COAST RANGE NEWT, SOUTHERN POPULATIONS

Taricha torosa (Rathke 1833)

Status Summary

Populations of *Taricha torosa* from the Salinas River in Monterey County south constitute a Priority 2 Species of Special Concern, receiving a Total Score/Total Possible of 66% (73/110). During the previous evaluation, these populations were also considered Species of Special Concern (Jennings and Hayes 1994a).

Identification

Taricha are stocky, medium-to-large newts (up to 8 cm SVL) with granular skin, indistinct or absent costal grooves, and dark dorsal coloration (Petranka 1998, Stebbins 2003). *Taricha torosa* has yellowish brown to dark brown dorsal coloration and pale yellow to orange ventral coloration (Petranka 1998). Adults that enter aquatic habitats for breeding develop smooth skin and a flattened tail while they are in the aquatic habitat, and the tail fin becomes enlarged in males (Stebbins 2003). Larvae are pond type, with large gill filaments and a large fin, and have two dark, irregular longitudinal stripes running down the back (Stebbins 2003).

Taricha torosa is the only newt in southern California but may be confused with other *Taricha* species in northern California, and with the Sierra newt (*T. sierrae*), where the two overlap in Tulare County. All of the characters for distinguishing among *Taricha* can be

Coast Range Newt, Southern Populations: Risk Factors

Ranking Criteria (Maximum Score)	Score
i. Range size (10)	10
ii. Distribution trend (25)	15
iii. Population concentration/ migration (10)	10
iv. Endemism (10)	10
v. Ecological tolerance (10)	3
vi. Population trend (25)	15
vii. Vulnerability to climate change (10)	7
viii. Projected impacts (10)	3
Total Score	73
Total Possible	110
Total Score/Total Possible	0.66

