4.0 AMPHIBIANS - SL, SO, SS

4.1 Arroyo Toad (*Anaxyrus californicus*) – Category SO

Management Units with Known Occurrences

The arroyo toad was historically found in coastal drainages and mountains in southern and central California from San Luis Obispo County to San Diego County and northern Baja California (Griffin et al. 1999; USFWS 2009). It has disappeared from approximately 75% of its range and is now primarily found in the headwaters of coastal streams (Jennings and Hayes 1994; USFWS 2009). The arroyo toad breeds and deposits egg masses in slow-moving, shallow, sandy pools bordered by sand and gravel flood terraces (USFWS 2009). Outside of the breeding season, adults are largely terrestrial and use a variety of upland habitats, including sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grassland (Holland 1995; Griffin et al. 1999) (see online map: http://arcg.is/2hlQeVx).

Known occurrences of arroyo toad since 2000 are largely derived from surveys conducted by USGS and from data in SANBIOS (2012). Based on these sources, significant occurrences of arroyo toad are found on Conserved Lands in 3 watersheds (Tijuana River, San Diego River, and San Dieguito River watersheds) in MUs 3, 4, 5, and 6 (see Table of Occurrences). In the Tijuana River watershed in MU3, arroyo toad is known to occur in only 1 stream system, Lower Cottonwood Creek at the Marron Valley Mitigation Bank. In the San Diego River watershed in MU4, significant occurrences are found along San Vicente Creek in Kimball Valley and on the San Diego River on land owned by Helix Water District. In the San Dieguito River watershed in MUs 5 and 6, significant occurrences are found in 5 areas: lower Santa Ysabel Creek, upper Santa Ysabel Creek, Temescal Creek, Santa Maria Creek, and upper San Dieguito River. Significant occurrences of arroyo toad are also likely to occur on Conserved Lands in MU8 since they have been detected both upstream and downstream of Conserved Lands on the San Mateo and Santa Margarita Rivers. Occurrences of arroyo toad are also found on MUs 9, 10, and 11. A complete listing of all locations where arroyo toad has been detected on Conserved Lands in the MSPA is available in MSP-MOM (2014).

Outside of the MSPA, significant occurrences of the arroyo toad are known to occur on MCB Camp Pendleton (Turschak et al. 2008; USFWS 2009), in Sloan Canyon on the Sweetwater River on property owned by the Sycuan Band of Kumeyaay Nation (USFWS 2009), on private land on the San Luis Rey River (USFWS 1999), and in the upstream portions of streams to the east of the MSPA (upper San Diego River, Sweetwater River, and far upper Santa Ysabel Creek).

Management Categorization Rationale

Arroyo toad should be managed as a Species Management Focus Category SO Species due to a moderate risk of loss of significant occurrences from Conserved Lands in the MSPA (see Vol. 1, Table 2-4). Factors contributing to this moderate risk of loss include the small numbers of isolated occurrences and the high level of threats (see Vol. 3, App. 1, Species Profiles).

Threats to arroyo toad in the MSPA include invasive nonnative aquatic species (e.g., bass, bullfrogs, sunfish), nonnative invasive plants, roads, grazing by livestock, incompatible human recreation (including ORV use), trash dumping, non-seasonal dam releases, altered hydrology, and drought (Madden-Smith et al. 2005; USFWS 2009). In addition, USFWS's 5-Year review (2009) noted that chytridiomycosis, an infectious amphibian disease caused by a fungus (*Batrachochytrium dendrobatidis*), may be a factor in this amphibian's decline.

Densities of arroyo toad are highly variable, fluctuating from year to year depending on the presence of suitable habitat, which is affected by drought, fire, flooding, hydrology, and other climatic and human-induced causes (Madden-Smith et al. 2005; USFWS 2009). USGS has developed a spatial occupancy model for arroyo toad on MCB Camp Pendleton (Miller et al. 2012). They found that arroyo toad presence was lower in perennial streams where the presence of nonnative invasive aquatic species was higher. USGS and a graduate student from Texas A&M University developed a potential and current distribution model for arroyo toad across its range (Treglia et al. 2015). These models can be used to better understand current suitable habitat for arroyo toad.

Management and Monitoring Approach

The overarching goal for arroyo toad is to protect and enhance existing significant occurrences to self-sustaining levels and reestablish occurrences in locations where they previously existed to ensure persistence over the long term (>100 years).

