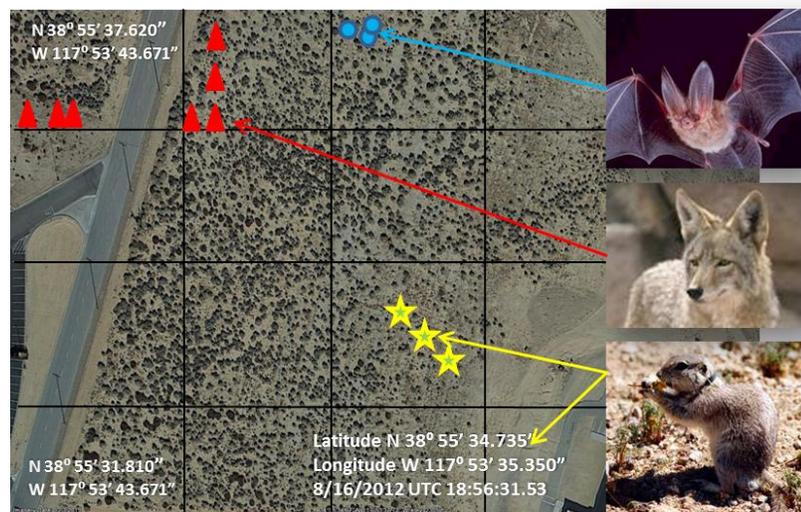


Acoustical Signature Identification and Tracking System

The Department of Defense (DoD) is required to manage the natural resources of each of its military reservations. This involves complying with the Endangered Species Act and specifically for the USAF, Air Force Instruction 32-7064. The AF Natural Resource Branch spends thousands of dollars documenting presence or absence of sensitive and listed species on bases. Managing the wildlife and habitat is costly in terms of time, materials, manpower, and accuracy of survey results. This SBIR addresses a new application of an existing marine technology in a terrestrial ecosystem. This new technology application will detect and locate animals based on the sounds that it emits to communicate with others. A ruggedized automated standalone acoustic detection/recorder system that listens for sounds of interest and their locations will provide a drastic reduction in costs and improve accuracy of field surveys, and build species databases.

As an example of the complexity of the existing field survey task, consider that Edwards Air Force Base is home to the threatened Mohave Ground Squirrel (MGS) (*Xerospermophilus mohavensis*) shown in figure 1 (lower right insert). According to the world's most foremost expert on MGS, Dr. Phil Leitner, the MGS is very elusive and difficult to find and observe. It spends a majority of time in underground burrows and is active only during the months of February through July. The rest of the year it is dormant. Even during its active season, the MGS stays in the shade of its burrow during the day, and then sleeps in its burrow at night. In addition, the MGS population area shifts over just a few years based on the amount of rainfall for that area. These factors make it difficult to observe and track. The traditional method of tracking MGS populations is to use baited traps to capture and count. The new proposed method of identifying and tracking populations detailed in this solicitation is to use an "acoustic fingerprint," or listening to its unique vocalizations it makes for mating and threat warnings.

CTSi, in conjunction with its partner Cornell University's Bioacoustics Research Program, has developed a solution for enhanced detection of acoustic signals, automatically identifying the species, and the location where the species emitted the sound. This system is the Acoustical Recording Identification and Tracking System (ARITS). ARITS will be easily adaptable and scalable to cover small or large survey areas, strong or weak acoustic signatures over relevant frequency ranges. It will also precisely locate the geodetic coordinates where the acoustic signal was emitted. In addition, the design solution allows



military and civilian personnel to conduct the field survey in lieu of using trained specialist to produce a field survey. The species map as shown in figure 1 that is produced by ARITS can be used for environmental compliance reports and will enable follow-up studies to be conducted in an efficient manner. Finally, animals would no longer need to be captured, tagged, and released. Acoustical identification is complementary to visual systems, and our system design can be integrated with visual sensors. This system provides customers many benefits when considering material cost, labor, ease of use, life cycle costs, and future growth capabilities factored into the system design.

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