



**FIGURE 55.** Pair of California condors in Eaton Canyon, 1906. Photograph by William Finley and Herman Bohlman. Finley, who with his partner Bohlman took hundreds of photographs of the California condor, predicted that without more vigorous protection, the species would soon go extinct. Reproduced by permission of the Museum of Vertebrate Zoology, University of California, Berkeley, catalog no. 9763.

while East Coast naturalists occasionally offered grim reports about its status. In 1913, for example, New York Zoo director and radical conservationist William Temple Hornaday declared that the “existence of this species hangs on a very slender thread.” In his inimitable style, Hornaday issued a nationalistic appeal to save the species: “The California Condor is one of only two species of condor now living, and it is the only one found in North America. As a matter of national pride, and a duty to posterity, the people of the United States can far better afford to lose a million dollars from their national treasury than to allow that bird to become extinct. Its preservation for all time is distinctly a white man’s burden upon the state of California.”<sup>118</sup> John C. Phillips remained more circumspect in his 1926 list of extinct and vanishing birds of the Western Hemisphere.<sup>119</sup> There he reported an estimate from Joseph Grinnell, who thought that about fifty condor pairs survived in southern California and perhaps as many as twenty-five pairs in lower California. Although acknowledging that the bird had recently become highly sought after by collectors, he believed that state protection was helping the species hold its own. Three years later, Miller, Van Name, and Quinn highlighted the dire plight of the condor in their vituperative pamphlet, *A Crisis in Conservation: Serious Danger of Extinction of Many North American Birds*. They included the species among a long list of “birds beyond

saving," doomed creatures that would soon "join the brotherhood of ghosts."<sup>110</sup> In 1933, Alex Wetmore confirmed that discouraging prognosis when he claimed that the remaining population of California condors had fallen to only ten birds, though he failed to reveal the source of his estimate in his article for *National Geographic* magazine.<sup>111</sup>

### SECURING THE SISQUOC SANCTUARY

A year after Wetmore declared the California condor all but extinct, the wealthy Santa Barbara County rancher, businessman, and budding conservationist Robert E. Easton invited seven guests to view the species on a remote forty-acre parcel of meadow and sandstone outcropping known as Montgomery Potrero.<sup>112</sup> The land was owned by the Sisquoc Investment Company, of which Easton served as secretary and general manager. Included among the party was the California ornithologist, Cooper Club member, and retired Union Oil chemical engineer Ernst Dyer, who produced the first motion pictures of the condor at the site. Initially, Easton and Dyer tried to keep word of their find secret, for fear that egg collectors, hunters, and others would descend on the area and harm the birds. When sensational accounts of their find began to appear in California newspapers, including one story that depicted a condor carrying off a baby fawn in its talons, Dyer decided to set the record straight in an issue of *The Condor* published in early 1935.

Dyer's account of the adventure bears a strong resemblance to Thorton Burgess's response to viewing the last heath hens on Martha's Vineyard only four years earlier. After witnessing a group of about ten condors feasting on the carcass of an old ranch horse, Dyer reported that he and other members of the expedition party "realized that we were, at last, beholding a portion—too large a portion—of the pitiful remnant of that great race that once ranged, even in prehistoric times, from Baja California in the south, northward through the full length of Alta California up into Oregon and Washington, perhaps even further." "As to their future prospects," Dyer continued, "the trend of their past history undeniably points to their ultimate extinction unless conservation measures are promptly put into effect."<sup>113</sup>

Dyer's article alerted the leadership of the National Association of Audubon Societies, which had become increasingly sensitive to the issue of endangered species. Shortly after the article appeared (and not long after Arthur Allen set off on his cross-country expedition to photograph and record rare American birds), Joseph Grinnell wrote to Audubon president John Baker asking if his organization would sponsor a field study of the condor to learn more about its

life history and current status.<sup>124</sup> Grinnell also recommended that Baker contact Easton, who had recently approached the California Fish and Game Commission and local Forest Service officials about improving protection for the condor. Apparently, he had found a generally sympathetic ear in the person of Stephen A. Nash-Boulden, who was supervisor of the Santa Barbara National Forest, and his deputy, Cyril Robinson, who had been systematically collecting data on condor sightings for several years. In response to Grinnell's request, Baker pointed out that he had already lobbied Ferdinand A. Silcox, chief of the Forest Service, on behalf of the condor, and that the National Association of Audubon Societies was willing to offer \$50 a month for a period of two months to study the condor.<sup>125</sup> Grinnell found Baker's initial offer of support insufficient and recommended that he approach Easton about additional funding for a proper study.<sup>126</sup>

