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## **A Sanctuary for Science: The Hastings Natural History Reservation and the Origins of the University of California's Natural Reserve System**

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**Abstract.** In 1937 Joseph Grinnell founded the University of California's (U.C.) first biological field station, the Hastings Natural History Reservation. Hastings became a center for field biology on the West Coast, and by 1960 it was serving as a model for the creation of additional U.C. reserves. Today, the U.C. Natural Reserve System (NRS) is the largest and most diverse network of university-based biological field stations in the world, with 36 sites covering more than 135,000 acres. This essay examines the founding of the Hastings Reservation, and asks how it managed to grow and develop, in the 1940s and 1950s, during a time of declining support for natural history research. It shows how faculty and staff courted the support of key institutional allies, presented themselves as the guardians of a venerable tradition in nature study, and emphasized the station's capacity to document ecological change and inform environmental policy and management. In the years since, Hastings and other U.C. reserves have played crucial roles in California environmental politics. Biological field stations in the post-war era deserve more attention not only from historians of biology, but also from environmental historians and other scholars interested in the role of science in society.

**Keywords:** biological field stations, natural reserves, Joseph Grinnell

### **Introduction**

In 1937, near the end of his long career in science and conservation, Joseph Grinnell set out to establish a new institution that he hoped would become a model for field research in the biological sciences.

Grinnell had served as the founding Director of the University of California's Museum of Vertebrate Zoology (MVZ) since 1908. Over the next three decades, he built the Museum into the premier research center of its kind in western North America. Under Grinnell's leadership, the Museum produced thousands of publications, and cataloged hundreds of thousands of specimens representing the faunal diversity of California and the American West. It was the largest and most thoroughly documented collection of vertebrates for any region of similar size in the world. Now Grinnell turned his attention to the bucolic hardwood rangelands and chaparral covered slopes of California's Coast Ranges, where he hoped to create the University's first biological field station (Herring, 2000).

The Hastings ranch was located in the Santa Lucia Mountains, near the town of Carmel Valley in Monterey County, about 150 miles south of the Berkeley campus. The 1,600-acre site encompassed diverse Mediterranean-style habitat types and contained a rich assortment of plants and animals. Hastings had a long history of cultivation and livestock production, but Grinnell did not intend for it to become another agricultural experiment station like the University Farm. Instead, Hastings would serve as a space for natural history field study, and as an example of what Grinnell called "agriculture in reverse." Scientists there would have a rare opportunity to "observe the sequence of biotic events on an area long grazed and in part cultivated...which will now be allowed to go 'back to Nature'" (Alagona, 2008).<sup>1</sup>

It was not just the land that Grinnell hoped would go "back to nature." At Hastings, he envisioned a sanctuary for science that would provide the ideal conditions for focused, long-term study. "My imagination pictures," Grinnell wrote, "in due course, the Hastings Reservation as a recognized 'Mecca' to which will come, for periods of undistracted research, advanced students of ornithology, mammalogy, botany, entomology, ecology, etc." They would gather specimens, observe faunal interactions, and use the site as a control to measure landscape transformations in the surrounding region. With its "station records and authentically identified reference collections," Hastings would become a living archive of California's natural and environmental histories.<sup>2</sup>

Joseph Grinnell was not the first scientist to call for the creation of university field stations. Between 1890 and 1940, foundations and universities in the United States established at least 48 field stations for

<sup>1</sup> Mark D. Stromberg, "History of Hastings 1940s to 2003," historical files of the Hastings Natural History Reservation.

<sup>2</sup> Stromberg, "History of Hastings."

study in evolutionary biology and the new science of ecology (Jack, 1945; Kohler, 2002a, b; Benson, 1988; Lilly, 1944; Pauly, 1988). This was the period that spanned from the great natural history expeditions of the nineteenth century to the triumph of the laboratory-based sciences in the mid-twentieth century. Yet after 1950 many of these institutions redirected their resources away from the traditional natural history disciplines toward trendier fields in the physical and biomedical sciences that were receiving more funding from government and industry (Farber, 2000; Johnson, 2009; Wilson, 1994, pp. 218–237). Administrative support waned, and some field stations shuttered their doors. By the 1970s, a few prominent individuals, mainly from universities in the Northeast and Midwest, were dominating what had become a small and cliquish community of American biological field station administrators.<sup>3</sup>

Seen in this context, Hastings proved remarkably successful. Natural history research there was not immune to charges of obsolescence from university administrators and laboratory scientists back on campus. Yet, the site soon emerged as a center for field biology on the West Coast. By 1964 the Reservation's manager, John Davis, could boast that scientists knew more about Hastings than any other place of equivalent size in the United States (Reed, 1964; Stromberg and Griffin, 1989). Hastings became a model for the creation of new research stations, and the following year the University consolidated these holdings into a single Natural Land and Water Reserves System. Today, the renamed U.C. Natural Reserve System is by far the largest and most diverse network of university-based field stations in the world, with 36 sites covering more than 135,000 acres.

Why did Hastings thrive and become a model for the University of California's natural reserve expansion initiative at a time when similar programs in other regions faltered? To understand why Hastings succeeded – or why any attempt to establish a new scientific research initiative “sticks” – we must understand its relationship to place. That is a premise of this special issue, and it has served as the subject of numerous recent studies on the geography of science (Agar and Smith, 1998; Bocking, 2007; Burkhardt, 1999; Demeritt, 1996; Finnegan, 2008; Henke, 2000; Kohler, 2002b; Kuklick and Kohler, 1996; Livingstone, 2003; Numbers and Stenhouse, 1999; Shapin, 1998). Observers of sci-

<sup>3</sup> The view that field station administrators in the 1970s comprised a “small and cliquish community” came from a personal communication between the author and Daniel R. Dawson, the Director of the University of California's Sierra Nevada Aquatic Research Laboratory and Valentine Camp.

ence in society have often argued that a fundamental aspect of scientific knowledge is its ability to “travel” and yet remain valid. Local concerns do not affect universal knowledge. During the past few decades, however, science studies scholars have challenged this view by highlighting the importance of space and place in the production, dissemination, and reception of scientific knowledge. From Renaissance salons to twenty-first century laboratories, and from agricultural experiment stations to astronomical observatories, space and place have shaped both the content and the politics of science.

This paper contributes to the literature in several ways. First, it argues that although most scholars have understood biological field stations in the context of the history of science, their emergence and development also had much to do with larger trends in environmental history. Joseph Grinnell and his colleagues watched, during the first three decades of the twentieth century, as resource extraction and development on private lands destroyed their field sites and reduced their opportunities to collect biological specimens. By the 1930s, they had placed their hopes in the rapidly expanding public lands, and they were working to secure permanent spaces for research and teaching in national parks and other government-owned areas. They had some early successes, at sites such as Glacier Bay and Yosemite, but the agencies often proved unfocused, fickle, and ambivalent about science. A series of disappointments encouraged researchers around the country to work for the establishment of university-owned sites where science would take precedence over other land uses.

