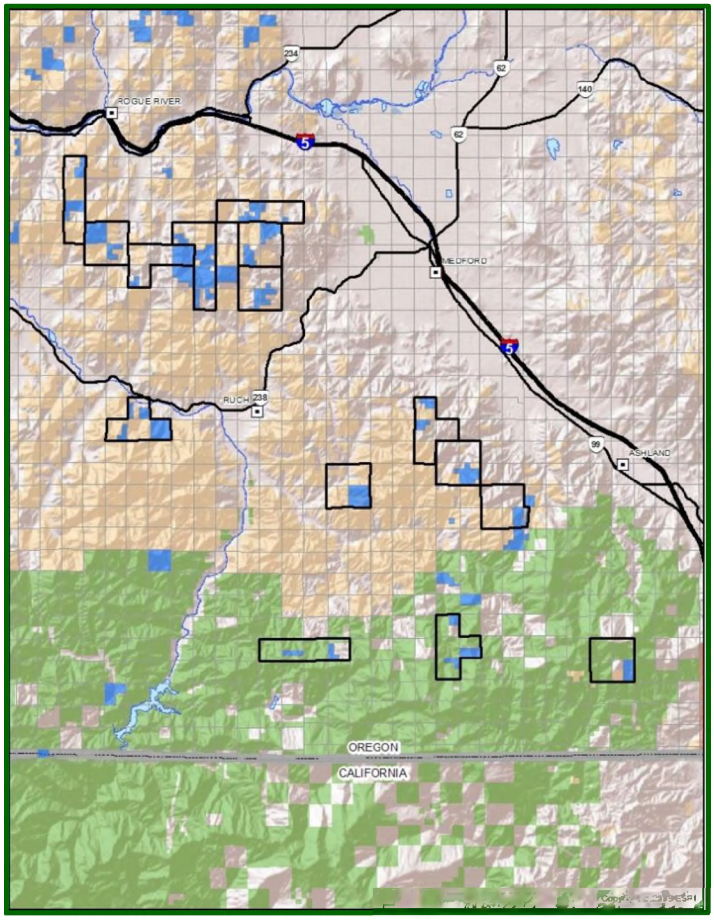
Hancock Forest Management®

A Division of Hancock Timber Resource Group, A Manulife Asset Management Company

Applegate mesocarnivore surveys in the Klamath Mountains, Jackson County, Oregon



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This study was intended to investigate the presence of mesocarnivores, primarily fisher, within a portion of the Klamath Mountains of southern Oregon. The study was conducted by W.M. Beaty & Associates under a contract with Hancock Forest Management. W.M. Beaty & Associates provided personnel, digital cameras, bait, field survey supplies, conducted the surveys and completed this report.

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ABSTRACT

Mesocarnivores serve an important ecological role in our conifer forests of southern Oregon. Due to their ecological importance and relative rarity, protocol surveys were initiated to determine if any mesocarnivores occur on Hancock Forest Management managed forestlands in a portion of the Klamath Mountains of southern Oregon. Thirty baited camera stations were surveyed within 15 sampling units encompassing 39,563 acres or approximately 62 square miles. The mean number of operational days camera stations were functional was 24.8 days. Surveys detected 25 different species with 23 mammals including fisher, and 2 bird species. The mean number of days to initial fisher detection was 10 days. Fisher were detected at 15 of 30 or 50% of the camera stations. While surveys did detect intraguild competitors to fisher including coyote and bobcat, overall, direct intraguild competition or interference to fisher appears low within the study area.

1.0 INTRODUCTION

Hancock Forest Management (HFM) manages privately owned forestland in Douglas, Jackson, Josephine and Klamath Counties, Oregon. The general management goal of HFM is to maintain and enhance the value of the land and manage their properties as healthy natural areas that provide aesthetic, recreational, wildlife and community values. Mesocarnivores serve an important ecological role in western coniferous forests. This study was intended to investigate the presence of mesocarnivores, primarily fisher, within the HFM managed forestlands in a portion of the Klamath Mountains of southern Oregon.