In April 1936, Baker ventured to the Santa Barbara National Forest to meet with Nash-Boulden and Robinson.<sup>127</sup> Prior to his visit, he had corresponded with Aldo Leopold, who, as we have already seen, had begun advocating for systematic studies of endangered species throughout North America. In addition, Audubon officials had been in contact with Easton and Dyer about the plight of the Sisquoc condors. Easton expressed particular concern about Nash-Boulden's effort to criss-cross the Santa Barbara National Forest with a dense network of roads, part of a campaign to control fires in the area.<sup>128</sup> One of the proposed roads would penetrate directly through the Sisquoc Falls area, the site of prime condor habitat, thereby allowing public access to this previously remote site. In an effort to stop construction of the road, Easton offered Nash-Boulden right-of-way through land owned by the Sisquoc Ranch as an alternative route. Nash-Boulden then agreed to a moratorium on the projected road until the situation could be studied further. After corresponding with Silcox, observing conditions firsthand, and speaking with members of the Cooper Ornithological Club, Baker agreed to raise funds to place two Forest Service employees in the field for thirty days to get a better handle on how many condors inhabited the Sisquoc Falls area and a second site near the White-Acre Peak-Hopper Mountain area.<sup>129</sup> The National Audubon Society and the Cooper Ornithological Club then raised \$270 to fund this limited study, which Robinson supervised. In his unpublished report, Robinson estimated that about fifty condors survived within the Santa Barbara National Forest (which had recently been renamed the Los Padres National Forest).<sup>130</sup> By October, Robinson informed Baker that the Forest Service had not only decided not to build the Sisquoc road but also to limit access to the area to protect the condor and maintain its habitat.<sup>131</sup>

Unfortunately, no clear administrative procedure existed for taking this action. Since its founding in 1905, the Forest Service's primary focus had been on

timber management within the boundaries of national forests.<sup>133</sup> When it came to managing wildlife on these federally owned areas, however, the agency had almost invariably deferred to state authority. On the rare occasions when it had done otherwise, it had provoked resentment, controversy, and even litigation in the western states where the vast majority of the national forests were located. For example, in the 1920s, the agency's efforts to control the overpopulation of deer in the Kaibab National Forest in Arizona led to a Supreme Court case when state game officials arrested Forest Service employees attempting to cull herds in the area.<sup>133</sup> Although the court ultimately affirmed the right of the U.S. government to protect its property by removing excess wildlife, uncertainty about the exact limits of federal authority remained.

Silcox had gone on record in support of greater protection for endangered species, and in 1936, he hired the botanist and ecologist Homer Shantz to become the agency's first director of wildlife management. Early the next year, his agency issued regulation T-9-1, a rarely invoked rule that prohibited trespassing of any area closed by the chief of the Forest Service, for the "perpetuation and protection of (1) rare and vanishing species of plants or animals, (2) special biological communities, or (3) historical or archaeological places or objects of interest." It also prohibited entry to any area closed for scientific experiments or other similar purposes.<sup>134</sup> The first site specifically set aside under this new regulation was the 1,200-acre Sisquoc Condor Sanctuary. Thanks to the untiring efforts of Easton, Robinson, Baker, and others, the Forest Service had finally taken an important first step in protecting the condor and preserving endangered species more generally.

### KOFORD'S CONDORS

Even as he was struggling to establish the Sisquoc Condor Sanctuary, Baker was also laying plans for an ambitious Audubon fellowship program that would fund the study of endangered species. A confluence of events—the loss of the final heath hen, Allen's search for the elusive ivory-billed woodpecker, Dyer's article on the threatened California condor, Leopold's call for a systematic inventory of endangered species, and the administrative shake-up within Audubon—led to the creation of the fellowship proposal that Baker announced at the fall 1936 meetings of the American Ornithologists' Union and the National Association of Audubon Societies.<sup>135</sup> Shortly after those meetings, Baker sent Grinnell a letter declaring that his organization was interested in offering a graduate fellowship "in cooperation with the Museum of Vertebrate Zoology, and under your supervision."<sup>136</sup> In subsequent correspondence, he outlined a tentative proposal

that called for a three-year program to study the California condor that carried a stipend of \$1,500 per year.

