population and the fact that about 97 percent of the area contains large blocks of flat-tailed horned lizard habitat, the Southeastern Population is not substantially composed of “small populations.” Therefore, we conclude the flat-tailed horned lizards in the Southeastern Population are not substantially threatened now or in the foreseeable

future by effects associated with barriers that subdivide populations or the deleterious effects that may follow.

For the Western, Eastern, and Southeastern Population areas combined, about 91 percent of the 1,585,157 ha (3,917,008.25 ac) area is in large enough blocks that the populations of flat-tailed horned lizards therein are not likely to be affected by threats associated with small populations. As mentioned above, the part that is primarily composed of the Gran Desierto de Altar is very large; it makes up about 45 percent of the total area of the three populations combined and is larger than the Western and Eastern Population areas combined. Without the Gran Desierto part, about 84 percent of the total area is in parts that are likely to contain populations large enough to avoid deleterious effects associated with small populations. Thus, despite not having complete population data for the species throughout its range, through this analysis of size of the habitat areas, and application of conservative estimates (the smallest density value within the estimated range, and the largest population size value below which we are considering (for our analysis of this species) a “small population”), we conclude that the flat-tailed horned lizard populations are not small and the species is not habitat-limited in the United States or Mexico.

In conclusion, this evaluation suggests that despite the presence of multiple barriers that potentially divide the Western, Eastern, and Southeastern Population areas into smaller parts, most of the areas within the current distribution outside of the greater Coachella Valley are in parts large enough to support populations of flat-tailed horned lizards that are large enough to avoid deleterious effects associated with small populations. Therefore, the implied meaning of fragmentation is not a significant threat to the flat-tailed horned lizard throughout its range or within the Western, Eastern, and Southeastern Population areas.

Coachella Valley Population

The Coachella Valley Population differs from the other three in that it has been highly affected by past agricultural development and recent (and continuing) urban development (see Factor A). As mentioned previously, the only areas with recent detections of flat-tailed horned lizards are within the Thousand Palms and the Dos Palmas reserves. The precise amount of habitat that is occupied is not known, but based on an analysis of habitats within the Coachella Valley MSHCP plan, the

Thousand Palms and Dos Palmas reserves are anticipated to be 1,707 ha (4,219 ac) and 2,078 ha (5,134 ac), respectively (Table 2). Of these, 94 percent of the Thousand Palms reserve is already in protected status, while 34 percent of the Dos Palmas reserve is protected (Table 2). Using the conservative estimated density of 0.3 adult flat-tailed horned lizards per ha (0.1 per ac), neither of these reserves—presently or even at their anticipated size—is large enough to support a “large population.” Thus, these two small, fully isolated occurrences may be more likely to experience deleterious effects associated with small population sizes. In our evaluation of the monitoring and management of flat-tailed horned lizard populations and habitat expected under the Coachella Valley MSCHP (USFWS 2008, Appendix A, p. 322), we stated: “The proposed Plan provides reasonably competent direction for monitoring and adaptive management, but not all details can be anticipated beforehand and much would depend on how the monitoring and adaptive management is implemented. We assume the implementation of the monitoring and adaptive management plan would strictly adhere to the guidance in the Plan. The extra pressures of edge effects and invasive species may be buffered by management to prevent pressures that would push a naturally low population to extinction. Populations are expected to increase in numbers again if anthropogenic factors are effectively managed.” Additionally, as noted above, even small populations in small habitat areas may be viable in the long term; however, for the purposes of this analysis (to be conservative) we are assuming they are not. Therefore, we conclude the continued existence of the Coachella Valley Population is likely to face significant threats within the foreseeable future.

Summary for Barriers and Small Populations

Past assessments identified “fragmentation” as a threat to the flat-tailed horned lizard. Fragmentation, as a term used in conservation biology, is ambiguous. To address the implied meaning of the term, we assessed potential barriers and the resulting flat-tailed horned lizard population sizes throughout the species’ range.

Barriers prevent movement of individuals and, thus, restrict or prevent gene flow. As such, barriers subdivide larger populations into smaller ones. For vertebrate species, populations of more than about 7,000 individuals are not likely to be affected by deleterious intrinsic and extrinsic forces and factors

over the long term. Not all potential barriers are complete barriers and some potential barriers may be “semipermeable.” Movement of 1 to 10 individuals per generation across a semipermeable barrier is likely enough to maintain connectivity between populations.

The populations of flat-tailed horned lizards in the Western, Eastern, and Southeastern Population areas are potentially divided by artificial manmade barriers. Flat-tailed horned lizards are difficult to detect, and population estimates are limited to a few, well-surveyed areas. Density estimates of adult flat-tailed horned lizards range from as low as 0.3 individuals per ha (0.1 per ac) to as much as 4.4 individuals per ha (1.8 per ac), depending on the analysis used (see Background section). Our evaluation of the range of the species suggests that the Western, Eastern, and Southeastern Population areas were divided by manmade barriers into 12, 9, and 13 “parts,” respectively. Using the lowest (most conservative) estimates of 0.3 adult flat-tailed horned lizards per ha (0.1 per ac), we calculated that the Western, Eastern, and Southeastern Population areas had about 83 percent, 73 percent, and 97 percent of the areas (respectively) in parts likely to support populations that are large enough to avoid deleterious effects associated with small populations. For those values, we assumed all identified potential barriers were complete barriers; however, the circumstance for each individual part varies, and some of the potential barriers we identified are likely to not be complete barriers. As such, some of the parts we identified as separate may contain populations of flat-tailed horned lizards that are actually connected with neighboring populations. Thus, we believe these percentages are conservative because we used the conservative density estimates and the parts, as analyzed, may not actually contain separate populations of flat-tailed horned lizards.

Additionally, the Coachella Valley Population area has numerous barriers and the remaining flat-tailed horned lizards are restricted to two small areas. The populations of flat-tailed horned lizards in these areas are likely to be affected by threats associated with small population size.

We again note that we have very little specific data regarding whether or to what degree populations of flat-tailed horned lizards are actually being affected by threats associated with small population size. Even for the flat-tailed horned lizard population in Part SE-2, which may be exhibiting genetic

deterioration because of isolation and small population size, we do not have direct information on the status of that population. Thus, based on information from the scientific literature on the potential effects of small population size, for the purposes of this threats assessment, we have assumed these “small” populations of flat-tailed horned lizards are being substantially affected by threats associated with small population size or are likely to be substantially affected by threats associated with small population size in the foreseeable future.

Even so, our evaluation suggests that despite the presence of multiple barriers that potentially divide the Western, Eastern, and Southeastern Population areas into smaller parts, most of the area within the current distribution outside of the greater Coachella Valley are in parts large enough to support populations of flat-tailed horned lizards larger than 7,000 individuals, meaning they are not habitat-limited and are not likely to suffer from threats associated with small populations now or in the foreseeable future. As such, the implied meaning of term “fragmentation” is not a threat to the flat-tailed horned lizard throughout its range.

Edge Effects

Another effect associated with fragmentation and barriers is that there are more habitat edges. When two ecosystems are separated by an abrupt transition (an “edge”), there may be an interaction between two adjacent ecosystems, known as an *edge effect* (Murcia 1995, p. 58). As noted previously, predation of flat-tailed horned lizards may be greater adjacent to urban and agricultural areas (Barrows *et al.* 2006, p. 486), and may extend several hundred meters (yards) from the neighboring developed area (Young and Young 2005, p. 7). Additionally, invasive, nonnative plants may also occur at higher densities along road edges (Gelbard and Belnap 2003, p. 420); however, native plant growth may also increase along roads (Lightfoot and Whitford 1991, p. 310). Increased plant growth may lead to increased seeds, which may benefit harvester ants, the primary food of the flat-tailed horned lizard.

Additionally, the invasive, nonnative Argentine ant (*Linepithema humile*) has been found to be a problem for coastal horned lizards (*Phrynosoma coronatum*) in habitat edges (Suarez *et al.* 1998, p. 2041; Suarez and Case 2002, p. 291). However, Argentine ants do not tolerate hot, arid conditions (Holway *et al.* 2002, p. 1610) and are not known to be a problem away from habitat edges in flat-

tailed horned lizard habitat (Barrows *et al.* 2006, p. 492); thus, we expect the effect of Argentine ants to be limited to areas adjacent to edges that have water sources.

Although edge effects may result in increased mortality of flat-tailed horned lizards, primarily resulting from increased levels of predation, the area affected is within several hundred meters (yards) of the edge. As discussed in the “Barriers and Small Populations” section, much of the area occupied by the flat-tailed horned lizard is in large areas (or “parts”). In such areas or parts, the ratio of linear edge compared to the areal size of the part is small, meaning large parts have larger “interior” areas that are not affected by edge effects. As such, the populations of flat-tailed horned lizards in large areas or parts are less likely to be substantially affected by edge effects. Conversely, smaller parts have a smaller percentage of their area that is likely to be affected by edge effects. As such, flat-tailed horned lizard populations in the small parts are more likely to be substantially affected by edge effects.

Because “parts” are created by infrastructural elements associated with urban and agricultural development, the small “parts” are more likely near urban and agricultural areas. Moreover, because edge effects are most pronounced near urban and agricultural development, the flat-tailed horned lizards in small parts are the most likely to be substantially affected by edge effects. Thus, edge effects are an added threat faced by flat-tailed horned lizard populations in the small parts. As such, edge effects are not additional threats to the flat-tailed horned lizard, but instead are part of the threats faced by flat-tailed horned lizard populations in small parts. Therefore, like small population size, we do not believe edge effects are a significant threat to the flat-tailed horned lizard now or in the foreseeable future.

Pesticide Spraying

Past assessments identified the spraying of pesticides as part of the California Department of Food and Agriculture’s Curly Top Virus Control Program as a threat to the flat-tailed horned lizard, mainly in the East Mesa, West Mesa, and Yuha Desert (58 FR 62627; FTHLIC 2007, p. 20). As described in the program’s environmental assessment (BLM 2007b, p. 8), beet curly top virus is a disease of commercially important crops, and also backyard vegetable and flower gardens. The only known vector of beet curly top virus is an insect known as the sugar beet leafhopper (*Circulifer*

tenellus). The Curly Top Virus Control Program includes aerial and ground-based spraying of malathion, which is the only product registered in California for the control of sugar beet leafhopper on rangeland (BLM 2007b, p. 15). The areas to be sprayed (treated) are prioritized; treatment priorities are given to areas subject to perennial virus infection, areas sustaining significant infection from the previous year, and areas with the highest current sugar beet leafhopper populations (BLM 2007b, p. 8).

Available information in the scientific literature regarding the effects of malathion, a broad-spectrum insecticide, on lizard species are equivocal, with some suggesting that malathion has substantial deleterious effects on lizards (such as Özelmaz and Akay 1995, pp. 730–737; Khan 2003, pp. 821–825; Khan 2005, pp. 77–81), and others suggesting the effects are less pronounced (such as Holem *et al.* 2006, pp. 111–116; Holem *et al.* 2008, pp. 92–98). We are not aware of any studies examining the effects of malathion on horned lizard species.

Flat-tailed horned lizards are insectivorous, primarily feeding on harvester ants. If the food source for the flat-tailed horned lizard is substantially affected by the spraying of malathion, the flat-tailed horned lizard could be affected. To address this concern, implementation of the Curly Top Virus Control Program in the Imperial Valley in 1991 included monitoring of harvester ant colonies. Results showed malathion killed worker ants on the surface at the time of the spraying, negatively affecting ant colonies temporarily; however, it also showed that the colonies, with the queen and other workers below ground, rapidly recovered (Peterson *in litt.* 1991, p. 10; see also BLM 2007b, p. 75). Although that monitoring was cursory, the information suggests that spraying is not likely to substantially affect the primary food source of the flat-tailed horned lizard now or in the foreseeable future.

Even if flat-tailed horned lizards or harvester ants are affected by malathion, the Curly Top Virus Control Program includes measures to limit its impact. The threat from pesticide spraying has been reduced by avoidance and minimization measures incorporated in the program since the publication of the 1993 proposed rule to list the flat-tailed horned lizard, including the following (BLM 2007b, p. 33):

(1) No malathion treatments shall occur in designated flat-tailed horned lizard Management Areas as set forth in the Flat-tailed Horned Lizard Range-wide Management Strategy.

(2) Application of malathion within the geographic range of the [flat-tailed horned lizard] will consist of no more than a single treatment per given area per year.

(3) All application [within flat-tailed horned lizard habitat] will be aerial. No spraying from off-road vehicles or use of off-road vehicles on other than designated roads will be used within [flat-tailed horned lizard] habitat.

Beyond the avoidance and minimization measures incorporated into the Curly Top Virus Control Program, aerial spraying is conducted infrequently in the Imperial Valley— aerial treatments have been necessary only twice in the 9 years prior to the 2007 environmental assessment (BLM 2007b, p. 9). Additionally, the State's program administrator for the Curly Top Virus Control Program indicated that although the program will continue in the region, the frequency of aerial treatments in the foreseeable future is anticipated to decrease; instead, treatments are more likely to be implemented via ground-based spraying in areas near agriculture outside of flat-tailed horned lizard habitat (R. Clark, California Department of Food and Agriculture, pers. comm., 2010).

Because of the avoidance and minimization measures incorporated into the Curly Top Virus Control Program, and because of the likely limited effects to the flat-tailed horned lizard and its food source at the levels that the program is expected to be implemented, we conclude that implementation of the Curly Top Virus Control Program is not a threat to the flat-tailed horned lizard.

Vehicle Activity

Flat-tailed horned lizards may be directly affected by vehicle activity. The assessments in the 1993 and 2003 documents (58 FR 62624 and 68 FR 331, respectively) identified impacts from vehicles as a threat to the species, especially OHV activity. Impacts of vehicle activity on flat-tailed horned lizard habitat are addressed in Factor A, above. Additionally, individual flat-tailed horned lizards may be killed—crushed—by vehicle activity. As discussed above, because flat-tailed horned lizards are unlikely to flee from oncoming traffic, when flat-tailed horned lizards are on paved roadways they are likely to be killed by any vehicle activity. Additionally, flat-tailed horned lizards may be killed by vehicles operating off paved roads, including vehicle activity on established dirt or gravel roads and trails, or vehicle activity off established roads and trails (OHV activity as defined in Factor A)

(Muth and Fisher 1992, p. 33). Vehicle drivers may not see or recognize flat-tailed horned lizards because their cryptic coloration makes them difficult to spot or they may be interpreted as rocks. Moreover, the species' propensity to freeze rather than flee makes them particularly susceptible. Impacts from vehicles are more likely when the lizards are on or near the surface; hibernating flat-tailed horned lizards are generally buried deep enough that they are not crushed by vehicles driving over them (Grant and Doherty 2009, p. 511). Additionally, most of the OHV activity in the region occurs during the cooler times of the year (Wone 1992, pp. 4–5), suggesting that fewer flat-tailed horned lizards would be on the surface during peak times of OHV activity.

