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Biography of a "Feathered Pig": The California Condor Conservation Controversy

PETER S. ALAGONA
Department of History
Institute of the Environment
University of California, Los Angeles
USA
E-mail: petea@ucla.edu

Abstract. In the early 20th century, after hundreds of years of gradual decline, the California condor emerged as an object of intensive scientific study, an important conservation target, and a cultural icon of the American wilderness preservation movement. Early condor researchers generally believed that the species' survival depended upon the preservation of its wilderness habitat. However, beginning in the 1970s, a new generation of scientists argued that no amount of wilderness could prevent the condor's decline and that only intensive scientific management - including captive breeding - could save the species from certain extinction. A bitter and highly politicized battle soon developed over how to best preserve the condor. For 5 years the condor was extinct in the wild; however, by the time that officials released the first captive-bred birds the condor recovery program had garnered widespread public support, even among its former critics. Today, condor advocates from the scientific and activist communities work together to manage the species and protect its habitat. The condor's story illustrates some of the tensions, problems, and successes that have accompanied the rise of conservation biology as a scientific field and environmental movement in the United States.

Keywords: California condor, conservation biology, endangered species, wildlife management

Introduction

On Easter Sunday 1987, a team of scientists, conservationists, and government officials finally caught up with Adult Condor-9, a 7-year old male California condor (*Gymnogyps californianus*) that had previously demonstrated an uncanny ability to evade his would-be captors (Figure 1). The team had stalked AC-9 for months, baited him with fresh meat, and snared him in a cannon-powered net as he feasted on the carcass of a stillborn calf, at the Bitter Creek National Wildlife Refuge northwest of Los Angeles. Over half a dozen other observers also waited nearby, watching from behind blinds and from within a covered earthen pit. AC-9 had been the last wild condor in North America, and now he

Figure 1. Condor sketch ca. 1900, by Louis Agassiz Fuertes. (From the Harry Harris archive, courtesy of the Natural History Museum of Los Angeles County.)

was headed to the San Diego Wild Animal Park to join 26 other California condors in a captive breeding program that proponents hoped would save the species from almost certain extinction (Figure 2).[1]

The dramatic a events of that spring afternoon represented the culmination of a 20-year controversy over how to best preserve the California condor. During the preceding decades the condor had served both as an object of scientific study and a cultural icon of the American wilderness movement. For years these dual identities had existed harmoniously, since most observers generally agreed that the condor's survival depended on the preservation of its wilderness habitat. However, as the condor's population dwindled in the decades

[1] Smollar, 1987; Mathews, 1987.

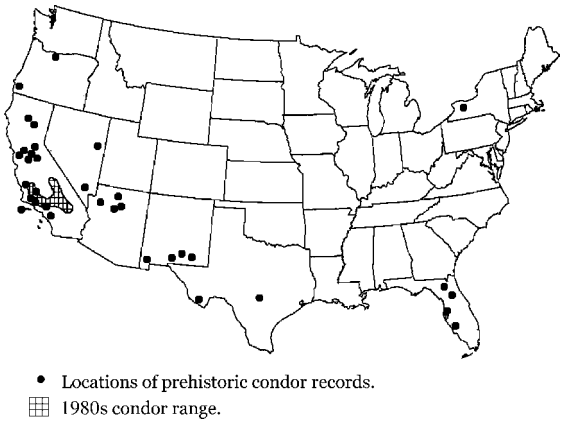

Figure 2. California condor range over time. Redrawn from maps and data provided by Simons (1983), Wilbur (1978), and Snyder (2000).

preceding AC-9's capture, a controversy developed over the issue of whether or not scientists should actively intervene on behalf of the species. According to wilderness activists and critics of wildlife management – a loose coalition of allies that included not only environmental activists but also many prominent scientists – condors just needed a larger wildland sanctuary and simply to be left alone. Wildlife managers and supporters of a more "hands-on" approach – led by the United States Fish and Wildlife Service's (USFWS) condor recovery team leader Noel Snyder – argued that without rapid intervention, thorough biological research, and intensive management the species would surely disappear. This debate received national media attention during the early 1980s, as the condor's population dwindled, and as the species' various advocates battled for control of its future.

The condor controversy culminated in the mid-1980s, when scientists confirmed that environmental hazards and toxins, not a lack of wilderness habitat, had caused the species' recent, calamitous decline. After years of political wrangling and frequently caustic debate, the population finally crashed in 1985, and federal officials made a highly controversial decision to round up all the remaining wild birds. Observers who witnessed AC-9's capture on that spring day characterized it as a poignant, even seminal moment in endangered species history. Yet, the condor's misfortune also created a significant opportunity for the scientists and agency officials who would now have the chance, through captive breeding and reintroduction, to establish themselves as the caretakers of the species.

Wilderness activists and supporters of ''hands-off'' wildlife management had invested a great deal of time, resources, and rhetoric toward the argument that condors should remain in the wild no matter how significant the risks. Believing that nature could manage itself far better than any expert could, supporters of this approach publicly cast themselves as the condor's only defense against overzealous and potentially destructive scientists and bureaucrats. Yet almost immediately after biologists plucked AC-9 from the wild, the condor controversy abruptly disappeared. By the time that officials reintroduced the first birds into the wild in 1992, the various parties that had participated in the conservation debate had already come a long way toward reconciling their differences, and many former opponents now supported the condor recovery program.

How did the various participants in the condor saga reconcile such profound and long-standing philosophical differences in such a short period of time? According to scientists like Noel Snyder, they didn't. These camps held such different perspectives that their views were largely irreconcilable.[2] For Snyder, intensive management, including captive breeding and vigilant protection in the wild, had always represented the species' only hope for survival. However, a broader perspective on the condor controversy reveals that the hands-on/hands-off dichotomy ultimately crumbled because, in order for condors to survive in the future, they would need not only intensive management and exhaustive research, but also a secure wilderness habitat. In order to succeed, the recovery program would also require widespread political support from the very scientists, activists, and agency officials who had previously clashed over the condor's fate.

