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

Southwestern Pond Turtle (*Clemmys marmorata pallida*)
Survey Report 2008

APRIL 20, 2008

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

LIST OF APPENDICES

NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological 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, 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.

We would like to 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 this year's data collection activities were conducted 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. We would especially like to acknowledge the Santa Ana Watershed Association, the Center for Natural Lands Management, and the Orange County Water District for their willingness to initiate or modify their data collection to complement our survey efforts in 2008.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. Any reader who would like 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. All Monitoring Program data, including original datasheets and digital datasets are stored in the Monitoring Program office in downtown Riverside, CA.

The primary authors of this report were the 2008 Herpetology Program Lead, Robert Packard and Staff Biologist, Sinlan Poo. 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. For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

Contact Info:

Executive Director
Western Riverside County
Regional Conservation Authority
3403 10th Street, Suite 320
P.O. Box 1667 Riverside, CA 92502
Ph: (951) 955-2857

Monitoring Program Administrator
MSHCP Biological Monitoring Program
4500 Glenwood Drive, Bldg. C
Riverside, CA 92501
Ph: (951) 248-2552

INTRODUCTION

The southwestern pond turtle (*Clemmys marmorata pallida*; CLMA) is a California species of special concern and is the state's only native freshwater turtle. There are 2 subspecies of *Clemmys marmorata* that occur in California: the northwestern subspecies (C. *m. marmorata*) ranges north of the American River, and the southwestern subspecies (C. *m. pallida*) is distributed from the San Francisco area south across the MSHCP Plan Area and into Baja California (Seelinger 1945; Holland 1994; USFWS 1992). The southwestern pond turtle prefers permanent water bodies with emergent vegetation and basking areas (Lemm 2006). Within the Plan Area, CLMA has been known to occur in portions of Cole Creek, the Santa Ana River, San Jacinto River, and the confluence of Temecula Creek and Murrieta Creek (Dudek & Associates 2003).

MSHCP Species Objectives for CLMA are to maintain at least 75% occupancy of 8 Core Areas as measured once every 3 years (Dudek and Associates 2003). Core Areas for CLMA are Cajalco Creek, San Mateo Creek, Santa Ana River, Chino Creek, Temecula Creek, Murrieta Creek, Santa Rosa Plateau, and San Jacinto River.

In 2006, we began surveying for populations of CLMA in Core Areas and other suitable areas in the Plan Area using visual and trapping protocols developed and tested in San Diego County by the Western Ecological Research Center, U.S. Geological Survey (USGS). We successfully detected the species during surveys in 2006 and continued to survey using the USGS protocol in 2007. In 2007, specific attention was paid to the timing and quantity of CLMA detections. Results from 2007 surveys indicated that 5-day, 4-night trapping efforts should be sufficient to detect CLMA in the Plan Area when it is present. Our 2008 effort focused on documenting presence and abundance of CLMA in suitable habitat in Core Areas where we have not yet detected them. Specifically, our goals and objectives in 2008 were as follows:

Survey Goals and Objectives

1. Locate suitable CLMA habitat in the remaining Core Areas
    a. Visual habitat assessments
2. Determine relative abundance and demographics of CLMA populations
    a. Live trap suitable CLMA habitat with hoop traps.
    b. Mark CLMA with Passive Integrative Transponder (PIT) tags
    c. Collect tissue samples for genetic analysis by USGS
3. Provide baseline data about CLMA distribution

METHODS

Protocol Development

We surveyed potential trapping sites using a visual habitat assessment protocol (Appendix A) developed by Natalie Marioni, former Herpetology Program Lead, which was based on the *USGS Pond Turtle (*Emys marmorata*) Visual Survey Protocol for the Southcoast Ecoregion*. We used the *USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion* when surveying for CLMA in 2008 (USGS 2006). The protocol details a trapping procedure to detect all turtle species present in a given area.