Grinnell, the longtime editor of *The Condor* and one of the most respected naturalists in the United States, seemed a logical choice to approach about the fellowship project.<sup>137</sup> A bird collector from his youth, Grinnell earned his master's degree (1901) and his Ph.D. (1913) from Stanford, where he studied under the famed evolutionary biologist David Starr Jordan. Along with the philanthropist and naturalist Annie M. Alexander, Grinnell proved instrumental in founding the Museum of Vertebrate Zoology in 1908. The institution's two organizers both hoped to establish a different kind of natural history museum at Berkeley, one where research took precedence over exhibition and where representative specimens of the Pacific coast's unique terrestrial vertebrates might be preserved before those species were forever lost to development. A meticulous researcher eager to raise the standards of natural history practice, Grinnell instituted a detailed set of procedures for fieldwork, specimen documentation, and research presentation that became the Museum of Vertebrate Zoology's hallmark. He also developed fundamental concepts in ecology—like the “niche” and “competitive exclusion”—while making important contributions to other areas of evolutionary biology, particularly the relationship between geographical distribution, climate, and physical environment.

In addition to his considerable scientific achievement, Grinnell became deeply concerned about the many threats facing the wildlife of his home state. Two years before Baker approached him in 1937, he had written an article, “Why We Need Birds and Mammals,” that provided a succinct expression of his basic conservation philosophy. While humans had once deeply respected the natural world and imbued it with a spiritual dimension, in recent times science had rendered them “more familiar with the workings of nature.” Unfortunately, this familiarity had led to the destruction of forests, the denuding of hillsides and valleys, and the extinction or near extinction of many animals. But because of the close interdependence of all living things, in the end the careless devastation of any one part of nature would rebound back to humanity. In language that echoed the notion of an ecological ethic that Aldo Leopold was groping toward during this period, Grinnell called for a fundamental reorientation of values:

We need to return to an attitude of deep respect toward nature. The relationships which have been set up through the ages between wild birds, mammals, and plants, in fact among all forms of life, can not be disturbed unless we are willing to accept the consequences—and these may be exceedingly serious for us. Where change in existing conditions appears to be unavoidable we should proceed with a caution

befitting our inadequate knowledge of the forces with which we deal; and above all we should avoid the capacious heedlessness that has characterized our exploitation of our surroundings so often in the recent past.<sup>138</sup>

While fearful that his position at a state-supported university hamstrung his ability to speak out freely in public, behind the scenes Grinnell worked tirelessly to end large-scale predator poisoning campaigns and to provide greater protection for all forms of wildlife, particularly birds and mammals. He also became mentor to numerous students who shared his devotion to scientific research and wildlife conservation. By the time Baker wrote him in late 1937, Grinnell's graduate program in ornithology and mammalogy was among the most active in the nation.

While delighted at the prospect of funding for one of his students, Grinnell realized that numerous issues still needed ironing out. In his review of Baker's proposal, Alden Miller, a Grinnell protégé and colleague, worried about the problem of maintaining high research standards in a sponsored study, particularly since the Audubon Society was ultimately interested in "conservation publicity," an agenda that might lead the organization to unduly "pressure for results of a certain type."<sup>139</sup> Moreover, there were turf issues to consider, since the ornithologist Harry Harris and the Los Angeles petroleum geologist and wildlife photographer J. R. "Bill" Pemberton, both prominent Cooper Club members, had been studying the condor for many years. Then there was challenge of finding funding for the fellowship. Initially, Baker hoped to convince a single wealthy donor to endow the entire Audubon fellowship program with sufficient funds to keep it going for many years, perhaps indefinitely.<sup>140</sup> When he failed to convince anyone to pledge the necessary \$250,000 he estimated would be needed, Baker began soliciting piecemeal donations for each of the studies. One particularly effective fund-raising technique involved screening motion pictures of the condor at local Audubon Societies and sportsmen's clubs in the region surrounding its habitat. Pemberton led this campaign, which featured movies he had made to garner support for the project.<sup>141</sup>