Moreover, the density of flat-tailed horned lizards is apparently naturally low. Even at the highest estimated density of 4.4 adult flat-tailed horned lizards per hectare (1.8 per acre) (see Background), which is equivalent to 0.00044 individuals per square meter (0.00004 per square foot), the chances of a flat-tailed horned lizard being run over by a vehicle is low, even in areas of high OHV activity (for example, see Nicola and Lovich 2000, pp. 208–212). Nevertheless, mortality of flat-tailed horned lizards resulting from OHV activity has been documented, even in areas of low OHV use. For example, in an area closed to OHV traffic, 2 of the 42 radio-tagged flat-tailed horned lizards were killed by illegal OHV activity, and 1 was killed by a vehicle on a paved road (Muth and Fisher 1992, pp. 18 and 33). However, in comparison, in that same study, 16 of the 42 radio-tagged flat-tailed horned lizards were depredated over the same period (Muth and Fisher 1992, p. 33).

In the past, OHV activity along the United States-Mexico boundary (border) from Border Patrol activity and other border-related OHV traffic has been specifically identified as a threat. Border-related OHV activity is part of our definition of OHV activity and is covered above. Moreover, since 2008, the U.S. Customs and Border Protection constructed the “border fence,” which is a vehicle and, in some areas, pedestrian barrier, plus associated infrastructure, in certain areas between the United States and Mexico. Although some areas of the border are not fenced, the areas of flat-tailed horned lizard habitat along the border are fenced (USCBP 2008a, p. 1–5; USCBP 2008b, p. 2–4; Rorabaugh 2010, p. 181). Evidence suggests the border fence has reduced illegal cross-border traffic and associated OHV activity (Rorabaugh 2010, p. 190), thereby reducing the amount of

potential impacts to flat-tailed horned lizards along the border from illegal trans-border OHV activity and subsequent law-enforcement OHV activity by the Border Patrol.

Because the flat-tailed horned lizard occurs naturally in low densities, roads are generally widely separated, and OHV activity is only intense in a few areas, the chances that a flat-tailed horned lizard being crushed by vehicle activity is low over the majority of the species' range; therefore, we conclude that vehicle activity is not a substantial threat to the species throughout its range, nor do we expect it to become a significant threat in the foreseeable future.

Drought and Climate Change

The assessments in the 1993 and 2003 documents (58 FR 62624 and 68 FR 331, respectively) included drought as a potential threat to the flat-tailed horned lizard. Additionally, changes in weather patterns associated with global climate change, particularly the timing and amount of rainfall in this arid region, are a potential threat to the species. We examine both below.

Prolonged periods of atypically low rainfall (drought) may potentially affect flat-tailed horned lizard by affecting its food chain (see Background section). Plants produce fewer seeds during periods of low rain, leading to a reduction in the number of foraging ants (Tevis 1958, p. 698), which reduces the amount of food available for flat-tailed horned lizards. However, harvester ant colonies do appear to survive prolonged periods of drought (Tevis 1958, p. 701; Whitford *et al.* 1999, p. 165), indicating that flat-tailed horned lizards will have some food available. Depressed flat-tailed horned lizard populations associated with reduced abundance of ants are known to have rebounded after ant populations returned, even in small populations of flat-tailed horned lizards (Barrows and Allen 2009, p. 314). Thus, we do not expect droughts to permanently affect large populations of flat-tailed horned lizards, although droughts may contribute to the extirpation of small populations. Because about 91 percent of the area occupied by flat-tailed horned lizards are in areas large enough to support large populations (see "Barriers and Small Populations" section above), and because evidence shows that even small populations of flat-tailed horned lizards have survived periods of drought (see above), this suggests that it is not likely that all of the 9 percent of the "small population" area would be affected by drought. Therefore, we do not anticipate

drought to be a significant threat to the species throughout its range.

Current climate change predictions for terrestrial areas in the Northern Hemisphere indicate warmer air temperatures, more intense precipitation events, and increased summer continental drying (Field *et al.* 1999, pp. 1–63; Cayan *et al.* 2006, pp. 1–47; Meehl *et al.* 2007, pp. 747–843). Assessments for the Sonoran Desert are few, but the region is expected to warm (IPCC 2007, p. 887). Indeed, since about the 1970s, the region appears to have experienced "widespread warming trends in winter and spring, decreased frequency of freezing temperatures, lengthening of the freeze-free season, and increased minimum temperatures per winter year" (Weiss and Overpeck 2005, p. 2065). Further, if summertime temperatures increase in the already typically hot Sonoran Desert, temperatures may exceed the ability for many animals, including the flat-tailed horned lizard, to survive. For example, Sinervo *et al.* (2010, p. 895) suggest that Phrynosomatid lizards (the family to which flat-tailed horned lizards belong) are susceptible to increased risk of extinction because of their intolerance to an increase in environmental temperatures. Increased temperatures would result in longer periods of time when the flat-tailed horned lizard would be forced to seek cooler microclimates (shade, burrows), leaving less time available in the day for feeding or other necessary activities (see also Huey *et al.* 2010, pp. 832–833). However, we are not aware of any information indicating that the flat-tailed horned lizard is being substantially affected by a reduced frequency of cold temperatures or increased frequency of high temperatures, or that it will be substantially affected in the foreseeable future.

Additionally, precipitation may become more variable (Weiss and Overpeck 2005, p. 2065). Increased severity, frequency, or duration of droughts may exceed the resiliency of the flat-tailed horned lizard, or the species in the food chain upon which it depends. In contrast, models suggest that the frequency and intensity of El Niño-Southern Oscillation events may increase as a result of global climate change (Field *et al.* 1999, p. 10), which may lead to increased rainfall in some portions of the species' range. Although typically considered a benefit, increased rainfall may negatively affect harvester ant abundance and thus negatively affect flat-tailed horned lizards, at least in some areas (Barrows and Allen 2009, p. 312). Also, increased rainfall may

disproportionately promote growth of nonnative, invasive plant species, which can increase the prevalence of wildland fire and be a physical hindrance to flat-tailed horned lizard locomotion (see "Invasive, Nonnative Plants" section in the Factor A discussion, above).

Thus, the effects associated with global climate change may affect the flat-tailed horned lizard, but at this time, the level of uncertainty in climate predictions is high. Moreover, we do not know whether such a change would substantially affect the flat-tailed horned lizard. While we recognize that climate change is an important issue with potential effects on species and their habitats, we lack adequate information to make accurate predictions regarding its effects to the flat-tailed horned lizard. We do not have any evidence to suggest that the flat-tailed horned lizard is being substantially affected by climate change at this time, or will be within the foreseeable future. Therefore, the effects of climate change are not a significant threat at this time.

Summary of Factor E Threats

For Factor E, we assess the natural and manmade threats that affect the status of the species. Small populations may be disproportionately affected by extrinsic and intrinsic factors that reduce population size. Given that historical agricultural and urban development destroyed large swaths of potential flat-tailed horned lizard habitat, we assessed whether the remaining populations are large enough to likely avoid the deleterious effects associated with small populations. Within the Coachella Valley Population area, where habitat destruction has continued (see Factor A), flat-tailed horned lizards are now found only in two small locations and may be more likely to be affected by the deleterious effects associated with small populations. Using conservative estimates of flat-tailed horned lizard density in combination with the size of the Western, Eastern, and Southeastern Populations areas (as a whole), we conclude that each is large enough to support populations that are not likely to be affected by the deleterious effects associated with small populations.

However, the Western, Eastern, and Southeastern Populations areas have within them potential manmade barriers (canals, roads, railways) that may further act as complete barriers or semipermeable barriers that subdivide the populations into smaller subpopulations. Thus, we assessed whether the areas created by these potential barriers were large enough to

likely support populations (subpopulations) that were likely greater than 7,000 adult individuals. Using the most conservative flat-tailed horned lizard density estimate of 0.3 individual adults per hectare (0.1 per acre), which is the lowest value in the range of estimates that extends to 4.4 individuals per hectare (1.8 per ac), and assuming (1) all potential barriers are complete barriers, which is unlikely because some barriers likely allow some movement of individuals (see above) and only 1 to 10 individuals per generation are needed to maintain population connectivity; and (2) 7,000 adults is the threshold above which a population is large enough to likely avoid the deleterious effects associated with small populations, which is at the high end of the range of estimated population thresholds, we concluded that about 83 percent, 73 percent, and 97 percent of the Western, Eastern, and Southeastern Population areas (respectively), and about 91 percent of the area overall, are in large enough blocks that the populations of flat-tailed horned lizards within them are not likely to be affected by threats associated with small populations. Thus, the vast majority of the current distribution of the flat-tailed horned lizard occurs in blocks of habitat large enough to support populations greater than 7,000 adults; therefore, small population size is not a threat to the flat-tailed horned lizard and the species is not habitat-limited.

Pesticide spraying associated with the Curly Top Virus Control Program is not a threat to the flat-tailed horned lizard because of the small area within the range of the species over which it is likely to occur, the avoidance and minimization measures built into the program, and the likely limited effects of spraying on the flat-tailed horned lizard and its harvester ant food source. Additionally, vehicle activity—on paved roads, non-paved roads, and off-road—is not a substantial threat to the species because the chances of a flat-tailed horned lizard being crushed by vehicle activity are low over the majority of the species' range. Drought is also not likely to be a substantial threat to the species throughout its range. Climate change could potentially affect flat-tailed horned lizards, but the future effects of climate change are uncertain. Moreover, no substantial effects of climate change to the flat-tailed horned lizard are known at this time. Therefore, the effects of climate change are not a significant threat at this time.

We do not consider the potential threats analyzed above to be substantial threats to the flat-tailed horned lizard,

either individually or in combination. Therefore, based on our review of the best available scientific and commercial information we find the flat-tailed horned lizard is not threatened by natural or manmade factors affecting its continued existence, either now or in the foreseeable future.

Conservation Efforts

Before we may determine whether a species should be listed as endangered or threatened, section 4(b)(1)(A) of the Act requires that we take into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect the flat-tailed horned lizard. Of particular note is the Interagency Conservation Agreement between and among participating State and Federal agencies implementing the Rangewide Management Strategy, which is discussed in detail in the Background section. Other conservation efforts include regulatory mechanisms, which are discussed under Factor D in the Summary of Factors Affecting the Species section.

On April 3, 2008, the Secretary of the U.S. Department of Homeland Security (DHS), pursuant to his authority under section 102(c) of the Illegal Immigration Reform and Immigrant Responsibility Act (8 U.S.C. 1103 note) (IIRIRA), exercised his authority to waive certain environmental and other laws in order to ensure the expeditious construction of tactical infrastructure along the United States-Mexico Border (*i.e.*, the "border fence") (73 FR 18293). As such, activities associated with construction and operation of the border fence are exempt from regulatory mechanisms described in Factor D. These activities also do not need to comply with the avoidance, minimization, or mitigation measures described in the Rangewide Management Strategy. However, the Secretary committed DHS to continue to protect valuable natural and cultural resources (USCBP 2008a, p. ES-1). As a result, the U.S. Customs and Border Protection prepared Environmental Stewardship Plans for the portions of the United States-Mexico border that fall within the current distribution of the flat-tailed horned lizard (USCBP 2008a, 2008b, entire documents). United States Customs and Border Protection has expressed an intent to work in a collaborative manner with local government, State and Federal land managers, and the interested public to identify environmentally sensitive resources and develop appropriate best management practices to avoid or minimize adverse impacts resulting from the installation of tactical

infrastructure (USCBP 2008b, p. ES-1), including certain conservation measures from the Rangewide Management Strategy that will be implemented to the fullest extent applicable and practicable. Thus, implementation of the Environmental Stewardship Plans is best considered a conservation effort for the species.

Finding

The flat-tailed horned lizard monitoring data on which we relied in this document are more robust than the data we relied on in our 1993 proposed rule (58 FR 62624) and our earlier withdrawal documents (62 FR 37852, 68 FR 331, and 71 FR 36745), thus enabling us to conclude with increased confidence that flat-tailed horned lizard populations in the Management Areas are not low in abundance or declining. Although no comparable historical abundance data exist, our analysis suggests that occupancy of flat-tailed horned lizards within survey areas is relatively high. Density estimates obtained through the new survey methodology are roughly in the same range provided by previous estimates, suggesting no marked declines in density since the late 1990s. Although additional surveys are needed before the recently collected data can provide long-term trend information, the short-term data do not currently indicate declines. Because of data limitations, we cannot extrapolate the data rangewide; however, for the Management Areas surveyed (*see Population Dynamics* under the Background section), the best available scientific information suggests that population levels are not low and not declining. In other words, recognizing that the areas surveyed compose only a fraction of the overall range of the flat-tailed horned lizard, it is our interpretation that the available population data (alone and without considering potential threats) do not support a conclusion that the species is in danger of extinction. Additionally, despite the lack of long-term trend data, the general agreement of the recent data with the older data from the available scientific literature lead to our interpretation that the available population data (alone and without considering potential threats) do not support a conclusion that the species is likely to become endangered within the foreseeable future.

Although our past assessments suggest that historical loss of habitat resulted in artificial barriers, except for the Coachella Valley Population, the information currently available indicate otherwise. We conclude that the manmade barriers resulting from

historical agricultural and urban development merely expanded pre-existing natural barriers. This conclusion is based on genetic data that show separation of the Western, Eastern, and Southeastern Populations occurred prior to the development of the region more than a century ago. Genetic data also suggest that flat-tailed horned lizards in the Coachella Valley had limited connection with the Western Population; thus, the historical agricultural development northwest of the Salton Sea, along with the continued development in that region, has created an artificial barrier at this location. As such, the treatment of flat-tailed horned lizards in the Coachella Valley as a separate population is more an artifact of manmade activities than of natural divisions within the flat-tailed horned lizard population as a whole.

