Catalina Bighorn Sheep Reintroduction Project
January 20, 2014 – February 2, 2014

ANNOUNCEMENT

In order to provide accurate information as timely as possible, significant events will be posted to the Department website at www.azgfd.gov/catalinabighorn. These posts will be confirmed factual information and will be made as quickly as possible; interested readers are encouraged to see the next project status update for additional information, context, and discussion.

BRIEFING

The following is a summary of Catalina Bighorn Sheep Reintroduction activities on the Coronado National Forest. This project status update covers the period from January 20 to February 2, 2014. For project background and previously-reported information on project events, please see the earlier project status updates available at: www.azgfd.gov/catalinabighorn.

Additional project information can be obtained by visiting the Arizona Game and Fish Department Facebook page at https://www.facebook.com/azgafd#!/CatalinaBighorns, the Arizona Game and Fish Department webpage at http://www.azgfd.gov/catalinabighorn or by visiting the Catalina Bighorn Advisory Committee webpage at http://www.catalinabighornrestoration.org/. This update is a public document and information in it can be used for any purpose.

CURRENT POPULATION STATUS

The original release of 31 sheep consisted of 21 adult females or ewes, three yearling/juvenile ewes, five adult males or rams, and two yearling/juvenile rams. Thirty of the released sheep were outfitted with satellite GPS collars to provide managers with up-to-date information to help make adaptive**,** data-driven decisions. As of February 2, 2014, 21 of the 30 collared sheep were known to be alive on the mountains.

To date there have been nine bighorn sheep mortalities. Seven of the sheep were killed by mountain lions, one died as the result of predation by a cat, and another died from myopathy. To date two of the offending lions have been removed. To follow are the details of each mortality, the result of the investigation and management actions. Additionally, the habitat evaluation map showing corresponding block numbers for the project area is included below (see Figure 1).

On January 31, 2014, an adult ewe (ID #57) was found in Habitat Block 47 (good). This area is characterized by steep slopes and cliffs with good visibility. Investigators conducted an investigation of the site and determined that the mortality was due to predation. The ewe was pregnant at that time of the predation event. The evidence indicates that a cat, perhaps a young mountain lion or a bobcat was

likely involved, but due to rains overnight, investigators failed to find fresh tracks or a trail, and the cat did not appear to have returned to feed on the sheep again. Thus the animal that preyed on the sheep was not removed.