Hastings provides an interesting example of a research institution that succeeded even though work there often seemed out-of-step with prevailing trends in science and politics. Joseph Grinnell was one of the country's leading figures in zoology, ecology, biogeography, and evolutionary biology, and his program based at the MVZ produced some of the most important advances in the early twentieth century life sciences. Yet, after his death, during the 1940s and 1950s, outside observers began to view research at Hastings as increasingly antiquated. Hastings served a space for observation during an era of growing experimentation in the life sciences; it provided a site for the collection of biological specimens during a time of declining support for museums; and its boosters championed the idea of scientific research for land management at low point in the history of American conservation. So how can we explain the Hastings Reservation's growth and development?

Hastings succeeded as a space of science – even when it failed to generate truly innovative or generalizable knowledge – because its leaders succeeded in maintaining the support of key institutional allies

and promoted themselves as guardians of a venerable tradition in natural history research. Even more important, though, was their argument that Hastings would produce the kind of place-based research that would be essential for confronting the state's environmental problems. At Hastings, Grinnell sought to create a model space that would demonstrate his ideas about conservation and inform land management decisions in areas such as the national parks. But unlike the national parks, which sought to protect special places, the value of Hastings came from the ordinariness of its landscape. The Hastings Reservation resembled millions of acres of hardwood rangelands throughout California, which meant that insights gained there could apply to a much larger region. Grinnell and his followers delivered this message to their allies and patrons regularly over the years to maintain their support in an often hostile academic climate. By the late 1950s, Hastings would become a model for the creation of other U.C. field stations. In the 1970s and 1980s, it would begin to fulfill its promised role as an environmental research institution that could provide crucial insights for land use and natural resource management.

Finally, Joseph Grinnell's vision for the research program at Hastings was as much about history as it was about geography. By focusing on a particular place, Grinnell and his successors were able to study change over time. They justified their work to colleagues, administrators, and patrons not only as biological research, but also as an early form of environmental monitoring. This argument won support during the New Deal era of 1930s, at a time of great concern about land degradation, and then again in the environmental era of the 1960s and 1970s, during a period of widespread anxiety about resource depletion. Grinnell's approach proved especially compelling in California, a state whose landscapes, for more than two hundred and fifty years of documentary history and presumably much longer, have known no constants except for change. Grinnell's followers at Hastings, during the post-war era, could not always claim to be doing cutting-edge biological research. But, to use one of the many metaphors that Grinnell himself popularized, they found their *niche* by becoming gatekeepers for the study of ecological change in California.

### **Joseph Grinnell's California**

Joseph Grinnell has received increasing attention in recent years from environmental historians and historians of science (Star and Griesemer,

1989; Runte, 1990; Griesemer and Gerson, 1993; Dunlap, 1988, 1998; Stein, 2001; Barrow, 2009). Yet he remains an underappreciated figure in the literatures of these fields compared to others who have made similar contributions (e.g., Mighetto, 1991). Those who have studied Grinnell have tended to focus on a few isolated aspects of his career – his role in predator control debates, his lobbying of the national park service, or his philosophy of museum administration – but few have considered the overall influence of his life's work.

There are several possible explanations for this oversight. Grinnell worked in California during a time when most scientists and conservationists lived in the Midwest and Northeast. His regional focus and meticulous attention to museum methods has led some scholars to view his contributions as provincial, antiquarian, or merely taxonomic. He remained at a university throughout his career, and never occupied a high-profile post in the federal government or at an exhibition-oriented museum. He was a reserved man who guarded his scientific reputation and had his “Berkeley Circle” of protégés serve as the public representatives of his advocacy efforts. Or perhaps the reason is that there is only room for one patron saint of wildlife in the pantheon of American environmentalism, and historians long ago bestowed that hero's honor on Aldo Leopold.

A closer look reveals that Grinnell had an enormous influence on biological science and conservation. Between 1893 and 1939, he published 554 books and articles in the areas of zoology, ecology, evolution, biogeography, and conservation. He extended C. Hart Merriam's life zone concept, developed the idea of the niche, and provided a basis for the competitive exclusion principle. He popularized the use of trinomial taxonomic classification – the division of species into subspecies using their morphological differences and geographic ranges – which he considered essential for understanding the evolutionary processes that led to the emergence of new forms. And he became the country's foremost expert on wildlife-habitat relationships (Star and Griesemer, 1989; Griesemer and Gerson, 1993; Grinnell, 1940).

As a natural scientist in California, Grinnell followed a rich tradition of field research. During the nineteenth and early twentieth centuries, natural scientists in California still lacked the libraries, museum collections, and laboratory facilities typical of more established and better endowed academic institutions on the Eastern Seaboard (Smith, 1987). But they did have a vast and sparsely populated “inner frontier” available for research (Kohler, 2006). California attracted naturalists who stressed observation over experimentation, and who looked to the

landscape instead of the laboratory for their subjects of study. Unlike their eastern counterparts, who organized elaborate imperial expeditions to exotic regions of Africa and South America, MVZ collectors and researchers worked closer to home in the wild hinterland that surrounded them (Beidleman, 2006; Ewan, 1955).<sup>4</sup>

Grinnell considered California's rugged, diverse, and dynamic landscapes ideal spaces for scientific research. In California's mountains and rivers, he found evidence for the importance of natural barriers to animal movement. In its valleys, he saw isolated centers of evolution that contained large numbers of endemic species. And in its fires and floods, he witnessed the unpredictable forces of landscape change that altered the availability of resources and rearranged animal populations (Grinnell, 1914a, b, c, 1943). Decades of research in California taught Grinnell that he could not understand ecology and evolution without history and geography. Fieldwork, he believed, required a rich sense of place.

At the Museum of Vertebrate Zoology, Grinnell built a research institution that rivaled those of Washington, New York, Boston, and London. But he also faced a serious problem. Biological specimens collected in the field provided the basis for all research at the Museum. Yet opportunities to collect specimens diminished with each passing year as development and resource extraction transformed the state's habitats and decimated its wildlife populations (Kohler, 2006, pp. 24, 148; Star and Griesemer, 1989). Grinnell and his assistants worked to stay one step ahead of the dredgers, dikers, dam builders, and bulldozers that were rerouting the state's waterways and grading its valleys to make room for new cities and farms. They searched remote mountains for the last redoubts of once-common game birds and fur-bearing mammals. And they mapped the spread of exotic species that were expanding their ranges at the expense of the native fauna (Grinnell, 1919).

From the beginning of his career, Grinnell viewed science and conservation as inextricably linked. At first, his conservation efforts focused on museum work: the collection, documentation, and preservation of biological specimens that would provide a historical record the "original faunal conditions in California and the west" (Grinnell, 1910). Grinnell and the Museum of Vertebrate Zoology's patron, Annie Alexander, developed a plan for collecting that prioritized areas where land use

<sup>4</sup> This was not the model for all California researchers. Scientists from other institutions, such as the California Academy of Sciences, launched research expeditions to distant lands like their East Coast counterparts.

change was imminent (Star and Griesemer, 1989; Stein, 2001; Kohler, 2006). In 1907, for example, Grinnell suggested that the Museum's first official expedition should visit the Imperial Valley, in the low desert southeast of Los Angeles.<sup>5</sup> Irrigation projects were facilitating agricultural development there, and the Valley's endemic fauna was in danger of eradication. He hoped that the Museum's staff would arrive in time to survey the area. But despite their efforts, they often showed up too late to gather a comprehensive set of specimens. The state's diverse native fauna was disappearing – and, along with it, opportunities for research and teaching.

