

REPORT

Project: BLM--Klamath Fisher (*Martes pennanti*) Hair Survey Samples 2013

Date Issued: May 13, 2014

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REPORT

On January 2, 2014 we received 15 hair samples collected in 2013 as part of non-invasive surveys for fisher in southern Oregon. These samples were collected on BLM lands west of Klamath Falls, OR. DNA analysis was requested on these samples to determine species, and if the samples were from fisher, individual, sex, haplotype, and source population analysis.

Three of the samples did not contain hair/contained vegetation. We obtained DNA for species identification from 10 of the 11 samples tested (84.6 %; Table 1). Nine of these samples were from fisher. Sample 15 only yielded DNA from chicken (*Gallus gallus*) presumably from the bait used in the hair traps.

Table 1. Species identification results

Sample #	Station #	Sample Collection Date	Observer	Fisher Photo (Y/N)	Location (TRS)	UTM (NAD 83 10N)	Notes	DNA Species Results
1	21-1	9/3/2013	S. Hayner	Y	T38S R5E SEC 21 SE	563078; 4677441	Fisher, Bear photos	Fisher
2	21-2	9/3/2013	S. Hayner	Y	T38S R5E SEC 21 SW	562220; 4677173	Fisher, Bear photos; Possibly 2 fishers at station	Fisher
3	28	10/29/2013	S. Hayner; M. Broyles; C. Runnels	Y	T38S R5E SEC 29 SE	562161; 4676209	small fisher photo	Fisher
4	34	11/5/2013	C. Runnels	N	T38S R5E SEC 34 NW	564232; 4675230	Camera Issues; 30K photos - No photos - Check for Species	Fisher
5	28	11/5/2013	C. Runnels	Y	T38S R5E SEC 29 SE	562161; 4676209	Only 1 brush	no hair/vegetation
6	35	11/12/2013	M. Broyles	N	T38S R5E SEC 35 SW	565784; 4674375	No photos - Check for Species	no hair/vegetation
7	7	11/19/2013	M. Broyles	N	T39S R6E SEC 07 NW	569087; 4671435	No photos - Check for Species	poor DNA
8	28	11/19/2013	M. Broyles	Y	T38S R5E SEC 29 SE	562161; 4676209		Fisher
9	1	11/26/2013	C. Runnels	Y	T39S R6E SEC 01 NW	567643; 4673109		Fisher
10	35	11/26/2013	C. Runnels	Y	T38S R5E SEC 35 SW	565784; 4674375		Fisher
11	34	11/26/2013	C. Runnels	Y	T38S R5E SEC 34 NW	564232; 4675230		Fisher
12	34	12/4/2013	S. Hayner; M. Broyles; C. Runnels	Y	T38S R5E SEC 34 NW	564232; 4675230		poor DNA
13	7	12/4/2013	S. Hayner; M. Broyles; C. Runnels	N	T39S R6E SEC 07 NW	569087; 4671435	No photos - Check for Species	Fisher

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14	1	12/4/2013	S. Hayner; M. Broyles; C. Runnels	N	T39S R6E SEC 01 NW	567643; 4673109	No photos - Check for Species	no hair/vegetation
15	35	12/4/2013	S. Hayner; M. Broyles; C. Runnels	Y	T38S R5E SEC 35 SW	565784; 4674375		chicken

Individual and Sex Identification

The 9 fisher samples were further tested for individual and sex. Eight hair samples contained quality DNA for these analyses (88.9%) and 3 unique individuals were detected (2 females and 1 male; Table 2). These ten individuals were compared to the fisher DNA database (including individuals detected previously from BLM surveys conducted by Jeff Stevens) and the 3 individuals from this survey represent new individuals. These individuals have been assigned unique identifiers “BLM-KL13-F1, F2 and M3”.

Table 2. Individual and sex identification of fisher hair samples. Individuals are color-coded.

Sample #	Station #	Sample Collection Date	Fisher Photo (Y/N)	Location (TRS)	UTM (NAD 83 10N)	Notes	DNA Sepcies Results	Sex	Individual
1	21-1	9/3/2013	Y	T38S R5E SEC 21 SE	563078; 4677441	Fisher, Bear photos	Fisher	Female	BLM-KL13-F1
2	21-2	9/3/2013	Y	T38S R5E SEC 21 SW	562220; 4677173	Fisher, Bear photos; Possibly 2 fishers at station	Fisher	Female	BLM-KL13-F1
3	28	10/29/2013	Y	T38S R5E SEC 29 SE	562161; 4676209	small fisher photo	Fisher	poor DNA	poor DNA
4	34	11/5/2013	N	T38S R5E SEC 34 NW	564232; 4675230	Camera Issues; 30K photos - No photos - Check for Species	Fisher	Female	BLM-KL13-F1
8	28	11/19/2013	Y	T38S R5E SEC 29 SE	562161; 4676209		Fisher	Female	BLM-KL13-F2
9	1	11/26/2013	Y	T39S R6E SEC 01 NW	567643; 4673109		Fisher	Male	BLM-KL13-M3
10	35	11/26/2013	Y	T38S R5E SEC 35 SW	565784; 4674375		Fisher	Female	BLM-KL13-F1
11	34	11/26/2013	Y	T38S R5E SEC 34 NW	564232; 4675230		Fisher	Female	BLM-KL13-F1
13	7	12/4/2013	N	T39S R6E SEC 07 NW	569087; 4671435	No photos - Check for Species	Fisher	Female	BLM-KL13-F1

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Source Population Evaluation

The 3 individuals were analyzed for mitochondrial DNA (mtDNA) haplotype to compare with our fisher database. Samples were analyzed using a 300bp region of the control region previously used to evaluate fisher (Drew *et al.* 2003, Vinkey *et al.* 2006, Schwartz 2007). We obtained a haplotype from all fisher samples (Table 3).

