Original drawing by Linda Newberry, a naturalist and artist living in Cannon Beach, Oregon.

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THE CALIFORNIA CONDOR: A HISTORY OF DECLINE

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> But for me the heart of California lies in the condor country. And for me the heart of mystery, of wonder, and desire lies with the California Condor, that majestic and almost legendary figure, which still haunts the fastnesses of our lessening wilderness.
>
> *William L. Dawson*[1]

When North America knew the scream of the saber-toothed tigers and felt the weight of giant ground sloths, the condor patiently watched and waited. The California condor (*Gymnogyps californianus*) may have faced intense competition at mastodon carcasses; it could have been driven off of fallen Pleistocene bison by big cats or fifty-pound *Teratornis merriami* and their twelve-foot wingspans.[2] This, of course, we may never know. What we do know is that North America's megafauna did not survive to the present—but the condor did.

More questions than answers remain when contemplating the condor and its history, a fact that has fueled the fascination of ornithologists, wildlife biologists, laymen, and geographers alike. This paper is an exploration of the human-related factors which may have contributed to the condor's decline. It will demonstrate the importance of habitat alteration to the existence of a species—in this case the California condor—and the need to understand these

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processes in order to preserve the condor and countless other species.

The condor was a widely dispersed species with impressive physical attributes. Written records stretch its former range from the Pacific Northwest, south along the coast, and into the mountainous interior of Baja California. Fossil evidence has condors soaring throughout much of the southwestern United States, northern Mexico, Texas, and east to Florida (Figure 1).[3] The condor's wingspan of just under ten feet is still impressive in today's world; in fact, its wingspan is the largest of any living North American land bird. Adults weigh up to twenty pounds, with nesting usually taking place every other year. Slow to mature (the lone nestling is dependent on its parents for more than a year), the condor can live up to forty years.

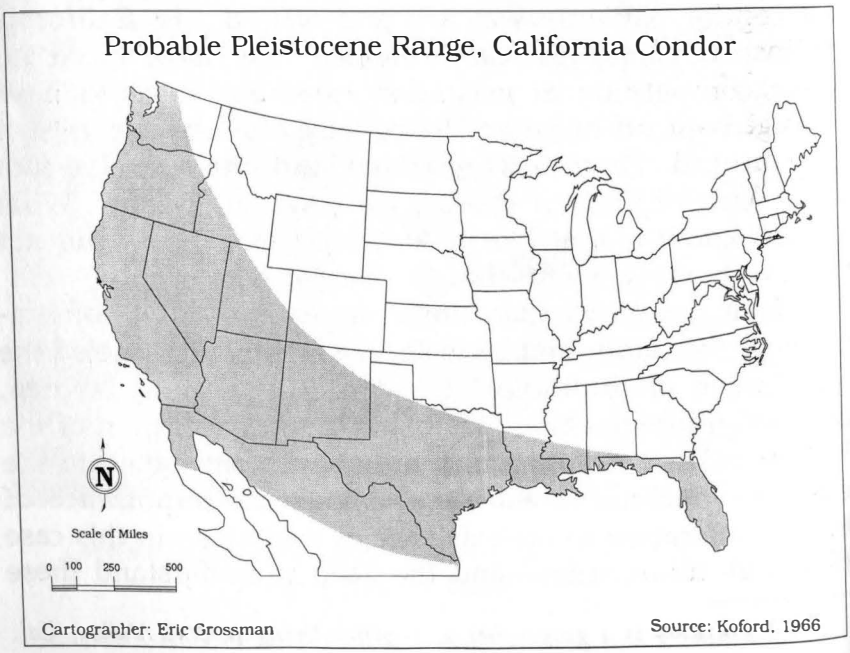

Figure 1. Probable Pleistocene Range, California condor.

In 1602, in present-day Monterey, California, the first known written observation of a condor was recorded by Antonio de la Ascencion.[4] Two hundred years later, and roughly 600 miles to the north, the Lewis and Clark expedition observed and collected condors along the Columbia River.[5] In the early 1800's, the condor's range shadowed the Pacific Coast between the Columbia River area and Baja California, with probable, yet infrequent, forays into Nevada and Arizona (Figure 2).[6] Today, no condors fly in the wild. What happened? That, of course, is the ultimate question for those concerned with the condor and species extinction.

Any number of authorities have noted that the condor is a "senile" species—a "Pleistocene relic" without a place in the modern world. Still others have argued that a combination of the arrival of humans and the extinction of large animals may have caused the condor's decline; but if that is true, then why now and not thousands of years ago.[7]

The condor has generated frequent debate, particularly during the last thirty years. The politics surrounding the management and conservation of this endangered species is at once fascinating and depressing, fast-paced and tedious.[8] The focus of this paper extends far beyond thirty years. It looks back on specific episodes in California history from roughly 1800 to the present and considers why the last of this species retreated to south-central California. First, though, we must return to 1805 and the Columbia River. It is there, high above the gorge, that the written accounts of Lewis and Clark place condors at what would prove to be the northern limit of their historic range. From 1800 on, sightings become less frequent and more southerly in their locale; successive waves of non-Indian explorers, naturalists, and immigrants arrived by sea and land at the continent's western edge as condors retreated to the rugged mountains of today's Los Padres National Forest.