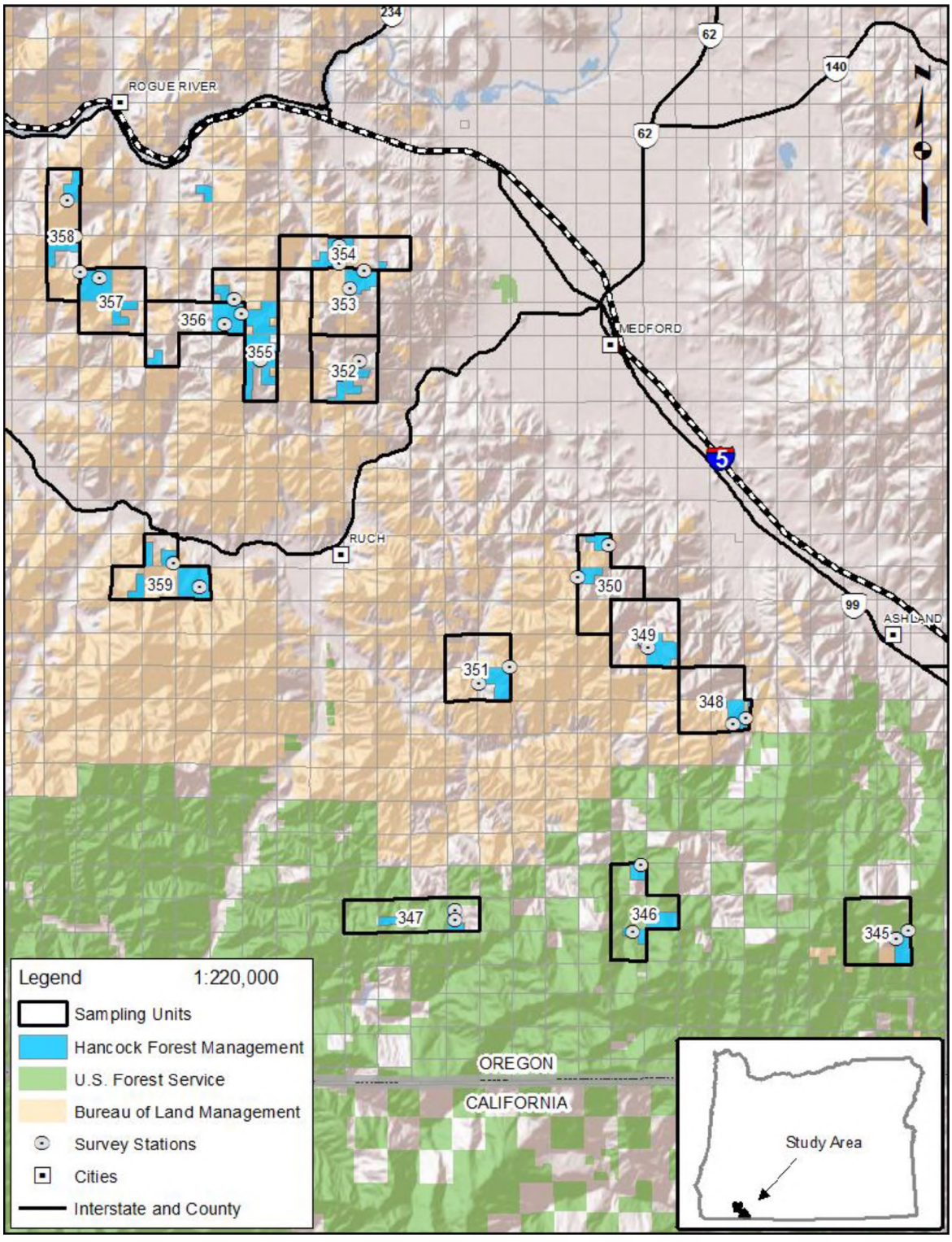
Mesocarnivores are typically more numerous and represent a wide diversity of species as compared to large carnivores which are typically the apex species of their ecological communities (Roemer et al. 2009). However, the distribution of fisher within the Klamath Mountains of southern Oregon is not well documented. Fisher that occupy the Klamath Mountains of southern Oregon are presumed to possess haplotype 1 or 2 which are native fisher related to a larger native population in Northern California (Aubry and Lewis 2003, Drew et al. 2003) and in the Klamath-Siskiyou region of California (Farber and Schwartz 2008). This study was also intended to investigate the distribution of fisher relative to the previously known distribution along the Klamath-Siskiyou region boundary.

