

From: Stermer, Chris@Wildlife
To: [Grizzle, Betty](#)
Subject: RE: Wolverine info?
Date: Monday, February 6, 2017 7:56:36 PM
Attachments: [2017_0124_Wolverine.csv](#)
[2016_2017_CarsonPass.pdf](#)
[2017_0206_Calif_Wolverine.pdf](#)
[California Wolverine assessment final.pdf](#)

Hi Betty,

I'm attaching a few pieces of information related to the wolverine I hope can be of some help. I don't put a lot of weight on incidental wolverine detections, unless they are verified through photo's or genetics, though I still sent you all of the Departments NDDDB records going as far back as 1902.

1. [2017_0206_Calif_Wolverine.pdf](#) – This map shows all the detections of the lone wolverine that has been occupying the region north of Truckee in the Tahoe National Forest. The map also displays a table showing the results of the genetic analysis, conducted by RMRS Genetics lab, for the detections confirming this animal's identity. Our primary objective for these surveys was to determine whether this was the only wolverine in the area, or are there more? It's important to note that for the latest detections in 2016, we have not been able to get a viable genetic sample to confirm this is the same animal. From video evidence, we can confirm at least one of these detections are of a male wolverine. I strongly suspect all the 2016 wolverine detections in this region, are of the same animal that has been present since 2008. I still have hair snares and camera's in this region and I should have a genetic sample soon.
2. [2017_0124_Wolverine](#) – This table has the Departments NDDDB records for wolverine detection going back to the early 20th century.
3. [2016_2017_CarsonPass.pdf](#) – The Region around Carson Pass has been a hotspot for wolverine detections reported by members of the public for the past few years. In addition, this year I also had a report of a wolverine around Meeks Bay, Lake Tahoe. This map shows where I am currently surveying for the potential occurrence of wolverine. Except for Meeks Bay, for which I have pulled the camera stations.
4. [California Wolverine assessment final.pdf](#) - This is a briefing document prepared by the CDFW in 2011, responding to the potential of augmenting wolverine's into California.

I hope this helps! I'm not sure what more relevant information I can offer, given the State's extremely low population size (=1), but please let me know if you think there is something I'm missing.

Best,

Chris

From: Grizzle, Betty [mailto:betty_grizzle@fws.gov]
Sent: Monday, February 06, 2017 7:58 AM
To: Stermer, Chris@Wildlife

Subject: Wolverine info?

Hi Chris - Checking in with you to see if you were still planning to submit information to our agency related to the wolverine (in California) for our status review.

Thanks!

