

**ARIZONA GAME AND FISH DEPARTMENT
HABITAT PARTNERSHIP COMMITTEE
HABITAT ENHANCEMENT AND WILDLIFE MANAGEMENT PROPOSAL**

Game Branch / HPC Project Number: 12-507

PROJECT INFORMATION

Project Title: Reintroduction of Desert Bighorn Sheep into the Santa Catalina Mountains - 2012

Region and Game Management Unit: V/33

Local Habitat Partnership Committee (LHPC):

- Tucson

Was the project presented to the LHPC?

YES[X] NO[]

Has this project been submitted in previous years? YES[X] NO[]

If Yes, was it funded? YES[X] NO[] → **Funded HPC Project #(s):** 11-507

Project Type: Desert Bighorn Sheep Restoration

Brief Project Summary: To reintroduce bighorn sheep (*Ovis canadensis*) into the Santa Catalina Mountains and establish a healthy and viable population. Approximately 30 bighorn sheep will be captured (as suggested by the Bighorn Species Management Guidelines, preferably these will be 65% ewes, 20% yearlings, and 15% medium aged rams [Classes II and III]), fitted with real time mortality sensing GPS collars, for release into the Santa Catalina Mountains in Region V in November 2013. Approximately 22 females and 8 males (or a ratio of about 3 females to 1 male if fewer than 30 sheep are captured) will be captured. The initial release source sheep will come from Region 4 while Region 6 believes they will be able to accommodate the second release. We will release sheep in good lambing habitat, where those ewes can develop an affinity to the area. The release sites, identified in Figure 3, will be near historical lambing areas as identified by deVos (1983) and newly identified potential lambing areas on the east side of the Catalinas near Sabino and Finger Rock Canyons. Secondary and tertiary releases of 30 sheep may be considered and deemed necessary depending on the success of the initial release, funding and availability of source sheep.

Big Game Wildlife Species to Benefit: Desert Bighorn Sheep

Implementation Schedule (Month/Day/Year):

Project Start Date:

September 1, 2011 and Release to Occur in November, 2013

Project End Date:

June 30, 2018

Environmental Compliance:

NEPA Completed: Yes[] No[] N/A[X]

Projected Completion Date: NEPA not reqd. Per Jim Upchurch, Forest Supervisor _____

State Historic Preservation Office - Archaeological Clearance:

Yes[] No[] N/A[X]

Projected Completion Date: _____

Arizona Game and Fish Department EA Checklist: Yes[] No[X]
N/A[]

To be Completed by: Region 5 _____

Projected Completion Date: Summer 2013

PROJECT FUNDING

Special Big Game License Tag Funds Requested:

\$ 100,000

Cost Share or Matching Funds:

\$ Pending – See Cooperators Section

Total Project Costs:

\$ 235,650 for year 1 and estimated to be \$674,800 for 5 years – See itemized budget

PARTICIPANT INFORMATION

Applicant (please print): Martin Guerena, John McGehee and Ben Brochu Wildlife Managers, Region 5	Address: Arizona Game and Fish Department 555 N Greasewood Rd. Tucson, AZ. 85745	E-mail: mguerena@azgfd.gov jmcgehee@azgfd.gov bbrochu@azgfd.gov
Telephone: 520-591-7636	Date: September 1, 2012	

AGFD Contact and Phone No. (If applicant is not AGFD personnel):

Project has been coordinated with:
 Game Branch, Research Branch, Region IV, Region VI, ADBSS, U.S. Forest Service, Catalina State Park.

