California Wolf Center

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California Fish & Game Commission
Attn. Sonke Mastrup, Executive Director
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September 18, 2012

RE: Petition to List the Gray Wolf (Canis lupus) as an Endangered Species, Under the California Fish & Game Code §§2070 et seq.

Honorable President Richards, Vice-President Sutton, Members of the Commission and Executive Director Mastrup:

Thank you for this opportunity to provide comments regarding listing the gray wolf (*Canis lupus*) under California's Endangered Species Act ("CESA"). We support the conclusion reached by the California Department of Fish and Game ("Department") in its August 9th report to the Commission recommending that listing may be warranted. We further believe that listing *is* warranted and with this letter provide information to support our position.

The request to list the gray wolf under CESA is perhaps an instance of first impression. From 1924 until December 28, 2011, when wolf OR-7 crossed the border into California, the gray wolf is believed to have been extinct here -- the victim, as elsewhere in the lower 48 United States, of an intensive, government-sponsored predator eradication campaign. This is possibly the first time a California listing petition has been filed when only one known animal of the species in question exists within the State. We believe, however, that OR-7 is but the first of his kind that will disperse to California in the future, and that the decision of whether to offer state protections to his species should not rely simply upon information about him or upon his individual destiny.

OR-7 is a living symbol of successful wolf recovery in the West; dispersal by young wolves seeking mates and territory of their own will hopefully expand this success to neighboring states the species once inhabited. California's lone wolf is the "Lewis & Clark" of this wolf expansion movement, and his dispersal into California begins a new chapter in our State's natural history.

The statutory process for the filing and consideration of a petition to list a species under CESA requires the inclusion and evaluation of at least 13 factors, and these same factors or other relevant information are to be the basis of comments submitted in support of or opposition to the petition. (CA F&G Code section 2072.3.)

As a preliminary matter, we address three of the factors -- population trend, degree and immediacy of threats, and impact of existing management efforts. The remainder of our comments addresses the species' historical distribution in California, and tangentially, through a discussion of wolf prey species, we also address the wolf's ability to survive and reproduce here.

Population Trend:

The current presence of one confirmed wild wolf in California is evidence of an increase in our State's wolf population, from zero for the last 87 years, to one individual in the year 2011-2012.

Paradoxically, OR-7's sole presence is also evidence of a likely future decrease in our State's wolf population, from one individual to zero. There is no other known wild wolf in California with whom OR-7 could mate and reproduce. Without progeny, once OR-7 dies, the species will once again become extinct in California.

Based on the above, a reasonable interpretation of the population trend is that it is unstable, unpredictable and extremely vulnerable.

Degree and Immediacy of Threats:

The inability to find a mate is a critical threat to any species' ability to reproduce and is an actual threat at this time to California's lone wolf, OR-7. While the trend of wolf expansion in the Western and Pacific Western United States has, since 1999, given rise to more than a dozen confirmed packs in Washington and Oregon -- after dispersing individuals from the northern Rockies moved westward, found mates and established packs -- at this time, there are no packs in central or western Oregon, the most likely region from which additional dispersers would come to California. In Oregon, it was nine years from the time a wolf dispersed there from Idaho (1999) until Oregon's first reproducing pack was confirmed (2008). In Washington, though rare sightings of wolves persisted in the decades following the 1920's, and one wolf accompanied by a pup was confirmed in 1996, no breeding pairs or packs were noted until 2008. Should this same pattern occur in California, it could be nearly another decade before we can confirm the existence of a successful breeding pair. In the meantime, OR-7's destiny or fate is uncertain.

Predation by humans – a chief cause of wolf mortality in all areas where wolves live -- is a threat to the survival of wolves. In California, verbal and written threats have been made against wolves generally and against OR-7 specifically. Some of these threats have come from individual county officials from northern California counties where OR-7 has been traveling. These have been documented in published newspaper articles and in archival audiotapes of public hearings, and have been heard first-hand by members of the public in attendance at the hearings (examples may be found in a Dec 24, 2011 Los Angeles Times article quoting one county supervisor, and in online archival audiotapes from a January 24, 2012 board of supervisors hearing in Modoc County.) Statements range from, "We believe all wolves should be shot on sight" to "If I see a wolf, it's dead." Threats against wolves and against OR-7 have also been made by citizens in comments posted on the internet in response to online news stories.

Impact of Existing Management Efforts:

At the present time, gray wolves that disperse into California are protected under the federal Endangered Species Act (ESA), and the U.S. Fish and Wildlife Service ("Service") has ultimate authority for wolf management in California. A cooperative management partnership between the Service, the Department and a third entity, USDA/APHIS/Wildlife Services, was established through a Memorandum of Understanding that was finalized in May of 2012 and which enumerates areas of responsibility.

As the ultimate authority for wolf management in California, the Service's history of actions regarding wolves in California and the Pacific West region, prior to the arrival of wolf OR-7, is instructive in evaluating the impact of management efforts:

- In 2000, the Service proposed to delist wolves from the Federal ESA in vast regions of the United States, including Washington, Oregon and California. (U.S. Fish and Wildlife Service Federal Register Notice, 2000.)
- In 2002, the Service denied a petition that had been filed the year prior, by Defenders of Wildlife, to create a Distinct Population Segment ("DPS") for gray wolves in the Pacific West, in an area representing over 16 million acres of federally managed lands in southwestern Oregon and northern California. (U.S. Fish and Wildlife Service letter, 2002.)
- During the mid-to-late 1990's, the Service had been studying the potential to restore wolves to the Olympic Peninsula in Washington, but halted these efforts and diverted funding to wolf reintroduction then taking place in central Idaho. (Simon, J., Seattle Times, 1997).
- In May of 2011, the Service announced it was embarking upon a status review for wolves in the Pacific West region. (U.S. Fish and Wildlife Service Federal Register Notice, 2011.) The Service's decision of whether to retain or remove federal protections for wolves here is expected to be announced in the Federal Register some time following the November elections. Independent sources advise that the Service is leaning towards removing federal protections for wolves in the region.

In the 12-year history outlined above, the Service has taken no actions aimed at recovering or conserving wolves in California. The impact is that there has been no effort to restore this once-native species to California and within the State, there is but one wolf, here of his own accord and only recently-arrived.

Given the above record, odds seem high that the Service will decide to remove protections here.

If so, this Commission's decision of whether or not to list the gray wolf under California's endangered species act (CESA) has far-reaching implications, as state-listed status may be the only means by which recovery and conservation of wolves in California could occur.

Conversely, the record of management actions by the Department since OR-7's arrival in California has been extremely proactive. The Department has created a website page dedicated to providing information to the public about OR-7, and the potential for wolves to return to California, and public access to official documents such as a wolf report the Department prepared over a several-year period, the Memorandum of Understanding with the Service, and other reports and documents relevant to the pending listing petition. The Department also immediately began a program of engagement with northern California county officials, including testifying at public hearings starting within just two weeks after OR-7 crossed the border. A stakeholders group of parties with diverse viewpoints regarding the return of wolves to California has been assembled by the Department, and a first meeting of the stakeholders took place only four months after OR-7's arrival. The Department has also been consulting with outside experts on a range of social issues related to wolves and taken steps to communicate with private landowners to prevent potential conflicts where OR-7 has been traveling. According to one newspaper article this year (Hearden, T., Capital Press, June 26, 2012), "The Golden State's largest ranchers' organization is giving high marks to how the state Department of Fish and Game has handled the expected arrival of wolves to the state."

The Department's proactive efforts, and its transparency to the public about its actions are extremely positive steps. It is quite possible that its actions have helped to keep OR-7 alive and it is likely that its actions have helped to assuage concerns on the part of some stakeholders. A state listing would allow the Department to implement a full range of conservation measures that would continue to support the recovery of wolves in California.