Moreover, we determined herein that the Western, Eastern, and Southeastern Population areas (each as a whole) are not threatened by the factors associated with small population size and are not habitat-limited. Thus, ramifications of historical habitat loss are not likely to constitute a significant threat to the species within the foreseeable future in these populations. Additionally, because the majority of the Western, Eastern, and Southeastern Population areas are not subdivided by other barriers (such as canals, roads, railways, or border infrastructure), it is unlikely these areas would be substantially affected by the intrinsic and extrinsic factors, including edge effects, that may negatively affect small populations.

In the Coachella Valley, the precise amount of habitat that is occupied is not known, but based on an analysis of habitats within the Coachella Valley MSHCP plan, the Thousand Palms and Dos Palmas reserves are anticipated to be 1,707 ha (4,219 ac) and 2,078 ha (5,134 ac), respectively (see Table 2). Of these, 94 percent of the Thousand Palms reserve is already in protected status, while 34 percent of the Dos Palmas reserve is protected (Table 2). These two small areas are unlikely to support flat-tailed horned lizard populations large enough to escape from being substantially affected by the intrinsic and extrinsic factors, including edge effects, that may negatively affect small populations. However, even if the Coachella Valley Population may be threatened by the effects of barriers and the intrinsic and extrinsic factors that may negatively affect small populations, the 3,785-ha (9,353-ac) Coachella Valley Population area makes up only about 0.2 percent of the roughly 1,585,000 ha (3,916,600 ac) of the rest of the species' range and about 0.8 percent compared

to the 467,000 ha (1,154,000 ac) of the U.S. portion of that range, and the threats to the Coachella Valley population do not substantially threaten the species as a whole.

Therefore, the effects to the species associated with the implied meaning of fragmentation—that is, the division of the species' populations into smaller populations by the introduction of manmade barriers and the subsequent deleterious effects that may be associated with small population size—are not likely to constitute a substantial threat to the species now or within the foreseeable future.

Within the United States, most of the area occupied by the species is under Federal or State control and overseen by agencies that are signatories to the Interagency Conservation Agreement and associated Rangewide Management Strategy. Although the Interagency Conservation Agreement is voluntary, several signatories—including the BLM, which is a major landowner within the U.S. portion of the range of the flat-tailed horned lizard—have incorporated aspects of the Rangewide Management Strategy into their planning documents, thus making them less voluntary because those plans implement existing regulatory mechanisms. Implementation of this strategy resulted in creation of five Management Areas that, as of 2009, total 185,653 ha (458,759 ac) of higher quality flat-tailed horned lizard habitat (Table 1). Management objectives also provide avoidance and minimization measures to reduce impacts from permitted projects and limit the development area within each Management Area to 1 percent. Additionally, implementation of the Rangewide Management Strategy calls for monitoring, management, land acquisition, and research; further, it promotes coordination with governmental and non-governmental groups in Mexico to provide conservation benefit for the species in that country. The tasks identified by the Rangewide Management Strategy have been consistently implemented by signatory agencies per the Rangewide Management Strategy's schedule. Thus, we conclude the conservation efforts implemented by signatories of the Interagency Conservation Agreement and associated Rangewide Management Strategy reduce the impact of existing threats in the United States and promote actions that benefit the flat-tailed horned lizard throughout its range, including Mexico.

Threats to flat-tailed horned lizards associated with development activities are reduced or limited by the Interagency Conservation Agreement on

signatory lands, particularly within Management Areas. Additionally, threats to the species and its habitat in areas outside of the Management Areas are likely restricted by the limited amount of water available in this arid region and remoteness of much of the habitat, especially in Mexico. Less remote areas, such as the Coachella Valley, Borrego Springs, Yuma, San Luis de Colorado, and Puerto Peñasco areas, are more likely to have urban or agricultural development; however, impacts in these areas are anticipated to be small relative to the amount of available habitat throughout the species' current distribution.

Development associated with new energy facilities is likely to be reduced or limited by continued implementation of the Rangewide Management Strategy. Although few energy development projects have been fully permitted to date, we anticipate more will be proposed in the foreseeable future. Within the range of the flat-tailed horned lizard, we expect development within the Western Population between Interstate 8 and the existing railway (Part W-5) to reduce the already limited connectivity across Interstate 8, although South Fork Coyote Wash is expected to continue to be a potential corridor for flat-tailed horned lizard movement. We conclude the remaining habitat in the Western Population area (*i.e.*, north of the railway and south of Interstate 8, including areas designated as Management Areas) is large enough to support flat-tailed horned lizard populations. Also, we expect the total acreage of potential development for renewable energy facilities to be small compared to the overall range of the species, including on private land. Additionally, on lands managed by signatory agencies to the Interagency Conservation Agreement, we expect the impacts to flat-tailed horned lizard habitat (whether inside or outside of designated Management Areas) will be further reduced because of the avoidance, minimization, and compensation measures of the Rangewide Management Strategy.

Additionally, invasive, nonnative plants; vehicle activity, including OHV use near the United States-Mexico border and elsewhere; and pesticide spraying are not likely substantial threats to the species throughout its range. Predation is not likely a substantial threat in and of itself, but because several species that prey upon flat-tailed horned lizards likely occur in higher numbers near manmade areas, predation may contribute to the deleterious effects (as an "edge effect") associated with urban and agricultural

development and increase the level of impermeability of some semipermeable barriers. However, we do not expect increased levels of predation to substantially affect the species where it occurs in large “parts,” which is a majority of its range overall and within the Western, Eastern, and Southeastern Populations. Drought and climate change have the potential to affect flat-tailed horned lizards, but the magnitude of this threat, although unclear because of the high level of uncertainty associated with climate predictions, do not appear to be significant now or within the foreseeable future.

Finally, we acknowledge we lack complete population data for the species throughout its range. However, through our analysis of size of the habitat areas, and application of conservative estimates (smallest density value within the estimated range, and largest population size value below which a population may be considered “small”), we conclude that the flat-tailed horned lizard populations are not small and the species is not habitat-limited in the United States or Mexico at this time, nor do we expect the species to suffer from the deleterious effects of small population size in the foreseeable future.

As required by the Act, we considered the species’ status relative to one or more of the five factors described in section 4(a)(1) of the Act, and the standards for listing as endangered or threatened throughout all of its range, and we considered the conservation efforts being made by any State or foreign nation. We have carefully assessed the best scientific and commercial data available regarding the past, present, and reasonably anticipated future threats faced by this species. Our analysis of the information pertaining to the five threat factors did not identify threats of imminence, intensity, or magnitude, either individually or in combination, to the extent that the species requires the protection of the Act throughout its range. Further, there is no information to suggest that the flat-tailed horned lizard population is declining or is in danger of becoming an endangered species in the foreseeable future. Therefore, we conclude that the species is not in danger of extinction or likely to become so within the foreseeable future and is not in need of the protections afforded by the Act at this time.

Distinct Population Segment

Under section 3(16) of the Act, a “species” is defined as including not only the full, taxonomically defined

species (*i.e.*, the species as a whole, including any and all taxonomically defined subspecies) but also any (individual) subspecies and any distinct population segment (DPS) of a vertebrate species (16 U.S.C. 1532). On February 7, 1996, we, along with the National Marine Fisheries Service (National Oceanic and Atmospheric Administration—Fisheries), finalized a joint policy that addresses the recognition of DPSs of vertebrate species for potential listing actions (DPS policy) (61 FR 4722). The policy was developed (1) to implement the measures prescribed by the Act and Congressional guidance, (2) to allow for a more refined application of the Act to better reflect the biological needs of the taxon being considered, and (3) to avoid the inclusion of entities that do not require protective measures of the Act. As noted in the policy (61 FR 4725), Congressional guidance indicates that the authority to list DPSs is to be used “sparingly.”

As mentioned previously, we proposed to list the flat-tailed horned lizard—the entire species throughout its range—as a threatened species under the Act in 1993 (58 FR 62624). Since then, we conducted several additional analyses on the status of the species. From the 1993 proposed rule through the 2006 withdrawal document (71 FR 36745), we noted the disjunct distribution of the species. Our 2003 withdrawal document in particular explicitly addressed threats over four disjunct populations of the flat-tailed horned lizard that we identified in the United States, including: (1) The Coachella Valley in California, (2) the area west of the Salton Sea and Imperial Valley in California, (3) the area east of the Salton Sea and Imperial Valley in California, and (4) the Yuma Desert area in Arizona (68 FR 331). Additionally, we addressed separately the populations in Mexico.

Also in our 2003 withdrawal document, we conducted a brief evaluation of a potential DPS for the Coachella Valley population (and only that population) in a response to a public comment (68 FR 336). We alluded to the population possibly being discrete (because it was disjunct), but we concluded that it was not significant within the meaning of the DPS policy because: (1) It was not “genetically, behaviorally, or ecologically unique”; (2) it was not a “large population” (not necessarily as defined in the present document); and (3) it did not contribute “individuals to other geographic areas through emigration.” Our response concluded, “If additional information becomes available that indicates the

Coachella Valley population is biologically or ecologically significant pursuant to the [DPS policy], we may reconsider the status of the Coachella Valley population for the purpose of listing under the Act” (68 FR 336).

Since then, additional information has become available on the genetic structure of flat-tailed horned lizard populations. Genetic data could, as indicated by the DPS policy (61 FR 4725), inform our analysis of discreteness or significance. Therefore, in light of this new information and our past DPS analysis, we believe it is appropriate to evaluate potential DPSs of the flat-tailed horned lizard.

The 1996 DPS policy specifies that we should address two elements prior to determining a population segment’s conservation status in relation to the Act’s standard for listing (61 FR 4725). These include: (1) The population segment’s *discreteness* from the remainder of the species to which it belongs, and (2) the population segment’s *significance* to the species to which it belongs. If we determine that a population segment meets the discreteness and significance standards, then we evaluate the level of threat to that population segment based on the five listing factors established by section 4(a) of the Act to determine whether listing the DPS as either endangered or threatened is warranted.

As described in *Description of Specific “Populations”* in the Background section above, the distribution of the flat-tailed horned lizard may be divided into four, physically (geographically) separated populations. Below, we evaluate these populations as potential distinct vertebrate population segments under our DPS policy.

Discreteness

Our DPS policy states that a vertebrate population segment may be considered discrete if it satisfies either of the following two conditions (61 FR 4725):

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

First Condition for Discreteness

As noted at various points in the Background section, each of the four described populations—the Coachella Valley, Western, Eastern, and Southeastern Populations—are geographically separated from each other by natural barriers, manmade barriers, or both. The four populations of flat-tailed horned lizards are markedly separated from each other as a consequence of physical factors and each may be readily circumscribed and distinguished from the others. Therefore, the four populations of flat-tailed horned lizards meet the first condition for discreteness under our DPS policy.

Additionally, the Coachella Valley Population, although more extensive in the recent past, now consists of two isolated occurrences, the Thousand Palms and Dos Palmas subareas. In the Summary of Factors Affecting the Species section, we considered the Thousand Palms and Dos Palmas subareas together as the Coachella Valley Population because both had the potential to share similar threats due to proximity, and both were covered by the Coachella Valley MSHCP. However, as noted, the genetic affinities of the Dos Palmas subareas are not known. Thus, combining the Thousand Palms and Dos Palmas subareas into the Coachella Valley Population was a grouping of convenience, adequate for evaluating threats, but not necessarily for assessing the population segments as potential DPSs. Thus, we consider the Thousand Palms and Dos Palmas subareas separately in our assessment of significance for the Coachella Valley Population. These two occurrences are markedly separated from each other and from the other populations of flat-tailed horned lizards as a consequence of physical factors (geographical separation); therefore, each meets the first condition for discreteness under our DPS policy.

Second Condition for Discreteness

The Western, Eastern, and Southeastern Populations extend across the international border with Mexico; as a result, each of these three populations could potentially be further divided into separate population segments under the policy's second condition for discreteness.

Application of the second condition for discreteness (61 FR 4725) with respect to the flat-tailed horned lizard tests for significant differences in: (1) The control of exploitation, (2) the management of habitat, (3) the conservation status, or (4) the regulatory

mechanisms between the United States and Mexico. Below, we present a brief synopsis of these four categories, combining the last two. Please refer to the Summary of Factors Affecting the Species and Findings sections of this document for additional details.

- **Control of exploitation:** We have no information suggesting that the flat-tailed horned lizard is significantly exploited on either side of the border (see the discussion under Factor B).

- **Management of habitat:** Management of flat-tailed horned lizard habitat is essentially the same in the United States and in Mexico, although the underlying mechanisms differ. For example, in the United States large areas are protected as Management Areas through implementation of the Rangewide Management Strategy, and in Mexico large areas are protected as National Parks and Biosphere Reserves (see the discussion under Factor A).

- **Conservation status and regulatory mechanisms:** In terms of actual designations of listing under the two countries' respective species-protection laws, the conservation status differs between the United States and Mexico. In the United States, as a result of this withdrawal, the species is not listed; in Mexico, it is listed as a threatened species under the Official Mexican Norm NOM-059-ECOL-2001 (SEMARNAT 2002, p. 134). However, in the United States, existing conservation efforts and regulatory mechanisms reduce the magnitude of potential threats to the species to a point where protections afforded by the Act are not necessary (see the discussion under Factor D and the Findings and Conservation Efforts sections).

We conclude the second condition is not satisfied because no significant differences exist with respect to the flat-tailed horned lizard across the international boundary between the United States and Mexico. As such, the Western, Eastern, and Southeastern Populations described above are discrete in themselves and not with respect to the international boundary between the United States and Mexico.

Conclusion for Discreteness per 1996 DPS Policy

We conclude that each of the four population segments analyzed (Western, Eastern, Southeastern, and Coachella Valley) meets the discreteness element of the 1996 DPS policy because each can be considered markedly separated from the other flat-tailed horned lizard populations as a consequence of physical factors (first condition for discreteness). Within the Coachella Valley Population, flat-tailed horned

lizards in the Thousand Palms and Dos Palmas subareas also meet the discreteness element of the 1996 DPS policy under the first condition for discreteness. None of the population segments that cross the United States-Mexico boundary meet the second condition for discreteness.

Significance

If a population segment is considered discrete under one or more of the conditions described in our DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used "sparingly," while encouraging the conservation of genetic diversity. In making this determination, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. Because precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy does provide four possible reasons why a discrete population may be significant. As specified in the DPS policy (61 FR 4722), this consideration of the population segment's significance may include, but is not limited to, the following four conditions (61 FR 4725):

- (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
- (2) Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon,
- (3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or
- (4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

A population segment needs to satisfy only one of these criteria to be considered significant. Furthermore, the list of criteria is not exhaustive; other criteria may be used as appropriate. Below, we assess whether the four discrete populations defined above are significant per our DPS policy.

