

Protocol Draft-Spadefoot Surveys

The objective of this research is to protect, enhance, and restore vernal pool habitat on Conserved Lands in the MSPA that supports or has the potential to support rare and listed species including the western spadefoot (*Spea hammondi*) so that the community has high ecological integrity.

Western spadefoots spend most of their time underground in burrows but require water for breeding. They prefer open areas with gravelly, friable, or sandy soils in washes and vernal pools in the vicinity of grasslands, oak woodlands, coastal sage scrub, and chaparral [6]. Adults and juveniles use their hind legs to dig burrows up to 0.9 m (3 ft) deep where they remain for up to 10 months. They emerge after rain at night to forage and breed only a few nights a year. They breed in ephemeral wetlands such as vernal pools and stock tanks, but occasionally breed in intermittent streams where larvae develop in isolated areas of the stream as it dries. Water temperatures in breeding pools must be between 9° C (48° F) and 30° C (86° F) for reproduction and not contain exotic species such as American bullfrogs (*Rana catesbeianus*) and crayfish (Order Decapoda). Breeding pools are typically 18-24 in (20-60 cm) deep and hold water long enough for eggs to hatch and tadpoles to transform (approx. 30 days), completing their life cycle in 4-11 weeks. They are found at elevations below 365 m (1,000 ft), but they have been observed as high as 1,365 m (4,500 ft) in the mountains of San Diego County.

Additional Information: https://sdmmp.com/view_species.php?taxaid=206990#species-profile-tab

Survey123 Spadefoot Survey Form: <https://arcg.is/eez4a1>

Equipment for field

- Maps of the site
- GPS with gpx of pools
- Dip nets (?)
- Survey123 app or Paper field data sheets
- Pen/pencil
- Secchi disk
- Phone/camera
- Thermometer
- Magnifying lens
- 16:1 water / bleach solution
- Latex gloves
- Coarse brush (to remove mud)

- Bucket (to soak shoes if needed)

Site Visit/Pool Data

Certain habitat characteristics will be taken at each pool, each visit. A record should also be created if the pool is dry at the time of the visit.

1. Affiliated Organization

- a. Check which land manager you are working with.

2. Observers

- a. Check the name of the observers present for the survey. For Crystal Cove and OC Parks check the number of staff present. This is a required field.

3. Survey Date and Start Time fill in automatically.

4. Site

- a. Check the site you are surveying. This is a required field

5. Pool ID

- a. Once Site is filled out you can check the pool you are surveying. This is a required field.
- b. Each pool should have a water depth gauge in the center with it's designation, or look on you map/GPS for the pool's ID number.
- c. If you are just testing out the survey, please use Test as the pool ID.

6. Pool Photo

- a. Take photos of the pool with the depth gauge visible each time you visit. Also take some pictures of the upland.

7. Pool Point

- a. Use the point you are standing at next to the pool.

Animal Data

- a. Make a new record for each age class of species seen
 - i. We only need one animal record for each age class/species for non-spadefoots. Estimate number of each age class present
 - ii. Don't forget to record inverts (fairy shrimp, clam shrimp, etc)
 - iii. Take voucher pictures of egg masses, tadpoles and fairy shrimp.
 - iv. If no species were encountered within the survey segment, record "None" in the Animals field

- v. For all species records:
1. **Species:** Record the species. If you are unsure of the species, put Other and take lots of pictures.
 2. **Total Count**
 - a. A count of the number of that species/age class present. For large numbers of tadpoles an estimate based on counting a small portion of the pool and then extrapolating for the rest of the pool is acceptable.
 3. **Age:** Record the age category of the animals detected. Each age category should be recorded as a separate record.
 - a. Adult: a fully mature animal.
 - b. Juvenile: last year's young, or an immature animal. Most likely this will not apply to amphibians. But if you see a young bobcat it lets us know about potential predation at the pools.
 - c. Metamorph: this year's young that have developed legs (only applies to frogs and toads).
 - d. Tadpole/larva: this year's young before they metamorph. The magnifying lens can help with small tad identification.
 - e. Egg Mass: only applies to amphibians.
 4. **Photo:** Take a voucher photo of the animal. Take more photos than you think necessary. If you have a handling permit and capture the animal take dorsal and ventral photos as well as photos of the front and sides of the animal.
 5. **Notes:** Record any pertinent information that does not fit into one of the other data fields.

1. **Air Temperature:** Measure air temperature (in degrees Celsius). Record temperature 1 m off the ground in the shade.
2. **Water Present:** Yes / No, is water present along the study site? If you encounter water, report the water quality measurements and stream measurements. If no water is seen in the survey site select “No”. This is important for documenting negative data.
 - a. This is a required field.
3. **Water Temperature:** If there is water present this will automatically come up. Record the water temperature. If using a thermometer, place your thermometer 10 cm below the surface of the water (if possible) in an area that is representative of the pool, (i.e., not in a backwater pool or side channel where temperatures would be expected to be warmer). Leave the thermometer under water for a minute or so and record the temperature once the thermometer reading has stabilized. You may also record the temperature that is on the DO meter or Ph meter. Be sure to always take your temperature from the same instrument as the different meters may not always agree on the temperature.
4. **Transparency:** Do a visual estimate of water transparency of the water (if possible), and indicate whether the water is clear, moderate / translucent, or opaque.

