

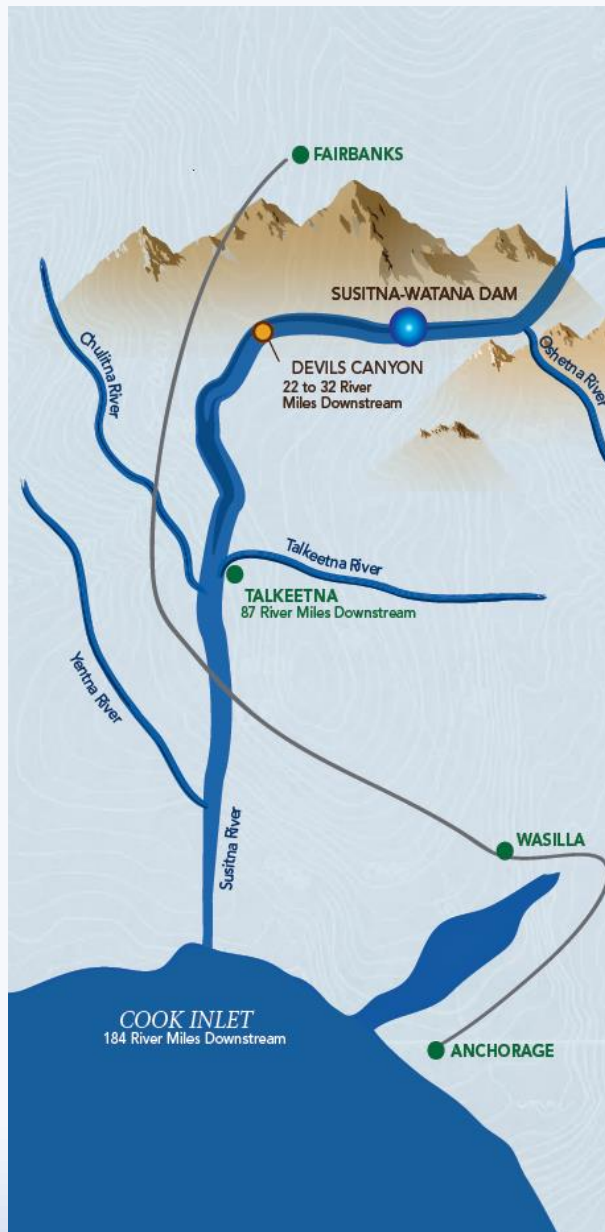
Initial Study Report Meeting

Study 10.10 Terrestrial Furbearer Abundance and Habitat Use

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Study 10.10 Status

- **ISR Documents (ISR Part D Overview)**
 - Initial Study Report (Jun 3, 2014)
 - Study Completion Report (Nov 4, 2015)

Study 10.10 Status

- **Data collection was completed** during the winter (January–April) and summer (July) field seasons in 2014.
- **Genetic analyses of scat and hair samples were completed** by the Prugh Lab at UAF in 2015.
- **Spatially explicit furbearer population estimates were generated** in 2015 using the results of genetic analyses.
- **Furbearer occupancy modeling was completed** in 2015.
- The cumulative results for the 2013–2014 field seasons were reported in the **Study Completion Report** in Nov. 2015.
- **AEA has fulfilled the Study Plan and completed the study.**

Study 10.10 Objectives

- Develop population estimates of coyotes, red foxes, lynx, and marten.
- Assess prey (snowshoe hare and vole) abundance in the study area.
- Compile habitat-use data for the furbearer species being studied.

Study 10.10 Components

- **Sample Collection** (ISR Part A, Section 4.1, pg 2):
 - Collect **scats** along transects following trails and streams during winter months (January through March) in 2013 and 2014.
 - Collect **hair samples** from lynx and marten using hair-snag devices in both years and, in 2014, at natural rub sites.
- **Genetic Analysis** (ISR Part A, Section 4.2, pg 4):
 - Perform **fecal genotyping** to identify each collected sample to the species and individual level.
- **Habitat Use** (ISR Part A, Section 4.3, pg 5):
 - Conduct **aerial track surveys** in winter.
- **Statistical Analyses and Data Interpretation**
(ISR Part A, Section 4.4, pg 6):
 - Use **genetic fingerprints as a genetic mark for a capture–mark–recapture population estimate.**
 - **Model species occupancy and detection probabilities.**

Study 10.10 Variances

- Lack of access to Cook Inlet Regional Working Group (CIRWG) lands in 2013 prevented **marten surveys** from being conducted as planned (RSP Section 10.10.4.1). Sampling protocols were modified in 2014 to increase sampling along scat collection transects and at a higher intensity than originally planned.
- No surveys were conducted in the **Chulitna Corridor in 2013 or the Gold Creek corridor** in 2013 and 2014 due to limitations on access.
- The **Chulitna Corridor was eliminated from further consideration** in 2014.
- To maximize sampling effort in areas accessible by snowmachine from the 2013 winter base of operations on the Denali Highway, the study team **expanded the 2013 survey area** to include areas northeast of the study area.

