

Guidance on Site Assessment and Field Surveys to Detect Presence or Report a Negative Finding of the Santa Cruz Long-toed Salamander December 2012¹

The U. S. Fish and Wildlife Service (Service) and California Department of Fish and Wildlife (DFW) regularly receive requests for guidance from applicants to plan for the protection of the Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) at the sites of proposed and existing land use changes. The Service lists the Santa Cruz long-toed salamander (SCLTS) as an endangered species and the DFW recognizes it as both endangered and fully-protected. The following guidance uses two procedures to predict the likelihood of SCLTS presence in the vicinity of a project site, including: (1) an assessment of locality records and potential habitat in and around the project area; and (2) focused field surveys of breeding sites and associated uplands for detecting species presence in a specific area. This guidance is specifically intended to assist regulators and land-use planners with development projects that may affect SCLTS.

For sites with suitable breeding habitat, two consecutive seasons of negative larval surveys followed by one season of an associated drift fence study are required to support a negative finding. Most locations with ponds will require drift fencing installed around at least 75% of the breeding site and in appropriate upland areas. For sites with no aquatic breeding habitat, but where suitable upland habitat exists, one season of a negative upland drift fence study is required to support a negative finding, assuming annual rainfall is 80% of normal or greater. Some upland locations will require enclosure of 90% or more of the perimeter of the project site, although proposals to study large parcels using less fencing will be considered. Survey proposals must include details on potential dispersal routes which will be analyzed by Service and DFW to determine the percentage/locations of upland drift fencing.

Results of the site assessments and field surveys must be reported to the Ventura Fish and Wildlife Office (VFWO), pursuant to the terms and conditions of the permittee's section 10(a)(1)(A) recovery permit, and to the appropriate DFW Regional office and other agencies or offices as required, including the California Natural Diversity Database (CNDDDB). Details regarding the required content and/or format of reports are provided throughout the remainder of this document.

Surveyors must obtain permission of the landowner before implementing any surveys or research on SCLTS. **Surveyors must first obtain a Recovery Permit for SCLTS pursuant to section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended, prior to**

¹Prepared by Chad Mitcham, USFWS Biologist, Ventura Fish and Wildlife Office, and David Johnston, CDFG Environmental Scientist. Primary Contributors were Mark L. Allaback, David M. Laabs and Wesley Savage, PhD.

Suggested citation:

U. S. Fish and Wildlife Service and California Department of Fish and Wildlife. 2012. Guidance on site assessment and field studies to determine presence or report a negative finding of the Santa Cruz long-toed salamander. Unpublished Report. Ventura and Sacramento, CA. Dated December 2012.

implementing the guidance. For surveys that may ultimately be used in support of a negative finding, surveyors are expected to consult with Service and DFW biologists to ensure that they implement up-to-date research protocols in any study design before beginning work as required by conditions detailed in their Recovery Permit. Design plans to perform presence/abundance assessments should be based on established amphibian monitoring methods detailed in Heyer *et al.* (1994) and current research/monitoring protocols that improve on standard detection methods and equipment. The permittee's recovery permit must authorize incidental take of other federally listed species (e.g., California tiger salamander {*Ambystoma californiense*}, California red-legged frog {*Rana draytonii*}) if they may co-occur with SCLTS at the project location. **For all locations, the surveyor must hold a valid Scientific Collecting Permit and compatible Memorandum of Understanding from the DFW for SCLTS.** If the Guidance provided is followed appropriately, the results of these site assessments and field surveys will be considered valid by Service and DFW for a period of 1 year following completion of a complete field study.

Site Assessment for the Santa Cruz Long-toed Salamander

Available information about SCLTS and their habitats in the vicinity of the project must be used to determine the likelihood that they may occur and if field surveys are appropriate. The project proponent must compile and submit to the Service and DFW the following information:

Element 1. Is the project site within the range of the SCLTS?

The surveyor should review all current information, including the CNDDDB, the SCLTS 5-Year Review (Service 2009), aerial photos and vegetation maps and the most up to date survey information from local DFW and Service staff as well as local experts to determine if the project site is within the currently known geographic range of the species or is close enough to that range to potentially support the species.

Element 2. What are the known localities of SCLTS within the project site and within 3.1 miles (5.0 kilometers) (km) of the project boundaries?

