Western Riverside County
Multiple Species Habitat Conservation Plan (MSHCP)
Biological Monitoring Program

Artificial Cover Survey Report 2009

23 April 2010

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NOTE TO READER:

This report is an account of survey activities conducted by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public, and the Wildlife Agencies (i.e., the California Department of Fish and Game and the U.S. Fish and Wildlife Service). Monitoring Program activities are guided by the MSHCP species objectives for each Covered Species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

MSHCP reserve assembly is ongoing and it is expected to take 20 or more years to assemble the final Conservation Area. The Conservation Area includes lands acquired for conservation under the terms of the MSHCP and other lands that have conservation value in the Plan Area (called public or quasi-public lands in the MSHCP). In this report, the term "Conservation Area" refers to the Conservation Area as understood by the Monitoring Program at the time the surveys were planned and conducted.

We would like to thank and acknowledge the land managers in the MSHCP Plan Area, who in the interest of conservation and stewardship facilitate Monitoring Program activities on the lands for which they are responsible. A list of the lands where data collection activities were conducted in 2009 is included in Section 7.0 of the Western Riverside County Regional Conservation Authority (RCA) Annual Report to the Wildlife Agencies. Partnering organizations and individuals contributing data to our projects are acknowledged in the text of appropriate reports.

While we have made every effort to accurately represent our data and results, it should be recognized that data management and analysis are ongoing activities. Any reader wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

The primary preparer of this report was the 2009, Herpetofauna Program Lead, Robert Packard. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the RCA. Further information on the MSHCP and the RCA can be found at www.wrc-rca.org.

Contact Information:

Executive Director
Western Riverside County
Regional Conservation Authority
4080 Lemon Street, 12th Floor
P.O. Box 1667
Riverside, CA 92502-1667
Ph: (951) 955-9700

Western Riverside County MSHCP
Monitoring Program Administrator
c/o Adam Malisch
4500 Glenwood Drive, Bldg. C
Riverside, CA 92501
Ph: (951) 782-4238

INTRODUCTION

Artificial cover (A/C) survey efforts in 2008 and 2009 focused on 3 species (including 2 subspecies) of reptiles covered by the MSHCP. Target species were southern sagebrush lizard (*Sceloporus vandenburgianus*), southern rubber boa (*Charina umbratica*) and 2 subspecies of the mountain kingsnake: San Diego mountain kingsnake (*Lampropeltis zonata pulchra*) and San Bernardino mountain kingsnake (*Lampropeltis zonata parvirubra*). The species-specific conservation objectives for all 4 reptiles require the Biological Monitoring Program to document the continued use of 75 percent of Core Areas listed in the MSHCP at least once every 8 years (Dudek & Associates 2003).

All subspecies of the California mountain kingsnake have recently been eliminated from the taxonomic classification accepted in the scientific literature, and they are all now known as simply *Lampropeltis zonata* (Rodríguez-Robles et al. 1999, Collins and Taggart 2002). The 2 former subspecies have different Core Areas and habitats, and will be monitored accordingly.

The 2009 effort was an extension of surveys that began in the fall of 2008. The 2008 survey effort was limited and no report was written. The data presented here thus reflect our survey effort from the fall of 2008 through the fall of 2009. Artificial cover surveys by Monitoring Program biologists in 2008 and 2009 focused on documenting target species presence within species-specific Core Areas in the Conservation Area. The following were the overall survey goals for 2008 and 2009:

Goals and Objectives

1. Document the presence of southern sagebrush lizard, San Diego mountain kingsnake, San Bernardino mountain kingsnake, and southern rubber boa within as many species-specific Core Areas as possible.

2. Examine the effectiveness of A/C surveys to detect target species.

3. Work in collaboration with the U.S. Geological Survey (USGS) to collect genetic material for an ongoing population study of reptiles in southern California (Appendix A).

All target species are known to use rock outcrops and rock crevices as wintering hibernacula (Behler and King 1979, Lemm 2006). The species objectives, suitable habitat, and MSHCP-identified Core Areas for each species are described below.

Southern Sagebrush Lizard (*Sceloporus vandenburgianus*)

The southern sagebrush lizard is not listed by the state or federal governments. It is usually found above 1500 m in open areas with sparse vegetation. It is primarily found in hardwood and conifer forests, woodlands, and juniper woodlands (Dudek & Associates 2003). The species objectives for southern sagebrush lizard require the conservation of 2

Core Areas within the Conservation Area: the San Jacinto and Santa Rosa Mountains (Dudek & Associates 2003).