The story of efforts to recover the California condor illustrates the unexpected friction that developed between wilderness preservation and wildlife management in the years following the passage of the US Endangered Species Act. As William Cronon has observed, ''vigilant and self-conscious management'' for endangered species and biodiversity may come in direct conflict with an ideology of wilderness that resists human intervention in wild nature.[3] However, the condor's story also demonstrates how conservation biology – which emerged as a scientific discipline and popular environmental movement in the United States during the 1980s and 1990s, at the same time that the condor drama unfolded – altered the terms of the debate by integrating the

[2] Bergman, 1990, pp. 72–79, provides a good perspective of Snyder's ideas, based on interviews he conducted.

[3] Cronon, 1995, pp. 81–82.

perspectives and concerns of both wilderness activists and wildlife managers. Conservation biology succeeded because it wedded environmentalists' concern for wild nature with scientific respectability and technological expertise.[4]

The term "conservation biology" probably first appeared in the literature of wildlife management and has been around since at least the late 1930s.[5] However, the academic discipline of conservation biology did not coalesce until the mid-1980s, when a variety of scientists conducting applied ecological conservation projects around the world first came together to unite their efforts under a single title. The formation of the Society for Conservation Biology in April 1986, and a series of conferences, such as the National Forum on BioDiversity, held in Washington, DC, in September 1986, signaled the emergence of the new discipline.[6] By the mid-1990s, universities in the United States, Europe, Australia, and elsewhere, offered courses and even new degree programs in this burgeoning field. Conservation biology emerged as a coherent academic discipline in the United States during this period due to a number of factors, such as the increasing public and scientific awareness of human-induced extinctions, gathering tensions regarding environmental activism in the field of ecology, and the increasing importance of the Endangered Species Act in American environmental law and politics.

Environmental advocates have always used science to bolster their cause. Indeed, recent historical scholarship has revealed that virtually every significant figure in American environmental history has incorporated aspects of science and sentiment, utilitarianism and spiritual reverence into their work.[7] Even the modern American wilderness movement, with its primitivistic leanings, used quantitative science as early as the 1950s, in the highly publicized controversy over damming the Colorado River at Echo Park, in Dinosaur National Monument.[8] Seen in this perspective, the condor's tale comprises just one chapter of a much longer story, in which admirers of wild nature have increasingly marshaled quantitative natural science and sophisticated technology for the purpose of protecting what they loved. In the 1980s conservation biology emerged as one highly successful manifestation of this pattern,

[4] For a discussion of the major philosophical questions in conservation biology see Sarkar, forthcoming, 2005.

[5] Errington and Hamerstrom, 1937, p. 3.

[6] Edward O. Wilson compiled numerous presentations given at the National Forum on BioDiversity in his 1988 edited volume, *Biodiversity*.

[7] Miller, 2001.

[8] For more on the Echo Park controversy see Harvey, 1994.

rapidly blossoming into an international environmental movement and establishing itself as a respected academic discipline. Although conservation biology came with its own set of problems, paradoxes, and unintended consequences, it now dominates scholarly, activist, and administrative discourse on preserving both wildlife and wilderness areas.

A host of other charismatic American wildlife species, such as the bald eagle, gray wolf, black-footed ferret, spotted owl, and grizzly bear, have also assumed symbolic meaning, undergone increasingly intensive scientific management, and prominently participated in the development of conservation biology.[9] It is also important to note that conservation biology is intimately tied to the notion of biological diversity, which has firm roots in systematics and tropical ecology as well as wildlife management. I have focused specifically on the condor's role in the history of conservation biology for two important reasons. First, from approximately 1967 to 1987, the condor conservation debate revolved largely around the relationships between wildlife and wilderness and the role of human intervention in endangered species conservation. These issues provide significant insight into the historical tensions surrounding science within American environmentalism. Second, the condor's story illustrates both the tremendous success of the conservation biology movement, and many of the unresolved quandaries that have accompanied it. Condors rebounded from near extinction only to linger in a semi-captive state, and biologists still face the monumental task of reintegrating the species into a modern environment riddled with perils, few of which will likely disappear anytime soon. In the condor's story, efforts to preserve wilderness and wildlife awkwardly came into conflict, only later to reunite under the rubric of conservation biology.

Decline

In the 20th century, American environmentalists came to associate the California condor with ancient ecosystems and remote wilderness areas. However, the species had actually engaged in an intimate, ten thousand-yearlong ecological relationship with humans. This relationship had profound consequences for the condor's population, which, by the beginning of the 20th century, had already declined to what naturalist

[9] For examples of the symbolism surrounding American wildlife species see Lopez, 1978; Dunlap, 1988; Barrow, 2002.

Graham Renshaw called "a miserable remnant … a mere dot on the map."[10] In the following paragraphs, I summarize the long-term history of human–condor relationships and show how this quizzical bird initially found its way into American environmental history and the history of conservation biology.

The California condor is one of only two surviving condor species and is the only member of the genus *Gymnogyps*. Its nearest relative is the Andean condor, but it is also closely related to other vulture species in North and South America. New World vultures first appear in the fossil record during the Eocene, some 50 million years ago, yet most of the current species date back less than 10 million years, to a time during the Pliocene and Pleistocene when their lineage radiated into its many modern forms.[11]

At the end of the Pleistocene epoch, some 10,000 years ago, condors still ranged widely throughout North America, from British Columbia to Mexico and from Florida to New York.[12] However, during subsequent centuries rapid ecological change greatly altered the species' habitat. The continental glaciers receded, the climate warmed considerably, many of the giant land mammals – which condors relied upon for a steady diet of carrion – went extinct, and hunter–gatherers colonized much of the continent. Researchers may never solve the mystery of exactly why the giant land mammals vanished; however, a growing body of evidence indicates that small bands of marauding hunters probably bear at least part of the blame.[13] Nevertheless, the fact remains that almost immediately after humans arrived in North America a large portion of the condor's food supply simply disappeared.