Range and Distribution / Ability to Survive and Reproduce:

In the last fifty years, scientific understanding of wolves has increased dramatically. In combination, current knowledge of the wolf's habitat and prey requirements; its highly adaptable nature; the fact that wolves once were the most widely-ranging land mammal on the planet; the only environments in which wolves are not found are extreme desert conditions or tropical rainforests; and information about the terrain, climate, prey species and prey distribution that have existed historically in California, all provide a basis to conclude wolves were likely present

in California and probably were widely distributed across the state. But this conclusion need not be reached based on conjecture. In fact, there exist numerous historical accounts of wolf encounters throughout the state, and substantial ethnogeographic records regarding wolves from California native peoples across the state. While there seems to be little evidence from which to estimate the numbers of wolves that may have once lived here – which, itself, suggests wolves may not have been numerous -- the historical and ethnogeographic evidence which exist support a finding that wolves were a widely distributed, far-ranging, native species in California.

Our comments in the remainder of this letter focus on evidence of the wolf's historical presence and distribution in California. We also discuss a factor key to the ability of wolves to survive and reproduce here: *i.e*., the existence and availability of prey for wolves. We address what prey base for the wolf was historically present in California and what exists in the State today.

In this section, we also have prefaced our comments with a background history regarding the discovery and settlement of California by non-native peoples and the resulting impacts on land and wildlife. This history provides context regarding the dates and locations of wolf sighting reports -- and the likely effect of human activities on existing wolf populations -- over time.

Methodology

A review was conducted of previously published literature documenting evidence of wolves via historical records, ethnographic evidence from California tribes and taxonomic studies. New research was conducted to locate additional historical accounts, ethnographic evidence and prey species information.[1] Reported wolf encounters were deemed credible where evidence suggested the documenting party knew the difference between wolves and other wild canids such as coyotes and foxes, a criterion relied upon by a prior author (Schmidt 1987, 1991). New research for additional ethnogeographic evidence was limited in scope, as this area of investigation could easily support an entirely separate research project.

A California Primer: Placing the Records into Context

Alta California – what currently exists as the state of California but at one time was simply that part of California north of the current Mexican border -- may have first been sighted by Europeans in 1540 when Hernando de Alaran explored the Colorado River and thus wolf encounters by Europeans may have occurred as early as this time, though native California tribes undoubtedly already had a lengthy history of interaction with wolves. In 1579, Sir Francis

[1] The review of previously-published literature and the newly-performed research that forms the basis of our comments was conducted by Amaroq Weiss, M.S., J.D., largely in 2008, working at the time as an independent consultant, with funding for her work provided by the California Wolf Center, Defenders of Wildlife and the Wendy P. McCaw Foundation, as well as funding and encouragement from Dr. Jerome Rowitch. Additional research was conducted in 2012. Many resources cited are housed at the Bancroft Library, at U.C. Berkeley.

Drake landed and camped at the Point Reyes area of San Francisco Bay and in 1602 Sebastian Vizcaino came ashore at Monterey.

Nearly 170 years later, Spain's occupation of Alta California began in earnest. Between 1769 and 1820, the coastal area between San Diego and the San Francisco Bay area was explored and saw the proliferation of more than 20 missions. The earliest written reports by Europeans of wolf sightings in California found to date derive from this period and occurred all along the coastal area. With the missions came the associated introduction of large numbers of domestic livestock, mostly cattle and horses, from which sprang a thriving industry in the production and export of tallow and hides that continued until the late 1840s. Spanish rule ended when, in 1821, Mexico won independence from Spain and claimed California as a Mexican territory.

From 1830-1846, the Mexican government used a system of land grants to colonists to launch an enormous expansion of agricultural development of the state, portending dramatic changes on the landscape and impacts on its native wildlife. These cattle ranchos dominated the livestock industry in the state until substantial droughts in 1855 and 1866 decimated the cattle herds and converted the livestock economy in California to sheep production. Simultaneously, fur trading parties came from the east in search of beaver, further impacting the land and wildlife, largely during the period of 1826 to the mid-1840's. Settlement of the Sacramento Valley began in the late 1830s.

The Mexican-American War took place in 1846-1848 and resulted in the United States being given California via the Treaty of Guadelupe Hidalgo. American settlers in California had, during the war, revolted against Mexico and helped complete the conquest. For a very brief time before California became a United States territory it was known as the Bear Flag Republic.

In 1849, gold was discovered at Sutter's Mill and people began to pour into the state to seek their fortunes. In 1849, there were only 15,000 Europeans in California. Three years later, there were 200,000. When, on September 9th, 1850, California became the thirty-first state of the United States of America, the bell was already tolling for some of the state's most iconic wildlife species.

It is estimated that until the 19th century, the central and coastal valleys and western Sierra Nevada foothills were home to an estimated 500,000 Tule elk, which shared their range with countless thousands of pronghorn antelope and deer. During Spanish rule and the mission era, the Spaniard's preference for beef over wild game did not directly impact the populations of wild ungulates, but the large numbers of both cattle and horses associated with the missions roamed unfenced and wild and competed to some degree with wildlife for range forage. The introduction of non-native plants replaced natural plant species that elk and pronghorn depended on and the arrival of fur traders and miners sparked hunting of game at a level not previously seen. The enormous influx of people, all of whom needed food to survive and many of whom capitalized on

California's abundant game to supply meat for urban dwellers, fueled an unchecked market hunting spree. Thousands of pronghorns were slaughtered and the Tule elk, a dry grassland species, obtained its common name when forced to take refuge from hunters and settlers in the marshes filled with Tule reeds. Simultaneously, the state's wide open valleys and marshes were being tilled, drained and fenced for agricultural crop production. For the Tule elk, this meant a loss of their marshy sanctuaries and a push to the brink of extinction. For pronghorn, a species evolved to run at breakneck speeds but without capacity to leap vertical objects, the fences that were erected for agricultural purposes created insurmountable barriers to natural travel corridors and food sources.

Concurrently, the very predators that depended on the quickly diminishing wild ungulate herds – i.e., grizzly bears, wolves, and mountain lions – were themselves subjected to relentless hunting pressure, from the time of Spanish colonization until nearly the last of these animals had been vanquished from the state. The missions each summer slaughtered cattle for tallow and hides and to pay tributes to the Church; the resulting aroma of carcasses and blood at the matanzas (killing grounds) would draw in grizzlies, wolves, and other predators and scavengers. The vaqueros (cowboys) often seized this opportunity to lasso and kill the predators for sport. California literature is saturated with stories of encounters with grizzly bears that sometimes ended with dead men but more often ended with dead bears and culminated with the killing of the last known wild grizzly in 1908.[2] The wolf, a much more elusive and shy animal than the grizzly, does not appear as frequently in the literature but exists in the margins and the shadows.

A wolf/coyote bounty was enacted in California in 1891 and thousands of wolf hides were turned in for bounty payments, some of which derived from California while others were fraudulently brought in for payment from Nevada. Observations of solo animals and of groups of wolves appear in journals and diaries but provide no full sense of the numbers of pack members that may have been beyond the range of vision during these encounters. Thus, there are no estimates of the population of wild wolves that may have been occupying California at the time of Spanish colonization, during the era of Mexican rule, or even at the point when California became a U.S. territory. However, the loss of vast herds of wild ungulates that had been the predominant prey base for wolves would have had an impact on wolf numbers, even apart from any direct actions taken by men to eradicate these predators. Wolf sightings dwindled, with reports rarely made after 1830, until the two last known wild wolves in California were trapped in 1922 and 1924, in San Bernardino and Lassen counties respectively.

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[2] The voluminous historical accounts of grizzlies in California inspired a treatise on the subject, *Bear in Mind: the California Grizzly* (Snyder, 2003), an excellent documentary resource regarding the human settlement and development events that led to the great bear's demise and undoubtedly, to that of the gray wolf, as well.

