

## Chapter 2

# History and Recent Trends

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**Frontispiece Chapter 2.** A characteristically multihued livestock herd grazes in the Sierra de Cádiz, a dehesa area in southern Spain. (Photograph by J.L. Oviedo)

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**Abstract** Contemporary ranches and dehesas are layered onto centuries of human use. The Spanish dehesas began forming during Roman rule, and by the time of the Christian Reconquest were managed for grazing, hunting, farming, foraging, and forestry. California's oak woodlands were shaped by thousands of years of Native American management, including widespread burning that was eventually suppressed after European settlement. With the first settlers from Spain came livestock and crops from the Old World, as well as grasses and other species that have since naturalized across the state. California woodlands have undergone periods of expropriation, scientific management, conservation, and integrated management. Spanish dehesas, meanwhile, have experienced periods of consolidation, development, decay, and resurgence. California oak woodland ranches have not been managed as intensively as the Spanish dehesa, but since World War II both landscapes have experienced pressures associated with development, technology, demographics, and globalization, leading to profound social and ecological change.

**Keywords** Environmental history · California Indians · Spanish colonialism · Mesta · Missions · Roman period · Menhirs

## 2.1 Setting

California and Spain are nearly 6,000 miles apart. Separated by a great continent and a vast ocean, they share only a handful of native species. Before 1542, when Juan Rodríguez Cabrillo sailed a 200 ton galleon, the *San Salvador*, and a pair of accompanying ships up the Pacific Coast of western North America, these two places might have existed on different planets. Today, however, a visitor from California who travels to the countryside of south-west Spain will find a landscape of oak woodlands, rangelands, pastures, and farms, with grassy rolling hills and distant arid mountains that is unmistakably—even eerily—familiar. The oak-dominated rural landscapes of California and Spain appear alike in part due to their physical geographies and climate. But their similarities are also the result of transformative human action. California's oak woodland ranches and the dehesas of Spain have different social, cultural, political, and economic histories. Yet, over

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the past 250 years, these histories have increasingly converged, producing similar landscapes, with similar attributes and similar problems, even while some aspects (hunting, cork planting, government policy) have diverged in notable ways. We begin with a history of California's oak woodlands, before turning to the history of the Spanish *dehesa*. The story of Portugal's *montado* is, of course, significant in its own right, but its history of management and use is quite distinct, and so is reserved for another venue.

## 2.2 History and Recent Trends in California's Oak Dominated Landscapes

Oaks have waxed and waned in abundance in California throughout recent geologic history. Oaks declined during major glacial cooling cycles, reaching a low point by 20,000–40,000 years BP as evidenced in the pollen record (Fig. 15.10 in Millar and Brubaker 2006). The oak woodlands of today can be traced back to the retreat of the glaciers after the last ice age, when a warming climate fostered the spread of grasslands and members of the genus *Quercus* or oaks. That advance accelerated even further around the time of the arrival of Spanish and Mexican immigrants, likely as a result of reduced Native American burning and changes in grazing and woodcutting regimes (Byrne et al. 1991; Mensing 2005, 2006). Today, California's oak woodland ranches form a bucolic countryside that is perhaps the state's most attractive and familiar rural landscape (Fig. 2.1).

### 2.2.1 Early Historical Use

Human settlement in California dates back more than 13,000 years. Prior to European contact, California was home to a diverse indigenous population comprised of at least 300,000 people, divided into six language families and more than 300 dialects (Fagan 2004). Native Californians describe a pre-contact system of access to lands and natural resources derived from common and usufructuary rights, distributed spatially and with access varying through the seasons, though the form these systems took varied among the many groups. Native Californians took part in vast trade networks extending far into the continent, transferring plant and animal materials. Oak-dominated landscapes were among the region's most densely populated and heavily used environments, and supporting one of the highest population densities in native North America were the abundant, nutrient rich, acorn crops, which offered a significant food source (Fig. 2.2). Thousands of years of human occupation created a distinctly cultural landscape long before European colonization.

