PROGRESS REPORT

for

COOPERATIVE BOBCAT RESEARCH PROJECT

Period Covered:

1 January – 31 May 2011

Prepared by

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SUMMARY BY PROJECT OBJECTIVES

OBJECTIVE I -- DEVELOP PROTOCOL TO ESTIMATE CURRENT ABUNDANCE OF BOBCATS AND TRACK POPULATIONS STATEWIDE.

Approach #1: Use transmitter-equipped bobcats to model suitable habitats and generate density estimate based on area requirements.

A. Location data

Seven new animals were added in Study Area 2 (Table 1). All bobcats were captured in wire box traps and no bobcat sustained any substantial injury from the capture and marking process. Based on the poor performance of Sirtrack collars in Study Area 1, all bobcats in Study Area 2 were equipped with Lotek collars (Wildcell). Collars are functioning well and bobcat home ranges indicate all animals are established residents (Fig. 1).

Table 1. *Bobcats captured, marked, and released in Study Area 2 (southeastern New Hampshire) during January – March 2011.*

Bobcat ID	Gender	Age class	Date	Township	Trapper	VHF frequency
41	Male	Adult	07-Jan-11	Gilmanton	Dan Hockman	151.170
42	Male	Adult	11-Jan-11	Gilford	Dan Hockman	151.230
43	Male	Adult	23-Jan-11	Gilmanton	Dan Hockman	151.190
44	Female	Adult	25-Jan-11	Gilford	Dan Hockman	151.210
45	Female	Adult	28-Jan-11	Barrington	Bob McMasters	151.250
46	Female	Adult	11-Feb-11	Barrington	BobMcMasters	151.270
47	Female	Adult	05-Mar-11	Milton	Bob McMasters	151.530

B. Development of habitat selection model

Currently, 15 habitat models that vary in spatial and temporal scales are being constructed and validated. These models are being developed using 37 variables that describe features at individual locations or proximity to features that are suspected to attract or deter bobcats (Table 2). Preliminary results suggest that during winter, bobcats are selecting wetlands and area of high ruggedness or steep slopes. In the spring, bobcats seem to be associated with wetlands and

areas with low road densities. In summer and fall, wetlands, areas close to waterways, and areas of low ruggedness seem to be preferred.