2.0 ENVIRONMENT

The study area lies west of Ashland and Medford, Oregon within the Klamath Mountains of southern Oregon (Figure 1). The Klamath Mountains province is bounded on the south by the Sacramento Valley, west by the Pacific Ocean, and on the east by the Cascades Mountains and north by the coast ranges (Thorson et al. 2003). Elevations range from 600 meters near the coast to 1,800 meters on the high peaks. They have a varied geology, with substantial areas of serpentine and marble. The climate is characterized by moderately cold winters with heavy snowfall and warm, dry summers with limited rainfall. Annual precipitation, from nomographs, range from 40 to 62 inches (102 to 157 cm) in the study area and decreases from west to east. As a result of the geology, soil types and climate the Klamath Mountains harbor a large diversity of confers as well as a variety of fish and wildlife.

The study area encompasses approximately 39,563 acres or approximately 62 square miles of forestlands. Land ownership in the study area includes; HFM managed forestlands, 9,418 acres (25%), Bureau of Land Management, 11,987 acres (30%), U.S. Forest Service, 5,658 acres (14%), Oregon Department of Forestry and Fire Protection, 391 acres (1%) and other private ownerships, 12,199 acres (30%). While the study area is comprised of a mix of private and public ownership, all camera stations occurred on HFM managed forestlands (Figure 1).

Figure 1 Study Area



Within the study area, elevation, aspects, geology and disturbance patterns have created four distinct vegetation patterns: mixed evergreen zone, mixed conifer zone, white fir zone and the red fir zone (Franklin and Dyrness 1973). At lower elevations in the study area the mixed-evergreen zone includes predominant tree species of Douglas-fir (*Pseudotsuga menziesii*) Tan-Oak (*Notholithocarpus densiflorus)*, Madrone (Arbutus menziesii), canyon live oak (Quercus chrysolepis), ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*). The mixed-conifer zone includes predominant tree species of Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), white fir (*Abies concolor*) and incense-cedar (*Libocedrus decurrens*). Within the white fir zone the predominant tree species include white fir and red fir (*Abies magnifica*) and incense-cedar. Within the highest elevation areas the red fir zone includes the predominant tree species of red fir, white fir and lodgepole pine (*Pinus contorta*) with occasional noble fir (*Abies procera*) and grand fir (*Abies monticola*).

3.0 METHODS

The mesocarnivore surveys were conducted following a modified Zielinski and Kucera (1995) protocol. The study area was divided into 15 four square mile sampling units (Figure 1). The goal of the sampling protocol was to maximize the probability of detecting mesocarnivores, specifically fisher and marten, while minimizing multiple detections of the same animal (Zielinski and Kucera 1995). Each four square mile sampling unit had two baited digital camera stations (hereafter, referred as "camera stations"). Camera stations were selected (i.e. locations were not randomly located) within sampling units as recommended in Zielinski and Kucera (1995). The selection of camera station locations focused on areas likely to detect mesocarnivores, including stream riparian areas and ridge top locations (Buck et al. 1983, Farber and Franklin 2005, Seglund 1995, Swiers and Powell 2010).

As recommend by Zielinski and Kucera (1995) and Slauson et al. (2009), the goal was to conduct surveys at each sampling station during the fall and winter periods for a minimum of 28 days. When camera stations did not operate during the previous 7-day sampling period, either due to extreme weather conditions or equipment malfunctions, an additional 7-day period was added. Cameras and bait were examined every 7 days and bait was replaced as necessary. Each camera station was baited with a minimum of one piece of raw chicken and two cans of cat food within a chicken wire basket. No additional olfactory attractants or visual attractants were used as mesocarnivores can be readily detected with or without additional attractants (Farber and Franklin 2005, Farber and Schwartz 2008, Swiers and Powell 2010). The basket was placed one half to one meter from the base of the tree to allow all species to be attracted to the station. A goal was to aim the camera so that the base of the tree and bait was included in the camera frame. Each camera was placed within four meters of the bait to ensure recording of photographs for each motion event.

We used Moultrie GameSpy Digital Model D55 cameras and Model D55-IRXT (Appendix A). This model has a digital camera imbedded within a protective plastic case. The sensor units, according to the manufacturers, are a "passive infrared sensor" or a motion detection unit. The cameras are set to record the date and time for each photograph, taking three photographs for every motion event and a minimum one minute delay between motion events.