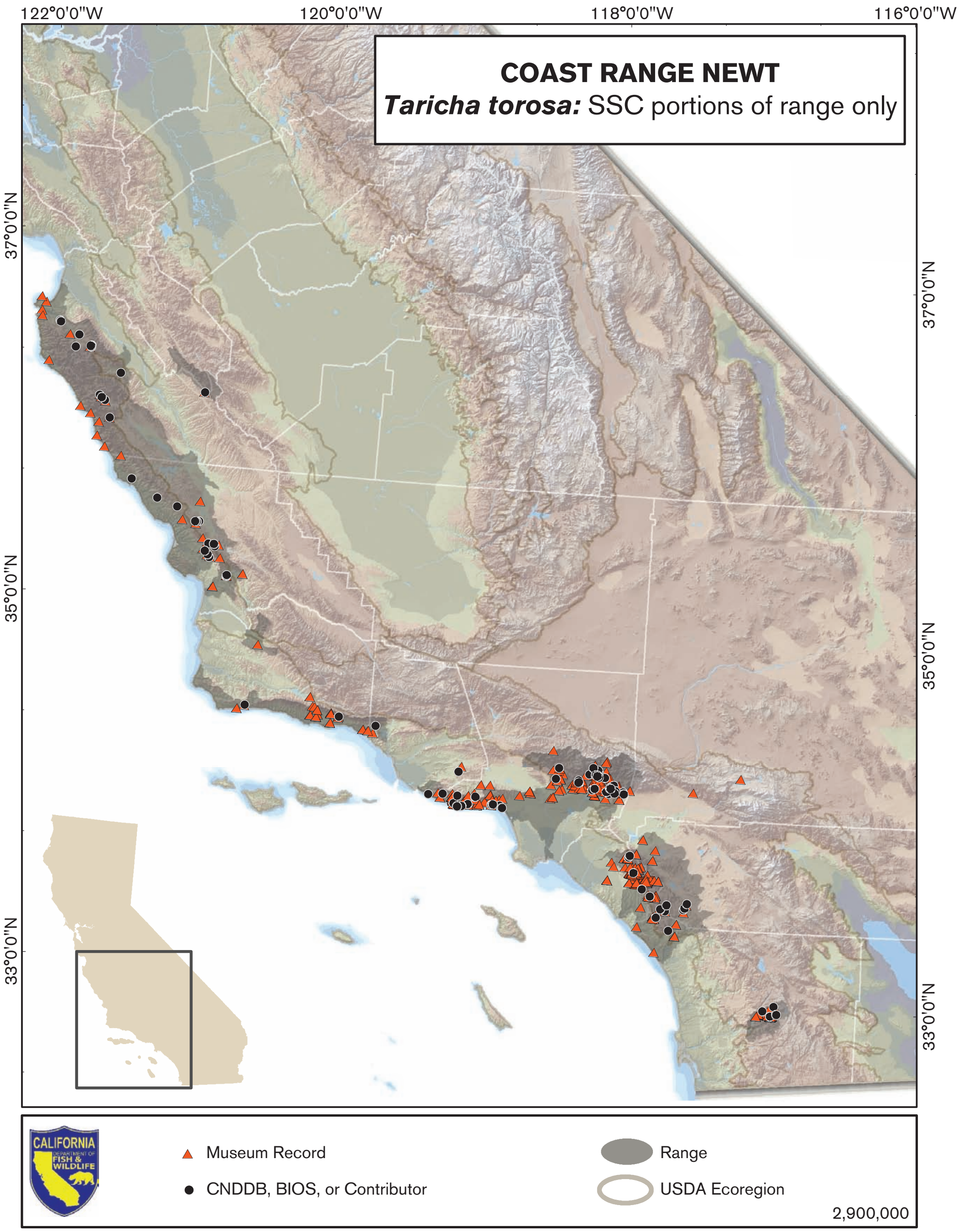

PHOTO ON PREVIOUS PAGE: Coast range newt, southern populations, Los Angeles County, California. Courtesy of Adam Clause.

variable, and in some individuals differentiating the species can be difficult. *Taricha torosa* resembles *T. granulosa* but can be distinguished based on the extensive light ventral coloration that reaches the underside of the eyes, eyes that extend beyond the margin of the head when viewed from above, and palatal teeth in the roof of the mouth forming a Y shape (Stebbins 2003). In *T. granulosa*, the dark dorsal coloration extends beneath the eyes, the eyes are more closely inset and do not extend to the margin of the head when viewed from above, and the teeth in the roof of the mouth are in a V-shaped configuration (Stebbins 2003). *Taricha rivularis* has dark eyes (*T. torosa* has yellow in the eyes), a tomato red venter, and dark coloration under the limbs and over the cloaca (Stebbins 2003). *Taricha sierrae* tends to be darker brown dorsally than *T. torosa* and has a burnt or reddish ventral coloration (Stebbins 2003). *Taricha sierrae* also has more of the lighter ventral coloration on its snout and upper eyelids than *T. torosa* (Twitty 1942, Riemer 1958), and these differences in color pattern are intermediate in hybrid populations (Kuchta 2007).

Taxonomic Relationships

Previously, two allopatric subspecies were recognized: *Taricha torosa sierrae* in the Sierra Nevada and *T. t. torosa* in the Coast Range (Riemer 1958). Phylogeographic work has shown that populations in the southern Sierra are *T. t. torosa* (Tan and Wake 1995), and further molecular work has supported elevation to species status for both subspecies (Kuchta and Tan 2006b, Kuchta 2007). There is a contact zone between the two species around the Kaweah River in Tulare County. Kuchta and Tan (2006b) concluded that while newts from San Diego County do not show long-term evolutionary independence, they still constitute a conservation unit due to genetic differentiation, demographic independence, and geographic isolation.