Personnel and Training

Field personnel attended a USGS-led training in May 2006 that covered protocol implementation and the identification of turtle species that occur in the Plan Area. Individuals that attended the USGS sessions then trained 2008 field personnel in protocol procedure and species identification. Biological Monitoring Program trainings included an in-office presentation of key characteristics used to distinguish studied species, and the examination of live specimens. Additionally, crew members were trained to insert Passive Integrated Transponder tags (PIT tags) and collect tissue samples using live specimens. Mock data was used to familiarize surveyors with Personal Digital Assistant (PDA) forms and data collecting techniques. A second trapping session (29-30 May 2008) at Cajalco Creek was also done in order to train new crew members on trapping techniques. Monitoring Program biologists that conducted CLMA surveys in 2008 were:

- Robert Packard, Herpetology Program Lead (Regional Conservation Authority)
- Natalie Marioni, former Herpetology Program Lead (Regional Conservation Authority)
- Ariana Malone (Regional Conservation Authority)
- Sinlan Poo (Regional Conservation Authority)
- Esperanza Sandoval (Regional Conservation Authority)
- Rika Setsuda (California Department of Fish and Game)
- Carol Thompson (Regional Conservation Authority)
- Michael Zerwekh (Regional Conservation Authority)
- Ryann Loomis (Regional Conservation Authority)

Study Site Selection

We trapped for CLMA at four locations in 2008: Cajalco Creek, the Davis unit of the San Jacinto Wildlife Area, the San Jacinto River at SJWA, and Temecula Creek in Temecula (Table 1, Figure 1). All trapping locations were MSHCP Core Areas for CLMA. Formal visual habitat assessment surveys to assess the suitability of turtle habitat were conducted along Murrieta Creek in Murrieta, but no suitable habitat was found at that time. San Mateo Canyon in the Cleveland National Forest was not trapped in 2008

Table 1. Summary of CLMA survey effort from 2006-2008, including locations and years in which we performed, the type of surveys performed (V = Visual Surveys, T = Trapping), whether we observed appropriate CLMA habitat at survey sites, and the years in which we detected CLMA.