We recorded physical and environmental conditions found at each camera station. We recorded legal location, landowner, elevation, aspect, slope and temperature. GPS coordinates were recorded for all camera station locations and are listed in Appendix B.

4.0 RESULTS

Surveys were conducted within all 15 sampling units with a total of 30 camera stations (Figure 2). The mean elevation of camera stations within the study area was 3,195 feet (974 m) and ranged from 1,679 feet (512 m) to 6,072 feet (1,851 m). For all 60 camera stations, stations occurred on all four aspect categories including: 33% North (315° to 45°), 23% East (45° to 135°), 20% South (135° to 225°), and 23% West (225° to 315°). The mean slope between all survey stations was 40% and ranged from 4% to 71%.

Wildlife Species Detected

The camera stations detected 25 different species including 23 mammals and 2 bird species (Table 1). Of the 23 mammals, 9 different mesocarnivore species were detected and fisher were detected at 15 of 30 or 50% of the camera stations (Table 2). The mean days to first detection of mesocarnivores varied by species and was 10 days for fisher (Table 2). Intraguild competitors bobcat and coyote were detected at one and two camera stations, respectively.

Sampling Days and Survey Efficiency

Surveys were completed during two 28-day sampling periods in the fall and winter of 2015. The southern portion of the study area was surveyed beginning on September 28th & 29th and the northern portion began on November 11th, 2015 (Appendix B). The mean number of days that cameras were deployed at each station was 36.6 days and mean operational days (ie. days where the camera and bait were functioning to protocol) was 24.5 days. Operational days ranged from 12 to 37 days. Forty percent of camera stations and 100% of sampling units were operational equal to or greater than the protocol recommended 28 days. Camera stations were not always operational primarily due to black bear or gray fox damage to the bait, camera, or both. Black bear were detected at 14 of 30 or 47% of the camera stations, and gray fox at 23 of 30 or 77% of the camera stations.

Figure 2 Location of five mesocarnivories species detected.