Some hunter–gatherer groups also took a particular interest in the condor itself. In certain areas, condors probably congregated around human settlements where hunters prepared dead animals for consumption, thus making them a familiar sight to early Americans. Archaeological excavations, rock art, and modern-day anthropological studies also indicate that condors frequently took on important ritualistic functions, and some Native American groups used the bird's feathers in their ceremonial garments. The gathering of feathers for such purposes may have served as an important source of condor

[10] Renshaw, 1907, pp. 295–298.
[11] Rich, 1983, pp. 3–16.
[12] Snyder and Snyder, 2000, pp. 10–11; Steadman and Miller, 1986; Emslie, 1987.
[13] For more on Pleistocene environmental change and species extinctions see Pielou, 1991, pp. 251–265; Alroy, 2001.

mortality and could have placed significant pressure on some local populations.[14]

In 1602 Fr. Antonio de la Ascension became the first European to document condors in North America. From the bow of his ship, he recorded a truly remarkable sight: a large congregation of condors feasting on the carcass of a beached whale.[15] Biologists now believe that, when condors were more abundant along the West Coast, they regularly consumed beached marine mammals. During the Mission Era of California history, Spanish colonists came to know condors as one of the many scavengers that loitered around the outskirts of their communities, "where [they] contended with the coyote[s] for the offal and carcasses of cattle slaughtered for their hides and tallow."[16] In 1792, the naturalist Archibald Menzies first scientifically described the species from a specimen collected in Monterrey, California. Sergeant Patrick Gass, of the Lewis and Clark expedition, documented condors feeding around the mouth of the Columbia River, and in 1827 the botanist David Douglas noted condors feeding on dead horses at Fort Vancouver, near present-day Portland, Oregon.[17] These reports led the preeminent condor biologist of the mid-20th century, Carl Koford, to speculate that some condors may have migrated seasonally, moving north to feed on Columbia River salmon runs during the spring and summer, and returning south to California in the winter. Nothing like this has occurred since at least the beginning of the 19th century.[18]

In 1849 the California Gold Rush initiated a set of dramatic cultural and ecological changes that forever altered the condor's environment. Soon after they arrived, many California gold miners appear to have outfitted themselves with a set of condor quills, which they used as lightweight vials for carrying gold dust. Even more importantly, the Gold Rush brought a dramatic increase in the scale and intensity of ranching in California's valleys and foothills, as cattlemen scrambled to profit from the vast new market for meat. The proliferation of cattle provided an unprecedented source of food for condors roosting in the nearby Coast Ranges and Sierra Nevada. However, it also exposed the birds to new dangers. During the late 19th and early 20th centuries, hundreds of condors probably died from lead poisoning, which they acquired by inadvertently ingesting bullets while eating the carcasses of

[14] Snyder and Snyder, 2000, pp. 30–45; Simons, 1983, pp. 470–494; Bergman, 1990, pp. 62–67.
[15] Harris, 1941.
[16] Grayson, 1891.
[17] Gass, 1904, p. 178, 203, 207; Flemming, 1924.
[18] Koford, 1953, p. 8–11.

deer, antelope, and elk that had been shot before dying. Large numbers also likely succumbed to strychnine poisoning after feasting on livestock that shepherds had purposefully tainted in order to kill the bears, cougars, and coyotes that stalked their sheep.[19]

By 1900 the California condor had declined from a wide-ranging generalist, able to exploit a variety of resources and capable of feeling at home in an assortment of different environments throughout North America, to a narrowly distributed endemic with a population of probably less than 200 individuals living off the scraps of cattle operations on the privately owned rangelands of central California. Condors still required roosting perches and nesting sites found in the mountainous high country, but they had also grown precariously dependent upon humans in the lowlands. As a result, most turn-of-the-century commentators believed that the condor was simply no longer a viable species. In 1890 the naturalist James Cooper, founder of the Cooper Ornithological Society, published an article on the California condor entitled "A Doomed Bird." Eight years later the Annual Report of the New York Zoological Society listed the species under the heading "Becoming Extinct." Naturalist C.W. Beebe also expressed little optimism in 1906, when he predicted that the condor's "doom is near; within a few years at most, the last individual will have perished." William Finley warned that the condor could "follow the Great Auk," and H.H. Sheldon observed that the species "has outlived its time and is on the trail of the dodo."[20]

In 1937 Joseph Grinnell, the prominent University of California ornithologist and longtime head of Berkeley's Museum of Vertebrate Zoology, offered a different perspective on the condor's future. According to Grinnell, the condor's biggest problem was that people had lacked the will to act on its behalf, and the species would only disappear if people continued to do nothing to protect it. Others apparently agreed, and the National Audubon Society soon responded by granting Grinnell funds to sponsor a student who would conduct research on the condor for his graduate work at Berkeley. Although a few researchers had worked on the condor in the preceding years, no one had yet systematically attempted to document the species' biology and natural history. With this project, Grinnell and his student, Carl Koford, opened a new chapter in the condor's history. Over the next 5 decades scientific knowledge about the condor grew tremendously. It

[19] Smith and Easton, 1964, p. 68; Snyder and Snyder, 2000, pp. 45–47; Burcham, 1981; Henshaw, 1920.