Betty

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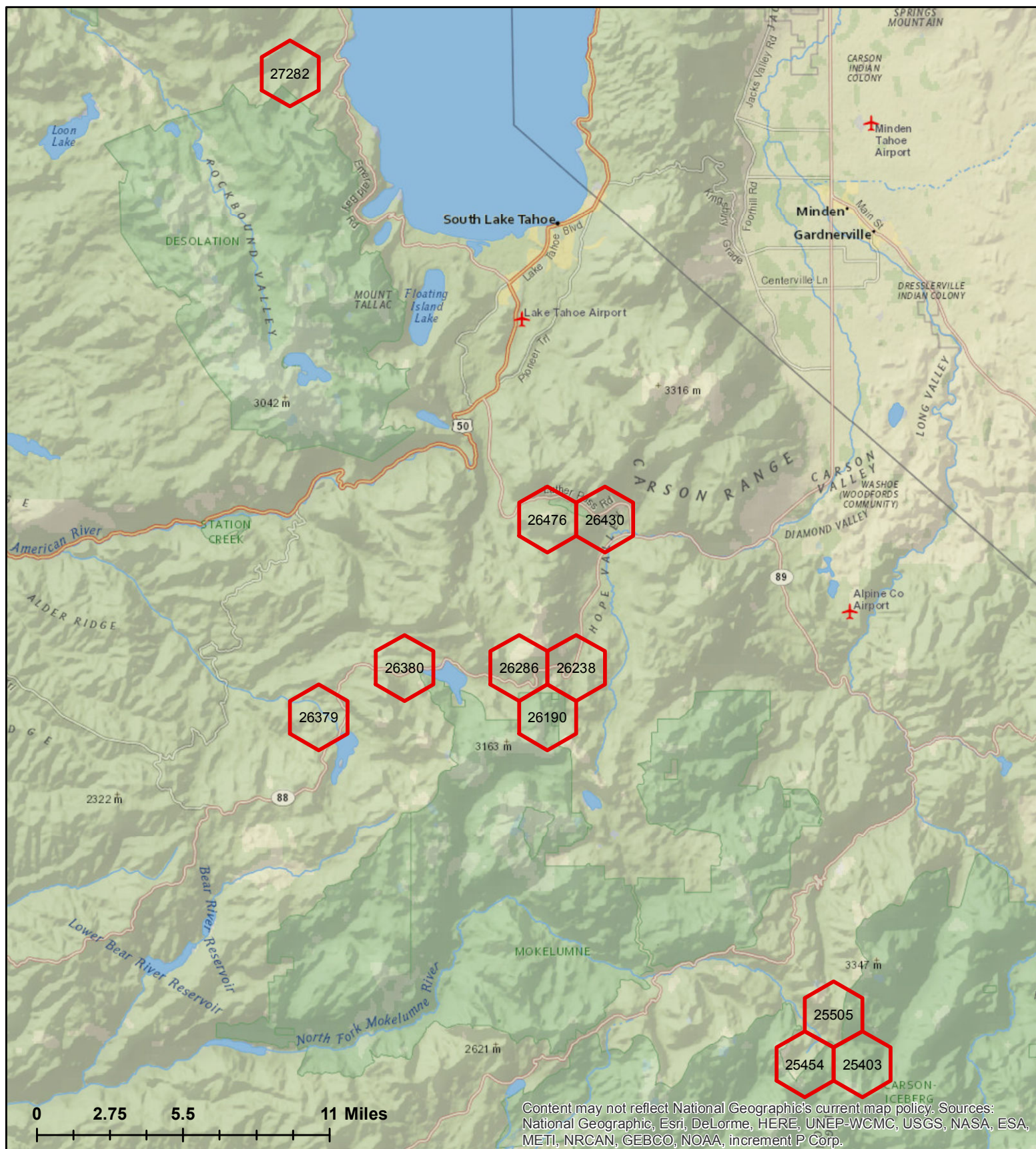
Betty J. Grizzle, D.Env.
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
2177 Salk Ave, Suite 250
Carlsbad, CA 92008
760-431-9440, ext. 215
760-431-5901 fax

2016-2017 Multi-Species Predator Surveys targeting the potential occurrence of Wolverine and Sierra Nevada Red Fox

Note: Red hexagons indicate where researchers are conducting multi-species predator surveys, targeting the potential occurrence of Sierra Nevada red fox and Wolverine. The survey protocol uses 2 cameras per 4 sq mile hexagon (sampling unit), set a minimum of 1 mile apart, with hair snare's to collect genetic samples. Primary survey objectives include determining: occupancy, detection probability, distribution, and habitat associations for all predator species we obtain data for.