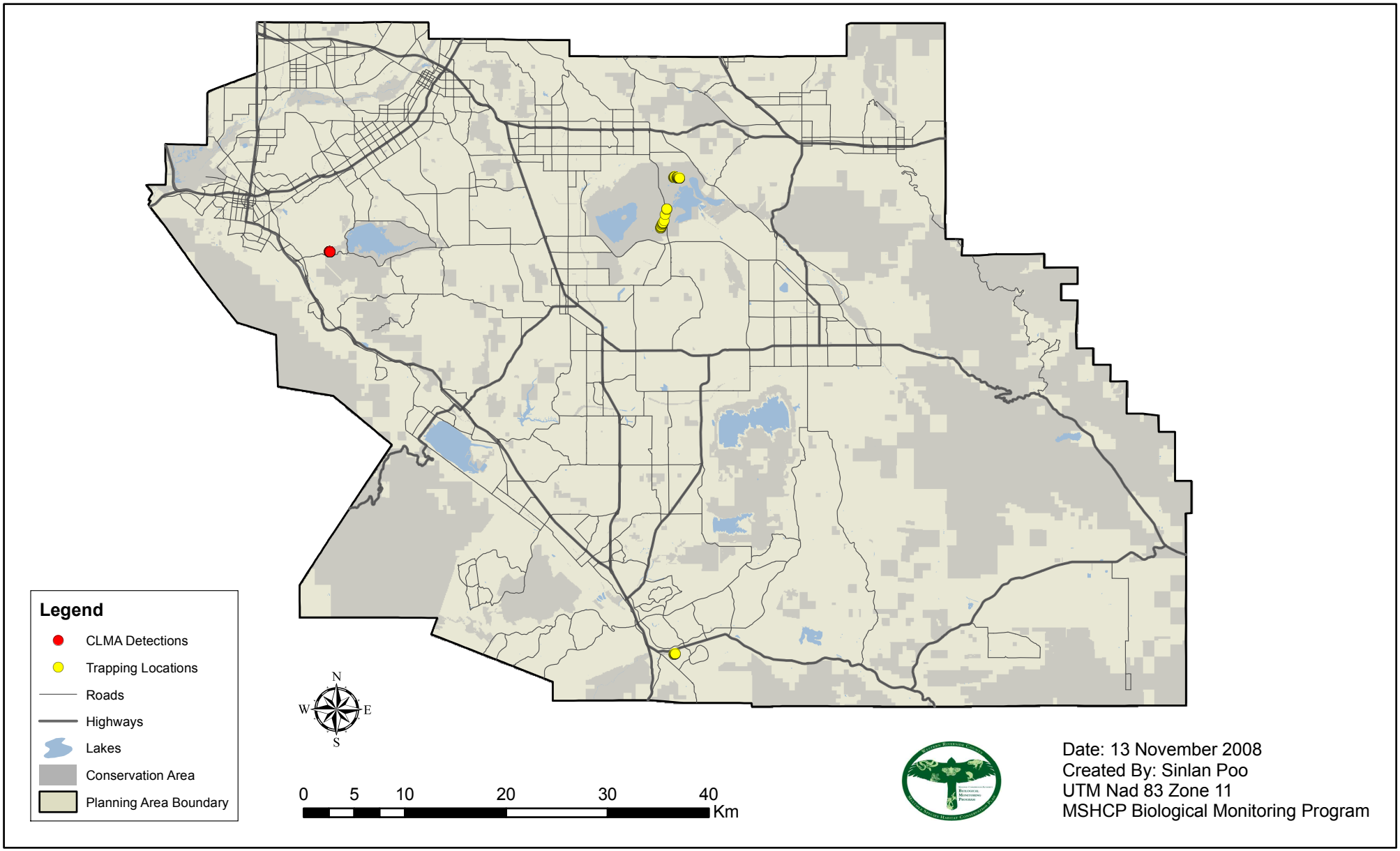
Location	2006	2007	2008	CLMA Habitat	CLMA Detected[a]
Core Areas					
Chino Creek	V, T	V	-	Yes	-
Cajalco Creek[b]	-	-	T	Yes	2008
Murrieta Creek	V	-	V	No	-
San Jacinto Wildlife Area[c]	V, T	V	T	Yes	-
San Mateo Canyon	V	V	-	Yes	2007
Santa Ana River[d]	-	-	-	No	-
Santa Rosa Plateau	V	V	-	Yes	2006, 2008
Temecula Creek	V	-	T	Yes	-
Non-core areas					
Lower Aliso Canyon[e]	-	T	-	Yes	2007
Santa Margarita River	-	V, T	-	Yes	2007

[a]CLMA detected represents CLMA observed during visual surveys or through trapping efforts.
[b]Area explored when access was first granted and turtle habitat assessed by NKM.
[c]Includes San Jacinto River.
[d]Approx 1000 m were explored during a 2006 Santa Ana sucker survey, during which the area was assessed for turtle habitat suitability.
[e]Not within the Plan Area, but was trapped for protocol testing.

due to lack of access. We selected trap sites by first conducting visual habitat assessments. At least 2 surveyors conducted habitat assessments between approximately 0800 h and 1700 h from May to August 2008. Field personnel walked along lake or stream banks and within stream channels in a downstream to upstream direction. Survey time per site varied between 30 and 60 minutes according to the number of appropriate trapping sites found and the abundance of amphibians detected.

We qualitatively ranked the suitability of each potential trap location according to presence or absence of slow moving water, water depth, quantity of basking sites (none, few, or many), aquatic and streamside substrate, and upland habitat. We also recorded the ease of human access (low, medium, or high), naturalness (natural, modified natural, or artificial), and identified all amphibians that were encountered at each potential trapping location (USGS 2006).We then selected trap sites based on water depth (≥0.75 m for large hoop traps, ≥0.45 m for small hoop traps), presence of vegetation cover, and availability of basking sites (e.g. logs, rocks, emergent vegetation). We also attempted to

Figure 1. Turtle trapping locations and detections in 2008.



locate trap sites that were distant from public access to prevent vandalism. The number of trapping locations at each site was dependent upon the extent of appropriate pools, and trap density was approximately 1 trap per 30m² - 100m².