[20] For quotations see Cooper, 1890; Hornaday, 1898; Beebe, 1906; Finley, 1908; Sheldon, 1939.

also competed for public attention with a mounting sentiment that the condor represented more than just biology and natural history. The condor stood for wilderness itself. [21]

Condor Symbolism

Beginning in the early 20th century, naturalists and preservationists gave the California condor an image makeover, transforming it from a lowly pest and opportunistic scavenger into venerated wildlife icon. First they changed its name. Native Californians had known condors by a variety of names, such as ''wee-itch'' (Yaulamne) and ''molloko'' (Chumash), reflecting the great linguistic and cultural diversity of the region's peoples. In the 19th century, however, Anglo-American explorers, shepherds, and cattlemen adopted more prosaic, even unappealing names for the bird, like ''buzzard'' and ''California vulture.'' Naturalists first referred to the species as the ''California condor'' in 1833, highlighting the recent scientific determination that the species was more closely related to its majestic Andean cousin than to other New World vultures. However, this new name did not appear in the common vernacular until around 1900, right at about the same time that observers began to write vigorously about the species' decline. In the Victorian sensibility of the day, such a rare and wonderful creature clearly deserved a title that conferred a sense of romantic splendor, and ''California condor'' worked quite nicely.[22]

In the mid-20th century the condor also began to take on symbolic virtues, as the species' admirers labored to connect it with North America's primeval past. In a 1953 *Los Angeles Times* article, one author commented that condors ''are carryovers from the Pleistocene Age of 1,000,000 years ago, having come down virtually unchanged from that ancient era.''[23] *The New York Times* agreed when it called the condor ''a living fossil.''[24] National Audubon Society President John Baker expressed a similar sentiment in a public letter, which he distributed to Society members in 1951 to raise funds for a condor sanctuary in the Los Padres National Forest. According to Baker, the condor provided a ''living link with the ice age.''[25] The ornithologist Lloyd Kiff summed it all up when he said that he found it ''hard to be

[21] Carlson, 1986.
[22] Smith and Easton, 1964, p. 75; Koford, 1953, pp. 2–3.
[23] Ainsworth, 1953.
[24] Carlson, 1986, A-1.
[25] Baker, 1951.

indifferent about condors. They seem like a creature out of another geologic age.''[26]

It may at first seem odd that experienced naturalists like Baker and Kiff so enthusiastically celebrated the condor's ancient origins, when dozens of other well-known American wildlife species had obviously originated much earlier. In fact, virtually all wildlife species alive today *must* have existed during the last ice age, since the ten thousand years that have elapsed since the last continental glaciers retreated has only under extremely rare situations provided enough time for significant evolutionary change resulting in the emergence of new vertebrate species.[27] But that was not the point. The condor's boosters sought to create a direct link in people's imaginations between condors – with their tremendous size and archaic appearance – and an ancient, unspoiled North American continent. According to the *Los Angeles Times*, ''hundreds of biologists, volunteers and academics … have spent years trying to keep condors a living symbol of American's primordial past.''[28] Such efforts proved extremely successful and the image has stuck.

During the same period, a host of environmental writers and wilderness activists also transformed the California condor into evocative symbol of wilderness and the American wilderness preservation movement. According to the nature writer and literary scholar Charles Bergman, the condor represented ''an ancient heritage of large spaces and unbroken stretches of time … to modern people crowded by the millions into cities like Los Angeles, the condor came to symbolize both wilderness and prehistory.''[29] The condor's status as a wilderness symbol also served the goals of activists who, throughout the second half of the 20th century, sought to protect more wilderness in Southern and central California. Their efforts proved persuasive enough that, by the 1980s, the species commanded what Bergman called a ''mystic reverence'' among Californians who wished to preserve wild areas in their primitive state.[30]

[26] For Lloyd Kiff's quotation, see Armstrong, 1991.

[27] Recent evidence has contradicted conventional wisdom about the amount of time needed to produce new vertebrate species. In eastern Africa's Lake Victoria, for example, several hundred new species of cichlid fishes may have emerged from a single common ancestor since the Lake refilled at the end of the last ice age, just ten to fourteen thousand years ago. Such events, however, have only occurred in extremely rare circumstances. For more information see Johnson, et al., 1996, pp. 1091–1093.

[28] Kelley, 2002b, A-1.

[29] Bergman, 1990, p. 71,

[30] For more on the history of the American wilderness movement see Nash, 1967, Oelschlaeger, 1991, and Callicott and Nelson, 1998; McMillan, 1981, p. 103.

Some preservationists saw the condor as more than just a fitting symbol of wilderness – they claimed that its very value as a species depended upon the wild country it symbolized. In his classic 1953 study, *The California Condor*, Carl Koford wrote that the "beauty of a California condor is in the magnificence of its soaring flight. A condor in a cage is uninspiring, pitiful, and ugly to one that has seen them soaring over the mountains."[31] Eben McMillan, a rancher who had studied condors near his home for some 50 years, agreed when he said that the species symbolized freedom, land, and sky. The famed conservationist David Brower called condors "soaring manifestations of the place that built them and coded their genes." For Brower, condors were "only 5% bones and blood and feathers … the rest is habitat." Brower would go on to echo his allies, saying that "condors in zoos [are] like feathered pigs."[32]

For Koford, McMillan, Brower, and others, condors and wilderness existed in a mutually dependent, symbiotic relationship. Condors embodied wild nature and justified the protection of wilderness areas as critical endangered species habitat; in return, wilderness endowed the condor with its symbolic capital. Some took this argument even further, claiming that real condors only lived in the wilderness and that intensive scientific management by definition robbed them of their wild essence. Condors would be better off left alone under any circumstances, even if doing so led to their extinction. Observers came to know this position as the "hands-off" approach to condor conservation. During the 1970s and 1980s proponents of the hands-off approach clashed with a new group of scientists who argued that only intensive management, and later wholesale captive breeding, could save the species from certain extinction.

Condor Science

From the 1930s until the 1970s, Carl Koford was undoubtedly the country's most influential condor expert, working for over four decades to document the species' life history, behavior, population dynamics, and geographic range. When Koford began his research at the University of California in the late 1930s, he followed in the tradition of wildlife biologists like William Finley, Cyril Robinson, and his mentor

[31] Koford, 1953, p. 135.
[32] Carlson, 1986; Brower, 1981, p. 275.

Joseph Grinnell, all of whom approached their work primarily as natural historians. However, from the very beginning Koford also focused on conservation, and toward the end of his life he participated vocally in the bitter dispute that emerged in the 1970s over how to best protect the species.