This is to place the project site in a regional perspective allowing the Service and DFW to determine how the proposed project may affect neighboring SCLTS occurrences. The surveyor should consult the CNDDDB maintained by DFW to determine known localities of the SCLTS. Local Service and DFW staff should also be contacted for localities. Background research should include correspondence with individuals possessing direct experience with SCLTS. The surveyor must note in their report all known SCLTS localities within the project site and within 3.1 miles of the project boundaries; if there are no localities within 3.1 miles, the nearest locality should be noted.

Element 3. What are the habitats within the project site and within 1.2 miles (2 km) of the project boundaries?

This distance is based on the anticipated mobility of the species and available scientific information that identifies movement distances over a given time frame, usually within a single season. Describe the upland and aquatic habitats within the project site and within 1.2 miles of the project boundaries. Characteristics of the site that should be recorded include acreage, elevation, topography, plant communities, presence and types of water bodies, current land use, a description of adjacent lands, and an assessment of potential barriers to SCLTS movement. Use of up-to-date aerial imaging or remote sensing may be necessary to identify potential breeding habitats nearby but not directly part of the project site under consideration. The aquatic habitats should be mapped and characterized (e.g., natural vernal/seasonal pools, stockponds, drainage ditches, creeks, types of vegetation, surface area, depth, approximate drying date, etc.). If the required information is unavailable, justification should be noted and explained. Suitable upland habitat (including aestivation, foraging, and movement habitats) for SCLTS should be mapped as well, with a focus on areas that support oak woodland, willow riparian and coastal scrub.

Reporting and interpretation of the site assessment

Site assessments must minimally include, but are not limited to, the following information: (1) photographs of the project site(s); (2) survey dates and times; names of evaluator(s); (3) a description of the site assessment methods used; (4) a list of SCLTS localities, as requested above; and (5) a map (to-scale) of the site(s) showing habitat as requested above. Maps should be of similar nature to a U.S. Geological Survey (USGS) 7.5-minute (1:24,000) topographic maps or Geographic Information System (GIS) data depicting the topography and other natural features of the site(s) and the area within 5 km (3.1 mi) of its boundaries. The report must be provided to the VFWO and DFW regional office prior to initiating field surveys.

After completing Elements 1-3 of the site assessment (as described above), send a report, preferably via electronic mail, to the contact affiliated with the VFWO and DFW regional office. Based on the information provided from the site assessment, the Service and DFW will provide recommendations within 30 days as to the appropriateness of field surveys. **Surveys shall not be initiated until authorized by the Service and DFW.**

Presence/Negative Finding Survey Guidance for the Santa Cruz Long-toed Salamander

Biological field surveys should be conducted for all sites with potential SCLTS habitat. Aquatic sampling for larvae during spring and summer months can be the most efficient way to determine if a local breeding SCLTS population is present in a given area. However, if environmental conditions are unfavorable, SCLTS may not breed successfully from year-to-year (or beyond), or the breeding site may be difficult to sample using nets or other standard detection methods.

At sites that contain both upland habitat and potential breeding habitat aquatic sampling during two breeding seasons and an associated rainy season drift fence study should be conducted to support a negative finding. At sites that contain appropriate upland habitat

only, but where there is a known or potential breeding site accessible within 1.2 mi, a rainy season drift fence study should be conducted.

In years with less than normal rainfall or if the timing of rainfall is not appropriate, upland movements may be reduced and SCLTS may not reach or use breeding locations. Field surveys conducted in years with at least 80% or greater of average rainfall between 1 October and 1 April, at the nearest National Oceanic and Atmospheric Administration (NOAA) climate station are most reliable. Data from survey seasons not meeting this criterion will also be considered; surveyors should provide strong justification that their data are reliable including but not limited to local climate (e.g., daily rainfall totals, pond filling date, pond drying date) and biological survey data (e.g., SCLTS, California tiger salamanders, or other amphibians captured at a similar research project site in the region). A finding of 'not present' is unlikely to be forthcoming if the analysis is weighted heavily with atypical rain year data.

Although studies may cease if aquatic sampling determines presence of SCLTS, subsequent drift fence studies may be necessary if more detailed information is required to formulate management recommendations. If presence of SCLTS is determined during a drift fence study, research may continue to collect information on relative numbers, movement patterns and distribution in coordination with the Service and DFW.