Survey Methods

We trapped sites located during visual surveys from May to August 2008 according to *USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion* (USGS 2006). Our trapping efforts were focused on sites at the Bolton Property at Cajalco Creek, the E ponds within the Davis unit of the San Jacinto Wildlife Area (SJWA), the San Jacinto River at the SJWA, and Temecula Creek in Temecula (Table 2). We opened traps on Mondays between 0800 h and 1700 h and, as recommended by the 2007 survey report, left traps open and in place for 4 consecutive nights. We installed traps at Temecula Creek at 0700 h and pulled them at 1700 h each day for five consecutive days in order to avoid human disturbance of traps overnight. In addition, we trapped Cajalco Creek for 2 days for training purposes. We recorded UTM coordinates of each trap on the day it was set, and uniquely numbered trap locations in the order in which they were selected.

We baited each trap with a punctured can of sardines and checked them daily between 0730 h and 1600 h to retrieve trapped turtles and other aquatic species (e.g., fish, frogs, inverts). We first recorded general weather information (ambient air temperature, sky conditions, and wind speed) and water temperature at each pool before checking traps. We then recorded trap site, sex, carapace length, carapace width, plastron length, and weight for each captured turtle. We also notched the right femoral scute of the plastron of all turtles, and collected tissue samples for each CLMA by clipping the last 3 mm of the tail. We preserved tissue samples in alcohol and stored them in a freezer at the Biological Monitoring Program office before delivering them to the USGS office in San Diego at the completion of our surveys. The USGS used the tissue samples in a larger genetic study to assess population structure and movement of turtles between sites. We took at least 3 photos of each CLMA (face on, carapace, and plastron orientations) and noted shell damage. We also marked most CLMA with a subcutaneous Passive Integrated Transponder (PIT) tag (American Veterinary Identification Devices, Inc.) inserted at the medial ventral fold of the right rear leg (Figure 2) after scanning individuals with a PIT tag reader to ensure that they had not already been tagged. We used a notching scheme as an alternative to PIT tagging for CLMA if an individual weighed under 100 g (Figure 3). We then returned all southwestern pond turtles to the pool from which they came. Processing times ranged from 5 to 10 min per animal depending on the presence/absence of PIT tags and marking scheme used.

We recorded species information and then released all native invertebrates, fishes, and amphibians found in each trap without taking additional measurements. We then re-set traps after each check and removed the traps on the fifth trapping day.

Table 2. Location, distance, and dates of trapping locations in 2008. Trapping effort specifications, number of CLMA captured, and exotic species detected during each trapping effort.

Site	Stream Length Trapped (m)	Trapping Dates	Number of Pools	Traps/pool (mean)	Trap effort (trap-hours)	CLMA Detected	Exotic Species Detected
Cajalco Creek[a]							
Round 1	95	5–9 May	2	6	1131	37	*Procambarus clarkii*
Round 2		29–30 May	2	6.5	307	8[b]	*Lepomis macrochirus*
San Jacinto Wildlife Area							
Round 1	565	9–13 Jun	2	9	1725	0	*Rana catesbeiana* *Gambusia affinis* *Trachemys scripta elegans* *Chelydra serpentina*
Round 2		16–20 Jun	1	17	1603	0	
San Jacinto River							
Round 1	2027	23–27 Jun	9	2	1805	0	*P. clarkii*
Temecula Creek[c]							
Round 1	130	9–10 Jun	4	1	96	0	*P. clarkii* *G. affini*, *Ameiurus melas* catfish spp. *T. scripta elegans*
Round 2		28 Jul – 1 Aug	4	1.25	250	0	

[a]These values are estimated sums across all sections of the river/ creek where traps were located.

[b]Of these 8 CLMA, 7 were recaptures from Round 1.

[c]Traps were removed after one trap was stolen on the first night of trapping.

Figure 2. Photo demonstrating CLMA PIT tag insertion location.
This photo shows a PIT tag being inserted into the medial ventral fold of the rear right leg of a CLMA. In addition, a notch on the right femoral plastron scute can be easily seen.

Data Analysis

Data were uploaded from PDAs to the USGS Pendragon database at the San Diego Field Station; paper data forms were stored at the Biological Monitoring Program Office in Riverside, CA. In 2009, we transferred all data to the Biological Monitoring Program's database. Quantitative analysis of these data was not possible due to small sample sizes and we present here only summary statistics.