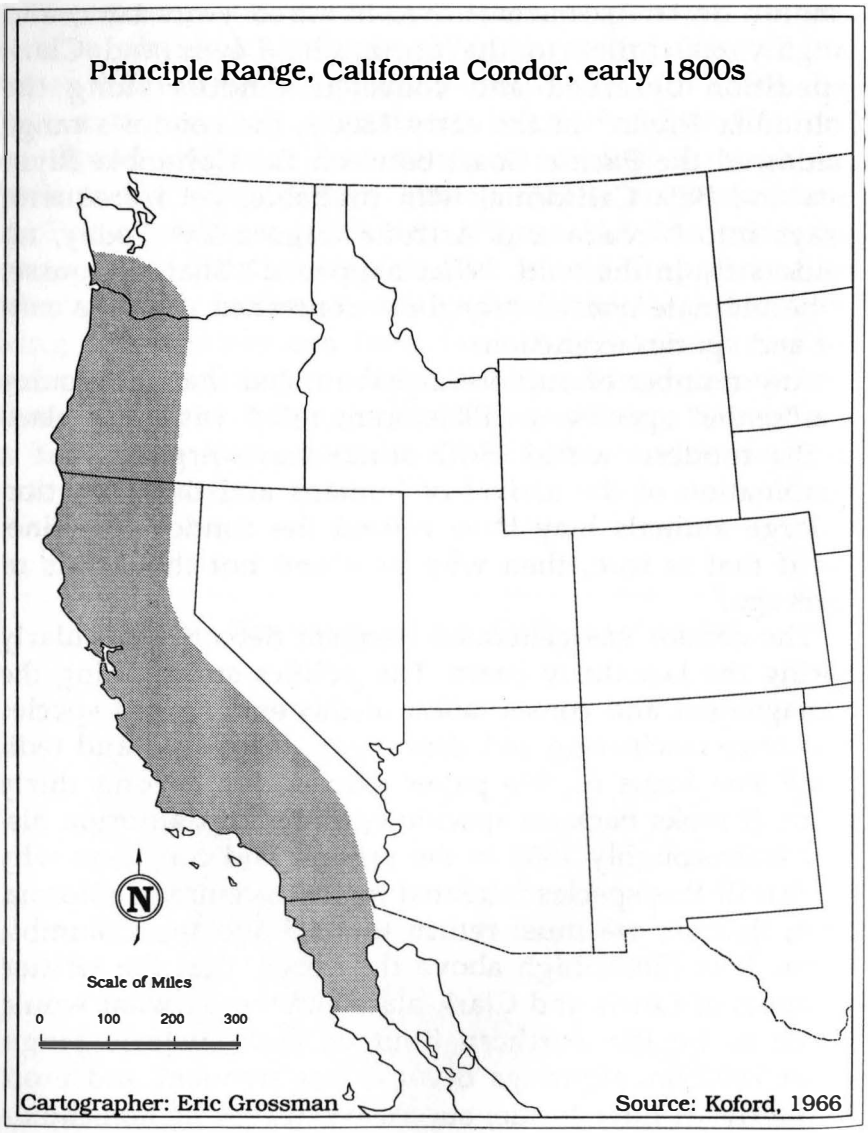

Figure 2. Principle Range, California condor, early 1800's.

It must be remembered that there are mortality factors we may never discover, hidden reasons for the contraction of the condor's range and its eventual decline—perhaps a slow-to-mix lethal brew of climatic change, habitat alteration and loss, predation by humans, and hidden evolutionary cues. Or, as Kenneth Brower has wondered, "What if *Gymnogyps*, watching Los Angeles sprawl toward its last hills, has simply decided it is time to go? Perhaps feeding on ground squirrels, for a bird that once fed on mastodons, is too steep a fall from glory."[9]

Boom and Bust?—The Hispanic Period

Between 1769 and 1823, twenty-one Franciscan Missions were established in "Alta California," stretching north from San Diego to Sonoma (Figure 3).[10] These outposts of the Spanish crown and the Catholic church may have been strong magnets for condors, drawing them to the coastal plains of southern and central California. The primary resource of the Missions, abundant cattle, could have sparked this attraction. Indeed, an abundance of condor food in the form of cattle carcasses may have resulted in artificially high numbers for the species, a possibility that could have contributed to a subsequent, rapid decline in the population.

There are numerous estimates of cattle numbers and colorful descriptions of the hide and tallow industry during the Mission era. Dary writes that, "Figures from two sources indicate that California's twenty-one missions owned at least 535,000 cattle around 1830; 423,000 by 1834; but only 28,220 cattle by 1842. These figures suggest that more than 394,000 cattle were slaughtered for their hides and tallow."[11] Davis, offering what he believes to be a conservative estimate, speculates that between 1800 and 1847, perhaps 5 million cattle hides were exported from California.[12]

Regardless of exact figures, tens of thousands, and at times hundreds of thousands, of semi-feral cattle grazed

