Friends of the Central Cascades Wilderness Citizen Science Annual Report

Fall 2015

1 Year in Review

Over the winter of 2014-15 and summer 2015 Friends of the Central Cascades Wilderness operated nine wildlife cameras at five stations, analyzed 40,852 images collected, and reported 108 carnivore detections to the Deschutes National Forest along with numerous detections of prey species. Slightly over 115 miles of trail were surveyed—with regular coverage of segments of particular interest—and approximately 175 scats were identified. One scat was considered a potential fox scat and will undergo DNA testing. Four cameras and supporting equipment were purchased by Friends and deployed by March 2015, other equipment being generously loaned to Friends to start the program in October 2014. Expansion to 14 cameras for the winter of 2015-16 to increase the area monitored and pursue research interests is in progress. Additional stations will be deployed and trail miles surveyed if volunteer availability increases or if funds are raised for paid staff.

Friends' carnivore monitoring efforts are part of the Deschutes National Forest inventory begun in 2012[1] and continuing in partnership between the Forest, High Desert Museum, and Friends. A priority of the inventory is determining presence of Sierra Nevada red fox (*Vulpes vulpes necator*; SNRF) along the Cascade Crest in Central Oregon via wildlife camera stations and trail surveys. SNRF is a red fox subspecies of current conservation interest, being warranted but precluded federally and state critically endangered in California,[2,3] indicated as a data gap species in the 2015 Oregon Conservation Strategy,[4] and a sensitive species in Forest Service region 6.[5] Additional data on the distribution of the Southern Cascades distinct population segment is desired for management. Current investigation in Central Oregon includes the Deschutes, Willamette, and Umpqua National Forests.[6] Data on other carnivores is also collected, with coyote (*Canis latrans*) and American marten (*Martes americana*) of primary interest due to possible niche competition with SNRFs and use of marten as an old forest management indicator species (MIS).

Friends' contribution to the inventory emphasizes hike in, volunteer involvement as it best aligns with the organization's wilderness stewardship interests. This began unofficially in September 2014 with the program being formalized in November. An organizational agreement between Friends and the Deschutes National Forest was signed in March 2015.

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[1] Hiller and Hiller (2014). Final Progress Report Forest Carnivore Research in the Northern Cascades of Oregon. Retrieved 2015-10-08.

[2] US Fish and Wildlife Service (2015). 12-Month Finding on a Petition To List Sierra Nevada Red Fox as an Endangered or Threatened Species. Retrieved 2015-10-08.

[3] Wikipedia (2015). Sierra Nevada red fox. Retrieved 2015-10-08.

[4] Oregon Department of Fish and Wildlife (2015). Oregon Conservation Strategy, draft 2015 update. Retrieved 2015-10-08.

[5] US Forest Service Region 6 (2015). ISSSP Agency Policy and Lists. Retrieved 2015-10-08.

[6] Jocelyn Akins, Cascades Carnivore Project. Lauri Turner, Monty Gregg, Joan Kittrell, USFS (2014). Private communications.

2 Summary of Field Results

2.1 Study Areas

SNRFs are montane, subnivean predators. Data as to their habitat selection is limited.[7,8] To assess their distribution the Deschutes forest carnivore inventory follows a two mile survey grid established by the Pacific Northwest Research Station, giving priority to placing cameras and transecting trails within survey cells identified by the Cascades Carnivore Project as containing suitable habitat. Camera stations set by the Deschutes National Forest over the past several years have provided coverage over a majority of the area. The High Desert Museum is focused on completing coverage across the southern two thirds of the Bend-Fort Rock West Ranger District. Friends operates primarily from Windigo Pass to Maiden Peak on the Crescent Ranger District with additional involvement off Century Drive. These two areas are referred to as the Willamette Pass and Dutchman Flat Sighting Areas, respectively.[9]

Trail transects of opportunity were also performed in the Mount Washington Sighting Area and several areas Iin the Three Sisters Wilderness west of the High Desert Museum's stations. Transects frequently moved off maintained hiking trails to follow game trails or overland to reach areas of interest.

