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

Arroyo Toad (*Bufo californicus*) Survey Report 2005

July 7, 2006
(Revised September 19, 2006)

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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 of 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 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 MSHCP information needs identified in Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

The primary preparer of this report was the Field Crew Leader, Shirley Bartz. 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 Western Riverside County Regional Conservation Authority. For further information on the MSHCP and the RCA, go to www.wrc-rca.org

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OVERVIEW

There are four Covered stream-dependent amphibian species with species objectives requiring the determination of successful reproduction within the MSHCP Conservation Area that can be detected by visual encounter surveys: arroyo toad (*Bufo californicus*), California red-legged frog (*Rana aurora draytonii*), mountain yellow-legged frog (*Rana muscosa*), and coast range newt (*Taricha tarosa tarosa*). In 2005, the Monitoring Program coordinated with the U.S. Geological Survey (USGS) on a stream survey protocol to assess the quality of stream habitats for the above covered amphibian species. Stream assessment surveys were conducted in accessible waterways in the Conservation Area between May and December 2005. Surveys for covered amphibians generally used the same protocol (with the exception of night surveys for California red-legged frog), but differed in the waterways surveyed and time of year surveys took place. This report describes methodology and survey results for arroyo toad only. Individual survey reports have been prepared for coast range newt, California red-legged frog, and mountain yellow-legged frog and are not discussed further in this report.

INTRODUCTION

The arroyo toad (*Bufo californicus*; "ARTO") is federally listed as endangered and is a California species of special concern. This species has narrow habitat requirements, typically being restricted to the middle reaches of third order stream (Dudek & Associates 2003). Records of ARTO within the MSHCP Planning Area date from the mid 1930s to early 2000s. Currently, the known distribution of ARTO in western Riverside County includes Temecula Creek, Arroyo Seco Creek, Tenaja Creek, Los Alamos Creek, San Jacinto River, Bautista Creek, and Wilson Creek. Many historic records of ARTO locations are taken from incidental sightings during surveys for other amphibian species and do not necessarily reflect habitats most preferred by ARTO (Stebbins 1951, Sweet 1989 and 1992).

The species objectives for ARTO require the conservation of nine Core Areas in the MSHCP Conservation Area. These Core Areas include: 1) San Juan Creek; 2) Los Alamos Creek; 3) San Jacinto River; 4) Indian Creek; 5) Bautista Creek; 6) Wilson Creek; 7) Temecula Creek; 8) Arroyo Seco; and 9) Vail Lake. Species objective 6 for ARTO states:

> *…within the MSHCP Conservation Area, Reserve Managers will maintain breeding populations at a minimum of 80 percent of the conserved breeding locations as measured by the presence/absence of juvenile toads, tadpoles, or egg masses across any 5 consecutive years.* (Dudek and Associates 2003).

Survey Goals

The intent of surveys in 2005 was to assess waterways for suitable habitat for ARTO and to document known ARTO breeding locations within Core Areas and other potentially suitable habitat in the Conservation Area. Specifically, our surveys goals were to:

A) Document ARTO breeding locations in nine Core Areas and as many other suitable habitat locations as possible within the Conservation Area.

B) Collect data to estimate occupancy in the area of inference (surveyed streams and similar habitat).
C) Gather data on habitat characteristics preferred by ARTO and present in surveyed waterways to test expected habitat suitability and associations between the target species and habitat available to them within the MSHCP.
D) Evaluate the protocol and provide input on changes/additions to field methodology for future surveys.
E) Share survey data with Reserve Managers who will evaluate the information and take steps to change or maintain management strategies

METHODS

Protocol Development

The USGS Western Ecological Research Center, San Diego Field Station drafted the protocol, *USGS Aquatic Species and Habitat Assessment Protocol for Southcoast Ecoregion Rivers, Streams, and Creeks* (USGS 2005), which was used by the Monitoring Program for amphibian stream surveys in 2005. Minor revisions were made to the protocol to ensure it would meet the requirements of the MSHCP species objectives for arroyo toad and other Covered amphibian species. Since the protocol has not been finalized by USGS, it was not included as an Appendix to this report. A copy of the protocol can be found in the Monitoring Program office or by contacting USGS directly.