Study 10.10 Variances

- A **change in base camp location in 2014** improved the study team's ability to travel throughout most of the original study area, but areas south of the Susitna River still remained inaccessible by snowmachine. However, the survey team extended track transects farther south down Deadman Creek in 2014.
- Deployment and use of **lynx hair snags** (RSP Section 10.10.4.1) was modified to increase sampling efficiency in the field and to create a survey layout that allowed better comparison of the lynx survey data with those from the canid scat collection effort. In 2014, the survey team backtracked fresh lynx tracks while checking hair snags to attempt to obtain additional hair samples and increase sample size.
- **Snowshoe hare sampling** grid distribution (RSP Section 10.10.4.1) was altered to better account for variability of habitats throughout the 2013 and 2014 survey area.

Study 10.10 Variances

- The **vole live-trapping surveys** were shortened in 2013 from the 1–5 nights originally proposed to a single night per grid.
- Additional data on habitat use and species occupancy (beyond the aerial surveys described in the Study Plan) were collected during the ground-based track surveys in winter 2013. This variance was continued in 2014.
- **Occupancy modeling** was added to the study design.
- The study team discontinued the use of motion-sensing cameras to collect data on habitat use and species occupancy in 2014 because that survey method did not produce useful information during the 2013 field season. This variance was proposed as a modification in ISR Part C, Section 7.1.2.

Summary of Results

(ISR Part A, Section 5)

Sample Collection in Winter 2013 for Genetic Analyses:

- Scat collections were successful in 2013, whereas hair collection had variable success.

ISR Table 5.1-1 (table number corrected per ISR Part B)

Species	Number of Scat Samples Collected
Coyote	35
Red Fox	76
Lynx	2
Marten	6
Wolverine	12
Total	131

ISR Table 5.1-2 (table number corrected per ISR Part B)

Species	Number of Hair Samples Collected
Lynx	23
Wolverine	6
Total	29

Summary of Results

(ISR Part A, Section 5)

Prey Surveys, Summer 2013:

- Prey abundance was highly variable across the study area, but appeared to be at relatively low densities overall.

ISR Table 5.1-3 (table number corrected per ISR Part B)

Survey Location	Average Number of Snowshoe Hare Pellets / Plot
1) Watana Creek Shrub	2.04
2) Jay Creek Forest	2.24
3) Tsusena Creek Shrub	8.7
4) Deadman Creek Forest	25.84
5) Watana Creek Forest	3.34
6) Upper Butte Creek Forest	0.48
7) Upper Butte Creek Shrub	1.32
8) Seattle Creek Shrub	3.78
9) Seattle Creek Forest	0.33
10) Butte Lake Forest	0.62
11) Butte Lake Shrub	16.48
12) Southern Butte Creek Forest	6.16
13) Southern Butte Creek Shrub	3.28
14) Jay Creek Shrub	45.16
15) Oshetna Creek Forest	29.78
Range	0.33 – 45.16

ISR Table 5.1-4 (table number corrected per ISR Part B)