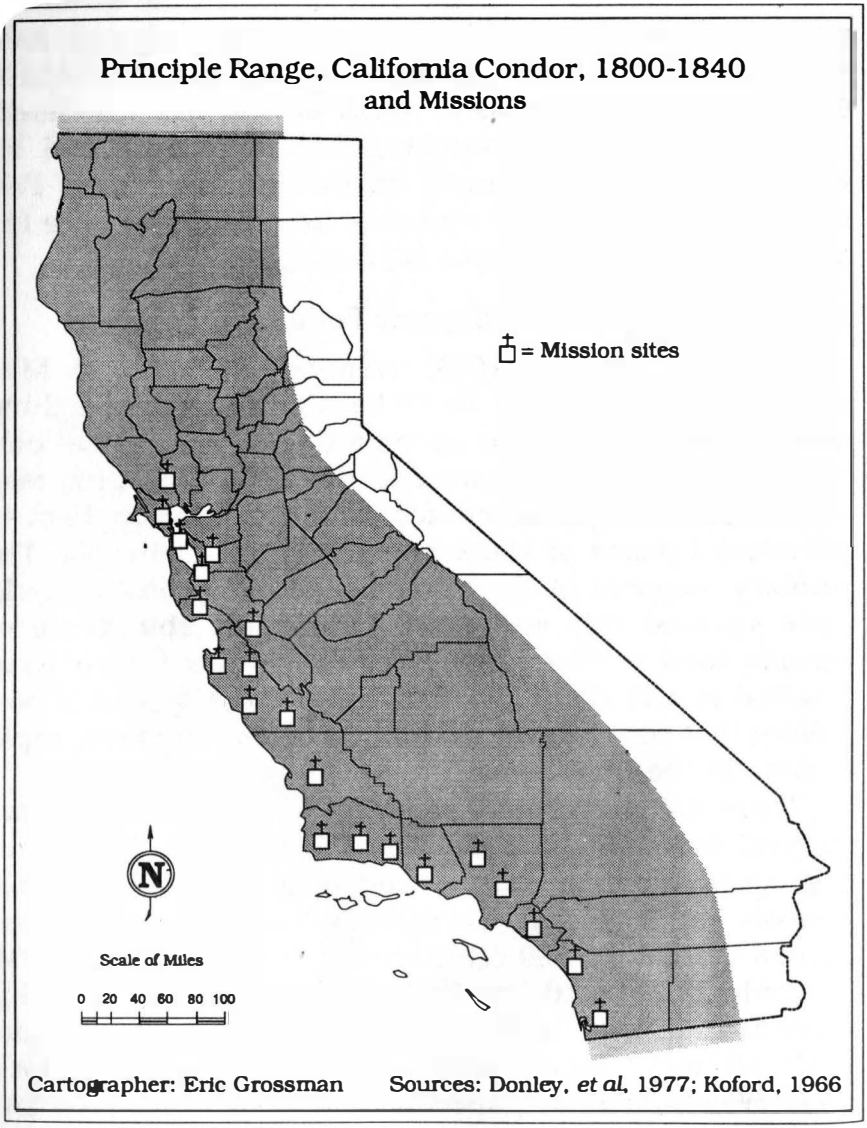

Figure 3. Principle Range, California condor, 1800-1840 and Missions.

around the Missions between 1800 and 1840; but sheer numbers alone would not attract and sustain condors. Rather, it was the nature of the extensive grazing herds and associated hide and tallow operations that could have artificially rallied these carrion-eating birds. Skittish herds were dispersed over expansive areas; cattle mortality rates were high relative to today's standards; and there were not enough "vaqueros," or cowboys, to cover the Missions' substantial holdings and tend to ailing cattle.

When cattle were slaughtered, an activity known as the "matanza" or "nuqueo," hides were removed, tallow collected, and occasionally prime cuts of meat were dried for jerky or "carne seca." The remainder—essentially the whole carcass—was left strewn about the slaughtering area. Numerous accounts describe condors, turkey vultures, coyotes, and grizzly bears congregating at these sites of easily accessible, plentiful food offered by hundreds of carcasses:

> It [the condor] is better known in California than elsewhere, where it was, previous to the civilization of that country, very abundant, approaching in large flocks the near vicinity of the Missions, where they contested with the coyote for offal and carcass of the cattle slaughtered for their hides and tallow.[13]

The hide and tallow of thousands of tule elk were also seasonally collected by vaqueros during this period.[14] Although seldom mentioned, numerous sheep grazed throughout Mission lands. Estimates of California's 1825 sheep population exceed 1 million.[15] Sheep, which have a higher mortality rate than cattle, no doubt were the source of many carcasses that added to the carrion bounty of the hide and tallow industry.

Creation of these slaughtering grounds as a by-product of the hide and tallow trade may have temporarily allowed the condor population to become somewhat stationary within its former range—tempering the drive behind their coastal peregrinations in search of food. Although the availability of carcasses and offal would have

been a condor focal point or magnet, this artificially concentrated carrion was only an added attraction amongst a cross section of early nineteenth-century California wildlife.

Just one indication of this richness in fauna was the millions of resident and migrating waterfowl, shorebirds, and landbirds that could literally darken the sky at midday. One visitor in 1826 observed that:

> The number of wild geese . . . is quite extraordinary, and indeed would hardly be credited by any one who had not seen them covering whole acres of ground, or rising in myriads with a clang that may be heard at a very considerable distance.[16]

More importantly for the condor, enormous herds of tule elk, pronghorn antelope, and mule deer were closely watched by grizzly bears and mountain lions.[17] One may have to travel the plains of Africa for inspiration in an attempt to describe the scene painted by early California explorers. It was a landscape that offered ample food for condors in the form of afterbirths during the calving season, and carcasses left by satiated predators, old age, and disease.

It is know that California Indians used condors and their feathers in ceremonies and kept them as pets (Figure 4). Most probably the Spanish and the Russians shot at the birds, but it is doubtful if these uses and threats removed significant numbers of condors from the population. In short, although some condors undoubtedly were killed by people, direct, human-caused mortality factors were not overwhelming.[18]

Nonetheless, the arrival of the Spanish was accompanied by some subtle and not so subtle changes in the natural environment. The introduction of domesticated livestock, for example, would dramatically alter wildlife habitats and the condition of California's rangelands. A less obvious introduction was the arrival of exotic plants. What eventually fed these new animals was not the na-

Figure 4. California condor skirt draped on Edwin Davis, San Diego County. This skirt was made for him by local Indians. Photograph by Carl B. Koford, Fall, 1940. Courtesy of the Museum of Vertebrate Zoology, University of California, Berkeley.

tive bunch grasses favored by the area's former grazers, but a hearty array of introduced grasses that hitchhiked north in the baggage of Spanish explorers and missionaries, and in the hooves and stomaches of their domesticated animals. Red and ripgut brome (*Bromus rubens* and *B. diandrus*), foxtail barley (*Hordeum leporinum*), soft chess (*Bromus mollis*), and wild oats (*Avena fatua* and *A. barbata*)—plants that had survived for thousands of years with domesticated grazers in the Old World—soon dominated. They would forever change the character of California's grasslands.