NEED STATEMENT – PROBLEM ANALYSIS:

Bighorn sheep historically were a natural component of the Santa Catalina Mountain (Catalina) ecosystem. While they were once widespread, today they have been extirpated from this range. Historically the Catalinas supported a healthy and abundant population of bighorn sheep. Early newspaper accounts (1879-1909) place bighorn sheep in the Catalina and Tucson mountains (Knipe 1985). At one time this population was considered the largest in the State (Buechner 1960). Allen (1895) reported that the Catalinas were one of the last areas where commercial harvests occurred. By 1930, the only sizeable bighorn sheep populations remaining outside of western Arizona were in the Grand Canyon, the Santa Catalina and the Superstition mountains, with small bands or individual bighorn sheep also reported from the Tucson, Santa Rita, Sierrita mountains, and Picacho Peak. With the passage of the Pittman-Robertson Act in 1937, Federal Aid funds became available to inventory and study wildlife populations. Surveys of bighorn sheep were initiated in the Santa Catalina and Tucson Mountains, but the war prevented any extensive studies (Brown 1989). Recent population estimates ranged from a high of 220 to a low of 35 sheep (Krausman et al. 1979). Bighorn sheep in the Catalinas declined in the 1980's until disappearing in the late 1990's (Wakeling et al. in print).

Multiple factors have been associated with the decline of bighorn sheep in the Catalinas including urban development (i.e., housing development, road construction), human recreation (i.e., hikers, hikers with dogs, trail development), disease and changes in habitat conditions (Etchberger et al. 1989, Czech and Krausman 1997, Krausman et al. 1996, 2000, Papouchis et al. 2001, Krausman et al. 2004). Habitat changes in the Catalinas have been associated with the suppression of wildfires (Etchberger et al. 1989, Krausman et al. 2000, 2004). While many causes for the decline have been speculated, no conclusive determination has ever been made (Wakeling et al. in press).

A study of the economic value, in the mid 1980's, of the Pusch Ridge population of bighorn sheep found that people placed a value of \$1.3 to 2.4 million on the continued existence of those animals, even if they would never see the bighorn sheep (Burgarsky 1986). With approximately 100 bighorn sheep on Pusch Ridge in the mid 1980's, each sheep would be worth \$13,000 to \$24,000. If the bighorn sheep could be seen, their value was estimated to be \$2.2 million to 3.9 million, or \$22,000 to \$39,000 per animal. Today, assuming average annual inflation from 1985-2010 to be 2.91%, these respective values would be \$2.7 million to \$4.9 million or \$26,000 to \$49,000 per animal. If they could be seen today, their value would be approximately \$45,000 to \$79,000 per animal or \$4.6 million to \$8 million for a population of 100 animals.

The translocation of bighorn sheep into the Catalinas has been discussed since, 1985 when it was identified as the single research need in the AZGFD Region V Big Game Strategic Plan. A

recommendation was made to analyze the possibility of improving survival within the heard by introducing bighorn sheep from other mountain ranges to improve the genetic diversity of the population (Shaw and DeVos, 1989). No additional sheep were introduced into the Catalinas and the population soon disappeared from the mountain. Several studies have been done to evaluate all potential bighorn sheep habitat in the Catalinas.

The Catalina Mountains were evaluated using a Cunningham/Brown model, (Cunningham 1989), in 2000 during the AZGFD and AZ Desert Bighorn Sheep Society statewide evaluation of bighorn sheep habitat study. The Cunningham/Brown model was used to evaluate an entire mountain range or area as a whole. Criteria evaluated for the Cunningham/Brown model 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 (Cunningham 1989). The Catalinas scored 47 of a possible 63 points. During that study, the Catalinas were not evaluated using the Cunningham/Hansen model, (Cunningham 1989) which divided an area into 4km² cells, each evaluated independently. Krausman et al. (2004) reevaluated sheep habitat in the Catalinas following the Bullock and Aspen fires in 2002 and 2003 respectively. Using their GIS model, they calculated 39,201 ha of potential habitat in the entire Santa Catalina Mountains and 9,017 ha of historic habitat in the western portion of the range. Approximately 21% of the potential bighorn sheep habitat and approximately 24% of the historic bighorn sheep habitat was burned during the Bullock and Aspen fires.

The most recent habitat evaluation was completed by AZGFD Region V and Coronado National Forest personnel in 2011, using the Cunningham/Hansen (Cunningham 1989) evaluation methodology. This evaluation divides the area to be evaluated into 4km²(1.5mi²) cells. Each cell is then independently evaluated based on five criteria: Topography (0-20 points), Vegetation (0-20), Precipitation (0-5), Water Sources (0-20), and Human Use (0-20). The highest possible total score for any cell is 85 points.