All fisher samples from your hair survey are Drew-haplotype-9 which has been detected in fisher populations in southwestern Oregon that received translocations. This haplotype is common in British Columbia (Drew *et al.* 2003).

For reference, fisher samples collected west of Ashland, OR are Drew-haplotype 1 and Drew-haplotype 2, which have been observed previously in Northern California and in the Mt. Ashland area (Drew *et al.* 2003; Timber Products Company Preliminary Results July 6, 2010). Neither of these populations is believed to have received historical fisher translocations (Aubry *et al.* 2004, Drew *et al.* 2003). Haplotypes 1 and 2 are consistent with these individuals coming from native source populations.

Table 3. Mitochondrial DNA haplotype results.

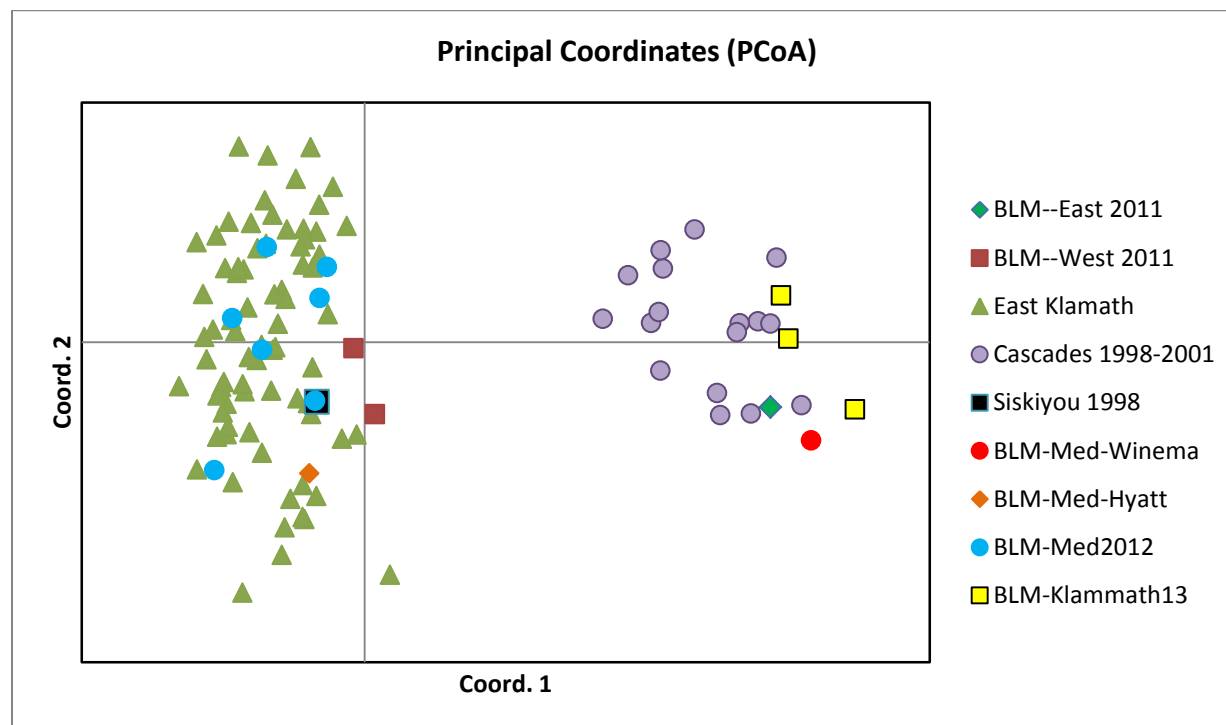
Sample #	Station #	Sample Collection Date	Location (TRS)	UTM (NAD 83 10N)	Notes	DNA Sepcies Results	Sex	Individual	mtDNA Halotype
1	21-1	9/3/2013	T38S R5E SEC 21 SE	563078; 4677441	Fisher, Bear photos	Fisher	Female	BLM-KL13-F1	Drew-hap9
2	21-2	9/3/2013	T38S R5E SEC 21 SW	562220; 4677173	Fisher, Bear photos; Possibly 2 fishers at station	Fisher	Female	BLM-KL13-F1	Drew-hap9
3	28	10/29/2013	T38S R5E SEC 29 SE	562161; 4676209	small fisher photo	Fisher	poor DNA	poor DNA	Drew-hap9
4	34	11/5/2013	T38S R5E SEC 34 NW	564232; 4675230	Camera Issues; 30K photos - No photos - Check for Species	Fisher	Female	BLM-KL13-F1	Drew-hap9
5	28	11/5/2013	T38S R5E SEC 29 SE	562161; 4676209	Only 1 brush	no hair/vegetation			
6	35	11/12/2013	T38S R5E SEC 35 SW	565784; 4674375	No photos - Check for Species	no hair/vegetation			
7	7	11/19/2013	T39S R6E SEC 07 NW	569087; 4671435	No photos - Check for Species	poor DNA			
8	28	11/19/2013	T38S R5E SEC 29 SE	562161; 4676209		Fisher	Female	BLM-KL13-F2	Drew-hap9
9	1	11/26/2013	T39S R6E SEC 01 NW	567643; 4673109		Fisher	Male	BLM-KL13-M3	Drew-hap9
10	35	11/26/2013	T38S R5E SEC 35 SW	565784; 4674375		Fisher	Female	BLM-KL13-F1	Drew-hap9