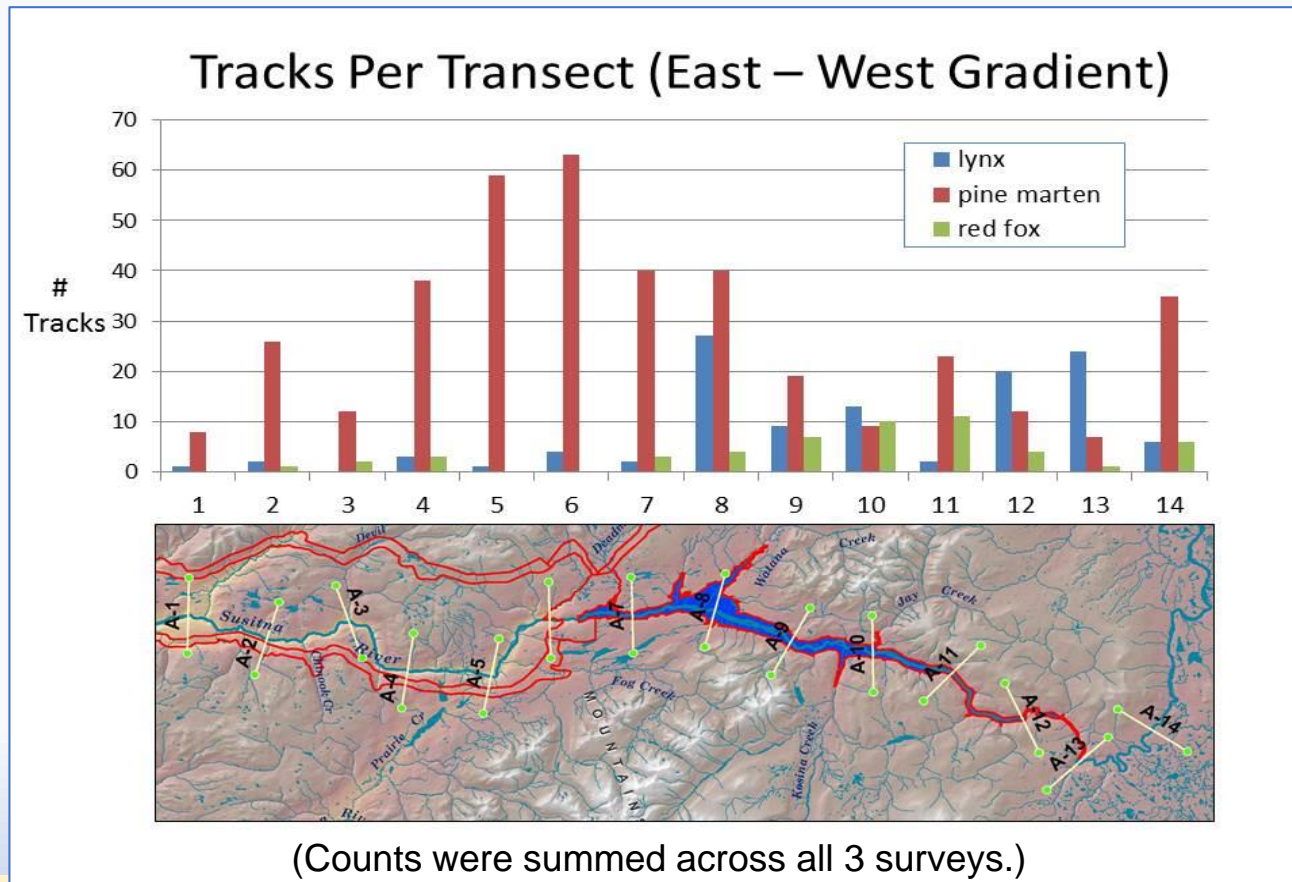
Survey Location	Number of Captured Voles (Species)
1) Watana Creek Forest	1 (Red-backed Vole)
2) Watana Creek Meadow	0
3) Jay Creek Forest	0
4) Jay Creek Meadow	2 (Meadow Vole, Singing Vole)
5) Tsusena Creek Forest	1 (Red-backed Vole)
6) Tsusena Creek Meadow	0
7) West Tsusena Creek Forest	2 (Red-backed Vole)
8) West Tsusena Creek Meadow	1 (Red-backed Vole)
9) Upper Butte Creek Forest	1 (Red-backed Vole)
10) Upper Butte Creek Meadow	1 (Red-backed Vole)
11) Upper Watana Creek Forest	1 (Red-backed Vole)
12) Upper Watana Creek Meadow	0
13) Seattle Creek Forest	1 (Red-backed Vole)
14) Seattle Creek Meadow	2 (Red-backed Vole)
15) Deadman Mountain Meadow	0
Total	13

Summary of Results

(ISR Part A, Section 5)

Aerial Track Surveys, Winter 2013:

- Three surveys were conducted (February 26, March 27, April 19) along the same 14 transects surveyed for the APA Project in November 1980.