Prey Species Availability and Distribution Support the Conclusion That Wolves Historically Occupied California

The existence of a native population of wolves in California would depend, as anywhere else, upon the availability of suitable prey in sufficient numbers. While consuming a variety of animals, typically wolf prey in North America predominantly consists of large wild ungulates such as elk (*Cervus elaphus* ssp.), deer (*Odocoilues hemonius* ssp.), moose (*Alces aces*), caribou *(Rangifer tarandus*) and bison (*Bison bison*) (Mech & Boitani, 2003). Of those species that historically inhabited California, their ranges are instructive regarding areas of the state that could have supported viable wolf populations. Known wild ungulate ranges support the credibility of documented wolf sightings in given areas but also suggest locales ripe for further research for previously unlocated reports of wolf encounters.

Elk, deer and bison, as well as pronghorn antelope (*Antilocapra americana americana*) and bighorn sheep (*Ovis* ssp.) all were historically found in California. The vast range of the Tule elk was shared with pronghorn antelope and deer and many of the great grasslands of California were covered in herds of these animals in such density as to be comparable to the bison of the Great Plains or the antelope herds of the Serengeti (McCullough 1996, 1971).

The minimal published research regarding evidence of wolf presence may have led McCullough, an expert and author of many treatises on California wildlife, including authoritative publications on the Tule elk, to note: "Conspicuous by its absence is the wolf (*Canis lupus*) which was such an important predator of open country in other areas. Grinnell (1933) stated that no verified record of a wolf was known from west-central California (including all the range of the Tule elk) and the more exhaustive study by Young and Goldman (1944) gave the same result." (McCullough, 1971, p. 17.)

However, as discussed, *infra,* Grinnell did not conclude that the wolf did not exist in California apart from the far northern region and portions of the Sierra Nevada; only that it was difficult to find evidence of wolves existing in other parts of the state within the last 100 years of his survey and thus a challenge to determine which exact subspecies inhabited the region and the extent of its occurrence (Grinnell, 1937). Further, Hall and Kelson's refinement of Young and Goldman's initial wolf subspecies distribution assessment, discussed *infra*, broadened the potential range distribution for wolves in California (Hall & Kelson, 1959).

Extrapolating from prey preference exhibited by wolves in Yellowstone National Park (Smith, Peterson, & Houston, 2003) -- where elk, deer, pronghorn, bighorn sheep and bison can also be found – wolves in California likely would have preferred elk, bison and deer, with far lesser reliance on pronghorn or bighorn sheep. Descriptions of the historic distribution of California's five wild ungulate species follow.

Elk

Three subspecies of elk historically occurred in California – the Rocky Mountain elk (*Cervus elaphus nelsoni*), Roosevelt elk (*Cervus elaphus roosevelti*), and Tule elk (*Cervus elaphus nannodes*). "Because of their immense numbers, large size, impressive antlers, and graceful carriage, elk made a strong impression upon early visitors to California. Encounters with groups of elk by early explorers and settlers were frequently recorded in journals, diaries, and other written reports. Thanks to this fortunate circumstance, there exists an unusually complete record of the early distribution of elk in this state." (McCullough, 1971, p. 9).

Like many eventual North American species, *Cervus elaphus* originated in Asia and migrated to North America via the Bering Straits land bridge during the Pleistocene period. It is believed that the Roosevelt and Tule elk were separate offshoots from the Rocky Mountain elk. The elk that inhabited northeastern California were likely Rocky Mountain elk, and multiple historic records suggest they migrated into California through southern Oregon. It is hypothesized that this initial colonizing species moved west through the Mount Shasta area, reaching the Central Valley and coastal ranges. Those that ended up in the humid, forested coastal areas evolved into Roosevelt elk while the animals making their way to the more arid Central Valley grasslands differentiated into Tule elk (McCullough, 1971).

The Roosevelt elk, a population of which still exists today, was historically found in the northern coast ranges, the greatest numbers living along the coast in Del Norte and Humbolt Counties. " . . . [They] were common along the coast in the Fort Bragg and Point Arena areas, and their range extended south into northern Sonoma County." (McCullough, 1971, p. 13.)

Rocky Mountain elk are believed to have lived in the region of Mount Shasta (north-central California), with their range perhaps extending eastward into the Great Basin. White settlement resulted in this subspecies' extirpation in the region by 1873 (though a reintroduction of animals from Yellowstone National Park to the Mount Shasta area took place in 1913, resulting in a currently existing population) (McCullough, 1971).

The most abundant subspecies of elk, the Tule elk, roamed the grasslands of central California in immense numbers and predominated the landscape. An estimated 500,000 Tule elk covered the central and coastal valleys, and the western Sierra Nevada foothills of Alta California (*Id.*). The decline of Tule elk began with the impacts from Spanish livestock -- possibly by direct competition for forage but certainly due to the decrease in native plants supplanted by non-native vegetation that flourished in the face of greatly increased grazing and soil disturbance. With the arrival of fur trappers and gold prospectors, elk were subjected to heavy hunting for personal consumption, while the market hunting that supplied wild game to urban diners added to the intense hunting pressure. All of these forces occurred within a few decades of each other and, when elk habitat was developed by settlers, the combination of factors pushed Tule elk almost to

extinction. Some estimates place its lowest point at fewer than 10, before conservation efforts began in earnest in the 1930's (Schoenherr, 1995).

Deer

Deer (Genus *Odocoileus*) are believed to have evolved in the Old World and arrived in North America more than 2 million years ago, and fossil remains of deer have been found in late Pliocene deposits. Historically, deer populations in California included a variety of subspecies inhabiting a large majority of the state's land mass. They included Rocky Mountain mule deer (*O.h. hemonius*), California mule deer (*O.h. californicus*), Southern mule deer (*O.h. fuliginatis*), Inyo mule deer (*O.h. inyoensis*), and Columbian black-tailed deer (*O.h. columbianus*) (Walmo, 1981).

The Rocky Mountain mule deer's range was vast, its western boundary at the summit of the Sierra Nevada-Cascade mountain range in Washington, Oregon and northern California (Taylor, 1956, p. 346), while California mule deer range spanned twelve central counties, including Ventura, Santa Barbara, San Luis Obispo, southern Monterey, Tulare, Kern, Fresno, El Dorado, Tuolomne, Mariposa, Calaveras and Yuba (*Id.* at 350). In San Diego County and the San Jacinto Mountains, the Southern mule deer ranged from sea level into the mountains (*Id*. at 351), while the eastern slope of the southern Sierra Nevada, into the Inyo and White Mountains comprised the range of the Inyo mule deer (*Id.* at 352). The Columbian black-tailed coast deer was distributed continuously along the coast from Del Norte County through the San Francisco Bay and on south to northern Monterey County and San Benito County, with broad areas of intergradation with California mule deer possibly as far south as Santa Barbara County; in the summer, coast deer occurred east to Medicine Lake in Siskiyou County, to Eagle Lake in Lassen County, and to Lake Tahoe in Placer County, and displayed intergradation with Rocky Mountain mule deer in some places (*Id*. at 357-358). Deer also densely populated the riparian oak woodlands along the Sacramento River south going into Butte, Yolo and Yuba Counties and occupied the western Siskiyou Mountains of Tehama County and the contiguous counties along the western foothills of the Sierra Nevada.

Historical accounts by explorers, fur traders and settlers often remarked that deer were populous and widely distributed in California. Smith (2000) estimated the black-tailed deer population, including mule deer, between 1800-1850 as nearly 800,000 and reviewed historic accounts to assess their distribution: "From these accounts we gain the impression that deer originally were numerous in the coastal mountains from San Diego to the Klamath River and in the foothills bordering the Central Valley. Populations were moderate or locally abundant in the high Sierra, the Great Basin area, and Central Valley. They were scarce in the desert and the heavily timbered northwest." (*Id*., webpage installment 2). Another source reported: "'It [the deer] is so abundant in certain portions of the Pacific Coast that I have heard of market hunters who killed five and six hundred in a season by stalking alone, and it was reported to me in 1874 that over three thousand were slaughtered within a period of five months in a region having an area of less than

two hundred miles, and that most of them were sent to market and sold at four cents, or two pence per pound. The retail sellers charged from ten to twelve cents per pound for the venison, so that they realized more than a hundred per cent profit on their investment.' (Murphy 1879)." (as reported in Taylor, 1956).