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11	34	11/26/2013	T38S R5E SEC 34 NW	564232; 4675230		Fisher	Female	BLM-KL13-F1	Drew-hap9
12	34	12/4/2013	T38S R5E SEC 34 NW	564232; 4675230		poor DNA			
13	7	12/4/2013	T39S R6E SEC 07 NW	569087; 4671435	No photos - Check for Species	Fisher	Female	BLM-KL13-F1	Drew-hap9
14	1	12/4/2013	T39S R6E SEC 01 NW	567643; 4673109	No photos - Check for Species	no hair/vegetation			
15	35	12/4/2013	T38S R5E SEC 35 SW	565784; 4674375		chicken			

We evaluated the individuals with ten variable microsatellite markers used previously for fisher in Oregon and California and compared these to our fisher microsatellite database (Figure 1). This database also contains individuals identified from BLM surveys conducted by Jeff Stevens for reference (BLM-East 2011, BLM-West 2011, BLM-Med 2012, and two individuals collected near Winema and Hyatt Lake). The microsatellite DNA data for the 3 individuals from your survey are consistent with being related to/descended from the reintroduced fisher population in the southern Cascades.

Figure 1. Principal coordinates graph of fisher microsatellites. Individuals from the Klamath Survey are represented by yellow squares.



Please contact us if you have any questions; we look forward to working with you in the future.

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Project: BLM--Klamath Fisher (*Martes pennanti*) Hair Survey Samples 2014

Date Issued: February 17, 2015

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REPORT

We analyzed 7 hair samples identified as being from fisher (species report 2/11/15) that were collected using noninvasive surveys in southern Oregon. These samples were collected on BLM lands west of Klamath Falls, OR.

Individual and Sex Identification

We tested the 7 hair samples for individual and sex. All 7 hair samples contained quality DNA for these analyses and 4 unique individuals were detected (2 females and 2 males; Table 1). These individuals were compared to our fisher DNA database (including individuals detected previously from BLM surveys). Two individuals are recaptures of individuals detected in the 2013 Klamath Falls fisher surveys (BLM-KL13-F1 and BLM-KL13-M3). Hair sample #29 is a recapture of a male identified from a survey station on the Winema National Forest in 2011 (sample ID BLM-Med-41). Sample #76 is from a female that represents a new individual to the DNA database and has been assigned a unique identifier “BLM-KL14-F4”.

Table 2. Individual and sex identification of fisher hair samples collected from the 2014 BLM-Klamath surveys. Individuals are color-coded.

Sample #	Station #	Sample Collection Date	Location (TRS)	UTM (NAD 83 10N)	DNA Species Result	Sex	Individual	Recapture?
22	23	5/16/2014	T38S R5E SEC 23	566746; 4678045	Fisher	Female	BLM-KL13-F1	Yes
23	23	5/28/2014	T38S R5E SEC 23	566746; 4678045	Fisher	Female	BLM-KL13-F1	Yes
29	23	6/5/2014	T38S R5E SEC 23	566746; 4678045	Fisher	Male	BLM_Winema_12M	Yes
30	19	6/5/2014	T 38S R6E SEC 19	569359; 4677543	Fisher	Male	BLM-KL13-M3	Yes
37	19	6/12/2014	T 38S R6E SEC 19	569359; 4677543	Fisher	Male	BLM-KL13-M3	Yes
51	30	8/6/2014	T38S, R05E, Sec. 30	559680, 4676365	Fisher	Female	BLM-KL13-F1	Yes
76	30	9/17/2014	T38S, R05E, Sec. 30	559680, 4676365	Fisher	Female	BLM-KL14-F4	No

Source Population Evaluation

We analyzed the new female for mitochondrial DNA (mtDNA) haplotype to compare to our fisher database. This sample was analyzed using a 300bp region of the control region previously used to evaluate fisher (Drew *et al.* 2003, Vinkey *et al.* 2006, Schwartz 2007). This newly identified female has a haplotype of Drew-haplotype 2 (Table 2). Drew-haplotype 2 is one of two native haplotypes observed previously in fishers from Northern California, the Mt. Ashland area and from BLM surveys west of I-5 in the Medford district (Drew *et al.* 2003; Timber Products Company Annual Reports 2007-2013; BLM results 5/20/2013). These populations West of I-5 are not believed to have received historical fisher translocations (Aubry *et al.* 2004, Drew *et al.* 2003).

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The recaptured individuals were analyzed previously and are Drew-haplotype-9 (Table 2) which has been detected in fisher populations in southwestern Oregon that received translocations from Canada and the mid-west United States. Drew-haplotype-9 is common in British Columbia (Drew *et al.* 2003).