RESULTS

We did not detect CLMA at the E ponds in San Jacinto Wildlife Area, but did find an abundance of bullfrogs (*Rana catesbeiana*) and mosquito fish (*Gambusia affinis*). We also captured two red-eared sliders (*Trachemys scripta elegans*), one male snapping turtle (*Chelydra serpentina*), and observed a female snapping turtle nesting on the bank of pond E2. We destroyed the snapping turtle nest, in cooperation with a warden from the California Department of Fish and Game and the manager of the San Jacinto Wildlife Area, by digging up and puncturing the eggs, and removed all other exotic turtles. We handed exotic species (1 snapping turtle and 2 red-eared sliders) over to the California

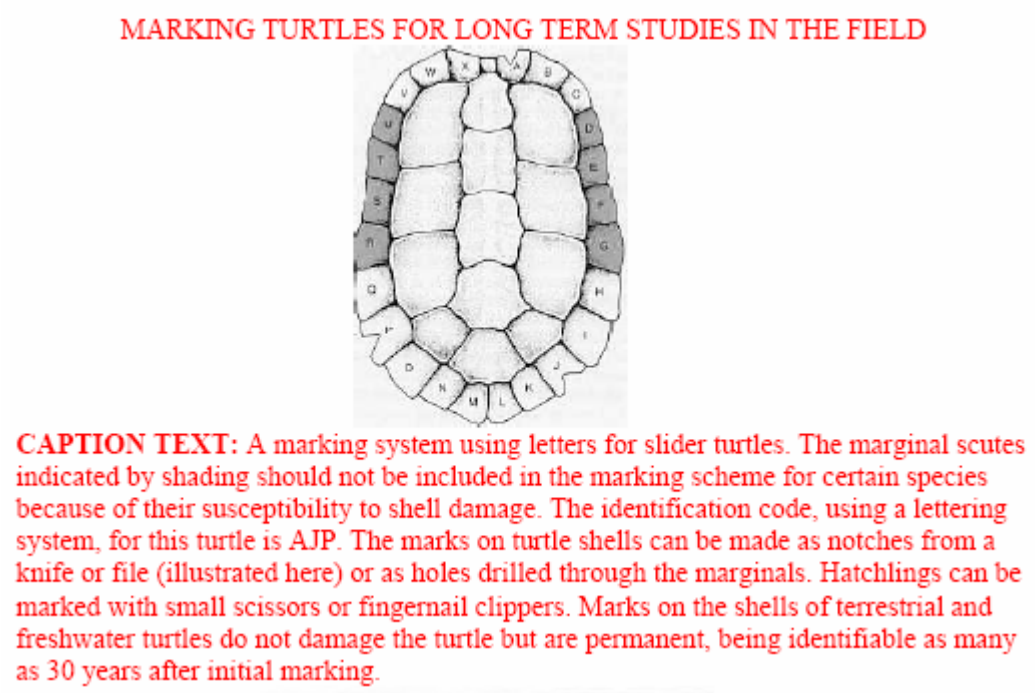


Figure 3. Illustration of notching scheme used in 2008 turtle trapping efforts (notching scheme and illustration used with permission from K.A. Buhlmann).

Turtle and Tortoise Club (Orange County, California) to be relocated or adopted out. We only captured exotic crayfish (*Procambarus clarkii*) in the San Jacinto River at the SJWA, and did not detect any turtle species.

We captured 38 CLMA across two discrete pools of Cajalco Creek (Figure 1). We did not capture any adult female CLMA at either pool (Appendix C). We trapped more turtles on the first night of the first round of trapping than on any other trap night with 74% of total CLMA individuals captured at Cajalco Creek. This was consistent with our results from 2007 when 63-75% of CLMA captures at each site occurred on the first trapping night. Of the 38 turtles captured, 8 were recaptured once and 3 were recaptured twice. We also captured crayfish and bluegill sunfish (*Lepomis macrochirus*) at Cajalco Creek (Table 2).