Records of deer populations which have been kept by the State since around 1800 are insightful. The enormous hunting pressures in the mid-to-late 1800's following the Gold Rush, and then a severe winter die-off, led to large-scale declines in deer population numbers (California Department of Fish and Game, website page re: Long Term Trends in Deer Population). Any remaining wolves and other large carnivores who favored this prey species may have found themselves short on food. Starting in the early 1900's, in response to fire-induced improved habitat quality, the deer population rebounded. (*Id*.)

Bison – *Bison bison athabascae*

Bison once lived in vast numbers on the plains, but the plains bison (*Bison bison bison*) was but one of two subspecies or races. A second race (*Bison bison athabascae*) lived in the forests and mountains, especially in the Rocky Mountains of the United States but also including parts of California (Christman, 1971). The year 1830 is suggested as the last occurrence of bison there. "Indians in the Sierra Nevada received bison robes by trade from Washoe and eastern Mono Indians of the eastern foothills of that range. Horn tips found in Buena Vista Lake, California, are probably such trade items." (*Id.* at 46).

Reliable information from members of several California tribes -- the Pit River Tribes and the Northern Pauites – also establishes the presence of bison. These tribes report that bison had existed in "the open semi-desert valleys of Modoc and Lassen counties, namely: Surprise Valley, Alturas valley, Hot Springs Valley, Madelin Plains, Horse Lake Valley, Eagle Lake Valley, the valley of Pine Creek on the west side of eagle Lake, and Honey Lake Valley." (Merriam, 1926, p. 212). Place names in the area between northeastern California and northwestern Nevada provide additional evidence, including "Buffalo Salt Works," "Buffalo Creek," and "Buffalo Meadows." Bison likely entered California by traversing the north end of the Great Salt Lake near the Utah-Idaho boundary, making their way through Idaho into Oregon, then coming south into California (*Id*.).

No estimates have been made regarding historical bison numbers in California but, as with the tribes of the region, wolves in northeastern California would have found a food source in these massive ungulates.

Bighorn Sheep (*Ovus canadensis* ssp.)

Three subspecies of Bighorn Sheep, the California/Sierra Nevada bighorn sheep (*O. c. californiana*), the Peninsular bighorn sheep (*O. c. cremnobates*), and the Nelson/desert bighorn sheep (*O. c. nelsoni*), historically occurred in California. California bighorns inhabited the

southern Sierra Nevada; Peninsular bighorns occurred in the Peninsular Ranges from the San Jacinto and Santa Rosa Ranges (Riverside County) south into Mexico; and the Nelson/desert bighorns occupied desert mountain ranges from the White Mountains of Mono and Inyo counties south to San Bernardino Mountains, then southeast toward the Mexican border (California Department of Fish and Game website).

Bighorn populations were heavily impacted as a result of the gold rush and the introduction into the region of domestic sheep. "The three decades following the large influx of gold miners, beginning in 1849, saw rapid loss of mountain sheep (*Ovus canadensis*) populations in parts of California. Indiscriminate shooting was probably important in some locations. This was followed by a more significant factor: the grazing of domestic livestock and the disease organisms they introduced to mountain sheep. Livestock grazing in the Sierra Nevada began about 1861 with cattle, but was replaced by domestic sheep . . . a die-off of mountain sheep from scabies occurred in the Great Western Divide (Jones, 1950). Presumably the disease was contracted from domestic sheep. Similarly, evidence suggests that no viable mountain sheep population remained in the Yosemite area of the Sierra Nevada past the early 1880's (Grinnell & Storer, 1924), despite Muir's statement to Seton (1929) that a few still remained in 1899. In northeastern California, the population on Mount Shasta encountered by Muir in 1874 (Wolf 1979) apparently had been decimated by 1883. (Buechner 1960)." (Wehausen, Bleich, & Weaver, 1987, p. 65).

Whether bighorn sheep may have been prey for any wolves living in California is debatable, since bighorn sheep tend to occupy terrain at elevation higher than wolves generally frequent (Smith *et al*., 2003). If bighorns were a component of wolf diet, then their human-caused decline could have negatively impacted wolves.

Pronghorn antelope – *Antilocapra americana*

Pronghorn antelope distribution historically "occupied a giant elliptical range that stretched from east Texas to western Minnesota to California's central coast." (Turbak, 1995, p. 13). In California, pronghorn were distributed across all of the open terrain, including parts of the deserts; Antelope Valley, in the western Mojave Desert, was named for its former inhabitant.

The demise of the pronghorn was in tandem with the fate of California's other large ungulates: "As cities sprang up across the West, market hunters filled wagons with dead antelope so [that] urban people might have food for their tables. In the early days of the California gold boom, pronghorn steaks fetched a whopping twenty-five cents per pound, but by the 1860s you could buy three or four entire antelope in the Denver market for that same quarter. When rail transportation became available, market hunters shipped tons of meat back East and to the growing settlements on the Pacific coast. In some places, pronghorns were so easy to acquire that professional hunters had a hard time giving their kill away. According to one report, a California market hunter set up shop near a popular pronghorn watering hole during a drought in

1859 and proceeded to slaughter five thousand of the animals as they came to drink." (*Id*. at 16-17.)

Antelope herds became observably reduced or absent by the 1860's, and by 1875 pronghorns were rare in the Central Valley. In 1906, C. Hart Merriam wrote: "Antelope occur in California in three widely disconnected areas, in all of which they are now scarce and diminishing in numbers. The three areas in question are the sage plains of northeastern California, in Modoc and Lassen Counties, the great interior Sacramento-Joaquin Valley and the Mojave and Colorado Deserts of southern California." (p. 100 (manuscript pages unnumbered).)

As with the bighorn sheep, whether pronghorn were a mainstay for wolves is an open question. Adult antelope run at speeds no wolf can match and it is debatable whether even pronghorn fawns would have been preyed upon by wolves. Recent research in Yellowstone National Park in fact suggests that the restoration of wolves to the park has boosted the pronghorn population by decimating its chief predator, the coyote (Berger, Gese, & Berger, 2008). If, however, pronghorns were a prey item for wolves in California, then human pressure on antelope populations would have reduced the availability of yet another prey species for wolves.

Current Prey Base Availability for Wolves

Historical accounts and published range maps depicting distributional patterns establish that common wolf prey species existed widely throughout the state, and in abundant numbers more than sufficient to support a wolf population.

Today, most of the same prey species exist in areas that would provide good wolf habitat, though population numbers for each has fluctuated over time in response to changing habitat quality and other factors, such as disease:

- California's current elk population is estimated at more than 11,000, comprised of 3900 Tule elk, 1500 Rocky Mountain elk, and 5500-6500 Roosevelt elk. (California Department of Fish and Game; Rocky Mountain Elk Foundation.)
- Records of deer populations in California have been kept since the 1800's. According to the Department, peak populations occurred in the 1950's-1960's, at levels exceeding the carrying capacities of the range. Populations have declined since that time "due largely to long-term declines in habitat quality throughout the state, brought about by various factors." However, California's deer population currently occupies habitat throughout most of the state and is estimated at around 445,000. (Weiser, M., 2012).
- Beyond their original ranges in the southern Sierra Nevada, peninsular ranges and desert mountain ranges, California bighorns have subsequently been reintroduced into Inyo County and the South Warner Wilderness in Modoc Co., while the Nelson bighorn modernly has an additional isolated population in the San Gabriel Mountains. (California Department of Fish and Game.) Nelson bighorn, in 2010, were estimated at 4,800 animals. (USA Trophy Hunts / California Hunting Outfitters webpage).