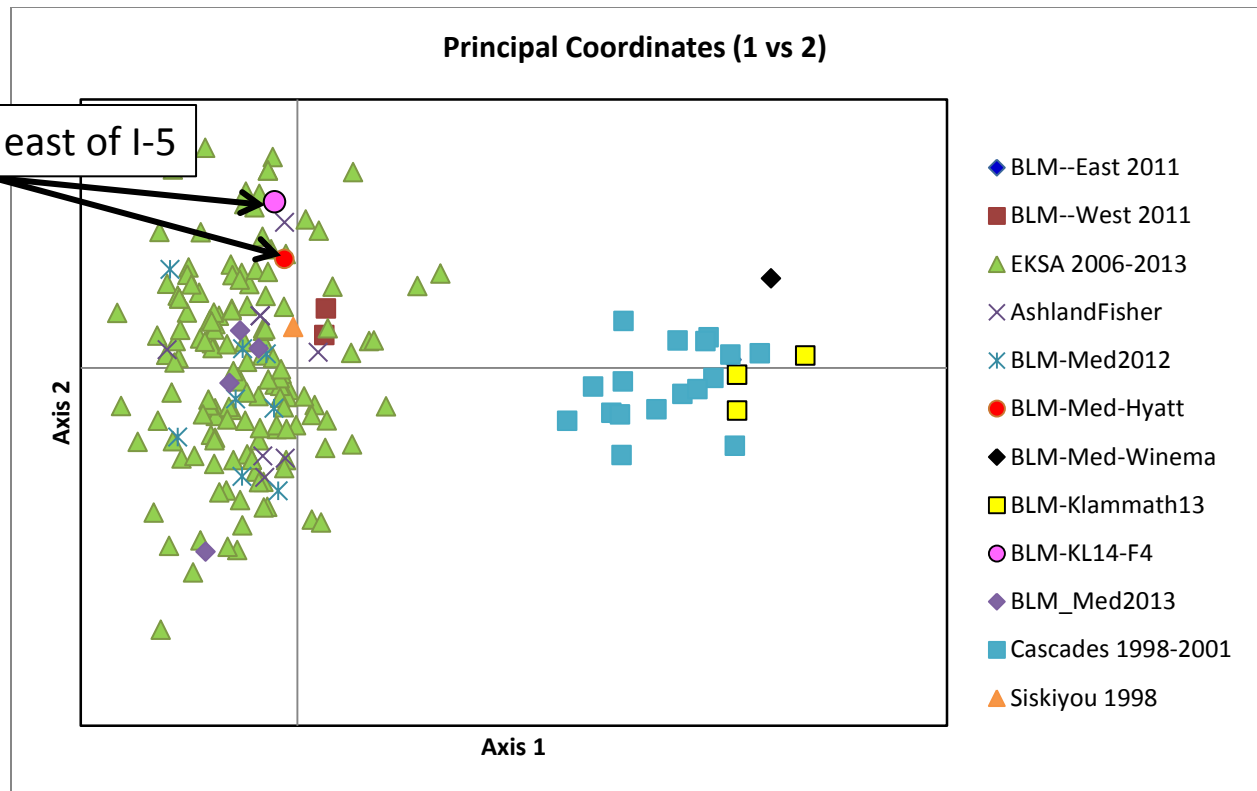
Table 2. Mitochondrial DNA haplotypes from fisher hair samples collected from the 2014 BLM-Klamath surveys. Individuals are color-coded.

Sample #	Station #	Sample Collection Date	Location (TRS)	UTM (NAD 83 10N)	Sex	Individual	Recapture?	mtDNA Haplotype
22	23	5/16/2014	T38S R5E SEC 23	566746; 4678045	Female	BLM-KL13-F1	Yes	Drew-hap9
23	23	5/28/2014	T38S R5E SEC 23	566746; 4678045	Female	BLM-KL13-F1	Yes	Drew-hap9
29	23	6/5/2014	T38S R5E SEC 23	566746; 4678045	Male	BLM_Winema_12M	Yes	Drew-hap9
30	19	6/5/2014	T 38S R6E SEC 19	569359; 4677543	Male	BLM-KL13-M3	Yes	Drew-hap9
37	19	6/12/2014	T 38S R6E SEC 19	569359; 4677543	Male	BLM-KL13-M3	Yes	Drew-hap9
51	30	8/6/2014	T38S, R05E, Sec. 30	559680, 4676365	Female	BLM-KL13-F1	Yes	Drew-hap9
76	30	9/17/2014	T38S, R05E, Sec. 30	559680, 4676365	Female	BLM-KL14-F4	No	Drew-hap2

We evaluated the individuals with ten variable microsatellite markers used previously for fisher in Oregon and California and compared these to our fisher microsatellite database (Figure 1). This database contains individuals identified from BLM surveys conducted by Jeff Stevens, fishers collected from the East Klamath Surveys 2006-2013, Ashland Fisher Survey, BLM-KL-2013, the individual collected near Winema and one individual collected near Hyatt Lake. The microsatellite DNA data from female BLM-KL14-F4 is consistent with being related to/descended from native populations. This female is the second individual (along with the male collected near Hyatt Lake (BLM-Med-44)) located east of I-5 that has a genetic signature consistent with native populations and not the reintroduced fisher population in the southern Cascades / Northern California. This suggests that these populations are in the initial stages of coming together.

Figure 1. Principal coordinates graph of fisher microsatellites from N. CA and S. OR. Individuals from the Klamath 2013 Survey are represented by yellow squares, while the new female identified from 2014 surveys is a pink circle.

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Please contact us if you have any questions; we look forward to working with you in the future.

REPORT

Project: BLM--Klamath Fisher (*Pekania pennanti*) 2016 Samples DNA Results

Date Issued: December 12, 2016

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REPORT

On July 27, 2016 we received 8 hair samples (#193-200) collected in 2016 as part of non-invasive surveys for fisher on BLM lands (Klamath district) southern Oregon. We also received two hair samples from live-caught fishers from the study area (F01 and F03). Subsequently, on September 9, 2016 we received blood samples stored on FTA blood cards from seven live-caught fisher (including F01 and F03). DNA analysis was requested on these samples.

We tested the eight non-invasive samples for species (Table 1). We obtained DNA for analysis from seven of the samples, and all are from fisher.