We captured 2 unknown catfish species, 1 black bullhead (*Ameiurus melas*) and observed a number of crayfish and mosquito fish in Temecula Creek. We did not capture any turtle species during our trapping efforts.

DISCUSSION

We focused 2008 CLMA survey efforts on locating potentially suitable habitat within the Conservation Area in areas where we have not yet detected CLMA. We detected an abundance of CLMA at Cajalco Creek, but no CLMA were located at the other sites surveyed. Additional habitat surveys were done at Murrieta Creek, although no

appropriate habitat was found. From 2006-2008, we have surveyed all 8 CLMA Core Areas visually, and we have performed trapping surveys in 4 Core Areas. During that period, we detected CLMA in 3 of 8 (38%) Core Areas, as well as in one non-core area.

We did not detect CLMA at the Davis Unit of the SJWA despite undocumented sightings of CLMA in the San Jacinto River. The lack of CLMA here may have been due to the presence of red-eared sliders (*T. scripta elegans*) and snapping turtles (*C. serpentina*), which are both exotic species that may pose a serious threat to native species through competition for food and basking and nesting sites, along with the introduction of exotic diseases (Spinks et al. 2003). Unlike the pools in the San Jacinto Wildlife Area, we did not detect exotic turtles in the San Jacinto River. One possible reason for the absence of CLMA and other turtles in the San Jacinto River could be the many significant alterations to the river's hydrology that have taken place over the past 100 years.

We had 3 incidental sightings of possible CLMA at Temecula Creek this year despite not capturing animals in our traps. An intensive manual search of the pool was also conducted but no turtles were observed using this method. A photograph taken of one of the turtles was tentatively identified as a melanistic red ear slider (*Trachemys scripta elegans*).

We only captured male adult CLMA at Cajalco Creek. It is possible that the lack of female turtle captures is partially due to timing of the nesting season, which typically occurs between May and June (Rathbun *et al*. 1992). However, in 2007, our CLMA trapping efforts also resulted in only male turtle captures, even though most trapping efforts occurred outside of the primary nesting period. Thus, it is unlikely that the lack of captured female turtles is due exclusively to nesting behavior.

Recommendations for Future Surveys

We will continue to survey all accessible Core Areas and attempt to identify other potential turtle habitat during the inventory stage of our program. We will trap the Core Areas of Cajalco Creek, San Mateo Creek, the Santa Ana River, Murrieta Creek and Temecula Creek in 2009 pending access permission. It might also be beneficial to future trapping success for us to determine time-of-year effects of trapping, thus informing us of the optimal weeks or months during CLMA activity to trap, by trapping certain areas on a weekly or monthly basis for at least one year.

We recommend the turtle trapping protocol be amended to include population estimates once the inventory stage of surveys is complete and the CLMA populations throughout Western Riverside County have been identified. While this is outside of the scope of the CLMA species objectives, population estimates would enable reserve managers to monitor the status of populations over time and could potentially provide valuable information regarding population responses to management actions.

We also suggest that a more comprehensive assessment of upland habitat usage be established to facilitate appropriate management. This would involve a more thorough

evaluation of the landscape composition, such as collecting parameters of upland slope and distance to suitable nesting locations. Pond turtles are known to travel extensive distances in search of suitable nesting habitat and it has been reported that CLMA in particular have traveled as far as 1.9 km streamside and 100 m into upland habitat (Rathbun *et al*. 1992). Telemetry studies could also be employed to determine specific upland habitat usage by nesting female turtles within the Conservation Area. Because CLMA do not nest in the aquatic system itself, it is important to assess all of their habitat requirements. This aspect of turtle surveying would likely be most appropriate once the inventory stage of this project is complete.

Also, we highly recommend that the Santa Margarita Ecological Reserve be added as a Core Area for CLMA given that access to some existing Core Areas is limited while others are heavily disturbed. Based on previous efforts, we know that a CLMA population occurs within the reserve along the Santa Margarita River. Therefore, it would be appropriate to replace a more highly disturbed or unsuitable area on the Core Area list with the Santa Margarita Ecological Reserve.

LITERATURE CITED

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.