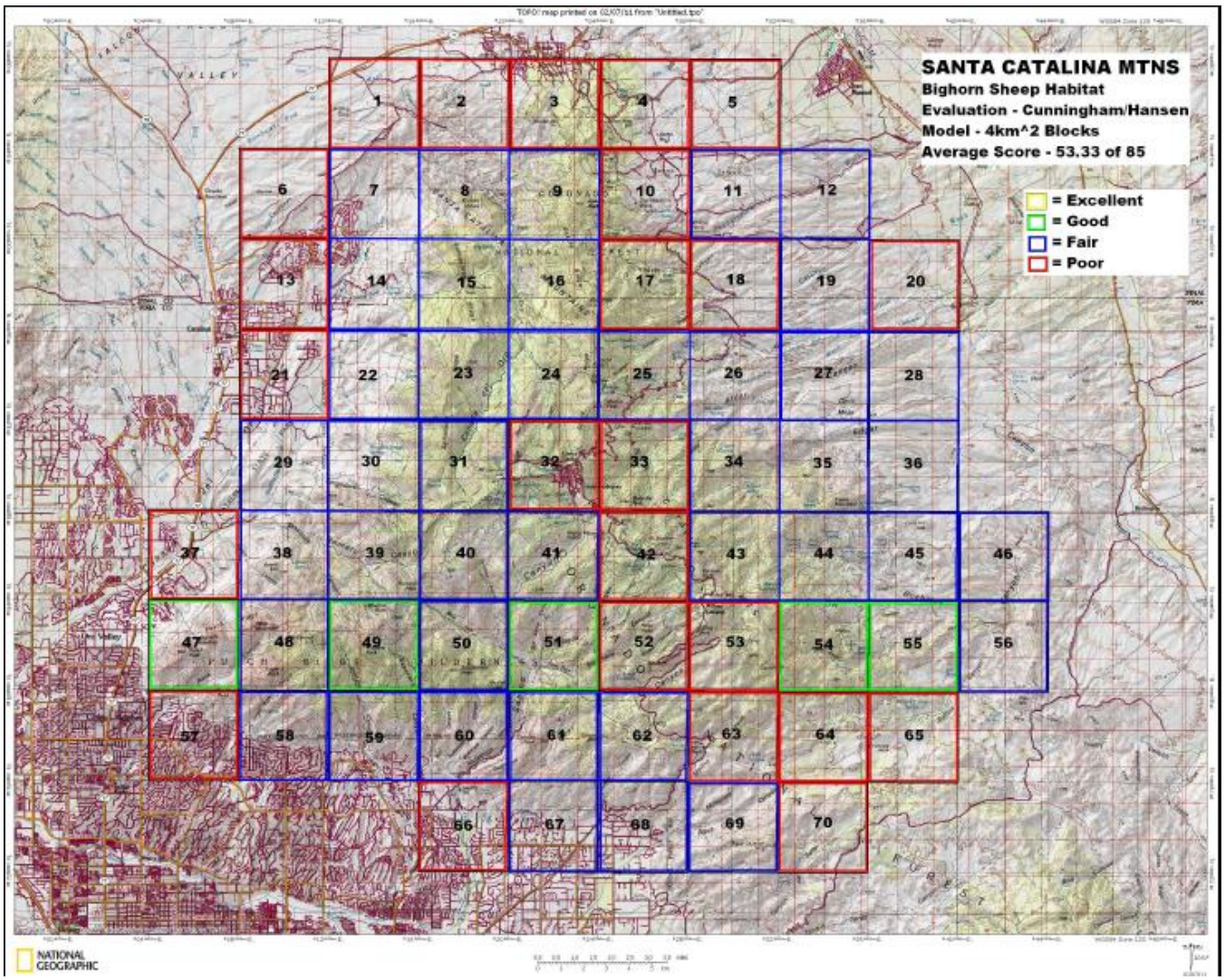

Figure 1. Cunningham Hansen Habitat Evaluation Map.

COMMUNICATION AND COORDINATION

The next written briefing will be provided on February 21, 2014.

PROJECT PERSONNEL

Mark Hart is the Public Information Officer for this project and can be reached at (520) 628-5376.

RESEARCH PROJECT FIELD NOTES

Research biologists have continued to monitor animals locations remotely, have been collaborating with regional Department staff to improve GPS collar functionality (see more below), and are preparing to collect a variety of field data. In the coming weeks, biologists will be in field collecting habitat measures and observing bighorn sheep to determine group size, composition, and presence of new lambs.

OTHER REMARKS

Satellites and Data

This project has employed state-of-the-art GPS collars for monitoring the bighorn sheep. As we have discussed in previous updates, there is much to learn about the collars, and translations of what they are telling us can be misinterpreted. Although GPS collars are the cutting edge of wildlife management technology, they have limitations and present unique challenges. In order to reap the benefit of GPS collars and the data they gather, a satellite uplink must occur, ideally on a daily basis. The collars are programmed to take four GPS readings throughout the day. Each collar is also programmed to send a transmission at a predetermined time each day, relaying the GPS points gathered the previous day. In order to receive the transmission, there needs to be minimal interference between the collar and the satellite. Sheep inhabit rugged, rocky country characterized by sheer cliff faces and canyon walls. If there is interference (e.g., in rough topography, thick vegetation, overhanging cliffs), or simply poor satellite configuration, during the scheduled transmission time, then the uplink fails and sheep locations will not be transmitted until the following day. Transmissions are scheduled once a day to save battery life. If an uplink is unsuccessful, the locational information is stored in the collar and transmitted during the next successful uplink. Ironically, the terrain that is so critical to sheep for evading predators can also impair uplink transmissions. This causes delays in providing managers with information used to determine an animal's location and movements, as well as providing a diagnostic tool to determine if reported mortality events are accurate.