Table 1. Species identification results of hair samples collected on BLM lands in the Klamath District; samples #193-200

Sample #	Station #	Sample Collection Date	Location (TRS)	UTM (NAD 83 10N)	Notes	DNA Species ID
193	JS 06	4/20/2016	T39S R6E Sec 06	568894 4672410	Fisher Photos	Fisher
194	23	6/9/2016	T38S, R05E, Sec. 23	566746; 4678045	Fisher Photos	Fisher
195	3-2	6/9/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher Photos	Fisher
196	23	6/14/2016	T38S, R05E, Sec. 23	566746; 4678045	Fisher Photos	poor DNA
197	3-2	6/14/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher Photos	Fisher
198	3-2	6/22/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher Photos	Fisher
199	23	6/24/2016	T38S, R05E, Sec. 23	566746; 4678045	Fisher Photos	Fisher
200	3-2	6/24/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher Photos	Fisher

We tested the seven fisher hair samples collected non-invasively, for individual and sex. We also tested the seven live-caught fisher for individual. From the non-invasive hair samples, we identified three individuals (two females and one male). The females are recaptures of previously identified individuals, and the male is a new individual (Table 2).

Table 2. Individual and sex results for fisher identified from non-invasively collected hair samples from 2016.

Sample #	Station #	Sample Collection Date	Location (TRS)	UTM (NAD 83 10N)	DNA Species ID	Sex	Individual	Recapture
193	JS 06	4/20/2016	T39S R6E Sec 06	568894 4672410	Fisher	F	BLM-KL16-F10	yes
194	23	6/9/2016	T38S, R05E, Sec. 23	566746; 4678045	Fisher	M	BLM-KL16-M12	no
195	3-2	6/9/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher	F	BLM-KL13-F1	Yes
196	23	6/14/2016	T38S, R05E, Sec. 23	566746; 4678045	poor DNA			
197	3-2	6/14/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher	F	BLM-KL13-F1	Yes
198	3-2	6/22/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher	F	BLM-KL13-F1	Yes
199	23	6/24/2016	T38S, R05E, Sec. 23	566746; 4678045	Fisher	M	BLM-KL16-M12	no
200	3-2	6/24/2016	T39S, R05E, Sec. 03	564403, 4673638	Fisher	F	BLM-KL13-F1	Yes

We tested the seven samples from live-caught fisher (3 females and 4 males). Five of the samples are recaptures of individuals previously identified from hair samples (Table 3).

Table 3. Individual results for seven live-caught fishers from the Klamath district 2016

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Individual	Sex	Individual	Recapture
F01T	F	BLM-KL13-F1	yes
F02T	F	BLM-KL15-F6	yes
F03T	F	BLM-KL14-F4	yes
M01T	M	BLM_Winema_12M	yes
M02T	M	BLM-KL-M02T	no
M03T	M	BLM-KL-M03T	no
M04T	M	BLM-KL13-M3	yes

We evaluated the mitochondrial DNA from individual BLM-KL-M12, BLM-KL-M02T and BLM-KL-M03T with the goal of assessing the source population. These samples were analyzed using a 300bp region of the mitochondrial DNA control region (Drew *et al.* 2003, Vinkey *et al.* 2006, Schwartz 2007).

Individual BLM-KL-M12 has a mitochondrial DNA (mtDNA) haplotype Drew-hap9, while individuals BLM-KL-M02T and BLM-KL-M03T have haplotype Drew-hap2 (Table 4). Drew-hap2 is one of two native haplotypes observed previously in fishers from Northern California, the Mt. Ashland area, and from BLM surveys west of I-5 in the Medford district (Drew *et al.* 2003; Timber Products Company Annual Reports 2007-2015; BLM results 5/20/2013). Drew-hap9 has been detected in fisher populations in southwestern Oregon (a population that received translocations from western Canada and the mid-west United States). Drew-hap9 is common in British Columbia (Drew *et al.* 2003).

Table 4. Mitochondrial DNA haplotypes from fisher samples collected from the 2016 BLM-Klamath surveys. Samples in blue are live-caught fisher. The highlighted haplotypes are consistent with native populations.

Sex	Individual	mtDNA Haplotype	BLM Samples	1st Year Detection
F	BLM-KL13-F1	Drew-hap9	1, 2, 4, 10, 11, 13, 22, 23, 51, 86, 87, 89, 94, 97, 101, 142, 144, 148, 149, 153, 171, 173, 195, 197, 198, 200, 202, F01T	2013
F	BLM-KL13-F2	Drew-hap9	8	2013
M	BLM-KL13-M3	Drew-hap9	9, 88, 93, 96, 136, 137, 143, 164, M04T	2013
F	BLM-KL14-F4	Drew-hap2	76, F03T	2014
M	BLM-KL15-M5	Drew-hap9	90, 91, 98, 99, 100, 112, 123	2015
F	BLM-KL15-F6	Drew-hap9	92, 110, 120, 122, 140, 146, 147, 152, 157, 172, F02T	2015
M	BLM_Winema_12M	Drew-hap9	BLM-MED-41, 29, 102, 106, 107, 108, M01T	2011
M	BLM-KL15-M7	Drew-hap9	105	2015
M	BLM-KL15-M8	Drew-hap9	111	2015
F	BLM-KL16-F9	Drew-hap2	178, 180	2016
F	BLM-KL16-F10	Drew-hap9	181, 183, 184, 185, 186, 189, 190, 193	2016
F	BLM-KL16-F11	Drew-hap9	182	2016
M	BLM-MED13M-Hyatt	Drew-hap1	BLM-MED-44	2012
F	BLM-MED-01F	Drew-hap9	BLM-MED-006	2008