Finding just the right person to conduct the study also presented a challenge. Carl Koford proved an inspired choice.<sup>142</sup> Born in Oakland, California, as an undergraduate he trained in forestry and zoology at the University of Washington before transferring to Berkeley during his senior year. After graduation in 1937, he served a term as a Civilian Conservation Corps officer in Montana and then spent a summer studying ground squirrels at the Hastings Reservation in Carmel Valley, a biological research facility that had been donated to the university. The fact that he had spent forty-two consecutive days perched in a tree observing his



**FIGURE 56.** Carl Koford with “Oscar,” a California condor nestling, 1939. A careful, dedicated researcher, Koford spent thousands of hours in the field studying the California condor. Based on his extensive experience with the species, he concluded that the condor was a wary bird that would fare poorly in captivity, a claim that would later be challenged. Courtesy of the Western Foundation of Vertebrate Zoology.

subject impressed Grinnell, who felt Koford possessed the requisite “perseverance, ruggedness, and natural instincts for observation which the field study of the California condor absolutely required.”<sup>143</sup> One of his close associates later characterized him as “a very unusual fella” with keen eyesight, a probing mind that “was analyzing things twenty-four hours a day,” and a temperament that allowed him to endure countless hardships to learn more about the life and behavior of his research subject.<sup>144</sup>

In February 1939, just over a year after Baker had first proposed the fellowship, twenty-four-year-old Koford boarded a bus to Los Angeles to begin his study. With him he carried a rucksack, a pair of binoculars, a notebook, and a letter of introduction from Grinnell.<sup>145</sup> J. R. Pemberton took the enthusiastic young naturalist under his wing, freely sharing his extensive notes on the condor and inviting Koford to join him on an upcoming trip to the Hopper Mountain area, where he had recently seen eighteen of the rare birds.<sup>146</sup> Because he did not own an automobile, during the first year of his study Koford had to repeatedly hike long distances across difficult terrain to restock supplies while in the field.

By the time he finally finished his study, Koford had spent nearly five hundred days viewing living condors in the wild, recording his observations on about 3,500 pages of narrowly scrawled notes, and producing 350 still photographs of the birds and their habitat. In addition to his extensive fieldwork, he interviewed many "personnel of government forest and agricultural agencies, ranchers, hunters, old-timers, and others" with knowledge of the condor and spent considerable time in museums, zoos, and libraries tracking down information on the species.<sup>147</sup>

In addition to gathering data on an increasingly rare bird that resided in remote areas and covered considerable territory while foraging, Koford faced numerous additional challenges in his attempt to bring the condor study to successful completion. One early complication was the death of Grinnell in May 1939. Alden Miller, Grinnell's right-hand man at the Museum of Vertebrate Zoology, then assumed supervision of the project. Fortunately, Miller not only had a personal interest in Koford's research but he also maintained close contact with him from the beginning, so the transition proved relatively smooth.<sup>148</sup> Nearly two and one half years into the three-year study Koford faced an even greater challenge when, in June 1941, he was called into active duty in the navy. Concerned that he might be forced to remain in the military for many years and that his data might soon become obsolete, Baker floated the idea of asking someone else to write up Koford's copious notes.<sup>149</sup> Miller immediately shot down the idea, fearing that allowing someone else to complete Koford's research would result in a "badly diluted second-hand product." Moreover, it would represent a real disservice to Koford who had "given all his energy in complete devotion to a scientific problem and ideal" and who rightfully expected that his work would lead to a doctoral degree.<sup>150</sup> In the end, Baker acquiesced on the issue; for the moment he was forced to settle for an interim report from Koford, though on several subsequent occasions, he again raised the possibility of hiring someone else to write up the final report.<sup>151</sup> As it turned out, Koford remained in the navy until after the war ended and did not get back into the field to finish his research until February 1946.

A year later, California ornithologists and National Audubon Society staff successfully lobbied the Forest Service for the establishment of a second, much larger condor sanctuary in the Los Padres National Forest. Miller and Baker had first seriously discussed the idea of pushing for additional protective areas for the species sometime in late 1940 or early 1941. Initially, Baker approached Ira Gabrielson, chief of the Bureau of the Biological Survey, about the possibility of having his agency take over the Sespe State Game Refuge, an area within Los Padres National Forest that Koford had identified as prime condor habitat. The

hope was that the Biological Survey would close the refuge to hunters and others who might harm the condor, something the state of California had refused to do. Apparently Gabrielson “listened sympathetically” to the idea but failed to act on it.<sup>152</sup>