Personnel and Training

All field observers took part in discussion of, and training in, the use of the USGS amphibian survey protocol on 18 March, 22 April, and 9 and 19 May 2005. Training included observation of live and preserved specimens of ARTO tadpoles, juveniles and adults, as well as other amphibian and fish species that could be encountered during stream surveys and at least two guided mock surveys lead by USGS amphibian biologists. Surveyors conducting ARTO surveys in 2005 included:

- Shirley Bartz, Field Crew Leader (Regional Conservation Authority)
- Adam Malisch (Regional Conservation Authority)
- Debbie De La Torre (Regional Conservation Authority)
- Ricky Escobar (California Department of Fish and Game)
- Annie Bustamante (California Department of Fish and Game)
- Rosina Gallego (California Department of Fish and Game)
- Karin Cleary-Rose (U.S. Fish and Wildlife Service)
- Brian Root (U.S. Fish and Wildlife Service)

Study Site Selection

Study sites were selected using a GIS map of historic detection locations. Surveys were conducted within all accessible Core Areas within the Conservation Area. Additional sites outside Core Areas, but within the Conservation Area, that contained suitable habitat were selected based on habitat characteristic descriptions in the MSHCP species account for ARTO. Selection characteristics included streams with:

- gravel-bottomed pools with minimal current
- persistent water from March – mid-June
- shallow pools less than 46 cm (18 inches)
- adjacent banks with sandy or gravely terraces and very little herbaceous cover

Stream segments with a slope greater than 3 percent were excluded from ARTO surveys except in the case where a single steep segment was flanked by segments with less than 3 percent slope measurements. Surveys were conducted in segments of San Juan Creek, Los Alamos Creek, San Jacinto River, Bautista Creek, Wilson Creek, Temecula Creek, and Arroyo Seco. Vail Lake and lower portions of Indian Creek were excluded due to lack of access.

Survey Methods

Detailed survey methodology is described in *USGS Aquatic Species and Habitat Assessment Protocol for Southcoast Ecoregion Rivers, Streams, and Creeks* (USGS 2005). All waterways (main creeks and tributaries) to be surveyed were sectioned into 250m segments, with segment numbers (i.e., Reach 1, Reach 2, etc.) beginning at a downstream confluence with a larger order waterway. Visual encounter surveys were conducted along stream banks and within the channel from downstream to upstream areas by at least two surveyors. All surveys were conducted in daylight hours. Survey time per segment varied according to streambed characteristics and abundance of amphibians detected. All amphibians encountered, including common species, were sampled using visual encounter and dip-net techniques.

Data on habitat characteristics were collected at the beginning and end of each surveyed segment. Data collected at the beginning of each surveyed segment included: date, observer, time, general weather description, temperature in shade at 1m above ground, average wind speed, presence/absence of water, water temperature, pH, percent dissolved oxygen, mg/L dissolved oxygen, conductivity, wetted depth and width of stream channel, water velocity and number of wetted channel braids. Data collected at the end of a survey included: presence and name of exotic plant species, percent wet length, percent shallow, medium and deep pools, presence and number of plunge pools, presence and type of aquatic refugia, percent of three most common aquatic substrates, and presence and type of recent disturbance.

Additionally, within each surveyed segment, data were collected when any amphibian species were detected. At the first encounter of each life stage (i.e., tadpole, juvenile, adult) for all species detected, UTM coordinates were saved as waypoints in a GPS unit. Waypoints included a creek name code, tributary number, and reach (segment) number (Example: SJ1R6 =

San Juan, trib 1, reach 6) and were linked to a time and date. Arroyo toad surveys were conducted from 9 May and 13 June 2005, between 0900 and 1600 hours.

Data Analysis

The intent of the 2005 survey effort was to locate breading populations of ARTO in the MSHCP Core Areas to meet MSHCP species objectives and begin to understand the distribution of breeding ARTO and appropriate ARTO habitat in the Conservation Area. In subsequent years where there is budget and crew available for multiple visits, data analyses will include a calculation of Proportion of Area Occupied (PAO, see MacKenzie et al. 2002). Calculation of PAO requires multiple visits to survey locations. Because we wanted to survey as many stream segments as possible, only single visits were made to each stream segment in 2005. PAO will provide us with the detection probability of ARTO in surveyed creeks, which will in turn allow us to estimate ARTO occupancy in the area of inference (i.e., surveyed streams and similar habitat).