2.2 Carnivore Detections

Detections are obtained from images and video captured by camera stations and sign found during trail transects. Those of primary interest are summarized in Table 1 and Figure 1 below. Stations are identified by a number following the prefix DS for Deschutes.[10] Each organization has its own numbering and some employ multiple prefixes. For example, Friends DS04 and Museum CAM4 are two different sets on different ranger districts. Only Friends stations are listed below. Animals typically remain in a camera's field of view long enough for several images of them to be captured, occasionally hundreds. Each such episode is considered one detection.[11]

Cameras routinely detect other species. Deer, elk, chipmunks, squirrels, grey jays,[12] turkey vultures, and rodents occupying too few pixels to be identifiable are common. Less frequent detections include rabbits, American robins, varied thrush,

[7] John Perrine (2005), Ecology of the Red Fox (*Vulpes vulpes*) in the Lassen Peak Region of California, USA. Retrieved 2015-10-08.

[8] Jocelyn Akins (2014, 2015). Private communications.

[9] US Fish and Wildlife Service (2015),

[10] As sensitive species are being studied latitude, longitude, and station friendly names are available on a need to know basis.

[11] Sliding windows are not used to account for multiple detections of an individual lingering at a station. This is primarily due to DS02, which was regularly visited by a pair of martens not visually distinguishable. This prevented determining whether closely spaced detections of a single marten were the same individual returning or the second member of the pair following the first.

[12] *Perisoreus canadensis*. Also called whiskey jacks or camp robbers.

woodpeckers, and even insects flying close to the camera. Snow, hail, and other events also trip cameras' motion sensors. With respect to carnivores this data is primarily of interest in monitoring availability of prey species.

station operating	area and elevation	American badger	bobcat	black bear	coyote	American marten	raccoon	red fox	striped skunk
DS01 fa, wi, sp	Dutchman 5455 feet					1 wi			
DS02 fa, wi, sp, su	Willamette 6178 feet		2 su	3 su		3 fa, 62 wi, 8 sp, 2 su		1 su	4 wi, 2 sp, 1 su[13]
DS03 wi,sp	Dutchman 5863 feet				6 sp	4 wi			
DS04 wi,sp	Willamette 5401 feet	1 sp[14]		1 su			1 sp		
DS05 su	Willamette 5247 feet		2 su			1 su			

Table 1 Detections by camera station and season for selected species; fa = fall, wi = winter, sp = spring, su = summer