Once Koford had been called up for active duty, Baker began using his interim report as a tool to push for the creation of a second condor sanctuary administered by the Forest Service. His initial sense of urgency diminished, however, when Cyril Robinson, who had by then been promoted to acting supervisor of the Los Padres National Forest, closed the Sespe State Game Refuge to public access on June 1942.<sup>153</sup> Events following World War II—the reopening of closed sites in the national forest, the end of gas rationing, and recent reports from Koford that condors were still occupying the proposed protected area—led to a renewed campaign for the establishment of an additional sanctuary. Setting boundaries based on recommendations from Koford, the Forest Service created the nearly thirty-five-thousand-acre Sespe Condor Sanctuary in 1947 (and enlarged the protected area to more than fifty thousand acres four years later).<sup>154</sup> The Forest Service and the National Audubon Society split the cost of a special patrolman to guard the site during the eight most critical months during the year.<sup>155</sup> The move proved popular among condor enthusiasts but had its detractors among local residents who resented the closure of areas previously open to hunting and other forms of recreation. Responding to the earlier creation of the Siskiyou Sanctuary, H. H. Sheldon argued in *Field and Stream* that the species had “outlived its time and is on the trail of the dodo.” By establishing a sanctuary to save an obviously relict organism, humans were “sacrificing the recreational value of a large area in exchange for the extremely doubtful preservation of a bird of no value, esthetically or otherwise.”<sup>156</sup>

Meanwhile, Baker was keenly disappointed to learn in 1947 that Koford needed at least two more years to finish his doctoral dissertation, a document that would require additional editing to make it suitable for a broader audience.<sup>157</sup> With support from a fellowship granted by the University of California, Koford successfully defended his dissertation in 1950. By this point, the National Audubon Society had issued two formal reports on endangered species and had one more in progress. In addition to Tanner’s monograph on the ivory-billed woodpecker (Research Report No. 1, 1942), Audubon staff member Robert Porter Allen had completed his study on the roseate spoonbill (No. 2, 1942) and was working on a second report on the whooping crane (No. 3, 1952).<sup>158</sup>

According to Koford, Baker insisted on “readable and breezy” prose like that found in the previous Audubon reports.<sup>159</sup> Tanner had written his book under the watchful eye of A. A. Allen, who had considerable experience communicating

to a popular audience, while Robert Porter Allen proved an accomplished writer with a gift for making his work come alive for the reader. Koford and Miller, on the other hand, were clearly more comfortable expressing themselves in the more turgid style typical of most academic science writing. In part as a result of their differences, Koford failed to complete the numerous revisions on his report that Baker had requested before he left for Peru early in 1951 to begin studying the vicuña. Further delays occurred when the airline on which Koford shipped the edited version from Lima lost the manuscript for seven months.<sup>160</sup> It was not finally published until 1953, fourteen years after it was begun.

### KOFORD'S CONCLUSIONS

Koford's landmark report offered the first detailed study of living condors in the field. In his foreword to the book, Baker once again reiterated the importance of obtaining solid facts through scientific research as "the essential basis for wise policies governing the conservation of wildlife resources." Humans had so reduced the California condor population that it had become the "third rarest living species of North American bird" and on "the verge of the extinction." Now it was up to humans to promote its "survival and restoration."<sup>161</sup> Alden Miller's preface vehemently denied the claim that the condor was a relict species beyond saving, a "passing remnant of the Pleistocene." To understand the true nature of the California condor (and how it might be rescued from the brink of extinction) a scientist needed "to live with them, think about them daily, gather facts in abundance, analyze and reflect," just as Carl Koford had done. Koford's exhaustive report offered a solid foundation for the conservation of the condor, Miller argued; now his sound program of protection and education needed implementation.<sup>162</sup>

In the body of his copiously illustrated study, Koford summarized what he had learned about the distribution, life, and behavior of this rare bird. A species that had once ranged widely across much of North America had now been reduced to a modest final stronghold, a wishbone-shaped swath of land just north of Los Angeles that cut through seven counties.<sup>163</sup> Based on an unexplained extrapolation from the maximum counts of condors seen by several reliable witnesses over a number of years, Koford estimated that about sixty condors remained and that the population size was currently stable, neither increasing nor decreasing.<sup>164</sup> Because of the population's small size and low breeding potential, however, the failure of even a single nest or the prevention of the death of a single condor could have important implications for the ultimate survival of the species.<sup>165</sup>