- Pronghorn can be found today mostly in the northeastern part of the state, with restoration efforts ongoing in central and southern California. A 2010 population estimate placed them at 6,000 animals. (USA Trophy Hunts / California Hunting Outfitters webpage).
- Bison have not occupied mainland California since the 1830's, though a small population was introduced to Santa Catalina Island in 1924 as movie extras for a silent film. The current herd of 150-200 animals at this Channel Islands location would not be accessible to any recovered mainland wolf population.

Thus, most of the prey species wolves would have relied upon historically are still present in the state and, in many cases, are located in areas the additional features of which would promote the development and maintenance of a viable wolf population. For instance, studies conducted by the Conservation Biology Institute in the late 1990's concluded that current conditions of topography, likely prey base availability, and patterns of limited human settlement would allow for a population of up to 470 wolves in the northern California/southwestern Oregon cross-border area known as the Klamath-Siskiyou Bioregion and the Modoc Plateau (Carroll, Noss, Shumaker, & Paquet, 2001).

Based on historical presence of suitable wolf prey base and current-day availability of suitable prey, large portions of California were – and remain – viable wolf habitat.

Scientific Assessments Establish that Wolves Historically Occupied California

Biologists and taxonomists have to some limited extent attempted to assess wolf presence in California. Biological assessments made in the early 1900's took place at a time when human impacts had already displaced or extirpated the species and thus reached limited conclusions. Early taxonomic evaluations have been modified with the advent of modern scientific means of assessment, including DNA analysis of museum specimens.

Wolf Taxonomy

From at least 1912 to the present, published works regarding gray wolf taxonomy in North America have described historic range for this species as occurring throughout Canada and nearly everywhere in the lower 48 United States and Alaska, with notable exceptions: the southeastern and eastern United States (which instead provided habitat for the red wolf, *Canis rufus*, a separate species) and, relevant to this paper, most of California.[3]

[3] An excellent discussion and chronology of the evolution of wolf taxonomy, with citations dating back to 1829, can be found in *Ecology and Conservation of Wolves in a Changing World* (Carbyn, Fritts, & Seip, 1995). Part VI, pp. 353-398.

A continuing thread has been the recognition of the historic presence of wolves in at least some parts of California. "The gray wolf is thought to have originated in the Old World and immigrated into North America in the Pleistocene via the Bering Land Bridge (Kurten 1968, Nowak 1979, Kurten and Anderson 1980)." (Carbyn *et al.*, 1995, p. 356.) Evidence of wolves closely related to modern-day gray wolves have been found in California in deposits from the Pleistocene period, including in the Rancho Le Brea tar pits (Nowak, 1979; Young and Goldman, 1944), with fossils discovered in Shasta, Kern, Los Angeles, and San Bernardino Counties (Schmidt, 1991).

Recognizing 23 subspecies of North American wolf, Young and Goldman (1944) described the historic range of each, concluding that two, *Canis lupus fuscus* ("Cascade Mountains wolf") and *Canis lupus youngi* ("Southern Rocky Mountain wolf"), once inhabited portions of California.

Specifically, *C.l. fuscus'* range was described as "[f]ormerly the forested region from the Cascade Range in Oregon and Washington west in places to the Pacific coast; south to undetermined limits along the Sierra Nevada in northeastern California, and probably northwestern Nevada, north along the coast of British Columbia to undetermined limits." (Young & Goldman, 1944, p. 455.) This subspecies was first described by Richardson (1839) as denoting "'the large brown wolf' of Lewis and Clark, said to inhabit 'California and the banks of the Columbia' River . . . ." (Young & Goldman, 1944, pp. 394, 457; Richardson, 1839, p. 5).

Similarly, the range for *C.l. youngi*, first described by Goldman in 1937, was defined as "[f]ormerly numerous in Rocky Mountain region from northern Utah and southern Wyoming south through Utah and western Colorado to northern Arizona and northern New Mexico; west irregularly to central Nevada (Gold Creek, Elko Count), and sporadically at least to southeastern California (Providence Mountains)." (Young & Goldman, 1944, p. 461).

In 1959, Hall and Kelson added a 24th subspecies to Young and Goldman's taxonomic scheme, modified some of the subspecies' range descriptions , including that of *C.l. youngi*, and prepared a map that visually depicts the historic distribution of gray wolves by subspecies (Hall & Kelson, 1959). Wolf distribution in California is depicted as occurring in the far northeastern part of the state known as the Modoc Plateau, and the eastern Sierra Nevada range. (see Carbyn *et al.*, 1995, map at pp. 361 and 376).

In 1995, Nowak published a taxonomic revision for North American gray wolf subspecies. Nowak's research, based on measurements of 580 specimen skulls of adult male wolves in historical collections, found that the number of gray wolf subspecies in North America was more properly confined to five, that many of the previously named subspecies were not true subspecies, including *C.l. fuscus* and *C.l. youngi*, and that the wolf inhabiting northeastern and eastern California was, in fact, one subspecies, *Canis lupus nubilis* ("Great Plains wolf," "Buffalo wolf," or "Loafer," first described in 1823 by Thomas Say) (Carbyn *et al.*, 1995). Nowak's morphological results were reinforced by mitochondrial DNA analysis of wolves which

concluded that the genetic variation among North American wolf populations was too small to justify the many subspecies designations used in the past (Wayne, Lehman, & Fuller, 1995). Nowak's taxonomic revision was accompanied by an updated range map, with *C.l. nubilis* depicted as the gray wolf subspecies that once inhabited the Modoc Plateau and Sierra Nevada. (see Carbyn *et al.*, 1995, map at p. 395). Nowak's revised taxonomic scheme that recognizes five subspecies of North American gray wolves is the figure currently in use in the scientific community.[4]

Joseph Grinnell's Survey of Fur-Bearing Mammals of California

Joseph Grinnell found little evidence of wolves still in existence at the time of his treatise on fur-bearing mammals of the state:[5]

"Unquestionably wolves ranged regularly over the northern one-fourth of the State and south along the Sierra Nevada to Inyo County at least, but we found no convincing evidence of their occurrence one hundred years ago in west central California or southern California west of the desert divides." (Grinnell, Dixon, & Linsdale, 1937, p. 529).

He noted the two specimens trapped in San Bernardino and Lassen Counties in 1922 and 1924, respectively, and viewed as credible additional sightings in Modoc County (*Id*.)

Grinnell's stature as an excellent naturalist may lead one to conclude that if he could not find evidence of wolves outside of the far northern portion of the state and in the Sierra Nevada, then they did not exist. However, many of the observations of wolves recorded by others were from sightings that took place well before Grinnell was born in 1877. It is also unlikely that he had

[4] In recent years, taxonomic studies have posed the question whether a gray wolf subspecies, *Canis lupus lycaeon*, is in fact an entirely separate, third species of wolf in North America properly called *Canis lycaeon*. A summary of various studies on this issue is provided in a federal government Federal Register Notice regarding the delisting of the Western Great Lakes population of wolves. (Federal Register Notice of Final Rule, 2011)

[5]Joseph Grinnell was a field biologist, zoologist and ornithologist famous for his extensive studies of California fauna, and whose commitment to protection and conservation of wildlife helped shape the philosophy of the National Park System. He introduced the concept of the "ecological niche" (i.e., how an organism makes its living in relationship to its ecosystem) and his work has had a major influence in the field of evolutionary biology. Grinnell was a visionary who recognized the extraordinary toll on California wildlife that was occurring due to increasing impacts of human population growth and unsustainable land use practices. This led him to establish a collection and detailed records including specimens, field notes and photographs at the UC Berkeley Museum of Vertebrate Zoology of the distribution and natural history of birds, mammals, reptiles and amphibians. His monographic treatments of areas were widely read and remain as authoritative sources, including "Animal Life in Yosemite," (1924) "Game Birds of California,"(1919) and "Fur-Bearing Mammals of California." (1937).

access to obscurely published accounts that can be obtained today at special collections libraries. It is not difficult to conclude that finding evidence of a species that is both elusive and well on its way to extinction in the state at the very time research was being conducted is a tall order.