Thus, an early nineteenth-century snapshot of the condor's status would probably be a stable one, tempering, although not eliminating, the theory of species senility and post-Pleistocene decline. As a viable species in the wild the "California vulture," as the condor was sometimes called, was not threatened. The bird was surrounded by abundant wildlife, and slaughtering grounds dotted its range.

Mission Secularization and the Early American Period

Between 1830 and 1850, the presence of large, free-roaming cattle herds and the activity on slaughtering grounds began to change. Mexico won independence from Spain in 1822, and this eventually affected the management of Mission lands. By 1833, the Missions and their sizeable landholdings were expropriated by the Mexican government and local elites in California. Over the next ten years, prime cattle and agricultural land was parcelled out to private ranchers. As a consequence of this turnover in ownership and use, the hide and tallow trade dropped off. A parallel decline also occurred in the region's sheep population.[19] The result was that the condor bounty of the "matanzas" soon became a phenomenon of the past, possibly marking the beginning of the bird's decline.

In 1846, political control of California was transferred from Mexico to the United States; and in 1848, the dis-

covery of gold drew thousands of fortune seekers to California. Between 1849 and 1857, it is estimated that over 380,000 people converged on the Golden State by ship alone.[20] This marked the beginning of the decline for many California wildlife species which, virtually overnight, became the objects of intense interest. In response to lack of refrigeration and skyrocketing demand for fresh meat in San Francisco and the gold-mining regions of the Sierra foothills, market hunters waged an all-out war against virtually every animal that could be cooked and eaten:

> Unregulated by law, encouraged by a doctrine of profit maximization, and undertaken by a people hellbent on a one-time, hit-and-run harvest of a region's resources, the early Gold Rush game trade resulted in the rapid demise of the big game populations of lowland California and provided the impetus for three decades of persistent commercial slaughter of upland big game, and for an expanded wildfowl trade that continued to deplete populations of feathered game into the present century.[21]

Statehood came in 1850, and with it further change in the condor's environment and food supply.[22] It is believed that the Spanish and Mexicans, although avid hunters and sportsmen, were relatively conservative with their shot and gunpowder, both expensive commodities of the time. The "reata," or lasso, was just as often their equipment of choice for pursuing game. New immigrants to California—a vibrant mix of Americans, French, English, Latin Americans, Chinese, and numerous other nationalities—brought with them a variety of firearms and the ability to produce both shot and gunpowder.[23] These developments, combined with the limitless demand for any type of edible game, posed a double-edged threat to condors from trigger happy Californians. In addition to being increasingly shot at, the availability of the condor's natural source of food—wildlife carcasses—radically decreased due to large-scale hunting of big game and their

predators by humans. By 1860, William Brewer's note on California wildlife is stark commentary on the swiftness and thoroughness of the market hunters:

> Game was once very abundant—bear in the hills, and deer, antelope, and elk like cattle, in herds. Russell said he had known a party of thirty or forty to lasso twenty-eight elk on one Sunday. All are now exterminated, but we find their horns by the hundreds.[24]

After 1850, the cattle and sheep population slowly increased throughout the condor's range, but under a much different ranching system. Mortality rates of these animals were lower on the new ranches compared to the semi-feral cattle of the Mission days. More importantly, cattle and sheep fetched truly incredible prices when driven to the bustling restaurants and markets of San Francisco, Sonora, Placerville, and Grass Valley. Further, though large ranches in southern California continued after the Mission era in the spirit of the former "ranchos," there was nothing equivalent to the "matanzas" of old. Repeated droughts in the 1860's and 1870's discouraged cattle ranching and favored more drought tolerant sheep. By 1876, California was home to more than six million sheep.[25] Carcasses still offered some food for condors.

Habitat alteration continued, though, as towns began to grow on all sides of the condor's dwindling range: San Diego, Los Angeles, Santa Barbara, San Jose, and San Francisco were officially incorporated in 1850; San Luis Obispo in 1856; Visalia in 1874; Fresno in 1885; Paso Robles and Monterey in 1889; and Bakersfield in 1898. After a precipitous drop, stable populations of mostly Spanish and Mexican heritage—Californianos—took root around the locales of the old Missions; and still other towns sprang up along the coast and on the southeastern flanks of the Temblor Range. San Francisco's population skyrocketed after the Gold Rush, from 1,000 in 1848 to 35,000 just two years later.[26] Development of the central and eastern San Joaquin Valley started slowly; and even though its affect

on the condor is unknown, it would eventually result in a patchwork of cultivated fields where grasslands, marshes, and wildlife had prospered—land across which condors once flew.[27]

Brewer, who passed through Los Angeles in 1860, described it as a "regular old Spanish-Mexican town" with a population of roughly 4,000—an image hard to believe for those familiar with today's megalopolis.[28] To the north, San Francisco's population had swollen to 150,000 by 1870, a year after the completion of the transcontinental railroad, while the population of the state as whole was estimated at 600,000.[29]