Native Californians engaged in a range of activities including game hunting, acorn gathering, seasonal burning, and planting that shaped the region's ecology



**Fig. 2.1** Oak woodlands are predominantly on private land in California, and may be used for ranching, wildlife habitat, viewshed, and, as here in the Sutter Buttes of the Sacramento Valley, kept as a space where visitors may on occasional go for a hike—with permission of the landowner. (Photograph by P. F. Starrs)

**Fig. 2.2** Acorns were often ground using rock outcrops. Generation after generation of Native Americans used a pestle to create acorn flour, a staple food that could be stored, creating these depressions in many of the rocks of the oak woodlands. (Photograph by L. Huntsinger)



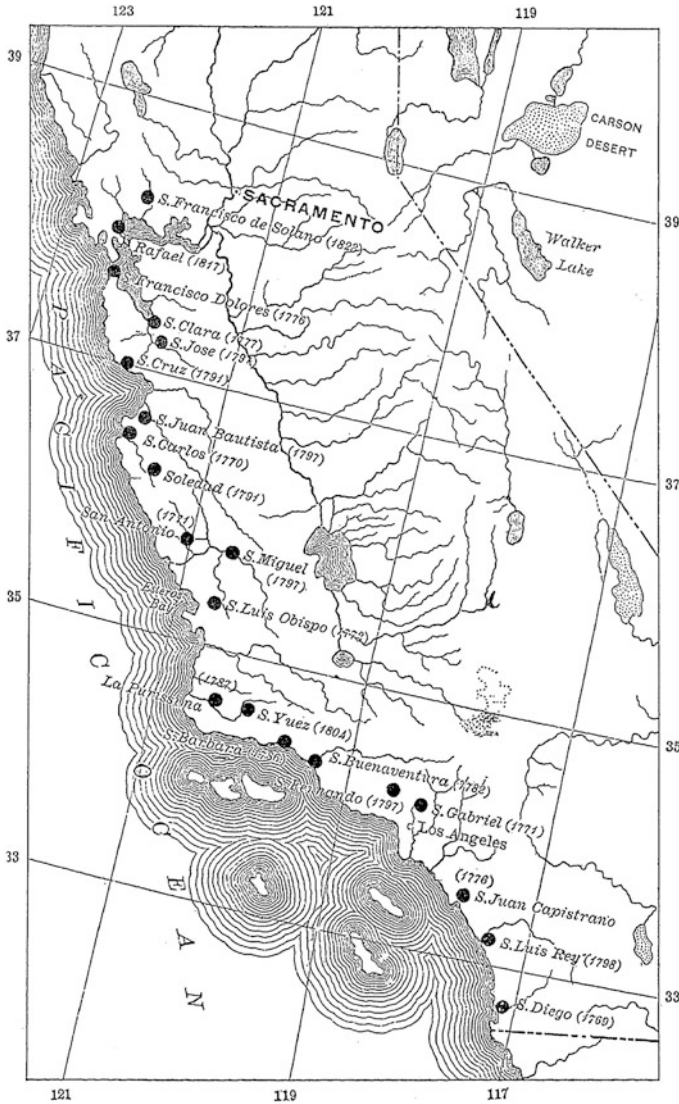
and environment (Anderson et al. 1997). Lightning frequency records, oral histories, and tree ring data confirm that Native Californians in some areas shortened wildfire intervals from natural cycles of about once a century to a frequency of a decade or less (Keeley et al. 2003; Syphard et al. 2007). Indigenous Californians used fire on a broad scale to enhance the production and collection of acorns and to improve habitat for wild game, and such burning continues in small areas today as permitted by law, sometimes as part of efforts to restore native vegetation.

### 2.2.2 Spanish and Mexican Era Woodland Use

Beginning in 1769, Spanish colonists settled along California's coast in a system of missions, presidios, pueblos, and large land grants—called *ranchos* by their proprietors—which they used for livestock production. The Spanish Crown granted about 30 ranchos, of several thousand hectares each, usually to retired soldiers or officials as a reward for their service. The early Spanish colonists, known as *Californios*, became a landed gentry of the New World. Blending Spanish tradition with New World imperatives, they established unique cattle handling practices, some of which persist to this day (Starrs and Huntsinger 1998). The *Californios* introduced not only the tools of the trade, like the lariat (*la reata* in Spanish) and the branding iron, but major livestock management institutions as well. The Judges of the Plains (*Jueces del Campo*) presided at regular round-ups where livestock were sorted to their correct owners and disputes among owners resolved, an institution that was eventually codified in California's constitution at statehood and can be argued to persist in the form of brand inspectors. The Judges evolved from the similar *Alcaldes de la Mesta* in Spain, recognized as a valid institution by the Crown as early as 1273, and the Judge of the Plains survived as a public office in California until the early 1950s (Stanford 1969).