Contact: Chris Stermer, (916)445-2626, chris.stermer@wildlife.ca.gov

Agency: California Department of Fish and Wildlife



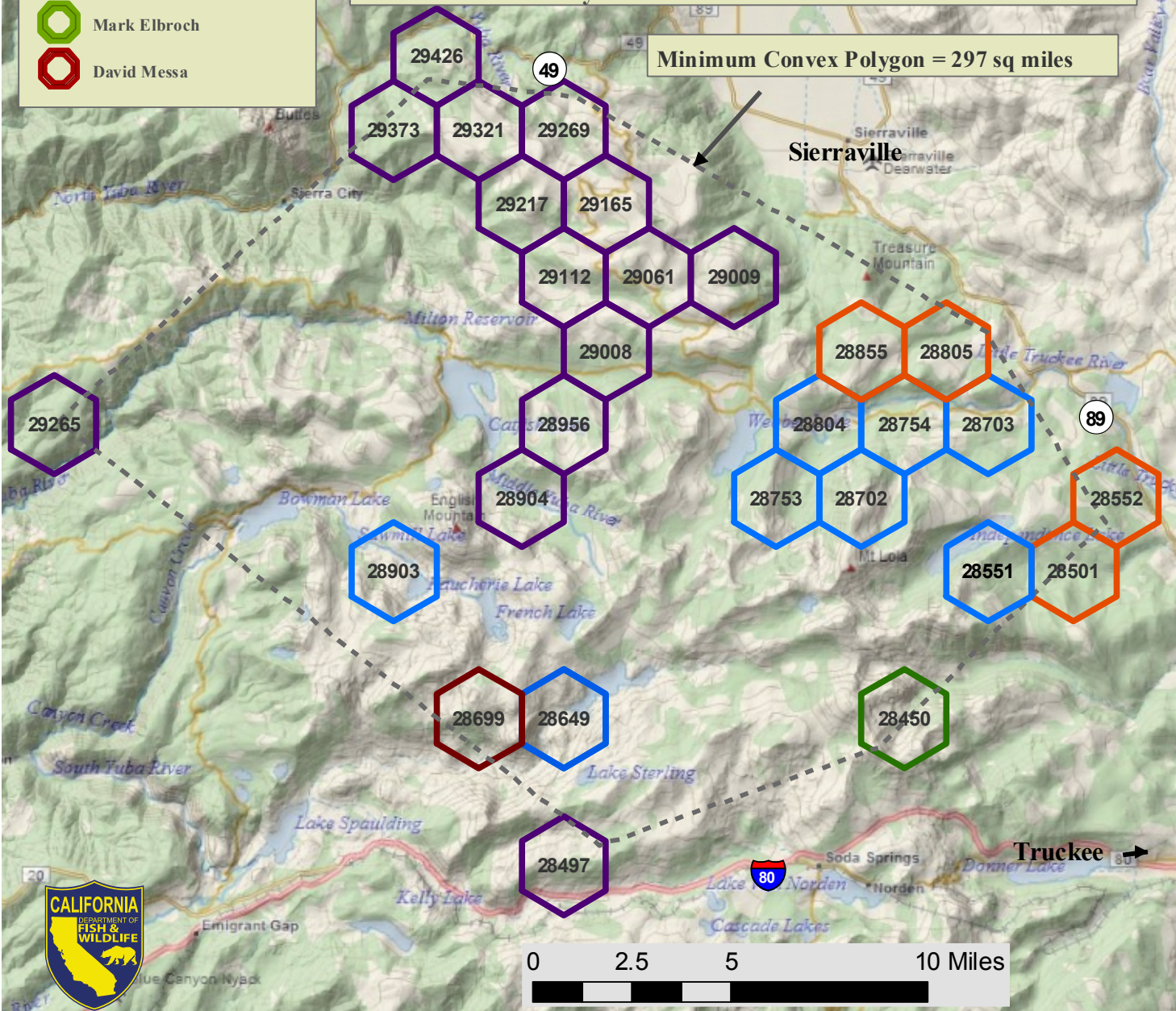
Contact information for detections:

-  K. Moriarty
-  Sierra Pacific Industries
- A. Shufelberger
-  CDFW
- C. Stermer and S. Anderson
-  Mark Elbroch
-  David Messa

Wolverine Detection History Update - Feb. 6 2017

The colored hexagons below represent regions where the wolverine, first discovered by Katie Moriarity in 2008, has subsequently been detected by multiple researchers over the last 8 years. The table on the right are the results from genetics analysis of hair and scat samples collected, confirming the animal's identify.

Minimum Convex Polygon = 297 sq miles



Hex#	Date Collected	Results
28855	3/21/2008	SC2008-325-male
28855	3/21/2008	SC2008-325-male
28855	3/22/2008	SC2008-325-male
28855	3/22/2008	No DNA
28855	3/22/2008	Poor DNA
28855	3/22/2008	SC2008-325-male
28855	3/22/2008	No DNA
29269	1/9/2009	No DNA
29061	1/9/2009	No DNA
29321	1/14/2009	SC2008-325-male
29261	1/14/2009	No DNA
29061	1/14/2009	SC2008-325-male
29321	1/27/2009	SC2008-325-male
29061	1/27/2009	SC2008-325-male
29321	2/10/2009	SC2008-325-male
29269	2/10/2009	SC2008-325-male
29009	2/4/2010	SC2008-325-male
29009	2/4/2010	SC2008-325-male
29009	2/23/2010	No DNA
28702	3/4/2010	SC2008-325-male
28753	3/14/2010	SC2008-325-male
28804	3/14/2010	SC2008-325-male
28753	3/14/2010	SC2008-325-male
29008	3/23/2010	No DNA
28460	10/29/2010	SC2008-325-male
29008	4/6/2012	No DNA
29008	4/12/2013	SC2008-325-male
28649	11/3/2014	SC2008-325-male
28551	2/27/2016	No DNA
28753	4/18/2016	No DNA
28804	4/24/2016	No DNA