Another important factor in the condor's decline was scientific collection of the species. From 1800 on, over 200 condors were either killed or taken from the wild, with at least an additional seventy-one eggs removed from condor nests (Figures 5 and 6).[30] Generously assuming a potential of fifty young from those seventy-one eggs, the total comes to roughly 250 condors. As Wilbur pointed out, "at least 111 birds and 49 eggs were taken between 1881 and 1910 alone, and in a single two year period (1897 and 1899) at least 20 condors and 7 eggs were secured."[31]

Burgeoning natural history museums throughout the United States and Europe coveted the highly-prized condor skins, skeletons, and eggs. Adding to this was the Oology, or egg collecting and studying phenomenon at the turn of the century. Private collectors would pay $250 for a legitimate condor egg. Such was the interest in bird eggs that a magazine dedicated solely to their sale and study, *The Oologist*, was printed from 1884 to 1941. The fact that such a large number of condors were directly and indirectly removed takes on added significance when one realizes that, while not precisely known, the total population of condors at any given moment in the late nineteenth century was usually estimated to consist of only a few hundred birds.[32] By the close of the century, the condor was becoming concentrated in the mountainous

Figure 5. Man and California condor, circa 1906. Courtesy of the Museum of Vertebrate Zoology, University of California, Berkeley. Photo by William Finley.

Figure 6. Children and pet California condor, circa 1910. Courtesy of the Museum of Vertebrate Zoology, University of California, Berkeley. Photo by William Finley.

regions of the present-day counties of Kern, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles. By the early 1900's, gas and oil fields combined with small-scale lumbering activities to further the human presence in condor country.[33]

The Modern American Period

During the 1940's, the late Dr. Karl Koford of the University of California at Berkeley's Museum of Vertebrate Zoology, conducting the first scientific study of the species, estimated only sixty condors remained within the horseshoe-shaped range formed by the southern Sierra Nevada, the Tehachapi Mountains, and the southern Coast Ranges (Figure 7).[34] Many editorials and stories of the day felt that the final blow already had been dealt, that the condor was all but extinct. Over the next thirty years, portions of the condor's territory were sprayed with DDT to kill beet leafhoppers and other insect pests, and 1080 was widely used to eradicate ground squirrels and other varmints.[35] Although no direct cause and effect was ever established, condors have been seen eating contaminated ground squirrels and kangaroo rats for decades; and consumption of such poisons at any level might have had a cumulative effect on the birds.[36]

In addition to persistent alterations of condor habitat, more recent causes of documented deaths range from shootings to lead and strychnine poisoning. Wildlife populations useful to condors are mere shadows of former herds 150 years ago, and cow-calf operations in the vestiges of condor territory are under continuous pressure to move aside for housing. The remaining condors—a total of twenty-eight in 1988—are held in captive breeding programs at the Los Angeles and San Diego zoos. One of the major goals of the multimillion dollar condor recovery plan is to return, eventually, some individuals to the open skies. Before that day arrives, however, up to twenty female Andean condors (*Vultur gryphus*) will be released,

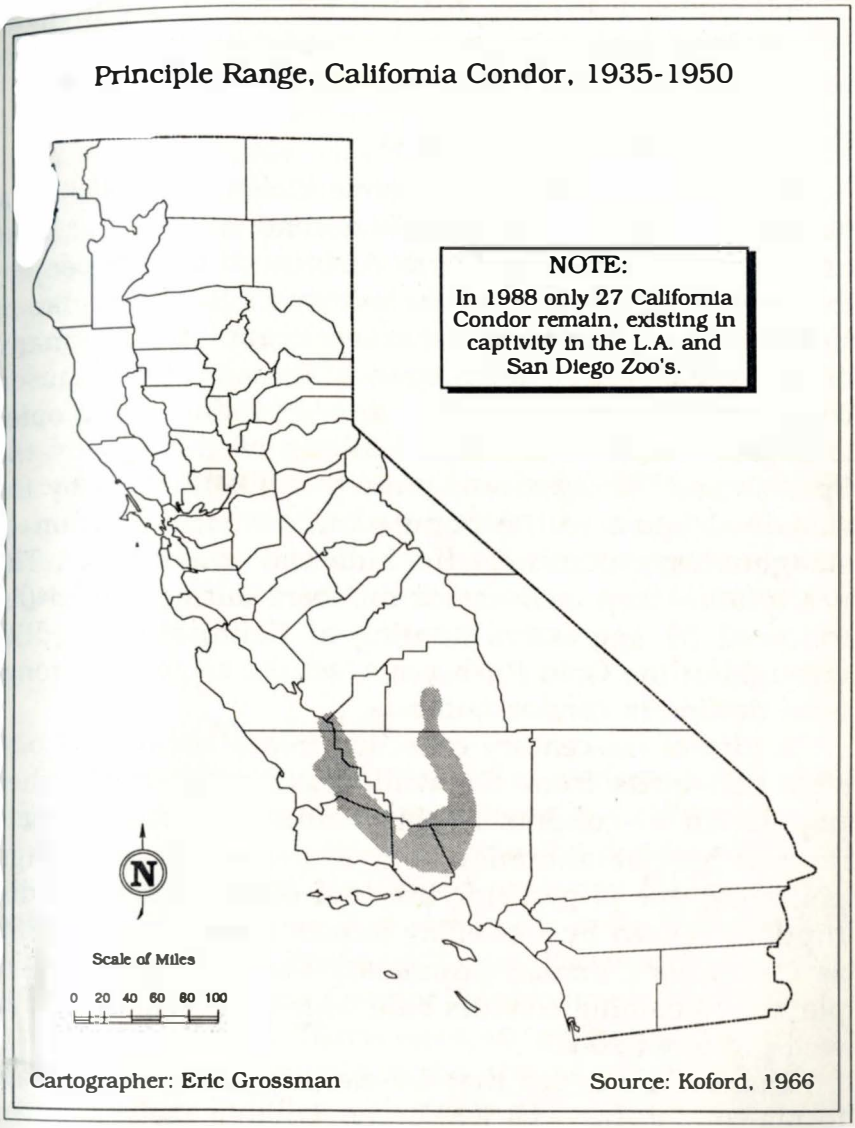

Figure 7. Principle Range, California condor, 1935-1950.