Southern Rubber Boa (*Charina umbratica*)

The southern rubber boa is a California Species of Special Concern. It is found at high elevations (above 1500 m) in deciduous and coniferous forests, chaparral and grasslands. It is usually found under debris or in rock piles and rock crevices (Dudek & Associates 2003). This species has been described as secretive and very difficult to observe (Hoyer and Stewart 2000). The species objectives for southern rubber boa require the conservation of 1 Core Area within the Conservation Area: the San Jacinto Mountains (Dudek & Associates 2003).

San Diego Mountain Kingsnake (*Lampropeltis zonata*)

The San Diego mountain kingsnake is a California Species of Special Concern. In the Plan Area it is expected to occur within the Santa Ana Mountains, Aqua-Tibia Mountains, and Desert Transition Bioregion above 500 m in elevation (Fisher and Case 1999, Hubbs 2004). The San Diego mountain kingsnake is restricted to rock outcrops, talus, and steep shady canyons within coniferous and mixed coniferous, hardwood, or riparian woodlands and other edge habitats when associated with coniferous habitat (Hubbs 2004). The species objectives for San Diego mountain kingsnake require the conservation of 3 Core Areas within the Conservation Area: the Santa Ana Mountains, Agua Tibia Mountains, and Desert Transition Bioregion (Dudek & Associates 2003).

San Bernardino Mountain Kingsnake (*Lampropeltis zonata*)

The San Bernardino mountain kingsnake is also a California Species of Special Concern. Within the Plan Area, San Bernardino mountain kingsnake is found only in the San Bernardino and San Jacinto Mountains above 1500 m (Fisher and Case 1999). The San Bernardino mountain kingsnake occurs in rocky areas, talus slopes, and deep shaded canyons in conifer and mixed conifer, hardwood, or riparian forest and edge habitats (Dudek & Associates 2003). They use the rocks and crevices for refuge, basking, hibernating, foraging, and as oviposition sites (Jennings and Hayes 1994, Holland and Goodman 1998). Downed logs, usually of large conifers, are also an important resource in many areas (Holland and Goodman 1998). The species objectives for San Bernardino mountain kingsnake require the conservation of 2 Core Areas within the Conservation Area: the San Jacinto Mountains and the San Bernardino Mountains (Dudek & Associates 2003).

METHODS

Protocol Development

The Biological Monitoring Program protocol for artificial cover surveys in 2009 was developed by the Herpetofauna Program Lead, Robert Packard (Appendix B).

Artificial cover has only been in use by researchers as a method for surveying for reptiles and/or amphibians since about the 1980s (Heyer et al. 1994). Moreover, most of the studies using A/C have either been used for detecting amphibians, or placed in very different habitats than those found in southern California. Our survey protocol was developed using current literature and with extensive assistance from Richard Hoyer, an independent herpetologist, who has had considerable success using A/C (carpet and plywood) to detect southern rubber boa and San Bernardino mountain kingsnake in and around rock outcrops in the San Bernardino Mountains and in Oregon (Hoyer and Stewart 2000, Hoyer 2007). Sites for A/C placement were not selected randomly, due to the localized nature of suitable habitat and the difficulty accessing remote areas while hauling artificial cover objects. The protocol focused on documenting the presence of targeted Covered Species in their respective Core Areas. A summary of survey methods is provided below.

Personnel and Training

Crew members were trained by the Herpetofauna Program Lead on survey techniques as well as species identification. Monitoring Program personnel were funded by the California Department of Fish and Game or the Regional Conservation Authority; volunteers are noted. The following Monitoring Program biologists and volunteers conducted artificial cover surveys in 2008 and 2009:

- Robert Packard (Herpetofauna Program Lead, Biological Monitoring Program)
- Adam Malisch (Biological Monitoring Program)
- Ariana Malone (Biological Monitoring Program)
- Ashley Ragsdale (Biological Monitoring Program)
- Dustin McLain (Volunteer)
- Elizabeth Dionne (Biological Monitoring Program)
- Esperanza Sandoval (Biological Monitoring Program)
- Jennifer Strules (Volunteer)
- Jonathan Reinig (Biological Monitoring Program)
- Lynn Miller (Biological Monitoring Program)
- Masanori Abe (Biological Monitoring Program)
- Michael Zerwekh (Biological Monitoring Program)
- Misty Gray (Biological Monitoring Program)
- Nicholas Peterson (Biological Monitoring Program)
- Nydia Celis (Biological Monitoring Program)
- Rika Setsuda (Biological Monitoring Program)
- Ryann Loomis (Biological Monitoring Program)

Study Design

We used Google Earth imagery to identify rock outcrops in Core Areas and appropriate habitat that could be safely and/or practicably accessed (San Bernardino National Forest, Cleveland National Forest, Iron Springs, Santa Ana Mountains, Agua

Tibia Mountains, and Santa Margarita Ecological Reserve) (Figure 1). We selected artificial cover sites in the field by identifying rock outcrops that were at least 100 m away from the nearest road or trail, at least 20 m by 20 m in size, within the MSHCP Conservation Area, and in at least 1 of the target species' Core Areas. Sites with a south-facing aspect and sites located near or above riparian areas were selected preferentially. Each site was selected to have exposure to the sun for a good portion of the day, preferably in the morning hours. Sites were chosen that would not be too difficult to access due to steep terrain or dense vegetation.

Artificial cover was installed in the San Jacinto Mountain/Banning Bench/Iron Springs/Santa Margarita Ecological Reserve sites (AREA 1) between 11 August and 27 October 2008. A/C was installed in Cleveland National Forest sites (AREA 2) between 8 October and 26 October 2009 (Figure 1).

Monitoring Program biologists distributed 4 pieces of 2 ft by 4 ft plywood and 4 pieces of 2 ft by 4 ft carpeting at each selected survey site, spread out on and around the rock outcrop. The location of each piece of board or carpet was recorded with a GPS unit.

We placed plywood cover on soft substrate along the edges or in the middle of the outcrop. We chose locations that were fairly level and inconspicuous, but with some sun exposure. Biologists placed plywood sheets on the soft substrate near selected outcrops, leaving a small gap underneath, but sealed to the ground on 3 sides. We weighed down the plywood sheets with rock to keep them from moving during high winds. Each board was numbered from 1 to 4 at each site and labeled with the unique site code.

For carpet cover, we chose locations on the rock outcrops themselves, on thin soil, or on low rocks with some sun exposure. We placed the carpet so that it was uneven enough to allow snakes to enter, or placed a few rocks or sticks underneath to facilitate use by target species. We weighed down the carpet with a rock at each corner to keep the carpet from blowing away or flapping in the wind. Each piece of carpet was numbered from 5 to 8 and labeled with the unique site code. We took at least 1 photo at each A/C site, oriented to characterize the rock outcrop as well as possible.

Survey Methods

We conducted surveys in AREA 1 between 3 November 2008 and 4 December 2009, and in AREA 2 between 16 November 2009 and 15 December 2009. We will continue to conduct surveys in AREA 1 until the spring of 2010 and in AREA 2 until the spring of 2011.

At least 2 surveyors checked artificial cover stations bi-weekly, beginning at least 14 days after the initial set-up of the A/C. We visited sites on a 14-day rotation to allow animals to reacclimatize to cover after being disturbed. Surveys were conducted between approximately 0800 h and 1500 h when there was no precipitation and temperatures were deemed warm enough to allow for reptile thermoregulation for these species (generally between 10 and 20 degrees C) (Stebbins 1985, Hubbs 2004).

Upon arriving at a given survey site, surveyors recorded the date, observers, location, A/C object number, percent sunlight falling on each A/C object, and general weather description. In addition, surveyors noted the ambient air temperature and average wind speed at the start and end of each survey. We attempted to identify all reptile species observed under A/C and recorded observations for each individual of any Covered Species encountered. We collected a small tissue sample from each target species captured and delivered these samples to the USGS Western Ecological Research Center in San Diego in collaboration with their ongoing study of reptiles in southern California (Appendix A). Detailed survey methods can be found in *Western Riverside County MSHCP Biological Monitoring Program Protocol for Artificial Cover Check Protocol* (Appendix B).