Grinnell soon decided that museum conservation was not enough. In 1912 he launched California's first grassroots political campaign for wildlife conservation. The campaign had several goals, but its primary objective was to pass a state law banning the sale of wild-caught game. Grinnell and his colleagues, including several graduate students from the MVZ, spent months on the effort. They succeeded in convincing the legislature to pass the Flint-Cary Act, but voters overturned it by referendum in 1914 after an ugly campaign in which both sides accused the other of spreading misinformation and unfounded accusations. The members of Grinnell's Berkeley Circle lost the battle, but they drew an important lesson from the episode. By 1916 they turned their attention away from overt political campaigns and state game codes to wildlife research and management in national parks, forests, and other “natural areas.”<sup>6</sup>

## Natural Areas

In the 1920s, the field of ecology was searching for a mission and clientele that would demonstrate its social relevance and promote its growth and development. Progressive era ecology in the United States was in part as a response to contemporary social problems. The first American ecologists set out to address the unintended consequences of westward expansion, population growth, resource extraction, and agricultural development. Several of these early researchers worked in the Midwest and Great Plains where these changes had been particu-

<sup>5</sup> Joseph Grinnell to Annie Alexander, 2 November 1907, University of California, Berkeley, Museum of Vertebrate Zoology. Correspondence Files, Folder: Alexander, Annie 1907.

<sup>6</sup> Documents related to the Flint-Cary debate are scattered throughout the files of the Museum of Vertebrate Zoology. For published examples, see Taylor, 1914; Bryant, 1914.

larly dramatic (Tobey, 1981; Schneider, 2000). They believed that the landscape transformations of the nineteenth century had thrown once “orderly” communities of plants and animals into disarray (Shelford, 1926, p. 3). Understanding how North America’s pre-Columbian landscapes functioned would become a key aspect of their work to reestablish an equilibrium in the balance of nature.

But the ecologists had two problems. First, they were still searching for a general approach and repertoire of methodologies that would differentiate them from nineteenth century naturalists and contemporary laboratory scientists (Adams, 1917, 1925; Benson, 1992; Barrow, 2009; Kohler, 2002a, b). This meant that they needed to develop a practice for their new discipline that would combine the broad, integrative perspective gained from sustained, field-based observation with the scientific rigor and control of laboratory experimentation. Second, the ecologists were being out-competed by specialists in other fields involved in the management of natural resources. New disciplines – such as forestry, agricultural entomology, fisheries biology, and range management – were already building their professional reputations, specializing on particular economic sectors, developing research methods applicable to specific working landscapes, and winning the allegiance of their patrons in government and industry.

Two of the discipline’s first national leaders, Charles C. Adams and Victor Shelford, offered a solution. They argued that ecologists should focus on the study of “natural areas,” and that their new professional organization, the Ecological Society of America, founded in 1915, should work to promote the discipline by advocating the establishment of nature reserves (Tjossem, 1994). These reserves would serve several functions. They would provide spaces for research and teaching. They would serve as benchmarks to measure changes in the surrounding landscapes. They would become storehouses of native plants and animals that had disappeared elsewhere. And they would enable ecologists to acquire a professional identity unique from practitioners in other fields who worked in spaces dominated by farming, ranching, logging, or other resource-based industries (Adams, 1913, pp. 23–35). “A branch of biological science which obtains its inspiration in the natural order in original habitats,” Shelford concluded, “must depend upon the preservation of natural areas for the solution of many problems” (Shelford, 1926, p. 3; 1932, 1933b).

Shelford and Adams had status in their young discipline, and they used their influence to promote an agenda of natural areas preservation. Both men had received their doctorates from the University of Chicago,

and they were among the country's first animal ecologists (Crocker, 1991). Shelford is often called the father of animal ecology in America. In 1915 he became the founding president of the Ecological Society of America, and Two years later he appointed himself head of the Society's Committee on the Preservation of Natural Conditions (Tjossem, 1994, pp. 40–43). It was the new Society's most ambitious initiative. The committee sent out queries, conducted field surveys, and compiled a massive amount of information. By 1921 it had identified about six hundred sites worthy of protection. The committee published its study five years later as a 761-page tome, entitled *The Naturalists' Guide to the Americas*.

Over the following decade, Shelford built on *The Naturalists' Guide* with updated assessments, reports, and recommendations. This included a basic framework for prioritizing and designing nature reserves. "First-class" sanctuaries would include those "areas of natural vegetation containing as nearly as possible all the animal species known to have occurred in the areas within historical times" (Shelford, 1933b, pp. 240–245). Second and third class sanctuaries would encompass more modified landscapes, including sites with altered vegetation and extinct or introduced species. Sanctuaries might go by different names in different land management agencies. But all sanctuaries should have core natural areas surrounded by perimeter buffer zones that would remain unavailable for human uses other than scientific research. Buffer zones would also provide additional habitat for the wide-ranging species that needed the most protection, particularly the large carnivores.

Many organizations could contribute to this vision, but the National Park Service held the greatest potential. According to Adams, the national park was "one of the few valuable American contributions to a policy of land use" (Adams, 1925, p. 565; Shelford, 1933b). It was an American idea that required an American approach. The discipline of ecology could provide both a scientific foundation for park management, and a justification for the American nationalism and exceptionalism that infused the national park idea (Runte, 1997).

Scientists had worked in the national parks since their inception, and some had attempted to institute evidence-based management practices for natural resources such as timber and wild game. But until 1930, the National Park Service had no coordinated science or resource management programs. Management efforts were erratic and unscientific, officials had little knowledge about the local environment, and there were no official plans for conservation. Park superintendents outlawed hunting, much to the chagrin of local residents who were redefined and

criminalized as poachers. But they also poisoned predators, allowed trapping by rangers, corralled elk and bison, maintained zoo-like enclosures, and constructed bleachers so that visitors could view bears foraging at garbage dumps.