First Condition—Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.

None of the four primary populations of flat-tailed horned lizard occurs in an ecological setting unusual or unique for the species. Although the ecological

setting varies across and within the range of the four populations, important ecological characteristics are similar among the four populations (*see* Background section). Climatic conditions across the range of the four populations are characterized by hot summer temperatures, mild winter temperatures, and little rainfall. Across the four populations, flat-tailed horned lizards are associated with creosote-white bursage plant associations in areas characterized as sandy flats or valleys (*see Setting and Habitat* in the Background section).

The ecological setting for the Coachella Valley Population as a whole, or the Thousand Palms and Dos Palmas subareas separately, are not markedly unusual or unique. The arenaceous (sandy) soils that support flat-tailed horned lizards in the Coachella Valley are derived from the surrounding areas and are compositionally different from those deposited by the Colorado River (van de Kamp 1973, p. 827), which is

the source for much of the sand over a large portion of the range of the species (*see Setting and Habitat* in the Background section). However, the range of the flat-tailed horned lizard includes other areas where soils are derived from sedimentation from the surrounding areas, particularly the western edge of the Western Population where it meets lower extremities of the Peninsular Range (*see Setting and Habitat* in the Background section). Thus, evidence indicates this difference in substrate does not translate into an ecological setting unusual or unique for the flat-tailed horned lizard. We conclude that none of the four population segments meets the first significance condition.

Second Condition—Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon.

Loss of the Western, Eastern, or Southeastern population segment would result in a significant gap in the range

of the species because each of these population segments represents a relatively large portion of the total range of the species (Table 6). In contrast, the range of the Coachella Valley Population as a whole, or the separate Thousand Palms or Dos Palmas subareas, is very small relative to the total range of the species. The range of the Coachella Valley Population represents only 0.24 percent of the total range of the species (0.80 percent of the U.S. portion of the range) (Table 6). The range of the Thousand Palms population represents only 0.11 percent of the total range of the species, and the range of the Dos Palmas population represents only 0.13 percent of the species' total range (Table 6). Loss of the Coachella Valley population segment would not result in a significant gap in the range of the species. We conclude that the Western, Eastern, and Southeastern population segments meet the second significance condition, but the Coachella Valley population segment does not.

TABLE 6—SIZE (AREA) OF THE POPULATIONS UNDER CONSIDERATION TO BE POTENTIAL DISTINCT VERTEBRATE POPULATION SEGMENTS UNDER THE ACT. THE THOUSAND PALMS AND DOS PALMAS OCCURRENCES ARE SUBSETS OF THE COACHELLA VALLEY POPULATION (SEE DESCRIPTION OF SPECIFIC “POPULATIONS” IN THE BACKGROUND SECTION FOR DETAILS).

Population	Total range of species		U.S. portion of range only	
	Size (area) ¹	Percent of total	Size (area) ¹	Percent of total
Western	341,989 ha (845,073 ac)	21.52	253,020 ha (625,226 ac)	53.74
Eastern	169,617 ha (419,133 ac)	10.67	146,121 ha (361,073 ac)	31.03
Southeastern	1,073,551 ha (2,652,802 ac)	67.56	67,922 ha (167,839 ac)	14.43
Coachella Valley	3,785 ha (9,353 ac)	0.24	3,785 ha (9,353 ac)	0.80
(Thousand Palms subarea).	1,707 ha (4,219 ac)	0.11	1,707 ha (4,218 ac)	0.36
(Dos Palmas subarea)	2,078 ha (5,134 ac)	0.13	2,078 ha (5,135 ac)	0.44
Total	1,588,942 ha (3,926,361 ac)	100.00	470,848 ha (1,163,491 ac)	100.00

¹ Area values are estimated through a GIS-based assessment. Despite the level of precision presented, area values are approximate; however, we believe they are accurate enough to draw the conclusions presented.

Third Condition—Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.

Populations of the flat-tailed horned lizard have not been introduced outside the species' historic range, so none of the four population segments meets the third significance condition.

Fourth Condition—Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

As described in *Populations and Genetics* in the Background section, the Western, Eastern, and Southeastern Populations are genetically cohesive populations within themselves but are

significantly genetically differentiated from each other (Mulcahy *et al.* 2006, pp. 1807–1826; Culver and Dee 2008, pp. 1–14). Thus, the evidence indicates that the Western, Eastern, and Southeastern Populations of flat-tailed horned lizards differ markedly from each other in their genetic characteristics.

However, evidence shows that the Thousand Palms subarea (occurrence) within the Coachella Valley Population is not markedly different from the Western Population in its genetic characteristics, although the Thousand Palms occurrence within the Coachella Valley Population, like the Western Population, is genetically significantly different from the Eastern and Southeastern Populations. Although

haplotypes unique to flat-tailed horned lizards from the Thousand Palms occurrence within the Coachella Valley Population have been found, genetic differences between these lizards and Western Population lizards were not statistically significant (Mulcahy *et al.* 2006, p. 1811 and p. 1817). Although Coachella Valley flat-tailed horned lizards are currently markedly separated geographically from other flat-tailed horned lizard populations as a result of isolation due to past agricultural and urban development, genetics information suggests that the flat-tailed horned lizards in the Thousand Palms occurrence were historically not separated from Western Population flat-tailed horned lizards (Mulcahy *et al.* 2006, p. 1821). Thus, the evidence

indicates that the population of flat-tailed horned lizards in the Thousand Palm occurrence within the Coachella Valley Population does not differ markedly from the Western Population in its genetic characteristics.

We are not aware of any genetic information on the Dos Palmas subarea (occurrence). [We believe the map shown by Culver and Dee (2008, Figure 1, p. 14) to be in error because they used the same samples for the Coachella Valley Population that Mulcahy *et al.* (2006) used (Culver and Dee 2008, p. 4), which indicated that genetic samples of flat-tailed horned lizards were collected from the Thousand Palms subarea (Mulcahy *et al.* 2006, p. 1826 and Figure 3, p. 1809) (see also Mendelson *et al.* 2004, p. 5)]. Although the genetic affinities of the Dos Palmas occurrence are unknown, it is likely this occurrence was historically connected with the Western Population through a connection to the north or west (when the Salton Basin was dry) or possibly the Eastern Population through a connection to the south along the eastern side of the Salton Trough when Lake Cahuilla was not full. Thus, the evidence suggests that the population of flat-tailed horned lizards in the Dos Palmas occurrence within the Coachella Valley Population is unlikely to differ markedly from the Western Population or Eastern Population in its genetic characteristics. Therefore, we conclude the Coachella Valley Population does not differ markedly from other populations of the species in its genetic characteristics.

We believe the best scientific and commercial information available indicates that the Western, Eastern, and Southeastern Populations meet the fourth condition for significance, but that the best scientific and commercial information available do not support a determination that the Coachella Valley Population (and the Thousand Palms and Dos Palmas subareas, individually) meet the fourth condition for significance. We did not identify additional criteria for determining significance beyond the four identified in the 1996 DPS policy.

Conclusion for Significance Element of 1996 DPS Policy

We conclude that the Western, Eastern, and Southeastern Populations of flat-tailed horned lizards meet the significance element of the 1996 DPS policy, but that the Coachella Valley Population does not. Loss of the Western, Eastern, or Southeastern Population would result in a significant gap in the range of the species (second significance condition), and information

indicates that each of these three population segments differs markedly in genetic characteristics from the other populations of flat-tailed horned lizards (fourth significance condition). In considering the importance of the Coachella Valley Population (the Thousand Palms and the Dos Palmas occurrences together) or the Thousand Palms and the Dos Palmas occurrences separately to the species as a whole, we determined that neither the Coachella Valley Population, the Thousand Palms occurrence, nor the Dos Palmas occurrence met any of the four significance conditions identified in the 1996 DPS policy, and we did not identify other considerations that would lead us to conclude that the respective population segments met the significance element of the policy, especially given Congressional guidance that the authority to list DPSs be used “sparingly” while encouraging the conservation of genetic diversity.

Conservation Status of DPSs

As stated by our DPS policy (61 FR 4725), if a population segment is discrete and significant (*i.e.*, it is a distinct population segment), its evaluation for endangered or threatened status will be based on the Act’s definitions of those terms and a review of the factors enumerated in section 4(a). It may be appropriate to assign different classifications to different DPSs of the same vertebrate taxon.

Above, we determined the Western, Eastern, and Southeastern Populations are discrete and significant, and thus, each is a distinct vertebrate population segment. We thus evaluate the conservation status of each of these three distinct population segments. We do not further separately evaluate the conservation status of the Coachella Valley Population or the two occurrences of flat-tailed horned lizards because we determined that these population segments do not meet the significance element of the 1996 DPS policy, and thus none are considered a distinct population segment under the Act and our DPS policy. For the remainder of the DPS analysis, we consider the Coachella Valley Population, which includes the Thousand Palms occurrence and the Dos Palmas occurrence, to be part of the Western DPS. Although it is possible that the Dos Palmas occurrence may more properly be placed in the Eastern DPS, for the purposes of our evaluation for endangered or threatened status, we are considering it to be within the Western DPS.

In our analysis of section 4(a) threats, we evaluated whether potential threats

were significant at the scale of flat-tailed horned lizard across its entire range, as well as whether any of the threats were significant at the scale of the four major populations (see Summary of Factors Affecting the Species section).

For Factor A, we identified and evaluated habitat threats from agricultural development, urban development, energy development, invasive and nonnative plants, OHVs, and military training activities. This analysis led us to conclude that none of these potential habitat threats, either individually or cumulatively, is significant enough to cause the flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all of its range. We also conclude based on the results of this same analysis presented in Summary of Factors Affecting the Species that none of these potential habitat threats is significant enough to cause the Eastern, Western, or Southeastern distinct population segments of flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all of their respective ranges.

For Factor B, we concluded that potential threats associated with overutilization due to collection for the pet trade and scientific and educational purposes are not significant threats to flat-tailed horned lizards now or within the foreseeable future across its range. We also conclude, based on this same analysis presented in Summary of Factors Affecting the Species, that potential overutilization threats are not significant enough to cause the Eastern, Western, or Southeastern distinct population segments of flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all of their respective ranges.

For Factor C, we concluded that potential threats associated with disease or predation were not significant threats to flat-tailed horned lizards now or within the foreseeable future across its range. We also conclude based on this same analysis presented in Summary of Factors Affecting the Species that potential disease or predation threats are not significant enough to cause the Eastern, Western, or Southeastern distinct population segments of flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all of their respective ranges.

For Factor D, we concluded that existing regulatory mechanisms are not inadequate and do not threaten the flat-tailed horned lizard throughout all or a

significant portion of its range either now or within the foreseeable future. We also conclude based on this same analysis of the best available information presented in Summary of Factors Affecting the Species that any potential threats associated with inadequate existing regulatory mechanisms are not significant enough to cause the Eastern, Western, or Southeastern distinct population segments of flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all or a significant portion of their respective ranges.

For Factor E, we identified and evaluated threats from other natural or manmade factors including barriers and small populations, edge effects, pesticide spraying, vehicle activity, drought, and climate change. This analysis led us to conclude that none of these potential threats, either individually or cumulatively, is significant enough to cause the flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all of its range. We also conclude, based on this same analysis of the best available information presented in Summary of Factors Affecting the Species, that none of these potential threats is significant enough to cause the Eastern, Western, or Southeastern distinct population segments of flat-tailed horned lizard to be in danger of extinction now or likely to become so within the foreseeable future throughout all of their respective ranges.

Conclusion for Conservation Status Element of 1996 DPS Policy

In our analysis of the species as a whole as detailed in Summary of Factors Affecting the Species section, we noted potential threats from development, invasive species, military training, vehicle (including OHV) activity, barriers and small populations, edge effects, pesticide spraying, and climate change. Additionally, we identified regulatory mechanisms and conservation efforts that reduced certain threats in certain areas. We determined that none of the potential threats, either individually or cumulatively, significantly affected the species throughout its range. In that analysis, we also addressed (where appropriate) separate flat-tailed horned lizard populations, including the Western, Eastern, and Southeastern Populations that we have determined, per the analyses in this section, are DPSs. Although all of the identified potential threats occur to a greater or lesser degree in each of the three DPSs, and although

the regulatory mechanisms and conservation efforts differ within and among DPSs, we found no one threat to be unique to any one DPS, nor did we find a threat that occurred with markedly greater magnitude in any one DPS. We therefore conclude that the Western, Eastern, and Southeastern distinct population segments of flat-tailed horned lizard also are not likely to be in danger of extinction now or likely to become so within the foreseeable future throughout all of their respective ranges.

Significant Portion of the Range

Having determined that neither the flat-tailed horned lizard nor the identified distinct population segments of flat-tailed horned lizard meet the definition of an endangered or threatened species, we must next consider whether there are any significant portions of the range where the flat-tailed horned lizard is in danger of extinction or is likely to become endangered in the foreseeable future. We considered whether any portion of the flat-tailed horned lizard's range warrants further consideration. Our consideration of areas that may constitute significant portions of the species' range focuses on areas where the geographic concentration of threats may be greater relative to the entire range. We consider whether there are any significant portions of the range of the flat-tailed horned lizard (the species as a whole) or of the identified DPSs that are in danger of extinction or are likely to become endangered in the foreseeable future.

Decisions by Ninth Circuit Court of Appeals in *Defenders of Wildlife v. Norton*, 258 F.3d 1136 (2001) and *Tucson Herpetological Society v. Salazar*, 566 F.3d 870 (2009) found that the Act requires the Service, in determining whether a species is endangered or threatened throughout a significant portion of its range, to consider whether lost historical range of a species (as opposed to its current range) constitutes a significant portion of the range of that species. While this is not our interpretation of the statute, we first address the lost historical range before addressing the current range.

Lost Historical Range

As shown in Figure 1, the current range of the flat-tailed horned lizard consists of three, large, separate population areas (the Western, Eastern, and Southeastern Populations), plus two, small, isolated occurrences that, together, compose the Coachella Valley Population (see the *Description of Specific "Populations"* section, above).