Koford's early research, though relatively pure in its emphasis on basic biology and natural history, came at a pivotal and politically charged time in the history of California's National Forests. In the 1930s the Forest Service initiated a national campaign to battle wildland fires. Most officials believed that effective fire fighting hinged on "attack time," or the length of time it took to reach the site of a fire after it began. Officials at the rugged and highly flammable Los Padres National Forest, large portions of which still remain closed in the summer due to fire danger, hoped to lower their agency's distressingly long, $3\frac{1}{2}$ hour average attack time by constructing new roads into previously inaccessible areas. The Depression-era Civilian Conservation Corps (CCC) would provide all necessary labor. However, this same area also served as the heart of the condor's breeding territory. Koford believed that in order to reproduce successfully, condors required a remote nesting habitat far from potential human disturbances. Road development thus posed a direct threat to condors, and beginning in the 1930s, Koford focused his research and conservation efforts on the condor's breeding habitat in the remote Los Padres backcountry.[33]

Koford's research revealed much about the condor's population. In his seminal 1953 monograph he gave initial population estimates, recorded detailed life history information, documented behavior, and mapped out habitat use. He also noted that, given some basic data on fertility and survivorship, "the prevention of the death of a single condor … may mean that the population will show an increase rather than a decrease for that year. Persons in a position to influence the welfare of individual condors, and especially of their nests, should keep in mind that the precarious natural balance of the population can be easily upset in the direction leading to extinction of the species." Koford clearly recognized that condors led a tenuous existence, and that a few unexpected fatalities could send the population into a downward spiral from which it might not return.[34]

[33] Ford, 1986, pp. 78–80.

[34] Koford, 1953, p. 23; Noel Snyder later considered Koford's initial population estimates too low.

Many factors contributed to condor mortality. Under the heading "Major Mortality and Welfare Factors," Koford listed wanton shooting, collecting, poisoning, trapping, accidents, starvation, fire, roads and trails, oil development, and oddly enough, photographers. "Minor Mortality and Welfare Factors" included sickness and disease, eating foreign objects, storms, killing for quills, Indians, lassoing, penning and, the scientists' ubiquitous complaint, false information. Although some of these threats had already disappeared by the time he published *The California Condor* (lassoing being a prime example), others had clearly intensified. For wild condors the world presented an abundance of potential pitfalls.[35]

On the positive side of the population equation, condors did seem to be breeding successfully. Condors naturally exhibit low fertility rates, which even under the best circumstances limit population growth over time.[36] However, according to Koford's data, some 45% of condors observed at five sites between 1936 and 1946 had not yet reached maturity. In insular populations such as the condor's, a high proportion of immature individuals usually indicates one of two things: either a growing population or high mortality offsetting fertility. Since the total number of individuals appeared stable, Koford reasoned that high mortality must limit the population. Later condor biologists eventually recognized this seemingly minor detail as a major revelation. Koford had established an early basis for what later became a crucial fact; mortality, not fertility, limited the condor's population.[37]

Koford's research did not, however, uncover the specific causes of high mortality that plagued condors within their wilderness sanctuaries. Koford believed that nest disturbance, forest mismanagement, development, and general harassment had caused the condor's decline. Human activities had endangered condors in the past, and future intervention, including some overly invasive research techniques, could only harm them further. People could, however, work to preserve more wilderness habitat for the species, which would eventually result in decreased mortality and population growth. Shortly before his death, in 1979, Koford argued eloquently against what he called the "drastic artificial procedures" that the Audubon Society had recommended in one of its condor management reports. "Must we further dilute the natural scene by manhandling the birds and injecting cage-raised stock

[35] Koford, 1953, pp. 129–135.
[36] Mertz, 1971, p. 442.
[37] Koford, 1953, pp. 21–23; For a more recent discussion of condor mortality see Meretsky et. al., 2000.

into condor society?'' No, Koford wrote, ''[l]et us keep condors forever free.''[38]

Beginning in the 1960s, a number of other researchers challenged Koford's position by observing that central California's valleys and foothills still seemed to have plenty of food resources available, in the form of dead cattle and deer, to support a population much larger than the one that currently existed. In a 1965 research report Alden Miller, Ian McMillan, and Eben McMillan wrote that, although land-use developments and feedlots had destroyed some condor foraging territory, increased grazing on the remaining rangelands had already compensated for those losses. In 1976 another prominent ornithologist, Sandy Wilbur, made a similar observation, writing that although land use changes have surely destroyed some of the condor's food sources, ''there are still vast acreages well stocked with livestock and deer.'' According to these observations condors had failed to tap significant caloric resources in their low country foraging areas.[39]

Vacancies also remained in perfectly suitable high country roosting and nesting sites. In the preceding decades, the US Congress had set aside several wilderness areas and nature preserves in known condor breeding areas, including the Sisquoc Condor Sanctuary (1937), Sespe Condor Sanctuary (1947), and the San Rafael Wilderness (1968). Thousands of acres in the Los Padres National Forest contained remote, structurally appropriate nesting habitat, and condors had all but disappeared from other seemingly appropriate sites nearby in the western Sierra Nevada, the Tehachapi Range, the eastern Transverse Ranges, and the Coast Ranges further north.[40] In addition, the Forest Service had never built most of the roads it originally planned in the 1930s, due to changing agency priorities, costs, and opposition from Audubon activists. Although much of the condor's historic territory had disappeared and individual condors each required a sizeable home range, much underutilized habitat clearly still remained. Looking back in 2000, condor recovery team biologists Noel and Helen Snyder summed it up by saying that ''for decades, a central operating assumption for condor conservation was that the species was threatened importantly by habitat loss and human disturbance of nesting areas and

[38] Koford, 1979, pp. 1–7.

[39] Miller, McMillan, and McMillan, 1965, p. 19; For quotation see Wilbur, 1978, p. 27.

