U. S. Department of the Interior
U. S. Geological Survey
Biological Resource Discipline
Western Ecological Research Center
San Diego Field Station
4165 Spruance Road, Suite 200
San Diego, California 92101

August 3, 2011

Keith Greer
Land Use and Transportation Planning
SANDAG

619-699-7390
kgr@sandag.org

Dear Mr. Greer,

The following summary covers the work completed for the invoice from August of 2011 for TransNet Environmental Mitigation Program Grant Agreement 5001140 regarding Southwestern Pond Turtle Restoration at Sycuan Peak Ecological Reserve and covers Task III.

We have included tables and figures summarizing site information, actions taken and species records at Sycuan Peak Ecological Reserve. ESRI shapefiles of the survey data have been submitted to California Department of Fish and Game's Biogeographic Information & Observation System (BIOS).

Respectfully,

Chris Brown

Progress Report and Preliminary Results for the TransNet Environmental Mitigation Program Grant Agreement 5001140 Regarding Southwestern Pond Turtle Restoration at Sycuan Peak Ecological Reserve, August 2011

Progress Report

Prepared for:

County of San Diego

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

Progress Report and Preliminary Results for the TransNet Environmental Mitigation Program Grant Agreement 5001140 Regarding Southwestern Pond Turtle Restoration at Sycuan Peak Ecological Reserve, August 2011

By: Chris Brown and Robert N. Fisher

U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

Progress Report

Prepared for:

TransNet Environmental Mitigation Program
Keith Greer

San Diego Field Station
USGS Western Ecological Research Center
4165 Spruance Road, Suite 200
San Diego CA, 92101

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2011

U.S. DEPARTMENT OF THE INTERIOR
KEN SALAZAR, SECRETARY

U.S. GEOLOGICAL SURVEY
Marcia McNutt, Director

For additional information, contact:

Dr. Steven Schwarzbach, Center Director
Western Ecological Research Center
3020 State University Dr. East
Modoc Hall, Room 3006
Sacramento, CA 95819

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Introduction and Goals

The southwestern pond turtle (*Emys marmorata pallida*) remains one of the rarest covered species within the Multiple Species Conservation Program (MSCP) in San Diego County with only three to six known extant populations, the largest population estimated to be between 30-81 individuals and no populations showing recruitment (Madden-Smith et al. 2005). The Sycuan Peak Ecological Reserve (Figure 1) was created as part of the reserve system for the MSCP and currently is inhabited by the largest MSCP population of pond turtles.

The U.S. Geological Survey (USGS) recently began work on SANDAG TransNet Environmental Mitigation Program Land Management Grant Agreement 5001140 to conduct southwestern pond turtle restoration and invasives removal at Sycuan Peak Ecological Reserve (SPER). The USGS in conjunction with the San Diego Zoo and the California Department of Fish and Game (CDFG) have continued work begun on the southwestern pond turtle by USGS in 2002 in efforts to enhance and restore the population at the SPER. This is the largest population within the MSCP but had no detectable recruitment in recent (2002-2003) surveys (Madden-Smith et al. 2005). Southwestern pond turtles (and other native aquatic species) are heavily impacted by nonnative species in the riparian habitat which include bullfrogs, largemouth bass, sunfish, crayfish and nonnative turtles. Much like nonnative plants, these aquatic nonnatives can spread throughout the riparian areas and directly impact the natives through predation and also indirectly through competition (Holland 1991; Brattstrom & Messer 1988). Similar to revegetation efforts, successful pond turtle restoration efforts include removal of nonnatives and headstarting of the native turtles (Spinks et al. 2003).

The restoration effort at the SPER is designed as an experiment within an adaptive management framework that initially focuses on removing the nonnative predators that are negatively impacting the turtles. In prior surveys there were no juvenile southwestern pond turtles observed at the SPER (Madden-Smith et al. 2005). As has been seen in many impaired pond turtle populations (Holland 1991) co-located with nonnative predators, recruitment has not been detected at this site. To test the hypothesis that removing nonnative predators results in increasing recruitment and to evaluate the overall health of the population, nonnative species removal is followed by monitoring by trapping for turtles and re-invasion of nonnative species in order to measure success.

Additional efforts include the initiation of a new collaboration with the San Diego Zoo. This collaboration involves the establishment of a reserve population of southwestern pond turtles at the San Diego Zoo to support future headstarting of juveniles for the SPER and other reserves within the MSCP. This is similar in concept to seed banking for plants. Headstarting of pond turtles involves captive breeding individuals and raising them to a size in which they are resistant to predation. Headstarting combined with restoration efforts has proved to be a successful method of conservation for pond turtles (Spinks et al. 2003). This effort stands to be a major milestone for the conservation of southwestern pond turtle in the southernmost portion of its range. Due to the fact that the San Diego County populations of southwestern pond turtles are severely fragmented and are suffering from the effects of nonnative species (Madden-Smith et al 2005, Bury and Germano 2008), aggressive and active management can effectively enhance the populations of this species (Spinks et al. 2003).