An analysis of habitat characteristics and the association of ARTO with predicted habitat variables will be conducted as sample size allows. Habitat characteristics noted in the MSHCP as being strongly associated with presence of ARTO will be analyzed for associations between presence or non-presence of the focal species.

Raw data are housed in the USGS database at the San Diego Field Station and at the Biological Monitoring Program office in Riverside.

RESULTS

Seventy-eight (78) stream segments were surveyed in 13 waterways (a total of 19.5 km). ARTO was detected in four of the13 waterways and 15 of the 78 segments surveyed (Table 1, Figure 1). Evidence of breeding (i.e., tadpoles, juvenile toads) was detected in three Core Areas: Arroyo Seco, Bautista, and San Juan Creeks (Table 2). Detections in Core Areas included Arroyo Seco with >500 tadpoles in five segments, Bautista with >50 tadpoles in seven segments, and San Juan with less than 10 tadpoles in one segment. Cole Creek, one of six surveyed non-Core Areas, also supported a breeding population of ARTO. Estimated numbers of ARTO in Cole Creek exceeded 100 tadpoles in two segments. Cole Creek was visited relatively late in the season (6-10 June) and was the only waterway where juvenile ARTO were found (approximately 30 individuals in two segments). No adult ARTO were detected in 2005.

Habitat characteristics varied among waterways (Table 3). At creeks supporting breeding ARTO populations, the most common upland vegetation was Oak Woodland, with 8 of 17 (47%) occupied segments vegetated by California live oak (*Quercus agrifolia*) and an understory of perennial grasslands or coastal sage scrub. The most common riparian vegetation was Cottonwood Willow Riparian Woodland, with 9 out of 17 (53%) occupied creeks vegetated by cottonwood (*Populus fremontii, P. balsamifera trichocarpa*) and tree willows (*Salix goodingii, S. lasiolepis, S. laevigata*). In support of predicted preferred habitat characteristics, ARTO were most often found in shallow pools, with 25-50% of a segment made up of pools less than 10 cm. The average depth of pools where ARTO was detected was 13 cm. The average water velocity in

inhabited segments was 0.96 meters per second. In reaches where ARTO was detected, pool bottom composition was most often sand (50-75%), then cobble (26-50%), and then boulder/bedrock (11-25%).

DISCUSSION

Of nine Core Areas listed in the MSHCP species account for arroyo toad, two were not accessible to the Monitoring Program (Vail Lake and lower Indian Creek). The remaining seven Core Areas were surveyed, as well as an additional six areas of suitable habitat. Of note was the detection of ARTO breeding activity at Cole Creek in the Santa Rosa Plateau Ecological Reserve. Although detections of an adult ARTO were noted there in 2001, no previous evidence of breeding had been documented at the Santa Rosa Plateau. The Monitoring Program will continue to conduct surveys for the presence/absence of juvenile ARTO, tadpoles, or egg masses as part of the initial inventory phase.

ARTO Breeding Locations

Species Objective 6 requires the MSHCP to maintain ARTO breeding activity in 80 percent of conserved breeding locations. We have interpreted "conserved breeding locations" to mean stream segments in occupied watercourses. In 2005, only one previously documented conserved breeding location had evidence of breeding ARTO (Bautista Creek). Evidence of breeding activity was documented in three of the nine Core Areas surveyed in 2005.

Recommendations for Future Surveys

Below is a list of recommendations for future surveys for ARTO in western Riverside County.

1. Begin hiring crew/surveying earlier in season, and hire more crew. Hiring and time constraints resulted in a reduction in the number of waterways surveyed.

2. Prioritize visits to waterways by creek size. Although 2005 proved to be a year of high water levels in Plan Area, small creeks were still noted as dry late in the field season. By visiting smaller order creeks earlier in the field season, chances of missing breeding activity due to loss of habitat (i.e., evaporation of water) will be reduced.

3. Collect data on proximity of human disturbance. Although riparian conditions may be suitable for development of larval ARTO, if upland conditions necessary for adult aestivation and juvenile dispersement are not available, or lost in the course of a breeding season, populations of ARTO will not persist. The addition of a measure of distance to nearest human disturbance will provide information on land area available to adult and juvenile life stages. A field for this variable needs to be added to the datasheet.