Most ranchos were located in oak-dominated coastal or valley landscapes suited to supporting a colonial economy based on livestock grazing. These areas housed many of the region's largest populations of Native Americans, whom the padres hoped to convert to Christianity. The missionary project was a disaster. Between 1769 and 1834, disease, violence, and displacement ravaged California's indigenous population, and the number of Native Americans living along the coast between San Diego and Sonoma declined by 75 % (Hackel 2005). The ranching project was more successful. By the 1820s, California's 21 missions acquired a vast pastoral empire of some 17 million acres (nearly 7 million ha), grazing around 300,000 sheep and 400,000 head of cattle (Fig. 2.3; Burcham 1981).

Indigenous lifeways were woven into the fabric of the pre-Columbian landscape, but generations of European colonizers undermined, ignored, and even sought to erase this historical legacy. Spanish newcomers set changes in motion that transformed California's hardwood rangelands. Cattle compacted the soil and sheep denuded the slopes. Plant seeds brought in ship ballast, crop seeds,



**Fig. 2.3** A total of 21 missions were established in California, with San Diego de Alcala (1769), San Gabriel (Los Angeles) (1771), and San Francisco Dolores (1776) among the earliest. The even spacing is widely attributed to a desire of the padres to have mission sites no farther than a long days trek apart. Later, these missions would be secularized. But their sway was great, acting as a nucleus for ranching and farming operations that extended well into the Sacramento and San Joaquin valleys. (Map modified from original in files of the California Missions Foundation)

and livestock feed spread widely and colonized the understory while feral goats and pigs tilled the soil and devoured the acorns. Ploughing land created opportunities for the introduction and spread of exotic grasses and weeds. Some wild





(Hornbeck 1983) (Fig. 2.4). Despite the subdivision of these original land grants, California's ranch properties remain relatively large. The few original ranchos in existence today cover thousands of hectares, and California oak woodland ranches still average 800–1,000 hectares in size (Huntsinger et al. 2010) .

### ***2.2.3 Conflicting Claims and a Rising Federal Role***

The Gold Rush of 1849 resulted in a huge population increase in California as gold seekers from the eastern United States, Latin America, Asia, Europe, and elsewhere flooded into the territory. Because the ore drew miners to the foothills and mountains, tribal groups that previously avoided the direct impacts of Spanish and Mexican settlement were deeply and suddenly affected. Already reduced by around three-quarters under Spanish and Mexican governance, native populations resumed a precipitous decline. When large-scale gold mining ended in the western foothills of the Sierra Nevada, miners returned home or moved to San Francisco, Oakland, Sacramento, Stockton, and other cities, leaving behind ecological devastation, crumbling infrastructure, and deserted settlements (Isenberg 2005).

By the 1860s, a few industrial livestock corporations, based in San Francisco, began to acquire vast landholdings in the Sacramento-San Joaquin valleys and adjacent foothills (Igler 2001). A system of transhumance developed in which ranchers moved their cattle and sheep from lowland winter pastures into the state's sparsely populated mountains. Yet by the late 1870s, barbed wire and enclosure laws began to restrict wintertime access of livestock in fertile valleys. The development in the twentieth century of large-scale industrial agriculture, supported by irrigation subsidies from federal and state government and employing costly new farm equipment, would complete this process. Montane summer range helped compensate for the loss of valley pastures to crop production. Indeed, grazing management was an important goal in the establishment of federal forest reserves, later called national forests, beginning in the 1890s (Miller 2011). This concentration of authority over land use in a single federal agency proved controversial among the local land users and owners (Fig. 2.5).

Montane cattle grazing continued after 1906 under permit from the U.S. Forest Service, but ranchers who did not own adjacent foothill properties were routinely excluded, and itinerant shearers, including many of Basque heritage, were usually the first to go. The establishment of national parks, such as Yosemite and Sequoia-Kings Canyon, further restricted high country grazing access. Since World War II, transhumance has continued to decline due to fire suppression efforts that reduce livestock forage, government environmental regulations, reductions of grazing permits on public lands, and land development patterns that interfere with traditional stock routes.



**Fig. 2.5** Considerable controversy surrounded the Forest Reserve Act (1891) and Organic Act (1897), which established federal control over much of California's higher-elevation forested areas. Gifford Pinchot, the first Chief of the U.S. Forest Service was vaunted but also vilified, as in this cartoon from around 1908. (Archives of the U.S. Forest Service)



### 2.2.4 Current-Day Uses

The contemporary geography of California's oak woodland ranches is a product of this history. Spanish and Mexican rule fostered the establishment of unusually large properties, compared to other parts of the American West where the U.S. government disbursed lands to private holders in smaller parcels. These large holdings had, and have, distinct advantages in terms of wildlife habitat and extensive management practices that provide much higher levels of environmental protection. The advent of large-scale agriculture led to an exclusion of most livestock from lowland pastures and the conversion of irrigated pasture to crops, and the establishment of national parks and forests resulted in the gradual loss of access to summer higher-elevation ranges (Starrs and Goin 2010). Today, grazing is concentrated in the oak woodlands that occupy the narrow elevation band between its lower valleys and higher mountains. Unlike California's deserts and montane forests, most of which are on public land, 82 % of the state's oak woodland rangelands remain in private ownership (CDF-FRAP 2003).