In our past assessments of the species, following the lead of the information then available to us, we concluded or implied that the *historical* range of the flat-tailed horned lizard was mostly without substantial discontinuities and that modern discontinuities in the species' range were the result of manmade changes, primarily habitat loss through agricultural development and the creation of the Salton Sea (for example, see the Factor A analyses at 58 FR 62625–62626, 62 FR 37857, and 68 FR 341; also Rado 1981, pp. 1–21; Hodges 1997, pp. 1–23). This characterization of the range of the species suggested to the reader that the conversion from habitat to non-habitat of the large swath of land between the Coachella Valley, Western, Eastern, and Southeastern Populations is what *created* those now-separate populations and that prior to the manmade changes all of the now-lost interstitial areas used to be occupied flat-tailed horned lizard habitat. However, the best currently available information indicates that such a conclusion is incorrect.

In our 2006 analyses (71 FR 36750–36751), we determined that the area of the historical lakebed of the former Lake Cahuilla (see Background section), which occupied most of the areas now under agriculture in the southern half, or so, of the Coachella Valley and most of the area now under agriculture in the Imperial Valley (for example, see Patten *et al.* 2003, p. 3), was frequently unavailable (through historical and pre-historical time) and likely contained little quality habitat for the flat-tailed horned lizard. The 2006 analysis then addressed the now-developed areas outside of the historical lakebed, including remaining portions of the Coachella Valley and Mexicali Valley, and the San Luis Valley. However, as detailed in the Background and further discussed in the “Barriers and Small Populations” section of Factor E, above, the available information now leads us to conclude that the Western, Eastern, and Southeastern Populations have long been separated from each other by natural barriers south of the Lake Cahuilla lakebed that pre-date any manmade changes. Specimen data show that large amounts of this now-lost area was formerly occupied by the species (see, for example, Funk 1981, p. 281.1), but as described in the *Setting and Habitat* section, above, the evidence also shows that, in addition to the historical lakebed of the former Lake Cahuilla, some unknown amount of the area in the Mexicali Valley and the San Luis Valley, was also frequently affected by the deltaic meandering and avulsive

flooding of the Colorado River. These hydrologically active areas likely contained little quality habitat for the flat-tailed horned lizard and formed natural barriers to movement of flat-tailed horned lizards thereby allowing genetic differentiation among the Western, Eastern, and Southeastern Populations (see the *Populations and Genetics* section, above). Thus, as we found for the Lake Cahuilla lakebed in our 2006 analyses (71 FR 36750–36751), we have also determined that these additional areas should not be considered part of the species' historical habitat.

Therefore, we consider the flat-tailed horned lizard's historical habitat to be (1) habitat outside the area of the former Lake Cahuilla and (2) the habitat outside the areas historically subject to periodic flooding by the Colorado River. Because we do not know the real extent of the non-habitat areas that created the natural barriers separating the populations, we cannot reasonably estimate (quantify) the size of the areas that do constitute the lost historical habitat for each of the separate populations. As a result, the remainder of this analysis qualitatively considers the species' lost historical habitat.

Because the habitat needs of the flat-tailed horned lizard are met within the home range of each flat-tailed horned lizard individual, the areas of former habitat within the lost historical range did not provide any special or unique features or meet any life-history needs that present-day flat-tailed horned lizards need to survive. In other words, there is no evidence in the available information to indicate that the habitat within the lost historical range provided special features for the flat-tailed horned lizard such as key breeding grounds, lek sites, or migratory pathways, which are examples of special habitat features other species need to survive. Had the habitat within the lost historical range provided any special or unique features or met any particular life-history needs of the flat-tailed horned lizard—in other words, had the habitat in the lost historical range been *significant* to the species—the loss of these habitat areas would have been detectable in further contraction in the range of the species or each DPS over the past 100 or so years (more than 25 flat-tailed horned lizard generations, as described in our 2006 analysis (71 FR 36751)), the time since most of the historical habitat was lost. Since the areas of historical habitat were converted to agriculture early in the 20th century, the distribution of the flat-tailed horned lizard has remained about the same, except in areas of continuing urban expansion where such

reductions in range are attributable to continued habitat loss (see Factor A). (Although adequate sample sizes to determine population trends have been difficult to obtain in the flat-tailed horned lizard, the distribution of the species, and thus its range, is based on where the species was and is detected—presence-absence data—which is much more easily obtained.) Moreover, the agricultural and urban development of the now-lost historical range did not create any new barriers that separated the Western, Eastern, and Southeastern Populations (DPSs) but merely expanded upon pre-existing, natural barriers (see Background section). Therefore, the historical loss of habitat has not resulted in substantial present-day ramifications to the species; in other words, the lost historical range is not biologically significant to the flat-tailed horned lizard and does not contribute meaningfully to the viability of the species overall or to the viability of each DPS.

Moreover, as described under Factor A, we do not expect additional significant conversion of flat-tailed horned lizard habitat to agriculture in the future in the Imperial Valley and elsewhere along the Colorado River given: (1) The existing limitations on the availability of water for irrigation, and (2) the water transfer agreement with San Diego that requires some fields to remain fallow (unirrigated); therefore, agricultural use has even decreased in this area (IID 2006).

The past agricultural and urban development that created the swath of now-lost historical habitat in the United States and Mexico removed the biological features that provided habitat for the flat-tailed horned lizard in these areas. Much of this habitat has been permanently lost due to urbanization, flooding of the Salton Sea, or both. Although habitat lost due to agricultural uses could potentially be restored in certain cases in the future, most agricultural fields are isolated from existing flat-tailed horned lizard populations by major irrigation canals, such as the Coachella Canal, Highline Canal, and All-American Canal, as well as, depending on the site's location, one or more smaller canals and drains. Therefore, we do not anticipate any significant amount of previously lost habitat will likely become suitable as habitat for the flat-tailed horned lizard in the foreseeable future.

In sum, we believe the lost historical habitat does not represent a significant portion of the range of the flat-tailed horned lizard because the habitat was lost decades ago and the species has not experienced a continuing range

contraction due to the loss of this habitat. Most of the lost habitat was lost early in the 20th century and that lost habitat was not significant enough to lead to substantial extirpation of the species within intact habitat (which would be detectable through a reduction of the species' distribution). The historically lost habitat did not provide any special or unique features or meet any life-history needs of the flat-tailed horned lizard that made those areas any more significant than any other habitat. The habitat within the lost historical range was not continuous and contained natural barriers that separated the Western, Eastern, and Southeastern Populations, which means the historical loss of habitat did not create any new barriers within the lost historical range. We do not expect the agricultural development that created the large "swath" of lost habitat to continue to expand substantially, nor do we expect significant amounts of land that are currently under agriculture to become flat-tailed horned lizard habitat within the foreseeable future. Therefore, the lost historical range is not a significant portion of the range for the flat-tailed horned lizard.

Current Range

We use the concepts of resiliency, redundancy, and representation (see below) as the basic tenets for determining whether a portion of a species' range is significant to that species. A portion of a taxonomic species' or DPS's range is significant if it is part of the current range of the species or DPS and it contributes substantially to the representation, resiliency, or redundancy of the species or DPS. The contribution must be at a level such that its loss would result in a significant decrease in the viability of the species or DPS.

We chose to identify any portions of the range of the species that warrant further consideration as the first step in determining whether a taxonomic species or DPS is endangered or threatened in a significant portion of its range. The range of a species or DPS can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be *significant* and *endangered* or *threatened*. To identify only those portions that warrant further consideration, we should, under the framework we chose for this evaluation, determine whether there is substantial information indicating that (i) the portions may be significant and (ii) the species or DPS may be in danger of extinction there or likely to become so

within the foreseeable future. In practice, we believe a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the range that are not significant to the viability of the species, such portions will not warrant further consideration.

Under this framework, if we identify any portions that warrant further consideration, we then determine whether in fact the species or DPS is endangered or threatened in any significant portion of its range. Depending on the biology of the species, the range of the species or DPS, and the threats the species or DPS faces, it may be more efficient for us to address the significance question first, or the status question first. Thus, if we determine that a portion of the range is not significant, we need not determine whether the species is endangered or threatened there; if we determine that the species or DPS is not endangered or threatened in a portion of its range, we need not determine if that portion is significant.

The terms *resiliency*, *redundancy*, and *representation* are intended to be indicators of the conservation value of portions of the range. Resiliency of a species allows the species to recover from periodic or occasional disturbance. A species or its members within a DPS will likely be more resilient if large populations exist in high-quality habitat that is distributed throughout the range of the species or DPS in such a way as to capture the environmental variability found within the range of the species or DPS. It is likely that the larger the size of a population, the more it will contribute to the viability of the species overall. Thus, a portion of the range of a species may make a meaningful contribution to the resiliency of the species or DPS if the area is relatively large and contains particularly high-quality habitat or if its location or characteristics make it less susceptible to certain threats than other portions of the range. When evaluating whether or how a portion of the range contributes to resiliency of the species, it may help to evaluate the historical value of the portion and how frequently the portion is used by the species or DPS. In addition, the portion may contribute to resiliency for other reasons—for instance, it may contain an important concentration of certain types of habitat that are necessary for members of a species or DPS to carry out their life-

history functions, such as breeding, feeding, migration, dispersal, or wintering.

Redundancy of populations may be needed to provide a margin of safety for the species or DPS to withstand catastrophic events. This does not mean that any portion that provides redundancy is a significant portion of the range of a species. The idea is to conserve enough areas of the range such that random perturbations in the system act on only a few populations. Therefore, each area must be examined based on whether that area provides an increment of redundancy that is important to the viability of the species.

Adequate representation insures that the species' adaptive capabilities are conserved. Specifically, the portion should be evaluated to see how it contributes to the genetic diversity of the species or DPS. The loss of genetically based diversity may substantially reduce the ability of the species or DPS to respond and adapt to future environmental changes. A peripheral population may contribute meaningfully to representation if there is evidence that it provides genetic diversity due to its location on the margin of the species' habitat requirements.

Applying the process described above for determining whether the flat-tailed horned lizard or any of the identified DPSs are likely to become endangered throughout a significant portion of their respective ranges, under this framework we next address whether any portions of the range of the flat-tailed horned lizard or the identified DPSs warrant further consideration. Based on past approaches and other treatments in the literature, the flat-tailed horned lizard may be divided into four "populations." As detailed above, we conducted our analysis of threats to the species based, in part, upon those populations. Moreover, we determined that the Western Population (including the Coachella Valley Population), the Eastern Population, and the Southeastern Population were DPSs under the Act per our DPS policy. We found that the species as a whole is not in danger of extinction or likely to become endangered within the foreseeable future throughout all of its range. We also found that the three DPSs are not in danger of extinction or likely to become endangered within the foreseeable future throughout all of their respective ranges. Because we determined that the DPSs (each as a whole) are not endangered or threatened within those portions of the species' range, we need not determine if the

Western, Eastern, or Southeastern DPSs (each as a whole) are "significant."

We found that the Coachella Valley Population was faced with substantial threats. Also, we noted certain barrier-created "parts" within the ranges of the Western, Eastern, and Southeastern Populations were small enough that the flat-tailed horned lizards therein were more likely to suffer from threats associated with small populations (see "Barriers and Small Populations" under Factor E) or were facing or likely to face other threats.

An important consideration in determining what portions of the species' or distinct population segments' ranges may be appropriate to consider for this analysis is the fact that there are no specific life-history traits of the flat-tailed horned lizard that make any one portion of its range significantly more important to the survival of the species than any other. The flat-tailed horned lizard is a small animal with limited abilities to move long distances, and the habitat features necessary for activities like breeding, feeding, and sheltering, may be found within or very close to the home range of each individual flat-tailed horned lizard. Moreover, a flat-tailed horned lizard's home range size (perhaps as much as 10 ha (25 ac)), although large compared to other horned lizard species, is very small compared to the overall range of the species (1.6 million ha (3.9 million ac)). In other words, this species does not need any particular portion of its range outside the general home-range area of each individual to meet any life history needs, such as particular breeding grounds, lek sites, or migratory pathways. As such, the "parts" identified in Factor E are appropriate subjects to address as potential significant portions of the species' range.

Thus, because the portions of the species' range that compose the Coachella Valley Population and the portions of the species' range that are formed by the small "parts" of the other three populations may face substantial threats, we next determine whether these portions of the species' range are "significant." As described above, we need not assess whether the portions of the species' range that are not facing substantial threats are "significant."

Coachella Valley Population Area

As discussed previously, the Coachella Valley Population, which is peripheral to the population-as-a-whole of the species, now consists of two small occurrences, Thousand Palms and Dos Palmas. These two occurrences are small in area and, thus, likely have

small populations of flat-tailed horned lizards (see “Barriers and Small Populations”). As such, the populations of flat-tailed horned lizards that comprise these occurrences may not be large enough to avoid deleterious effects associated with small population size (see “Barriers and Small Populations”). This suggests that the respective portions of the flat-tailed horned lizard’s range in these two occurrences may face substantive threats and have the potential to be endangered or threatened; thus, we should evaluate whether the portions of the species’ range are *significant* portions of the species’ range. To do so, we assess (1) Whether the population of flat-tailed horned lizards in each occurrence contributes meaningfully to the resiliency, redundancy, and representation of the entire species; (2) whether the Thousand Palms occurrence contributes meaningfully to the resiliency, redundancy, and representation of the Western DPS; and (3) whether the Dos Palmas occurrence contributes meaningfully to the resiliency, redundancy, and representation of the Western DPS or Eastern DPS.

Resiliency—Resiliency of a species, as described in greater detail above, allows the species to recover from periodic or occasional disturbance. The size of the flat-tailed horned lizard population at the Thousand Palms and Dos Palmas occurrences (each separately or the two combined) is likely small because the amount of available habitat within each of these occurrence areas are small. Small populations are less resilient than large populations. Additionally, neither occurrence nor the two combined contains an important concentration of certain types of habitat that are necessary for flat-tailed horned lizards to carry out their life-history functions because each flat-tailed horned lizard has the habitat types it needs within its home range. Although the sands in the Coachella Valley are largely derived from local sediments (as opposed to being derived from the Colorado River, as are much of the sands within the range of the species), flat-tailed horned lizards occur in a number of areas with locally derived sediment (see Background).

Additionally, there is nothing in the available information to indicate that the location or characteristics of these occurrences (separately or combined) makes them significantly less susceptible to certain threats than other portions of the species’ range. Moreover, there is no indication that these occurrences have provided value to the species historically. The ebbing and

flowing of Lake Cahuilla through historical time has meant these two occurrences have likely been periodically disconnected from each other and from the Western DPS (or, for Dos Palmas, possibly the Eastern DPS). Even prior to any natural or manmade reductions in the geographical or numerical extent of these populations, they were outposts of the main population and did not contribute meaningfully to the viability of the larger Western Population (or, potentially for the Dos Palmas occurrence, the Eastern Population). Thus, the flat-tailed horned lizard populations in the Thousand Palms and Dos Palmas occurrences (each separately or the two combined) do not contribute meaningfully to the resiliency of the entire species, the Western DPS, or the Eastern DPS.