Based on its total score, the cell is classified according to the following scheme:

<u>Total Score</u>	<u>Classification</u>	<u>Sheep Density per Section (mi²)</u>
0-50	Poor	0.6
51-69	Fair	1.1
70-79	Good	2.0
80-85	Excellent	2.1-6

Overall the Catalinas produced a fair habitat classification score of 53.33 out of 85. For further information on the habitat evaluation, refer to the Santa Catalina Bighorn Sheep Restoration Proposal.

The Catalina Mountains are identified in the September 6, 2002 Bighorn Sheep Transplant Priorities in Arizona as Region V's top priority for sheep translocations with a score of 47 second only to the Mineral Mountains of GMU 37B, which also scored 47. The Mineral Mountains received its third release of 30 animals in November of 2010 from GMU's 22 and 24B, now making the Catalinas the number one bighorn sheep transplant priority in Region V.

PROJECT OBJECTIVES:

To reintroduce bighorn sheep into the Santa Catalina Mountains and establish a healthy and viable population. Habitat use, population distributions, travel corridors, and potential causes of mortality will be studied through the monitoring of GPS collared sheep and mountain lions.

The project objectives for the reintroduction of bighorn sheep into the Santa Catalina Mountains are:

- Establish a viable population of bighorn sheep in suitable unoccupied bighorn habitat
- Increase and diversify the resource values of public and National Forest lands
- Increase the number of desert bighorn sheep in AGFD Region V and in the state (once the population expands to carrying capacity of the new habitat)
- Increase the opportunity for the public to view bighorn sheep
- Increase the opportunity to hunt bighorn sheep, if the population expands to harvestable levels
- Monitor bighorn sheep movements
- Examine overlaps in space use with potential BHS lambing areas (e.g., Pusch Ridge/Ram Mountain, Montrose Canyon/Buster Spring/Alamo, Dead Horse, and Slash Canyons)
- Identify changes in habitat selection and space use post BHS introduction
- Identify bighorn sheep travel corridors between the Santa Catalina Mountains and adjacent ranges
- Evaluate whether or not some source populations of bighorn sheep or specific areas within populations are reaching carrying capacity, and if these populations would benefit from the removal of animals.

PROJECT DESCRIPTION AND STRATEGIES:

1. Capture for transplant 30 desert bighorn sheep in November 2013 from Region 4 and release into the Catalinas
2. Outfit all 30 sheep with satellite GPS collars to monitor movements, habitat use and determine cause-specific mortality
3. Minimize predation by mountain lions on translocated sheep using the Adaptive Mountain Lion Management Plan
4. Annually survey translocated sheep by helicopter
5. Conduct secondary and tertiary releases of bighorn sheep as needed

PROJECT LOCATION:

Figure 1: Map of Santa Catalina Mountains & Pusch Ridge Wilderness Area near Tucson, AZ in U33

