

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

Game Branch / HPC Project Number:	15-703
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PROJECT INFORMATION	
Project Title: Identify and validate modeled movement corridors used by Black Bears in north-central Arizona	
Region and Game Management Unit: Region 2; GMU 6B	
Local Habitat Partnership Committee (LHPC): • Williams-Flagstaff	Was the project presented to the LHPC? YES[] NO[X]
Has this project been submitted in previous years? YES[] NO[X] If Yes, was it funded? YES[] NO[] → Funded HPC Project #(s): NA	
Project Type: Research/Wildlife Management	
Brief Project Summary: The purpose of this project is to identify key movement corridors, habitat use and population demographic parameters of black bear (<i>Ursus americanus</i>) within and immediately adjacent to the Camp Navajo, a fragmented landscape in northern Arizona. We will validate and refine existing wildlife corridor models along I-40 in northern Arizona and provide wildlife managers with recommendations for managing corridors for black bear in order to maintain functional permeability of movements on a developing landscape, as well as black bear habitat and populations in northern Arizona.	
Wildlife Species to Benefit: This project will directly benefit black bear populations in northern Arizona, and has potential to benefit other large-bodied wildlife known to occur in the area including turkey, elk, mule deer, pronghorn and mountain lion.	
Big Game Wildlife Species to Benefit (% benefit per species): Black bear (50%), pronghorn (10%), elk (10%), mule deer (10%), wild turkey (10%), and mountain lion (10%). Project results will inform future planning for maintenance and development of tracts of land critical for wildlife movement between either side of I-40 and the surrounding areas.	
Implementation Schedule (Month/Day/Year): <u>Project Start Date:</u> Initialized in May 2016 <u>Project End Date:</u> Finalized December 2019	Environmental Compliance: NEPA Completed: Yes[] No[] N/A[X] <u>Projected Completion Date:</u> _____ State Historic Preservation Office - Archaeological Clearance: (Provide Attachment) Yes[] No[] N/A[X] <u>Projected Completion Date:</u> _____ Arizona Game and Fish Department EA Checklist: N/A[] To be Completed by: <u>Lias Hastings</u> <u>Projected Completion Date:</u> 5/1/2016

PROJECT FUNDING		
Special Big Game License Tag Funds Requested:	\$ 19,750	
Cost Share or Matching Funds:	\$ 3,330 – NAU (labor and mileage)	
Total Project Costs:	\$ 23,080	
PARTICIPANT INFORMATION		
Applicants (please print): Lias Hastings , Wildlife Technician, Arizona Game and Fish Department (AGFD), Wildlife Contracts Branch and Graduate Student, Northern Arizona University; Dr. Michael Ingraldi , State-wide Supervisor, AGFD, Wildlife Contracts Branch; Dan Sturla , Wildlife Specialist II, AGFD, Wildlife Contracts Branch	Address: Lias Hastings 5110 E. Daphne Lane #3 Flagstaff, Arizona 86005	E-mail: Lah228@nau.edu
Telephone: (928) 225-0316		Date: 8/28/15
AGFD Contact and Phone No. (If applicant is not AGFD personnel):		
Project has been coordinated with: Hannah Telle , Wildlife Specialist, Camp Navajo – Department of Defense; Dr. Tad Theimer , Professor, Northern Arizona University; Tom McCall , Region II Wildlife Specialist, AGFD; April Howard , Furbearer and Large Carnivore Biologist, Game Branch		

NEED STATEMENT – PROBLEM ANALYSIS:

Municipalities are developing and growing at a rapid rate, especially along major highways and interstates. The Arizona Sun Corridor is one of the fastest growing developments, spanning from Tucson to Flagstaff and encompassing 86% of Arizona residents. This megaregion is expected to double by 2050. Such growth alters landscapes resulting in habitat fragmentation and loss of connectivity for Arizona’s wildlife. Pro-actively identifying important wildlife corridors today, will allow for their preservation through informed city planning and proper mitigation efforts.

In 2012, The Arizona Game and Fish Department, in cooperation with the City of Flagstaff and Coconino County, took such pro-active measures by launching the Coconino County Wildlife Linkages Project (http://www.azgfd.gov/w_c/documents/CoconinoCountyLinkageReportFINAL4Mar2011.pdf). This project generated GIS-based wildlife corridors in the Flagstaff region, which included a large wildlife corridor along the eastern extent of Camp Navajo that connects habitat on both sides of I-40. These models lack on-the-ground validation. Validating these predictive models by tracking black bear movements will elucidate the usefulness of these models and at the same time allow us to characterize habitat used by black bear in northern Arizona. Camp Navajo is an ideal study site given it is located near two growing municipalities in northern Arizona (e.g., Bellemont and Flagstaff) and along Interstate 40 which has been modeled in the Coconino County Wildlife Linkages Project.

