

From: [Grizzle, Betty](#)
To: [Scott Sobiech](#)
Subject: Fwd: FW: wolverine
Date: Tuesday, May 9, 2017 9:58:24 AM

This is a much longer, more thorough discussion, and includes information and analyses from a couple of researchers (Dr. Kyle and Dr. Zigouris) who have conducted robust genetic studies of wolverines in North America. Bottom line - it is more closely associated with eastern Canada (Manitoba/Ontario) wolverine populations.

----- Forwarded message -----

From: **Hicks, Scott** <scott_hicks@fws.gov>
Date: Tue, May 9, 2017 at 8:43 AM
Subject: Fwd: FW: wolverine
To: Betty Grizzle <betty_grizzle@fws.gov>

message 2 of 2, with more of the back and forth on genetics --

On Mon, Feb 11, 2013 at 3:24 PM, Hicks, Scott <scott_hicks@fws.gov> wrote:

Shawn,

Looks like you remembered it correctly. If I'm following the e-mail string correctly though, it looks like there may have been some subsequent testing that suggested otherwise (by a Dr. Chris Kyle reportedly noted "more closely related to an Ontario/Manitoba animal than a Northwest Territory animal").

Scott

U.S. Fish and Wildlife Service
East Lansing Field Office
2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823

Phone: 517-351-6274
Fax: 517-351-1443

----- Forwarded message -----

From: **Kennedy, Daniel (DNR)** <KENNEDYD@michigan.gov>
Date: Mon, Feb 11, 2013 at 3:58 PM
Subject: FW: wolverine
To: "Scott_Hicks@fws.gov" <Scott_Hicks@fws.gov>

Is this what you were looking for?

Dan Kennedy
Endangered Species Coordinator
Michigan DNR, Wildlife Division
P.O. Box 30444
530 W. Allegan
Lansing, MI 48909-7944
Office: 517-241-3944

Show your support for conserving wildlife habitat in Michigan by purchasing the [wildlife habitat license plate](#) or [Simply make a tax-deductible donation!!!](#)

From: Bump, Adam (DNR)
Sent: Monday, February 11, 2013 3:51 PM
To: Kennedy, Daniel (DNR)
Subject: wolverine

FYI. It looks like the guy here is "Jeff Ford".

----- Forwarded message -----

From: "Karr, Arnold" <IMCEAEX- _O=MIGOV_OU=FIRST+20ADMINISTRATIVE+20GROUP_CN=RECIPIENTS_CN=BA7347AE-634F3EF0-D98F4A27-8EF40DB6@michigan.gov>
To: "Bump, Adam (DNR)" <BUMPA@michigan.gov>, "Cooley, Thomas (DNR)" <CooleyT2@michigan.gov>
Cc: "Bailey, Michael (DNR)" <BaileyM3@michigan.gov>, "Ainslie, Rex (DNR)" <AINSLIER@michigan.gov>
Date: Wed, 7 Apr 2010 09:45:43 -0400
Subject: Fwd: Re: wolverine PR

Hi all, Attached is the info you're looking for. The "Report MI gulo" attachment was the first DNA sample results by Dr. Schwartz, US Forest Service. He then sent the hair sample on to Dr. Kyle at Trent University because he had a much larger wolverine DNA data base. The "RE MI wolverine" attachment is an e-mail sent to me from Dr. Kyle. It is an article written by Jeff Ford with Dr Kyles comments to me in parentheses.

I have considered Dr. Kyle the expert on the DNA origin, not Mr. Ford.

Arnie

>>> Adam Bump 04/07/2010 9:19 AM >>>

Actually I wondered the same thing he did. The last I had seen of it, the wolverine matched

Alaskan populations better. I haven't looked into this in a long time though. The last time I was on his website he had the Alaska connection but wasn't giving up and had found a researcher that was willing to try to get it to match Hudson Bay populations. I can't find Ford's website anymore but I found an old sportsmans forum website with a release from Ford that has a bunch of researchers names in it saying it matches Manitoba and Ontario populations. I have no idea of the credibility of those claims.

I also had no involvement on the press release that went out. I never saw it or was consulted on it so I can't vouch for where we got the information and if we relied only on Ford's word. We did not do any analysis- Ford sent samples to researchers on his own.