Although the collars appear to be collecting bighorn sheep locations successfully, the ability of the collars to upload the locations in a timely manner via satellite (thereby making them available to Department staff) has been lower than anticipated. Over the past few weeks, we have seen fluctuating results on some days with good satellite communication and successful uplinks for up to 50% of the collars. On an average day, we have observed that 40% of the collars have uplinked successfully although we have been as low as 13%. This is a relatively low success rate, and it has significantly affected our abilities to monitor the collared sheep. However, we have been working closely with the collar manufacturers to identify windows of time when the satellite transmissions might be more successful since a successful uplink relies on having sheep in locations (ideally out in the open) where the satellites can 'talk' to the collars. These recent manipulations of uplink timing are promising better satellite and collar communication, and we are hopeful that uplink success is rising!

The Back-up Plan

Satellite collars are the current cutting edge technology, but before their advent, collars that transmitted VHF (i.e., "very high frequency") signals were used extensively for wildlife research projects. GPS technology relies on triangulation between a collar and transponder satellites overhead, while VHF uses a direct radio frequency to locate a given collar. Using a radio receiver and antenna to receive the

signal, researchers would first hear a directional signal and then either use it to track down and observe an animal directly or triangulate signal reception from several points on the ground to map an animal's location without observing it directly. While this method of locating animals is a scientifically sound technique, it is very labor intensive and introduces additional error (in comparison to GPS collars) because it relies on observer estimation of direction of the signal.

Yet VHF technology has still been very useful for our project. Each of the GPS collars in this project is also equipped with VHF technology as another tool for locating sheep. The VHF functions during a specified block of time every day. This allows managers/biologists to use ground or aerial surveillance to locate sheep that have not uplinked to satellites for a period of time. This is, of course, more time consuming and expensive, as it requires additional field time for personnel, but it can aid us greatly in locating animals when the GPS collars fail to transmit data in a timely fashion. The VHF function also provides managers with a second means of determining if the collar is sending out a live or mortality signal, and by listening to the signal volume (i.e., a consistently louder signal usually indicates a stronger, more direct signal) and then using the radio receiver and antenna to follow its strongest path, managers/biologists can narrow their search for either alive or dead collared sheep in an area and use the VHF to locate animals on the ground or from the air..

One goal of using GPS collars on the Catalina bighorn sheep is to minimize the field time required to follow the sheep on the ground. Ideally, with GPS technology, we should be able to monitor sheep remotely via uploaded satellite data to a computer in a manager's or biologist's office. Although uploading GPS information can sometimes be sporadic, it provides us with a wealth of information that was previously unavailable with only VHF. For instance, GPS collars allow managers the opportunity to monitor animals daily. In the past, managers and researchers would have flown over a study area on a weekly, monthly, or bi-monthly basis searching for VHF signals on collared animals, and many researchers spent considerable time hiking to locate and observe bighorn sheep at a distance. Sometimes they were able to locate all animals and sometimes not. If they heard a collar sending a mortality signal during a flight, they would generally hike in and retrieve those collars from downed animals, but important information surrounding the animal's death would likely be lost depending on how long it took to detect a mortality and get to the scene. With GPS and satellite technology, we have a much greater likelihood of detecting mortality events in a timely manner so that we can arrive on scene and increase our chances of being able to determine cause of death on collared animals. In addition, data collected by GPS collars provides increased opportunities to learn about their habitat use and selection patterns, both during the day and at night. This information is key to identifying what the true limiting factors are in the Catalinas and what our mitigating actions should be to enhance the return of a naturally functioning ecosystem.