

5.3.17 Santa Cruz Long-toed Salamander (*Ambystoma macrodactylum croceum*)



Santa Cruz long-toed salamander Photo Credit: U.S. Fish and Wildlife Service

Status

- Federally Endangered
- State Endangered
- State Fully Protected

Ecological Requirements

- RCIS Regions: Monterey Bay Coastline, Salinas River and Associated Corridor (USFWS 1999)
- RCIS Natural Communities: Chaparral, Valley Oak Woodland, Coastal Oak Woodland, Freshwater Emergent Wetland (CDFW 2020; USFWS 1999, 2004a, 2019a)
- Breeding habitat: Shallow, usually ephemeral freshwater ponds with clumps of vegetation or debris (CDFW 2020; USFWS 1999, 2004a)
- Upland habitat: Spend a majority of life underground in small mammal burrows, under leaf litter and organic debris, in root systems of plants in upland coastal scrub, and in woodland areas of coast live oak (*Quercus agrifolia*) or Monterey pine (*Pinus radiata*),



and in strips of riparian vegetation, such as arroyo willows (*Salix lasiolepis*) (CDFW 2020; USFWS 1999, 2004a, 2009b)

- Can disperse to upland habitat up to 1 mile from breeding site (USFWS 1999)
- Extremely limited natural distribution (approximately 15 miles) restricted to Santa Cruz and Monterey counties (CDFW 2020; USFWS 1999, 2004a, 2019a)
- Susceptible to fungal diseases, vehicle-impact mortality, and salt water intrusion (USFWS 2009b, 2019a)
- Full species account available: U.S. Fish and Wildlife Service Santa Cruz Long-toed Salamander (Ambystoma macrodactylum croceum) Draft Revised Recovery Plan (1999) and 5-Year Review: Santa Cruz Long-Toed Salamander (Ambystoma macrodactylum croceum), Summary and Evaluation (USFWS 2009b)
- RCIS Conservation Target: Highest (very rare species, limited distribution of breeding habitat)

Associated Non-Focal Species

• None

Climate Change Vulnerability Assessment

A species-specific climate change vulnerability assessment has not been conducted for the Santa Cruz long-toed salamander (SCLTS); however, climate change projections for Santa Cruz long-toed salamander are likely similar to those for the Santa Lucia slender salamander because of its similar restricted present-day range (both have small ranges limited to Monterey County). Thus, it is likely that Santa Cruz long-toed salamander is at "high risk" from climate change. This estimate is based on the likely persistence of current populations through 2050 and the amount of current climatically suitable habitat likely to remain suitable. Wright et al. (2013) projects that in 2050 there will be a 40 to 80 percent reduction in the Santa Lucia slender salamander species distribution and a 20 to 50 percent decrease in available suitable habitat under low emission scenarios. High emission scenarios project a more than 80 percent reduction to the current species distribution, with a 50 to 99 percent decrease in suitable habitat. Limited and fragmented distribution of natural suitable habitat increases the impacts of local extirpations on long-term Santa Cruz long-toed salamander viability (USFWS 2009a). Climate change will likely exacerbate all the threats listed in Table 5-27.



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EcoAdapt (2020) conducted a climate change vulnerability assessment of salamanders, including the Santa Cruz long-toed salamander, in the Santa Cruz mountains adjacent to the RCIS area using expert input as well as scientific literature. As a group, salamanders are projected to have a High Overall Vulnerability Ranking. They are projected to be sensitive to climate stressors and disturbances such as warmer air and water temperatures, changes in precipitation, increased drought, altered wildfire regimes, and disease (EcoAdapt 2020). With its extremely limited range and distribution, the Santa Cruz long-toed salamander is vulnerable to impacts from drought and may not be able to adapt to changing conditions (CDFW 2021; EcoAdapt 2020). Non-climate stressors, such as development, non-native species, and contaminants, may exasperate these sensitivities by contributing to habitat loss and fragmentation (EcoAdapt 2020).

Table 5-26. summarizes the climate change exposure, spatial distribution, and vulnerability of mixed chaparral communities statewide, which could experience a 0 to 25 percent decrease in habitat suitability. Coastal oak woodland and valley oak woodland communities could experience a 25 to 75 percent decrease in habitat suitability, and freshwater emergent wetland communities are projected to experience a 75 to 100 percent decrease in habitat suitability.

Natural Communities	Climate Exposure and Spatial Disruption Rank High Emissions (RCP8.5) Warm and Wet	Climate Exposure and Spatial Disruption Rank High Emissions (RCP8.5) Hot and Dry	Combined Vulnerability Rank High Emissions (RCP8.5)	
Mixed Chaparral	Low to Moderate	Moderate to Mid- High	Moderate to Mid- High	
Coastal Oak Woodland	Moderate	Mid-High	Moderate	
Valley Oak Woodland	Moderate	Mid-High	Moderate	
Freshwater Emergent Wetland	High	High	High	

Fable 5-26 .	Santa Cruz	Lona-toed	Salamander	Natural ⁽	Community	Vulnerability	Ranking

Source: Thorne et al. 2016

The goals, objectives, and actions shown in Table 5-27 aim to protect, enhance, and restore present day suitable habitats for Santa Cruz long-toed salamander, as well as habitats that may become suitable in the future because of projected climate changes. Actions also address



population stability, such as monitoring for disease and sources of road mortality, which may allow individuals to move to newly suitable habitats in the future. Figure 5-13 shows the range and modeled suitable habitat for the Santa Cruz long-toed salamander.

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Figure 5-13. Santa Cruz Long-toed Salamander Range and Modeled Habitat

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Santa Cruz Long-toed Salamander Conservation Priorities, Goals, Objectives, and Actions

All RC and Amphibian goals, objectives, and actions apply to Santa Cruz long-toed salamander. Water 1.1.1, 1.1.3, 1.1.5, 1.1.7. 1.1.8, and Water Objective 1.2 apply. Table 5-27 summarizes specific goals, objectives, and actions for the species.