It is noteworthy that despite the scant wolf evidence, Grinnell reported strong evidence of recent encroachment by coyotes into habitats where they had not been previously reported:

"With the cutting of timber and clearing of the land in California's coast belt north of San Francisco Bay the Coyote, a plains animal has, within the memory of men now living, extended its range westward almost or quite to the seacoast." (Grinnell,1928, p. 444).

The coyote's distribution across North America has been documented to have tripled since the start of 1900 and it is well-noted in the literature that "the coyote's range expansion has been attributed to widespread reduction in the distribution of the gray wolf and the clearing of forests." (Crabtree & Sheldon, 1999, p. 146). It is possible that with the eradication of wolves in California during the 1800's, coyotes were able to colonize territory from which they were previously held at bay by their larger and very territorial cousin, the gray wolf.[6] In fact, this supports Grinnell's well-accepted theory that organisms evolve and adapt to fill specific ecological roles in nature.

C. Hart Merriam's Assessment of California Mammals

In May of 1906 C. Hart Merriam dictated a manuscript on the mammals of California with an emphasis on their historic and present distribution within the state.[7] Regarding the current status of wolves at the time he wrote:

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[6]The reintroduction of wolves to Yellowstone National Park resulted in mortality of approximately 50% of the Park's coyote population – and as high as 90% mortality in some areas – due to interspecific competition by the newly-restored wolves (Crabtree & Sheldon, 1999; Smith *et al*., 2003). High population levels and widespread distribution of coyotes within the Park prior to wolf reintroduction may have resulted from coyotes filling the vacuum created when wolves were eradicated from the Park by the early 1920's.

[7] C. Hart Merriam was an ornithologist, entomologist and ethnographer who, in 1886, became the first chief of the Division of Economic Ornithology and Mammalogy of the United States Department of Agriculture (predecessor to the National Wildlife Research Center and the United State Fish and Wildlife Service). He is equally known for his contributions, in later life, in the field of ethnogeography of native peoples of the western United States, including central California. A highly detail-oriented taxonomist and naturalist, Merriam's work contributed greatly to the developing field of ecology; his position allowed him to encourage that biological surveys be conducted throughout the United States and his proposal to map how plants and animals are distributed across landscapes, a concept called "life zones," was an important milestone in scientific understanding.

"The Timber Wolf (*Genus Canis Griseus*) In California big wolves are so scarce as to be almost unknown. In 1899 Bailey was told that they were occasionally seen south of Tule Lake, in the extreme northeastern part of the State, and in 1898 I was told by ranchmen on Redwood Creek, in Humboldt County, that there were no timber wolves in the region. On the other hand a man named Mason Cole told me, in August 1899, that late in the previous fall he caught a timber wolf in a trap set for bear, between the legs of a dead horse, high up on the Canyon Creek in northern Trinity County. [¶] Formerly large timber wolves occurred in the Sierra region where several of the Indian tribes have names for them, but I have not been able to obtain any reliable record, in recent years, although in 1891 Nelson was told by several old residents and trappers that a few were still to be found in the forest on the Merced and Joaquin Rivers." (Merriam, 1906, p. 113 (manuscript pages not numbered)).

Though Merriam's report suggests wolf numbers had dwindled substantially by the late 1800's, the sporadic sightings or trapping of individuals in locations quite distant from one another bolsters the notion that wolves were widespread in California.

Summary of Scientific Evidence

Assessments of the mammalian fauna of California, as well as taxonomic classifications and subspecies range identification support the conclusion that wolves were native inhabitants of California, rather than occasionally appearing as random dispersers from adjacent states. Surveys conducted in the early 1900's acknowledged implicitly or explicitly that wolves were already well on their way towards extinction when the assessments were being made, thus making the identification of the subspecies that chiefly occupied California and the full extent of its range an extremely challenging task. Scientific advancements in DNA analysis techniques have helped narrow the range of possibilities as to the California subspecies such that any future findings of historical specimens may be evaluated through these modern techniques.

Historical Accounts Support the Conclusion that Wolves Historically Occupied and Were Widely Distributed Throughout Most of California

Previously-Assembled Accounts

Two papers based on the review of paleontological evidence and an examination of historical accounts by explorers, railroad surveyors, settlers and historians of their experiences in California, including encounters with wolves, seem to comprise the entire previously published works addressing this subject (see Schmidt 1987, 1991). Schmidt examined more than 50 accounts of life in early California, and limited his analysis to only those reports he found credible based upon the observer's ability to distinguish between wolves, foxes and coyotes. His research revealed that wolf sighting locations within the state coincided with the changing patterns of human settlement.

Wolf sightings from the 1750's to the 1850's were largely contained to coastal regions where explorers first landed but were so widely ranging as to include sightings from San Diego all the way to the San Francisco Bay. This pattern of coastal sightings gave way to observations of wolves further inland during the period of 1850-1900, coinciding not only with the inland expeditions of the mountain men and fur traders but also with the arrival from the east of large numbers of people drawn by the discovery of gold. Overall, Schmidt reports historic sightings near San Diego area, near the San Gabriel Mission in southern California, in the Monterey Bay area, Humboldt County, northern Shasta County, the central Sierra Nevada, and in the Sacramento-San Joaquin Valley. He notes the wolf specimens trapped in San Bernardino County and Lassen County in the early 1920's; Grinnell's reports from Modoc County published in 1937; and estimates given by the U.S. Forest Service in 1939 for suspected wolf numbers in six National Forests distributed across the state, including Lassen, Tahoe, Eldorado, Stanislaus, Angeles, and Rogue River.[8] These widely distributed sightings provide a basis for concluding that wolf distribution was not limited to the far eastern and northeastern regions of the state.

Newly-Uncovered Accounts

The few published papers on the historic presence of wolves in California are tantalizing. Their results suggest that perhaps the reason little evidence of wolves has been found in the literature is that few people have searched for it, or what evidence was discovered was dismissed for lack of credibility of the recording party. However, wolf encounters in historic literature appear in many contexts. Newly-uncovered historical accounts that report wolf sightings are provided below, with quotes, in bold, taken directly from the written sources, and an accompanying background provided regarding the source, where possible.

Ranchos

Those who lived at or were guests at the ranchos established by Spanish land-grants frequently recorded their daily life experiences with the land and animals. Describing a land-grantee who became dissatisfied with *rancho* life and yearned for life on the San Francisco Bay, one historian wrote: **"Don William Richardson was granted Rancho Saucelito (present Sausalito). But he did not like to live on his rancho. It was his plan to find a port town on the bay. He took his family to live at the Yerba Buena cove. He built the first shelter there made of redwood posts covered with a ship's sail. The only neighbors they had were bears, coyotes, and wolves."** (Bauer, 1957, p. 97).

[8] An adult male wolf killed in 1962 bear Woodlake in Tulare County was, upon morphological examination and comparison with skull samples at the Museum of Vertebrate Zoology, determined to most likely be an introduced/released captive wolf originating from an Asiatic race of wolves, rather than a native subspecies originating in or dispersing into the Sierra Nevada (McCullough, 1967).

Describing the wildlife near ranchos in the area of Anaheim, Tustin City, Santa Ana, and Orange in the 1870's, another historian noted: **"Grizzly and black bear, gray wolves, wildcats, and mountain lions were to be found in great numbers in the mountains and canyons. Hundreds of coyotes ranged over plain and hill and took heavy toll of the flocks of sheep."** (Cleland, 1952, p. 92).

Mountain Men and Fur Traders

William Henry Ashley financed some of the most important trade route explorations to find a central route to the Pacific in the 1820's, and **Jedediah Smith** was one of the famous mountain men who traveled on these expeditions and others. Smith kept a journal during his travels; an encounter with wolves in California is noted in his January 4th, 1827 entry while staying at the San Gabriel Mission in the San Pedro/Los Angeles area: **"THURS. 4th. Still at the mission; . . .Myself and Mr. McCoy went up in the mountains to see if we could find some dear [sic]; I saw two and wounded one, killed a wolf and two ducks . . ."** (Dale, 1941, p. 214).