## 2.3 California's Oak Woodland History: Four Eras

Within a broader environmental history, California's woodlands have undergone changes through at least four major historical periods since 1850, each defined by a shift in management practices and institutional arrangements (Fig. 2.6).

**Fig. 2.6** Reminiscent of eighteenth century paintings of European landed gentry, this work by James Walker (1819–1889), depicts a “Patron” with silver conchos along the vest-front and pants, ornate silver-mounted spurs and bit, and the high-stepping horse of Arabian heritage, which testifies to the ranch-owner’s prosperity. (Courtesy of The Bancroft Library, University of California, Berkeley)



### ***2.3.1 Expropriation and Ranch Enlargement***

A first phase, lasting from 1850 to around 1920, began when Anglo-American settlers started usurping lands owned by Mexican ranchers and developed a more efficient, market-oriented approach to livestock production (Fig. 2.7). Demand for livestock products was initially high, with population growth in mining and trading towns spurring high prices. Livestock were imported from other territories, and new herds established with the animals that did not go immediately to market. The newcomers believed that although California’s environment was dynamic and unpredictable, its resources would be limitless if it could be properly subdued and transformed into a capitalist wealth-producing machine.

The fantasy of controlling nature and the myth of nature’s inexhaustibility shaped the use of oak woodland ranches during this period. These ideas helped produce a series of booms and busts in livestock markets that, in some areas, resulted in severe rangeland degradation (Burcham 1981; Cleland 1941; Iglor 2001). By the beginning of the twentieth century, the false faith in nature’s infinite productivity gave way to an equally unfounded sense of inevitable decline.



**Fig. 2.7** The influence of early Spanish and Mexican heritage left a deep imprint in California's place names, as with this small town in the eastern San Joaquin Valley. *Bellota* is Spanish for acorn, and oaks, acorns, and the mast that would accumulate below oak trees were important feed sources from Native American times onward in California. (Photograph by P. F. Starrs)

### ***2.3.2 Efforts Toward Scientific Management***

A second phase began in the early 1920s with the advent of scientific range management. Range management as a scientific, rather than a vernacular activity, came to California's oak woodland ranches around 1922 when Arthur Sampson, who had studied under Frederick Clements at the University of Nebraska and worked under Gifford Pinchot at the U.S. Forest Service, accepted the University of California's first professorship in this new field. Sampson believed that productivity was an intrinsic quality of the landscape and that the range manager's task was to restore and maintain sustainable levels of natural productivity (Sampson 1914, 1923). To achieve this, he mobilized the state's agricultural extension program, in partnership with local cattlemen's groups, to provide ranchers with useable scientific knowledge and organize ranching communities to engage in coordinated efforts. These included grass seeding, livestock management, and seasonal burning. By the end of World War II, Sampson and his colleagues had enrolled most of the state's oak woodland ranches in cooperative conservation programs to inhibit shrub growth and encourage forage productivity (George 1987).

With range science in its infancy, efforts to develop a hardwood forest products industry were also underway. Attempts by industrial scientists and Extension foresters at the University of California to establish cork oaks in California dated to 1858 (Metcalf 1947). By the early twentieth century, gaskets and effective



**Fig. 2.8** The arboretum at California State University, Chico, includes an oak grove established in 1904 to evaluate prospects for growing cork in California. Traces of harvests attempted from 1940 to 1947 appear on the trunks. The ground is covered with cork oak (*Q. suber*) seedlings, and over time, an unmanaged thicket of trees has evolved that is much appreciated as a walking path. (Photograph by L. Huntsinger)

sealants were in short supply, and cork was a crucial insulating material in the years between World Wars. While cork oaks were planted on a variety of California sites including Chico, Davis, and Napa, an absence of skilled cork harvesters and the development of alternative fireproofing, insulating, and noise-reduction technologies reduced demand and left cork oak stands isolated and neglected (Ryan 1948) (Fig. 2.8).