No individual played a more important role in changing these policies than Joseph Grinnell (Sellars, 1997; Runte, 1990). Grinnell conducted the first systematic surveys of the fauna in Yosemite and other California national parks. In 1916, just two years after their defeat in the Flint-Cary campaign, Grinnell and his student, Tracy Storer (1916), published an essay in the journal *Science* that called for the management of national parks as wildlife refuges. Grinnell persuaded park officials to sponsor public education programs, outlaw trapping, close the elk paddock, end predator control, and establish a Wildlife Division, in the park Service's Bureau of Research and Education, staffed by his former students. He was also instrumental in convincing several park superintendents to create "research reserves," which would be set aside for study and monitoring. By 1940 the Service had designated 28 research reserves in 10 national parks and monuments (Kendeigh, 1942). It also established a Wildlife Division, led by three of Grinnell's protégés – George Wright, Joseph Dixon, and Ben Thompson – which during its short existence articulated a novel, evidence-based approach for land and wildlife management (Sellars, 1997; Shafer, 2001; Sumner, 1983; Wright et al., 1933, 1935). In the words of the historian Alfred Runte, Grinnell had become "the conscience of the National Park Service" (Runte, 1990).<sup>7</sup>

For a brief period in the 1930s, it appeared that a new era was beginning for science in national parks. But this was not to last. In 1936 George Wright, the talented and energetic leader of the Wildlife Division, died at the age of 31 in an automobile crash while working on a project near Big Bend National Park in Texas. The Wildlife Division had always been a "minority opposition group" in the National Park Service, and in the build-up to World War II, officials in Washington slashed the Division's funding along with a variety of other programs (Sellars, 1997, pp. 145–148; Sumner, 1983). With a few notable exceptions, the research reserves never produced much scholarship, and by the end of the war, memory of their existence in some parks began to fade. It would not be until the publication of A. Starker Leopold's report on "Wildlife Management in the National Parks," in 1963, that Grinnell's ideas would return to Park Service policy.

<sup>7</sup> The U.S. Forest Service also set aside a small group of research reserves during this period; for more, see Catton and Mighetto, 1998.

This future was not yet apparent in 1937. But Grinnell had already become frustrated with the Park Service, and he had begun to search for alternative sites where research and teaching could continue in protected areas outside the federal lands. He joined Shelford, Adams, and others in calling for the creation of more university field stations where scientists could work without the need to compete against tourists, hunters, and other user groups. Convincing universities to acquire new lands would be difficult. But ecology was coming into its own as a scientific discipline and its practitioners – many of whom now worked in universities – were increasingly reluctant to advocate for wilderness preservation and participate in bureaucratic politics (Tjossem, 1994, pp. 44–45). Dealing with government bureaucracies would be the job of conservation organizations and the new profession of wildlife management. The future of ecology as scientific discipline, they argued, was at universities and other academic institutions.<sup>8</sup>

### **Founding a Research Station**

The first field biology research stations emerged in Europe in the 1870s and in the United States shortly thereafter (Kohler, 2002a, b). Some formed as independent institutions. The Marine Biological Laboratory at Woods Hole, Massachusetts, began in 1881 when the Women's Educational Society of Boston established a small center there for research on marine zoology (Maienschein, 1989; Pauly, 1988). Other field stations, such as the Carnegie Institution's Station for Experimental Evolution, in Cold Spring Harbor, New York, were attached to larger scientific foundations. The Cold Spring Station boasted a main laboratory, a vivarium, a poultry run, and an experimental garden. These facilities occupied an intermediate space. They had much in common with urban biological laboratories. But they also had important connections to the rural agricultural experiment stations that the U.S. Congress had made possible through the Hatch Act of 1887, which offered federal land grants to states for agricultural research usually conducted through land-grant colleges.

After 1900 universities took the lead in creating new research stations. Some of these stations extended the Carnegie Institution's model of the "biological farm," which emphasized experimental over observational research. The University of Pennsylvania's research station

<sup>8</sup> The sociologist of science, Kinchy (2006), has referred to this division of labor between the ecologists' scientific and political activities as "organizational splitting."

included a host of simulated environments, from aquaria and terraria, to formicaries, insectaries, greenhouses, and gardens. Other stations provided opportunities for observational natural history research. The universities of Minnesota, Michigan, and Montana all established field stations that resembled nature reserves – or at least adult summer camps. In 1912 Charles Kofoid, of the University of Illinois, wrote that work conducted at the Illinois River research station brought “the student and the investigator into closer connection with nature, with living things in their native environment” (Kohler, 2002a, p. 54). Kofoid argued that such experiences were necessary to inspire continued study of “the old natural history or, in modern terms, oecology.”

The (o)ecologists did their best to promote the stations, but they encountered several problems. Even the most remote stations were too small or too altered by recent land use to host the sort of natural area studies that Shelford and Adams envisioned. Shelford also complained that he could find no protected area with the equipment and facilities necessary for his work. Since he believed that reserves should be left unmanaged, with the least human interference possible, active restoration seemed out of the question (Shelford, 1933a, p. 230). Shelford and Adams continued to call for the creation of more university owned biological research stations, but by the mid-1930s it remained unclear whether such sites could ever fulfill the goals of their advocates.

There were administrative problems, too. Universities were reluctant to acquire remote lands that could become legal or financial liabilities. Even administrators who supported the idea of field stations argued that they could accept such sites only by donation, on a temporary basis, and with a self-supporting endowment. The stations would need to generate their own operating budgets through external gifts or grants. And then there were the issues of trespass, theft, and vandalism. In a letter to Joseph Grinnell, Albert H. Wright, a Cornell University zoologist active in natural areas preservation, described an incident in which an unidentified man claimed to have purchased the timber on 160 acres of Cornell owned land in Wisconsin. The University did not discover the theft until one of its attorneys visited the site two years later, “and lo and behold, it had been cut over” (Tjossem, 1994, p. 45).

Grinnell knew that all future acquisitions would need a clear justification “in the eyes of the University administration.” So he set out to build a case for the creation of the University of California’s first natural history research station. Selecting the right place was crucial, and the Hastings family ranch was an obvious choice (Kohler, 2002a, p. 255). Grinnell and his assistants at the MVZ had already become

familiar with the site. They had an enthusiastic patron in the family's matriarch, Frances Simes Hastings. And the ranch was located just a couple of hours by car from Berkeley, in an area that was remote enough to offer a secluded environment, close enough to campus for short visits, and accessible year-round.

The rugged terrain of the Santa Lucia Mountains, where Hastings was located, created a diverse landscape of chaparral, oak woodlands, grasslands, riparian corridors, and flat benches with old agricultural fields. It was not a unique place, but rather a representative one that resembled millions of acres of coast ranges and foothills throughout the state. Yet, it was the very ordinariness of the site that made it so valuable. Research there would address ecological questions relevant to a large geographic region, and it had the potential to inform conservation policies and practices at a time when wildlife management was just beginning to coalesce as a profession.<sup>9</sup>

In 1937 the MVZ began managing the 1600-acre site as a research station under an agreement with Francis Hastings. Grinnell's objectives were to "preserve an area in California's coastal region where native plants and animals may live undisturbed by human use of the land," and to "provide for the continuous study of vertebrate animals, especially their numbers and relationships to their surroundings, as those relationships change in the annual cycle and from year to year." Two years later, the family offered to donate its ranch to the University. The gift included not only the land, but also the fences, roads, buildings, utility lines, farm machinery, and vehicles – structures and equipment that would all prove crucial for developing the research capacity of the station.<sup>10</sup>

Grinnell offered several justifications to the U.C. administration for the creation of its first natural reserve. He argued that such a facility was crucial for basic research in evolutionary biology. He described his proposed plan for Hastings as a natural experiment in farmland restoration – a topic of great public interest during the Great Depression. He also referred to his work as "a project in wildlife ecology." Wildlife