RESULTS

We checked artificial cover stations for southern sagebrush lizard, southern rubber boa, San Bernardino mountain kingsnake, and San Diego mountain kingsnake in the fall of 2008, winter of 2008/2009, and in the spring, fall, and winter of 2009. We checked A/C stations twice from 3 November to 4 December 2008 in the San Jacinto and San Bernardino Mountains, until snow cover prevented further checks. We also checked A/C at lower elevation sites (Santa Margarita Ecological Reserve, Iron Springs) 3 times from 20 November 2008 to 28 January 2009, until temperatures were deemed too low for target species thermoregulation.

In 2009 we checked A/C in the San Jacinto and San Bernardino Mountains twice from 27 February until 26 May and twice from 27 October to 30 November, unless snow cover prevented further checks, in which case stations were only checked once during this period. We checked A/C in the lower elevation sites twice from 16 March to 26 May 2009, and twice from 3 November to 9 December. We also checked A/C stations in the Santa Ana Mountains twice from 16 November until 15 December 2009. We did not check any stations in the summer season, as temperatures are generally too high for target species to use A/C for thermoregulation.

We detected 52 individual reptiles of 8 different species and 5 individual amphibians of 1 species under A/C cover objects from the fall of 2008 to the winter of 2009 (Appendix C). The species detected were: southern alligator lizard (*Elgaria multiscutata*, *n* = 10), western fence lizard (*Sceloporus occidentalis*, *n* = 10), side-blotched lizard (*Uta stansburiana*, *n* = 9), southern sagebrush lizard (*Sceloporus*

vandenburgianus, *n* = 7), ringneck snake (*Diadophus punctatus*, *n* = 4), western skink (*Plestiodon skiltonianus*, *n* = 4), orange-throated whiptail (*Aspidoscelis hyperthra*, *n* = 2), granite spiny lizard (*Sceloporus orcutti*, *n* = 2), and garden slender salamander (*Batrachoseps major*, *n* =5), plus 4 unidentified lizard species. The area with the most observations was the Santa Margarita Ecological Reserve, with 17 individual reptiles of 5 different species, including 3 of the 4 snake records, and all 5 of the amphibian records.

The only target species found under our artificial cover thus far was the southern sagebrush lizard. All sagebrush lizards found under cover were in the San Jacinto Mountains, with none being found in their other Core Area, the Santa Rosa Mountains. No mountain kingsnake of either subspecies or southern rubber boa were found under our A/C in 2008 or 2009.

Two San Bernardino mountain kingsnake individuals were incidentally observed in the San Jacinto Mountains (San Bernardino National Forest) by Bureau of Land Management employee James Gannon in 2009. One of these records was found under artificial cover. This A/C was plywood, was not marked in any way, and it is unknown who placed it in the National Forest. These boards appear to be considerably older than the A/C distributed by Monitoring Program biologists in 2008 and 2009. We have checked these boards periodically since their initial discovery, but have not found any reptiles underneath them as of December 2009.

DISCUSSION

Artificial cover surveys are a simple technique for detecting secretive and/or nocturnal animals that spend the majority of their time on the surface of the ground. Because the target species' monitoring objectives only require documentation of presence within listed Core Areas, these initial surveys did not employ more complex designs such as time-constrained sampling (Crump and Scott 1994) or repeat visits to the same sites in an occupancy framework (MacKenzie et al. 2006).

Artificial cover surveys in 2008 and 2009 were very poor at detecting target species. The only target species detected under cover was southern sagebrush lizard, in the San Jacinto Mountains. Totaling all reptile species, we found just 52 individuals of 8 species, and 5 amphibians of 1 species. As discussed below, the time elapsed between distributing and checking artificial cover can be a significant factor affecting the success of finding animals under the cover (Grant et al.1992, Monti et al. 2000).

Only 4 snakes of 1 species [ringneck snake (*Diadophis punctatus*)] were found during these surveys, indicating that other survey methods may be necessary for monitoring snakes, especially if the A/C study design does not produce meaningful results in the near future.