### ***2.3.3 A Concern for Conservation***

The third phase, which lasted from 1950 to 1985, comprised an era of “big conservation.” Beginning around 1950, the farming and ranching industries in California expanded to supply commodities for growing markets. Over the next 25 years, California’s cattle population rose by 280 %, reaching a peak of about 3.2 million head in 1976 (Burcham 1981). California’s ranchers benefitted from financial and technical support provided by the state and federal governments, corporations, private donors, and a new generation of range managers who launched ambitious research, education, and outreach programs.

Unlike the range managers of Arthur Sampson's day, post-war range managers spoke out for large-scale landscape manipulation that could fundamentally alter the productivity of the landscape. They were advocates for the use of herbicides, heavy machinery, and other tools to reduce tree density, which they believed would increase forage availability, improve stream flow, and raise livestock carrying capacity. Using state annual range improvement reports, Bolsinger (1988) found that from 1945 to 1974 about 0.8 million ha of hardwoods and chaparral were cleared in the name of rangeland improvement.

By 1980 a cohort of scientists and managers began criticizing what was in essence an industrial conservation approach to hardwood range management. This new group was allied more closely with 1970s environmental activists than with the big program conservationists of an earlier generation. They argued that clearing too many oak trees was counterproductive in many cases because it impaired important ecological processes, and their studies suggested that short-term gains in productivity would soon be followed by long-term declines (Holland 1976). And significantly, they spotted a threat that 1950s and 1960s managers had not addressed: Oak woodland ranch subdivision for residential and agricultural development.

### ***2.3.4 Integrated Management***

A fourth period in the management history of California's hardwood rangelands began in 1986, when the University of California launched a new cooperative program to address escalating conflicts, and conservation concerns, over privately owned oak woodlands, referred to in the program as "hardwood rangelands." The Integrated Hardwood Range Management Program (IHRMP) helped avert the controversial prospect of state regulation of oak use and management with increased support for voluntary research and education. The IHRMP provided a central clearinghouse for statewide programs in hardwood rangeland science, conservation, and restoration (Standiford and Bartolome 1997). This included projects in ecology, natural resource economics, rural sociology, and public policy, and specific initiatives to deal with the spectacular growth of wine grape cultivation in the 1990s and the spread of sudden oak death in the 2000s. In 2009 the University terminated IHRMP funding during a time of state-level budget cuts to higher education and environmental programs. The IHRMP's work continues today through a coalition of scientists, extension specialists, and private ranchers, and through the University of California's Oak Woodland Conservation Workgroup and other programs (CA-OWCW 2012).

The burst of research that followed the formation of the IHRMP provided a rich trove of information about the status of California's oak woodland ranches. California livestock ranching on oak properties remains a family business, but not often a lucrative one from a commercial point of view. More than 80 % of ranchers live on their ranch with their families and manage the enterprise



themselves, with few, if any, employees. Yet less than 15 % of ranchers make the majority of their income from ranching (Huntsinger et al. 2010). The romance of a rural lifestyle has attracted large numbers of exurbanites who have sought the amenities of ranch living, but who are unaccustomed to the sights, sounds, and smells of commodity production in working landscapes. Local political conflicts have often surrounded these clashes of urban and rural cultures (Walker and Fortmann 2003).

### **2.3.5 *At the Moment***

Today, California's oak woodland ranches exist in a complex public policy environment. Subsidies for tree clearing gradually ended, at both the state and federal levels, but other subsidies for agricultural and real estate development remain, and markets for biomass harvesting for cogeneration creates local incentives to remove trees. Agricultural and open space easement programs, including tax rebate opportunities such as the California Land Conservation Act of 1965—universally referred to as the Williamson Act, though threatened with elimination in California's currently troubled economy—can entice landowners to make conservation commitments. Yet ranchers often view these as weak incentives when compared to the pressure of rising land market value and formidable estate taxes, and recent austerity cuts in the state budget have put such programs at risk.

The State of California has chosen not to regulate oaks under the Forest Practice Act of 1974, which gives the state the authority to oversee harvesting or clearing projects for marketable timber species, and it has successfully defended this policy in court. As a result, regulation of oaks has devolved to local governments (Doak et al. 1988). By 1990, over 100 city and county governments in California had laws to protect native oaks. Today, many more such regulations exist. These local oak tree ordinances provide guidelines and regulatory frameworks for community oak management, but often focus on maintaining individual oak trees rather than functional ecosystems, lack adequate enforcement mechanisms, have weak or poorly enforced mitigation requirements, and create an uneven regulatory landscape across the state's many complex governance structures and jurisdictions.