starting this winter, into the former range of California condors. By introducing these surrogate species over the next several years, the Condor Research Center of the United States Fish and Wildlife Service hopes to gain insight into, and help prevent, mortality factors which would affect future releases of native condors.

Conclusions and Final Remarks

By many measures, that "senile Pleistocene relic" of a bird was actually a vibrant Pleistocene survivor, at least until humans arrived in North America. If not for people, the condor would no doubt be enjoying a large population to this day—it is a historical scenario applicable to many of our endangered animal species. Initial, human-caused condor mortality came in the form of Indian ceremonies and practices. The occasional killing of condors by the Spanish and Mexicans was more than likely offset by the sustained boost to the population with the creation of slaughtering grounds for the hide and tallow trade. The precipitous drop in livestock numbers during the 1840's, followed by aggressive hunting of California's wildlife throughout the Gold Rush years, set the stage for a long-term decline in condor numbers.

A turn-of-the-century collecting frenzy removed a possible 250 birds from the wild, leaving the diminished population of condors in this century to face not only intense habitat alteration, but also random shootings, poisoning due to pesticide use, and other predictable disruptions caused by a swelling human population. In 1988, as California's human population nears 28 million people, the remaining condors bide their time, sequestered in well-protected zoos.

There is no doubt that we can live without the California condor; but, can we survive without the symbolism and wildness it embodies? What does the condor's near extinction say about our responsibilities to the land and other species? In place—in the wild—the condor stood for

and literally protected wilderness in California. Just as with the grizzly bear, wolf, cougar, elk, and bald eagle, animals which still survive throughout the west in restricted numbers, the condor has become a symbol—a symbol of wilderness and an international representative for countless species on the verge of extinction.

Studying the demise of the condor and other species can serve not only as a vehicle for piecing together historical changes in our natural environment, but also provide a lesson in understanding how people perceived and treated the land and its resources. Contemporary environmental problems and species extinctions cannot be properly and comprehensively analyzed without paying attention to historical factors. The radical transformations in California's biotic and rural landscape of the past 200 years are fascinating, sobering, at times alarming, and rich in opportunities for geographic study. Although condors no longer soar in California skies, these types of studies are nonetheless crucial, for the future of condors, countless other species and their habitats, and ultimately for human beings.

Geographic Opportunities

How might geographers from various backgrounds have helped in evaluating changes in California's biotic landscape, its rural economy, and the demise of the condor? This question challenged professor Hartmut Walter and myself when we first met in the early 1980's. In 1982, with the help of Professor James Parsons, we convened the First California Condor Environment Roundtable in San Luis Obispo. There were an estimated twenty-three condors left in the wild at the time of our meeting. Many geographers familiar with different aspects of California's human and natural history were present: James Parsons, Homer Aschmann, William Bowen, William Preston, Randall Rossi, and several graduate students.

In the proceedings of the roundtable Hartmut Walter highlighted areas open for geographical research and summarized why the seminar was organized:[37]

1. Many questions and problems of condor survival have been present for over forty years; yet, some of them have never been researched in a serious way.
2. Can we as geographers detect some interesting questions for our own research, and do we possess any kind of knowledge or expertise to contribute in a meaningful way to condor management and survival?
3. Condor data. There are many qualitative statements about condor history; for instance, the transformation of condor habitat. How did this actually happen? When, where, and at what scale did the land within the former condor range change? How much of the habitat has been lost?
4. What about the intensity and frequency of forest and chaparral fires in California? Have they changed over the past 300 years? If so, has it made it easier or more difficult for condors to locate food sources in the foothills regions? Do they even need these wooded habitats in terms of access to prey?

To paraphrase Hartmut Walter, these and other questions all await answers, answers which geographers studying California might provide.

NOTES

1. William L. Dawson, *Birds of California* (San Diego: South Moulton Co., 1923), p. 1720.
2. The Pleistocene predecessor of today's California condor was a slightly larger bird, *Gymnogyps amplus*. For a discussion about the difference between these two species, their fossil record, and evolution see: Carl B. Koford, *The California Condor* (New York: Dover, 1966), pp. 2-8.
3. Koford, op. cit., note 2, pp. 7-8.
4. "There are some other birds of the shape of turkeys, the largest I saw on this voyage. From the point of one wing to that of the

other it was found to measure seventeen spans." Antonio de la Ascencion, "Father Antonio de la Ascension's Account of the Voyage of Sebastian Vizcaino," *California Historical Society Quarterly*, Vol. 7:4 (1928), p. 361. A span being eight inches, the bird in question was reported to have a wingspan of over eleven feet. The largest condor wingspan recorded by Koford—in what is still the definitive work on condors—was nine feet, seven inches. Koford, op. cit., p. 3. Discrepancies aside, Ascencion's bird is most likely a condor. The bald eagle, the next largest North American land bird, has a maximum wingspan of seven feet, five inches, or just over eleven spans.