Holland DC. 1994. The western pond turtle: habitat and history. Final Report. DOD/BP-62137- 1. Bonneville Power Administration, and Oregon Dept. of Fish and Wildlife, Wildlife Diversity Program, Portland, OR.

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

Rathbun GB, Siepel N, Holland D. 1992. Nesting behavior and movements of western pond turtles, *Clemmys marmorata*. The Southwestern Naturalist 37(3):319-324.

Seelinger LM. 1945. Variation in the Pacific mud turtle. Copeia 1945:150-159.

Spinks Q, Pauly GB, Crayon JJ, Shaffer HB. 2003. Survival of the Western Pond Turtle (*Emys marmorata*) in an urban California Environment. Biological Conservation 113(2): 257-267.

[USFWS] U.S. Fish and Wildlife Service. 1992. Endangered and threatened wildlife and plants; 90-day finding and commencement of status reviews for a petition to list the western pond turtle and California red-legged frog. Fed. Reg. 57:45761-45762.

[USGS] U.S. Geological Survey. 2006. USGS western pond turtle (*Emys marmorata*) trapping survey protocol for the southcoast ecoregion. U. S. Geological Survey protocol. San Diego, CA.

Appendix A. Western Riverside County MSHCP Monitoring Program CLMA Protocol Amendment for Habitat Assessment

The information provided here is an amendment created by the MSHCP Monitoring Program to the USGS Western Pond Turtle Protocol. This amendment was created in order to have more statistically sound and quantifiable data regarding pond turtle trapping locations and trapping effort. The information provided here was supplied by USGS from the following document:

Madden-Smith, M. C., E. L. Ervin, K. P. Meyer, S. A. Hathaway, and R. N. Fisher. 2005. Distribution and Status of the Arroyo Toad (*Bufo californicus*) and Western Pond Turtle (*Emys marmorata*) in the San Diego MSCP and Surrounding Areas. U. S. Geological Survey final report prepared for County of San Diego and California Department of Fish and Game. San Diego, CA. 183 pp.

Habitat Quality

Pond turtle habitat is defined as having the following 6 characteristics.

1. slow moving water
2. ≥ 0.50 m of pooling water
3. basking sites
4. aquatic refugia
5. streamside refugia*
6. upland nesting habitat*

Characteristics #s 3-6 will then each be ranked as either 0 (“none”), 1 (“few”) or 2 (“many”) for a particular stream reach or 250 m shoreline of pond habitat. The shoreline of ponds less than 250 m will be measured to determine how much shoreline there is and will then be classified as one site. The numeric rankings are then tallied, giving a number between 0-8. Habitat quality is based off of this tally in the following way:

0-2 = poor*; 3-4 = marginal; 5-6 = good; 7-8 = high

*Sites without water or with < 0.05m water is automatically considered poor.

Habitat Disturbance

In addition to the general habitat characteristics that were collected during the habitat assessment conducted in this study, more detailed data should be collected and should include: more precise measurements of percent of canopy cover and pool size (possibly using digital orthophotographs), pool depth, substrate types (both wetland and upland), and percent of basking site coverage.

Block (stream/ pond): _____ **DATE**: _____

Site (reach/ pool #): _____

Observer(s) Initials: _____

Habitat Quality

slow moving water circle one: no yes___

≥ 0.50 m of pooling water circle one: no yes___

basking sites circle one: 0 ("none") 1 ("few") 2 ("many")

aquatic refugia circle one: 0 ("none") 1 ("few") 2 ("many")

streamside refugia* circle one: 0 ("none") 1 ("few") 2 ("many")

upland nesting habitat* circle one: 0 ("none") 1 ("few") 2 ("many")

Level of Human Access (circle one)

Low (remote sites or sites with restricted or limited access)

Medium (sites with restricted or limited access, but with a moderate frequency of trespassing (e.g., private reservoirs), or sites with only limited restrictions on access & have only moderate use (e.g., parks imbedded in low density housing, parks in a developing area with only moderate use at this time))

High (sites with few access restrictions, usually designated recreational areas (e.g., fishing/boating areas)

Level of Naturalness (circle one) – If not able to assess in the field, please leave for Natalie.