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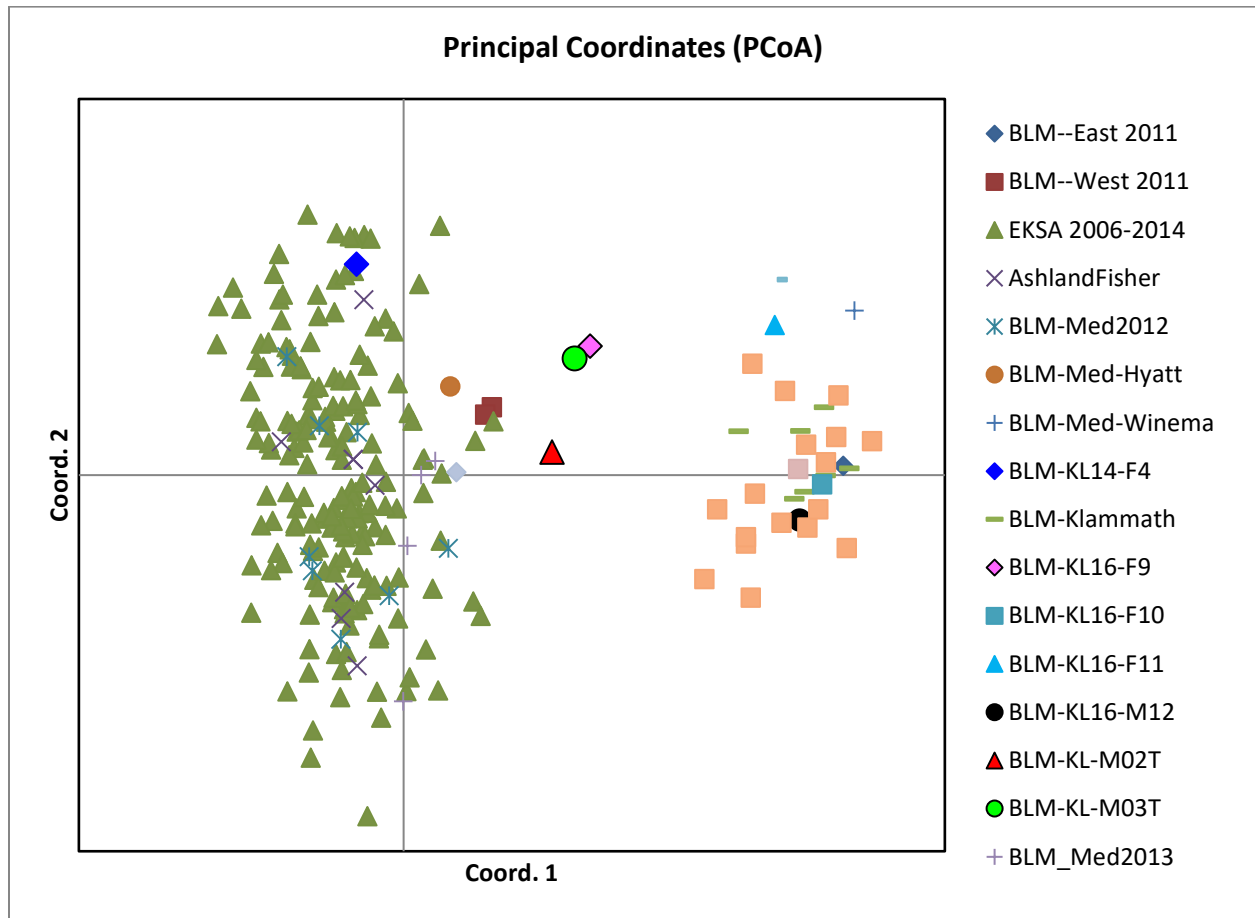
M	BLM-KL16-M12	Drew-hap9	194, 199	2016
M	BLM-KL-M02T	Drew-hap2	M02T	2016
M	BLM-KL-M03T	Drew-hap2	M03T	2016

Males BLM-KL-M02T and BLM-KL-M03T are the fourth and fifth individuals to be detected east of I-5 with a native haplotype (Drew-hap2). The other individuals sampled east of I-5 from BLM surveys all have haplotype Drew-hap9.

Eleven variable microsatellite markers used previously to determine the number of unique genotypes (individuals) were used to assess population substructure. Genotypes from individuals collected by the BLM were compared to our fisher microsatellite database for fisher in Oregon and California. Individual BLM-KL-M12 has nuclear DNA consistent with being related to/descended from native populations (Figure 1). Individuals BLM-KL-M02T and BLM-KL-M03T have a genetic signature showing nuclear DNA from both the Northern California (native) and Southern Oregon (reintroduced origin) populations. These individuals are the second and third introgressed individuals (along with BLM-KL-F9) observed from this area.

Figure 1. Principal coordinates graph of microsatellites from modern fisher collected in N. CA and S. OR by collection location (East and West of I-5). The translocated OR fishers from 1998-2001 are represented by squares. The three individuals detected east of I-5 with native haplotypes are shown separately. BLM-Med-13M_Hyatt (yellow triangle) and BLM-KL16-F4 (green circle) were sampled East of I-5 but have nuclear DNA genotypes and mtDNA haplotypes consistent with originating from West of I-5. BLM-KL16-F9, BLM-KL-M02T and BLM-KL-M03T were also sampled East of I-5 and have a mtDNA haplotype consistent with being from West of I-5 (native haplotype), but a genotype that appears to be introgressed from individuals both East and West of I-5 (see text for further discussion).