1831-1835 was a period of intense activity in the exploitation of the fur trade of the Far West. **Zenas Leonard** , a "free-lance" trapper, traveled from Ft. Osage in St. Louis, Missouri, to Monterey, California. Leonard lived among other mountaineers for 5 ½ years during the 1830's. Near Monterey, in Dec 1833, he describes the butchering of wild cattle for hides and tallow: **"After they strip off the hides and take out the tallow, and sometimes the choice part of the meat, the remainder of the carcase [sic] is left on the ground to be devoured by the wolves."** (Leonard, 1934, p. 171).

"Grizzly Adams" (born James Capen Adams), was a larger than life figure in western culture due his unusual habit of capturing and taming grizzly bears and other wild animals which he took on tour for profit. Best known for his bears, Adams also had wolves. In a book he self-authored, Adams indicates he went to California in 1849 where he lived and mined in Sonora. In 1853, he headed into the Sierra Nevada where he built a log hut and reported: **"I was successful that winter in trapping four grizzly bears, besides deer, wolves, beavers, rabbits, minks, etc., whose skins are valuable, without number."** (Adams, 1860, p. 4).

Explorers and Traders of Goods

Many explorers kept journals recording their routes and the daily experiences of their travels. In September 1786, John Francis Galoup de la Perouse arrived at the Bay of Monterey, where he landed and was entertained by the Fathers of the San Carlos Mission, reporting: **"Before the Spaniards settled here, the Indians of California only cultivated a little maize, and almost entirely subsisted on fishing and hunting. No country abounds more in all sorts of fish and game. Hares, rabbits, and stags are very common, otters and sea wolves as abundant as to the northward, and they kill in winter a very large number of bears, foxes, wolves and wild cats."** (Harrison, 1892, p. 51).

In a separate entry in the above book an Ed. Martin described his experience in the countryside of Santa Cruz County as follows: **"For the purpose of this article we will commence from the year 1850. . . . over the plains now dotted with enormous orchards and well-tilled farms, roamed herds of cattle; coyotes and wolves were numerous, attacking the new-born calves, and occasionally a grizzly bear would condescend to be in the company of these mongrels of the plains."** (*Id*. at 59).

John Coulter's mid-19th century account of tradeship visits to foreign lands for goods includes descriptions of his journeys to and travels within California. At some point prior to 1836, at the south point of California, Coulter and his crew dropped anchor at a locale he indicates as Bay St. Lucas where they went ashore to visit and stay at a ranch owned by a Mr. Fisher: **"I enjoyed some excellent and exciting sport on this extensive plain . . . Some distance further on, we fell in with a poor stray bullock, evidently worn out from fatigue, sitting on its haunches, bellowing most mournfully; six or eight large wolves were barking around, and about commencing their attack, but on our closing up to it, they scampered off into an adjoining jungle . . . "** (Coulter, 1847, pp. 131-134). In another report, Coulter described a friend who, while hunting in the valley of Tule Lakes found himself being attacked by robbers. The hunter and a companion thwarted the attack and killed their assailants: **" . . . and thus they left the scene of action, the bodies of the robbers to the wolves, who were howling about them, and entered St. Francisco in triumph."** (*Id.* at 167). Among other topics, Coulter describes the wild beasts and fowl likely to be encountered along the coast of northern California and its interior: **"In the depths of the forest, in the thickets, in the rocky ground, and occasionally out on the prairies, you will fall in with the 'mustang,' or wild horse, the buffalo, deer, the swift wild goat, termed berendos; antelope, elk, prairie dogs, hares, rabbits, red panther, or peuma [sic], commonly called the American lion; spotted leopard, jaguar; black, white and grey wolves; blue, red, and black fox; porcupine, badger, hedgehog, muskrat, land and sea otter, raccoons, squirrels; the brown, black, and grisly [sic] bears, &c."** (*Id*. at 177). Describing an encounter with a grizzly bear that ended with the bear being killed by Coulter's hunting companion, he writes: **"He next turned to and skinned the animals with experienced dispatch, rolled up the skin to as small a parcel as possible, and we moved on rapidly from the place where the carcase [sic] lay, the hunter telling me that the smell of it would attract the wolf, peuma [sic], and jaguar. He was right in his conjectures, for we were scarcely five hundred yards off when a fearful growling and ferocious roars assailed our ears. 'The wolves are at work now on old grisly Bruin. Did you hear that roar?'"** (*Id.* at 183-184).

William Heath Davis first traveled to California on a trading ship in 1831. He spent many years in California, involved in trading and cattle production, among other endeavors. In early-mid August of 1839, Davis was employed on a ship that took Captain John A. Sutter and some comrades from Yerba Buena to the Sacramento/American Rivers: **"Having accomplished my purpose of landing Captain Sutter at the junction of the American and Sacramento rivers with his men and his freight, the following morning we left him there and headed the two**

vessels for Yerba Buena. As we moved away Captain Sutter gave us a parting salute of nine guns – the first ever fired at that place – which produced a most remarkable effect. . . . A large number of deer, elk and other animals on the plains were startled, running to and fro, stopping to listen, their heads raised, full of curiosity and wonder, seemingly attracted and fascinated to the spot, while from the interior of the adjacent wood the howls of wolves and coyotes filled the air, and immense flocks of waterfowl flew wildly over the camp." (Davis, 1929, p. 16).

John Charles Fremont, in a journal entry for March 4, 1844 writes of attempts to find a Mr. Preuss, who had gone missing from Fremont's party while traveling through the Sierra. Fremont reports that when Preuss was found, after crossing Rock Creek near a place called Beautiful Camp, Preuss advised that, while trying to find his way back to the band of men, he: **" . . . heard at some distance from the river the barking of what he thought were two dogs, and walked in that direction as quickly as he was able, hoping to find there some Indian hut, but met only two wolves . . . ."** (Fremont, 1887, p. 349).[9]

Writers

Mary Austin, renowned southwestern author, wrote twenty-seven books and more than 250 articles, focusing on American Indian and Hispanic traditions of the Southwest as well as on attitudes towards women and women's rights. In *Land of Little Rain*, she wrote of her experiences with the land, wildlife and people in the Panamint Mountains. She enumerates many wildlife species and describes a camp, the land and a mountain respectively, as follows: **"High as the camp may be, so it is not above timber-line, it is not too high for the coyote, the bobcat, or the wolf."** (Austin, 1903, p. 59). She goes on: **"It is the country of the bighorn, the wapiti and the wolf, nesting place of buzzards, land of cloud-nourished trees and wild things that live without drink."** (Id. at 86). Noting the difference in wolf and bighorn habitat through the measure of altitude, she wrote: **"On Oppapago, which is also called Sheep Mountain, one finds not far from the beds of cassiope the ice-worn, stony hollows where the bighorns cradle their young. These are above the wolf's quest and the eagle's wont . . . ."** (*Id*. at 210).

One of the most well-known works of famous poet and essayist **Joaquin Miller** was a book describing his life with the Indians in the Mount Shasta area of northern California during 1856-1860. Describing elk coming down from the mountain, he wrote: **"At this season of the year, as well as late in the fall, they are found in herds of hundreds together . . . [P] . . . When the maples and grasses of one marsh are consumed, they break through the snow in single file,**

[9] To aid in assessing where Fremont's party was at the time of this sighting, it is instructive to know that, two days later Fremont's party was at the River of the Americans, which they were told joined the Sacramento River about 10 miles below. By the 8th, they had reached the junction of these two rivers.

led in turns by the bulls, to another. . . . [P] . . . The cows come up last, to protect the calves in the line of march from the wolves." (Miller, 1972, (reprint of 1873 edition), pp. 213-214). Near McCloud, to the south of Mount Shasta, he noted: **"From one of these lodges a small black wolf started out and stole swiftly across the hill."** (*Id.* at 372).