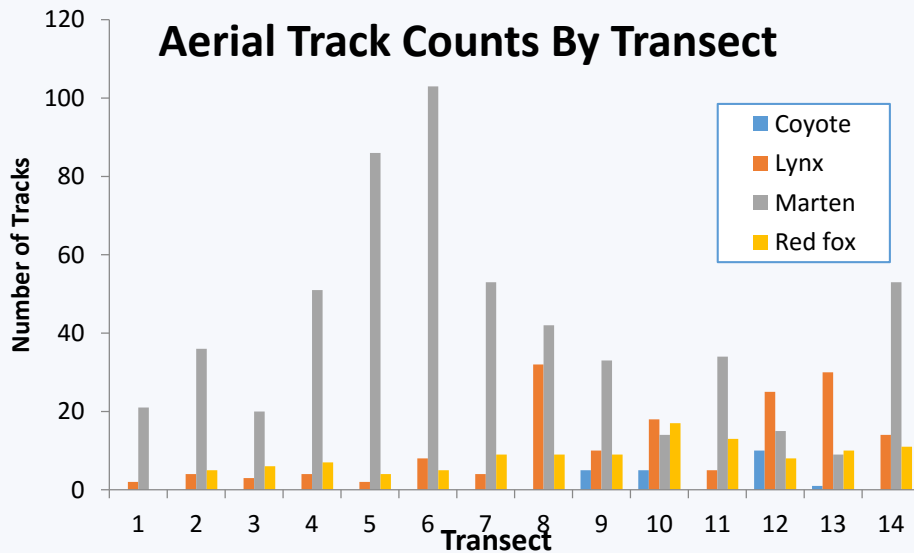
ISR Part A,
Figure 5.2-1

Summary of Results

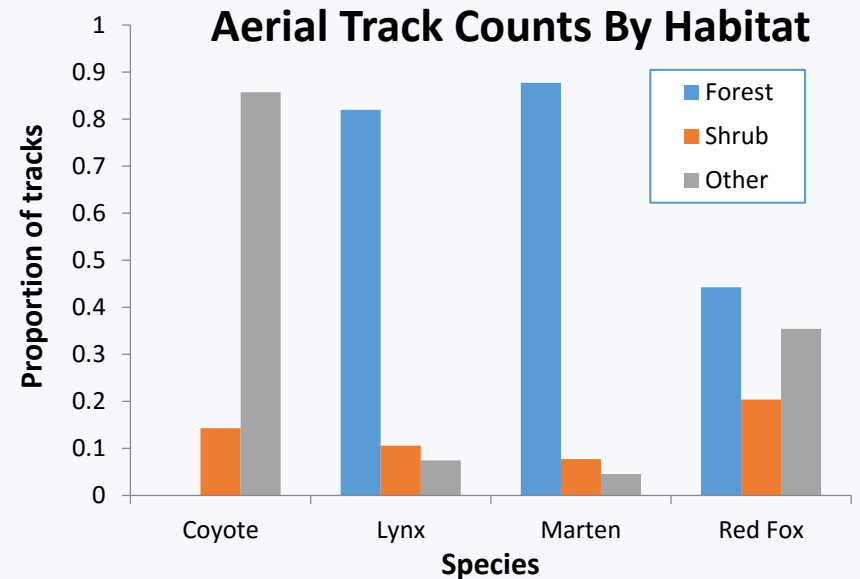
(SCR Section 5)

Aerial Track Surveys in Winter 2014:

- Due to poor snow conditions, only two aerial track surveys were conducted in winter 2014 (February 17 and March 25).
- A total of 458 furbearer tracks were detected, including 179 marten, 61 red fox, 47 lynx, and 21 coyote tracks. Tracks of non-target species included 55 wolverine, 37 wolf, 33 weasel, 5 river otter, and 1 bear.



SCR Figure 5.2-1. Track Counts of Terrestrial Furbearers along Each Aerial Survey Transect in Winter 2013 and 2014. Counts were summed across 5 surveys.



SCR Figure 5.2-2. Proportion of Furbearer Tracks Counted in Major Habitat Types During Aerial Transect Surveys in Winter 2013 and 2014. Counts were summed across 5 surveys.

Summary of Results

(SCR Section 5)

Scat Collection in Winter 2014 for Genetic Analysis:

- Success of coyote and red fox scat collection increased from 2013.

SCR Table 5.1-1. Furbearer Scat Samples Collected during the Terrestrial Furbearer Study, Winter 2013 and 2014.