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Interpretations

We identified five individuals sampled east of I-5 with native haplotypes that were previously only found West of I-5. BLM-Med-13M_Hyatt (tan circle; Figure 1) and BLM-KL16-F4 (blue diamond; Figure 1) were sampled East of I-5 but have nuclear DNA genotypes and mtDNA haplotypes consistent with originating from West of I-5. BLM-KL16-F9 (pink triangle), BLM-KL-M02T (red triangle) and BLM-KL-M03T (green circle) were also sampled East of I-5, have mtDNA haplotypes consistent with being from West of I-5 (native haplotype), but a genotype that appears to be introgressed from individuals both East and West of I-5. This suggests that the individual's mother was originally from the population in Northern California/Southwestern Oregon with the native haplotype as mtDNA is maternally inherited, and its father was from the Southern Oregon introduced population. While there may be other individuals in the study area that are un-sampled that may also be possible parents, female BLM-KL16-F9, and males BLM-KL-M02T and BLM-KL-M03T are genetically consistent with being offspring of BLM-KL14-F4 and BLM-KL15-M5.

REPORT

Project: BLM--Klamath Fisher (*Pekania pennanti*) 2016 Samples DNA Results

Date Issued: March 8, 2017

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REPORT

On December 16, 2016 we received 13 hair samples (#203-215) collected in 2016 as part of non-invasive surveys for fisher on BLM lands (Klamath district) southern Oregon. We also received ten hair samples and one tissue from known fisher (live-caught and mortalities) from the study area. DNA analysis was requested on these samples.

We tested the 13 non-invasive samples for species; we obtained DNA for analysis from ten of the samples, and all are from fisher. These samples along with the 11 from known fishers were tested for individual and sex. From the non-invasive hair samples, we identified two individuals (both males; Table 1). The submitted hair samples from two live-caught fisher (F07T and M08T) did not contain quality DNA to be able to determine individual. Six of the known fisher samples represent new individuals, and three are re-captures of previously identified individuals (Table 1).

Table 1. DNA results for samples #203-227 collected in 2016. Individuals represented by more than one sample are color coded.

Sample #	Station #	Sample Collection Date	UTM (NAD 83 10N)	Notes	Species	Sex	Individual	Recapture?
203	380510A	9/15/2016	564033; 4680422	Fisher Photos	Fisher	Male	BLM-KL15-M8	Yes
204	380508A	9/20/2016	561432; 4680395	Fisher Photos	Fisher	Male	BLM-KL15-M8	Yes
205	380511B	9/20/2016	565398; 4681456	Fisher Photos	Fisher	Male	BLM-KL15-M8	Yes
206	380511A	9/20/2016	565824; 4680257	Fisher Photos	poor DNA			
207	380510A	9/20/2016	564033; 4680422	Fisher Photos	Fisher	Male	BLM-KL-M07T	no
208	380510A	9/28/2016	564033; 4680422	Fisher Photos	Fisher	Male	BLM-KL-M07T	no
209	380510A	10/4/2016	564033; 4680422	Fisher Photos	Fisher	Male	BLM-KL-M07T	no
210	380619C	10/11/2016	570020; 4677897	Fisher Photos	poor DNA			
211	380510A	10/12/2016	564033; 4680422	Fisher Photos	Fisher	Male	BLM-KL-M07T	no
212	380508A	10/12/2016	561432; 4680395	Fisher Photos	Fisher	Male	BLM-KL15-M8	Yes
213	380507B	11/22/2016	560074; 4681100	Bear and Fisher Photos	poor DNA			
214	near F01T maternal den	3/24/2016	562074; 4676899	Check for Species	Fisher	poor DNA	poor DNA	
215	380517B -Hair left in trap	10/21/2016	561194; 4678570	Check for Species	Fisher	poor DNA	poor DNA	
216	380510A	11/9/2016	564033; 4680422	F07T -Captured	n/a	Female	poor DNA	
217	N/A	6/30/2016	462221; 4691911	Road Kill Fisher	n/a	Female	BLM-KL16-RdKl_F	no
219	N/A		562986; 4676175	F04T- Dead Kit	n/a	Female	BLM-KL-F04T	no
220	380517A	10/18/2016	560876; 4679740	M07T- Captured	n/a	Male	BLM-KL-M07T	no
221	390407A	11/10/2016	550168; 4670762	M03T- Captured	n/a	Male	BLM-KL-M03T	Yes
222	380435B	10/18/2016	555635; 4674816	F05T- Captured	n/a	Female	BLM-KL-F05T	no
223	380520B	8/17/2016	562075; 4677617	M05T-Captured	n/a	Male	BLM-KL15-M5	Yes
224	380335A	11/13/2016	547326; 4674672	M08T-Captured	n/a	Male	poor DNA	
225	380529C	8/17/2016	561460; 4676032	F02T-Captured	n/a	Female	BLM-KL15-F6	Yes
226	N/A	9/7/2016	560907; 4675475	M06T- Mortality	n/a	Male	BLM-KL-M06T	no
227	380520B	10/20/2016	562075; 4677617	F06T- Captured	n/a	Female	BLM-KL-F06T	no

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We evaluated mitochondrial DNA from these samples with the goal of assessing the source population. These samples were analyzed using a 300bp region of the mitochondrial DNA control region (Drew *et al.* 2003, Vinkey *et al.* 2006, Schwartz 2007). We obtained haplotypes for all fisher samples; the majority of samples have a haplotype Drew-hap9, while three samples have haplotype Drew-hap2 (Table 2). Drew-hap2 is one of two native haplotypes observed previously in fishers from Northern California, the Mt. Ashland area, and from BLM surveys west of I-5 in the Medford district (Drew *et al.* 2003; Timber Products Company Annual Reports/EKSA 2007-2016; BLM results 5/20/2013). Drew-hap9 has been detected in fisher populations in southwestern Oregon (a population that received translocations from western Canada and the mid-west United States). Drew-hap9 is common in British Columbia (Drew *et al.* 2003).

