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Catalina Bighorn Sheep Reintroduction Project
December 12, 2013 – January 5, 2014

BACKGROUND

On November 18, 2013, the Arizona Game and Fish Department (Department) released 31 desert bighorn sheep into the Santa Catalina Mountains just north of Tucson. Bighorn sheep that once inhabited the Santa Catalinas disappeared in the early 1990s. This restoration project represents a historical new approach that involves a collaborative effort bringing together a local group of diverse stakeholders. These stakeholders formed an Advisory Committee and have been advising the Department on how best to accomplish the goal of restoring ecosystem health that would support a wide variety of species, including bighorn sheep. This methodology represents a significant change in the planning process and has been built on recognizing differences, finding commonalities, and working towards a common goal. The restoration project has generated a great deal of interest, and consequently, many inquiries regarding project status. The Advisory Committee and Department have decided to use a briefing format to deliver the most accurate and up-to-date information in a consistent and equitable manner to all.

ADVISORY COMMITTEE

The Advisory Committee is comprised of the following members and their respective affiliations:

Brian Dolan – Arizona Desert Bighorn Sheep Society
Mike Quigley – The Wilderness Society
Randy Serraglio – Center for Biological Diversity
Trica Oshant Hawkins – Arizona Wilderness Coalition
Joe Sheehy – Arizona Desert Bighorn Sheep Society
Acasia Berry – Sky Island Alliance
Sergio Avila – Sky Island Alliance
Brian Ham - Sportsman
Les Corey – Arizona Wilderness Coalition

BRIEFING

The following is a summary of Catalina Bighorn Sheep Reintroduction activities on the Coronado National Forest. 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/w_c/bighornSheep.shtml, or by visiting the Catalina Bighorn Advisory Committee webpage at <http://www.catalinabighornrestoration.org/>. Past updates may be viewed on these websites. This update is a public document and information in it can be used for any purpose.

OVERVIEW AND DISTRIBUTION

There appears to have been a change in the general habitat use patterns of some of the bighorn sheep over the past two weeks. While some found good habitat characterized by steep slopes and apparently open terrain quickly after the release, others passed through this habitat on their way to higher elevations. Although much of the terrain at the higher elevations is steep, much of it is thickly vegetated and characterized by sporadic rock outcroppings as opposed to contiguous cliffs. This may make bighorn sheep more vulnerable to predators who benefit from cover when stalking their prey. Managers are optimistic to see that some animals have moved out of the heavily vegetated areas and, in some cases, have joined other bighorn sheep in the more open terrain. Managers are optimistic that this trend will continue and that the risk of predation will be reduced.

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 January 5, 2014, 25 of the 30 collared sheep were known to be alive on the mountains.

To date there have been five bighorn sheep mortalities. Four of the sheep were killed by mountain lions while the fifth most likely died of capture myopathy. 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 3, 2014, an adult ewe was found south of the Biosphere, in an area characterized by low elevation hills and mesquite scrub. This area is rated as “fair” (block 8) according to the Cunningham/Hansen habitat suitability model. When this ewe was released on November 18th, 2013, she moved north and approached Highway 77 before turning southeast and settling in near the Biosphere. Based on GPS locations, this ewe appeared to be alone and did not demonstrate extensive movement. Managers checked on this sheep 3 weeks ago and observed that it was in good condition. After receiving a mortality signal from the collar, the ensuing investigation concluded that the ewe had been killed by a mountain lion. Subsequent pursuit of the lion by the Department’s houndsman was unsuccessful and discontinued due to lack of certainty that the offending lion could be identified.

On December 9, 2013, an adult ewe was found in low quality habitat (block 40) characterized by thick vegetation that likely limited her ability to detect predators. Investigators determined that the sheep had been killed by a mountain lion. Pursuit of the lion was unsuccessful and has been discontinued.