We detected southern sagebrush lizard in the San Jacinto Mountains Core (Figure 1), but not the Santa Rosa Mountains Core. Southern sagebrush lizards were also

documented via incidental observation in the San Jacinto Mountains at higher elevations, from 946 m to 2068 m. In contrast, portions of the Santa Rosa Mountains that occur within the Plan Area (i.e., Existing Core L) consist of desert transition habitats that mostly lie below the stated elevation minimum of 1524 m for this species (Dudek & Associates 2003). The A/C in this area (Iron Springs) is well below this elevation (1358-1458 m). Lemm (2006) states that southern sagebrush lizard is found from 150 m to 3200 m, but we have no records of the species below 944 m. Furthermore, USGS reptile sampling data in the Plan Area includes no record of southern sagebrush lizard below 1524 m (Fisher and Case 1999), and MSHCP historical records are all in the San Bernardino National Forest above 1676 m. The historical locations reported in the MSHCP species account for this species are also all at least 12 km from Existing Core L. If future surveys fail to detect southern sagebrush lizard in Existing Core L, then efforts should be conducted in the higher elevations of the Banning Bench area where suitable habitat exists. If sagebrush lizards are detected at the Banning Bench, then we recommend this location replace Existing Core L as a Core Area for this species.

Southern sagebrush lizards are not listed as occurring in the Santa Ana Mountains in the MSHCP species account. Its presence there is undetermined, but there is suitable habitat in the area. Surveys should be conducted in the higher elevations to determine if the species is present there.

Two San Bernardino mountain kingsnake records in the San Jacinto Mountains Core Area were submitted to the Biological Monitoring Program by the Bureau of Land Management in 2009 (Figure 1). These records minimally fulfill the species objective for this species for the current reporting period in this Core Area. The other Core Area for San Bernardino mountain kingsnake is the San Bernardino Mountains, where the Monitoring Program has no recently documented observation records.

One southern rubber boa was found in the San Jacinto Mountains by a U. S. Forest Service employee assisting USGS mountain yellow-legged frog surveys in 2007 (Figure 1). A Monitoring Program employee was also present at this observation. Because this observation occurred in the only listed Core Area for southern rubber boa, this minimally fulfills the species objective for this species for the current reporting period.

Recommendations for Future Surveys

Artificial cover should be left in place in Core Areas for as long as possible, to facilitate target species locating and utilizing it as cover. Because it can take up to a year or more for snakes to find and utilize artificial cover objects as thermoregulation sites (Grant et al.1992, Monti et al. 2000) we may need several more years of data before a fair assessment of the use of A/C in detecting the target species is possible. If the A/C does not produce significant results in the near future (spring of 2010), additional survey methods may be necessary to supplement the minimal data gathered thus far through A/C and incidental species observations. A significant increase in the number of A/C sites

and/or number of A/C objects per site should be considered, along with the possibility of checking natural cover at survey sites.

LITERATURE CITED

Behler JL, King FW. 1979. The Audubon Society Field Guide to North American Reptiles and Amphibians. New York (NY): Alfred A. Knopf, Inc.

Collinsm JT, Taggart TW. 2002. Standard common and current scientific names for North American amphibians, turtles, reptiles, and crocodilians, fifth edition. Lawrence (KA): Center for North American Herpetology.

Crump ML, Scott NJ Jr. 1994. Visual encounter surveys. p 84-91 In: Heyer WR, Donnelly MA, McDiarmid RW, Hayek LAC, Foster MS, editors. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian,Washington, D.C.

Dudek & Associates. 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Final MSHCP, Volumes I and II. Prepared for County of Riverside Transportation and Lands Management Agency. Prepared by Dudek & Associates, Inc. Approved June 17, 2003.

Fisher R, Case T. 2000 Southern California Herpetofauna Research and Monitoring: 1995-1999. Data Summation Report. U.S. Geological Survey Technical Report submitted to U.S. Fish and Wildlife Service and California Department of Fish and Game.

Grant BW, Tucker AD, Lovich JE, Mills AM, Dixon PM, Gibbons JW. 1992. The use of coverboards in estimating patterns of reptile and amphibian biodiversity. p. # - # In McCullough DR, Barrett RH, editors. Populations in 2001. New York (NY): Elsevier.

Heyer WR, Donnelly MA, McDiarmid RW, Hayek LC, Foster MS. 1994. Measuring and Monitoring Biological Diversity Standard Methods for Amphibians. Washtington, D.C.: Smithsonian Institution Press.

Holland, D.C., R.H. Goodman. 1998. A guide to the amphibians and reptiles of MCB Camp Pendleton, San Diego County, California. Prepared for AC/S Environmental Security Resource Management Division MCB Camp Pendleton, CA. Contract M00681-94-C-0039.

