

mi), respectively. Moreover, for the four areas of the State in which the four remaining population segments of the California tiger salamander occur, road densities due to past urbanization are already high. Overall, these four areas have 5,860.2 km (3,641.5 mi) of roads (and rail tracks) of all types. The range of current road (and rail) density is from 1.01 km per 100 ha (0.25 mi per 100 ac) in the Southern San Joaquin population of the salamander, to 1.64 km per 100 ha (0.41 mi per 100 ac) in the Bay Area population of the salamander. We believe such relatively high road-use and road-density values result in road-kill mortality being a potentially serious threat to the species, and a threat that is likely continuing to grow in concert with the State's rapid growth of human population and urbanization.

Hybridization With Nonnative Salamanders

Sixteen populations of hybrid California tiger salamanders and the nonnative tiger salamander (*A. tigrinum*) were found in southern Santa Clara, eastern Merced, San Benito, and northern Monterey Counties (Shaffer and Trenham 2002). Four populations consisting of pure nonnative tiger salamanders were located in Monterey County (Shaffer and Trenham 2002). The tiger salamanders at a number of locations in this area reportedly are the result of intentional introductions of the animals by a bait salesman in the 1950s and 1960s (B. Shaffer, pers. comm. 2002).

Hybrids between the California tiger salamander and the nonnative tiger salamander have been documented elsewhere in the range of *A. californiense* (Shaffer and Trenham 2002). Introduced salamanders may out-compete the California tiger salamander or interbreed with the natives to produce hybrids that may be less fit and adapted to the California climate or are not reproductively viable past the first or second generations (Bury and Lukenbach 1976; Shaffer *et al.* 1993). More recent evidence suggests that the hybrids are viable and that they breed with California tiger salamanders (Shaffer and Trenham 2002). Over time, a population of a species could become genetically indistinguishable from a larger population of an introgressing species such that the true genotype (the genetic constitution of an individual or group) of the lesser species no longer exists (Levin 2002). The loss of any population of the Central California tiger salamander due to hybridization with, or competition from, introduced species is of serious concern.

Livestock Grazing

Light to moderate livestock (cattle, sheep, and horses) grazing is generally thought to be compatible with the continued successful use of rangelands by the Central California tiger salamander, provided the grazed areas do not also have intensive burrowing rodent control efforts (T. Jones, *in litt.* 1993; Shaffer *et al.* 1993; S. Sweet, pers. comm. 1998; H. Shaffer and P. Trenham, pers. comm. 2003). By maintaining shorter vegetation, grazing may make areas more suitable for California ground squirrels whose burrows are essential to California tiger salamanders. Melanson (*in litt.* 1993) noted that although vernal pool species continued to reproduce under a November to April grazing regime, California tiger salamanders were either absent or diminished in numbers in portions of pools heavily trampled by cattle. Repeated trampling of pond edges by cattle also can increase the surface area of ponds which may increase water temperature and evaporation rate, thus reducing the amount of time the pond contains water (S. Sweet, pers. comm. 1998).

Reduction in water quality cause by livestock excrement may negatively affect the California tiger salamander by increasing nitrogen and silt levels. High nitrogen levels are associated with bacterial blooms and lowered dissolved oxygen (Worthylake and Hovingh 1989), and silt has been associated with fatal fungal infections (Lefcort *et al.* 1997), as discussed earlier under Factor C.

However, grazing generally is compatible with the continued use of rangelands by the Central California tiger salamander as long as intensive burrowing rodent control programs are not implemented on such areas and grazing is not excessive (T. Jones, *in litt.* 1993; Shaffer *et al.* 1993; S. Sweet, pers. comm. 1998).

Conclusion

In making this proposal, we have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by the Central California tiger salamander. As discussed in the Summary of Factors Affecting the Species above, this species faces a number of threats. The most overwhelming threat is from continuing habitat destruction, degradation, and fragmentation. Secondary threats exist from predation and competition from introduced exotic species; possible commercial overutilization; disease; hybridization with nonnative salamanders; various chemical

contaminants; road-crossing mortality; and rodent control operations. The various primary and secondary threats are not currently being offset by existing Federal, State, or local regulatory mechanisms. The Central California tiger salamander also is vulnerable to chance environmental or demographic events. The combination of its biology and specific habitat requirements makes the animal susceptible to random events, such as drought, disease, and other occurrences. Such events are not usually a concern until the number of breeding/estivation sites or geographic distribution become severely limited, as is the case with the Central California tiger salamander.

Critical Habitat

Critical habitat is defined in section 3 of the Act as the—(i) specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species, and (II) that may require special management considerations or protection, and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Act, upon a determination by the Secretary that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary of the Interior (Secretary) designate critical habitat at the time the species is determined to be endangered or threatened. Our implementing regulations (50 CFR 424.12(a)) state that critical habitat is not determinable if information sufficient to perform the required analysis of impacts of the designation is lacking, or if the biological needs of the species are not sufficiently well known to allow identification of an area as critical habitat. Section 4(b)(2) of the Act requires us to consider economic and other relevant impacts of designating a particular area as critical habitat on the basis of the best scientific data available. The Secretary may exclude any area from critical habitat if she determines that the benefits of such exclusion outweigh the conservation benefits, unless to do so would result in the extinction of the species.