Species ¹	Number of Scats Collected in an Unknown Year	Number of Scats Collected in 2013	Number of Scats Collected in 2014	Total Scats Collected	Number of Scats Successfully Genotyped (% of total)
Red Fox	2	75	154	231	137 (59%)
Coyote	1	28	44	73	50 (68%)
Marten	0	02	1	3	3 (100%)
Lynx	0	0	8	8	8 (100%)
Wolverine	0	11	24	35	17 (49%)
Wolf	0	3	30	33	n/a
Failed	2	19	44	65	n/a
Total Success	3	119	261	383	n/a
Grand Total	5	138	305	448	215

Samples were identified to the species level in the Prugh Lab at UAF using DNA extraction techniques outlined in the RSP (Section 10.10.4.2).
n/a = Not Applicable (scats from wolves were not genotyped to the individual level).

Summary of Results

(SCR Section 5)

Hair Collection in Winter 2014 for Genetic Analysis:

- Lynx hair collection was improved from 2013 by adding backtracking and collection at natural rub sites.
- Marten hair collection was hindered by lack of access to CIRWG lands.
- DNA extractions from hair samples were largely unsuccessful.

SCR Table 5.1-2. Hair Samples Collected during the Terrestrial Furbearer Study, Winter 2013 and 2014.

Species	Number of Samples Collected in 2013	Number of Samples Collected in 2014 at Hair Snag Stations	Number of Samples Collected in 2014 by Backtracking
Lynx	23	18	22
Marten	0	21	0
Total	23	39	22

Note:

Samples were identified in the field based on hair coloration and size and the presence of furbearer tracks near the hair snag station. These counts represent field collection data only, as DNA extractions failed for most of the collected samples.

Summary of Results (SCR Section 5)

Prey surveys conducted in July 2014 showed a significant increase in vole abundance from 2013.

SCR Table 5.1-4. Number of Voles Captured and Estimated Vole Density*

Survey Plots	Red-backed Voles Caught, 2013	Singing Voles Caught, 2013	Meadow / Tundra Voles Caught, 2013	Total Number of Voles Caught, 2013	Vole Density 2013 (voles/ha)	Red-backed Voles Caught, 2014	Singing Voles Caught, 2014	Meadow/ Tundra Voles Caught, 2014	Total Number of Voles Caught, 2014	Vole Density 2014 (voles/ha)
1) Watana Creek Forest	1	0	0	1	3.2	3	0	0	3	9.5
2) Watana Creek Meadow	0	0	0	0	0	10	0	0	10	31.6
3) Jay Creek Forest	0	0	0	0	0	9	0	0	9	28.4
4) Jay Creek Meadow	0	1	1	2	6.3	2	0	12	14	44.2
5) Tsusena Creek Forest	1	0	0	1	3.2	8	0	1	9	28.4
6) Tsusena Creek Meadow	0	0	0	0	0	11	0	0	11	34.8
7) West Tsusena Creek Forest	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a
8) West Tsusena Creek Meadow	3	0	0	3	9.5	n/a	n/a	n/a	n/a	n/a
9) Upper Butte Creek Forest	1	0	0	1	3.2	7	0	0	7	22.1
10) Upper Butte Creek Meadow	1	0	0	1	3.2	2	0	0	2	6.3
11) Upper Watana Creek Forest	1	0	0	1	3.2	4	0	0	4	12.6
12) Upper Watana Creek Meadow	0	0	1	1	3.2	0	7	0	7	22.1
13) Seattle Creek Forest	1	0	0	1	3.2	9	0	0	9	28.4
14) Seattle Creek Meadow	2	0	0	2	6.3	2	0	0	2	6.3
15) Deadman Mountain Meadow	0	0	0	0	0	0	0	0	0	0
Average – Meadow	0.8	0.1	0.3	1.1	3.6	3.9	1.0	1.7	6.6	20.8
Average – Forest	0.7	0.0	0.0	0.7	2.3	6.7	0.0	0.2	6.8	21.6
Average – Overall	0.7	0.1	0.1	0.9	2.9	5.2	0.5	1.0	6.7	21.1

n/a Plots were not surveyed.

* Density conversion ($Dv = \text{voles per hectare}$; $N1 = \text{number of voles caught on first trap night}$; see Methods): $Dv = 0.5157 * N1 - 0.0684$.

Summary of Results (SCR Section 5)

Prey surveys conducted in July 2014 indicated generally lower, albeit variable, abundance of snowshoe hares compared with 2013.