Conservation Priorities

 Acquire, protect, and enhance habitat at or adjacent to the inner dune face, from Pajaro River to Salinas River, Upper Moro Cojo Slough drainages (between Dolan Road and Castroville Boulevard to the north and Tembladero Slough to the south), areas along Elkhorn Road east of Elkhorn Slough Reserve, and the upper reaches of Elkhorn Slough (USFWS 1999) (SCLTS 1.1, 1.2).

Goal	Objective	Threats	Co-Benefits	Action
SCLTS Goal 1. Promote persistence of Santa Cruz long-toed salamander populations in the RCIS area through protection, restoration, and enhancement of habitat.	SCLTS Objective 1.1: Protect known occurrences and allow expansion by protecting 45,000 acres of suitable habitat. Measure progress toward achieving this objective by the number of breeding locations, acres of adjacent upland habitat, and adjacent/equivalent acres protected.	 Habitat loss, degradation, fragmentation Climate change 	 Other focal/ non-focal species Biodiversity Climate change resilience 	RC Objective 1.1 (Protection) actions

Table 5-27. Santa Cruz Long-toed Salamander Goals, Objectives, and Actions



Goal	Objective	Threats	Co-Benefits	Action
SCLTS Goal 1.	SCLTS Objective 1.1:	• Habitat loss, degradation, fragmentation	• Other focal/ non-focal species	SCLTS 1.1.2: Conduct surveys in suitable habitat to identify opportunities for habitat protection, enhancement, restoration, and/or creation. Focus surveys in areas identified in the U.S. Fish and Wildlife Service 1999 Recovery Plan, namely the inner dune face from Pajaro River to Salinas River, Upper Moro Cojo Slough drainages (between Dolan Road and Castroville Boulevard to the north and Tembladero Slough to the south), areas along Elkhorn Road east of Elkhorn Slough Reserve, and the upper reaches of Elkhorn Slough (USFWS 1999).



Goal	Objective	Threats	Co-Benefits	Action
SCLTS Goal 1.	SCLTS Objective 1.2: Enhance occupied and suitable Santa Cruz long-toed salamander habitat throughout the RCIS area. Measure progress toward achieving this objective in acres of habitat and adjacent/equivalent acres enhanced and occupied by Santa Cruz long-toed salamander.	 Increased salinity and saltwater intrusion Degraded water quality Climate change 	 Climate change resilience Other focal/ non-focal species Biodiversity Water quality 	SCLTS 1.2.1: Manage saltwater intrusion by maintaining tide gates in proximity of suitable Santa Cruz long-toed salamander breeding habitat, and install new tide gates as sea levels rise, where feasible (USFWS 2019a).
SCLTS Goal 1.	SCLTS Objective 1.2:	 Increased salinity and saltwater intrusion Climate change 	 Climate change resilience Other focal/ non-focal species Biodiversity Water quality 	SCLTS 1.2.2: Conduct monitoring of ponds connected with tidally influenced marshes and translocate larvae when salinity levels are harmful (currently, three parts per thousand), in coordination with regulatory agencies. Coordination with scientific advisors, land managers, and universities is also



Goal	Objective	Threats	Co-Benefits	Action
				advised (USFWS 2019a).
SCLTS Goal 1	SCLTS Objective 1.2:	• Amphibian Objective 1.1 (Enhancement) threats	 Other focal/ non-focal species Biodiversity Climate change resilience Water quality 	Amphibian Objective 1.1 (Enhancement) actions
SCLTS Goal 1	SCLTS Objective 1.3: Restore occupied and/or suitable habitat for Santa Cruz long-toed salamander and create new habitat. Measure progress toward achieving this objective by acres of restored or created habitat and adjacent/equivalent acres, and by the number of breeding ponds restored or created.	• Amphibian Objective 1.2 (Restoration) threats	 Other focal/ non-focal species Biodiversity Climate change resilience 	Amphibian Objective 1.2 (Restoration) actions
SCLTS Goal 2: Support stability and recovery of Santa Cruz long-toed	SCLTS Objective 2.1: Reduce vehicle-related mortality. Measure progress toward	 Transportation infrastructure construction 	 Other focal/ non-focal species 	SCLTS 2.1.1: Develop wildlife crossing infrastructure



Goal	Objective	Threats	Co-Benefits	Action
salamander populations in the RCIS area through measures to reduce direct mortality.	achieving this objective by the reduction of vehicle-related Santa Cruz long-toed salamander deaths detected, compared to present day.	and maintenance; vehicle-impact mortality	• Biodiversity • Connectivity	improvements, such as drift fences, wildlife tunnels, or construction of elevated roads, in transportation corridors with high numbers of vehicle- related Santa Cruz long-toed salamander mortality. Focus on areas adjacent to known locations and protected habitats (USFWS 1999, 2009, 2019a).
SCLTS Goal 2:	SCLTS Objective 2.2: Reduce pathogen-related mortality. Measure progress toward achieving this objective by the reduction of pathogen-related Santa Cruz long-toed salamander deaths detected, compared to present day.	• Disease		SCLTS 2.2.1: Monitor known and potential breeding ponds for the presence of pathogens by traditional and eDNA methods.
SCLTS Goal 2:	SCLTS Objective 2.2:	• Disease		SCLTS 2.2.2: Sterilize all equipment entering



Goal	Objective	Threats	Co-Benefits	Action
				known or suitable Santa Cruz long-toed salamander breeding habitat, to prevent introduction of disease.

Sources: CDFW 2015, 2020; USFWS 1999, 2009b, 2019a