Genetic Testing conducted by:
US Forest Service Rocky Mountain
Research Station's Wildlife Genetics Lab

SC2008-325-male - Identification of the single male wolverine nicknamed "Buddy"

Contact: Chris Stermer, (916) 445-2626
California Department of Fish and Wildlife
chris.stermer@wildlife.ca.gov



California Department of Fish and Game

Briefing Document

California Wolverine Population Augmentation Considerations

November 7, 2011

Topic: The Department of Fish and Game has recently reviewed two concepts for augmenting the population of wolverines (*Gulo gulo*) in California through translocation. A *Feasibility Assessment and Implementation Plan for Population Augmentation of Wolverines in California* (November 2010) was submitted to the Department by D. Garcelon and others of the Institute for Wildlife Studies (IWS), Arcata, California for review. The Department has also been in contact with the National Park Service which has recently been discussing a concept to translocate wolverines to California (D. Graber and R. Kahn, pers. comm.). Although this document is primarily a discussion of the Garcelon et al. (2010) IWS proposal, discussion below would likely apply to any wolverine augmentation project in California. The U.S. Fish and Wildlife Service have recently contacted the Department seeking the State's perspective on the potential for population augmentation of wolverine in California.

Background: Wolverines have been listed as threatened under the California Endangered Species Act since 1971 and are on the list of California's Fully Protected Mammals (Fish and Game Code section 4700). There are no recovery plans or goals in place for wolverines in California. In December of 2010, The United States Fish and Wildlife Service (FWS) found that the distinct population segment of wolverines in the contiguous United States warranted listing under the Endangered Species Act, but was precluded by higher priority actions (Federal Register vol. 75, no. 279 p. 78030-78061). Under a settlement between the FWS and the Center for Biological Diversity, the FWS is scheduled to develop a "...proposed rule (to list) or a not warranted finding..." by 2013.

In 2007 the Wildlife Conservation Society convened a wolverine conservation symposium with scientists and staff from research institutions and state and federal agencies, including staff from the Department. At that time it was determined that the two areas of the contiguous United States with the greatest potential to sustain viable populations of wolverines in a warming climate were the high elevation mountains of the northern Rocky Mountains and the southern Sierra Nevada, largely due to the fact that wolverine natal den distribution is strongly linked to areas of persistent spring snow pack (Aubry et al. 2007).

In California, wolverines were historically distributed through the Sierra Nevada from Mount Shasta south to Tulare County and may (Schempf and White 1977), or may not (McKelvey et al. 2008) have also inhabited the north coastal mountains. Prior to 2008, the most recent verifiable detection of a wolverine in the state was collected in 1922 (McKelvey et al. 2008), although tracks have reportedly been photographed and cast in plaster as recently as the 1980's (G. Gerstenberg pers. comm., Garcelon et al. 2010). Beginning in 2008 and continuing through the present (2011), a single male wolverine has been periodically photographed at baited camera stations in the vicinity of Truckee, California (Moriarty et al. 2009, C. Stermer pers. comm.).

Reintroduction Proposal(s): The *Feasibility Assessment and Implementation Plan for Population Augmentation of Wolverines in California* from the IWS describes a proposed program to translocate during winter 6-8 female and 2-3 male wolverines from British Columbia to the southern Sierra Nevada where they would be “soft released” by holding them in outdoor enclosures where their health would be monitored until spring, at which time they would be released. Adult animals would be equipped with GPS transmitter collars and adults and young (it is likely translocated females would be pregnant at the time they are captured) would have VHF transmitters surgically implanted. Monitoring of adults would occur through satellite download of movement data and monitoring of young would require regular flights.

The Feasibility Assessment includes an analysis of the probability that a viable population of wolverines persists, undetected, in the southern Sierra Nevada. The Assessment is based largely on the analysis of a 2006 systematic camera station survey of the Sequoia and Kings Canyon National Parks carried out by the authors. Although the results of the Assessment are highly dependent on assumptions about home range sizes and the distance at which wolverines can detect bait, the probability that a viable wolverine population exists undetected in the parks is very low.