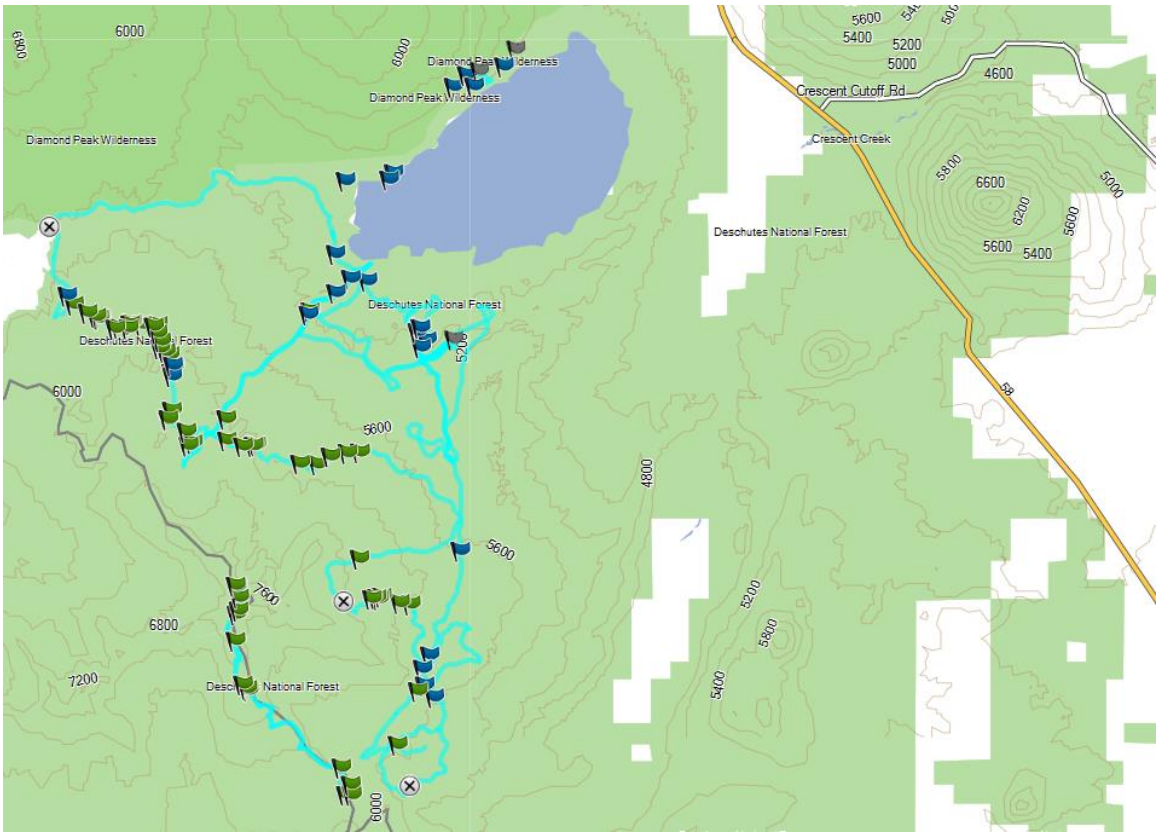


Figure 1 Selected trail transects and sign on Crescent; dark blue = coyote, green = marten, grey = other species

[13] Cheron Ferland (2015). Unusually high elevation for striped skunk in the area (*Mephitis mephitis*). Private communication.
[14] Carina Rosterolla (2015). First known interaction between a badger (*Taxidea taxus*) and a camera station on Crescent Ranger District. Private communication.

2.3 Camera Selection and Detection Efficacy

Wildlife camera stations use trail cameras, which are motion triggered digital cameras specifically built for outdoor use with animals. Camera selection is fundamental to detection efficacy and therefore the success or failure of station data in presence surveys such as the current one. We employed primarily cameras from two manufacturers—Bushnell and Reconyx—which provide fast trigger and recovery times, low power consumption, and temperature ratings desirable for carnivore research.[15] Depending on the exact models being compared two to four Bushnell cameras can be purchased for the cost of one Reconyx. Most organizations therefore select Bushnell, including the Middle Fork Ranger District of the Willamette National Forest, Oregon Department of Fish and Wildlife contractors pursuing fox studies, United States Fish and Wildlife Service personnel in Oregon, and the High Desert Museum. Friends is no exception, operating 12 Bushnell Trophy HD Aggressor 119775Cs and two Trophy HD 119677Cs.

To investigate the possibility of systematic bias due to nearly all fox data in Central Oregon being collected with Bushnell cameras Friends operated a Trophy HD 119677C and a Reconyx HC500 loaned by the Cascades Carnivore Project next to each other on the same tree at station DS02. This provides the two cameras with as closely matched motion trigger stimuli as possible in field conditions and, as the 119677C is a black flash unit (near infrared LED flash) and the HC500 a low glow unit (deep red LED flash) the two cameras do not trigger each other at night. No foxes were detected at the station during the comparison period. Of 45 marten visits detected the HC500 captured 28 and the 119677C 40, a 43% increase over the HC500. This is not a robust study but it is the only controlled comparison in field conditions between the two most capable trigger units currently on the market Friends is aware of, particularly for critters approximately the size and shape of a fox. The marten results are consistent with those for other species detected during the comparison—grey jays, grey squirrels, and striped skunk—and also consistent with anecdotal reports from other operators of both models.[16] It is not known why the 119677C missed five marten visits detected by the HC500.

2.4 Protocol Evolution

Carnivore monitoring is a detail oriented activity requiring considerable attention to ensure all needed supplies are carried, cameras are set for best results, scats aren't missed during trail transects, DNA samples aren't contaminated, and so on. The Cascades Carnivore Project provided Friends with camera station and trail transect protocols and Friends has made a point of talking with other researchers to collect and improve best practices. Notable changes over the field year were

1. Adoption of high barrier bags and lure caches. Some area call lures used are extremely loud, to the point some researchers maintain a separate pack, set of clothes, and so on for use when carrying them as well as some equivalent of a trapper's shed for sorting or at least airing out gear used in the field. Caching lure in high barrier bags in the field avoids most transport requirements while providing sufficient containment critters aren't distracted from camera stations. Triple bagging offers little risk of contaminating gear or clothes even if one bag fails, making hiking with lure, transport of lure in vehicles other than pickups, and

[15] TrailCamPro (2015). Battery, detection, and recovery test data. Retrieved 2015-10-08. Other cameras employed were two Trail Watcher Researchers, which produced no detections, and a Primos Truth Cam 60.