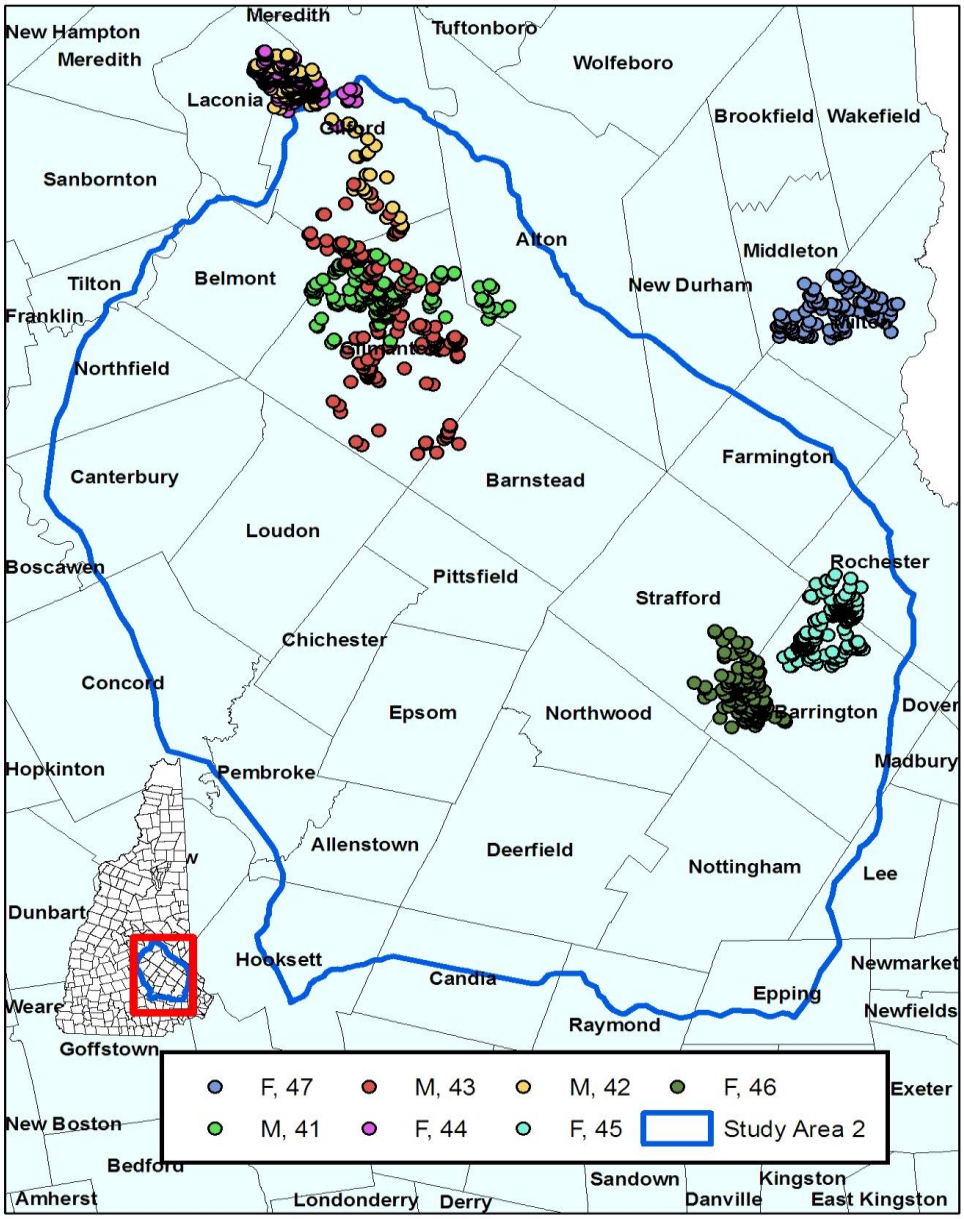

Figure 1. *Bobcat locations in Study Area 2 (see map insert) from 7 January through 15 April 2011. Locations per bobcat ranged from 199 to 335 (total = 1,834).*

Table 2. *Habitat variables used to model bobcat habitat in New Hampshire.*

Variable	Data source
Elevation	USGS Digital Elevation Model (DEM)
Slope (degrees)	DEM spatial analyst calculation
Aspect (9 categories)	DEM spatial analyst calculation
Landcover (9 categories)	2006 National Land Cover Dataset (2006 NLDC)
Road density (km/km^2)	Spatial Analyst calculation
Stream density (km/km^2)	Spatial Analyst calculation
Snow depth	Spatial Analyst calculation (sum of winter month precipitation)
Percent canopy closure	2001 NLDC
Vector ruggedness measurement	VRM Tool calculation
Distance to edge	Landscape Fragmentation Tool and Analysis Tool calculation
Distance to waterway (all stream orders)	NHDFlowline and Analysis Tool calculation
Distance to river (stream order ≥3)	NHDFlowline and Analysis Tool calculation
Distance to road (all road classes)	NH & VT Road layers and Analysis Tool calculation
Distance to major road (road classes 1 & 2)	NH & VT Road layers and Analysis Tool calculation
Distance to water	2006 NLDC and Analysis Tool calculation
Distance to light development	2006 NLDC and Analysis Tool calculation
Distance to heavy development	2006 NLDC and Analysis Tool calculation
Distance to disturbed/bareground	2006 NLDC and Analysis Tool calculation
Distance to shrub/scrub	2006 NLDC and Analysis Tool calculation
Distance to agriculture	2006 NLDC and Analysis Tool calculation
Distance to wetland	2006 NLDC and Analysis Tool calculation

C. Estimate of bobcat density based on habitat affinities and area requirements

Once habitat models are completed, they will be used in a GIS to identify areas of suitable habitat and then be combined with area requirements to produce a population estimate.

Approach #2: Evaluate methods (excluding telemetry) to monitor abundance of bobcat populations.