On December 1, 2013, an adult ewe was discovered dead in habitat characterized by low elevation hills and mesquite scrub, and rated as “fair” (block 38). The ewe was in the later stages of pregnancy. On-scene investigators concluded that the ewe had been killed by a mountain lion. The male lion was removed by Department personnel in accordance with the Mountain Lion Management Plan developed explicitly for this project, which allows for the removal of specific lions that have preyed on sheep, with the exception of females with kittens or solitary kittens. The mountain lion’s stomach contents confirmed conclusively that the lion had fed on the ewe.

On November 30, 2013, a yearling ewe was discovered in thick vegetation, rated as “fair” (block 41). The ewe was found cached in a small ravine. During the investigation of the scene, the investigating Wildlife Manager was stalked by a mountain lion that remained in close proximity. Fearing for his and the public’s safety, the Wildlife Manager was forced to kill the male lion in self defense. An investigation of the sheep carcass and the mountain lion’s stomach contents confirmed conclusively that the lion had fed on the ewe.

On November 27, 2013, an adult ram was found in the higher elevations in an area characterized by dense Manzanita bushes and rated as “fair” (block 39). The ram had been scavenged by a bear and all indicators pointed towards capture myopathy as the cause of death. Every effort is made during the capture process to minimize capture related complications, including monitoring and controlling body temperature, minimizing handling and providing oxygen to the animal, all of which helps to avoid lactic acid build-up. Capture myopathy is associated with a build-up of lactic acid in the muscle tissue that can lead to heart failure. Myopathy generally occurs during the first two weeks after animals are transplanted and released, but lasting effects of capture myopathy can be observed up to four weeks post release.

COMMUNICATION AND COORDINATION

The next written briefing will be provided on January 24, 2014.

INCIDENTS

We continue to receive several false mortality signals. Although we are thankful that alerts from most of the collars have been false, they also take a great deal of effort to investigate. Managers and research biologists have dedicated efforts to gain a better understanding of the mortality signals and ways to determine if they are real or not. In learning the nuances of the collars, there have been times when a ground investigation was delayed while we worked to interpret the information provided by the satellite technology. Such delays have impacted the effectiveness of subsequent removal efforts of lions that killed sheep. It is unfortunate that we have had predation events on the sheep that necessitated removal of individual mountain lions. The goal of this project is to see bighorn sheep and mountain lions coexisting in a naturally functioning ecosystem. To achieve that goal, it is important to quickly establish a viable population of sheep by temporarily reducing lion predation. By targeting individual offending lions, we are minimizing the impact to the mountain lion population and foregoing indiscriminate techniques used elsewhere, in which the overall lion population was deliberately reduced. Our project is under continual evaluation and management responses will be adapted to best achieve the goal of healthy sheep and lion populations in the Catalina Mountains.

PROJECT PERSONNEL

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

RESEARCH PROJECT FIELD NOTES

Research is an important aspect of the restoration effort, and research findings will better enable managers to make data-driven decisions as the project progresses. The Department's Research Branch is conducting a research project in collaboration with this bighorn sheep translocation, and as part of a larger project that also includes a study site in northwestern Arizona. Researchers are working closely with Department staff in Tucson, with the goal of learning as much as we can from this translocation effort. In the future, this section will relay field notes from the researchers regarding significant activities and observations. As this aspect of the project is just beginning, there are no notes provided in this update.

OTHER REMARKS

The Habitat Evaluation, Other Restoration Efforts and the Research Tie-in

Since 1955, the Arizona Game and Fish Department (AGFD) has been involved in active bighorn sheep management through habitat improvement efforts and transplant programs. These efforts have enabled bighorn sheep to repopulate many of the areas from which they were previously extirpated. To date, nearly 2,000 Arizona bighorn have been transplanted within Arizona and into the neighboring states of Utah, Colorado, New Mexico and Texas. As a result, several different previously extirpated populations have been restored, including Aravaipa Canyon, the Galiuros, Peloncillos, Superstitions, Mazatzals and Mineral Mountains. Despite this success, several transplant programs fell short of expectations and did not result in the establishment of viable bighorn populations.