[16] Not enough visits occurred by these species to be significant. Among four skunk visits during the comparison period the HC500 detected two and the 119677C three.

storage of extra lure at personal homes feasible. This makes the program at least an order of magnitude more accessible to volunteers and reduces side trips to drop off or pick up lure from storage locations by an order of magnitude. Safety when camping with lure also improved due to the muted call.

2. Standardization of station service intervals. This halved the number of station visits from original plans, doubling the amount of data collected as twice the stations could be staffed by the same number of volunteers.
3. Identification, testing, and adjustment of a default Trophy HD configuration. This was known informally within the fox research community but not captured to protocol. Further testing and updates were required for substantial hardware changes Bushnell introduced in 2014 and 2015. Station image quality was improved somewhat over initial settings and some reduction in effort required to analyze images obtained.
4. Adoption of the Cascade Carnivore Project's webbing based snare belt design. Easier to adjust on the bait tree than the corrugated plastic design developed in California, more bear resistant, and packs smaller so is more convenient to carry when setting or moving stations.
5. Definition and adoption of a communication plan for carnivore crew. The Deschutes National Forest wrote job hazard analyses for camera station operation and DNA sample collection. Combined with updated versions of the Cascades Carnivore Project's protocols these documents supported an organizational agreement between Friends and the Deschutes National Forest, extending agency coverage to Friends carnivore crew and formally authorizing carnivore studies.

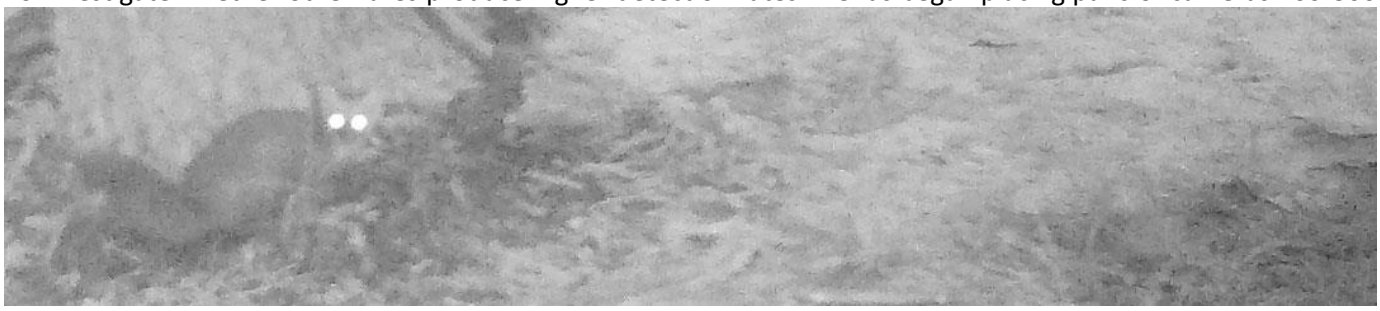
Friends has also devoted significant effort to defining and testing a winterover protocol for use in 2015-16. Preliminary results from winterover operation of camera stations for 200 or more days without servicing will be available in the 2015-16 annual report.