4. Collection of data on presence and distance of gravel and/or sand in upland habitat. This habitat characteristic is necessary for adult and juvenile refuge and aestivation. A field for this variable needs to be added to the datasheet.

5. Incorporate landscape/vegetation communities that apply specifically to western Riverside County. Many of the upland and riparian vegetation communities available for selection on the datasheet were not found in the Plan Area (e.g., San Diegan Sage Scrub). Amphibian surveyors would benefit from several pre-survey visits (perhaps accompanied by a botanist) with the express purpose of identifying and categorizing communities common to arroyo toad habitat.

6. Incorporate a field for estimated abundance of focal species on the datasheet. This information could be entered into the Animal sub-form in the "Total Count" field, with a note that the count is an estimate rather than a count of all individuals.

Data Sharing with Reserve Managers

Extreme winter precipitation in 2004-05 led to higher than average water levels in rivers and creeks of western Riverside County in 2005. It is highly probable that arroyo toad populations were affected by these high water levels. Increased water levels from March to July may have provided extended time for breeding and larval development, as well as greater food and cover availability for adult and juvenile ARTO. It is also possible that high water levels resulted in increased flow and scouring in channels where ARTO had previously bred or developed into adult life stages.

The results of our surveys for arroyo toads in 2005 indicate that ARTO populations are breeding in the MSHCP Conservation Area. These areas should be managed to encourage persistence of the populations. The Biological Monitoring Program will continue to search for ARTO populations over the next few years and will monitor known conserved breeding locations. Comparisons of year to year breeding levels may provide Reserve Managers with some indication of population trends.

REFERENCES

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.

MacKenzie, D.I., J. D. Nichols, B.L. Gideon , S. Droege, A. Royle, and C.A. Langtimm. 2002. Estimating site occupancy rates when detection probabilities are less than one. Ecology, 83: 2248 – 2255.

Stebbins, R. C. 1951. Amphibians of western North America. University of California Press, Berkeley and Los Angeles, California. ix – 539 pp.

Sweet, S. S. 1989. Observations on the biology and status of the arroyo toad, Bufo microscaphus californicus, with a proposal for additional research. Department of Biological Sciences, University of California, Santa Barbara, California. Unpublished report. 23 pp.

Sweet, S. S. 1992. Ecology and status of the arroyo toad (Bufo microscaphus californicus) on the Los Padres National Forest of southern California, with management recommendations. Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, California. 198 pp.

University of California, Riverside, Center for Conservation Biology. 2005. Final Report: Western Riverside County Multiple Species Habitat Conservation Program. Prepared for California Department of Fish and Game, under contracts titled: Inland Ecosystems of California: Resource Assessment Project and Western Riverside County and Sierra Nevada Wildlife Assessment Project. May 4, 2005.

U.S. Geological Survey. 2005. Draft USGS Aquatic species and habitat assessment protocol for southcoast ecoregion rivers, streams, and creeks. Western Ecological Research Center. Sacramento, CA.

Table 1. Results of arroyo toad surveys in 2005. Non target species encountered during surveys included coast range newt (*Taricha tarosa tarosa*), western toad *(Bufo boreas*), Pacific treefrog (*Hyla regila*), California tree frog (*H. cadaverina*), and bullfrog *(Rana catesbeiana*).

Creek Name	MSHCP Status	Survey Date	Observers[1]	# Segs Surveyed	ARTO	Other Spp
Arroyo del Torro	Potential Habitat	30 May-3 Jun 05	1, 4, 7	6	No	B. boreas, H. regila
Arroyo Seco	Core Area	16 - 20 May 05	1, 2, 3, 5, 6	5	**Yes**	B. boreas, H. regila, H. cadaverina
Bautista Creek	Core Area	9 - 20 May 05	1, 2, 3	22	**Yes**	B. boreas, H. regila
Cole Creek	Potential Habitat	6 - 10 Jun 05	1, 2, 3, 4, 7	10	**Yes**	B. boreas, H. regila
Los Alamos Creek	Core Area	30 May-3 Jun 05	2, 3, 4, 6	8	No	H. cadaverina, R. catesbeiana
Potrero	Potential Habitat	6-Jul-05	2, 5	3	No	B. boreas
San Jacinto River	Core Area	22 - 30 Jun-05	1, 3, 4, 5	5	No	H. regila
San Juan Creek	Core Area	23 - 27 May 05	2, 3	3	**Yes**	H. cadaverina, H. regila, T. tarosa
Santa Gertrudis	Potential Habitat	13-Jul-05	2, 5	4	No	None
Temecula Creek	Core Area	24-Jun-05	3, 4, 5	2	No	H. regila, H. cadaverina
Tenaja Creek	Potential Habitat	23 - 27 May 05	1, 7, 8	6	No	H. regila, H. cadaverina, T. tarosa, B. boreas
Warm Springs	Potential Habitat	15-Jul-05	2, 5	3	No	H. regila, B. boreas
Wilson Creek	Core Area	16-Jun-05	1, 3, 5, 7	1	No	H. regila
Total Segments Surveyed				78		