Pool Size

5. **Pool Depth (cm):** Using the water gauge or a ruler or the secchi disk, measure the pool at the deepest spot. This is a required field
6. **Width (m):** Either using a measuring tape/secchi disk stick or a range finder determine the width of the pool. Measure perpendicular to the length. This field is not required.
7. **Length (m):** Either using a measuring stick/secchi disk stick or a range finder determine the width of the pool. Measure perpendicular to the width. This field is not required.
8. **Turbidity:** Using a secchi disk take the turbidity at 5 different locations in the pond and record the average depth. Turbidity should be done in the deeper parts of the pool.
 - a. Lower the disk beyond the point of disappearance, then raise it and lower it to set the Secchi depth. Record the depth at the point where the secchi disk can't be seen or the depth at which point the secchi disk touches the ground. Note: Round up to the nearest centimeter.

- b. Note: we take the turbidity as a stand in for how easy it is to see animals in the water. If the water is very turbid detectability goes down.

Pool Data

9. **Aquatic Refugia:** Check any aquatic refugia category present at the pool. Write in other refugia present if not on the list in the Notes section.
10. **Aquatic Submerged Vegetation:** Estimate the percent of the pool covered with aquatic submerged vegetation. This is vegetation that is mostly covered by water, it still counts if just the tips are out of water.
11. **Emergent Vegetation Cover:** Estimate the percent of the pool covered with emergent vegetation. This is vegetation with the majority of the plant out of the water, but it is rooted in the water.
12. **Floating Material:** Estimate the percent of the pool covered with floating material. Anything floating on the pool surface.
13. **Disturbances:** Document any disturbance seen that was at the study site. Check all that apply.
14. **Degree of Disturbance:** Estimate the level of the disturbance across the segment as a whole. The options are low, medium, high, or none
15. **Notes:** Add any relevant information on the pool properties that have not yet been recorded.

Search Methods and Survey Techniques

1. **Visual encounter:** Carefully search the water, especially in pools, along shoreline, and near aquatic refugia for eggs, tadpoles, fish, and adult amphibians. Floating material can be gently moved back with finger or stick to look underneath. Look ahead often to spot frogs that may leap into water when they hear or see you coming.
 - a. If no animals are seen during the visual encounter survey, sweep the pool at five different areas with a dip net (see below) to confirm absence.

2. **Dip Netting:** Some fish, tadpoles, and other animals can be found at the edge or in the bottom mud of pooled water, in aquatic vegetation and under ledges along the perimeter of pools. When encountering deep pools and aquatic refugia, first visually check for any aquatic animals or egg masses. If no eggs are seen, you may take long sweeps with the dip net through these areas. Gently sweep the net along the bottom and sides of the pool or refugia, then check the net for aquatic species by carefully sifting through any mud and debris brought up from the bottom. We recommend using two sizes of nets, a large fish net with a long handle for sweeping deep pools and a small aquarium size net for small fish and tadpoles. Do not disturb any egg masses with dip nets. Capturing tadpoles and fish with a dip net is also a useful method to observe animals more carefully, take voucher photos, and make positive identifications. Use the magnifying lens to help identify tadpoles and egg masses to species. State and federal permits may be required for capturing and handling any listed species.
3. **Call Surveys:** Although many amphibians are most often heard calling at night, some can be heard during the day. Always be listening for calls (Davidson, 1995) and for the sound of animals jumping into the water.

Post-survey Procedures:

1. QA/QC Data fields
2. Properly process any voucher specimens, get positive species identifications if needed.
3. Label photographs Clean all equipment used during survey

Biosecurity Measures:

To prevent the spread of chytrid, cysts and other unwanted things all field gear must be cleaned between sites.

Supplies:

- 16:1 water / bleach solution
- Rags
- Latex gloves

- Coarse brush (to remove mud)

Procedure (adapted from Speare et al., 2004):

1. If possible, use separate equipment for each watershed you visit. We consider Shoestring Canyon and Irvine Mesa to be two different watersheds.
2. Prior to going in the field, disinfect all equipment using a 16:1 water / bleach solution.
3. Always work from the “cleanest” site (sites that have tested negative for chytrid) to the “dirtiest” site (sites of unknown status and sites known to have the pathogen) and disinfect in between water bodies.
4. Disinfect all equipment before leaving any site. This means wash first to remove all clumps of dirt etc., then disinfect with a 16:1 water / bleach solution.
5. When PIT-tagging or toe-clipping use sterile instruments. Sterilize them with ethanol between animals.
6. Do not allow disinfectants to contact amphibians.
7. If wet shoes have been in the vehicle, scrub floor and pedals with disinfectant and do not drive through water at another watershed unless you disinfect wheels with the bleach solution.
8. Wash your field clothes after each visit.