For the planning cycle of 2017–2021, the management and monitoring approach is the following:

(1) Annually inspect known areas occupied by arroyo toad to identify and reduce threats that can be managed at the local scale, including road crossings, illegal encroachment, ORV use, nonnative plants, trash dumping, grazing by livestock, and incompatible human recreation. Where possible, restrict access to arroyo toad upland and breeding habitats to help prevent disturbance to all arroyo toad life history stages (eggs, larvae, metamorphs, and adults). Activities should be restricted in upland habitat year-round and in breeding habitat during the core of the breeding season (March through July).

(2) Continue to convene with the working group of land managers, scientists, and local biologists knowledgeable in arroyo toad to review existing conditions of known occurrences on Conserved Lands and to prepare a management plan that considers each site's unique conditions (e.g., hydrology, water quality, threats) and includes actions that will provide for the long-term sustainability of arroyo toad, with consideration for the needs of breeding and estivating toads. The management plan should include actions to reduce risk at occupied sites with high fire risk and post-fire recovery actions. High-priority actions identified in the arroyo toad management plan should be implemented and monitored for effectiveness.

(3) Conduct routine management actions identified through the IMG regional protocol monitoring, including protecting populations from detrimental human use (e.g., ORV, trampling, altered hydrology), removing invasive plants, and removing aquatic predators and exotic species within the known arroyo toad habitat.

(4) Establish program and permits to allow emergency management actions for the arroyo toad during or immediately following wildfire events, such as implementation of emergency rescue and temporary translocation, to protect from potential loss or extirpation.

(5) Implement an arroyo toad rescue program during wildfire events to protect from loss and/or extirpation and monitor the effectiveness of

rescue programs following wildfire events, including both translocation or reintroduction efforts.

(6) Continue genetic studies of the arroyo toad in San Diego County to evaluate the degree of genetic variation within and between populations and to possibly identify genetic bottlenecks or barriers; this information will also be used to determine source populations to use in reestablishing arroyo toads in previously occupied areas.

(7) Implement post-fire management actions to ensure the recovery at occupied sites following wildfire events, including invasive plant and animal control, debris/sediment removal, erosion control, or other management actions as needed for 3 years following a fire. Monitor stream conditions and the effectiveness of management actions implemented to assist in recovery of arroyo toad for 3 years following wildfire events.

(8) Assuming adequate rainfall levels, conduct comprehensive arroyo toad surveys using USGS survey protocols throughout the MSPA on Conserved Lands in known occupied and potential habitat to determine current distribution and status of arroyo toad, collect data on threats and habitat covariates, and identify management needs.

For details and the most up-to-date goals, objectives, and actions, go to the MSP Portal Arroyo Toad summary page: https://portal.sdmmp.com/view_species.php?taxaid=773514

Arroyo Toad References

Griffin, P. C., T. J. Case, and R. N. Fisher. 1999. *Radio Telemetry Study of Bufo Californicus, Arroyo Toad Movement Patterns and Habitat Preferences. Technical Report Prepared for the California Department of Transportation*.

Holland, D. C. 1995. *Sensitive Species Hydroecological Evaluation–Santa Margarita River: Arroyo Southwestern Toad (Bufo Microscaphus Californicus)*. Camp Pendleton.

Jennings, M. R., and M. P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California. Report Prepared for California Department of Fish and Game*. Rancho Cordova, CA.

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*. San Diego, CA.

Miller, D. A. W., C. S. Brehme, J. E. Hines, J. D. Nichols, and R. N. Fisher. 2012. Joint Estimation of Habitat Dynamics and Species Interactions: Disturbance Reduces Co-Occurrence of Non-Native Predators with an Endangered Toad. *Journal of Animal Ecology* 81:1288–97. DOI:10.1111/j.1365-2656.2012.02001.x.

MSP-MOM. 2014. *Management Strategic Plan Master Occurrence Matrix*.

SANBIOS. 2012. Sensitive Species Sightings Geodatabase. http://catalog.opensandiego.org/opendata/resource/3118/sanbios-ecology/.

Treglia, M. L., R. N. Fisher, and L. A. Fitzgerald. 2015. Integrating Multiple Distribution Models to Guide Conservation Efforts of an Endangered Toad. *PLoS ONE* 10 (6). DOI:10.1371/journal.pone.0131628.

Turschak, G. M., C. S. Brehme, S. L. Schuster, and C. J. Rochester. 2008. *MCBCP Arroyo Toad Monitoring Results for 2006 with Multi-Year Trend Analysis*. 55 pp.

USFWS (U.S. Fish and Wildlife Service). 1999. *Recovery Plan for the Arroyo Southwestern Toad*.

USFWS. 2009. *Arroyo Toad 5-Year Review : Summary and Evaluation*. Ventura , California.