## **2.4 History and Recent Trends in the Spanish Dehesa**

The long history of oak woodland management in the dehesa region dates back some 6,000 years, according to pollen core evidence of vegetation change. Pollen studies suggest that early forms of management involved livestock grazing and human-wielded fire. These activities created the oak dotted savannas that characterize the landscape today, although past dehesas probably also included cultivated



chestnuts, olives, and grapes (Stevenson and Harrison 1992). Work since on Neolithic cave sites in Cáceres corroborates the early human transformation of oak woodland into a managed dehesa system (López Sáez et al. 2007a, b).

Contemporary dehesas are dominated by human activities that prevent shrub encroachment and maintain an open understory of grasslands and patchy farmlands, systems that require constant maintenance (Chaps. 6, 8; Martín Bolaños 1943; Parsons 1962a, b; Gade 2010). After clearing, shrubs recolonize the understory within a few years, absent intensive grazing, clearing, or crop cultivation (Díaz et al. 1997).

The dehesa appeared in a recognizable form in south-west Spain in the first millennium AD when the region's lands were divided among retired Roman legionnaires from Extremadura (Fig. 2.9) (Cerrillo 1984; Díaz et al. 1997). Dehesa became more permanent and widespread during the Reconquest, which lasted from the eleventh through the fifteenth centuries (Linares and Zapata 2003; Stevenson and Harrison 1992). During this period, the kingdoms of Castile, León, and Aragón captured areas previously under Muslim control with the help of the northern nobility and military orders, including knights from the Orders of Alcántara, Santiago, and Calatrava.

Several factors beyond the region's soil and climate encouraged emergence of the dehesa as a dominant land-use system (Linares 2012). From the Islamic

**Fig. 2.9** A detail from a mosaic, restored at the Museo Romano in Mérida (Emerita Augusta) and provisionally dated 324 AD, shows a well-garbed Roman hunter spearing a wild boar in a managed woodland. The taller oak shows the effects of pruning, and in the foreground are spiny oaks that would key out as either *Q. ilex* or *Q. coccifera*. (Photograph by P. F. Starrs)

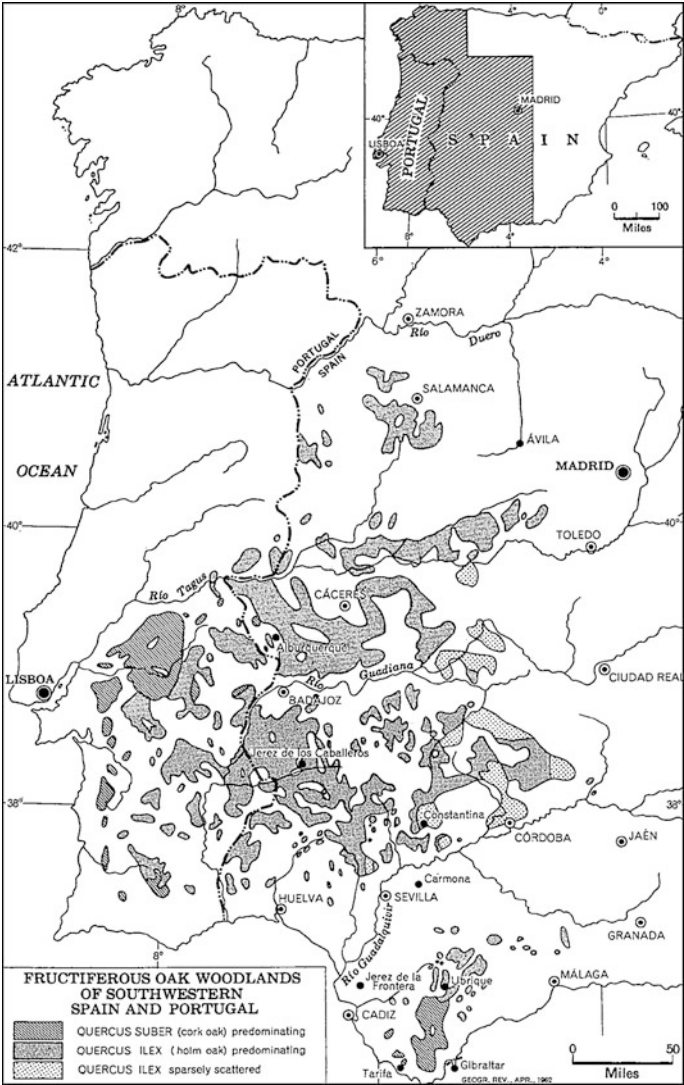


conquest in the eighth century until at least the twelfth century, the south and west of Spain comprised a military frontier with weak institutions and fragmented local communities. Settlement patterns shaped the arrival of humanized rural landscapes including the present-day dehesa.