Hoyer RF. 2007. The fallacy of perceptions. Journal of Kansas Herpetology 21: 5-10.

Hoyer RF, Stewart GR. 2000. Biology of the rubber boa (*Charina bottae*), with emphasis on *C. b. umbratica*. Part I: capture, size, sexual dimorphism, and reproduction. Journal of Herpetology 34:348–354.

Hubbs B. 2004. Mountain Kings: A collective history of California, Sonoran, Durango, and Queretato Mountain Kingsnakes. Tempe (AZ): Tricolor Books.

Jennings MR, Hayes MP. 1994. Amphibian and reptile Species of Special Concern in California. Final report submitted to California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California, under Contract 8023.

Lemm JM. 2006. Field Guide to Amphibians and Reptiles of the San Diego Region. Los Angeles (CA): University of California Press.

MacKenzie D, Nichols J, Royle JA, Pollock KH, Bailey LL, Hines JE. 2006. Occupancy estimation and modeling: inferring patterns and dynamics of species occurrence. San Diego (CA): Elsevier- Academic Press.

Monti L, Hunter M, Witham J. 2000. An evaluation of the artificial cover object (ACO) method for monitoring populations of the redback salamander, *Plethodon cinereus*. Journal of Herpetology 34: 624.629.

Rodríguez-Robles JA, Denardo D, Staub R. 1999. Phylogeography of the California mountain kingsnake, *Lampropeltis zonata* (Colubridae) Mol. Ecol. Vol 8.

Stebbins RC. 1985. A field guide to western reptiles and amphibians. New York (NY): McGraw Hill Book Company.

Appendix A. Western Riverside County MSHCP Biological Monitoring Program Protocol for Reptile Tissue Sampling, March 2009.

Tissue sampling has been shown to be a valuable component of scientific and genetic studies. Many genetic studies have revealed important results about local populations (Richmond, Jockusch 2007; Wood, Fisher, Reeder 2007), and tissue sampling allows for analyses of population genetics to be conducted without killing individuals in the population. Reptiles generally recover quickly from injuries sustained during acquisition of a small tissue sample, and the resulting scars can be used to aid in recapture identification analysis. Scale clipping and taking tail tips rarely draws blood, and the application of a tissue adhesive (e.g., New Skin) will speed the healing process and stem any blood loss. The tissue adhesive should also help minimize the risk of bacterial infection, although this is a possible deleterious side-effect. Some species of lizards also readily shed their tails as a defense mechanism and although care will be taken to process all animals as quickly and carefully as possible it is likely that a small number of individuals will lose their tails during handling. Although there are some risks associated with tissue sampling, this method should have less impact on target populations than taking specimens for vouchering and still provide valuable monitoring data.

The protocol outlined below will be followed by Monitoring Program staff processing reptiles in the field. All current herpetological personnel were trained in taking tissue samples by a USGS biologist at the USGS office in San Diego on March 5, 2009, or trained by those who attended said training. Tissue samples were taken by all crew from dead specimens; however a live specimen was used for demonstrating handling techniques while taking tissue samples. Future personnel will be trained by our crew on live specimens in the field. All tissue samples will be temporarily stored in refrigeration at the MSHCP's Biological Monitoring Office at 4500 Glenwood Drive, Riverside, CA, and then transported to the USGS Western Ecological Research Center's San Diego Field Office at 4165 Spruance Road, San Diego, CA for genetic analysis.

USGS TARGET SPECIES Processing Methods

Target Species include: Gilbert's skink (*Plestiodon gilberti*), western skink (*P. skiltonianus*), rosy boa (*Lichanura trivirgata*), southern rubber boa (*Charina umbratica*), glossy snake (*Arizona occidentalis*), shovel-nosed snake (*Chionactis occipitalis*), San Diego mt. kingsnake (*Lampropeltis zonata pulchra*), San Bernardino mt. kingsnake (*L. z. parvirubra*), red coachwhip (*Masticophis flagellum*), striped whipsnake (*M. lateralis*), red-sided garter snake (*Thamnophis sirtalis infernalis*), two-striped garter snake (*T. hammondii*), southwestern blind snake (*Leptotyphlops humilis humilis*) San Diego banded gecko (*Coleonyx variegatus abbotti*), western banded gecko (*C. v. variegatus*), granite night lizard (*Xantusia henshawi henshawi*), and sagebrush lizard (*Sceloporus vandenburgianus*).