In an effort to better identify suitable release sites, the AGFD performed a statewide habitat evaluation in 2000. A number of bighorn sheep habitat evaluation models were reviewed to determine which were best suited to evaluate habitat used by Arizona's bighorn sheep. The Department concluded that the models first developed by Hansen (1980) and Brown (1983), and later modified by Cunningham (1989), were the most effective models to use.

The Cunningham/Brown model was used to evaluate an area as a whole. Criteria evaluated included historic occurrence, land status, topography, cover, presence of exotic ungulates, presence of native ungulates, human use, water availability, habitat discreteness, and range expansion potential. A total of 63 points were possible with this evaluation.

Upon the completion of the Cunningham/Brown evaluations statewide, higher scoring mountain ranges were then evaluated in greater detail using the Cunningham/Hansen model. These areas were evaluated using individual 4km² (1.5mi²) cells within a larger area to provide greater accuracy in identifying potential release sites and determining locations for future habitat modifications, such as water developments. This model classified each cell within the area as excellent, good, fair, or poor quality habitat based on topography, vegetation, precipitation, water availability, and human use. A total of 85 points were possible for this evaluation.

How did the Catalinas Rank?

Cunningham/Brown Evaluation - In the Tucson region, the Peloncillos ranked the highest with a score of 48, while there was a three-way tie for second with a score of 47 between the Catalinas, Aravaipa Canyon and the Mineral Mountains. Viable bighorn populations have been successfully restored in all of these mountain ranges with the exception of the Catalinas.

Cunningham/Hansen Evaluation – In 1994, Wildlife Managers evaluated the Catalinas using a modified version of the Cunningham/Hansen evaluation. Instead of the 4km² blocks, which were later used in the statewide evaluation in 2000, managers used 1km² blocks for a more detailed evaluation. Because of this, the Catalinas were not evaluated in 2000 as part of the statewide effort. While the evaluation performed in 1994 analyzed habitat blocks in greater detail, this effort could not be compared to other evaluations around the state from the 2000 effort.