Aquatic larval sampling

1. Aquatic larval surveys of potential breeding pools should be repeated three times annually for two, consecutive seasons. Surveys should not be conducted prior to 1 April and should be completed by 30 June with at least 10 days between visits. **If SCLTS or other special-status species' eggs are observed or encountered all surveys should cease and not resume for two weeks.** If ponds are likely to dry prior to the completion of three surveys, the sampling schedule should be shifted accordingly. If unanticipated rainfall patterns do not coincide with the required survey dates above the Service and DFW may consider alternative survey dates with strong justification.
2. Captured SCLTS should remain in nets for the minimum amount of time necessary, but no longer than 2 min; during this time, **larvae should not be kept out of water for more than 30 seconds.** Photographs should document at least one captured SCLTS, and should include a reference for scale.
3. Disruption to the pond bottom must be minimized. Shallow areas where young larvae may occur should be traversed slowly, and in the most direct and least disturbing manner possible.
4. Sampling should cease once presence has been determined. If SCLTS are detected at a pond, subsequent visits to that pond are not necessary unless considered appropriate in coordination with Service and DFW. Time spent sampling and all

aquatic vertebrates detected should be recorded including fish (by species). Presence of other exotics such as crayfish should also be reported.

5. Ponds should be initially sampled using D-shaped or similar, long-handled dip-nets with 1/8th in (3.2 mm) or finer mesh. If SCLTS larvae are not captured in the first 50 dip-net sweeps covering representative portions of the pond, and enough open water habitat is available, seines may be used. If submergent or emergent vegetation limits effective use of a seine, the dip-net effort should continue until the permitted biologist determines the site has been thoroughly sampled.
6. If dip-netting has been unsuccessful and enough open water habitat is available, seines should be used to sample 50% of the surface area of ponds smaller than 0.5 acre, and at least 30% of the surface area of larger pools or 100% of all shallow areas to depths of 4 ft. Every sampling session must include a representative sample from different water depths and vegetated and non-vegetated areas. One-eighth in. (3.2 mm) mesh minnow seines with weights along the bottom and floats along the top edge should be used, with dowling or PVC pipe attached to the end of the seine so the bottom edge can be dragged along the bottom of the pool. Whenever possible, the seine should be pulled from one edge of the pond to the other. A figure and/or graphical description of the final sampling approach used should be provided.
7. Data regarding the type and quality of each pool sampled should be recorded. At a minimum, these data should include the date and time, location, type of water body (e.g., vernal pool, seasonal wetland, artificial impoundment, perennial pond, etc.), dimension and depth of pond (either measured or estimated), water temperature, turbidity, presence of aquatic vegetation (submergent and emergent), and dominant invertebrates and all vertebrates observed. Map imagery and photographs of pools and adjacent upland areas should be included in the final report, with detailed descriptions of specific sampling locations and capture numbers highlighted on map images.
8. Surveyors should follow guidance below for disinfecting equipment and clothing after surveying a pond and before entering a new pond, unless the two ponds are hydrologically connected to one another. These requirements are adapted from the Declining Amphibian Population Task Force Fieldwork Code of Practice, which can be found in its entirety at:

http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/DAFTA.pdf

Other Methods

Night road surveys, cover-board studies, visual egg surveys or other methods may be used to determine presence provided that all permit conditions are followed; however, these techniques are not likely to be accepted in support of a negative finding.

Drift Fence Survey Methods

A drift fence study conducted during fall/winter is the primary method used to determine presence of SCLTS in upland habitats or potential breeding locations where aquatic sampling has been unsuccessful or impractical. Aquatic sampling may fail to determine presence at a breeding site due to deep water, dense vegetation or because the SCLTS larvae are rare due to local demography, or competition with sympatric species or introduced predators. To support a possible negative finding, an upland drift fence study should be conducted. Although less intrusive methods (see below) may also be used to determine presence of the SCLTS, these methods are generally less reliable and thus cannot be used to support a negative finding.

The Service may assume presence of SCLTS if a known breeding pond lies within 1.2 mi (2 km) of appropriate upland and no significant barriers to movement exist. Examples of significant physical barriers include high-density residential or urban development, very wide, heavily trafficked roadways including most portions of State Highway 1, and rivers (Pajaro River), while features such as grasslands, streams, agricultural and/or disked fields, and most paved roads are not considered barriers.