1. Gender/Age
    - Male, female or unknown
2. Measurements
    - Using metric ruler
        i. Snout-Vent length (mm)
        ii. Tail length (mm)
    - Using pesola scale
        i. Weight (g): tare scale first with sampling bag, then place animal in bag.
            1. Use the smallest scale possible for the most accuracy.
3. Take tissue sample (y/n) (Do not take a sample if the animal is too small to safely do so)
        i. Label micro-centrifuge tubes with sample # [date, full board name(site#-board#), 4-letter species code, and individual sequential # (ex. 20091125_MS12-02_EUSK_1)]
    - Sterilize scissors with alcohol.
    - For larger snakes: Take three ventral scale clips from the largest midbody scales, the three samples not from adjoining scales. The clip should be ~1 mm x ~3 mm, but try to clip all the way across each scale, and try to get some of the pigmentation of each scale.
    - For small snakes and lizards: Snip ~3 mm of the tail tip with scissors into centrifuge tube.

      Place drop of tissue adhesive (New Skin) on cut, allow to air dry. Place micro-centrifuge tube in designated container in specimen freezer at the office.
4. Take photos (Optional except for Mt. Kingsnakes and Rubber Boa)
    - Minimum of 3 (1 dorsal, 1 ventral, 1 close-up of dorsal portion of head).
        i. Place, in each photo, ruler and tape with date and specimen # (corresponding to order entered on datasheet).
        ii. Label the photos with photo #s [date, photographer initials, and photo file number (ex. 20091125_SLP_362)].
5. Notes - Record unusual morphology
    - Take notes on any unusual characteristics of the animal (e.g. coloration, injuries, regrown tail, etc.).
6. Return animal to exact location where found.

Non-Target Species Processing Methods (DO NOT PROCESS ANY VENOMOUS REPTILES!)

1. Gender/Age

   Male, female or unknown
2. Measurements
    a. Using metric ruler
        i. Snout-Vent length (mm)

ii. Tail length (mm)

b. Using Pesola scale

i. Weight (g): tare scale first with bag, then place animal in bag.

1. Use the smallest scale possible for the most accuracy.

3. Take photos (optional)

i. Record photo #s on datasheet.

ii. Label the photos with photo #s [date, photographer initials, and photo file number (ex. 20091125_SLP_362)].

4. Return animal to exact location where found.

REFERENCES

Richmond JQ, Jockusch EL 2007. Body size evolution simultaneously creates and collapses species boundaries in a clade of scincid lizards. Proc R Soc Lond B. 274:1701–1708.

Wood DA, Fisher AN, Reeder TW 2008. Novel patterns of historical isolation, dispersal, and secondary contact across Baja California in the Rosy Boa (Lichanura trivirgata). Molecular Phylogenetics and Evolution.; 46:484–502.

Appendix B. Western Riverside County MSHCP Biological Monitoring Program Artificial Cover Check Protocol 2008-2009.

Goals

To locate southern sagebrush lizard (Sceloporus vandenburgianus), southern rubber boa (Charina umbratica), San Bernardino mt. kingsnake (Lampropeltis zonata parvirubra) and San Diego mt. kingsnake (Lampropeltis zonata pulchra) in their respective Core Areas and other areas of suitable habitat in the MSHCP Conservation Area.

Procedure

Artificial cover should be checked in the spring and fall when the temperature is between 10 and 20 degrees Centigrade (50-65 deg. F) when there is minimal snow cover. First find or print the appropriate maps and download the GPS points of the artificial cover objects. When within 100m of the site, record the sky code, wind, snow cover, and temperature. When approaching the site, try to be as quiet as possible, and keep an eye on the artificial cover as you approach to observe any animals escaping. Sites must be checked with two people. One person should slowly lift the cover object while the other is observing what is underneath. Be very careful not to leave any part of your body exposed to any rattlesnakes, etc. that may be lurking underneath. If any lizards are present, try to capture them before they escape for positive identification, but only after determining that no snakes are under the cover.