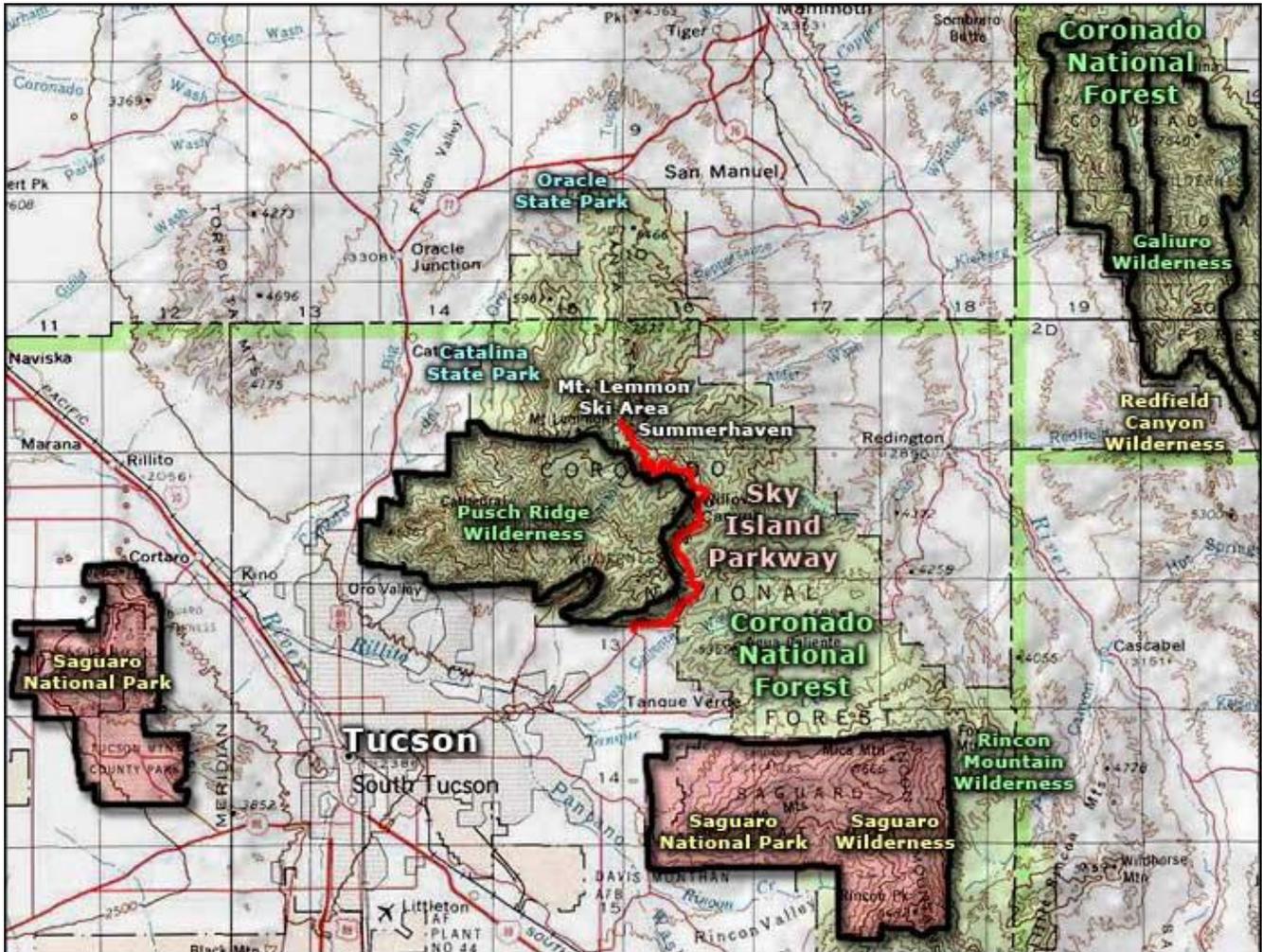


Figure 2: Map of the Pusch Ridge Wilderness Area in the Santa Catalina Mountains

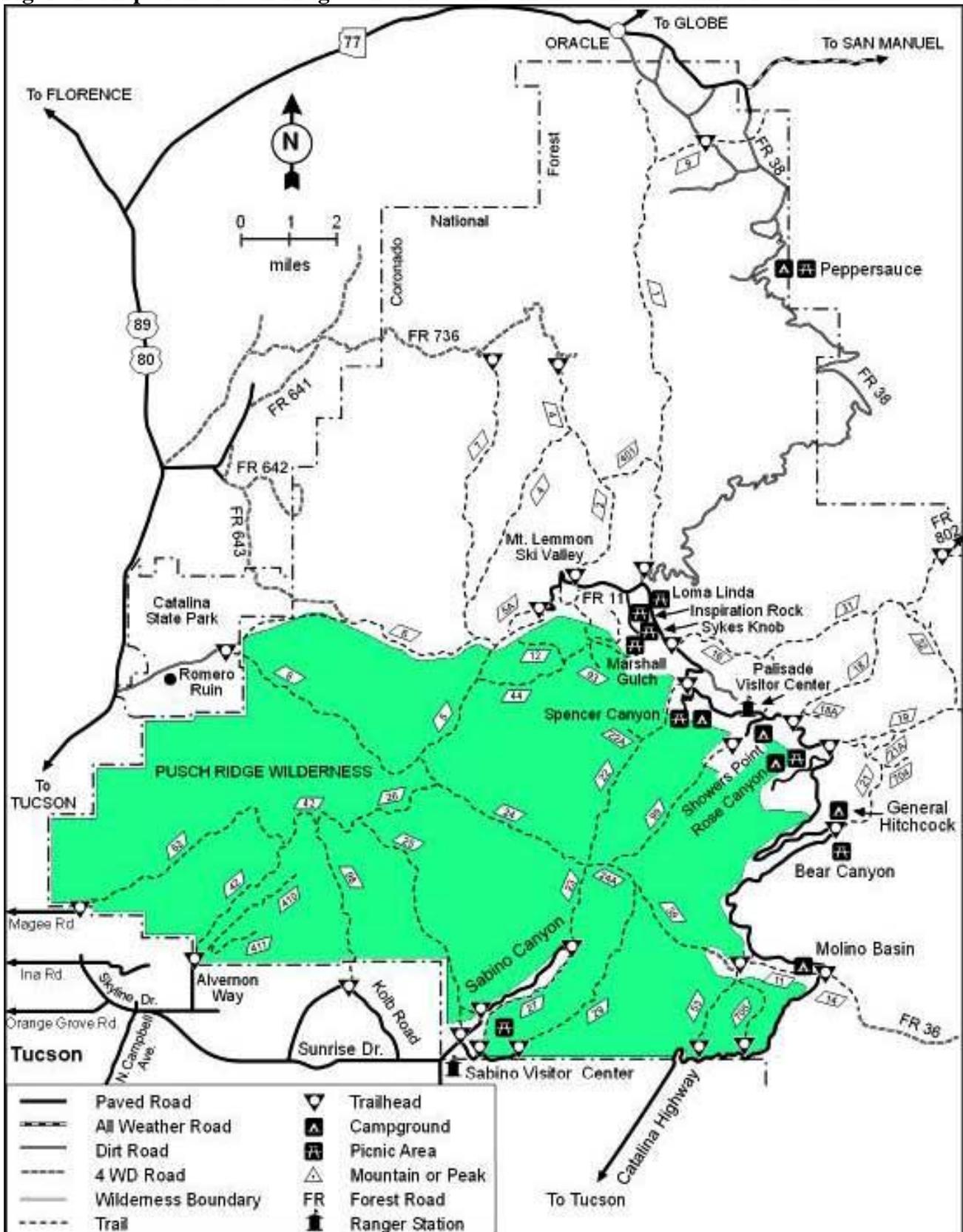
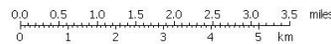


Figure 3: Map of bighorn sheep release sites in the Catalina Mountains.



10' 1092
05/19/11

- 1) Finger Rock Canyon Release Site: N3220.754 W11055.127
- 2) Montrose Canyon Release Site: N3225.352 W11053.683
- 3) Bird and Rattlesnake Canyon Release Site: N3219.216 W11049.356
- 4) Middle Sabino Canyon Release Site: N3219.806 W11047.619
- 5) End of Sabino Canyon Release Site: N3220.645 W11046.765

***All Proposed Release Sites are on Coronado National Forest Land.**

LAND OWNERSHIP AT THE PROJECT SITE(S):

(if the project area is private property, please state specifically and provide the landowner's name)

- *IF PRIVATE PROPERTY, IS THERE A COOPERATIVE BIG GAME STEWARDSHIP or LANDOWNER AGREEMENT BETWEEN THE LANDOWNER AND THE DEPARTMENT?*

YES[] NO[] N/A[X]

All Release Sites in the Santa Catalina Mountains are located on public land managed by the Coronado National Forest, Santa Catalina Ranger District. Other portions of desert bighorn sheep habitat are located on State and Forest Lands in Catalina State Park and the 56,933 acres, which make up the Pusch Ridge Wilderness area.