Life History

Terrestrial adults migrate to aquatic breeding habitats such as ponds, streams, and reservoirs from December to early May, and timing varies by locality, weather, and habitat conditions (Storer 1925, Twitty 1942, Riemer 1958, Gamradt and Kats 1997). Southern populations migrate in March and April (Storer 1925, Brame 1968, Kats et al. 1992) and tend to breed in quiet stream pools (Gamradt and Kats 1996, Gamradt and Kats 1997). No other stream-breeding salamanders occur in the southern part of the range of *Taricha torosa*. Eggs are attached under rocks or to vegetation, with egg masses ranging in size from 7 to 47 eggs (Ritter 1897, Storer 1925, Twitty 1942, Brame 1956, Brame 1968, Mosher et al. 1964). Females may lay 3–6 egg masses at a time, but it is unknown if they breed every year or skip years like *T. rivularis* (Ritter 1897, Twitty 1961, Twitty et al. 1964, Brame 1968). Adults typically leave breeding habitats in early to midsummer (Kats et al. 1994).

Eggs hatch after 4–6 weeks (Kats et al. 1994), and larvae develop for several months, typically metamorphosing in summer or fall (Kuchta 2005). Overwintering has been documented in larvae from Los Angeles (Storer 1925) and Riverside (Carroll et al. 2005) Counties, but given a lack of other reports, this behavior is likely uncommon (Kuchta 2005). Average size at metamorphosis for a Berkeley, Alameda County, population was 47 mm TL, although this probably varies widely depending on local conditions (Ritter 1897). Larvae from a vernal pool in Sonoma County metamorphosed in late July and early August at an average size of 43.8 mm TL (Kuchta 2005). Metamorphosis in permanent water habitats, as are commonly used in the southern part of the range, has not been studied.

Taricha torosa appears to show similar breeding site fidelity, homing ability, and longevity as other *Taricha*, although relatively fewer data are available from *T. torosa*. Watters and Kats (2006) PIT-tagged 36 breeding adults in the Santa Monica Mountains in Los Angeles County in the early 1990s, and recaptured animals for several years. Thirty-nine percent of animals originally tagged were recaptured in subsequent years, some as long as 11 years later, yielding minimum age estimates of 12–14 years. Animals were recaptured on average 15.5 m from the original capture locality. Terrestrial habitat use is poorly studied in juveniles and adults, although overland movements can be substantial. Trenham (1998) recaptured juveniles up to 3.5 km from their natal ponds. Once adults leave breeding sites, they use mesic microhabitats for aestivation during the dry summer (Stebbins 1951, Trenham 1998).

Larvae presumably eat small invertebrates, detritus, and possibly cannibalize conspecifics (Ritter 1897, Kuchta 2005). Aquatic adults will cannibalize eggs and larvae (Ritter 1897, Kats et al. 1992, Hanson et al. 1994). Terrestrial adults are generalist predators consuming a variety of invertebrate prey and the occasional small vertebrate (Ritter 1897, Hanson et al. 1994, Kerby and Kats 1998).

Habitat Requirements

Northern populations occur in mesic forests in hilly or mountainous terrain, while southern populations occur in drier habitats such as oak, chaparral, and grassland (Riemer 1958). Southern populations tend to use permanent streams for breeding, though recruitment may be higher in seasonal reaches that are free of nonnative predatory fish (E. Ervin, pers. comm.). *Taricha torosa* in southern California are also limited by the availability of rocky canyons with clear, cold water (S. Barry, pers. comm.; R. Fisher, pers. comm.). In the Santa Monica Mountains in Los Angeles County, *T. torosa* using a perennial stream laid 89% of their egg masses in pools and 9.5% in runs (Gamradt and Kats 1997). Riffles were rarely used for oviposition (Gamradt and Kats 1997).