The information gained from the proposed study will be important in planning corridors that allow for sufficient black bear movements within Camp Navajo and the adjacent lands in northern Arizona, so as to ensure long-term population viability and continued sport harvest of the black bear in northern Arizona.

PROJECT OBJECTIVES:

- 1) Identify key black bear movement corridors within and immediately adjacent to Camp Navajo;
- 2) Validate and refine existing wildlife corridor models along I-40 in northern Arizona;
- 3) Identify habitat use (e.g., home range sizes, core use area, denning sites) by black bear within and immediately adjacent to Camp Navajo;
- 4) Estimate reproductive success and survivorship of the adult black bears within and adjacent to Camp Navajo;
- 5) Provide wildlife managers with recommendations for incorporating and maintaining corridors into specific land use plans, and managing black bear habitat, populations and harvest quotas in northern Arizona.

PROJECT DESCRIPTION AND STRATEGIES:

We will attempt to collar up to ten black bear that will be fitted with GPS radio collars (Telonics™, Mesa, Arizona). Bucket snares will be used to capture black bears and they will be immobilized with Telazol administered with a dart gun. Collars will be programmed to record a minimum of eight GPS locations per day (i.e., March-November) activity for a total of 18 months. The collars will be programmed to automatically release after 18 months, and will contain a standard VHF tracking radio with mortality signal for collar recovery. Opportunistically, research biologists from the Arizona Game and Fish Department will fly over the project area to monitor animal welfare and estimate locations.

To *identify corridors used and test model fit of current wildlife corridors*, location data collected on collared black bear will be compared to existing Coconino County Wildlife Linkages Project corridor planning maps to identify congruence and variation. Specifically, data will be analyzed using a suite of connectivity planning software (e.g. Linkage Mapper, Circuitscape, Corridor Design, etc.) to identify corridors used and assess model fit of current wildlife corridors. Habitat covariates will be identified and modeled to determine which environmental characteristics best predict habitat use of black bears. Habitat covariates will include types and/or locations of the following: water sources, dominate landforms, elevation, vegetation communities, high use human areas and barriers, intraspecific interactions, etc. We will *identify home-range and core use areas* within the home-range using fixed kernel estimates and Brownian Bridges in a GIS. We will *identify denning sites* from GPS locations collected during the denning season (December-February). To *determine reproductive success of cubs*, we will conduct late-winter den checks and record age of primiparity from known-age bears, and litter interval, litter size, cub survival (number of cubs surviving to 1 year of age/ total number of cubs born), natality (number of cubs/female/year), and recruitment (number of yearlings/female/year) of radio collared bears. We will *determine the annual survival rate* of adult black bears by sex and age class and calculate survival rates using the staggered-entry Kaplan-Meier estimator.

PROJECT LOCATION:

Camp Navajo Military Installation (and surrounding area), approximately 10 miles west of Flagstaff on Interstate 40; 422763 N 3895454 E, NAD 83, Zone 12N

LAND OWNERSHIP AT THE PROJECT SITE(S):

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

Camp Navajo is owned and operated by the Arizona Army National Guard, and AGFD has an MOU in place with Camp Navajo.

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

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

HABITAT DESCRIPTION:

Camp Navajo is an 11,522 ha Arizona Army National Guard Base located approximately 16 km west of Flagstaff, Arizona (Figure 1). Land use ranges from developed facilities with high intensity human use, to undeveloped forested regions with low human use. At the center of Camp Navajo is a limited use area (900 ha) for ammunition storage, surrounded by almost 7,000 ha of forested buffer area (ADEQ 2014; Figure 1). Topography consists of gently sloping terrain to the north east, rugged steep mountains (Volunteer Mountain) to the northwest, and a deep incised canyon (Volunteer Canyon) to the southwest. Elevations range between 408 m in the southern extent to 2,874 m in the central and western extents. The vegetation is dominated by a ponderosa pine (*Pinus ponderosa*) forest with a mixed understory of Gambel’s oak (*Quercus gambelli*) and New Mexican locust (*Robinia neomexicana*). Higher elevations (e.g., Volunteer Mountain) are characterized by Douglas fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*). A portion of the southern extent is dominated by blue spruce (*Picea pungens*).

ITEMIZED USE OF FUNDS:

Special Big Game License Tag Funds

Description	Cost	Total
10 Telonics store-on-board (TGW-4600-3) radio collars	\$1,675	\$16,750
10 CR-2A collar release mechanisms	\$300	\$3,000
	Grand Total	\$19,750

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

\$3300.00

LIST COOPERATORS AND DESCRIBE POTENTIAL PARTICIPATION:

DoD-Camp Navajo – will provide access to the installation
 Arizona Game and Fish Department, City of Flagstaff, and Coconino County – will provide Coconino County Wildlife Linkages Project data

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

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

Results from this project will inform future municipality planning by protecting and maintaining large tracts of wildland that is currently managed for multi-use, in essence, protecting these tracts from development will maintain recreational access. Black bear population data will inform wildlife managers on hunt recommendations ensuring that sport harvest quotas are supported.