[1] Observers: 1: S. Bartz, 2: R. Escobar, 3: A Malisch, 4: A. Bustamante, 5: R. Gallego, 6: K.Cleary-Rose, 7: D. De La Torre, 8: Brian Root

Table 2. Arroyo toad detections in 2005. Note: only tadpole and juvenile ARTO detected in 2005.

Waterway	Segment	Waypoint	Zone	Easting	Northing	Lifestage	Tadpoles*	Juveniles*
Arroyo Seco Creek	Reach 009	ASR9	11 S	502561	3702757	tadpoles	100	0
Arroyo Seco Creek	Reach 010	ASR10	11 S	502539	3702519	tadpoles	50	0
Arroyo Seco Creek	Reach 011	ASR11	11 S	502545	3702274	tadpoles	100	0
Arroyo Seco Creek	Reach 012	ASR12	11 S	502659	3702068	tadpoles	100	0
Arroyo Seco Creek	Reach 013	ASR13	11 S	502785	3701868	tadpoles	150	0
Bautista Creek	Reach 053	BCR53	11S	515506	3725663	tadpoles	10	0
Bautista Creek	Reach 054	BCR54	11S	515593	3725438	tadpoles	10	0
Bautista Creek	Reach 055	BCR55	11S	515602	3725189	tadpoles	10	0
Bautista Creek	Reach 056	BCR56	11S	515731	3724991	tadpoles	5	0
Bautista Creek	Reach 057	BCR57	11S	515913	3724823	tadpoles	5	0
Bautista Creek	Reach 061	BCR61	11S	516546	3724320	tadpoles	5	0
Bautista Creek	Reach 062	BCR62	11S	516759	3724203	tadpoles	5	0
Cole Creek Trib 3	Reach 4	CK3R4	11 S	474835	3711423	tadpoles, juveniles	50	15
Cole Creek Trib 3	Reach 5	CK3R5	11 S	474624	3711529	tadpoles, juveniles	50	15
San Juan Creek	Reach 001	SJCR1	11 S	459643	3719482	tadpoles	5	0

* numbers estimated; not individually counted.

Location coordinates are in UTMs, Datum = WGS84, Zone 11S

Table 3. Habitat Characteristics at arroyo toad detection locations. Arroyo toads have been noted to prefer gravel-bottomed pools with minimal current, persistent water from March – mid-June, shallow pools less than 46 cm, adjacent banks with sandy or gravely terraces and very little herbaceous cover. Below, "Rip. Spp 1" represents the most dominant riparian species present, with "Rip. Spp 2" as the second-most dominant, etc. Likewise, "Aquatic 1" represents the most common substrate presnt in the bed of the creek. Data in columns "Shallow", "Medium", and "Deep" represent portions of segments with pools of this depth.