<sup>9</sup> Jean Linsdale, "Frances Simes Hastings Natural History Reservation: Summary of Activities to May 1, 1946," University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

<sup>10</sup> No author's name appeared on Hastings management plans from 1937 to 1939, but Grinnell almost certainly wrote them. See Anonymous, "[Plan]: Frances Simes Hastings Natural History Reservation," University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7. Robert G. Sproul to Mrs. Russell P. Hastings, 26 May 1939, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

ecology was still a new field at the time, but it generated considerable attention during the New Deal due to concerns about the depletion of wild game and the unintended consequences of predator control programs, as well as the federal government's first large-scale experiments in habitat restoration. And in all of these cases, he cited the importance of studying California's rapidly changing landscapes.<sup>11</sup>

Grinnell's proposals for the Hastings Reservation reveal much about his thinking. Like Victor Shelford, Grinnell preferred a "natural experiment" in ecological rehabilitation instead of an active attempt to restore the land through human intervention. He knew that plant communities and faunal populations would change in the absence of farming, grazing, and hunting, and he believed that over time the landscape would return to a more natural state. The task of researchers would be to document these changes and compare them to other sources of data. Hastings would remain undisturbed by development, but it would not remain unchanged. If the Museum of Vertebrate Zoology's collections had recorded the faunal conditions of the past – a baseline for California at the beginning of the twentieth century – then research at Hastings would comprise a history of the future.

The University administration gave Grinnell's proposal a cordial reception, but it would not accept the gift without conditions. Comptroller L. A. Nichols wrote that the University could not guarantee any funds for the project, and it reserved the right to "terminate its participation at any time." U.C. President Robert Sproul advised Grinnell and the Hastings family that, even if the University agreed to the arrangement, it would retain the option to sell the land after 25 years and use the proceeds to fund other research. C. W. Porter, Chairman of the Board of Research, agreed that it was "desirable to accept the offer made by Mrs. Hastings if the gift can be accepted without placing a new financial burden upon the University."<sup>12</sup>

On May 29th, 1939, with the donation days away from approval, delayed only by "the drafting of certain legal phraseology," Joseph Grinnell died of a heart attack at his home in Berkeley. He was just 62 years old. The following day, Robert Sproul eulogized Grinnell as

<sup>11</sup> Joseph Grinnell to Robert G. Sproul, 7 March 1939, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

<sup>12</sup> L. A. Nichols to Robert G. Sproul, 28 September 1937, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7; Robert G. Sproul to Mrs. Russell P. Hastings, 26 May 1939, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7; C. W. Porter to Robert G. Sproul, 30 September 1937, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

the person who had done more than any other “to promote public knowledge of wild life [sic] in the west, and to arouse public interest in its enjoyment and conservation.”<sup>13</sup>

It would be years until the Museum fully recovered from this loss, and in the chaotic weeks after Grinnell’s sudden death only crucial business received any attention. Yet, on June 1st, just a day after Grinnell’s funeral, the Museum’s acting director, E. Raymond Hall, wrote to Jean Linsdale, another Grinnell protégé who was serving as the interim chief of operations at the Hastings family ranch. “Of immediate concern to you,” wrote Hall, “is the matter of Mrs. Hastings’ bequest.” Two and a half weeks later, the U.C. Board of Regents approved the Hastings’ land donation, along with the endowment and operating budget it required as a condition of acceptance – a sum of \$5,820 per year.<sup>14</sup>

### **Building a Research Station**

As the first director of the Hastings Reservation, Jean Linsdale did not start with a blank canvass. In addition to the site’s long land use history, the Reservation also had skeptical neighbors, preexisting structures, a body of unpublished research including more than six hundred days of field notes, and a vague development plan that comprised one of the last documents ever penned by Linsdale’s legendary mentor. But where to begin? Linsdale soon discovered that, although bold research plans and philosophical arguments were important for justifying the Reservation’s existence, making Grinnell’s vision a reality would require him to accomplish a host of more mundane tasks. He would spend most of his time repairing old farm equipment, maintaining old buildings, mending old fences, and befriending old neighbors. Much of the job was, quite literally, about nuts and bolts. And many of those nuts and bolts were old, too.<sup>15</sup>

Managing Hastings as a research station required diplomacy and vigilance. Disputes involving land ownership, grazing, and hunting had

<sup>13</sup> Anonymous, *San Francisco Examiner*, 1939.

<sup>14</sup> Alden H. Miller to Jean M. Linsdale, 2 June 1939, University of California, Museum of Vertebrate Zoology, Correspondence Files. Folder: Linsdale, Jean M. 1931–1939; E. Raymond Hall to Jean Linsdale, 1 June 1939, University of California, Museum of Vertebrate Zoology, Correspondence Files. Folder: Linsdale, Jean M. 1931–1939. Robert M. Underhill to Mrs. Russell P. Hastings, 21 June 1939, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

<sup>15</sup> Alden H. Miller to Jean M. Linsdale, 30 October 1940, University of California, Museum of Vertebrate Zoology, Correspondence Files. Folder: Linsdale, Jean M. 1940.

been the subject of legal proceedings in California since the mission era. Trespass laws strengthened only gradually during the nineteenth century, and landowners often quarreled with neighbors who allowed their livestock to wander in search of greener pastures, or who crossed fence lines in pursuit of wild game. Hastings was no different. The site had been privately owned for generations, but local residents were accustomed to having at least some access.

Public access did not fit into Grinnell's plan for a natural experiment in restoration ecology. Permeable boundaries that allowed hunting and grazing threatened the very idea of a controlled study based on detailed observations of a natural area over time. As early as 1937, Grinnell complained that "Fences and 'postings' are little heeded, except when reinforced by a fearless rider." The most important issue in reserve management was "protection, thru [sic] constant patrol, year in and year out." This task fell to Jean Linsdale and his skeleton staff. "To insure against disturbance of plants and animals on the area," Linsdale wrote in 1940, "has required one person whose work includes building and repair of fences, roads and trails, care of buildings, machinery, and horses, and guarding against fire and intrusion by hunters and domestic animals from surrounding land." It was a full-time job, and one that required a considerable expenditure of the Reservation's limited resources.<sup>16</sup>

Linsdale also had to contend with requests for use of the land from other public agencies. On March 29, 1944, Reuben Albaugh, an agricultural extension agent affiliated with the University of California and United States Department of Agriculture, wrote a letter to the University Farm, in Davis. Albaugh worked in Salinas, where just 11.68 inches of rain had fallen in the nearly completed rainy season. Ranchers in the area were getting desperate. Albaugh knew that the Hastings Reservation had "not been grazed for four or five years...and it has excellent feed on it. Since we are very short of feed in this area," he wrote, "it seems to me if it wouldn't upset their experimental work too much it should be used for the grazing of cattle."<sup>17</sup>

Albaugh's request reached the highest level of the University's administration, the office of U.C. President Robert Sproul. Agriculture

<sup>16</sup> Jean M. Linsdale, "Frances Simes Hastings Natural History Reservation: Summary of Activities to April 1, 1940," University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

<sup>17</sup> Reuben Albaugh to George H. Hart, 29 March 1944, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7; I. F. Smith to Robert G. Sproul, 1 April 1944, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

was California's largest industry, and California was the country's largest producer. Agriculture was also an essential aspect of the war effort, and the state's farming and ranching industries were poised to expand further in the post-war era with support from the University's College of Agriculture. It was a defining moment for the young Reservation. Would Hastings remain fallow, or would it return to grazing? Would it continue to serve as a natural history reserve, or would it become another agricultural research station?