Extremadura was notably less fertile than areas to its south (Andalucía) and east (Murcia), and unattractive to settlers. Population growth lagged until the second half of the thirteenth century, when monarchs encouraged settlement with concessions of large properties to nobility and the creation of new municipalities, which received their own landholdings to use, manage, and exploit. Growing demand from the textile industry encouraged the development of new political and economic alliances that brought the nobility, military, and local governments together with northern woolgrowers to make Extremadura a prime lowland seasonal range for Merino sheep trailed from northern Spain as part of a transhumance between the north and the south. The woolgrowers became a guild known as the *Mesta*, whose tax payments to the Crown earned them considerable royal support, much to the chagrin of local farmers and stock producers seeking to protect their lands from migrant flocks that would graze their way across Spain. Nearly 600 years later, by the mid-nineteenth century, the *Mesta* had dissolved, and private landowners—including gentry, Church orders, and municipalities—were vying for grazing land. Despite vast changes leading up to the late 1800s, the livestock industry continued to flourish in the Iberian Peninsula.

As is the norm in many a traditional society, everyday life in historical Spain gave a great deal of attention to hunting (Chap. 11). The taking of big game (wild boars and deer) and small game that ranged from hares and rabbits and doves to starlings and larger birds led to a complicated combination of hunting for food and sport (Parsons 1960; CdV 1986). On private dehesa estates hunting was an activity pursued by nobles, usually for their own pleasure or with friends. For the more prosperous municipalities (*municipios*), where a village or community owned a dehesa that included hunting rights, residents might be allowed to hunt (Owens 1977; López Ontiveros et al. 1988; López Ontiveros and Valle Buenestado 1989). And poachers roamed, with the combined rewards that could include alleviating boredom and getting men and boys out of the house. Game taken would either be eaten at home or sold as provender to local bars and roadside inns. Of course, significant penalties could come with being caught—penalties that continued well into the 1970s, as the Guardia Civil wielded an iron authority over rural Spain and protected landowner interests (López Ontiveros 1986, 1994).

Rights to draw on woodland and forest resources in the dehesa existed in a complicated scheme of access, penalties, rights, and traditions, with significant variations from landholding, municipality, region, and kingdom (Gómez Mendoza 1989; Chap. 11). In terms of hunting, no region is so well studied, in historical context and management, as Andalucía's Córdoba, with researchers working on hunting history and on aspects of current hunting interest, examining each from the perspectives of social life, veterinary health, and management of game (Buenestado 1978; de Urquijo 1988; López Ontiveros and Valle Buenestado 1989). Hunting of



**Fig. 2.10** While delimiting the exact extent of the dehesa remains a matter of some cartographic uncertainty, this effort supervised by the geographer James J. Parsons offers a reasonable idea of the extent of the dehesa and its characteristic cork and holm oaks in the southern and western Iberian Peninsula. The definitive maps were produced for some, but not all of, the dehesa area by the Spanish Ministry of Agriculture in the 1970s and 1980s. (Modified from an original map in Parsons 1962a)

rural dehesa lands was a sought-after activity as early as the years of Roman and Arab control of Spain, and the full picture of its history is slowly being revealed in historical and geographical sources (Fig. 2.10).

## 2.5 Four Historical Eras in the Spanish Dehesa

The historical roots of today's dehesa landscape derive from the time of the Christian repopulation. Consolidation of power and authority in Church and gentry grew in a region of weak urban networks, low population density, large landholdings, and a livestock-based economy. Since medieval times, the dehesa has undergone countless smaller changes. The remainder of this section focuses on changes that relate to the ownership, management, and use of the dehesa, dividing it into four periods: consolidation, development, decay, and present-day trends.

### 2.5.1 Consolidation of the Dehesa

A period of consolidation, lasting from the mid-thirteenth-century to the mid-eighteenth-century, was a time of great change in dehesa lands. Place names and data collected in the *Book of Hunting* by Alfonso XI document the Christian colonization of south-western Spain and the accompanying shift from Mediterranean hardwood forests and shrublands to pastures and farms (Bernal 1998). Yet a lack of definitive data makes it difficult to characterize the vegetation that existed immediately before the period of consolidation, and only very recently has the precise spatial extent of the area in dehesa been defined (MARM 2008).