Unlike Finley, who presented the condor as tolerant of humans, Koford argued that it was a particularly sensitive species that would readily desert its nest if disturbed.<sup>166</sup>

In the conservation section of his book, Koford outlined his conclusions about the threats the condor faced and his recommendations about how to preserve the species. He began by refuting the largely pessimistic attitude taken toward the fate of the species since Cooper had first lamented its decline in 1890. The major single obstacle to perpetuating the species, he asserted, was the lack of commitment on the part of the many individuals who had the power to affect its fate.<sup>167</sup> Among the most important perils threatening the continued existence of the condor were wanton shooting by thoughtless hunters and ranchers; collecting, which he believed had "contributed significantly to the decline of the condor in some areas"; inadvertent poisoning and trapping by those engaged in campaigns to reduce mammalian pest and predator populations; various kinds of accidents; road building, trail construction, and oil development that not only directly disturbed habitat but also made condor country more accessible to the public; and photographers who bothered the birds in an effort to obtain still or motion pictures.

Koford dismissed as impractical several proposals to resurrect the species.<sup>168</sup> Artificial feeding, by regularly placing carcasses near roosts, would be costly to implement, attract carnivores that sometimes preyed on condors, and cause the remaining birds to concentrate in relatively small areas, where they proved more vulnerable to disaster or disease. The trapping and transplanting of condors to unoccupied territories would also fail since the birds were able to cover such a large territory and a pair that had been moved from its original nest site would likely return back to that site. Koford was particularly adamant in his opposition to artificial breeding of the species in captivity, which he said should only be attempted as a last resort, "after all efforts to maintain the natural population have failed."

The San Diego Zoo had successfully raised the Andean condor (*Vultur gryphus*) in a large cage, but for several years leading up to the publication of the condor report, Koford, Miller, and Baker had strongly opposed a proposal to grant that institution the necessary permit to capture a pair of wild California condors.<sup>169</sup> Their reasons were ostensibly scientific. In his report, Koford questioned whether condors raised in captivity would possess the basic skills and experiences necessary to survive in the wild. He also worried that the release of captive condors might introduce diseases into the wild population. But in the end, the arguments against captive breeding were as much about aesthetics as

science. Koford, for example, spoke of the grace and majesty of the species in its native habitat, an aesthetic treasure that greatly diminished when the species was forced to live in artificial circumstances:

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 who has seen them soaring over the mountains. Condors are so few that their recreational value is one of quality rather than of quantity. As Leopold . . . points out, the recreational value of wildlife is inverse in proportion to its artificiality. The thrill of seeing a condor is greatly diminished when the birds are being raised in captivity. Our objective should be to maintain and perhaps to increase the natural population of condors.<sup>170</sup>

To achieve that goal, Koford offered a series of recommendations, beginning with greater legal protection. While state law had protected the condor at least since 1905, apparently only one person had ever been prosecuted for violating that law; he received a \$50 fine after being convicted trying to sell a condor he shot near Pasadena in 1908. "As a striking and unique species, threatened with extinction," Koford declared, "the condor is of national interest and is deserving of strict federal protection." A tentative start in that direction had been made in 1942, with the ratification of the Convention on Nature Protection and Wild Life Protection in the Western Hemisphere. The annex of this convention listed the condor as one of several species whose protection was "declared to be of special urgency and importance." Moreover, the federal government agreed to safeguard it "as completely as possible," though as yet nothing had come of this pledge.<sup>171</sup>

Beyond federal legislation, Koford offered a several other suggestions for rescuing the condor. In keeping with his notion about the sensitivity of the species to human disturbance, Koford called for the continued closure of its nesting and roosting grounds. All the recently used nesting sites that he knew about were either inside the boundaries of national forests or, in one case, within a federal Indian reservation. While several of these areas had been closed to public entry with the creation of the Sisquoc and Sespe Condor Sanctuaries, oil drilling was still being permitted within a large portion of the Sespe, several prime condor roosting sites were located on private property, and hunters still used some trails within sanctuaries that were supposed to be closed. In addition to addressing these problems, Koford thought the Forest Service should stop maintaining certain trails and roads that crisscrossed condor country. Unfortunately, most of the condor feeding areas remained on private property, where the birds faced harassment by the public. Here Koford called for an educational campaign to help

those who came in contact with the bird to “understand something of the relation of the condor to its environment.” And finally, Koford thought that ranchers, stockmen, and trappers should be encouraged to leave animal carcasses in the wild rather than destroying them. At the same time, Koford reiterated, “carcasses of poisoned animals must be regarded as dangerous to condors until they are proven otherwise.” To shed further light on this issue, he called for studies using turkey vultures as surrogates for the condor.<sup>172</sup>