PROJECT MONITORING PLAN:

N/A - This project by default is a monitoring project.

PROJECT MAINTENANCE:

Trapping will be conducted to re-deploy any collars that fall off before the scheduled drop off time, or in the case of any harvested bears.

PROJECT COMPLETION REPORT TO BE FILED BY:

Lias Hastings, Dan Sturla and Michael Ingraldi, PhD - Arizona Game and Fish Department, Wildlife Contracts Branch and Graduate Student, Northern Arizona University

WATER DEVELOPMENT PROJECTS (please use the worksheet below): N/A

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

ATTACHMENTS:

(Please provide cultural clearance documentation from land management agency, e.g., FONSI, Inventory Standards, etc. Also attach any project pictures)

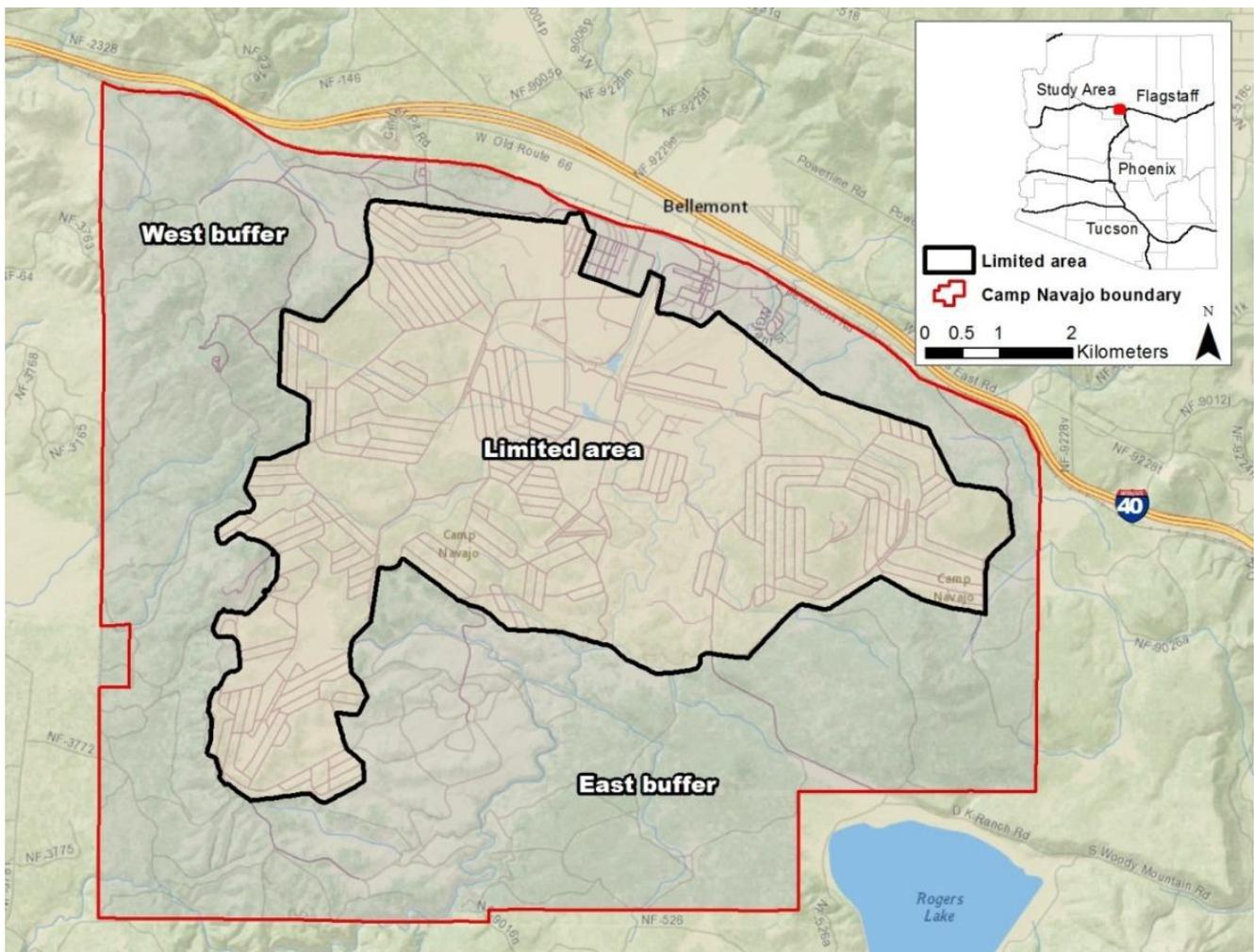


Figure 1. Camp Navajo study area located west of Flagstaff in Belmont, Arizona 2014.