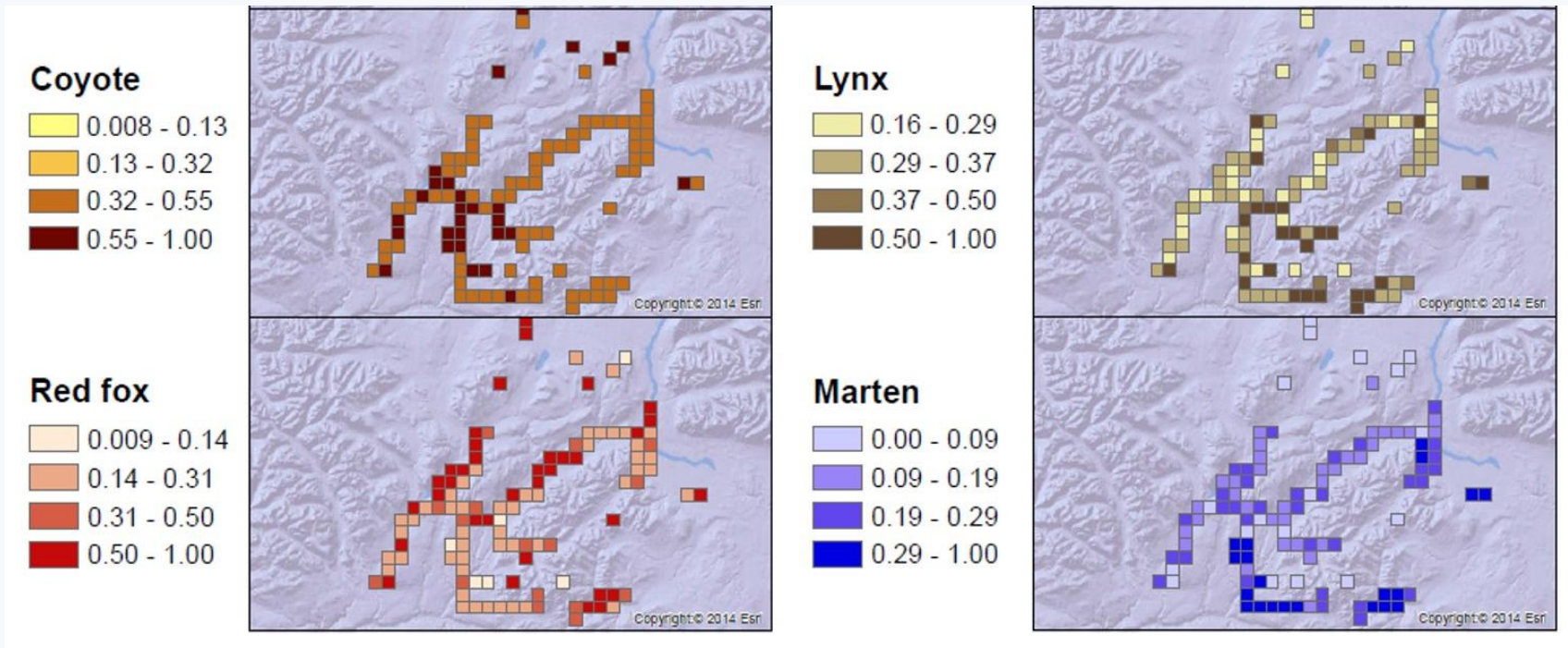
SCR Table 5.1-3. Average Number of Hare Pellets per Survey Plot and Average Hare Densities*

Survey Plots	Mean Number of Pellets per Plot in 2013	Estimated Hare Density in 2013 (hares/ha)	Mean Number of Pellets per Plot in 2014	Estimated Hare Density in 2014 (hares/ha)
1) Watana Creek Shrub	2.0	0.08	1.32	0.05
2) Watana Creek Forest	3.3	0.12	3.36	0.13
3) Jay Creek Forest	2.2	0.09	0.74	0.03
4) Jay Creek Shrub	45.2	1.41	16.90	0.62
5) Tsusena Creek Shrub	8.7	0.30	3.96	0.15
6) Deadman Creek Forest	25.8	0.74	10.38	0.39
7) Upper Butte Creek Forest	0.5	0.02	0.10	0.00
8) Upper Butte Creek Shrub	1.3	0.05	0.64	0.02
9) Seattle Creek Shrub	3.8	0.09	4.08	0.16
10) Seattle Creek Forest	0.3	0.01	0.10	0.00
11) Butte Lake Forest	0.6	0.02	0.82	0.03
12) Butte Lake Shrub	16.5	0.39	6.46	0.25
13) Southern Butte Creek Forest	6.2	0.18	2.64	0.10
14) Southern Butte Creek Shrub	3.3	0.11	1.76	0.06
15) Oshetna Creek Forest	29.8	1.14	29.40	0.86
Average – Shrub	11.5	0.35	5.0	0.19
Average – Forest	8.6	0.29	5.9	0.19
Average – Overall	10.0	0.32	5.5	0.19

* Density conversion equation: $D_h = 0.03 * D_p$ (Prugh 2005).