Methods

The field component of this project consists of using a suite of techniques for detecting aquatic nonnative species and southwestern pond turtles. These include visual encounter, baited hoop net trapping, minnow net trapping, seine netting and dip netting surveys at the SPER (Figures 1 and 2 and Table 1). Survey methods follow established USGS protocols (U.S. Geological Survey, 2006a, 2006b, 2006c) and utilize standardized trapping techniques (Ashton et al. 2001; Rathbun et al. 2002). Large hoop traps are set parallel to shore in most cases and anchored to shore with a rope (tied to the center top of the trap) so that the traps do not drift or sink. The top of the traps are raised above the water's surface with floats to allow captured turtles (and other species) to surface for air (see Figure 2). The traps are baited with either punctured cans of sardines or frozen fish in a plastic hardware cloth net to prevent consumption by the turtles; the bait simply serves as an attractant to the trap. Minnow traps without bait are anchored to the shore but are often allowed to sink to the lower portions of the pools for trapping African clawed frogs (trap openings are kept small to prevent trapping juvenile turtles). Survey methods target nonnative aquatic invertebrates (crayfish), amphibians (American bullfrogs and African clawed frogs), turtles and fish (primarily centrarchid fishes). Survey locations, effort and results are presented in Tables 1, 2, and 3.

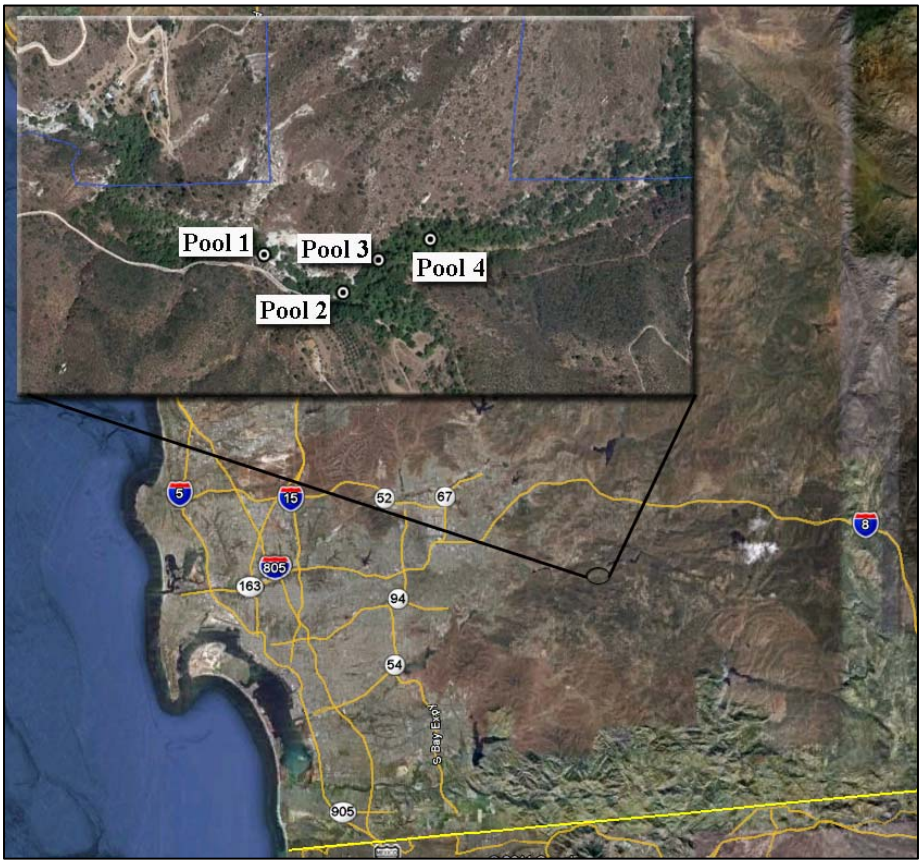

Figure 1. Overview of Study Site. Sycuan Peak Ecological Reserve is located downstream of Loveland Reservoir along the Sweetwater River. Blue lines indicate property boundary in reference to the occupied turtle habitat. Southwestern pond turtles are known from four large pool complexes within the site.