For sites with at least one accessible potential breeding pond, two consecutive seasons of aquatic larval surveys (if presence of SCLTS was not established during the first season of aquatic sampling) shall be conducted and combined with one rainy-season drift fence study. The study should also include drift fence in appropriate upland areas relative to known or suspected upland and aquatic habitat offsite. Exceptions to this standard may be granted with justification, on request.

For project sites that support upland but lack appropriate aquatic habitat or it is unreasonable to appropriately survey the aquatic habitat, a one-season drift fence study is required if: 1) a site has suitable upland habitat and a potential breeding pool lies within 1.2 mi (2 km); 2) on-site ponds cannot be adequately sampled using aquatic methods (e.g., deep impoundments); or 3) if non-native predators or poor water quality may preclude detection of SCLTS during larval sampling (i.e., due to mortality of a high percentage of eggs/embryos and larvae). Drift fence studies conducted during drought years (or other adverse climatic conditions) may or may not be endorsed based on knowledge of SCLTS movements at other project sites. Other project sites must be reasonably comparable to the subject project site for it/them to be used for Service and DFW analysis to determine presence/negative finding.

1. As required by federal and state research permits, a study plan to conduct a drift fence study must be submitted in writing to the Service and DFW. The proposal should include an aerial photograph of the study site indicating all potential on- and off-site breeding locations identified in the site assessment and an overlay with the proposed drift fence study design clearly delineated. We require that drift fence study designs incorporate the following:
 - a. **For sites with at least one suitable breeding pond** (i.e., ponds that contain standing water for at least 10 continuous weeks in most years), the ponds

should be surrounded by drift fences installed 10-30 ft (3-9 m) from the high water line. Sections of drift fence should be spaced regularly around the pond. We recommend that each section of fence be 33-100 ft (10-30 m) long and installed such that no less than 75% of the perimeter is enclosed and that no more than ~98% of the pond is enclosed. There should be no more than 33 ft (10 m) between pitfall traps, and drift fences should be constructed such that during periods when traps are closed, there are openings at least every 100 ft (30 m) to allow free movements of SCLTS and other small animals. The width of openings may vary based on the specific study site but should never be less than 10 in (25 cm) and rarely more than 33 ft (10 m), and the openings in the drift fence should be standardized to the extent practical around the entire perimeter. For example, it may be necessary to work around seasonal or perennial creeks that enter the pond and/or access roads.

- b.** **For all sites**, we also require upland drift fences because SCLTS may not use the target pond the year it is studied or they may over-summer onsite and breed elsewhere; note that a parcel without appropriate upland habitat may still provide a critical movement corridor for SCLTS to reach other sites. Unless a strong rationale can be presented for locations that include one or more potential breeding ponds, drift fence equaling at least 90% of the site perimeter should be installed. The exact placement of fences should be selected to maximize the probability of capturing SCLTS (e.g., in or near oak woodland, willow riparian or dense coastal scrub; along site boundaries closest to identified potential breeding pools assuming straight-line movements from the subject property; with pitfalls situated away from areas where flooding is likely). Pitfalls should be spaced 50 ft (15.2 m) apart. To the extent possible drift fences and pitfalls should be placed to minimize the amount of fencing and number of buckets. Each section of fence should be a minimum of 100 ft (30.5 m) long, unless topography, property lines, or other circumstances dictate. Upland drift fences should be constructed such that during periods when traps are closed there are openings at least every 200 ft (61 m) to allow animal passage.
2. Efforts should be made to have arrays approved and constructed prior to the first significant rain (≥ 0.25 in; 6.35 mm) and all studies should be operational by 15 October. We recommend installing all drift fences in September and staging pitfall traps and related supplies such that they can be quickly placed prior to the first rain. Beginning on or before October 15, pitfall buckets should be opened before sunset if there was any rain during the day or if by 14:00, rain is forecast for the remainder of the day or subsequent night with 40% or greater probability (based on the nearest National Weather Service forecast, <http://www.wrh.noaa.gov/mtr/> and NOAA forecast probabilities, <http://www.weatherspark.com>). Traps should be open each night and checked each morning until no rain has fallen the preceding night (traps must remain open if rain continued past sunset the preceding night). Efforts should be made to monitor every rain event through at least 15 March (or longer if

captures continue) but all studies typically cease by 1 April. If rainfall events are missed due to an inaccurate forecast or other reasons, these data must be included in the final report.