Koford’s report received accolades in the handful of publications that reviewed it.<sup>173</sup> But it seems to have had little effect on slowing the decline of the condor. The National Audubon Society cosponsored a second condor report in 1965, which was also completed under the supervision of Alden Miller. There Eben and Ian McMillan—brothers, ranchers, and amateur naturalists—estimated that only forty-two condors remained, a number that had been calculated by relying on Koford’s earlier estimate.<sup>174</sup> Like the ivory-billed woodpecker, the condor was among the first species to receive protection under the first Endangered Species Act (1966), but listing initially did little to stem the species’ ongoing population decline. Although strongly opposed by Koford, Miller, McMillan, and others, calls for a more aggressive captive breeding program for the species became increasingly hard to ignore as the condor population continued to plummet toward disaster.

### THE LIMITS OF SCIENCE

The 1920s and 1930s marked a watershed in the evolution of policies and scientific practices related to endangered species in the United States. While naturalists had long shown a keen interest in the plight of vanishing wildlife, for the first time they possessed the training, conceptual tools, techniques, financial backing, and desire to begin more thorough investigations of those species in the field. The three studies chronicled in this chapter were born of an optimistic belief that if enough could be learned about the life history, behavior, and ecology of vanishing animals, they might be snatched from the jaws of extinction. Consistent with that belief, all three studies identified numerous hazards that seemed to be pushing their respective subjects toward the brink of annihilation, and all three offered concrete suggestions about how to reverse that decline. Although each pointed to human actions as the primary source of endangerment, their recommendations proved quite modest, at least in the context of later, more substantial and interventionist efforts to save species threatened with extinction. In the cases of Tanner and Koford, the single most important proposal was to restrict human access to and modifications of areas known to be prime ivorybill and condor

habitat. Yet, given the larger political, social, and economic climate of the time, even those modest recommendations faced stiff resistance from individuals who had prior claims on the landscapes on which these species depended to survive. While Koford and his colleagues overcame much of that resistance, the National Audubon Society failed to stop logging on the Singer Tract. Clearly, science alone could achieve only so much without a larger change in values.

Beyond the lack of political will to fully implement the recommendations that Tanner and Koford made were limitations in the science they pursued. Their pioneering studies clearly went far beyond previous research on endangered species, but they remained restricted in scope and scale. Each was undertaken by a single individual, with a modest budget, and over a fairly narrow span of time. While Tanner visited several locations where recent sightings of the species had been claimed, he managed to actually find and observe only five ivorybills at a single site. Exactly how many of these charismatic birds still roamed the earth, and where were they? How representative were the behaviors he witnessed at the Singer Tract? How much variability did the species exhibit in terms of its behavior, food requirements, and habitat needs? Despite Tanner's knowledge and dedication, these critical questions remained unanswered following his study—and probably unanswerable for a single naturalist, no matter how capable and devoted.

Similarly, while Koford made numerous important discoveries during his four years of intensive research on the California condor, at the end of the day he too lacked accurate information about the size of the remaining condor population, the number of total number of breeding pairs, and mortality rates, all critical pieces of information for developing an effective plan to rescue the species.<sup>175</sup> Despite evidence to the contrary, he also argued that the California condor was an extremely wary, sensitive species, and thus not a good candidate for captive breeding experiments. The conservation biologists Noel Snyder and Helen Snyder argue that this perspective on the condor was not only inaccurate but also dangerous for the long-term well-being of the beleaguered species, which continued to decline long after the creation of the Sespe Sanctuary.<sup>176</sup>

The years following World War II witnessed a dramatic increase in public support for endangered species preservation and an impressive growth in the size of American universities, both of which led to more funding for research on the issue. Growing public concern about extinction also fostered a political atmosphere in which stronger protective legislation could prevail. Just as they had done since the nineteenth century, naturalists would continue to play a key role in shaping that legislation.