[40] Stoms et al., 1993, showed that despite its dwindling population, the condor's overall range had not declined dramatically during the 20th century. The few surviving condors still foraged widely across Southern and Central California, although the species' population density and total numbers had decreased dramatically.

that the key to its conservation lay in habitat preservation and isolating the species as much as possible from direct contact with humanity. However, habitat loss and disturbance of nesting areas turned out to be only minor factors in the condor's decline. The major factor was excessive mortality, especially from poisoning.''[41]

Between 1982 and 1986, poisoning emerged as the single most important cause of condor mortality, causing 25% (4 out of 16) of all condor deaths. No one knew to what extent lead and cyanide poisoning had historically affected condors in the wild. However, the fact that each of these four incidents appeared to have happened independently suggested widespread danger. The more scientists knew about the effects these poisons had on condors, the worse things looked for the few remaining wild birds. Everyone involved in condor conservation agreed that habitat protection remained an essential component of any effort to recover the species, but many scientists and agency officials also agreed that land preservation alone could not save the species. If all condors, in all habitats, were now in danger of being poisoned to death, then no amount of wilderness could save them.[42]

In the winter of 1984–1985, mathematical probabilities finally caught up with the fragile population. During a single season, six adults – 40% of the remaining wild flock – died, leaving only one breeding pair. The situation had clearly gotten out of control, and the species was now in danger of immediate extinction in the wild. At this point, the hands-on versus hands-off debate, which had polarized the condor's advocates, and had centered an ultimately ideological dichotomy regarding proper research and management techniques, abruptly turned to the specific and momentous question of whether or not any condors at all should remain on their own in the wilderness.

Opinions on what to do next ran the gamut. Researchers from the United States Fish and Wildlife Service (USFWS), the National Audubon Society, and the Condor Research Center, in Ventura, California, argued that captive breeding should proceed at the fastest possible pace, but that at least a few birds should remain in the wild to preserve the species' social structure and to serve as custodians of its habitat. However, Brian J. Kahn, Vice President of the California Department of Fish and Game, contended that the physical survival of the species must take the highest priority. Officials should capture all the remaining wild birds, he reasoned, since based on mortality statistics all

[41] Ford, 1986, pp. 80–83; For quotation see Snyder and Snyder, 2000, p. 370.
[42] Snyder and Snyder, 2000, pp. 92–95, 273–275, 298–305.

wild birds would probably perish in the next few years.[43] However, the condor's connection to wilderness would not go away, and many activists now openly worried that if the species disappeared then its habitat might also vanish. Noel Snyder, who served as the condor recovery team leader during the mid-1980s and led those calling for an immediate effort to bring all condors into captivity, did not share this perspective. Snyder and his wife Helen later wrote that "the concept of captive breeding condors was apparently so repugnant and divergent from [many environmentalists'] image of the condor as the essence of wilderness, that they proclaimed their preference for 'death with dignity' for the species, should captive breeding be its only salvation."[44] According to Snyder, condors came to "glorify wilderness," even though they spent much of their time foraging on cattle ranches. He would later complain that trying to manage a symbol was about as easy as "trying to manage smoke rings … We had to prove the condor was a bird."[45]

By that winter, both the bird and the symbol had reached a turning point. In January 1986 the decisive moment arrived, when, despite a dramatic effort to revive her, a key breeding-aged female died of lead poisoning. Recovery team biologists had considered Santa Barbara Female, or SBF, a lynchpin in the future of the tattered flock, and without her the remnant wild population no longer appeared viable. That spring, the US Department of the Interior finally accepted the fractured recovery team's proposal to capture all remaining wild birds.[46]

Opposition to this desperate scheme came from a variety of camps. Celebrity biologists, like Paul Ehrlich and A. Starker Leopold, wrote impassioned editorials denouncing the plan. Some public figures, remembering the chick that had died several years earlier during a routine examination, openly questioned the recovery team's ability to care for the animals in their custody. The team still lacked essential captive breeding data, and many critics remained unconvinced that condors could reproduce successfully in confinement. The National Audubon Society, which in 1977 had stepped forward as one of the first environmental organizations to endorse captive breeding, filed a lawsuit alleging that agency officials had acted without adequate information, and arguing that at least a few birds should be left in the wild to serve as vanguards for a future captive bred population. Finally, Chumash activists wrote an impassioned plea to the USFWS, stating that if all

[43] Crawford, 1985, pp. 844–845.
[44] Snyder and Snyder, 2000, pp. 298–305, 95.
[45] For second Snyder quotation see Bergman, 1990, p. 74.
[46] Snyder and Snyder, 2000, pp. 307–313; Bergman, 1990, p. 74.

condors ceased to exist in the wild, their religion would suffer irreparable damage.[47]

One of the last protests to the recovery team's actions came from literary scholar and environmental critic Charles Bergman, whose 1990 book, entitled *Wild Echoes: Encounters with the Most Endangered Animals in North America*, offered an expansive critique of condor management. According to Bergman, the condor debacle marked a crossroads in endangered species history. Previously, biologists had attempted to study and protect organisms in their natural environments. Now, however, scientists had removed an entire species from the wild and attempted to reconfigure it in a laboratory to match the specifications of modern society. Bergman argued that the condor fiasco illustrated a larger cultural pathology, in which scientists used their knowledge to gain power over nature, to decimate it, and then to preserve trivial relicts of it. ''The methods we have used to save endangered species must fail,'' he wrote, ''because the scientific approach to animals is part of the cultural mentality that created endangered species'' in the first place. Yet Bergman's challenge came too late; wildlife officials had already rounded up all the remaining wild condors and shipped them to zoos.[48]

AC-9's capture immediately altered the terms of the condor debate, ironically engendering a new era of consensus and cooperation among the condor's diverse advocates. With the entire species in captivity, all parties could now agree on a single goal: returning condors to the wild. Everyone involved in the condor controversy had hoped to keep a viable population in the wild, even if they had disagreed on the best approach, and nobody wanted to see condors locked up in zoos. Now, a new coalition composed of groups that had formerly battled over the condor's fate suddenly stood on common ground, and even the most ardent critics of condor management joined in a guardedly optimistic chorus. Charles Bergman expressed his deep admiration for the individual scientists who have made ''heroic efforts'' on behalf of the condor, and after interviewing Noel Snyder, he found himself ''extremely excited'' about the species' prospects for recovery in the care of trained experts.[49] David Brower had already turned his attention to restoration efforts just weeks after AC-9's seizure, writing that ''[t]he challenge now is to see that captive condors are released, and work together to keep the habitat

[47] *Audubon Leader*, 1977; Ehrlich and Ehrlich, 1981; Leopold, 1981; Snyder and Snyder, 2000, p. 304.
[48] Bergman, 1990, p. 82.
[49] Bergman, 1990, p. 78.

a safe place'' for the future wild flock.[50] The condor's immediate welfare depended on state of the art biology and intensive veterinary care. However, as Brower had observed, the species' successful reintroduction would also rely on the vigilant preservation of its wildland habitat.