Arnie- Can you shed any light on this or do you have anything that would verify our press release statement beyond what we got from Jeff Ford?

>>> Thomas Cooley 04/07/2010 7:27 AM >>>

Hi Adam. The attached email was forwarded to me by Mary Detloff. I answered the individual's initial email and he since has written back questioning the DNA origin of the wolverine. I don't know if you want to respond to him or want me to--he is wondering why we are considering Jeff Ford the expert on the DNA origin of the animal and not someone more in the scientific community. I guess I would like a little guidance on what we want to say concerning the DNA analysis--we have a sample of muscle tissue here and would be able to check the DNA if we have a funding source and someone to do it. I have never seen any paperwork stating the lab that did the DNA analysis or the results--I have just gone by what I have heard.

I am only here until noon today and then will be off for the rest of the week, so if you can get back to me this morning that would be helpful. If I don't hear back from you by 11 or so, I will probably go ahead and respond to him. I will be down in necropsy the first half of the morning (at least), so you can call me at 336-5116 instead of my office (336-5034).

Tom

Thomas M. Cooley
Wildlife Biologist
Michigan Department of Natural Resources
Wildlife Disease Lab
(Office) 517-336-5034
(Necropsy) 517-336-5116
email: cooley2@michigan.gov

----- Forwarded message -----

From: "Karr, Arnold" <IMCEAEX-_O=MIGOV_OU=FIRST+20ADMINISTRATIVE+20GROUP_CN=RECIPIENTS_CN=BA7347AE-634F3EF0-D98F4A27-8EF40DB6@michigan.gov>

To: "Hoving, Christopher (DNR)" <HOVINGC@michigan.gov>, "Bump, Adam (DNR)" <BUMPA@michigan.gov>, "Beyer, Dean" <IMCEAEX-_O=MIGOV_OU=First+20Administrative+20Group_cn=Recipients_cn=e344d5fb-6e95ebfe-1e3acd9e-4bac924c@michigan.gov>, "Etter, Dwayne (DNR)" <ETTERD@michigan.gov>

Cc: "Ainslie, Rex" <IMCEAEX-_O=MIGOV_OU=First+20A

dministrative+20Group_cn=Recipients_cn=581e3d32-f8014cad-b83145bd-ec97faeb@michigan.gov>

Date: Fri, 30 Jul 2010 08:10:15 -0400

Subject: Fwd: RE: MI wolverine

fyi, Here's the latest on the wolverine DNA analysis.

Arnie

----- Forwarded message -----

From: Joanna Zigouris <jzigouris@nrdpfc.ca>

To: "Karr, Arnold" <IMCEAEX-_O=MIGOV_OU=First+2A
dministrative+20Group_cn=Recipients_cn=ba7347ae-634f3ef0-d98f4a27-8ef40db6@michigan.gov>

Cc: "Kyle, Christopher" <christopherkyle@trentu.ca>

Date: Tue, 27 Jul 2010 19:07:52 -0400

Subject: RE: MI wolverine

Dear Dr. Karr,

I am a graduate student working with Dr. Kyle on wolverine genetics.

I see from the ongoing email correspondence below, that Dr. Schwartz identified the Michigan Thumb wolverine as having mtDNA Haplotype C. In the literature there are two haplotype C's that have been identified for wolverines, with each one having a different mtDNA sequence. The first was identified by Wilson et al. (2000) and it occurred in Nunavut (Canada), the second Haplotype C was identified by Tomasik and Cook (2005) and occurred along southern Alaska (US). Based on the emails below, it sounds like the Haplotype C that was identified for the Michigan Thumb wolverine was the one from Tomasik and Cook (2005). I find it interesting that it was the one from southern Alaska and not the haplotype C that was identified in Nunavut by Wilson et al. (2000).