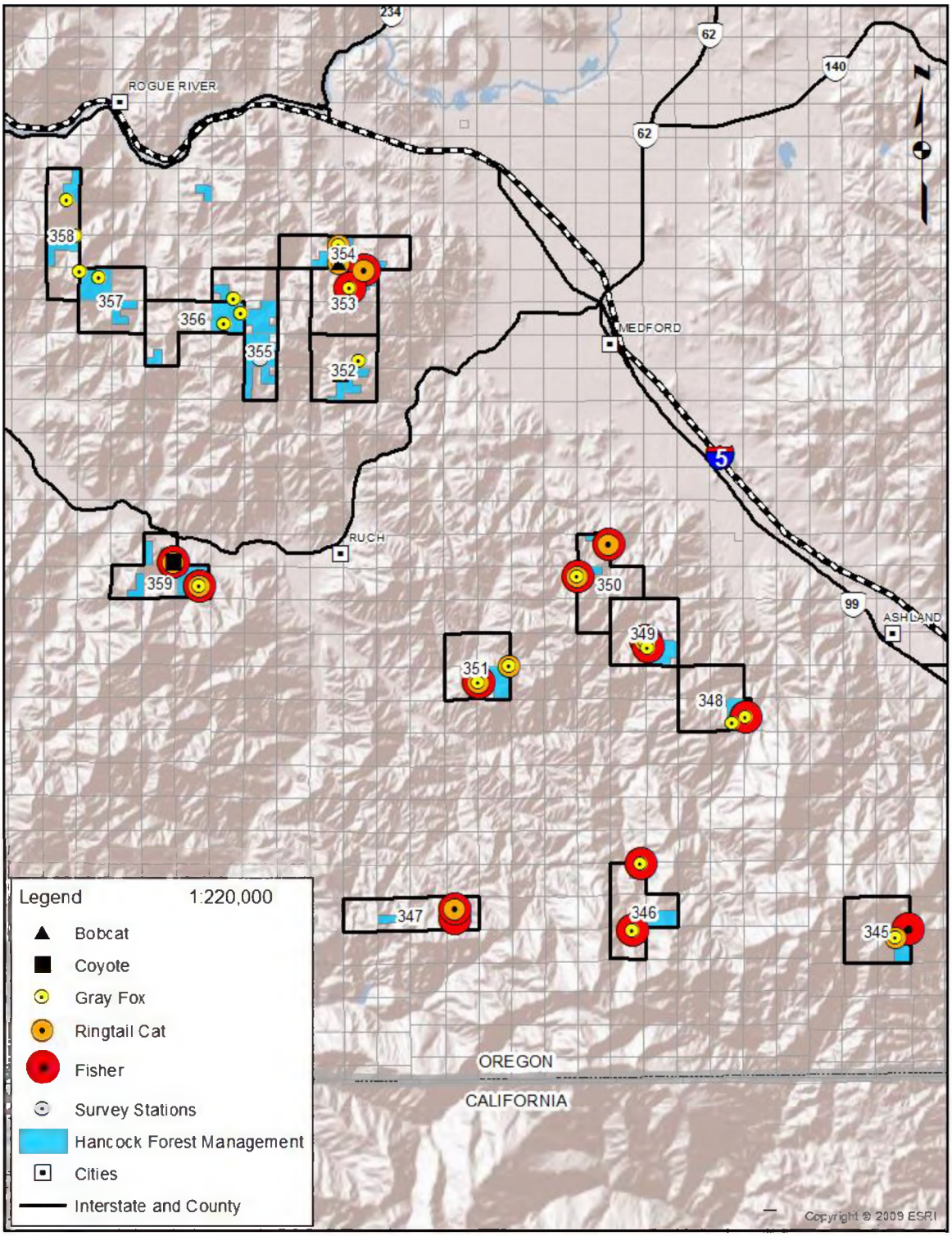


Table 1 Species detected

Lifeform	Common Name	Scientific Name
Mesocarnivore (n=9)	Bobcat	*Felis rufus*
	Coyote	*Canus latrans*
	Gray fox	*Urocyon cinereoargenteus*
	Fisher	*Pekania pennanti*
	Long-tailed weasel	*Mustela frenata*
	Raccoon	*Procyon lotor*
	Ring-tailed cat	*Bassariscus astutus*
	Spotted skunk	*Spilogale gracilis*
	Striped skunk	*Mephitis mephitis*
Other Mammals (n=14)	Chipmunk sp.	*Tamias sp.*
	Black bear	*Ursus americanus*
	Bushy-tailed woodrat	*Neotoma cinerea*
	Deer mouse	*Peromyscus maniculatus*
	Domestic cattle	*Bos taurus*
	Domestic cat	*Felis catus*
	Domestic dog	*Canis lupus familiaris*
	Douglas squirrel	*Tamiasciurus douglasii*
	Flying squirrel	*Glaucomys sabrinus*
	Ground squirrel	*Spermophilus beecheyi*
	Mountain lion	*Felis concolor*
	Black-tail deer	*Odocoileus hemionus*
	Opossum	*Didelphis virginiana*
	Western gray squirrel	*Sciurus griseus*
Birds (n=2)	Common raven	*Corvus corax*
	Stellar's jay	*Cyanocitta stelleri*

Table 2 Mesocarnivores detected

Species	Number of Stations with Detections	Mean Days to first detection	Median Days to first detection	+/- 1 SD
Bobcat	1	9.0	9.0	NA
Coyote	1	15.0	15.0	1.4
Gray fox	23	8.2	7.0	8.5
Fisher	15	10.1	10.0	6.5
Long-tailed weasel	1	1	1	NA
Raccoon	3	10.7	11.0	6.5
Ring-tailed cat	11	7.5	8.0	6.8
Spotted skunk	8	5.0	2.5	4.2
Striped skunk	5	11.8	3.0	15.1

5.0 DISCUSSION

One goal of this study was to determine fisher use of HFM managed forestland within the study area. Fisher were detected at 50% of the camera stations indicating widespread use of managed forestlands and confirms the results of many other studies that fisher occur in a wide variety of managed conifer forests in the Klamath Mountains (Farber and Criss 2006, Farber and Franklin 2005, Farber and Nicolls 2012, Swiers and Powell 2010). In this study, we document fisher occurring in mid-seral intensively managed stands that contain forest structures important to fisher like decayed wildlife trees, conifer and hardwood trees with cavities and accumulations of large woody debris. To better understand fisher occupancy in these managed forests, future studies should focus on the amounts and distribution of structures important to fisher in these mid-seral managed forests.