Natural: (Sites with 10% or less modification of the natural habitat (e.g., mostly natural river or stream channel)

Modified Natural: (sites with greater than 10% artificial modification of the natural habitat (e.g., dammed or channelized river or stream))

Artificial: (sites that were completely artificial and occur outside of a natural channel or wetland (e.g., artificial ponds in a park setting, agricultural ponds))

NOTES:

Appendix B. Measurements and PIT Tag ID numbers for CLMA captured at Cajalco Creek in 2008.

Capture Date(s)	Pool	Sex	Life Stage	Weight (g)	Carapace Length (mm)	Carapace Width (mm)	Plastron Length (mm)	Shell Height (mm)	PIT Tag or Notch ID
6-May	2	M	JU	51	66.33	58.58	59.47	25.17	notch AB
6-May	2	UNK	JU	115	93.23	79.35	85.56	34.6	notch AC
6-May	2	M	JU	145	101.28	83.36	92.25	35.17	103057336
6, 30 May	2	M	JU	165	102.08	87.26	92.26	36.63	103059544
6-May	2	M	AD	170	102.44	86.75	90.75	37.11	95786596
6, 30 May	2	M	AD	193	108.61	91.46	98.4	38.7	95626079
6-May	2	M	JU	180	110.01	89.88	97	37.16	103260327
6-May	2	M	AD	213	115.52	92.95	104.57	37.82	95786606
6-May	2	M	AD	330	115.53	98.55	93.31	48.92	103340634
6-May	2	M	AD	240	115.85	93.69	106.34	43.15	103083529
6-May	2	M	AD	215	116.04	92.99	101.85	40.64	103023069
6-May	2	M	AD	270	123.2	101.5	111.57	42.44	103120847
6-May	1	M	AD	335	131.04	103.92	115.54	47.8	93320601
6, 30 May	2	M	AD	323	131.53	105.84	113.25	45.43	103015893
6-May	2	M	AD	300	132.84	109.2	114.95	42.85	103850339
6-May	2	M	AD	395	132.85	105.77	118.73	51.49	103340634
6-May	2	M	AD	390	133.35	110.47	116.51	48.58	103097781
6-May	2	M	AD	420	135.9	111.16	122.06	51.36	103326047
6, 30 May	2	M	AD	348	136.79	107.92	119.84	49.51	95633116
6-May	2	M	AD	437	137.22	122.25	111.58	56.12	103106040
6-May	2	M	AD	352	138.84	112.11	120.25	44.38	103310864
6-May	2	M	AD	335	139.29	108.72	121	45.37	103100097
6, 7, 8 May	1	M	AD	391	127.56	106.5	113.3	56.24	95778378
6, 8 May	1	M	JU	133	98.4	81.01	90.2	34.53	95777557
6, 8, 30 May	2	M	AD	305	133.52	107.28	113.79	45.06	95781040
6, 9 May	2	M	AD	220	116.57	94.14	101.41	38.55	103087537
6, 9 May	2	M	AD	248	122.19	100.29	108.4	42.01	103295830
6, 9, 30 May	1	M	AD	500	145.87	115.08	130.84	56.9	95770291
7, 30 May	2	M	AD	230	118.04	97.01	104.4	39.99	95790864

Appendix B. Measurements and PIT Tag ID numbers for CLMA captured at Cajalco Creek in 2008.

7-May	2	M	AD	263	123.23	100.67	106.85	42.93	95614369
8-May	2	M	JU	40	59.14	53.69	53.12	23.54	notch AH
8-May	2	M	AD	120	92.87	77.81	82.12	33.68	95639544
8-May	1	M	AD	400	133.82	109.17	121.01	53.1	95612804
9-May	1	M	JU	55	64	57.59	56.32	24.27	notch AI
9-May	1	M	AD	155	101.16	85.06	89.43	36.91	95778869
9-May	2	M	AD	230	114.94	96.24	103.31	41.86	95622367
9-May	1	M	AD	299	132.93	107.23	110.91	45.42	95782257
30-May	2	M	AD	140	118	100	105	40	104296855