Summary of Results (SCR Section 5)

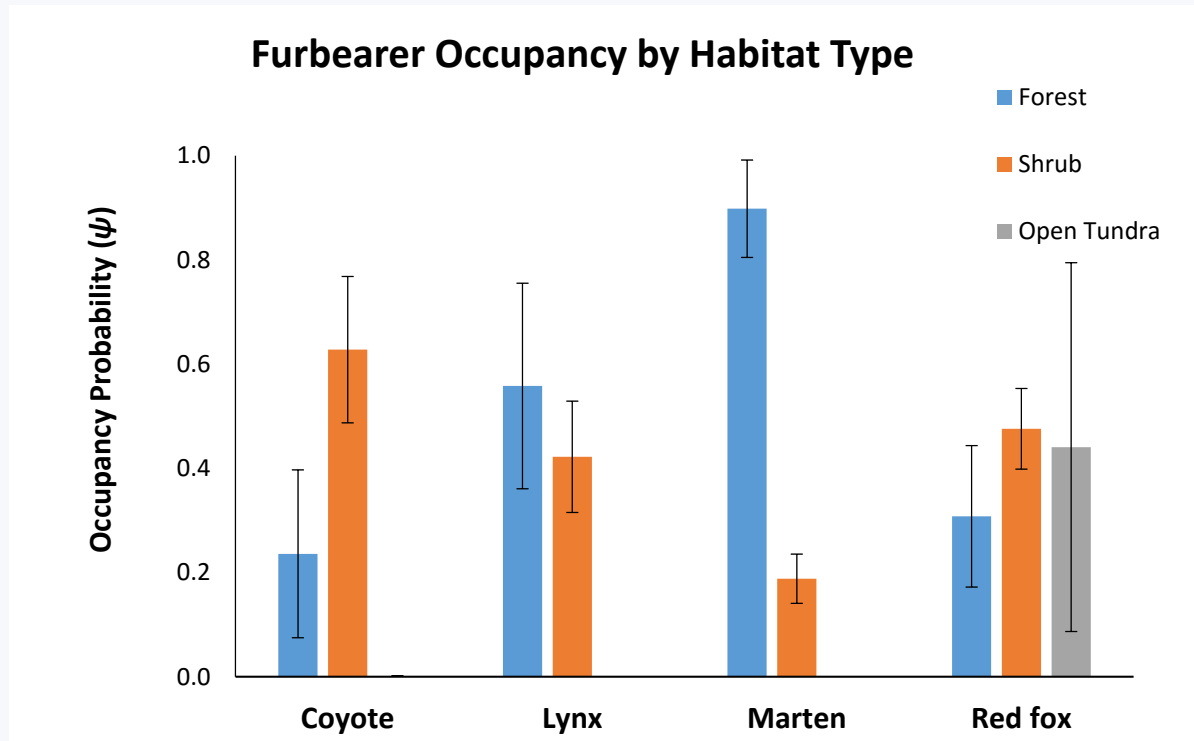
Statistical Analyses: Occupancy probabilities were calculated from ground-based track surveys.



SCR Figure 5.2-4. Cell-specific Maximum Occupancy Probabilities for Furbearers in the Study Area, Winter 2013–2014. Estimates are from model: $p(\text{dist} + \text{dsls} + \text{species} + \text{method} + \text{year}) \psi(\cdot)$. The continuous detection covariates 'survey distance' (dist) and 'days since last snowfall' (DSLs) were held constant at their mean values for these estimates.