The National Park Service has also been internally evaluating the merits of a wolverine reintroduction into California and at last contact is reportedly nearing the “next step” which is to begin a broader multi-agency discussion of the topic. NPS personnel have informed Department staff that this internal evaluation is underway.

Analysis and Recommendation: The Department is supportive of the initiation of dialogue among interested parties on the potential for a wolverine augmentation project. There are however, several issues related to agency support, environmental compliance, public review, and project costs that warrant further consideration as part of these discussions. Additionally, there are numerous technical details such as health screening, release protocols, and monitoring that would require further development if an augmentation project were to proceed.

Background

Current Population Status – The size and distribution of the current California wolverine population is unknown. Prior to the discovery of a lone male wolverine near Truckee in 2008 some had suggested that wolverine had been extirpated in California as early as the 1930's (McKelvey et al. 2008). Exact reasons for the decline are not specifically known, although it is generally believed that the active period of predator control using strychnine poisoning (e.g., Compound 1080) decades ago was largely responsible.

Wolverine sightings however, have regularly but uncommonly, been reported to the Department through the 2000's. As noted above (McKelvey et al. 2008, Garcelon et al. 2010) indicate there is a very low probability that a viable wolverine population exists in the southern Sierra Nevada. A lack of recent verifiable evidence of wolverines in the southern Sierra Nevada indicates wolverines are either absent or exist in very low numbers. Furthermore, intensive survey efforts in recent years for Sierra Nevada red fox and other montane carnivores have failed to detect wolverine elsewhere in the Sierra and Cascade mountains. It is logistically infeasible to prove the absence of a scarce species. If additional surveys are considered necessary to document the status of wolverines in the southern Sierra Nevada, surveys using fixed-wing aircraft are a cost effective technique that has been employed in other states for the species (Gardner et al. 2010).

Genetic Considerations – Should native wolverines remain in the southern Sierra Nevada, the introduction of individuals from other locations should proceed only after careful consideration of the potential genetic impacts. Historical specimens of wolverines from California are genetically distinct from other North American wolverines, and appear to have diverged from other lineages at least 2,000 years ago (Schwartz et al. 2007). The single known extant wolverine near Truckee was found to be most closely related to wolverines from the western Rocky Mountains of Idaho and Montana (Moriarty et al. 2009) and may have dispersed naturally to California. The IWS proposal calls for the introduction of wolverines from British Columbia. At this time, the Department is not certain where the source animals being considered by the National Park Service would come from, although we believe it may be Montana. Introduction of individuals from outside of California would alter the genetics of a native population and could result in the loss of genetic traits uniquely adapted to the California environment (Storfer 1999); although presumably adaptive genes would continue to be selected for through the greater survival of the offspring of hybrids expressing native traits. Consequently, if there is a reasonable likelihood that native wolverines persist in the southern Sierra Nevada the Department should carefully examine whether intensive management efforts could be taken to foster the growth of their population prior to initiating a relocation program.

Long Term Sustainability – Another question needing further consideration is whether translocated wolverines would be able to sustain a viable population in the southern Sierra Nevada after an augmentation program is completed without the aid of further human intervention. The main factors implicated in the possible extirpation of wolverines from California are predator poisoning associated with livestock production, and trapping (Banci *in* Ruggiero et al. 1994, Garcelon et al. 2010). These sources of mortality have been eliminated through regulatory changes thereby greatly increasing the odds of survival for extant and introduced animals and of population viability.

Population viability is not assured however, due to the problems associated with small, isolated populations. Such populations are at increased risk of extinction due to demographic stochasticity (unpredictable changes in sex and age ratios, distribution of individuals and geographic structure of a population (Mace and Lande 1991)), genetic stochasticity (random changes in gene frequencies and fitness which are amplified in small populations), and inbreeding depression (Pimm et al. 1988). A statewide wolverine population estimate of 50-100 animals was made by White and Barrett (1979) by examining home range size and available habitat (including the northwestern mountains). The carrying capacity of the southern Sierra Nevada would be expected to

be substantially lower than this estimate. It is questionable whether a population in the southern Sierra Nevada could be reached by unaided immigrant wolverines from the Rocky Mountains or the north Cascades (the two closest extant wolverine populations) due to natural and anthropogenic barriers such as urban zones and trans-Sierra highways. Consequently an augmented population would likely remain genetically isolated and therefore at some level of risk of extinction. The Department and participating collaborators should acknowledge and explain the uncertainty of success and risk involved in attempting a wolverine population augmentation.