Redundancy—Redundancy, as described in greater detail above, provides a margin of safety for the species or DPS to withstand catastrophic events. As discussed in the “Barriers and Small Populations” section under Factor E, the respective populations of flat-tailed horned lizards in the Thousand Palms and Dos Palmas occurrences, or the two combined, is more likely to be significantly affected by deleterious effects associated with small population size, including catastrophic events, than areas with larger populations (see the “Other Small ‘Parts’ of the Three DPSs” section, below). As such, the Coachella Valley occurrences do not provide a significant margin of safety for the species. Additionally, as discussed under **Resiliency**, above, the population of flat-tailed horned lizards in each of these occurrences is likely small because the amount of available habitat within each part is small. Similarly, the entire population of the flat-tailed horned lizard rangewide and the respective populations of flat-tailed horned lizards within each DPS are each relatively large compared to the respective populations of flat-tailed horned lizards in the Thousand Palms or Dos Palmas occurrences, or the two combined, because the amount of available habitat throughout the species’ range and within each DPS is relatively large compared to the Coachella Valley occurrences. As such, the Coachella Valley occurrences, or the two combined, provide an unsubstantial increment of redundancy. Thus, the Thousand Palms and Dos Palmas occurrences separately, or the two combined, do not contribute meaningfully to the redundancy of the

entire species, the Western DPS, or the Eastern DPS.

Representation—Representation, as described in greater detail above, ensures that the species’ adaptive capabilities are maintained. The genetic differences between the Thousand Palms occurrence and the Western Population are not statistically significant, despite having some unique haplotypes (see *Populations and Genetics* in the Background section). Thus, the Thousand Palms occurrence does not contribute meaningfully to the maintenance of the adaptive capabilities of the flat-tailed horned lizard rangewide or the Western DPS. Although the genetic affinities of the Dos Palmas occurrence are unknown, it is likely this occurrence was historically connected with the Western Population through a connection to the north or west (when the Salton Basin was dry) or possibly the Eastern Population through a connection to the south along the eastern side of the Salton Trough when Lake Cahuilla was not full. Thus, the Dos Palmas occurrence likely does not contribute meaningfully to the maintenance of the adaptive capabilities of the flat-tailed horned lizard. Therefore, neither the Thousand Palms occurrence, the Dos Palmas occurrence, nor the two occurrences combined (that is, the Coachella Valley Population) contributes meaningfully to the representation of the entire species, the Western DPS, or the Eastern DPS.

Therefore, in sum, we do not expect the Coachella Valley Population as a whole, or the Thousand Palms and Dos Palmas occurrences separately, to contribute substantially to the resiliency, redundancy, or representation of the species, the Western DPS, or the Eastern DPS. As a result of this information, we believe neither the Coachella Valley Population (the Thousand Palms and Dos Palmas occurrences combined), nor the Thousand Palms and Dos Palmas occurrences separately, constitute a significant portion of the range of the entire species, the Western DPS, or the Eastern DPS.

Other Small “Parts” of the Three DPSs

In our analysis in the “Barriers and Small Populations” section, we identified certain portions, or “parts,” of the Western, Eastern, and Southeastern Population areas. In the Distinct Population Segment section, we determined these three Populations to be DPSs. We now evaluate whether any of these parts constitute a significant portion of the range of the flat-tailed horned lizard (the species as a whole) or the three DPSs. However, there is no

purpose to analyzing portions of a species' range that are not reasonably likely to be both *significant portions of that species' range and endangered or threatened*. We have chosen in this section to first assess whether the flat-tailed horned lizard is reasonably likely to be endangered or threatened within each part.

For the reasons discussed in the Summary of Factors Affecting the Species section (note that the discussions go beyond the simple yes-no results presented in Tables 3 through 5), we believe the populations of flat-tailed horned lizard in the respective following parts (portions of the species' range) do not face significant threats: W-1, W-3, W-5, W-7, W-9, W-11, W-12, E-3, E-5, E-9, SE-1, SE-5, SE-8, SE-9, and SE-13 (Figures 3 through 7). Although the specifics vary to some extent from part to part, none of these parts faces or is likely to face in the foreseeable future significant threats associated with:

(1) Small population size, because the parts are large in size (area) or, for parts W-7, W-9, and W-11, likely have higher densities of flat-tailed horned lizards than the most conservative estimate (see the Barriers and Small Populations section) and, therefore, likely support large populations of flat-tailed horned lizards;

(2) Significant loss of habitat from development, because what impacts may occur are expected to be small relative to the size of the parts because they are (i) remote; (ii) are receiving and are expected to continue receiving avoidance, minimization, and mitigation measures associated with the Rangewide Management Strategy (including those aspects that have been incorporated into agency plans that implement regulatory mechanisms) in the United States, or in Mexico, protections from biosphere reserves and listing under the Official Mexican Norm; or (iii) some combination thereof; and

(3) Climate change; nonnative, invasive species; or other range-wide threats identified in the five-factor analysis, because none of these potential threats are significantly concentrated in any one part.

As a result, the flat-tailed horned lizard is not reasonably likely to be endangered or threatened within the parts listed above. Thus, these parts do not warrant further consideration in this section.

The remaining parts, W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 (Figures 3 through 7), are either small in area and,

thus, likely have small populations of flat-tailed horned lizards or, in the case of parts E-1 and E-4, which are larger in area, likely have small populations of flat-tailed horned lizards because they primarily contain areas of deep, actively shifting sands of the Algodones Dunes that are likely rarely used by flat-tailed horned lizards (see "Barriers and Small Populations"). As such, the populations of flat-tailed horned lizards in these parts may not be large enough to avoid deleterious effects associated with small population size (see "Barriers and Small Populations"). This suggests that the respective portions of the flat-tailed horned lizard's range in the latter group of parts may face substantive threats and have the potential to be endangered or threatened; thus, we should evaluate whether the portions of the species' range are *significant* portions of the species' range. To do so, we assess whether the population of flat-tailed horned lizards in each part contributes meaningfully to the resiliency, redundancy, and representation of the species as a whole or to each DPS.

Resiliency—Resiliency of a species, as described in greater detail above, allows the species to recover from periodic or occasional disturbance. The respective populations of flat-tailed horned lizards in parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 are likely small because the amount of available habitat within each part is small, including the relatively large (in area) parts E-1 and E-4 that primarily consist of the deep, actively shifting sands of the Algodones Dunes that are likely rarely used by flat-tailed horned lizards (see discussions in the "Barriers and Small Populations" section under Factor E). Small populations are less resilient than large populations. Additionally, no one part contains an important concentration of certain types of habitat that are necessary for flat-tailed horned lizards to carry out their life-history functions because each flat-tailed horned lizard has the habitat types it needs within its home range. Moreover, there is nothing in the available information to indicate that the location or characteristics of part W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, or SE-12 makes it significantly less susceptible to certain threats than other portions of the species' range. Thus, none of the flat-tailed horned lizard populations in the remaining parts contribute meaningfully to the resiliency of the species as a whole or to each DPS.

Redundancy—Redundancy, as described in greater detail above,

provides a margin of safety for the species or DPS to withstand catastrophic events. As discussed in the "Barriers and Small Populations" section under Factor E, the respective populations of flat-tailed horned lizards in parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 are more likely to be significantly affected by deleterious effects associated with small population size, including catastrophic events, than the respective populations of flat-tailed horned lizards in parts W-1, W-3, W-5, W-7, W-9, W-11, W-12, E-3, E-5, E-9, SE-1, SE-5, SE-8, SE-9, and SE-13. As such, the former group of parts do not provide a significant margin of safety for the species. Additionally, as discussed under *Resiliency*, above, the population of flat-tailed horned lizards in each of these respective parts is likely small because the amount of available habitat within each part is small, including the relatively large (in area) parts E-1 and E-4 that primarily consist of the deep, actively shifting sands of the Algodones Dunes that are likely rarely used by flat-tailed horned lizards (see discussions in the "Barriers and Small Populations" section under Factor E). Similarly, the entire population of flat-tailed horned lizards and the population within each DPS are each likely relatively large compared to the respective populations of flat-tailed horned lizards in parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 because the amount of available habitat throughout the species' range and within each DPS is relatively large compared to the parts under consideration here (see Tables 3 through 5). As such, parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 provide an unsubstantial increment of redundancy. Thus, none of the flat-tailed horned lizard populations in the remaining parts provide a significant level of redundancy for the species as a whole or to each DPS.

Representation—Representation, as described in greater detail above, ensures that the species' adaptive capabilities are maintained. The scientific information on the genetics of flat-tailed horned lizard populations indicates that the Western, Eastern, and Southeastern Populations (DPSs) are significantly different from each other (see *Populations and Genetics*); thus, the representation of the species is provided by the three Populations. Although we do not have genetic data

from every “part,” the available information suggests the genetic diversity is fairly uniform and does not differ significantly within each of the three DPSs. As such, no one part within the respective DPSs contributes meaningfully to the representation of the species as a whole or to each DPS. Moreover, as discussed in the *Populations and Genetics* section, one part, Part SE-2, shows evidence suggesting the genetic variability of the flat-tailed horned lizard population in that part has declined as a consequence of being small and isolated by a manmade barrier. This suggests that the species’ adaptive capabilities in this part have declined. That is, the ability of the flat-tailed horned lizard population to provide adequate representation has been reduced in Part SE-2. It is possible the representation of the other parts with small populations and with complete barriers has been or may become similarly reduced. Therefore, it is unlikely that parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 contribute significantly to the species’ adaptive capabilities, and thus, the respective parts do not contribute meaningfully to the representation of the species as a whole or to each DPS.

In sum, we found that none of the “parts” identified in the “Barriers and Small Populations” section constituted significant portions of the range of the flat-tailed horned lizard. For the reasons discussed in the Summary of Factors Affecting the Species section (note that the discussions go beyond the simple yes-no results presented in Tables 3 through 5), we determined that the portions of range of the flat-tailed horned lizard in parts W-1, W-3, W-5, W-7, W-9, W-11, W-12, E-3, E-5, E-9, SE-1, SE-5, SE-8, SE-9, and SE-13 are not reasonably likely to be endangered or threatened; thus, we did not need to determine whether the portions of the range that these parts represented are significant portions. We determined that the flat-tailed horned lizards in the remaining parts, parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12, may face substantive threats and have the potential to be endangered or threatened. As such, we assessed whether any of the portions of the species’ range within the parts in this latter group is a significant portion of the species’ range overall or of the ranges of each DPS. We found that the portions of the species’ range within the respective parts in this latter group

likely contained small populations of flat-tailed horned lizards that did not contribute meaningfully to the species’ resiliency, redundancy, or representation of the species as a whole or of each DPS. We determined, therefore, the portions of the flat-tailed horned lizard’s range in parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 are not significant portions of the range of the species as a whole or of each DPS.

Summary of Significant Portion of the Range

In summary, we examined whether the lost historical range of the species, the current range of the species in the Coachella Valley Population, or the current range of the species in the other respective “parts” of the Western, Eastern, and Southeastern DPSs constituted significant portions of the species’ or distinct population segments’ respective ranges under the Act. We determined the lost historical habitat does not represent a significant portion of the range of the flat-tailed horned lizard because the habitat was lost decades ago and, despite the amount of time that has since transpired, the species has not experienced a continuing range contraction due to the past loss of habitat. Additionally, the historically lost habitat did not provide any special or unique features or meet any life-history needs of the flat-tailed horned lizards that made those areas any more significant than any other habitat. Moreover, the lost historical range was not continuous and contained natural barriers that separated the Western, Eastern, and Southeastern Populations.

We also determined that neither the Coachella Valley Population as a whole nor the Thousand Palms and Dos Palmas occurrences separately contribute substantially to the resiliency, redundancy, or representation of the entire species, the Western DPS, or the Eastern DPS. Therefore, we conclude that neither the Coachella Valley Population as a whole nor the Thousand Palms and Dos Palmas occurrences separately constitute a significant portion of the range of the entire species, the Western DPS, or the Eastern DPS.

Lastly, we determined that none of the “parts” identified in the “Barriers and Small Populations” section represented a significant portion of the range of the flat-tailed horned lizard. We found that the flat-tailed horned lizards in Parts W-1, W-3, W-5, W-7, W-9, W-11, W-12, E-3, E-5, E-9, SE-1, SE-5, SE-8, SE-9, and SE-13 were not

reasonably likely to be endangered or threatened; thus, we did not need to determine whether the portions of the range that these parts represented are significant portions. We determined that the flat-tailed horned lizards in parts W-2, W-4, W-6, W-8, W-10, E-1, E-2, E-4, E-6, E-7, E-8, SE-2, SE-3, SE-4, SE-6, SE-7, SE-10, SE-11, and SE-12 may face substantive threats and have the potential to be endangered or threatened, meaning that we needed, under our framework, to assess whether the flat-tailed horned lizards in these parts constituted significant portions of the species’ range. We found that the portions of the species’ range within the respective parts in this latter group likely contained small populations of flat-tailed horned lizards that did not contribute meaningfully to the resiliency, redundancy, or representation of the species as a whole or of each DPS. Thus, we determined the portions of the range of this latter group of parts are not significant portions of the range of the species as a whole or of each DPS. Therefore, no portion of the range of the flat-tailed horned lizard is a “significant portion of [the species’] range” under the Act.

Conclusion

Threats to the flat-tailed horned lizard rangewide or within the three identified DPSs have been reduced, managed, or eliminated, or found to be less substantial than originally thought. Additionally, implementation of the Interagency Conservation Agreement and associated Rangewide Management Strategy, including those aspects of it that have been incorporated into documents that implement existing regulatory mechanisms, is an important conservation effort that reduces threats in the United States and benefits the species throughout its range and within the identified DPSs. Therefore, we conclude that none of the existing or potential threats are likely to cause the flat-tailed horned lizard as an entire species or as any one of the Western, Eastern, or Southeastern DPSs to be in danger of extinction or likely to become so within the foreseeable future throughout all or a significant portion of its range.

Withdrawal of Proposal To List Flat-Tailed Horned Lizard

Based on the information discussed above, we withdraw our November 29, 1993 (58 FR 62624), proposal to list the flat-tailed horned lizard (*Phrynosoma mcallii*) as a threatened species under the Act.