All reptiles, amphibians, and mammals should be recorded, along with their age and sex, if known. These will be released after positive identification is made. If it is an unusual animal, take a photograph. Any skins or dead reptiles found under the cover should be put in a plastic bag, labeled, and brought back to the office for identification. A record must be made for each cover object. Make sure to record “None” for all cover with no animals underneath. Record all herps seen in the area and during the hike to and from the site under “Notes”. Take a photograph of any unusual specimens and put them at Projects\Herps\ArtificialCover\MiscPhotos. Label the photos with photo #s [date, photographer initials, cover number, and photo file number (ex. 20091125_MS17-02_SLP_362)]. If the animal was not under cover, write in an appropriate location in place of the cover number, e.g. _IronSprings_.

If any target species is found under the artificial cover, they must be captured and processed. These species should have weight, snout to vent length, tail length, sex, age and any irregularities recorded. For larger snakes take three ventral scale clips from the largest midbody scales, the three samples not from adjoining scales. Each clip should be ~1 mm x ~3 mm, but try to clip all the way across each scale, and try to get some of the pigmentation of each scale. For small snakes and lizards snip ~3 mm of the tail tip with scissors into a centrifuge tube (For a full target species list and detailed processing checklist, see the Artificial Cover Processing Methods below).

Samples should be labeled with the same unique identifier as the photographs described above. Scissors should be wiped with ethanol afterwards. Photographs of each animal should be taken of the head and dorsal and ventral surfaces. Label photos as above. After processing the animal should be released unharmed exactly where it was found.

Equipment

- Datasheets
- Maps
- Access permits
- Micro-centrifuge tubes with ethanol
- Surgical scissors
- New Skin adhesive
- GPS unit with points downloaded
- Extra batteries
- Pen or pencil
- Camera
- Kestrel
- Gloves
- Water bottle
- Metric ruler
- Sampling bags
- Snake stick
- Snake gaiters (optional)
- Field guides

Appendix C. Species detected at artificial-cover stations in 2008 and 2009.

Site	*n*	Common Name	Scientific Name	Year
Fern Valley	1	Side-blotched lizard	*Uta stansburiana*	2008
	1	Western fence lizard	*Sceloporus occidentalis*	2009
	5	Southern sagebrush lizard	*Sceloporus vandenburgianus*	2009
May Valley	1	Side-blotched lizard	*Uta stansburiana*	2008
	2	Side-blotched lizard	*Uta stansburiana*	2009
Black Mountain	2	Western fence lizard	*Sceloporus occidentalis*	2009
	1	Western skink	*Plestiodon skiltonianus*	2009
Dark Canyon	1	Granite spiny lizard	*Sceloporus orcutti*	2009
Thomas Mountain	1	Western fence lizard	*Sceloporus occidentalis*	2009
	1	Side-blotched lizard	*Uta stansburiana*	2009
	1	Western skink	*Plestiodon skiltonianus*	2009
	1	Ringneck snake	*Diadophis punctatus*	2009
Thousand Trails	2	San Diego alligator lizard	*Elgaria multicarinata webbii*	2009
	2	Southern sagebrush lizard	*Sceloporus vandenburgianus*	2009
	1	Western skink	*Plestiodon skiltonianus*	2009
Suicide Rock	1	Side-blotched lizard	*Uta stansburiana*	2009
Banning Canyon	1	San Diego alligator lizard	*Elgaria multicarinata webbii*	2008
Indian Truck Trail	1	Granite spiny lizard	*Sceloporus orcutti*	2009
Agua Tibia	1	Side-blotched lizard	*Uta stansburiana*	2009

Appendix C. cont.

Site	*n*	Common Name	Scientific Name	Year
Iron Springs	2	Western fence lizard	*Sceloporus occidentalis*	2008
	1	Side-blotched lizard	*Uta stansburiana*	2009
Santa Margarita Ecological Reserve	2	Garden slender salamander	*Batrachoseps major*	2008
	3	Garden slender salamander	*Batrachoseps major*	2009
	2	San Diego alligator lizard	*Elgaria multicarinata webbii*	2008
	5	San Diego alligator lizard	*Elgaria multicarinata webbii*	2009
	3	Western fence lizard	*Sceloporus occidentalis*	2009
	1	Western skink	*Plestiodon skiltonianus*	2009
	2	Orange-throated whiptail	*Aspidoscelis hyperythra*	2009
	3	Ringneck snake	*Diadophis punctatus*	2009