Adequacy of Food Supply – Wolverines appear to be highly dependent on large mammal carrion for survival and reproductive success (Banci *in* Ruggiero et al. 1994). Small mammals become the primary prey when the carrion of larger mammals is unavailable (Banci *in* Ruggiero et al. 1994). The Feasibility Assessment concluded that there is an adequate supply of food for wolverine in the southern Sierra Nevada. Department staff believes the Feasibility Assessment may overestimate the availability of large mammal carrion in the Sierra Nevada. Estimates of mule deer (*Odocoileus hemionus*) number and mountain lion (*Felis concolor*) kills derived from winter range (at lower elevations than wolverines would be expected to range) were extrapolated to high elevation summer range (where wolverines are expected to range year-round), where deer density and mortalities are significantly lower. Department staff who monitor radio-collared deer have noted that deer carcasses are completely consumed within 2-3 days following mortality (G. Gerstenberg pers. comm.) which may reduce carrion available to wolverines. However, caching behavior by wolverine has been well documented and they are known for taking food from other carnivores (e.g., wolves and bears). A method to assess whether food availability is a limiting factor in re-establishing a southern Sierra Nevada wolverine population would be to closely monitor the condition and survival of experimentally re-introduced animals.

Impact on Other Sensitive Species – An important consideration for the Department is the potential effect of translocating wolverines on native wildlife, particularly endangered species and species of special concern. Wolverine habitat is shared, at least in part by the state-listed threatened Sierra Nevada red fox (*Vulpes vulpes necator*), the state and federally endangered Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*), the federal candidate Pacific fisher (*Martes pennanti*), and the American pika (*Ochotona princeps*), which the Department has been petitioned to list as threatened or endangered.

Little is known about Sierra Nevada red fox – wolverine interactions, but carnivores with similar niches can be expected to interact antagonistically, possibly lethally. There is evidence of competition between the species as Gardner (1985) observed wolverines following red fox tracks for up to 2 km., presumably in an attempt to locate and raid red fox food caches. Magoun (1985) observed a wolverine raiding a red fox food cache in Alaska.

Wolverine interactions with fisher could also be expected to be antagonistic. However, only limited overlap between the two species normal ranges would be expected due to different habitat preferences.

Wolverines have been known to kill adult ungulates when deep snow conditions hinder their movement. There is one account of a young Dall sheep (*Ovis dalli*) being taken by a wolverine (Banci *in* Ruggiero et al. 1994) suggesting that under the right conditions adult Sierra Nevada bighorn sheep could be killed. The killing of young lambs would be more likely than predation on adults, but the greatest potential impact on bighorn would likely come from the disturbance of ewes and lambs around the time of parturition.

American pika have been documented in the diet of wolverines (Magoun 1985). Gardner (1985) observed foraging wolverines frequently investigating rock outcrops where the only likely prey was collared pika (*Ochotona collaris*) and marmot (*Marmota caligata*). However, due to the protection the pika's talus habitat provides, it seems unlikely that wolverines would significantly affect pika population size or distribution.

Although it is possible in some cases to predict the outcomes of direct interactions between wolverine and other native wildlife species, their significance at a population level, or the indirect effect the translocation of a mid-sized predator may have on native wildlife community dynamics, is unknown. However, wolverine are native to California and coexisted with prey and other carnivores historically. For example, if competition for carrion from wolverines reduces the number of coyotes (*Canis latrans*) in the alpine environment, the net effect of translocation may be beneficial to red foxes, which avoid coyotes (Perrine et al. 2010). Wolverines are known to have been killed by wolves, mountain lions and bears (Banci *in* Ruggiero et al. 1994). While the effect of introduced wolverine on the native wildlife community may be limited due to the species' low densities and scavenging lifestyle, the potential interactions with other rare species warrants further consideration. Consequently, it is not possible to pre-determine whether such a reintroduction of a native species would have a negative or a positive effect on other native species.

Technical and Practical Considerations

Permitting and California Environmental Quality Act – Implementation of an augmentation project will require a Scientific Collecting Permit and an MOU for the handling of a state-listed and fully protected species. We believe this is possible as the effort would be for bona fide scientific purposes and precisely related to recovery of the species.