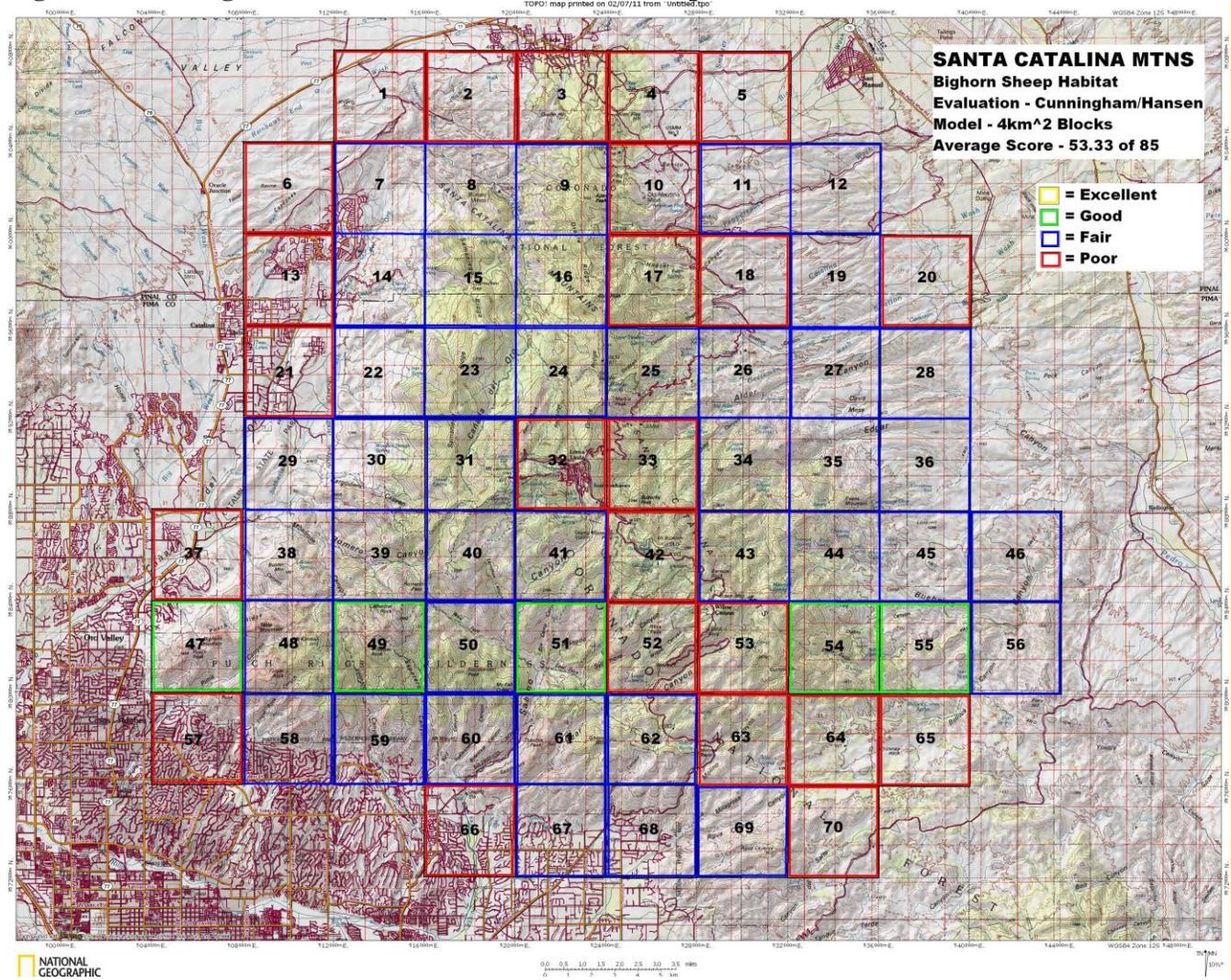
In 2011, AGFD and U.S. Forest Service personnel completed a habitat assessment of the Catalinas using the established Cunningham/Hansen evaluation methodology that divided the area into 70 4km² cells. Each cell was then independently evaluated based on five criteria: topography, vegetation, precipitation, water sources and human use.

The attached map (Figure 1) and table below (Table 1) depict the results of the 2011 evaluation and demonstrates a rough estimate of what each habitat block on the Catalinas might support in potential bighorn sheep numbers. It is important to note two things with this model: 1) sheep numbers could remain below this estimate and still form a viable and sustainable population, and 2) the Cunningham/Hansen suitability model is a coarse evaluation method because there are various quantities and habitat types in each of the cells, yet the score in each block reflects the overall attributes accordingly.

Table 1. Cunningham/Hansen Evaluation for the Catalinas

Habitat Quality	Block Score	# of 4km ² Cells	# of Sections (mi ²) Cells	Sheep Density per Section (Remington 1989)	Estimated Density per Habitat Type
Excellent	80-85	0	0	>2	0
Good	70-79	5	7.7	2	15.4
Fair	51-69	41	63.14	1.1	69.454
Poor	0-50	24	36.96	0.6	22.176
Total					107.03
Catalina Bighorn Sheep Population Objective is 110 individuals					

Figure 1. Cunningham Hansen Habitat Evaluation Map



Past Restoration Efforts and What We Might Expect

Restoring a viable population of bighorn sheep is not an overnight management action; these are long-term efforts. To illustrate this, below is a brief summary of restoration efforts in comparable mountain ranges to the Catalinas.

- Aravaipa Canyon – 18 year effort - This was the first restoration effort in Arizona that began in 1958 by capturing sheep at water holes. Of the 8 sheep captured between 1958 and 1960, only 2 rams remained in 1964. Capture efforts also took place in 1967 and in 1971, when bighorn captures began using a helicopter and tranquilizer darts. In 1973, the herd finally began to gain some traction and grew until it was considered well established in 1976 with 35 animals, 18 years later. Today, the population is estimated at approximately 100 bighorn.