Summary of Results (SCR Section 5)

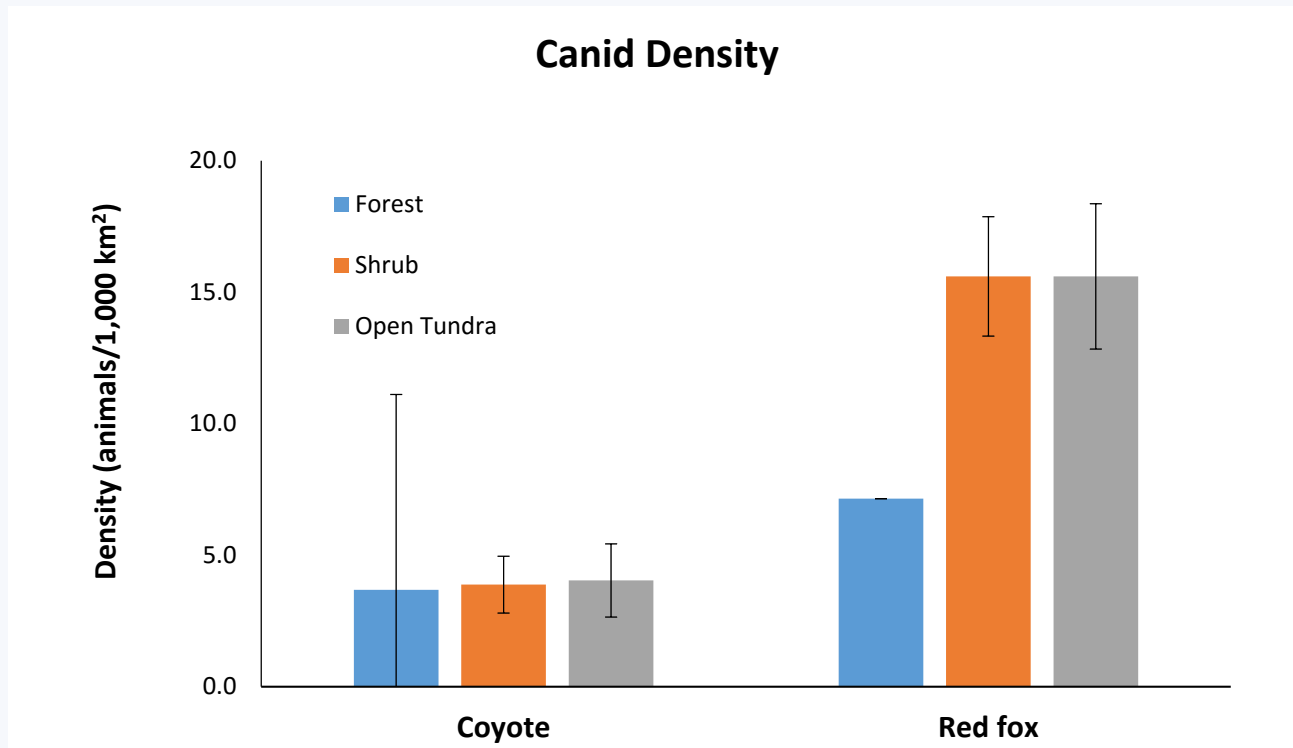
Statistical Analyses: Occupancy probabilities were compared by habitat type and species.



SCR Figure 5.2-6. Occupancy Probabilities by Habitat Type with Standard Errors for Terrestrial Furbearer Species in the Study Area, Winter 2013–2014. Estimates are from model: $p(dist + dsls + species + method + year) \psi(species*habitat)$ where $dist$ = survey distance, $dsls$ = days since last snowfall, and $method$ = square or linear track transect.

Summary of Results (SCR Section 5)

Statistical Analyses: Density of coyotes and red foxes was calculated from a spatially explicit mark–recapture model based on genetic results. (Similar density estimates could not be obtained for lynx and marten due to the failure of genetic analyses to produce usable results for those species.)



SCR Figure 5.3-1. Model-averaged Density Estimates, with Standard Error, of Coyotes and Red Foxes during the 2014 Winter Survey Season in the Terrestrial Furbearer Study Area. 2013 and 2014 density estimates were nearly identical. Estimates are broken down by major habitat type. Variance for red fox density in forest habitats was not estimable.

AEA's Proposed Modifications

- The Chulitna Corridor has been eliminated from further consideration, and therefore from the study area.
(ISR Part D Overview, Section 1.3)
- **AEA plans no further modifications of the methods for this study, as this study is now complete.**



Example of lynx hair sample collected on backtracking survey.

Steps to Complete Study

AEA has fulfilled the Study Plan and completed the study.

Licensing Participants' Proposed Modifications to Study 10.10?

Coyote and fox photos taken at caribou carcass on upper Watana Creek.



- Agencies
- CIRWG members and Ahtna
- Public