As indicated in previous progress reports, we have evaluated several possible methods to monitor bobcat at regional and statewide scales. Use of remotely-triggered cameras seems to be a practical approach and a thorough evaluation is planned. Based on a review of the emerging literature on this

subject, photographic rate, area occupancy models, and conventional mark-recapture (based on individual recognition) will be the methods evaluated.

OBJECTIVE II -- COMPARE ABUNDANCE OF BOBCAYS IN NEW HAMPSHIRE TO POPULATIONS IN ADJACENT STATES.

Approach: Solicit observations from the general public to estimate the distribution of bobcats within the state.

Since 2008, 409 sightings have been obtained via the project website. Of these, 372 observations included sufficient information to estimate location coordinates. The majority (n = 298) were considered to be of "high accuracy" (red) because they included sufficient information (e.g., street address, road intersection, or actual GPS coordinates) to confidently estimate the observation within 0.40 km. These observations will be used to generate an additional bobcat habitat model. The remainder of locations were considered to be of "low accuracy" (blue) and will only be used to indicate that a township is occupied.

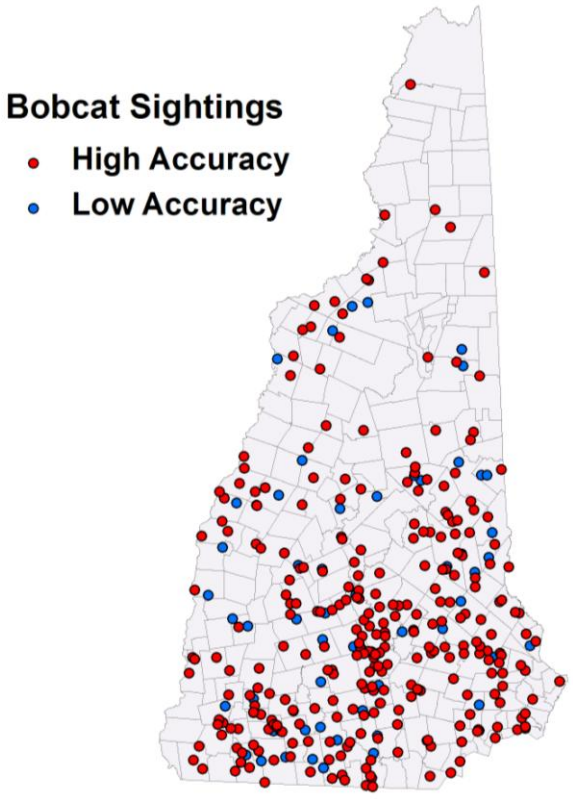

Figure 2. *Bobcat sightings reported by New Hampshire residents from 2008-2011.*

OBJECTIVE III -- USE INFORMATION ON BOBCAT MOVEMENTS AND GENE FLOW TO IDENTIFY POTENTIAL WILDLIFE CORRIDORS.

Approach #1: Use location data obtained from radio-collared bobcats in conjunction with various spatial models (e.g., least-cost pathways) to identify potential corridors used by bobcats.

This topic and approach will be the major focus of the second graduate student involved with this project. Greg Reed was selected as the graduate student for this portion of the project. He will be arriving in mid August.

Approach #2: Evaluate the application of landscape genetics using historic samples of bobcats.

Because of the low success rate in finding bobcat scat, we have developed a method to recover small DNA fragments from bobcat skulls or teeth collected during the 1950s by Dr. Clark Stevens (Dept. of Natural Resources, UNH). At this point, the DNA extraction method has been optimized with a 77% success rate (i.e., 20/26 successful DNA amplifications). However, because historic DNA samples are highly degraded, fragments of only about 250 base pairs can be recovered. Currently, we are evaluating various mitochondrial genes that can be used to determine the phylogeography of the historic samples. We are also evaluating the possibility of using microsatellite markers to determine paternity and gene flow among these samples. However, success rates for microsatellites are low because of the poor quality of the DNA.

DNA has also been extracted from 28 carcasses provided by Fish & Game. Together with the 19 samples collected from the radio-collared individuals, these samples will be used in determining more recent connectivity and gene flow.