

and ongoing rodent-control activities (see Factor E).

A comparison of the past and present extent of suitable habitat for the Central California tiger salamander indicates that the range of the species has been substantially reduced from its historical distribution. Historically, approximately 3.67 million hectares (ha) (9.06 million acres (ac)) of valley and coastal grasslands existed within the range of the Central California tiger salamander, with an additional 2.64 million ha (6.53 million ac) supporting an overstory of blue oak/foothill pine, valley oak, or mixed hardwoods (Kuchler 1988), for a total of 6.31 million ha (15.59 million ac) of potential habitat. However, urbanization and intensive agriculture have eliminated virtually all valley grassland and oak savanna habitat from the Central Valley floor. Valley grasslands and, consequently, Central California tiger salamanders are now distributed primarily in a ring around the Central Valley (Heady 1977). An analysis of CNNDDB (2002) and Service (2003) records indicate that currently there are only about 4.5 million ha (11.1 million ac) of potential habitat where the California tiger salamander may still be extant. From 1995 to 2020, the human population in the range of the Central California tiger salamander (Central Valley, Bay Area, and Central Coast Counties) is projected to grow by 49 percent (from 12.8 million to 19.1 million people) (California Department of Water Resources (CDWR) 1998). Therefore, impacts on the Central California tiger salamander and conversion of its habitat resulting from urban development are expected to continue.

The relative loss of habitat has been even more extreme with respect to vernal pools, the historic breeding habitat of the Central California tiger salamander. Approximately 1.68 million ha (4.15 million ac) of grasslands in 20 Central Valley Counties are estimated to have supported vernal pools at the time of European settlement (Holland 1978, 1998a, 1998b; Holland and Jain 1988). Most of this area, excepting the northern Sacramento Valley, was within the Central California tiger salamander's historical range. The remaining vernal pool complexes are now fragmented and reduced in area. Where vernal pools remain, they are often disturbed and degraded by drainage modification, overgrazing, ORV use, nonnative plant invasion, trash dumping, road construction, and urban development (Jones and Stokes Associates 1987; 59 FR 48136; Keeler-Wolf *et al.* 1998). Vernal pools are now recognized as a threatened resource (Jones and Stokes

Associates 1987; Wright 1991; 59 FR 48136). During the 1980s and 1990s, vernal pool grasslands continued to be lost at an estimated rate of 1.5 percent per year (Holland 1998a, 1998b). As of 1997, 377,165 ha (931,991 ac) of vernal pool grasslands remained in the Central Valley, representing a loss of approximately 78 percent (Holland 1998a, 1998b). Along the southeastern edge of the Central Valley, from San Joaquin to Fresno Counties, at least 25 percent of the 259-ha (640-ac) sections that had contained vernal pools in 1970 (Holland 1978) were wholly converted to agriculture or urban uses by 1994 (Seymour and Westphal 1994). This conversion estimate is probably conservative because it does not include partially converted sections where vernal pool habitat may also have been lost (Seymour and Westphal 1994).

Shaffer *et al.* (1993) detected California tiger salamanders in only 36 of 86 localities (42 percent) that had been previously recorded, and ponds currently occupied by California tiger salamanders were significantly higher in elevation than those that were unoccupied or had been previously occupied. These data suggest that low-elevation breeding sites on the valley floor have been eliminated in recent years, thereby restricting the species to higher-elevation habitats on the margin of its ecological requirements (Shaffer *et al.* 1993; Seymour and Westphal 1994; Fisher and Shaffer 1996).

In both our final rule listing the Santa Barbara County DPS of the California tiger salamander (65 FR 57242), and the Sonoma County DPS of the California tiger salamander (67 FR 47726), we described land conversions to more intensive agriculture, especially conversions to grape vineyards, as being a factor in the species' decline. Data from the California Agricultural Statistics Service (CASS) (2002) provides further corroboration that this is a factor and shows that the phenomenon extends over much of the Central California tiger salamander's current and historic range.

Urban development poses a similar significant threat to the Central California tiger salamander. The human population of the State of California is continuing to increase, along with a concomitant increase in urban development. According to the 2000 census, the number of people in California has increased by 13.8 percent since 1990 (California Department of Finance 2002). The average growth in human population within the Counties in the range of the Central California tiger salamander has been 19.5 percent. Counties in the East Bay region and the

Highway 99 corridor in the San Joaquin Valley are undergoing increases both in human population and related urbanization. Sub-populations at forty-one records of the Central California tiger salamander from the CNDDDB data base have been extirpated by urban development (Service 2003).

The information documenting the present or threatened destruction, modification, or curtailment of Central California tiger salamander habitat or range due to urbanization and other factors is organized below as it applies to four populations of the species (Shaffer *et al.* 1993; Shaffer and Trenham 2002) that we have not yet listed.

**Bay Area Population** (Alameda, Santa Clara, San Benito, southwestern San Joaquin, western Stanislaus, and western Merced Counties): Thirty-two percent (194 of 608 sites) of the known California tiger salamander records are in this population, most of them in eastern Alameda and Santa Clara Counties (CNDDDB 2002). Forty-nine of these records in the Bay Area population are considered extirpated due to urbanization, orchards and vineyards, and hybridization with nonnative tiger salamanders (CNDDDB 2002; Service 2003). There are 83,386 ha (206,051 ac) of potential habitat for the California tiger salamander in the Bay Area (Service 2003).

The East Bay area of the Bay Area and Livermore Valley area has undergone intensive urban development in recent years. The total human population of Santa Clara, Contra Costa, Alameda, Solano, and Yolo Counties increased by approximately 86 percent between 1990 and 2002. From 1995 to 2020, the human population is projected to increase by 18 percent for the San Francisco Bay hydrologic region, with agricultural crop land use projected to remain around 26,305 ha (65,000 ac) (CDWR 1998). From 1990 to 1996, 16,457 ha (40,665 ac) of native habitat were converted to urban and agricultural uses in Santa Clara, Alameda, and San Benito Counties (California Department of Conservation (CDC) 1994, 1998). Approximately 90 percent of land conversions in Santa Clara, Alameda, and Contra Costa Counties were to urban use.

Of 98 California tiger salamander localities where wetland type was identified, only 15 percent (15) were located in vernal pools. These wetland type localities within the Bay Area population of California tiger salamanders occur within the Solano-Colusa and Livermore vernal pool regions (Keeler-Wolf *et al.* 1998). However, little vernal pool habitat