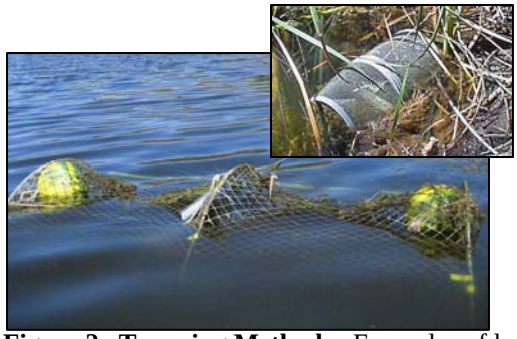

Figure 2. Trapping Methods. Examples of large hoop traps with floats and small minnow traps.

Table 1. Site Overview. Overview of pool complexes at Sycuan Peak Ecological Reserve that contain suitable habitat for southwestern pond turtles. Coordinates are in WGS84 and represent the general location of the center of the pool complex.

Name	Lattitude	Longitude	General Description
Pool 1	32.772304	-116.800899	Most downstream turtle pool complex with large, deep bedrock pools
Pool 2	32.771747	-116.799467	Second most downstream turtle pool complex with shallow bedrock and sandy bottom pools
Pool 3	32.772224	-116.798829	Third most downstream turtle pool complex with predominately sandy bottoms and shorelines
Pool 4	32.772527	-116.797894	Most upstream turtle pool complex with predominately sandy bottoms and shorelines, can dry completely in some years

Animal captures are recorded electronically and entered into the USGS Multi-Taxa database server. Date, time, location of capture, species and age class are recorded for all aquatic animals observed. All nonnative aquatic species observed are removed from the site. Each southwestern pond turtle captured is measured, weighed, and sex is determined based on morphological traits (Holland 1991). Measurements include carapace length, carapace width, carapace height, and plastron length. General health condition and number of annuli are also recorded. Upon initial capture, a small (approximately 3-5mm) tail-tip tissue sample of each southwestern pond turtle is collected and stored in 95% ethanol. Southwestern pond turtles are checked for tags or tagged with an AVID passive integrated transponder (PIT) tag (encoded with a unique identification number). The PIT tags are inserted inside the body cavity anterior to the right rear leg following methods of Buhlmann and Tuberville (1998) and a triangular notch is made with a small triangular file on the femoral scute to indicate that the individual had been PIT tagged. Both methods will assist in future recognition of the individual. Southwestern pond turtles are released near the point of capture immediately following processing.

Task III: Mid-Season Nonnatives Removal/Turtle Monitoring

Task III surveys include intensive trapping events dispersed through the summer of 2011, targeting WPT activity and removing any nonnatives that may have moved downstream from the overtopping of Loveland Reservoir. Nonnatives removed include sunfish (*Lepomis* spp.), largemouth bass (*Micropterus salmoides*) African clawed frogs (*Xenopus laevis*), and crayfish (*Procambarus* spp.) (Table 2). This task will continue through August and September.

Table 2. Mid-Season Nonnatives Removal/Turtle Monitoring Summary.
Results of nonnatives removal and turtle monitoring by pool for each species with total trap hours by pool included.

Species	Pool Complex				Total
	1	2	3	4	
Sunfish (*Lepomis* spp.)	11	-	-	-	11
Largemouth bass (*Micropterus salmoides*)	-	3	-	-	3
Crayfish (*Procambarus* spp.)	4	10	-	8	22
African clawed frog (*Xenopus laevis*)	-	8	-	-	8
Total exotics removed:	15	21	0	8	44
Western pond turtle (*Emys marmorata*)	2	4	-	1	7
Total trap hours:	1,164	1,021	603	539	3,327

Program Match

Southwestern Pond Turtle Headstarting

Combined with the nonnatives removal program is a headstarting program overseen by the San Diego Zoo. During the trapping surveys, San Diego Zoo staff assisted with southwestern pond turtle monitoring and capture of gravid female southwestern pond turtles. Gravid females were taken to the San Diego Zoo and kept until eggs were laid, then returned to the site. The San Diego Zoo staff then incubates and hatches the eggs, juveniles are raised in isolated enclosures. To date, three different females from Sycuan Peak Ecological Reserve have produced four fertile clutches having a total of eleven hatchlings. When large enough, the juveniles can be released at Sycuan Peak Ecological Reserve. This component of the program is paid for by the San Diego Zoo and its employee contributions program.

Figure 3. Southwestern Pond Turtle Headstarting. Eggs from gravid females from Sycuan Peak Ecological Reserve (upper left) are incubated in the San Diego Zoo Reptile House incubation facility (upper right). As hatchlings emerge (lower left) they are transferred to isolated enclosures (lower right).

Field Assistance and Site Access.

The California Department of Fish and Game provided and coordinated access to the reserve. Without this support, this restoration would not be possible.

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