Only three haplotypes were observed in Ontario (n=54) and Manitoba (n=38). The first was Haplotype A (Wilson et al. 2000); the other two were equivalent to haplotypes J and K as identified by Chappell et al. (2004). In our samples, Haplotype C (from the Wilson paper) was observed in the Northwest Territories, Nunavut, and in one sample from Alberta and Saskatchewan. Wilson's Haplotype C was not identified in any of our Manitoba or Ontario samples, however, this does not mean it is not present...it may be there but in very low frequency as observed in Alberta and Saskatchewan. The Tomasik Haplotype C was only observed once (in the Yukon) for all samples that I sequenced across Canada, so you can see why I find the mtDNA sequence finding for the Michigan wolverine interesting. I will be sequencing additional wolverine samples from across Canada, with a particular focus on Manitoba and Ontario in August, and will let you know if any of the two Haplotype C sequences are observed.

I also re-analyzed the Michigan Thumb wolverine along with samples from Nunavut, Northwest Territories, Saskatchewan, Manitoba, and Ontario for the 11 microsatellites using the program STRUCTURE, as there were an additional 14 individuals genotyped from Ontario. I found that the Michigan Thumb wolverine had a membership coefficient of 79% for Ontario/Manitoba and 21% membership with Nunavut, Northwest Territories and Saskatchewan. This supports Dr. Kyle's initial finding that the Michigan Thumb wolverine

is much more closely related to an Ontario/Manitoba animal than a Northwest Territory animal.

Please feel free to contact me should you require any additional information. I will keep you posted regarding my findings with the additional samples.

Cheers,
Joanna Zigouris

Joanna Zigouris
Ph.D. Candidate
Environmental & Life Sciences Graduate Program
Trent University
1600 West Bank Drive
Peterborough, Ontario K9J 7B8 Canada

fax: 705.748.1026

-----Original Message-----

From: Christopher Kyle [<mailto:christopherkyle@trentu.ca>]
Sent: Fri 7/23/2010 7:51 AM
To: Joanna Zigouris
Subject: Fwd: RE MI wolverine

Begin forwarded message:

> From: "Arnold Karr" <karra@michigan.gov>
> Date: July 22, 2010 8:38:51 AM GMT-04:00
> To: "Christopher Kyle" <christopherkyle@trentu.ca>
> Subject: Re: RE MI wolverine
>
> Good morning Dr. Kyle, Any conclusions yet? Thanks.
> Arnie
>
>>>> Christopher Kyle <christopherkyle@trentu.ca> 05/07/2010 3:34 PM >>>
> We're working on it, but not yet done. Hope to have some more context
> within a few weeks.
>
> Sorry, nothing yet, but we have start to re-run the sample.
>
> Cheers,
>
> Chris

> On 7-May-10, at 10:46 AM, Arnold Karr wrote:
>
>> Good morning Dr. Kyle, Have you had a chance to put the MI
>> wolverine into further context yet? We'll soon be putting the
>> mount on display and would like to include the latest information in
>> the placard.
>> Thanks.
>> Arnie
>>
>>>>> Christopher Kyle <christopherkyle@trentu.ca> 04/16/2010 9:04 AM
>>>>> >>>
>> Hi,
>>
>> My student has just finished running mtDNA on Ontario, Manitoba, and
>> Quebec (historic samples) wolverines. We'll try and put the MI
>> wolverine into further context for you.
>>
>> Take care,
>>
>>
>> Chris
>>
>> On 16-Apr-10, at 7:29 AM, Arnold Karr wrote:
>>
>>> Hello Dr. Kyle, (I tried to send this to you last week by I
>>> think I was using the wrong e-mail address.)
>>>
>>> I hope you are well. Attached is a press release about the death
>>> of the Michigan wolverine, in case you have not heard about it.
>>> I am curious to know if there have been any new developments in
>>> the DNA analysis since yours and Dr. Schwartz's in 1996.
>>> I contacted Dr. Schwartz yesterday, and he suggest I ask you if
>>> mitochondrial DNA analysis has been run on the Ontario/Manitoba
>>> samples. If so, was a type C found?
>>> He also offered to do the analysis, if it has not been done, and
>>> if you want to send him 100 samples from the area.
>>> Thanks for your help.
>>>
>>> Arnie Karr
>>> Michigan Dept. of Natural Resources and Environment
>>> Cass City Field office
>>> (989)872-5300
>>> cell (989)385-5607
>>>
>>>
>>>
>>>
>>>>>> "Chris Kyle" <chris.kyle@nrdpfc.ca> 09/28/2006 8:25 AM >>>
>>> Dear Mr. Karr,
>>>

>>>> Pleasure talking with you yesterday. Below is the article Jeff Ford
>>>> said he would submit. I have inserted a few comments in brackets
>>>> for clarification.