Jean Linsdale and Alden Miller, the current Director of the Museum of Vertebrate Zoology, were able to reject Albaugh's request based on two arguments. First, it was not a dry year. The rainy season was not yet over, and by June the Salinas airport had received 13.66 inches of precipitation (Monterey County Water Resources Agency, 2010). The 1943 to 1944 winter season was unusual only in the sense that the total rainfall was almost exactly average, and in central California the average is uncommon. The lack of feed had resulted either from flawed range management or a surplus of livestock – not a shortage of water.

Linsdale and Miller also argued that, in the five years since the University had assumed management of the site, researchers there had already gained indispensable knowledge about the ecology of California's hardwood rangelands that would have been impossible to ascertain in the presence of livestock. According to Linsdale, "continuous watching and recording of biological events" had revealed "the striking changes which occur when such artificial disturbances as grazing are removed." Several plant species that depended on cattle had almost disappeared, while others had declined to "a more nearly normal place in the environment." The reservation was still a dynamic landscape, but the changes that continued to occur were mainly related to cycles in the seasons, the climate, and the ecological relationships among species.<sup>18</sup>

This meant that the knowledge produced at Hastings was important, not only for biological science but also for land management. By 1944 Linsdale could compare conditions at Hastings with those on neighboring lands, and find evidence that reserve management had tangible benefits, which had the potential to influence "many of the common practices of land use." Even the extension agent, Reuben Albaugh, had tacitly admitted this when he compared the verdant conditions at Hastings to those on the denuded rangelands nearby. The "accumulated results of protection," Linsdale wrote five years later, demonstrated that

<sup>18</sup> Jean M. Linsdale, "Frances Simes Hastings Natural History Reservation: Summary of Activities to April 1, 1944," University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

“this kind of land is able to maintain stabilized populations of plants and animals without human help. Many visitors come each year to examine this example of protected wild land.”<sup>19</sup>

Throughout his career, Grinnell argued for a view of nature as dynamic and historical. But he also believed that, if left alone, landscapes would recover and regain their natural attributes over time. Many ecologists today would take issue with this assessment. Yet, research at Hastings seemed to confirm both of Grinnell’s predictions – with one important caveat. According to Linsdale, with each passing year the Reservation was moving “toward a more stable condition.” What surprised him was the speed at which these changes in the landscape were occurring. By 1941 he commented on the unexpected “Rapidly and intensity of the environmental changes,” and argued that the pace of the transformation necessitated even more immediate, focused, and comprehensive study. Hastings was becoming a laboratory for the study of environmental change.<sup>20</sup>

Grinnell’s natural experiment required a cadre of astute and dedicated observers. Linsdale and his colleagues devoted themselves to the task, and they soon produced more data than anyone had predicted. Early work focused on species identification and specimen collection, as well as animal life history, population, and biogeographic studies. Linsdale continued to dedicate much of his time to building the Reservation’s library, collections, and research facilities – including the installation of electric lighting – that would facilitate the work of visiting faculty and students.

With basic surveys and infrastructure projects underway, research began to grow, but much of it remained focused on natural history. Of the first 100 journal articles based on research conducted at Hastings, published between 1938 and 1969, approximately 57% focused on taxonomy. This percentage declined over time as Hastings researchers produced more articles on life history and behavior (~17%), ecology and population biology (~9%), biogeography (~5%), and research methods (~5%). Other minor areas of research included ecological

<sup>19</sup> Jean M. Linsdale, “Frances Simes Hastings Natural History Reservation: Summary of Activities to April 1, 1949,” University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

<sup>20</sup> For “a more stable condition,” see Jean M. Linsdale, “Frances Simes Hastings Natural History Reservation: Summary of Activities to May 31, 1952,” University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7. For “rapidity and intensity,” see Jean M. Linsdale, “Frances Simes Hastings Natural History Reservation: Summary of Activities to March 15, 1941,” University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

history, geology, and physiology. Throughout this period, but especially during the 1930s and 1940s, basic taxonomic research comprised the bulk of the work completed at the Reservation.<sup>21</sup>

By 1951 Alden Miller could brag that, “As I look about centers of activity in biology in this country, I do not see any persons or like institutions concerned with biology that have had such massive production in the same 13-year period.” To visit Hastings and “study its methods is now a must for biologists coming to the West Coast.” Miller also noted that Hastings provided an example of what naturalists could learn and accomplish in an area with “full land protection.” For Miller, Hastings served as one of the finest examples of conservation leading to “land recovery.”<sup>22</sup>

Miller probably exaggerated the station’s uniqueness and achievements to please his colleagues, supporters, and patrons. He undoubtedly knew that other similar efforts were underway in Wisconsin and elsewhere. But he also knew, like Grinnell before him, that natural history field study needed tireless boosters who were not afraid to champion the cause. This was even more the case in the 1950s than ever before, when traditional natural history disciplines, such as botany and zoology, were shrinking, and the physical, agricultural, and laboratory-based biological sciences were threatening to capture all of the University’s resources (Johnson, 2009). Miller was a formidable character but he had an equally formidable task. He needed to show that Hastings was carrying the torch of natural history, forging ahead in ecology and evolutionary biology, and addressing the practical needs of land management – all at no cost to the University.

In other areas of the country, some field stations that had emerged during the previous decades were losing resources, reducing their programs, or even closing their doors. One example comes from the Bass Biological Laboratory, located on the remote coast of Lemmon Bay near the town of Venice, Florida. The Bass Lab, founded in 1932, was Florida’s first year-round and co-educational research station. The site contained boarding houses, laboratories, boat launches, and a 54-foot schooner for use in studies of marine biology, ecology, zoology, and other related fields. By the late 1940s, however, the station closed its doors due to wartime rationing and financial problems. At Lemon Bay,

<sup>21</sup> A searchable Hastings bibliography can be found on-line at the “UC NRS System-Wide Bibliography” Web site. The percentages given are all approximations because many articles do not fall neatly into a particular category.