3. Drift fences should be constructed from a material that provides a complete visual barrier, is difficult to climb, durable, weather resistant, and **appropriate for the area in which it will be installed; proposals should describe the materials to be used**. Examples include aluminum flashing, nylon silt fencing (used in the erosion control and building industry), untreated wood or wood particle board and heavy-grade linoleum. Shade cloth, window screen, Vexar plastic mesh, and similar materials that do not provide a complete visual barrier and can be partially climbed may only be used for short segments of fence that experience heavy overland water flow or regular flooding and should be used as little as possible. All segments of mesh fencing should be capped to prevent SCLTS from climbing over. Drift fences should be buried at least 6 in (16 cm) underground and extend at least 1 ft (31 cm) above the ground. All drift fences require regular inspections and maintenance, especially after every significant storm event, and repairs must be made the same day they are observed. Drift fences installed incorrectly and/or with insufficient maintenance are likely to lead to a questioning of the reliability of any negative data. All pitfall traps must be removed and their associated holes filled immediately after cessation of the study (unless otherwise authorized by the Service and DFW).
4. Installation of drift fences and pitfall traps must be performed or monitored by a permitted biologist. Minor adjustments to the drift fence should be made in the field to avoid dense vegetation or where the soil depth is limited by root masses (e.g., dense willow stands) where practicable, but it is often necessary to create a trail during installation since the species over-summer in scrub and woodland.
5. To minimize flooding, efforts should be made to place traps preferentially in slightly elevated locations where flooding is less likely. At all locations, pitfall traps should be installed slightly above grade although compacted soil should reach the lip of each trap in all directions. Most pitfall traps should have 1/8th in. drain holes. At locations with a high water table, pitfalls may be free of holes and weighted down with gravel or other non-toxic materials as needed.
6. All pitfall traps should have a rigid lid or appropriate insert that closes securely. When not in use, traps should be closed in a manner that precludes entry by any animals.
7. Pitfall traps should be cylindrical, plastic containers or buckets. They must be a minimum of 1-gallon in size and at least 8 in (20 cm) deep, but a 2-gallon size is required where SCLTS co-occur with California tiger salamanders.
8. Each pitfall trap must contain noncellulose sponges or other nontoxic absorbent material, which should be kept moist at all times when open. If the sponge or

absorbent material does not also provide cover for captured animals, 3 in. (7.62 cm) lengths of PVC tubing (1 in diameter) should also be provided for protection.

9. Each pitfall trap should have a rigid cover with legs 1-2 in. high to provide shade and shed water during extreme rain events; shades should be sized to overlap the opening of the pitfall trap by ~2 in. (5.08 cm) for increased predator protection. If predators disturb pitfall traps, methods should be used to ensure shades are heavily weighted or locked in place when operational.
10. When in use, pitfall traps should be checked as often as necessary, but at a minimum each day between sunrise and noon. Ideally, traps should be opened just before dark and checked and closed the following morning.
11. When not in use, the drift fence and pitfall traps must be inspected weekly to ensure the system has not been disturbed by vandals, wildlife, fallen trees, wind, etc. Repairs to fences should be completed prior to the next night of sampling.
12. Pitfall traps and associated inverted shades sometimes attract ant nests. If an ant nest develops at a pitfall trap, it may be possible to maintain 1/4-1/2 in of water at the bottom of a pitfall trap without holes to keep ants away from captured amphibians. If necessary, the pitfall trap should be closed temporarily, moved to a different location along the fence line, or removed.
13. Captured SCLTS should be released as near as possible to the point of capture and in the direction of travel outside of the drift fence, in a manner that maximizes their survival, typically in moist, leafy debris or dense, shaded vegetation. Efforts should be made to release individuals within 20 ft (6 m) and no more than 49 ft (15 m) from the capture site. If this is not practicable, cover-boards (no smaller than 4 x 4 foot, 1/2 in plywood) may be used as a release site within 49 ft (15 m). If necessary, SCLTS should be watched after release to ensure they are in a safe location and are not at risk of predation, desiccation, or trampling by site investigators.
14. If a SCLTS is captured during a drift-fence study, the Service and DFW must be contacted within two days. If the approved study plan included pitfall trapping during the entire season, the field study may continue. If the study was designed to determine presence only, all traps and drift fences must be removed within 72 hours, and holes in the ground which contain traps filled in.
15. In addition, to minimize mortality of various species of small mammals that may become trapped during surveys, each pitfall trap should also incorporate untreated, ~5 mm dowling or similar round sticks that extend from the bottom of the pitfall trap to its lip or above (Perkins and Hunter 2002). Although jute twine, as described in Karraker (2001) is similarly effective, it may need to be replaced during the course of a wet season. Other options include a rodent safe-house (Padgett-Flohr and Jennings 2001).

