

discrete population segment differs markedly from other populations of the species in its genetic characteristics. We have found substantial evidence that two of these significance factors are met by the population of the Central California tiger salamander.

The extinction of the Central California tiger salamander would likely result in the loss of a significant genetic entity and create a significant gap in the range of the species. Shaffer and Trenham's recent genetic work (2002) indicates that the Central California tiger salamander consists of four populations. As discussed above, the Central California tiger salamander differs genetically from the Sonoma County and Santa Barbara DPSs. This supports the hypothesis that no natural interchange of the Central California tiger salamander occurs with the Santa Barbara County or the Sonoma County DPSs. Loss of the Central California tiger salamander would also result in a significant gap in the range of the species.

Conclusion

We evaluated the Central California tiger salamander, addressing the two elements which our policy requires us to consider in deciding whether a vertebrate population may be recognized as a DPS and considered for listing under the Act. We propose that the Central California tiger salamander is discrete, as per our policy, because it is both genetically different and geographically separated from the Santa Barbara County and Sonoma County DPSs. We propose that the Central California tiger salamander is significant because the loss of species would result in a significant gap in the range. It would also constitute loss of a genetically divergent portion of the species. Because the population segment appears to meet both the discreteness and significance criteria of our DPS policy, we propose that the Central California tiger salamander constitutes a DPS that qualifies for consideration for listing.

We have already listed the Sonoma County DPS and Santa Barbara County DPS as endangered. We will be reviewing the relationship between the Central California tiger salamander, and the Sonoma County and Santa Barbara County DPSs as part of this proposed rulemaking.

Summary of Factors Affecting the Species

Section 4 of the Act, and the regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act, describe the

procedures for adding species to the Federal list of Endangered and Threatened Wildlife and Plants. We may determine a species to be endangered or threatened on the basis of one or more of the five factors described in section 4(a)(1) of the Act. These factors, and their application to the Central California tiger salamander, are described below.

We have analyzed threats to the California tiger salamander throughout the four populations using information from 608 California tiger salamander sites identified in the CNDDDB, of which 486 sites are known to be extant (Service 2003). This database includes the localities listed by Shaffer *et al.* (1993), Seymour and Westphal (1994), LSA Associates, Inc. (1994), and numerous other biologists. At each of these localities, at least one California tiger salamander (adult, juvenile or larva) has been identified by a biologist. Upland habitat types in the vicinity of these localities include annual grassland (49 percent) and oak savannah (12 percent) (California GAP 1996; Service 2003). The remaining upland habitat types are agricultural crops, urban areas, and other natural habitats. The localities in the CNDDDB for which one or more wetland type was identified included vernal pools, artificial bermed ponds or stockponds, or ponds. Threats are analyzed in detail below in the discussion of the five factors affecting the species.

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

Destruction, modification, and curtailment of Central California tiger salamander habitat is caused by a variety of urban and agricultural land uses. We define urban impacts to include a variety of nonagricultural development activities, such as building and maintenance of housing, commercial, and industrial developments; construction and widening of roads and highways; golf course construction and maintenance; trash dumping, landfill operation and expansion; operation of gravel mines and quarries; dam building; and inundation of habitat by reservoirs. Agricultural impacts include the conversion of native habitat by discing and deep-ripping; and cultivation, planting, and maintenance of row crops, orchards, and vineyards.

Many habitat changes began before California tiger salamanders were widely collected or studied by biologists. Habitat degradation or loss, alteration of vernal pools and seasonal ponds, introduction of nonnative

organisms, and other changes have occurred throughout the range of this species (Shaffer *et al.* 1993; Jennings and Hayes 1994; Thelander 1994).

These impacts threaten both wetland breeding habitat and upland habitat. Even salamanders utilizing breeding sites that are protected from development may not persist as viable populations if upland sites are unavailable. Earthmoving operations and cultivation in upland habitat can directly or indirectly kill or injure California tiger salamanders in burrows or on the surface by crushing or trapping them. These practices can also expose salamanders to adverse environmental conditions (increased predation, high temperatures, low humidity) and alter surface hydrology (potentially affecting breeding ponds). Discing, deep-ripping, or grading of upland habitat also destroys California ground squirrel burrows and other crevices, making suitable upland sites unavailable and reducing long-term adult survival of Central California tiger salamanders. Ongoing agricultural and urban land uses prevent upland sites from being reestablished, and may kill or injure salamanders that enter the developed area. Existing vineyards and orchards can disrupt annual migration patterns and cut off access to breeding wetlands as salamanders avoid moving through areas with heavy canopy cover (S. Sweet, in litt. 1998). Agricultural and urban land uses can interfere with dispersal among breeding sites and prevent natural recolonization of ponds after local extirpation.

Filling, discing, or excavating wetland habitat can directly kill or injure larvae, eggs, or breeding adults, and prevents future use of the wetland for reproduction. Additionally, surviving adults may be unable to locate alternative breeding sites in subsequent years. Erosion from agriculture or grading can similarly impair reproductive success by causing sedimentation and degradation of nearby wetlands (S. Sweet, in litt. 1998; Sneed 2000). Changes in flooding duration and depth caused by urban and agricultural land use (e.g., digging of drainage/irrigation ditches, construction of permanent ponds or reservoirs, deepening or berming of seasonal wetlands, redirection of runoff from developments) can reduce reproductive success either by prematurely drying wetlands and desiccating larvae, or by extending the flooded period and facilitating invasion of exotic predators (see Factor C). Other secondary effects of agricultural and urban land uses include increased road mortality, drift and runoff of pesticides and fertilizers,