HABITAT DESCRIPTION:

The Catalinas are located in southcentral Arizona on the Coronado National Forest (Figure 1). Located to the south and west of the Catalinas is Tucson, a metropolitan area with a population in excess of 520,000 people. The Catalinas are roughly triangular in shape with an east-west base of about 32 km and the apex 32 km north of that base. Elevations range from 854m at the southwest base of Push Ridge to over 2766m at the top of Mt. Lemmon.

Within the southwest portion of the Catalinas, lies the Push Ridge Wilderness Area (PRWA – Figure 2), which historically has held most of the bighorn sheep. The PRWA was established February 24, 1978 by the Endangered American Wilderness Act. As established, this area consists of 22,837ha. One of the major goals of the PRWA was to protect habitat for desert bighorn sheep (Anon. 1978). The topography quickly goes from rolling hills and high benches to steep, rugged cliffs, canyons, and ridges. The proposal area goes from an upper Sonoran desert scrub community with diverse forage species (mormon tea, paloverde, prickly pear, brittlebush, side oats grama, red brome, fairyduster, mesquite, catclaw, grasses, sedges, and forbs) to oak woodland and ponderosa pine in the higher elevations. Russo (1956) analyzed the contents from 15 stomachs collected in southwestern Arizona during January, which indicated unusually high seasonal use of forbs, 48%, with 26% grasses, and 21% browse and cacti. Analysis of stomachs collected throughout the Kofa Game Range showed jojoba to constitute 38% of the rumen matter, ironwood 8%, and catclaw 7%. Shrubs and cacti compromised 64% of the stomach volume, grasses 33%, and forbs only 3%. Welles (1943) observed principal food items in the Santa Catalina and Tucson mountain ranges to include jojoba, brittlebush, and rock moss.

There are numerous perennial water sources in Romero, Alamo, Pima, Ventana, Rattlesnake, Sabino, and Bear canyons. There are springs spread out over Pusch Ridge including Buster Spring on the north side by Catalina State Park and Pima Spring in the upper reaches of Pima Canyon and Red Warrior Spring in Rattlesnake Canyon. In addition there are additional springs on Mt. Lemmon itself to the northeast of Pusch Ridge. These include, but are not limited to: Shovel, Iron, Samaniego, Cargodera, Quartzite, and Walnut Springs. In addition there are sand and rock dams in Powder House, Pima, Pokan, Ventana, and Agua Caliente canyon and several other canyons along the south face of Pusch Ridge. The dams hold water after monsoons. There is also a functional water catchment at the base of Pusch Ridge.

Active habitat management including the reintroduction of fire and limiting habitat encroachment by humans is critical for the persistence of a viable population of bighorn sheep in the Catalinas. We will work cooperatively with the Forest Service to implement prescribed burns within potential sheep habitat in the Catalinas. We will also encourage allowing natural caused wildfires to burn provided they do not pose a threat to human life or resources.

We will also encourage more proactive fire management practices within the project area. The Forest Service and collaborators recently unveiled FireScape (<http://www.azfirescape.org/>) with the mission of restoring the ecology of the Sky Islands to a dynamic and resilient state. FireScape addresses the well documented need for using controlled burns to manage vegetation in bighorn sheep habitat. Opportunities to use prescribed fire in the Catalinas for many benefits, including improvement and maintenance of bighorn sheep habitat, are now becoming reality through FireScape. This is perhaps the best thing management agencies could do to ensure that a viable population of bighorn sheep will persist in the Catalinas.