Authorization of such a project would likely be considered a discretionary action, and therefore subject to the California Environmental Quality Act (CEQA). The Department would be the lead agency under CEQA and responsible for the preparation, circulation, and approval of the appropriate environmental disclosure documents. Evaluation of personnel and funding costs would be required, although some costs could conceivably be reimbursed by the groups supporting a translocation effort.

Collaboration – Any wolverine translocation in California should be a collaborative effort and coordinated with other wildlife and land management agencies and stakeholders. Stakeholders would include potentially affected or interested private landowners and non-governmental organizations. The agencies involved should include at a minimum the Department, U.S. Fish and Wildlife Service, U.S. Forest Service, and the National Park Service. Additionally, coordination should occur among the agencies to ensure that the IWS proposal and the National Park Service concept are informed by each other,

coordinated, or possibly combined as one to maximize efficiency and efficacy. Should an augmentation program be initiated, the Department would assess the conservation priority of such an effort relative to other existing or planned activities given our finite resources.

Areas of Controversy – Finally, while outside the realm of biology/ecology, there may be some controversy and implications of a wolverine translocation project that should be carefully considered by the Department and other collaborators. Recent consideration of wolverine reintroduction in Colorado generated resistance from mining and skiing industry groups. Concern from these same groups, as well as timber and grazing groups could be anticipated in California if a translocation project moves forward. Although much of the potential wolverine habitat in the southern Sierra Nevada is wilderness and other public lands, seasonal and occasional movement of wolverines to lower elevations and private lands should be anticipated.

Another consideration would be the legal status of translocated animals. If native California wolverines are determined to be extinct, would translocated wolverines be considered a threatened species under the California Endangered Species Act? Does California have existing or potential avenues to designate translocated animals as experimental populations or to provide assurances to affected landowners?

Recommendation:

1. *The Department should engage with other interested agencies and stakeholders to begin a collaborative discussion of wolverine conservation in California including the subject concept of translocation.* For cost-effectiveness and because of the scope, such an effort would need to be collaborative and benefit from the support of diverse agencies and stakeholders. These include U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service, and non-government organizations who are willing to provide fiscal and/or logistical resources such as the Institute for Wildlife Studies (IWS). Further, FWS should co-lead an organized discussion of wolverine in California because of their mandate to evaluate the status of wolverine by 2013.
2. *Seek legal counsel advice as it relates to California Environmental Quality Act (CEQA) requirements or federal equivalents that such a project would be subject to and whether animals introduced under such a project could be considered an experimental population.* It would be desirable to have the wolverine fit into current, existing land management strategies occurring in the Sierra Nevada, rather than have current management need to change to accommodate the wolverine if translocated.
3. *Examine existing data and consider whether additional surveys for wolverine in California are warranted prior to approval of a translocation project.* This should include an assessment of the probability that wolverines have not been detected by surveys in

recent years as well as the probability that a small population, should it occur, could persist without intervention.

4. *If translocation was ultimately approved as a project, a full health screening led by Department would be required (analogous to our Pacific fisher translocation protocols).*
5. *If approved, a translocation would require a detailed post-release monitoring plan.* Under current economic conditions it appears both the State and federal agencies may have limited resources available, but ensuring that such a project could adequately be evaluated for its success is necessary. The affected agencies and NGO's could collaboratively develop a cost-effective monitoring plan; most details of the plan would need to be worked out prior to project approval. Within the monitoring plan, consideration of responsive management actions should be developed in response to negative/positive outcomes of translocation.
6. *Coordination with Western Association of Fish and Wildlife Agencies (WAFWA), Association of Fish and Wildlife Agencies (AFWA), and neighboring states should be initiated to ensure all potentially affected agencies are in communication on the topic.*

Prepared by:

Daniel Applebee (lead), Esther Burkett, Richard Callas, Dr. Deana Clifford, Greg Gerstenberg, Canh Nguyen, Dr. Tom Stephenson, Chris Stermer, Dr. David Wright, Joseph Vondracek, Dr. Eric Loft

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Wolverine (Gulo gulo) Observations & Range

- Sightings prior to 2003
- Sightings from 2003 on
- *Gulo gulo* Range

Source:
California Natural Diversity Database, October 2011
California Wildlife Habitat Relationships, 2008