Bounty Records

The first wolf bounty in America was enacted in 1630 in Massachusetts and, as settlers made their way westward and encountered wolves and coyotes they viewed as threats to their livestock and livelihood, local and state laws were enacted to pay bounties to anyone turning in a hide of such animal. The number of hides turned in and bounties paid out in any given area can be enlightening regarding the local population numbers of the species in question or, as in the case of the wolf in California, can be more enlightening regarding the nature of human greed.

The 1896 Yearbook of the United States Department of Agriculture reports that between 1888-1895, $210,345.00 was paid out in wolf bounties in California (see Table at p. 60). However, even knowing what the payment amount was per hide and conducting the mathematical calculations to determine what number of pelts that represented would not provide a reliable estimate of the number of wolves in California, because the bounty system was also wracked by fraud.

One such account of the bounties paid in California on coyote and wolf hides weighed the costs of the payments against the benefit received: **"Enormous sums have been paid out relatively in bounties. In California, an act was passed in 1891, making the bounties on coyotes $57 [sic?] each. During the 18 months that the act was enforced that state paid out $187,485 on wolf hides. . . . That the offering of bounties has made the number of wolves considerably less than it would otherwise have been cannot be questioned. The discouraging thing about it, however, is, first, that it has not gone far toward the extermination of wolves, and, second, that it has led to the fraudulent practices on the part of wolf hunters."** (Shaw, 1914, pp. 383-384).

Another explained the demise of the bounty law: **"The wolf bounty in Nevada was 50 cents when California was offering $5 for scalps. Consequently, thousands of scalps were shipped from Nevada to California, and large numbers of them were actually imported from Mexico; so that California found herself getting poorer at a distressing rate, and the bounty law was repealed."** (Shields, 1897, p. 375).

Thus, records of bounties paid on wolf hides in California cannot be relied upon as a credible source of information regarding how many wolves may have been inhabiting the state nor for information regarding where within the state the wolf populations were most numerous. However, the fact a bounty for wolf hides was enacted informs that California considered its wolf population to be sufficiently numerous to be a problem worth eradicating.

Ethnogeographic Evidence from California Tribes Supports the Conclusion that Wolves were a Widely Distributed Native Species

Ethnogeography, the study of the geographical distribution of racial groups and their relationships with each other and with the land has, with respect to California native peoples, proved a fruitful means of discovering historical evidence of wolves. Two published papers report information discovered at that time and in the course of research for the current paper, additional findings were made. In each case, the results demonstrate that California tribes occupying territory across the far reaches of the state were familiar with wolves.

Wolves are represented in language, creation stories and belief systems, ritual artwork, sound mimicry and dance regalia (Margolin & Geddes-Osborne, 2001). When Europeans arrived in California, 80 different native languages were being spoken in the region and most had distinct words for wolf, fox, dog and coyote – fairly conclusive proof that all four canids lived here. (*Id*.). The Wintu of the Sacramento Valley believed powerful men and wolves could interchange shapes, while the Chimariko of northwestern California were known for their excellent wolf howl imitations; sand-paintings critical to adolescent/adult initiation rites for Kumeyaay boys of southern California included a figure known as wolf; and blinders constructed from wolf fur and worn by ritual dancers in the White Deerskin Dance and World Renewal Ceremonies of several northern California tribes including the Yurok, Karuk and Hupa, suggested the important role wolves played in balancing the world[10] (*Id*.). Similar evidence of the practical use, as well as symbolic meaning, of wolves to the Illmawi band for the Pit River tribe of the Modoc Plateau has been reported: wolf pelts were used for warmth and dance regalia, and wolves were even used as a food source, while Pit River creation stories prominently feature the "wolf-chief" as a key character (McCarthy, 2003).

From the Paiute tribe comes a tale that gives the wolf a leadership role among animals and explains the integral role animals, including wolves, have in dispersing plant seeds across the landscape. The story also notes that deer will continue to proliferate despite being the wolf's chief quarry because of the relationship wolf has with its prey: **"Wolf said, 'I am going to kill deer, and I am going to smoke before I ever kill one. In that way, even if I kill deer they will continue to increase."** (Beers & Elrod, 2007, p. 267). Told through the characters of Wolf, Coyote and A'na (a species of mountain bluebird), as well as their cohorts Rat, Eagle, Deer, Mountain sheep, Chipmunk, Sau'awini (a small, gray sage bird), Mouse, Woodpecker, Yellowhammer and Crow, the story combines biology with spirituality, and suggests the Pauites

[10]Research conducted in Yellowstone National Park in the late 1990's-early 2000's following wolf reintroduction there has revealed the integral role wolves play in the interconnected web between large carnivores, ungulate prey, vegetation, smaller carnivores and other mammals, scavengers, songbirds, and even hydrologic processes (Ripple & Beschta, 2004). These results come long after California native people already recognized the wolf's key role in keeping the world in balance.

were quite familiar with wolf characteristics and understood aspects of its role as a keystone species.

In his capacity as an ethnogeographer, later in life, C. Hart Merriam researched and catalogued stories of native California people of the Central Valley.[11] The stories give individual names to the animal species which populate them – for instance, among the canids, the wolf is Too-le'-ze, the dog is Choo'-koo, the coyote is O-la'-choo, and the gray fox is Yu'-wel – and the stories ascribe traits to the animals that are representative of their actual behavior and role in nature. From the Northern Mewuk comes the story of "How Too-Le'-Ze, the Timber-Wolf Hunts Deer: **"*Too-le'-ze* the Big Wolf is a hunter. Like *He-le'-jah* the Cougar or Mountain Lion he hunts deer, but he hunts in a different way. He chases them like *Choo'-koo*the Dog but catches them by the throat with his claws, which he sinks deep into the sides of the throat. In the early morning he howls long howls. He used to be common here but now is rarely seen."** (Merriam, 1910).

These initial forays into the rich ethnogeography of California tribes reveal evidence of historic wolf presence that is widely represented among various tribes across the state, and demonstrate an undeniable familiarity with wolves as distinct from other canids in the region. Since some native peoples are known to have sent hunting parties to regions other than California, the question may arise whether California tribes learned of wolves simply because the parties returned with tales of wolves and other species that lived elsewhere. This could be likened to the way in which modern-day Americans have learned about pandas and kangaroos and their respective attributes, by viewing them on television or reading about them in nature magazines. However, the multiple ways in which the wolf is integrated into various cultural aspects of California tribal life, and the specificity of understanding of the species' attributes and role in nature suggest that this could only be the result of direct observation and experience, as opposed to "importing" the wolf from abroad.

CONCLUSION

Casting a light on the shadows of California history, the wolf emerges as a once-native inhabitant, widely distributed across the state. A bibliography of sources cited in this comment letter is provided in the following pages. Yet there no doubt remain many more reports of wolf encounters and much more cultural evidence related to wolves yet to be discovered. Areas worth further research and potential sources for information include:

* A greatly expanded investigation into ethnogeographic information from California native peoples;

[11]*Mewan* is a southern Miwok variation of *Miwok* and means "people." According to Frank Latta, in *Handbook of the Yokuts Indians* (1949), pp. 89-90, some of these stories are actually Yokuts myths, with Mewuk names substituted for Yokuts names.

* Continued review of historical accounts from rancho life, mission records, and dictations of interviews with individual settlers;
* Livestock association records, for potential historical accounts of depredations by large predators such as wolves;
* County historical society records in locales with high wolf prey abundance.

With the arrival of OR-7 to California, the information we have compiled regarding the wolf's historical presence and distribution in the State takes on additional meaning, beyond the intellectual curiosity it may satisfy. This information is now pertinent to your decision of whether to offer OR-7's species full protections under State law. We believe this information supports a decision to list the gray wolf, provide the full statutory protections and conservation measures granted by the statute, and begin the work of restoring this iconic, native species in California.

Sincerely,

Amaroq Weiss
Northern California Representative

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