Another goal of this study was to determine the distribution of fisher relative to the previously known distribution along the Klamath-Siskiyou region boundary. Our results confirmed that fisher continue to use managed forestland along the Klamath-Siskiyou boundary near Ashland, Oregon. Our study also documented that fisher use managed forestlands near the town of Ruch, Oregon along State Highway 238 and north of State Highway 238 within the Galls Creek watershed. These detections occur in locations previously thought to be outside of the current known range of native fisher in the Klamath Mountains of southern Oregon.

It has been suggested that intraguild competition between mesocarnivores may explain presence or absence, relative abundance and distribution of specific mesocarnivores (Gosselink et al. 2003, Major 1997, Roemer et al. 2009). In northern California, based on DNA taken from fisher killed by a predator, 60% were predated by bobcat and 33% by mountain lion (Wengert 2012). Based on these results, studies are on-going to better understand intraguild competition between mesocarnivores, specifically, bobcat and fisher (Wengert 2012). We only detected bobcat and coyote at 3% and 6% of the camera stations, respectively. We believe this apparent lack of direct intraguild competition or interference may have contributed to the detection fisher at 50% of camera stations within this study area.

6.0 REFERENCES

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Appendix A: Digital Camera Types

Moultrie D55 Digital Camera

Moultrie D55-IRXT Digital Camera

Appendix B Applegate Digital Camera Stations (n=15)

Unit	Camera Station	UTM North	UTM East	Elev (meters)	Start Date	End Date
345	345A	4657479	524847	1789	9/28/2015	10/26/2015
	345B	4657082	524261	1851	9/28/2015	10/26/2015
346	346A	4657421	511385	1411	9/28/2015	10/26/2015
	346B	4660679	511808	1162	9/28/2015	10/26/2015
347	347A	4658182	502777	1189	9/29/2015	10/27/2015
	347B	4658470	502728	1130	9/29/2015	10/27/2015
348	348A	4667844	516947	987	9/28/2015	11/2/2015
	348B	4667550	516278	1290	9/28/2015	11/2/2015
349	349A	4671596	512022	948	9/28/2015	11/2/2015
	349B	4671256	512175	978	9/28/2015	11/2/2015
350	350A	4674725	508747	1052	9/28/2015	11/2/2015
	350B	4676285	510239	947	9/28/2015	11/2/2015
351	351A	4669546	503903	772	9/29/2015	11/2/2015
	351B	4670327	505382	923	9/29/2015	11/2/2015
352	352A	4685293	498044	957	9/29/2015	12/7/2015
	352B	4684647	497145	989	9/29/2015	12/7/2015
353	353A	4689741	498334	738	11/3/2015	12/7/2015
	353B	4688822	497538	1114	11/3/2015	12/7/2015
354	354A	4690909	497103	804	11/3/2015	12/14/2015
	354B	4690078	497009	858	11/3/2015	12/14/2015
355	355A	4688394	491924	588	11/3/2015	12/14/2015
	355B	4685337	493169	922	11/3/2015	12/14/2015
356	356A	4687715	492230	663	11/3/2015	12/14/2015
	356B	4687091	491475	833	11/9/2015	12/14/2015
357	357A	4689662	484439	990	11/3/2015	12/7/2015
	357B	4689302	485393	849	11/3/2015	12/7/2015
358	358A	4693109	483735	882	11/3/2015	12/14/2015
	358B	4691438	484195	567	11/3/2015	12/14/2015
359	359A	4675407	489000	512	9/29/2015	10/27/2015
	359B	4674238	490250	539	9/29/2015	10/27/2015

Appendix C:

Fisher detection, Unit #345: Camera Site 345A.

Fisher detection, Unit #346: Camera Site 346A.

Fisher detection, Unit #346: Camera Site 346B.

Fisher detection, Unit #347: Camera Site 347A.

Fisher detection, Unit #347: Camera Site 347B.

Fisher detection, Unit #348: Camera Site 348A.

Fisher detection, Unit #349: Camera Site 349A.

Fisher detection, Unit #349: Camera Site 349B.

Fisher detection, Unit #350: Camera Site 350A.

Fisher detection, Unit #350: Camera Site 350B.

Fisher detection, Unit #351: Camera Site 351A.

Fisher detection, Unit #353: Camera Site 353A.

Fisher detection, Unit #353: Camera Site 353B.

Fisher detection, Unit #359: Camera Site 359A.

Fisher detection, Unit #359: Camera Site 359B.