3 Sierra Nevada Red Fox Protocol Research

3.1 Area Lure Efficacy

The default survey protocol for montane fox research exhibits low detection rates during periods of low snowpack.[17] Historically, while some variation from researcher to researcher exists,[18] typically a majority of winter stations detect montane foxes. Fox detection occurred at less than 10% of camera stations in Oregon over winter and spring of 2014-15, though tracking data indicated fox travel within 0.25 to 1.5 miles of an operating camera station on at least four occasions.[19] The winter was 4-6°F warmer than average, resulting in snowpacks around 7% of average in most Oregon basins.[20] Additionally, limited data from use of other lures suggests default protocol may rely on an area lure which is not preferred by SNRFs and may result in station avoidance.[21]

To investigate whether other lures produce higher detection rates Friends began placing pairs of cameras 200-300



[17] Jocelyn Akins. Cheron Ferland, USFS (2015). Private communications.
[18] Jocelyn Akins. Monty Gregg. Jon Nelson, High Desert Museum (2015). Private communications.
[19] Jocelyn Akins (2015). Private communication. Friends carnivore survey data (2015).
[20] Oregon Drought Watch (2015-04). April 2015 basin report. PRISM (2015). Anomaly maps.
[21] Jon Nelson (2015). Private communication.

m apart in each 4 mi^2 survey cell in August 2015. One camera is set with default lure and serves as a control. The other is set with alternate lures identified in discussion with other fox researchers.[22] Unlike default fox protocol, which places one camera per survey cell, this allows an animal to indicate preference by visiting one camera more often than the other. The two cameras are not independent as they fall within each other's scent cones but the distance required for independence between stations is not known. Independent stations also require greater control for nonuniform critter presence over the landscape. It therefore appears smaller separations might offer improved statistical power from a given number of stations, though this will not be known until the next field year's data has been analyzed. The most effective separation between cameras in a pair is also unknown though most guesstimates fall in the 200-500 m range—a finding of strong preference would imply separation could be reduced, one of no preference that separation could be increased. Lack of preference would also indicate more volunteer friendly lures could be used, benefitting at least one species in the program.

It's estimated three to four years' pair data will be required to make an evaluation at current data collection rates. A tripling of the seven pairs planned for winter 2015-16 is desirable as collection of sufficient data for statistical significance may be possible in a single year, simplifying control for annual variability and reducing study time. This lies beyond Friends's forseeable capacity. It may, however, be possible to build to this number over time with partners.

3.2 Hair Snares

The High Desert Museum and Oregon State University (OSU Cascades) have a collaboration investigating whether fox genetic material can be more efficiently collected. Friends initiated discussion in late September with the OSU researchers[23] in regards to joining the project. Evaluation is just beginning as of this report.

4 Funding and Budgeting

Due to substantial contributions from Microsoft, the citizen science program currently has $6621 available. As the volunteer generating matching funds from Microsoft is changing employers it is anticipated funding from this source will decrease dramatically in 2015-16 and to close to zero in 2016-17 and beyond. It is expected up to $2000 may be spent acquiring cameras and that 20% of program assets will need annual replacement, suggesting an upkeep cost of $3600 to support the program through the 2018-19 field season when planned surveys on the Crescent Ranger District are expected complete.

As such, $1000 is presently available to expand the citizen science program into other areas. Two possible vegetation studies are being investigated but no commitments have developed as of this report, meaning the extent of financial demand is unknown.

income - $11,005

donations designated for citizen science	$500
Microsoft monetary match of donated volunteer time	$10,505

forest carnivore expenses - $4381

14 cameras	$2306

[22] Jocelyn Akins. Jon Nelson. Carina Rosterolla, USFS (2015). Private communications. As sensitive species are being studied details of the lures used are available on a need to know basis.
[23] Matt Orr and Francois Schneyder.

batteries for cameras and battery chargers	$386
snare belts and gun brushes	$376
SD cards for cameras	$348
lures, containment, and dispersal	$313
camera locks	$285
ArcGIS desktop advanced annual license	$101
DNA sample collection kit other than snare belts	$78
other station supplies and shipping	$77

forest carnivore donations - $0 and greatly appreciated

bait	Deschutes National Forest
DNA sample collection kit	Cascades Carnivore Project
lure	High Desert Museum

5 Acknowledgements

The Pacific Northwest montane fox research community is a friendly one and Friends' citizen science program would not be what it is without many individuals. Barbara Webb, Blake Creagan, Carina Rosterolla, Cheron Ferland, Chris Domschke, Dan Murphy, Jon Nelson, Kevin Branscrum, and Molly Johnson, and Monty Gregg have all offered enduring and substantial support. The program coordinator would particularly like to thank

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