Survey Date	Block	Reach	Depth(Cm)	Velocity	UplandCommunity	RiparianCommunity	Rip. Spp 1	Rip. Spp 2
17-May-05	Arroyo Seco	10	14	0.4	Oak Woodland	Cottonwood-Willow Woodland	Mulefat	Willow
17-May-05	Arroyo Seco	9	18.5	1.32	Oak Woodland	Cottonwood-Willow Woodland	Mulefat	Willow
18-May-05	Arroyo Seco	11	22.5		Oak Woodland	Cottonwood-Willow Woodland	Mulefat	Cottonwood
18-May-05	Arroyo Seco	12	14.5	0.36	Oak Woodland	Cottonwood-Willow Woodland	Mulefat	Cottonwood
18-May-05	Arroyo Seco	13	2	0.4	Oak Woodland	Cottonwood-Willow Woodland	Mulefat	Sycamore
12-May-05	Bautista Creek	53	5	2	Coastal Scrub	Cottonwood-Willow Woodland	Cottonwood	Mulefat
12-May-05	Bautista Creek	54	9	3	Coastal Scrub/Chaparral	Cottonwood-Willow Woodland	Mulefat	Willow
12-May-05	Bautista Creek	55	4.5	2.15	Coastal Scrub/Chaparral	Mulefat Riparian Scrub	Mulefat	Scalebroom
17-May-05	Bautista Creek	57	9	0.6	Coastal Scrub/ Chaparral	Cottonwood/Mulefat scrub	Cottonwood	Mulefat
17-May-05	Bautista Creek	56	6.5	0.7	Coastal Scrub/ Chaparral	Mulefat Riparian Scrub	Mulefat	Tamarisk
18-May-05	Bautista Creek	62	9	1.5	Coastal Scrub/ Chaparral	Mulefat Riparian Scrub	Mulefat	Sycamore
18-May-05	Bautista Creek	61	12.5	1.5	Chaparral	Mulefat Riparian Scrub	Mulefat	Cottonwood
26-May-05	San Juan Creek	1	30	0.3	Oak Woodland	Southern Willow Scrub	Mulefat	Willow
09-Jun-05	Cole Creek	4	45	0.14	Oak Woodland	Mulefat Riparian Scrub		
09-Jun-05	Cole Creek	5	7	0.24	Oak Woodland	Mulefat Riparian Scrub		

Table 3. Continued from the previous page.

Block	Reach	Rip. Spp 3	Canopy	Shallow	Medium	Deep	Aquatic 1	%1	Aquatic 2	%2	Aquatic 3	%3
Arroyo Seco	10	Cottonwood	60%	51-75%	26-50%	1-10%	sand	26-50	Cobble	26-50	Boulder/Bedrock	11-25
Arroyo Seco	9	Cottonwood	10%	76-100%	11-25%	1-10%	sand	26-50	Cobble	26-50	Boulder/Bedrock	11-25
Arroyo Seco	11	Willow	30%	51-75%	11-25%	0	sand	51-75	Cobble	26-50	Boulder/Bedrock	11-25
Arroyo Seco	12	Willow	10%	51-75%	26-50%	0	sand	51-75	Cobble	26-50	Boulder/Bedrock	26-50
Arroyo Seco	13	Cottonwood	30%	26-50%	26-50%	0	sand	11-25	Cobble	51-75	Boulder/Bedrock	76-100
Bautista Creek	53	Willow	10%	76-100%	1-10%	0	sand	26-50	Cobble	51-75	Pebbles	26-50
Bautista Creek	54	Cottonwood	0	76-100%	1-10%	0	sand	76-100	Cobble	51-75	Boulder/Bedrock	1-10
Bautista Creek	55	Sycamore	10%	26-50%	1-10%	0	sand	51-75	Cobble	26-50	Boulder/Bedrock	11-25
Bautista Creek	57	Tamarisk	65%	26-50%	1-10%	0	sand	51-75	Cobble	51-75	Boulder/Bedrock	1-10
Bautista Creek	56	Sycamore	0	51-75%	0	0	sand	51-75	Pebble	1-10	Cobble	11-25
Bautista Creek	62	Cottonwood	18%	26-50%	11-25%	0	sand	51-75	Cobble	26-50	Boulder/Bedrock	11-25
Bautista Creek	61	Willow	5%	51-75%	1-10%	0	sand	51-75	Gravel	1-10	Cobble	11-25
San Juan Creek	1	Oak	15%	76-100%	26-50%	0	sand	51-75	Cobble	11-25	Gravel	11-25
Cole Creek Trib 3	4		18%	51-75%	1-10%	0	sand	51-75	Gravel	1-10	Cobble	1-10
Cole Creek Trib 3	5		0	26-50%	11-25%	0	sand	26-50	Gravel	11-25	Cobble	11-25

Figure 1. Arroyo Toad Surveys 2005