Peer Review

As described in our 2003 withdrawal (68 FR 340) and in accordance with our July 1, 1994, Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities (59 FR 34270), we solicited six individuals with scientific expertise on flat-tailed horned lizard, its habitat, and the geographic region in which the species occurs to provide their expert opinion and to review and interpret available information on the species' status and threats. Peer reviewer comments and our responses to those comments were included in our 2003 withdrawal (68 FR 340) and are hereby included in this document by reference.

Summary of Comments and Recommendations

Public Comments

All public and peer review comments we received during public comment periods and public hearings prior to our March 2, 2010, **Federal Register** announcement on the reinstatement of the 1993 proposed rule and notice of public hearings are included in this document by reference (*see* Previous Federal Action section for dates, times, and locations of prior comment periods and hearings).

Since the proposed rule was reinstated on March 2, 2010 (75 FR 9377), there has been one public comment period and four public hearings. During the 60-day comment period from March 2 to May 3, 2010, for the reinstated proposed rule, we received a total of 24 comment letters in response to our request for new information: 2 from Federal agencies (duplicate letter from 2 submitters), 4 from State or local agencies and governments, and 18 from organizations or individuals. During the public hearings on March 23, 2010, in Palm Desert, California, and March 24, 2010, in Yuma, Arizona, we received a total of 4 comments: 1 written comment and 3 oral comments. Two of these comments were from local government representatives and the remaining two from organizations or individuals. All comments received were reviewed for substantive issues and new information regarding the 1993 proposed rule to list the flat-tailed horned lizard as a threatened species, and we address those comments below.

Comments From Federal Agencies

Comment 1: The U.S. Navy does not support the listing of flat-tailed horned lizard as a threatened species because: (1) Listing or designation of critical habitat would encroach on the ability to

perform military readiness activities at NAF El Centro; (2) the species is not threatened throughout a significant portion of its range; (3) conservation should be implemented through the existing Interagency Conservation Agreement, the Rangewide Management Strategy, and the updated NAF El Centro INRMP; and (4) conservation should be implemented through a continued working partnership with other State and Federal agencies, including the U.S. Navy.

Our Response: Based on the rationales provided in this document, we agree with the U.S. Navy that the species does not warrant listing under the Act. Additionally, we agree that the Interagency Conservation Agreement and associated Rangewide Management Strategy make important contributions to reducing threats to the flat-tailed horned lizard and its habitat through efforts contributed by the Service, BLM, BOR, U.S. Marine Corps, U.S. Navy, Arizona Game and Fish Department, CDFG, and CDPR. Although many of these efforts are voluntary, conservation actions are formally incorporated into planning documents of participating agencies (such as the NAF El Centro INRMP and BLM's California Desert Conservation Area Plan). We appreciate the U.S. Navy's support of this long-term partnership and commitment to conservation of sensitive species, including the flat-tailed horned lizard, and their habitats through its participation in the Interagency Conservation Agreement and implementation of the NAF El Centro INRMP. For additional information on the Interagency Conservation Agreement and the associated Rangewide Management Strategy and the U.S. Navy's conservation actions, please see *Management and Populations* under the Background section and *Sikes Act* under Factor D.

Comments From State Agencies

Comment 2: The Arizona Department of Transportation believes the flat-tailed horned lizard Interagency Conservation Agreement is an adequate regulatory mechanism that provides strong protection for the species on signatory lands. Much of the remaining habitat in southwestern Arizona is managed by agencies that are signatories to the Interagency Conservation Agreement. For example, project proponents for the construction of Arizona State Route 195 (Yuma Area Service Highway) used the Rangewide Management Strategy to avoid and mitigate impacts to the flat-tailed horned lizard and its habitat. Additionally, the Arizona Department of Transportation believes the flat-tailed

horned lizard Interagency Conservation Agreement is a viable mechanism for the long-term conservation of the species in the absence of listing under the Act.

Our Response: We agree the Interagency Conservation Agreement and associated Rangewide Management Strategy is a viable conservation effort to promote the long-term conservation of flat-tailed horned lizard. The avoidance, minimization, and mitigation measures incorporated into the Yuma Area Service Highway project reduced impacts to the flat-tailed horned lizard and is an example of how the Rangewide Management Strategy can reduce impacts to the species associated with development (*see* Factor A).

Comment 3: The CDPR expressed a concern that listing flat-tailed horned lizard as a threatened species would restrict CDPR's ability to manage recreational activities and park operations at Ocotillo Wells State Vehicular Recreation Area (SVRA), and that listing the species under the Act may cause OHV use to move to off-site areas with little or no management control. The CDPR also stated that listing the species may potentially reduce the number of visitors, resulting in a negative economic impact on the region. Further, they believe that recreational OHV use does not conclusively show adverse effects to the species.

Our Response: Although OHV activity has the potential to crush flat-tailed horned lizards (*see* Factor E) and impact the species' habitat (Factor A), we determined it is not currently a substantial threat to the species throughout its range. We agree that OHV activity in designated and managed open or limited-use areas is preferable to unmanaged OHV activity elsewhere. We acknowledge CDPR's contributions to the Rangewide Management Strategy through monitoring and management at Ocotillo Wells SVRA, and we encourage CDPR's continued participation in the Interagency Conservation Agreement.

Comment 4: The CDPR states that long-term studies of flat-tailed horned lizard are needed because annual climatic conditions can result in variability in population sizes. They believe that long-term studies and an adaptive monitoring program are warranted prior to listing the species under the Act.

Our Response: We agree that more information on the effects of weather and climate on the flat-tailed horned lizard and its habitat would be helpful; however, we are required to make a determination based on the best available scientific and commercial

information. We determined the flat-tailed horned lizard does not require protection under the Act. CDPR's contributions to the Rangewide Management Strategy have included funding studies to increase the knowledge of the species, and we encourage CDPR's continued participation, including contributing to developing and implementing long-term studies and adaptive management programs.

Comments Related to Biology, Ecology, or Climate Change

Comment 5: One commenter believes flat-tailed horned lizard populations will take longer to “* * * rebound to stable wild populations than other classes of animals.” The commenter believes listing flat-tailed horned lizard as a threatened species under the Act is warranted because of low clutch survival rates from breeding to maturity due to impacts from predators and human activities.

Our Response: The commenter did not provide any information regarding the class of animals to which he or she was referring in comparison to the flat-tailed horned lizard, or any information to substantiate the claim that wild populations of flat-tailed horned lizards are not stable. With regards to the commenter's concerns about “low clutch survival rates from breeding to maturity due to impacts from predators and human activities,” flat-tailed horned lizards are known to produce relatively small clutches of eggs ($N = 31$; mean clutch size = 4.7; range = 3 to 7) (Howard 1974, p. 111) compared to most other horned lizards (Sherbrook 2003, p. 139), and predation has been identified as a potential threat to the flat-tailed horned lizard (FTHLIC 2003a, pp. 16–17). However, available information indicates predation does not appear to be excessively high throughout its range, although it is likely higher than natural levels near developed areas. Such results suggest that higher levels of predation of flat-tailed horned lizards observed in some areas is an “edge effect,” but much of the species' distribution is away from habitat edges (see Factor C, *Disease or Predation* section).

Comment 6: One commenter states that climate change will become more of an issue as ant population numbers decline because flat-tailed horned lizard populations will subsequently decline.

Our Response: Flat-tailed horned lizards do feed primarily on harvester ants; however, what effects climate change may have on harvester ant populations is unclear. Although populations of harvester ants decline

during periods of both drought and increased rain, they rebound as do populations of flat-tailed horned lizards (Tevis 1958, p. 701; Barrows and Allen 2009, p. 311). Harvester ants are also capable of surviving extremes in temperature (Tevis 1958, p. 704). The effects that global climate change may have on localized climate in areas inhabited by flat-tailed horned lizards and harvester ants is unclear, and we are not aware of any evidence indicating that harvester ant populations will decline in the foreseeable future.

Comment 7: One commenter stated a belief that the Service's final determinations in the past have been correct and the flat-tailed horned lizard should not be listed as threatened under the Act. The commenter further stated that there are more flat-tailed horned lizards known today compared to 20 years ago, and (with respect to climate change) there has been adequate rainfall to produce forage in the desert for this species to flourish.

Our Response: As discussed in the Background section, the number of flat-tailed horned lizards is difficult to estimate. We do not have acceptably accurate data to show any trend, either increasing or decreasing, in flat-tailed horned lizard populations. Rainfall varies from year to year in the Colorado Desert (Shreve and Wiggins 1964, pp. 18–20). We determine if a species needs protection under the Act based on analysis of the species' status relative to one or more of the five factors described in section 4(a)(1) of the Act, and the standards for listing as endangered or threatened (see Summary of Factors Affecting the Species section). We determined the species is not in need of the protections afforded by the Act at this time.

Comment 8: One commenter provided information resulting from research they conducted on flat-tailed horned lizard habitat loss in the Coachella Valley. The commenter believes that the reasons that the flat-tailed horned lizard was not listed in the past are because there was not enough known about this species' biology and distribution, and the largest share of the species' distribution was on Federal (BLM, DOD) lands such that the species could be managed without listing. The commenter's opinion is that neither of the above reasons is applicable today. The commenter also believes the Coachella Valley has been underrepresented in past assessments and that construction of the border fence, OHV activity, and development of energy facilities pose threats to the species.

Our Response: Our determination of whether to list a species is based on our

assessment of the five listing factors described in the Act and the standards for listing as endangered or threatened. A determination is made using the best scientific and commercial information available. In the Summary of Factors Affecting the Species section, we address the potential threats that may be affecting the species, including those identified by the commenter. Additionally, we have also addressed the Coachella Valley Population in detail.

Comment 9: One commenter opposed to the listing of the flat-tailed horned lizard believes that before this species should be considered for listing, researchers should conduct monitoring of the full desert ecosystem, as declines for this species may be a result of natural processes.

Our Response: Our determination of whether to list a species as endangered or threatened is based on our assessment of the five listing factors described in the Act using the best available scientific and commercial information. These include potential threats from natural and manmade sources. Although anecdotal evidence suggests that flat-tailed horned lizard populations are smaller now than compared to the past (for example, Luckenbach and Bury 1983, p. 278), we do not have data to suggest a positive or negative trend (see *Population Dynamics* in the Background section).

Comments Related to Threats

Comment 10: Four commenters support listing the flat-tailed horned lizard as a threatened species, and one commenter supports listing as an endangered species with designated critical habitat. These commenters believe listing is warranted due to a number of threats, including: Recreation; OHV use (such as in the Yuha Desert, Coachella Valley, West and East Mesas, near Algodones Dunes, and near Yuma, Arizona); construction of the border fence and border patrol traffic; development (including renewable energy projects such as SES Solar Two Project or Ocotillo Express Wind Project); power lines (Sunrise Powerlink); road/highway development (Yuma Area Service Highway, El Golfo to Rocky Point Highway); other miscellaneous development (such as Travertine Point, Drop 2 Reservoir, All American Canal, Coyote Wells Specific Plan Project, Reynolds Atlas RV Storage Facility); nonnative plant invasions; predation; and climate change. In general, the commenters believe these threats will continue, resulting in more habitat lost than gained. Further, the commenter that asserts the species

should be listed as endangered states that Federal protection is necessary to ensure the survival of the species and eventual recovery, and ultimately reduce the costs of recovery.

Our Response: Although we acknowledge losses of habitat can and do occur through natural and manmade processes, the determination to list a species is made by looking at the five factors described in section 4(a)(1) of the Act and the status of the species relative to the standards for listing as endangered or threatened. This determination is made solely on the basis of the best scientific and commercial information available, and takes into account regulatory mechanisms that many benefit the species and those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect the species through habitat protection or other conservation practices. As described in the Summary of Factors Affecting the Species section, we assessed the potential threats to the species using the five factors. We also assessed the existing efforts and measures that benefit the species or its habitat that may potentially reduce threats. We determined that threats to the flat-tailed horned lizard throughout its range, including recreational OHV activity; various types of development; invasive, nonnative plants; predation; and climate change, are not of a magnitude that it is likely to become endangered in the foreseeable future. Specifically, the identified development projects are not a significant threat to the species throughout its range or the respective DPSs identified in the *Distinct Population Segment* section, above, because the projects (1) are subject to the avoidance, minimization, and compensation measures of the Rangewide Management Strategy (in the United States only); (2) are relatively small compared to the range of the species or DPSs; (3) do not result in complete barriers to flat-tailed horned lizard movement; (4) do not result in the elimination of large "parts" where the deleterious effects associated with small population size are likely to substantially affect the population; (4) or a combination of these, as detailed in the Summary of Factors Affecting the Species section.

Comment 11: One commenter believes that urban development is conflicting with flat-tailed horned lizard survival.

Our Response: As described in the *Urban Development* section under Factor A, urban development within the range of the flat-tailed horned lizard is

largely occurring within areas that were previously developed for agriculture and is not resulting in additional habitat loss because the prior agricultural conversion had already made the land unavailable for the species. Urban development in flat-tailed horned lizard habitat is occurring, but in a limited area compared to the large area occupied by the species. Additionally, large areas of the species' range are under some level of protection where urban development is prevented or restricted, including Management Areas created through implementation of the Rangewide Management Strategy, CDPR lands, BLM wilderness, Coachella Valley MSHCP reserves, and portions of two biosphere reserves in Mexico. Moreover, where urban development may occur, its impact is further reduced (through avoidance, minimization, and mitigation) by the measures that benefit the flat-tailed horned lizard (such as the Rangewide Management Strategy, Coachella Valley MSHCP, and Mexican Federal listing). Thus, we concluded that urban development is not a substantial threat to the species.

Comments Related to the Rangewide Management Strategy

Comment 12: Four commenters state that the Rangewide Management Strategy currently in place is working to the benefit of the species, and there is no need to list the flat-tailed horned lizard as a federally threatened species. Two of these commenters further agree with the 2008 Annual Progress Report which states that the Interagency Conservation Agreement and Rangewide Management Strategy continue to provide an effective management focus to conserve flat-tailed horned lizard habitat throughout its range. Two commenters also expressed concern that listing the species could undermine the Interagency Conservation Agreement and questioned the efficacy of listing the flat-tailed horned lizard prior to completion of the surveys called for by the Rangewide Management Strategy.