<sup>22</sup> Alden H. Miller to Mrs. Russell P. Hastings, 15 March 1951, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

as at other sites around the United States, the pre-war period began to look like a fleeting “golden age” in the history of biological field stations.<sup>23</sup>

Hastings proved remarkably durable during this low point in the history of zoology and the field-based biological sciences in part due to the backing of key supporters from the University administration. Robert Sproul served as the University of California’s President from 1930 to 1958. Grinnell cultivated Sproul’s support in the 1930s, and Sproul became an advocate of both the Museum of Vertebrate Zoology and the Hastings Reservation. In his letters to Frances Hastings, Sproul expressed his enthusiasm for the endeavor: “The University of California is engaged in an infinite variety of investigations aimed at the extension of human knowledge but I don’t know of any other which proceeds so steadily and surely with such quiet conviction and persistent effectiveness.” In 1958, on the eve of his retirement, Sproul again expressed his pride at having watched Hastings develop and succeed during a time of adversity. “The project itself is unique and the results will have lasting significance,” he wrote, “but in addition there is the very real influence which it has on academic balance in this University and elsewhere during this period of intense concentration on the physical sciences.”<sup>24</sup>

### **The U.C. Natural Reserve System**

In 1954 Wilbur Mayhew accepted a position as an assistant professor of biology at the new University of California campus in Riverside. Mayhew had conducted his graduate work at the Museum of Vertebrate Zoology, in Berkeley, under the direction of A. Starker Leopold who had earned his PhD working with Alden Miller. When Mayhew arrived at Riverside, he began teaching a field biology course that allowed him to explore Southern California’s mountains, deserts, and coastlines. But he soon found that some of the best sites were being transformed by

<sup>23</sup> Several of the field stations listed in Jack’s 1945 study, “Biological Field Stations of the World,” closed by 1950. The Bass Lab provides just one example. Anonymous, “An Introduction and Overview to the Bass Biological Laboratory Papers,” Mote Marine Laboratory, Web, 12 August 2010.

<sup>24</sup> For “infinite variety,” see Robert G. Sproul to Mrs. Russell P. Hastings, 5 September 1956, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7. For “lasting significance,” see Robert G. Sproul to Mrs. Frances S. Hastings, 29 June 1958, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

development – converted into houses, shopping centers, freeways, and golf courses. On one trip, he showed up at a secluded coastal outcropping, where he had taken his students the previous year to view plants and animals in the rocky intertidal zone, only to find the site cordoned off by fences, dissected by ribbons of fresh asphalt, and dotted with the foundations of new homes. Like Grinnell before him, Mayhew soon concluded that if he wanted to continue his work, he would either need to find or help create permanently protected areas dedicated specifically to science.<sup>25</sup>

Southern California had large tracts of public land, some of it quite remote, including several national parks. But as in the 1930s, the public lands did not offer a panacea for field biologists. Research projects begun on the public lands were never completely safe from interference, particularly in areas where recreational use was increasing, which was just about everywhere in the 1950s and 1960s. Moreover, the public lands did not include some of the region's most diverse, unique, and interesting landscapes. Sand dunes, salt marshes, coastal sage scrublands, and rocky intertidal zones were largely unprotected, but they were among the most important spaces for biological research and teaching.

Mayhew soon found a promising site that was both private and accessible – a 40-acre parcel in Deep Canyon near the town of Desert Hot Springs, owned by the California state senator and U.C. Regent, Philip Boyd. Boyd invited Mayhew to use the site and he delighted in his role as a patron. In 1958 he informed Mayhew that he wanted to purchase a much larger parcel and donate it to the University for use as a full-service biological research station, much like the one at Hastings except on a larger scale. The proposed station encompassed more than 6,000 acres, an area more than four times the size of Hastings, and spanned from the desert floor near sea level to the crest of the Santa Rosa Mountains at over 8,700 feet in elevation. If the University would accept the site, Boyd promised to purchase the additional checkerboard parcels of land interspersed among his existing properties to create a single contiguous reserve.<sup>26</sup>

Mayhew quickly mobilized, identifying allies, writing proposals, contacting faculty at other campuses, and gathering information on reserve management. In April of 1958, he wrote to Jean Linsdale asking

<sup>25</sup> Wilbur W. Mayhew, "Transcript of Oral History Interview," 10 August 1998, Oral History Program, University of California, Riverside.

<sup>26</sup> Wilbur Mayhew, personal interview conducted by the author in collaboration with Stephanie Pincetl, 18 January 2005.

for his insights on how to build a successful field station. “The University of California at Riverside may have the opportunity to acquire some desert land for a research station,” Mayhew wrote. “If we are successful, we plan to set it up somewhat along the lines you have developed at the Hastings Reservation.” Mayhew wanted information on the Hastings Reservation’s operating costs, personnel, procedures, and any other special administrative or logistical issues. “There are many issues to be considered,” Linsdale responded. “It seems to me that it would be worth while [sic] for you to come to the Hastings Reservation, and see the landscape and the nature of the work that has been undertaken at the Reservation.”<sup>27</sup>

During the late 1950s, U.C. Riverside was a conflicted institution. It did not become a full service campus until 1959, and during the early years of its development into a research university it was divided into two main units: the new “Watkins College” of letters and sciences, and the world famous Citrus Experiment Station, which had existed there for more than half a century. Mayhew and Boyd’s proposal struck some faculty and administrators in the new College as a step backward toward provincial agricultural research, which was exactly what they were trying to move away from. Faculty and staff from the Citrus Experiment Station, meanwhile, viewed natural history research as the stuff of dusty museums or flaky nature lovers.<sup>28</sup>

With little support and no consensus in Riverside, Mayhew turned to the Office of the President in Oakland. He and his allies argued that acquiring another reserve would increase the prestige of the University, contribute to its missions of research, teaching, and public service, and ensure that vital environmental research would continue unimpeded. They also claimed that the station would generate much of its own operating budget through grants and donations, thus providing myriad

<sup>27</sup> Wilbur W. Mayhew to Jean M. Linsdale, 14 April 1958, Grants and Gifts folder, Historical Files of the Boyd Deep Canyon Research Station; Jean M. Linsdale to Wilbur Mayhew, 8 May 1958, Grants and Gifts folder, Historical Files of the Boyd Deep Canyon Research Station; D. R. Parker, “Deep Canyon Desert Research Area: A Proposal for the Acquisition of Lands and for the Establishment of an Areas Devoted to Basic Research into the Biology of Desert Species,” Division of Life Sciences, University of California, Riverside, December 1958, Grants and Gifts folder, Historical Files of the Boyd Deep Canyon Research Station; “A Proposal for the Development of a Specialized Facility For Desert Research in Deep Canyon, Riverside, California (Prepared for Submission to the National Science Foundation),” Division of Life Sciences, University of California, Riverside, February 1959, Grants and Gifts folder, Historical Files of the Boyd Deep Canyon Research Station.

<sup>28</sup> Roger Samuelsen and Margaret Herring, “Clark Kerr on the Natural Reserve System,” oral history interview with Clark Kerr, conducted on 12 March 1999.

benefits to the University at little expense, just as Hastings had for the previous two decades.