By the spring of 1987, most of the condor's advocates could agree that the hands-on/hands-off debate, which had attracted so much attention and resulted in so much personal rancor, had ultimately proven fruitless. The condor's future survival would clearly require intensive management, including both vigorous captive breeding and habitat preservation. As Noel Snyder himself later noted, captive breeding can serve as a last resort but it should never take the place of habitat protection or of efforts to maintain populations in the wild.[51] In subsequent years, habitat preservation and scientific wildlife management would form the two pillars of condor recovery efforts. These two approaches also emerged as the central themes of the larger field of conservation biology, for which the condor's tale would eventually serve as a formative case study.[52]

Recovery

For 5 years condors were extinct in the wild. However, during its tenure in confinement the species thrived, and by 1992 the captive population had nearly doubled from 27 to a total of 52 birds. In the years that followed, recovery team scientists would continue to produce chicks using a battery of approaches including intensive veterinary care, breeding techniques like multiple clutching, and DNA fingerprinting, which allowed biologists to genetically map the entire species and establish suitable mating pairs. The next, and more foreboding phase of the project – reintroduction and reestablishment in the wild – would require broad cooperation among numerous interest groups, generous funding, scientific research, and the establishment of a safe habitat for condors in the wild.[53]

Reintroduction posed several potential problems. First, condors learn their survival skills through social interactions and thus require the tutelage of older, more experienced birds. As a result, birds raised in captivity have a distinct disadvantage when it comes to acquiring the basic skills needed to live in the wild. The biologists involved in the breeding program hoped to solve this problem with an odd solution:

[50] Brower, 1987, p. 2.
[51] Snyder, et al., 1996.
[52] Smollar, 1987.
[53] Ryder, et al., 2000, pp. 275–277; Geyer, et al., 1993; Stammer, 1991.

''armed'' with hand puppets designed to look like adult condors, they would raise their chicks in disguise. No one knows to what extent this puppetry actually fooled the captive chicks, but concealment nonetheless seemed necessary, since associating humans with food would probably mean death for a condor in the wild. To ensure that the chicks learned to stay away from people, their stealthy trainers also enlisted them in an ''aversion therapy'' program, a sort of boot camp designed to instill fear in the hearts of young birds. Described by some as ''tough love,'' the curriculum included exercises like moving ''a person into the [bird's] line of sight. Just as [it] sees the person, a group of biologists will rush the bird and turn it upside down.''[54] Mock power lines, carrying ''mild'' electric charges, hung in the birds' pens, and ''dysfunctional parents'' were eliminated from the breeding pool. As Michael Wallace, a San Diego Zoo biologist and head of the condor recovery team in the late 1990s commented, ''[a] good day is when you have condors throwing up all over at the mere sight of a person.''[55] Through these extreme and sometimes painful measures, recovery team members hoped to break the condor's destructive ''culture,'' eliminate individuals with detrimental ''traditions,'' and train their pupils for new lives in a modern environment.[56]

In January 1992, after 5 years in exile, officials finally released two California condors and two of their Andean counterparts, at the Sespe Condor Sanctuary, in the Los Padres National Forest. During the next decade, scientists released dozens of more birds in Ventura County, in Monterrey County near Big Sur, and in the Vermillion Cliffs region straddling the Utah–Arizona border. The culmination of these efforts came in May 2002, when AC-9 finally returned to the wild after 15 years in protective custody. Twenty three years and 35 million dollars after its inception, the condor recovery program had achieved resounding success: 68 condors survived in the wild, 16 more birds neared release, and 113 others waited in captivity, pampered and procreating.[57]

Biologists have clearly rescued the condor from extinction, yet numerous trials still confront the recovery program. In recent decades Southern Californians of all stripes have tended to view condors with the sort of affection usually reserved for local celebrities. Even the *Los Angeles Times* made a rare exception for them, saying that in the

[54] Miller, 1995.
[55] Cohn, 1999, p. 866.
[56] Graham, 2000; Carlson, 1986; Simon, 1995.
[57] Stammer, 1992; Kelly, 2002a; By March 1, 2003 the total number of condors had increased to 196, with 118 in captivity and 78 in the wild.

condor's case "ugly is okay."[58] However, some residents of communities near the Vermillion Cliffs release site, in southern Utah and northern Arizona, have objected vehemently to the government's condor reintroduction plans. One letter written to the USFWS declared that "[t]he condor is not a majestic bird but a common buzzard which lives on road kill … If you think that we or any tourist would be excited to see these birds gnawing away on a dead animal's carcass along the road you are very mistaken."[59] The USFWS eventually established a memorandum of understanding with a host of neighboring government agencies, but many local residents remain suspicious of the federal government and its privileged vultures.