We will also work cooperatively with the Forest Service to the extent possible, to help limit human use and encroachment in areas, which may negatively affect the establishment of a viable sheep population. Signage is already in place at numerous trailheads in the Catalinas. There is still a dog restriction in the Pusch Ridge Wilderness and the USFS will assist in enforcing this rule. These will be issues to pay

attention to in the future, but they are not so critical as to preclude successful supplementation of sheep. There is an abundance of great habitat for the sheep to remove themselves from recreational activity. There have been several major fires in the Santa Catalina mountain range including Pusch Ridge that have expanded the amount of available habitat, so finding undisturbed areas shouldn't be difficult.

ITEMIZED USE OF FUNDS:

Santa Catalina Bighorn Sheep Restoration Project 5 Year Budget						
Description of Cost or Activity	Year					Total Possible Project Expense
	2013	2014	2015	2016	2017	
Initial Capture of 30 sheep	\$25,900					
Itemized Capture Expenses	Total					
2 ships, 2 days, 5 hours per day						
20 hours @ \$1050/hr	\$21,000					
Ferry - 7 hours @ \$700/hr	\$4,900					
Secondary Capture of 30 sheep		\$25,900				
Itemized Capture Expenses	Total					
2 ships, 2 days, 5 hours per day						
20 hours @ \$1050/hr	\$21,000					
Ferry - 7 hours @ \$700/hr	\$4,900					
Tertiary Capture (if needed) of 30 sheep				\$27,250		
Itemized Capture Expenses	Total					
2 ships, 2 days, 5 hours per day						
20 hours @ \$1100/hr	\$22,000					
Ferry - 7 hours @ \$750/hr	\$5,250					
Annual Helicopter Surveys - 5 hrs @ \$1050/hr	\$5,250	\$5,250	\$5,250	\$5,250	\$5,250	
Global Positioning System Collars - 30 @ \$5000 ea (This includes the satellite uplink cost) - Two captures only	\$150,000	\$150,000				
Miscellaneous Supplies - (ear tags, medical, etc.) - \$1500/30 sheep	\$1,500	\$1,500		\$1,500		
AGFD Administrative Houndsman for Lion Removal	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	
Research Specialist (data processing, map and website maintenance, quarterly reports depicting survivorship status and movements, etc.)	\$28,000	\$28,000	\$28,000	\$28,000	\$28,000	
Yearly Total Expenses	\$235,650	\$235,650	\$58,250	\$87,000	\$58,250	\$674,800

Special Big Game License Tag Funds

- 11-507 - \$80,000 from last year
- This proposal - \$100,000

Cost Share or Matching Funds (for volunteer labor rates please refer to the worksheet below)

- Wild Sheep Foundation - \$50,000 (pending approval) for this fiscal year
- SCI – Large Grants Program - \$50,000/yr for 5 yrs = \$250,000 (pending approval)
- Club Ovis – Amount unknown – Pending approval
- AZSCI - \$5,000 – Pending Approval

LIST COOPERATORS AND DESCRIBE POTENTIAL PARTICIPATION:

- USFS - assist with processing, release and post release monitoring.
- National Park Service - assist with release and post release monitoring.
- Wild Sheep Foundation - \$50,000 (pending approval)
- SCI – Large Grants Program - \$50,000/yr for 5 yrs = \$250,000 (pending approval)
- Club Ovis – Amount unknown – Pending approval
- AZSCI - \$5,000 – Pending Approval
- ADBSS – assist with funding, processing, release, and post release monitoring.
- Donations from various groups and organizations.

WOULD IMPLEMENTATION OF THIS PROJECT ASSIST IN PROVIDING, MAINTAINING, OR FACILITATING RECREATIONAL ACCESS?

YES[] NO[] N/A[X]

PROJECT MONITORING PLAN:

Sheep will be monitored with satellite GPS collars

PROJECT MAINTENANCE:

N/A

PROJECT COMPLETION REPORT TO BE FILED BY:

Jim Heffelfinger, Game Specialist Region V

WATER DEVELOPMENT PROJECTS (please use the worksheet below):

N/A

TREE CLEARING/REMOVAL PROJECTS (please use the worksheet below):

N/A

LITERATURE CITED:

Available upon Request