The road-killed fisher from collected west of Grants Pass, OR has a haplotype of Drew-hap2. Individuals BLM-KL-M03T (reported on previously) and BLM-KL-F05T were captured east of I-5 and also have haplotype Drew-hap2 (Table 2).

Table 2. Mitochondrial DNA haplotypes from fisher samples collected from the 2016 BLM-Klamath surveys. The highlighted haplotypes are consistent with native populations.

Sample #	Sample Collection Date	UTM (NAD 83 10N)	Notes	Sex	Individual	Recapture	mtDNA Haplotype
203	9/15/2016	564033; 4680422	Fisher Photos	Male	BLM-KL15-M8	Yes	Drew-hap9
204	9/20/2016	561432; 4680395	Fisher Photos	Male	BLM-KL15-M8	Yes	Drew-hap9
205	9/20/2016	565398; 4681456	Fisher Photos	Male	BLM-KL15-M8	Yes	Drew-hap9
207	9/20/2016	564033; 4680422	Fisher Photos	Male	BLM-KL-M07T	no	Drew-hap9
208	9/28/2016	564033; 4680422	Fisher Photos	Male	BLM-KL-M07T	no	Drew-hap9
209	10/4/2016	564033; 4680422	Fisher Photos	Male	BLM-KL-M07T	no	Drew-hap9
211	10/12/2016	564033; 4680422	Fisher Photos	Male	BLM-KL-M07T	no	Drew-hap9
212	10/12/2016	561432; 4680395	Fisher Photos	Male	BLM-KL15-M8	Yes	Drew-hap9
214	3/24/2016	562074; 4676899	Check for Species	poor DNA	poor DNA		Drew-hap9
215	10/21/2016	561194; 4678570	Check for Species	poor DNA	poor DNA		Drew-hap9
216	11/9/2016	564033; 4680422	F07T- Captured	Female	poor DNA		Drew-hap9
217	6/30/2016	462221; 4691911	Road Kill Fisher	Female	BLM-KL16-Rdcl_F	no	Drew-hap2
219		562986; 4676175	F04T- Dead Kit	Female	BLM-KL-F04T	no	Drew-hap9
220	10/18/2016	560876; 4679740	M07T- Captured	Male	BLM-KL-M07T	no	Drew-hap9
221	11/10/2016	550168; 4670762	M03T- Captured	Male	BLM-KL-M03T	Yes	Drew-hap2
222	10/18/2016	555635; 4674816	F05T- Captured	Female	BLM-KL-F05T	no	Drew-hap2
223	8/17/2016	562075; 4677617	M05T-Captured	Male	BLM-KL15-M5	Yes	Drew-hap9
224	11/13/2016	547326; 4674672	M08T-Captured	Male	poor DNA		Drew-hap9
225	8/17/2016	561460; 4676032	F02T-Captured	Female	BLM-KL15-F6	Yes	Drew-hap9
226	9/7/2016	560907; 4675475	M06T- Mortality	Male	BLM-KL-M06T	no	Drew-hap9
227	10/20/2016	562075; 4677617	F06T- Captured	Female	BLM-KL-F06T	no	Drew-hap9

Eleven variable microsatellite markers used previously to determine the number of unique genotypes (individuals) were used to assess population substructure (Figure 1). Genotypes from individuals collected by the BLM were compared to our fisher microsatellite database for fisher in Oregon and California. Individual BLM-KL-Rdcl_F has nuclear DNA consistent with being related to/descended from native populations. Individual BLM-KL-F05T has a genetic signature

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showing nuclear DNA from both the Northern California (native) and Southern Oregon (reintroduced origin) populations. Individual BLM-KL-F05T is the fourth introgressed individual (along with BLM-KL-F9, BLM-KL-M02T and BLM-KL-M03T) observed from this area.

BLM-KL16-F9 (green square), BLM-KL-M02T (yellow square), BLM-KL-M03T (green circle) and BLM-KL-F05T (orange diamond) were sampled East of I-5, have mtDNA haplotypes consistent with being from West of I-5 (native haplotype), but a genotype that appears to be introgressed from individuals both East and West of I-5. This suggests that the mother was originally from the population in Northern California/Southwestern Oregon with the native haplotype as mtDNA is maternally inherited, and the father was from the Southern Oregon introduced population. While there may be other individuals in the study area that are unsampled that may also be possible parents, these four introgressed fishers are genetically consistent with being offspring of BLM-KL14-F4 and BLM-KL15-M5.

Figure 1. Principal coordinates graph of microsatellites from modern fisher collected in N. CA and S. OR by collection location (East and West of I-5). The six individuals detected east of I-5 with native haplotypes are shown separately. BLM-Med-13M_Hyatt (blue square) and BLM-KL16-F4 (pink circle) were sampled East of I-5 but have nuclear DNA genotypes and mtDNA haplotypes consistent with originating from West of I-5. BLM-KL16-F9, BLM-KL-M02T, BLM-KL-M03T and BLM-KL-F05T were also sampled East of I-5 and have a mtDNA haplotype consistent with being from West of I-5 (native haplotype), but a genotype that appears to be introgressed from individuals both East and West of I-5.

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