5. "The buzzard is, we believe, the largest bird of North America. One which was taken by our hunters . . . was twenty-five pounds. Between the extremity of its wings the bird measured nine feet and two inches . . . This bird was not seen by any of the party until we descended Columbia River, below the great falls, and he is believed to be of the vulture genus . . ." Meriwether Lewis, *History of the Expedition under the command of Captains Lewis and Clark to the Sources of the Missouri thense across the Rocky Mountains and down the River Columbia to the Pacific Ocean Performed during the years 1804-5-6*, by order of the government of the United States, prepared for press by Paul Allen (Philadelphia: Bradford & Inskeep, 1814), Vol. 2, pp. 183-184.

6. References to the condor's former range and sightings emanate mostly from Koford, op. cit., note 2, pp. 7-19. See also: Carl B. Koford, "1979," in David Phillips and Hugh Nash, eds., *The Condor Question* (San Francisco: Friends of the Earth, 1981), pp. 79-84; and Harry Harris, "The Annals of Gymnogyps to 1900," *The Condor*, Vol. 43:1 (1941), pp. 3-55.

7. For examples of this debate see: J. G. Cooper, "A Doomed Bird," *Zoe*, Vol. 1:8 (1890), pp. 248-249; L. H. Miller, "Succession in the Chathartine Dynasty," *The Condor*, Vol. 44:5 (1942), pp. 212-213; Koford, op. cit., note 6, p. 80; Lloyd Kiff, "An Historical Perspective on the Condor," *Outdoor California*, Vol. 44:5 (1983), pp. 5-6, and 34-37.

8. For different views on condor management and captive breeding see: D. Phillips and H. Nash, op. cit., note 6; and *Outdoor California*, op. cit., note 7. For a recent discussion of the condor in the context of its physical and human environment see: David Darlington, *In Condor Country* (Boston: Houghton Mifflin Co., 1987).

9. Kenneth Brower, "Night of the Condor," in Phillips and Nash, op. cit., note 6, p. 35.

10. H. H. Bancroft, *California Pastoral, 1768-1848, Bancroft's Works*, Vol. XXXIV (San Francisco: The History Company, Publishers, 1888), p. 339; A. Duhaut-Cilly, "Duhaut-Cilly's Account of California in the Years 1827-1828," *California Historical Society Quarterly*, Vol. 8:4 (1929), p. 309; and Michael W. Donley, *et al, Atlas of California* (Culver City: Pacific Book Center, 1979), p. 10.

11. David Dary, *Cowboy Culture* (New York: Avon Books, 1981), p. 53. Dary utilized the following references: Clarence W. Gordon, "Report on Cattle, Sheep, and Swine, Supplementary to Enumeration of Livestock in 1880," *Report on the Productions of Agriculture. Tenth Census*, Vol. III (Washington, D.C.: Department of Interior, 1883); Eugène Duflot de Mofras, *Exploration du territoire de l'Orégon, des Californies et de la mer Vermeille, 1840, 1841 et 1842* (Paris: Libraire de la Société de Géographie, 1844); and William H. Davis, *Seventy-five Years in California* (San Francisco: John Howell Books, 1967). These comprise a few of the numerous diaries and government reports from Spain, Mexico, and the State of California, available at the Bancroft Library, which discuss numbers and economics of the early California cattle industry.

12. "I have taken the years 1800 to 1847, and I find the arrival of 600 vessels of all sizes and nationalities [to California]. In my conjecture I take 200 of them, which is certainly a liberal deduction, and allow to each 1,000 hides exported yearly. This will give a total of 9,400,000 hides for 200 vessels for forty-seven years . . . I think it perfectly accurate to estimate the exportation of hides and tallow for forty-seven years at 5,000,000 hides and 10,000,000 arobas of tallow, a deduction of nearly one-half from the first calculation . . ." Davis, op. cit., note 11, p. 281.

13. Andrew Jackson Grayson (1818-1869), "*Cathartes Californianus* (Shaw), The California Vulture" (Unpublished manuscript: courtesy of the Bancroft Library). For historical information on grizzly bears see: Tracy Storer and Lloyd Teves, *The California Grizzly* (Berkeley: University of California Press, 1955). The following quotations convey a sense of the enormous scale of the hide and tallow industry from 1830-1840: "From May to July 5,700 cattle were killed, leaving 2,850 hides for the mission, the rest belonging to the 'porcioneros' . . . 2,000 cattle were killed in a

single day at one mission, the meat and fat being left in the fields . . . Pio Pico . . . says he had a contract at S. Gabriel [Mission], employing 10 vaqueros and 30 Indians, and killing over 5,000 cattle . . . Estudillo . . . tells us that after a time nothing but the hides were saved. Some 20,000 head were killed at the S. Jacinto ranch of S. Luis Rey." All quotes are from H. H. Bancroft, *Bancroft's History of California*, Vol. III, 1825-1840, *Bancroft's Works*, Vol. XX (San Francisco: A. L. Bancroft Company, Publishers, 1885), p. 349, footnote 12.

"The California [vessel] had been twenty months on the coast, and the Lagoda, a smaller ship, carrying only thirty-one or thirty-two thousand [cattle hides], had been two years getting her cargo; and we were to collect a cargo of forty thousand beside our own, which would be twelve or fifteen thousand; and hides were said to be growing scarcer." Richard Henry Dana, *Two Years Before the Mast* (New York: Harper & Brothers, 1840), p. 113.