>>>>

>>>> Kind regards,

>>>>

>>>> Chris

>>>>

>>>>

>>>> Dr. C.J. Kyle

>>>> Natural Resources DNA Profiling and Forensics Centre

>>>> Trent University

>>>> Peterborough, Ontario

>>>>

>>>> Thumb Wolverine

>>>>

>>>> New DNA Analysis Indicates She could be a Local Gal

>>>>

>>>> Over the last 5 months there has been ongoing research and
>>>> analysis to uncover the most likely origin of the Michigan Thumb
>>>> wolverine. Mike Schwartz early last spring ran DNA analysis from
>>>> hair samples we collected in the thumb of Michigan, and compared
>>>> those samples to a DNA database. Mike and his staff found a genetic
>>>> type, Haplotype C, that had previously been found in 35.5% of
>>>> wolverines living in or near Alaska. The existence of that
>>>> Haplotype in the thumb wolverine suggested that she could have
>>>> originated in or near that area.

>>>>

>>>> (MtDNA is maternally inherited and evolves slower than
>>>> microsatellite DNA, further, haplotype C, as categorized by Tomasik
>>>> and Cook 2005 is very closely related to other common wolverine
>>>> mtDNA haplotypes. Also, note that sample sizes to detect all
>>>> molecular types in the north were limited and haplotype C might have
>>>> a broader distribution, just not in high frequency. Bottom line,
>>>> having haplotype C doesn't mean that the wolverine necessarily comes
>>>> from AK).

>>>>

>>>> The DNA was then sent to Chris Kyle, a reputable geneticist that
>>>> is well respected and currently working as post-doctoral researcher
>>>> at Trent University. Kyle received his PhD from the University of
>>>> Alberta and has done extensive genetics work with a main focus on
>>>> the mustelidae family. He has previously conducted Genetic research
>>>> on the Fisher, Marten, Badger, and the wolverine. In an study of
>>>> North American wolverines, Kyle was able to show how genetically
>>>> isolated the Idaho population of wolverines is relative to the
>>>> northern groups of this species.

>>>>

>>>> (Basically, I have a relatively large database of wolverine samples
>>>> from across much of the wolverines North American distribution).

>>>>

>>>> In June Schwartz forwarded the Michigan wolverine's DNA to
>>>> Kyle. He would try to confirm she was not related to wolverines from
>>>> Ontario or Manitoba, and would also compare her to other wolverine's
>>>> DNA in the Northwest Territories.

>>>> What I was expecting to find considering the previous research
>>>> was the thumb wolverine not matching up with wolverines from
>>>> Ontario or Manitoba, thus confirming the theory that she was a
>>>> captive wolverine at some point in her life and escaped or was
>>>> released. What Kyle found in his analysis and comparison was
>>>> surprising and quite exciting. The thumb wolverine matched up much
>>>> more strongly with Ontario and Manitoba wolverines than those from
>>>> far northern wolverines! After completing the first round of his
>>>> analysis Kyle stated "My preliminary findings for the thumb
>>>> wolverine: It looks like she's much more closely related to an
>>>> Ontario/Manitoba animal than a Northwest Territory animal.
>>>> Interesting! Definitely not what I would have expected, this could
>>>> mean we have a natural disperser from Canada into the lower 48
>>>> states east of the Rockies. That's a big deal with some potentially
>>>> important implications for wolverine conservation".

>>>>

>>>>

>>>> (Remember, microsatellites are different, they are inherited from
>>>> both parents, and evolve faster, thus are more likely to give a
>>>> genetic signal of who the animal is most recently related to, I also
>>>> have a database of Ontario and Manitoba animals that Dr. Schwartz
>>>> doesn't have. This doesn't mean the animal is from ON or MB, but
>>>> just suggests it's more likely to have come from this region in
>>>> Canada. This also doesn't mean it wasn't caught in this region of
>>>> Canada and subsequently released in MI).