Distribution (Past and Present)

Taricha torosa ranges from central Mendocino County south through the Coast Ranges to San Diego County, and also occurs in the southern Sierra Nevada north to Tulare County, from sea level to 1280 m (Stebbins 1959, Tan and Wake 1995). Species of Special Concern status extends only to those populations found in Monterey County and farther south, excluding the southern Sierra Nevada isolate. Our map only shows these populations, though we note that it includes museum specimens from the San Bernardino Mountains that have been questioned (E. Ervin, pers. comm.). *Taricha torosa* is restricted to the Santa Ynez Mountains in Santa Barbara County (S. Sweet, pers. comm.). The southernmost populations of *T. torosa* are highly fragmented and occur in the Santa Monica, San Gabriel, and Santa Ana Mountains (Stebbins 2003). Within San Diego County, populations farthest south are geographically isolated from the rest of the range. Jennings and Hayes (1994a) reported these populations as extirpated; however, since then San Diego populations in the Cuyamaca Mountains have been reported to persist in small isolated pockets of 15–20 breeding adults in the Boulder, Ceder, and Conejos Creek systems (E. Ervin, pers. comm. in Kuchta 2005). Surveys in the 1990s of the foothills and mountains around the Central Valley found *Taricha* species (*T. torosa* and *T. granulosa*) absent from more than half of historically occupied counties (Fisher and Shaffer 1996). Jennings and Hayes (1994a) estimated that a third of localities in southern California have been extirpated. Surveys from 2000 to 2002 in the Santa Monica Mountains and Simi Hills in southern California found *T. torosa* present in 43% (15/35) of streams (Riley et al. 2005). *Taricha torosa* tended to be absent from urban streams, and Riley et al. (2005) hypothesized that this was due to effects on habitat quality from artificial flow regimes, increased presence of introduced species, and possibly also collection pressure.

Trends in Abundance

Historically, *Taricha torosa* was noted as common along the Pacific slope (Klauber 1928, Bogert 1930, Klauber 1930, Dixon 1967, Brattstrom 1988), and it may have been one of the most abundant amphibians in California (Jennings and Hayes 1994a). Populations in the upper Carmel Valley adjacent to the Hastings Reservation in Monterey County numbered in the thousands in the early 1990s but have not been systematically resampled more recently (B. Shaffer and W. Koenig, unpublished data). Southern populations in the Santa Ynez Mountains of Santa Barbara County may have always been small (Jennings and Hayes 1994a). Population size estimates are not available, but populations in the south that used to be in the hundreds are now in the tens (R. Fisher, pers. comm.; E. Ervin, pers. comm., in Kuchta 2005), with populations in San Diego County potentially on the brink of extirpation (S. Kuchta, pers. comm.).

Nature and Degree of Threat

Major threats to *Taricha torosa* include habitat loss and degradation, wildfire, introduced species, and vehicular traffic (Jennings and Hayes 1994a). Sedimentation has caused a large amount of habitat degradation, especially in Los Angeles, Orange, Riverside, and San Diego Counties (Jennings and Hayes 1994a), and *T. torosa* is absent from previously occupied streams in heavily urbanized watersheds (Riley et al. 2005). Wildfire also contributes to habitat degradation. Surveys before and after a chaparral wildfire along a perennial Santa Monica Mountain stream in Los Angeles County documented a roughly 50% reduction in the availability of preferred pool and run habitat due to erosion (Gamradt and Kats 1997). As a result, egg mass density was reduced by two-thirds compared to prefire levels (Gamradt and Kats 1997). Terrestrial adults were observed to produce foamy skin secretions while walking through a prescribed burn area of chamise habitat in Monterey County (Stromberg 1997).

Negative effects of introduced predators on *T. torosa* have been documented. In the Santa Monica Mountains in Los Angeles County, introduced crayfish (*Procambarus clarkii*) and mosquitofish (*Gambusia affinis*) are predators on *T. torosa* and may be contributing to declines (Gamradt and Kats 1996). Stream surveys did not detect either invasive species in the 1980s. Resurveys in the 1990s of previously used breeding habitats found no evidence of breeding in streams with crayfish and mosquitofish present. In one case, *T. torosa* recolonized a reach following floods that removed crayfish, supporting the hypothesis that crayfish exclude newts from breeding habitat. In field and lab trials, survivorship of eggs and larvae was less than 30% in the presence of crayfish. Mosquitofish did not affect egg survivorship but did predate heavily on larvae. Only 46% of larvae survived in the presence of mosquitofish (Gamradt and Kats 1996). Crayfish also aggressively attack and chase adult *T. torosa* out of the water (Gamradt et al. 1997). Native California tiger salamanders (*Ambystoma californiense*) will prey on *T. torosa* larvae where the two co-occur around the Central Valley. However, recruitment is even lower in the presence of hybrids between native *A. californiense* and introduced barred tiger salamanders (*Ambystoma tigrinum mavortium*) (Ryan et al. 2009).