"In 1840 the mission of San Jose ordered the slaughter of about two thousand bulls, simply for the hides, not taking any meat from them. The vaqueros rode into the fields and lassoed and killed them on the spot, taking off the hides and little tallow and leaving the carcasses there untouched." Davis, op. cit., note 11, p. 32.

"When an haciendo wished to nuquear or slaughter his cattle, he sent six men on horseback, who rode at full speed over the fields, armed with knives. Passing near an animal, one gave it a blow with the knife in the nerve of the nape of the neck, and it fell dead. The nuqueadores passed on, and were followed as by a flock of hungry vultures, by dozens of peladores, who took off the hides . . . A field after the nuqueo looked like Waterloo after the charge of the old guard . . . When the year was bad and pastures meagre the padres ordered a desviejar, that is, the killing off of old stock . . . The hides were taken off, and the flesh, left for the beasts or the birds, or for the Indians." H. H. Bancroft, *California Pastoral, 1768-1848, Bancroft's Works*, Vol. XXXIV (San Francisco: The History Company, Publishers, 1888), pp. 340-341.

14. "In the months of May and June the Spaniards resort to this plain with their lassos, and take as many of these animals as they can ensnare, for the sake of their fat, of which they will sometimes procure between four and five arobas from one ani-

mal." Frederick W. Beechey, *An Account of a Visit to California in 1826-27* (San Francisco: Grabhorn Press, 1941), pp. 65-66.

15. Robert F. Miller, *Sheep Production in California* (Sacramento: California Agricultural Extension Service, 1930), Circular 49, p. 5.

16. Beechey, op. cit., note 14, p. 36.

17. There are many references to California's abundant wildlife during the first half of the nineteenth century. For two excellent works which contain good information and extensive bibliographies see: Scott W. Stine, "Hunting and the Faunal Landscape—Subsistence and Commercial Venery in Early California" (Unpublished Master's thesis: Department of Geography, University of California, Berkeley, 1980); Raymond F. Dasman, *The Destruction of California* (New York: Macmillan, 1965).

18. For information regarding the California Indians and their use of the condor see: A. L. Kroeber, *Handbook of the California Indians* (Washington, D.C.: Smithsonian Institution, Bureau of American Ethnolgy, Bulletin 78, 1925), pp. xviii, 608, 642, and 676; see also Sanford R. Wilbur, "The Condor and the Native Americans," *Outdoor California*, Vol. 44:5 (1983), pp. 7-8. For a more general discussion of Indians, condors, and other early nineteenth-century use and abuse of the birds see: Koford, op. cit., note 2, p. 134.

19. Miller, op. cit., note 7, p. 6.

20. Ralph Brown, *Historical Geography of the United States* (New York: Harcourt, Brace and Co., 1948), p. 505.

21. Stine, op. cit., note 17, pp. 3-4.

22. Around 1850, some written accounts of naturalists and government employees referred to the condor's waning numbers and scarcity compared to earlier days. Typical is that of Hughes: "In the Tulares [near Mission San Gabriel] there are the eagle, the turkey buzzard, the falcon . . . and the condor. Though most of these are seen in other portions of the province, yet the condor is said to be rarely observed beyond the limites of the teeming valley . . ." John T. Hughes, *California: Its History, Population, Climate, Soil, Productions, and Harbors from Sir George Simpson's "Overland Journey Round the World"* (Cincinnati: J. A. & U. P. James, 1850).

23. Homer Aschmann, in Hartmut Walter and Jerry Emory, eds., *The Condor, The People, The Land,* Proceedings of the First California Condor Environment Roundtable, San Luis Obispo, May 29-30, 1982 (Los Angeles: Department of Geography, U.C.L.A., 1982), p. 14; and Stine, op. cit., note 17, p. 91.

24. William H. Brewer, *Up and Down California in 1860-1864* (Berkeley and Los Angeles: University of California Press, 1949), p. 185. The elk to which Brewer refers are tule elk; and although severely reduced during the late nineteenth century, they were not totally exterminated, as evidenced by their presence today.

25. Miller, op. cit., note 7, p. 6.

26. Brown, op. cit., note 20, p. 504.

27. Dr. J. S. Newberry, while travelling through California's Central Valley with the Pacific Railroad Survey wrote about the condor: "A portion of every day's experience in our march through the Sacramento Valley was a pleasure in watching the graceful evolutions of this splendid bird." Dr. J. S. Newberry in Harry Harris, op. cit., note 6, p. 36.

28. Brewer, op. cit., note 24, p. 13.

29. Brown, op. cit., note 20, p. 361.

30. S. R. Wilbur, "The California Condor, 1966-76: A Look At Its Past and Future," *North American Fauna 72* (Washington, D.C.: Department of the Interior, Fish and Wildlife Service, 1978), p. 20.

31. Ibid.

32. For a brief discussion of this unanswerable yet fascinating historical question see: Wilbur, op. cit., note 30, pp. 17-18.

33. For information on the timing and location of these activities see: Bret Wallach, "The West Side Oil Fields of California," *The Geographical Review,* Vol. 70:1 (1980), pp. 50-59; Koford, op. cit., note 2, pp. 132-133; and Donley, op. cit., note 10, pp. 85-86.

34. Koford, op. cit., note 2, p. 21.

35. Eben McMillan, personal communication (1980), Cholame, California; Dr. Steve Herman, "Maps," in Phillips and Nash, op. cit., note 6, pp. 294-297.

36. Eben McMillan, personal communication (1980), Cholame, California; Koford, op. cit., note 2, pp. 71-72; and Wilbur, op. cit., note 30, p. 41.

37. Walter and Emory, op. cit., note 23, p. 5.