Some commentators have also criticized condor recovery efforts for serving as an avian welfare program, since the species' survival will continue to require intensive and costly management into the foreseeable future. Managers still keep condors on a "carcass leash" near established safe sites by enticing them with a steady supply of fresh livestock remains. Leaving them to forage on their own would result in almost certain death. In one necropsy, conducted at the San Diego Zoo in 2002, pathologists discovered "12 bottle caps, shards of glass, electrical fixtures, screws and washers inside [a] turkey sized chick."[60] Since the reintroduction phase of the recovery program began several other birds have also met gruesome fates, including poisoning, colliding with power lines, and drowning. Land preservation and management also remain critical issues, as demonstrated by recent proposals to expand fossil fuel exploration in the Los Padres National Forest. The condor recovery program clearly has a long way to go, and will require much more financial and institutional support, before scientists can claim victory and curtail their intensive management of the species. However, the species' prospects have improved considerably now that recovery efforts have garnered widespread support from a diverse coalition of environmental activists, scientists, agency officials, and the general public.[61]

Despite all the evidence to the contrary, condors actually had several qualities that greatly improved their chances for eventual recovery. The species bred well in captivity (unlike the northern white rhino), its survival did not stand in direct opposition to powerful economic interests (like the northern spotted owl), and it lacked nasty habits like preying on live cattle or stalking domestic pets (unlike the gray wolf).

[58] Jones, 1991.
[59] Pols, 1996.
[60] Kelly, 2002c.
[61] Sheldon, 1939; Revkin, 1985; Ybarra, 1997; Kelly, 2002b; *Los Angeles Times* editorial, 2002.

Leadless bullets have also recently entered the market, and if put into widespread use they could significantly reduce the danger of poisoning. Finally, thanks in part to the efforts of wilderness activists, large portions of the condor's former range in California and throughout the western United States remains relatively wild. The condor's situation is still extremely grave; however, it may face better prospects than dozens of other endangered species that occupy specific ecological niches, that have lost most of their former their habitats to human-induced environmental change, or that do not possess the broad political constituency that condors have come to enjoy.[62]

Epilogue

In 1997 the Ventana Wilderness Society (VWS), which cites spiritual health and the intrinsic value of wild nature as the bases for its education, restoration, and research programs, became the first non-profit organization to release and manage condors in the wild. This group represents just one example of the ways in which American wildlife managers and wilderness preservationists came together to reconcile the ideological differences that had irrupted in the years following the passage of the Endangered Species Act. Today, the diverse preservation efforts of academic researchers, wildlife managers, and non-profit organizations like the VWS all fall under the banner of conservation biology.[63]

In 1991 Reed Noss, a future Editor of the journal *Conservation Biology* and President of the Society for Conservation Biology, commented on the marriage of wilderness ethics and endangered species management. In an article published in *Conservation Biology*, Noss argued that although "the wilderness idea has fallen on hard times as of late," wilderness itself should still serve as a foundation of conservation biology. For Noss, wilderness offered scientific knowledge, biological values, a source of humility, and it had an intrinsic value all of its own.[64] In the inaugural issue of activist Dave Foreman's journal, *Wild Earth*, which sought to promote the protection of native biodiversity through wilderness preservation, Noss further wrote that science offered "an appropriate 'left-brain' complement to the ethical and spiritual reasons for wilderness preservation that attracted so many of us to this business

[62] Snyder and Snyder, 2000, p. 367; Bishop and Clement, 1975.
[63] Ventana Wilderness Society, 2003.
[64] Noss, 1991a.

in the first place."[65] In the same issue, activist Jim Eaton recalled that although most "wilderness activists in the 1960s were backpackers who wanted to protect [their] favorite tramping grounds," many of these same people had converted to conservation biology, and now sought to understand and preserve biological diversity.[66] At this early stage in its history, conservation biology had offered little new to the scientific community in terms of specific ecological knowledge. However, it had already provided a blueprint for future cooperation between activists interested primarily in preserving wild landscapes and scientists charged with the management of endangered species.

Conservation biologists have succeeded at gaining support for their approach within activist organizations, government agencies, and academic circles. However, the story of the decline, near extinction, resurrection, reintroduction, and potential recovery of the California condor reveals many of the problems that have accompanied their work. In the condor's saga wilderness conflicted with wildlife, ecologists quarreled with environmentalists, preservationists argued against acting to save an endangered species, giant scavengers had to be trained to be wild, and an animal supposedly adapted to the world of the Pleistocene thrived in 21st century zoos. As late as the mid-1980s, prominent scientists fought against the notion of active scientific management. Finally, although academic conservation biologists unanimously advocate the establishment of natural preserves for endangered species and biodiversity protection, the notion of wilderness still creates widespread discomfort in the scientific community. During the 1990s, a number of influential scholars denounced the traditional wilderness idea as a sexist, racist, and imperialistic ideology that artificially alienates nature from society. The notion of a pristine wilderness apart from the stain of civilization also contradicts the historical axiom that humans have interacted with and profoundly shaped their environments for thousands of years. These criticisms have rung especially true for scientists from outside the United States, who tend to see idea of wilderness as a peculiarly American cultural relict, associated more with 19th century frontier mythology and the romantic sublime than with relevant biological science. Despite these quandaries, conservation biology's success in the United States derives at least in part from its identity as an academic field and an environmental movement, encompassing the concerns and values of myriad constituents with diverse philosophies and political priorities.[67]

[65] Noss, 1991b.
[66] Eaton, 1991.
[67] For the most frequently cited critique of the wilderness idea, see Cronon, 1995; Bergman, 1990, p. 77.

In 2000 *Audubon* magazine finally broke its long silence on the condor issue. In a commentary entitled "On Human Intervention," Editor Lisa Gosselin reflected on the condor's story and on her own organization's legacy of opposition to active intervention on the species' behalf: "Only by interacting with nature can we come to appreciate it, understand it, and, we hope, preserve it. What we have learned from the condor may help us to alter our behavior enough to save these birds, or other animals. At the very least, it may prevent us from killing off another symbol of the wild."[68] Today, scientists, activists, and environmental writers like Gosselin widely endorse active, scientifically informed management for the purpose of protecting wild nature and its symbolic agents. Thus, the current philosophical basis of condor management – and of conservation biology in general – harkens back to an earlier time in American history, before the Wilderness and Endangered Species Acts, when environmental thinkers like Aldo Leopold saw no inherent conflict between idealizing wild nature and managing it, too.[69]

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[68] Gosselin, 2000.

[69] For a good primer on Aldo Leopold's ideas and historical significance see Callicott, ed., 1987.

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