>>>>

>>>> Chris Kyle ran an extensive investigation that involved DNA
>>>> from 220 different wolverines which he cross referenced to the
>>>> Michigan Thumb wolverine. Kyle cross-referenced 11 micro satellite
>>>> markers from each animal in the study. Micro satellite markers are
>>>> comprehensive, involving DNA from both parents; the wolverines
>>>> mother and father, where as mitochondrial DNA only considers the
>>>> mothers genetic influence. In the study Kyle had access from a DNA
>>>> database to 38 wolverines residing in Ontario, 35 wolverines from
>>>> Manitoba, and 147 wolverines from the Northwest Territories, and the
>>>> Michigan thumb wolverine. What he found was the Ontario and Manitoba
>>>> wolverine's matched the thumb wolverine much closer than others in
>>>> the study.

>>>> Holy crackers! This gal may have actually crossed the ice after
>>>> all. Can you imagine that? For those folks that haven't been
>>>> keeping up with current events, wolverine tracks were confirmed last
>>>> winter by scientists studying wolves only 90 miles north of
>>>> Michigan, in Chapleau, Ontario. In 2002, a GPS radio collared
>>>> wolverine was documented traveling 258 miles, as a crow flies, in a
>>>> period of 19 days, all while climbing up and down steep slopes in
>>>> the mountains of Idaho. Huh! We may be on to something, but at this

>>>> point any theories are only speculation, at best. Kyle in a recent
>>>> phone call stated "Based on the findings I cannot rule out the
>>>> possibility of the Michigan wolverine having originated from Ontario
>>>> or Manitoba".

>>>> A lot of folks have contacted me this summer by phone and e-mail
>>>> inquiring if the thumb wolverine is alive and doing well; some as
>>>> far as Australia, so here's my update. She's looking healthy as
>>>> ever, and my most recent picture of her is early September, 2006.

>>>> She has been a bit of a feisty gal lately. On August 14th, at
>>>> 2:42 AM, my Wildlife Eye Video System caught her attacking a
>>>> raccoon by galloping in looking like she's on a mission, and
>>>> slamming down her right paw on the back of the coon, which after
>>>> watching the video and the way she swung her front paw looks to me
>>>> like a club with claws. She also let the coon know she wasn't in a
>>>> good mood by using her grizzly like vocal cords. I'm sure that coon
>>>> probably was in need of a diaper during the attack. If that wasn't
>>>> fascinating enough, the same night my camera caught the wolverine
>>>> standing side by side next to a raccoon, seemingly to hold no grudge
>>>> for the previous encounter. Go Figure!

>>>> As we make the progression from summer into hunting season, make
>>>> sure you take note there is a furry female wolverine roaming the
>>>> thumb that is protected by the Department of Natural Resources,
>>>> which I commend for getting her protected within a 24 hour period,
>>>> the quickest ever documented on an animal here in Michigan. There
>>>> has never been a human fatality in North America caused by a
>>>> wolverine, so keep that in mind on your hunting excursions this
>>>> fall, and don't let the wolverine's presence deter you from your
>>>> hunting pursuits. She is no threat to you. I guarantee it! Make sure
>>>> of your target before releasing your arrow or pulling the trigger,
>>>> and good luck to you hunting!

>>>>

>>>> Authors Note: I'd like to thank a few folks for their help with the
>>>> wolverine research. Thanks to Chris Kyle and Mike Schwartz for the
>>>> DNA analysis which took many hours. I'd like to thank Audrey
>>>> Magoun, a biologist in Alaska for her continual help and insight
>>>> virtually every step of the way during this new venture. Jason
>>>> Rosser for his hand in downloading and editing the recent video
>>>> footage of the wolverine to DVD, Steve Noble for his help with the
>>>> Powerpoint presentations and tracking, Alan Broughton,
>>>> Superintendent of Deckerville Community Schools, for allowing us to
>>>> utilize the schools technology to put together an impressive
>>>> presentation, and the Sanilac County Sportsmen Club of Croswell for
>>>> donating \$500 towards continued research of the thumb wolverine. I
>>>> appreciate all your contributions. Thank you!

>>>>

>>>>

>>>>

>>>> <Michigans Only Known Wolverine Died of Natural Causes.rtf>

>>>

>

By Jeff Ford

--

Shawn Sartorius, Ph.D.
US Fish and Wildlife Service
Montana Field Office
Helena Montana

406 449-5225 x208

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