Bd has been documented in 7% (6/90) of *T. torosa* sampled from Santa Clara County (Padgett-Flohr and Longcore 2007), but the role of *Bd* in *T. torosa* declines is unknown. The role of UV radiation in declines is also unknown. Anzalone et al. (1998) reared eggs in field enclosures in the Santa Monica Mountains and found that eggs exposed to UV radiation had 40% survivorship compared to 80% survivorship of eggs when UV was shielded out. However, given that eggs are often attached under rocks and to vegetation, UV is unlikely to be responsible for large-scale declines in the field (Palen and Schindler 2010).

Under climate change, mean annual temperatures are projected to increase throughout the southern range of *T. torosa*, with warmer winters and summers and earlier spring warming expected (reviewed in PRBO 2011). There is less certainty about future precipitation patterns, with estimates ranging from little change to roughly 30% decreases in rainfall (Snyder and Sloan 2005, PRBO 2011). Warmer and potentially drier conditions may affect availability of intermittent and ephemeral waterways used for breeding. Snowpack reductions of up to 90% are predicted in southern California

(Snyder et al. 2004), which will likely result in altered flow regimes. How *T. torosa* may respond to these changes is unknown. The probability and extent of large (>200 ha) fires is expected to increase in the northern part of the special concern range (Fried et al. 2004, Westerling and Bryant 2008). Increases and decreases in fire probability and extent have been predicted for southern California. There is little consensus on future fire dynamics in this part of the range because of the difficulty in modeling Santa Ana weather events (Westerling et al. 2004, Westerling and Bryant 2008). Increases in fire are likely to negatively impact *T. torosa*, largely through habitat degradation but possibly also through direct mortality. Predicted vegetation shifts due to climate change include decreases in chaparral, shrubland, and woodland, and increases in grassland area (Lenihan et al. 2008, PRBO 2011). *Taricha torosa* uses all of these habitat types, and the effects of shifts in their relative abundance and distribution are unknown.

Status Determination

Documented extirpations and reductions in density of remaining populations in southern California, combined with occurrence in an area of high human density, result in a Priority 2 designation for southern populations of *Taricha torosa*.

Management Recommendations

Disturbances such as roadbuilding and road use, housing development, and water diversions should be minimized or eliminated in *Taricha torosa* habitat. Known breeding habitat should be a high priority for protection. Upland terrestrial habitat also needs to be protected, though the extent and configuration of upland habitat required to maintain population connectivity needs more study. Measures to prevent invasion or remove existing nonnative predators are high-priority activities to stabilize populations of this newt. Road mortality is a clear issue in some areas, particularly south of the Santa Monica Mountains. Road signage has been used to try to reduce road mortality in Monterey County, although its effectiveness is not known. Migration barriers and under-road tunnels may reduce vehicular death in key areas, though research is needed into the design and efficacy of such interventions (Schmidt and Zumbach 2008).

Monitoring, Research, and Survey Needs

Research into terrestrial habitat use and movement is critical for understanding habitat requirements and potential corridors of movement among populations, and these should be undertaken for both stream- and pond-breeding sites. Monitoring of sites where invasive species have been removed should be conducted to determine the long-term efficacy of removals and the recovery time and stability of populations following removal. Genetic analyses at the landscape level could be very informative with respect to both metapopulation dynamics and habitat corridor use and should be conducted in both relatively intact (e.g., Santa Monica Mountains) and more fragmented landscapes. Research is also needed into potential management strategies for dealing with wildfire and erosion control in order to protect breeding habitat.