- Superstition Mountains – 9 year effort - Restoration efforts took place in the Superstitions in two different release areas: Horse Mesa and Coffee Flat. Efforts began in 1983 and continued until 1992 after 129 bighorn had been released between the two sites. Today, the population is estimated at 185 bighorn (Figure 2).
- Mazatzal Mountains – 5 year effort - In 1980, 20 bighorn were released on Goat Mountain. In 1981, an additional 12 were released to supplement this population. Although nine of the 22 radio collared sheep died from these efforts, by 1986 the population was considered well established. Today, the population is estimated at 185 bighorn (Figure 2).
- Mineral Mountains – 9 year effort – Restoration efforts in the Minerals began in 2003 with the release of 30 bighorn. Subsequent releases took place in 2007 (10 sheep), 2012 (30 sheep) and 2012 (30 sheep). Today the population is estimated at 100 bighorn.

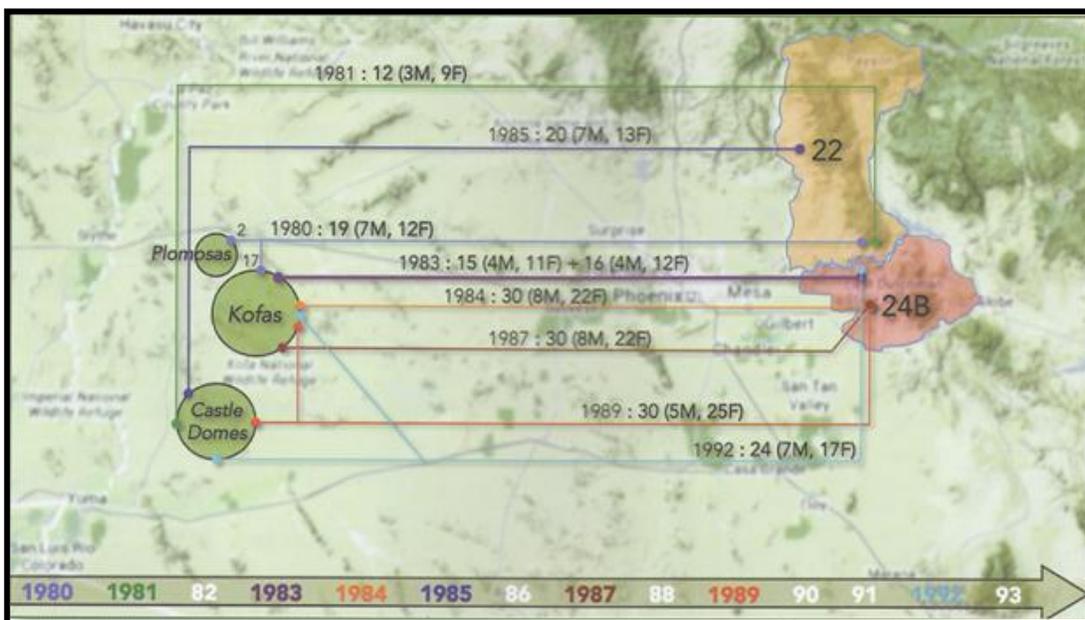


Figure 2. Summary with Timeline of Mazatzal (22) and Superstition Mountain (24B) Restoration Efforts

The Research Tie-in

There is a large research component to the Catalina restoration project as it relates to the use and selection of habitat by bighorn sheep. Managers made the decision to collar all released bighorn with satellite GPS collars to allow for making the most informed decisions on sheep habitat use and movements, human disturbance, cause-specific mortality, travel corridors and most importantly, to be adaptive with respect to the needs for establishing a viable population of sheep.

While evaluating habitat in the Catalinas in 2011 with the Cunningham/Hansen model, the Department recognized that the Cunningham/Hansen model had some limitations. Thus, data gathered from collared bighorn in the Catalinas may be used to develop a better habitat use and assessment model in transitional habitats found in ranges like the Catalinas, Galiuros, Superstitions, Mazatzals, and Minerals.