Our Response: We agree with the commenters that the Rangewide Management Strategy is providing important conservation benefits to the flat-tailed horned lizard and its habitat in the United States. Although many of these efforts are voluntary, conservation actions are formally incorporated into planning documents of participating agencies (such as BLM's California Desert Conservation Area Plan). Moreover, most of the measures outlined in the Rangewide Management Strategy are being successfully implemented (FTHLICC 1998, pp. 1–11; FTHLICC 1999, pp. 1–13; FTHLICC

2001, pp. 1–24; FTHLICC 2003b, pp. 1–32; FTHLICC 2004, pp. 1–33; FTHLICC 2005, pp. 1–37; FTHLICC 2006, pp. 1–34; FTHLICC 2007, pp. 1–33; FTHLICC 2008a, pp. 1–35; FTHLICC 2009, pp. 1–38; FTHLICC 2010, pp. 1–33). Most of the benefits to the species occur within the United States. Although implementation of the Rangewide Management Strategy is also contributing to the conservation of the species in Mexico by promoting partnerships with local organizations in that country that are implementing programs that benefit the species, the benefits associated with the avoidance, minimization, and mitigation measures called for by the Rangewide Management Strategy are not in effect in Mexico. As such, the benefits afforded the species through implementation of the Rangewide Management Strategy, important though they may be, are limited. We appreciate the commenters' support of the Interagency Conservation Agreement that is benefitting the flat-tailed horned lizard and its habitat. Please see our response to Comment 1 and *Management and Populations* under the Background section for more information regarding the Rangewide Management Strategy.

Regarding the commenters' concern over the possibility that we may make a determination to list the species without complete flat-tailed horned lizard survey information, we note that we are required to make a final listing determination. Our determination of whether to list a species as endangered or threatened is based on our assessment of the five listing factors described in the Act using the best scientific and commercial information available. Although we agree population trend data would help us better understand the current status of the species, we must meet our obligations under the Act by examining the threats to the species. This analysis is presented in the Summary of Factors Affecting the Species section. We conclude that the species is not in need of the protections afforded by the Act at this time. Additionally, because we are not listing the species, the question of the potential effects of listing on the implementation of the Interagency Conservation Agreement is moot.

Comment 13: Three commenters asserted that implementation of the Rangewide Management Strategy, including the designation of Management Areas, is not working to recover the species. The commenters stated that mitigation lands are insufficient to make up for losses of habitat, especially from threats such as OHV use and large-scale renewable

energy projects. Two of the commenters stated the strategy is inadequate and not rangewide. A fourth commenter stated that the Service has relied heavily on the Rangewide Management Strategy to prevent the flat-tailed horned lizard's listing in the past.

Our Response: With regard to the commenters' concerns that mitigation lands may be insufficient to recover the species, we concluded that none of the existing or potential threats are likely to cause the flat-tailed horned lizard as an entire species or as any one of the Western, Eastern, or Southeastern DPSs to be in danger of extinction or likely to become so within the foreseeable future throughout all or a significant portion of its range; thus, the species does not need to be "recovered." Implementation of the Rangewide Management Strategy, including the mitigation (compensation) by the signatory agencies is providing for the consolidation of the existing Management Areas by purchasing private inholdings within the Management Areas. Moreover, implementation of the avoidance and minimization measures included in the Rangewide Management Strategy is reducing certain potential future threats, including development of energy generation facilities and associated infrastructure on signatory lands.

With regard to the commenters' concerns that the Rangewide Management Strategy is not rangewide, the purpose of this strategy is to provide a framework for conserving sufficient habitat to maintain several viable populations of the flat-tailed horned lizard throughout the range of the species in the United States. Five Management Areas were designed to identify large areas of public land in the United States where flat-tailed horned lizards have been found, and to include most flat-tailed horned lizard habitat identified as key areas in previous studies (Turner *et al.* 1980, pp. 1–47; Turner and Medica 1982, pp. 815–823; Rorabaugh *et al.* 1987, pp. 103–109; FTHLICC 1997, p. 35). Furthermore, the Management Areas were delineated to include areas as large as possible, while avoiding extensive, existing and predicted management conflicts (such as OHV open areas). The Management Areas are meant to be the core areas for maintaining self-sustaining populations of flat-tailed horned lizards in the United States (FTHLICC 2003a, p. 47). Although this strategy does not include Mexico, implementation of the Rangewide Management Strategy includes coordination with partners in Mexico to promote efforts to benefit the species in that country (FTHLICC 2009, p. 14). Additionally, approximately 60

percent of the habitat in Sonora (Mexico) lies within two Mexican Federal natural protected areas where impacts from development and other activities is limited (see *Management and Populations* in the Background section for further discussion).

Regarding the use of the Rangewide Management Strategy in our past listing determinations (withdrawals), we did not rely solely on the Rangewide Management Strategy in our decisions, nor do we do so in this determination. As we state in our response to Comment 12, the evidence indicates that implementation of the Rangewide Management Strategy is providing important conservation benefits to the flat-tailed horned lizard and its habitat; however, that is but one aspect we consider. Our determination to list a species is made by looking at the five factors described in section 4(a)(1) of the Act and the status of the species relative to the standards for listing as endangered or threatened. This determination is made solely on the basis of the best scientific and commercial information available, and takes into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect the species through habitat protection or other conservation practices. Our assessment of the effects of the five listing factors on the flat-tailed horned lizard is presented in the Summary of Factors Affecting the Species section. Our assessment of those efforts being made to protect the species through habitat protection or other conservation practices is presented in the Conservation Efforts section (see also *Management and Populations* under the Background section)—which, in this case, included the Rangewide Management Strategy. Thus, we have considered but have not relied solely upon the Rangewide Management Strategy in our determination.

Comment 14: One commenter states that the Rangewide Management Strategy does not discuss impacts of the border fence (which they believe isolates populations) and proposed solar energy projects. Specifically, this commenter and a second commenter believe that the border fence in the Yuha Management Area and the proposed Tesser Solar North America Project (also known as the Imperial Valley Solar Project) will result in isolated populations of the species and fragmented habitat. Further, the second commenter believes this project will result in impacts to the flat-tailed horned lizard and its habitat from construction and maintenance, vibrations from vehicle traffic, changes

in topography, destruction of vegetation that is a food source for harvester ants, and increased dust deposition on vegetation. Additionally, the first commenter believes the Service should analyze the impacts of the border fence and proposed solar projects on the viability of flat-tailed horned lizard populations and cumulative impacts of habitat loss.

Our Response: As discussed in our Factor A and E analyses (Summary of Factors Affecting the Species section), we acknowledge that the border fence and solar (energy generation) projects may result in the loss or degradation of flat-tailed horned lizard habitat and potentially serve as barriers, isolating populations of flat-tailed horned lizards. Although not extensively discussed by the Rangewide Management Strategy, private development of solar and other energy generation facilities on lands controlled by signatory agencies is still subject to the avoidance, minimization, and mitigation measures called for by the Rangewide Management Strategy. For example, the project proponent for the Imperial Valley Solar Project designed the project to avoid and minimize impacts to flat-tailed horned lizard Management Areas and is providing funds to acquire off-site habitat areas as compensation for unavoidable impacts, all per the specifications of the Rangewide Management Strategy (BLM 2009, pp. 4–7 to 4–10). Because of the prevalence of Federal and State lands in the U.S. portion of the range of the flat-tailed horned lizard and because most of this land is managed by signatories to the Interagency Conservation Agreement implementing the Rangewide Management Strategy, we expect that the vast majority of proposed energy development projects that are likely to affect flat-tailed horned lizard habitat will be subject to the avoidance, minimization, and compensation measures incorporated into the Rangewide Management Strategy (see *Energy Generation and Facility Development* section).

Such projects may also serve as barriers to flat-tailed horned lizard movement. Many of the proposed and anticipated projects are likely to occur in the Western Population area. As described in the "Barriers and Small Populations" section under Factor E, the parts of the Western Population north and south are large enough to likely not be substantially affected by the threats associated with small population size. Moreover, Interstate 8, which runs along the southern edge of the Imperial Valley Solar Project and many of the other proposed or anticipated energy

generating projects in the area, is already likely to be a substantial barrier to flat-tailed horned lizards within the area of the Imperial Valley Solar project.

Development of renewable energy is not without impacts, but implementation of the Rangewide Management Strategy, either under the voluntary Interagency Conservation Agreement or as it is incorporated into existing regulatory mechanisms, is anticipated to reduce the direct and indirect effects, including habitat loss and isolation of populations. We do not believe vibrations of vehicle traffic, changes in topography, destruction of vegetation that is a food source for harvester ants, and dust on vegetation will be any more substantial than the actual loss or degradation of flat-tailed horned lizard habitat, the effects of which we anticipate to be reduced by avoidance, minimization, and mitigation measures of the Rangewide Management Strategy. Moreover, the cumulative effects of habitat loss are reduced through implementation of the Rangewide Management Strategy by the creation and maintenance of large blocks of flat-tailed horned lizard habitat, including the establishment of Management Areas, the 1 percent cap on impacts, the avoidance and minimization measures directed by the Rangewide Management Strategy, and the consolidation of the respective Management Area through the purchase of private inholdings with monies acquired from compensation for unavoidable impacts from development activities.

Regarding the concerns raised by the commenter about the border fence, we also acknowledge in our Factor E analysis that tactical infrastructure (such as fencing, lighting, and access and patrol roads) along portions of the border fence area has the potential to serve as a barrier for flat-tailed horned lizard movement. However, installed fencing has been constructed to allow movement of small animals (USCBP 2008a, pp. 1–4 to 1–6 and Appendix B; USCBP 2008b, pp. 2–5 and 8–9); thus, we do not anticipate the fence itself to completely hinder flat-tailed horned lizard movement (see “Barriers and Small Populations” under Factor E). Additionally, with respect to the Yuha Desert Management Area, this area was selected for management protections of flat-tailed horned lizards because it is likely to support high densities of lizards (i.e., 0.7 individuals per ha (0.3 per ac), which is a conservative estimate). Moreover, as mentioned above, the border fence is likely a semipermeable barrier for small species such as flat-tailed horned lizard,

allowing some connectivity between the Yuha Desert Management Area and the areas of habitat in Mexico.

Comment 15: One commenter believes the Rangewide Management Strategy does not provide enough protection because the document acknowledges that it is unknown whether the lands set aside are sufficient, and that the Ocotillo Wells State Vehicular Recreation Area is not being managed adequately. A second commenter stated that they believe BLM is understaffed and underfunded, which has led to its inability to reduce impacts on flat-tailed horned lizard Management Areas.

Our Response: As described in the “Barriers and Small Populations” section under Factor E, we evaluated the size of the parts formed as a result of potential barriers. We calculated the Western, Eastern, and Southeastern Population areas, as defined herein and based upon the current distribution map presented in the revised Rangewide Management Strategy (FTHLICC 2003a, p. 5), are 341,989 ha (845,073 ac), 169,617 ha (419,133 ac), and 1,073,551 ha (2,652,802 ac), respectively. Within those three Population areas combined, we found about 91 percent of the area, despite containing potential barriers, is in large enough blocks that the populations of flat-tailed horned lizards are not likely to be affected by threats associated with small populations. Although the Rangewide Management Strategy is an important conservation effort that provides substantial benefit to the flat-tailed horned lizard and its habitat, especially within the United States, the status of the species does not depend solely upon the lands set aside through implementation of the Rangewide Management Strategy. Similarly, the status of the flat-tailed horned lizard does not depend solely on management that may or may not be adequate on Ocotillo Wells SVRA; however, management activities that reduce threats to the species make important contributions to the status of the species at a local or regional level. Moreover, for implementation of the Interagency Conservation Agreement to be successful, each signatory agency should implement its share of the Rangewide Management Strategy (see also the *Management and Populations* in the Background section, and the *Description of Specific Populations* section for further discussion).

Comment 16: One commenter stated that flat-tailed horned lizards should not be listed as a threatened species because there has been sufficient management in place over the past 10 years. The commenter believes management efforts

should be implemented to eradicate Argentine ants (*Linepithema humile*), which displace the main food source (harvester ants) for flat-tailed horned lizards.

Our Response: We agree with the commenter that there is sufficient management and conservation occurring for flat-tailed horned lizards (see the Finding section and *Management and Populations* under the Background section of this document for discussion of the long-term management of this species). We will continue to work with our partners to implement management actions to benefit this species.

With regard to the commenter's concern about Argentine ants, the evidence indicates that Argentine ants are not a threat to flat-tailed horned lizards. Argentine ants do not tolerate hot, dry conditions (Holway *et al.* 2002, p. 1610). The range of the flat-tailed horned lizard is hot and dry (see Background section), suggesting that Argentine ants do not invade flat-tailed horned lizard habitat to any substantial degree (Barrows *et al.* 2006, p. 492); thus, they do not substantially affect the primary food of the species throughout most of the species' range. Therefore, we do not believe eradication of Argentine ants in flat-tailed horned lizard habitat is a warranted management action to benefit the species.

Comment 17: One commenter states that the management strategy is sufficient for flat-tailed horned lizard and therefore listing this species is not warranted. Specifically, the commenter described the following management actions that are benefiting the species: (1) Since 1997, the Imperial Irrigation District has paid \$10,000 to offset potential project impacts to habitat; (2) although border patrol and unpermitted OHV use continue to impact the species, there are no significant trends in lizard encounter rates in Yuha Desert, East Mesa, or West Mesa from 1979 to 2001; (3) agricultural land development is no longer occurring; (4) urbanization is not occurring in Yuha Desert, East Mesa, or West Mesa; and (5) the Mexican Government is providing protections to flat-tailed horned lizards.

Our Response: As described in our analysis above, we agree with the commenter's statements in general. The mitigation (compensation or off-setting) measures associated with the Rangewide Management Strategy are important to consolidating the Management Areas under the control of signatory agencies. We agree monitoring data indicate that flat-tailed horned lizard populations in the surveyed Management Areas are not low and are not declining. We also agree that

agricultural and urban development are not significant threats to the species, as discussed under Factor A, and that the protections afforded to the species by Mexican laws are not inadequate.

References Cited

A complete list of all references cited in this document is available on the Internet at <http://www.regulations.gov>. Additionally, a complete list of all

references cited, as well as others, is available upon request from the Carlsbad Fish and Wildlife Office (*see ADDRESSES*).

Author

The primary authors of this document are staff members at the Carlsbad Fish and Wildlife Office (*see ADDRESSES* above).

Authority: The authority for this action is section 4(b)(6)(B)(ii) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: February 25, 2011.

Daniel M. Ashe,

Acting Director, Fish and Wildlife Service.

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