16. Each pitfall trap or associated shade should be marked with the Scientific Collecting Permit number issued by the DFW. All traps should be individually numbered and any recorded captures should indicate the trap location and movement direction (inward or outward bound) of captured individuals. Signage should be posted that provides contact information and identifies the purpose and dates of the study.
17. Deviations from this guidance may be approved by Service and DFW on a case-by-case basis if a strong rationale can be presented.

Reporting of Field Surveys

If any life stage of SCLTS are captured, observed, or detected by any means, a digital image photograph must be supplied. The Service and the DFW should be contacted by telephone or email within two working days. If any mortality of SCLTS occurs, specimens should be collected according to permit conditions, preserved by freezing, and the Service and DFW contacted by email and or telephone, within 24 hours of detection.

For each survey location, a final report detailing the survey results should be submitted to the Service and DFW within 45 days of completion of the field study. The written report should include, but is not limited to, the following information: name(s) of surveyor(s), permit and authorization numbers, descriptions, maps and images at the appropriate resolution of the type and quality of upland and aquatic habitats and land uses at the site; a map indicating the location of water bodies sampled for larvae; a map indicating the location of drift fences and pitfalls. The report should include methods used, the dates and times of surveys, rainfall totals by date, nightly minimum temperatures, time spent using a dipnet and/or seine, total estimated area of aquatic sampling, number of aquatic animals captured/per minute, records of upland animals captured, and pond turbidity and maximum depth at each aquatic sampling. If SCLTS are detected on the site, the report should include a map indicating the precise location of all observations and captures, the number of eggs, larvae, post-metamorphic juveniles (metamorphs), sub-adults and adults observed, and photographic verification of each life stage of SCLTS encountered from the site. Representative photographs of the habitat may also be helpful in interpreting survey results. For the DFW, survey reports must be accompanied by CNDDDB field locality forms. Locality information should be in the form of UTM (NAD 83) or latitude-longitude (degree, minute, second) coordinates.

Efforts should also be made to summarize the results of other focused field studies conducted in the region during the same season, especially drift fence studies. In the case of a negative finding, including a season with <80% of average rainfall, additional information (e.g., pond filling and drying dates, quantity and timing of rainfall during each sampling interval, temperatures) supplied by the surveyor, may assist the Service and the DFW in our analysis.

Contact Information:

U.S. Fish and Wildlife Service

For an application or guidance on how to obtain a Federal permit or for reporting, please contact:

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Attn: Permit Coordinator
2493 Portola Road, Suite B
Ventura, California 93003
(805) 644-1766

<http://endangered.fws.gov/permits/>

California Department of Fish and Wildlife

For State permit information, please refer to:

California Department of Fish and Wildlife
License and Revenue Branch
3211 S Street
Sacramento, California 95816
(916) 227-2271

Citations

- Heyer WR, Donnelly MA, McDiarnid RW, Hayek L-AC, Foster MS (1994) *Measuring and monitoring biological diversity: Standard methods for amphibians* Smithsonian Institution Press, Washington.
- Karraker, N.E. 2001. String theory: reducing mortality of mammals in pitfall traps. *Wildlife Society Bulletin* 29:1158-1162.
- Padgett-Flohr, G. E. and M. R. Jennings. 2001. An economical safe house for small mammals in pitfall traps. *California Department of Fish and Game* 87(2):72-74.
- Perkins, D. W., and M. L. Hunter, Jr. 2002. Effects of placing sticks in pitfall traps on amphibian and small mammal capture rates. *Herpetological Review* 33:282-284.
- U.S. Fish and Wildlife Service (Service) and California Department of Fish and Game (DFG). 2003. Interim guidance of conducting site assessments and field surveys for determining presence or a negative finding of the California tiger salamander. Sacramento, CA. Dated October.

U.S. Fish and Wildlife Service (Service). 2009. Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office. Ventura, California