In the 1950s, like in the 1930s, the U.C. bureaucracy expressed doubt about the need for and cost of maintaining a vast and remote biological field station. Mayhew and Boyd's proposal also met with skepticism because it diverged from the precedents set at most other research universities, which had only one field station, or perhaps one marine lab and one terrestrial reserve. The Deep Canyon acquisition seemed to open the door to a much larger institutional commitment, and one that many in the University administration were unwilling to support. Crucial backing for the effort once again came from the top, this time from the University's new President, Clark Kerr. During his tenure as the Chancellor at U.C. Berkeley, Kerr had become concerned about the attacks that laboratory-based biologists were directing toward the campus's naturalists, and he wanted to create a safe space where traditional field-based research could continue. Creating the additional natural reserves, he recalled years later, "was a gesture towards preserving something of the 'old biology.'"<sup>29</sup>

In February of 1959, the U.C. Regents accepted the donation and established the Boyd Deep Canyon Desert Research Center. Deep Canyon seemed immense to Wilbur Mayhew at the time, but it captured only a small slice of the California desert and an even smaller sample of the state's natural diversity. By the time of Deep Canyon's establishment, Ray Cowles, a herpetologist from UCLA and close colleague of Wilbur Mayhew, had already begun to think on a much bigger scale. Cowles believed that the University should set up an entire network of reserves around the state for scientific study. He reached out to figures such as Mildred Mathias, the renown UCLA botanist, who would take a leading role in the early development of the Natural Reserve System. In the early 1960s, Cowles sent his star student, Kenneth S. Norris, to work on the project. Norris began to develop a proposal for a representative system of natural reserves that would encompass the state's physiographic and biological diversity (Jarrell, 1999; Rumsey, 1999; Herring, 2000).

In Norris's letters and proposals, he pointed to the unintended consequences of development, the increasing urgency of California's environmental problems, and forecasts for the state's rapid population growth that were shaping plans for the growth of the U.C. system more generally. Kerr was becoming a central figure in postwar American

<sup>29</sup> Roger Samuelsen and Margaret Herring, "Clark Kerr on the Natural Reserve System," oral history interview with Clark Kerr, conducted on 12 March 1999; van Eck, 1968.

higher education, and at the time he was developing plans for one of most ambitious expansions of any American research university. Kerr's "Master Plan" for public higher education in California established the state's three-tiered system of community colleges, state teaching colleges, and research universities. Norris's proposal fit well within Kerr's system-wide, long-term vision. It also helped that the reserve proposal received the blessing of A. Starker Leopold. In the mid-1960s, Leopold was busy working to reintroduce Joseph Grinnell's ideas to the National Park Service, and his 1963 report on "Wildlife Management in the National Parks" remains one of that agency's seminal historical documents. Leopold remained Kerr's close advisor and confidant on all matters related to natural history and conservation, and he proved a quiet but effective force in promoting the fledgling natural reserves.<sup>30</sup>

In 1966 Norris set out to survey potential sites for new reserves, and the following year he produced and circulated a draft "General Acquisition Plan for the University of California Natural Land and Water Reserves System." The plan called for the development of selection criteria for new reserves, the identification of outside sources of funding, and the adoption of a general plan for the future development of the system. "It is commonplace and widely understood," Norris wrote, "that we Americans should set aside natural areas of unusual beauty as parks. It is scarcely understood by the public that we must also preserve the ecological diversity of America, whether the samples are beautiful or barren." In 1970 the University renamed its Natural Land and Water Reserves System the U.C. Natural Reserve System. Over the next few years, it began the process of setting aside new reserves, both beautiful and barren, to create a representative system of biological field stations in the state's deserts, forests, mountains, valleys, and coastlines.<sup>31</sup>

As the original University's original natural reserve, the Hastings Reservation remained a model for the creation of new U.C. biological

<sup>30</sup> Roger Samuelson and Margaret Herring, "Clark Kerr on the Natural Reserve System," oral history interview with Clark Kerr, conducted on 12 March 1999.

<sup>31</sup> On the creation of the U.C. Natural Reserve System, see Norris, 1968, 2010; Mathias, 1973. Kenneth S. Norris, "General Acquisition Plan for the University of California Natural Land and Water Reserves System Prepared by the Statewide Committee on Natural Land and Water Reserves," Historical Files of the University of California Natural Reserve System, Box 18, Folder A.1.a: "Long Range Development Acquisition Plan (Norris)." Kenneth S. Norris, "California's Natural Land and Water Reserve System," American Institute of Biological Sciences annual meeting, University of Maryland, August 1966, Historical Files of the University of California Natural Reserve System, Box 18, Folder A1.1.3: "Early Background (Roger Samuelson Compilation)."

field stations throughout the period of expansion and development that began in the 1960s. But what kind of model was it? Why did this model succeed at a time when so many other natural history institutions faltered? And how did Hastings and other U.C. reserves inform policy and management in the environmental era?

The initial goal of the Hastings Reservation was to promote natural history research. More than half of the station's first 100 journal publications were descriptive essays on taxonomy or life history. Hastings was not always at the forefront of biological science during this period, but it did not need to be. Prominent biologists – including Joseph Grinnell, Alden Miller, and A. Starker Leopold – secured support from key administrators, including U.C. presidents Robert Sproul and Clark Kerr, by cultivating a nostalgic fondness for nature study and by offering themselves as the guardians of this tradition. They also argued that Hastings would serve an essential resource for future Californians by documenting environmental changes and by conducting applied research in land management, monitoring, and restoration. As public anxiety about resource depletion grew again, in the 1960s, reserve advocates could argue that their large-scale, long-term approach to ecological research was exactly what scientists needed to understand environmental change. Faculty from throughout the U.C. system – such as Wilbur Mayhew, Mildred Mathias, and Kenneth Norris – began clamoring for more spaces to conduct environmental research and teaching, and they looked to Hastings as a model for how to operate a successful research station.<sup>32</sup>

It would be another decade before research at Hastings and other U.C. reserves would begin to shape environmental policy and management. In the 1970s, researchers working at Hastings became alarmed about the loss of California's native oak trees, and they spoke out against management practices that had resulted in the clearing of tens of thousands of acres of oak woodlands. In the 1980s, researchers at the Sierra Nevada Aquatic Research Laboratory played central roles in the effort to preserve the unique ecosystem at Mono Lake, which was shrinking and becoming more saline due to upstream water diversions by the City of Los Angeles. In the 1990s and 2000s, workers at the Santa Cruz Island Reserve, Boyd Deep Canyon Reserve, James San Jacinto Mountains Reserve, and elsewhere participated in landmark efforts to recover endangered species and develop landscape-scale habitat conservation initiatives.

<sup>32</sup> Alden H. Miller to Mrs. Russell P. Hastings, 15 March 1951, University Archives, University of California, Berkeley, CU-5, Series 3, Box 15, Folder 7.

These are but a few examples of the ways that researchers working at U.C. natural reserves and other biological field stations have participated in environmental policy and management. Joseph Grinnell wanted Hastings to go back to nature, not become another agricultural experiment station. But today, the U.C. Natural Reserve System performs research, teaching, outreach, and advisory functions for natural resource management that are similar to the roles agricultural experiment stations play for the farming and ranching industries. Scholars are only beginning to appreciate the importance of biological field stations for science and politics in the environmental era. These sanctuaries for science deserve more attention not only from historians of biology, but also from environmental historians and other scholars interested in the role of science in society.

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