The exact process by which dehesa landscapes emerged during the consolidation period remains unclear. Resettlement charters describe land use practices that could have resulted in the creation and maintenance of dehesa systems. These included cutting timber for use as farm implements, building materials, firewood, and charcoal, stripping cork to make beehives, and the cultivation of crops, hunting of game, and gathering of mushrooms, wild herbs, and medicinal plants. Extensive grazing and acorn gathering appear to be the most important and widespread land use practices during this period on both communal and privately owned lands (Linares 2002; Clemente 2007).

By the mid-fifteenth century, when more detailed information began to emerge, extensive dehesa systems were already fully formed (Linares 2001). Within a fringing ring around the populated areas—usually on the margins between municipalities and farmlands—noblemen, military orders, municipalities, and neighboring communities maintained open stands of oak. Over time, towns and farmlands began to encroach on these woodlands, while seasonal grazing expanded the dehesa along its outer edges (Linares and Zapata 2003). Similar patterns of encroachment and expansion have continued in more recent centuries.

Sources available for the period of consolidation distinguish between two types of dehesa properties: private dehesa owned by the nobility, clergy, or agrarian oligarchy, and public dehesa (*dehesas boyales*) controlled by municipalities or communities. Private lands were managed by administrators, or, in some areas, as around Cáceres, by associations of multiple administrators who shared in the

ownership of a single property and divided the revenue from its uses (Melón 1989). For public dehesa, governing boards from each municipality assumed the authority to manage the use of their communally held properties—an approach still common today (Linares 2002).

On private and public lands, grazing and browsing of livestock was the most important commercial use, especially on fresh pastures during the fall and winter. Except in the commons, grazing rights were usually leased to members of the Honorable Council of the Mesta, an arrangement that guaranteed the seasonal presence of Merino sheep in south-west Spain (Klein 1920; García-Sanz 1985b).

The second most important use of these lands was for acorn foraging by domestic pigs. Pig foraging permits were leased to the highest bidder on the private estates and at an appraised rate on the public lands. Livestock use permits were leased at lower rates for summer pastures, and any additional agricultural by-products, including forage and hunting for small game on fallowed fields and post-harvest stubble, remained free for use by local residents (Linares 2006).

Crop cultivation was the third most important commercial activity on the dehesas during the period of consolidation. The predominant crop was cereal for human consumption, grown in biennial or triennial rotation systems with intervening fallow years. On private woodlands, this practice was often subleased to third parties by the northern stockbreeders. On public dehesas, it was offered to community members free of charge or sold to the highest bidder (Linares 2002).

Forestry uses had only minor commercial value, but they were important for land management. Tree pruning was thought to increase the production of acorns (see, however, Chap. 7), and the few existing contemporary sources suggest local residents were permitted to cut branches for use as lumber, firewood, and charcoal at no cost. The information available about cork harvest is less clear. In the eighteenth century, cork harvesting was linked to uses such as tanning and beehive construction, although even today Extremadura has villages where the skill of its specialized cork-harvesters-for-hire is famed. Sources say little about landowner cork oak management. The same goes for other dehesa uses, such as hunting, fishing, stone working, beekeeping, and the harvesting of mushrooms, plants, truffles, and aromatic or healing herbs. All of these practices were underway, but little is known about their extent, application, or management (Linares 2008).

### 2.5.2 *The Developing Dehesa*

A second phase—the period of development—lasted from the mid-eighteenth century to the mid-twentieth century (Fig. 2.11). Reports compiled in the *Catastro of Ensenada* (1750–1754) indicate that as this period began dehesa covered more than 30 % of all useable land in the former provinces of Salamanca, Toledo, La Mancha, Extremadura, Sevilla, Córdoba, and Jaén. In Extremadura, dehesa covered 55 % of usable land (Grupo’75 1977). Multiple activities continued on the dehesa, but Merino sheep predominated on the region’s autumnal pastures.





**Fig. 2.11** The Plaza de España of Seville, built in 1928 for the Ibero-American Exposition, is regarded as a Renaissance Revival architectural marvel. Alongside the Alcoves of the Provinces in the Plaza appears this map showing part of the Sierra Morena, north of Seville, in southwestern Spain, showcasing the region's long history of herders and their livestock, along with villages and features of local renown. Livestock are a reflection of the dehesa landscape, with goats, sheep, cattle, dairy animals, pigs, and donkeys. (Photograph by P. F. Starrs)

Local residents called for change in response to the continued presence of the northern Merino herds. After 1808, tumultuous events—including the Spanish War of Independence (1808–1814), the enactment of the first Spanish Constitution of 1812, and a crisis in the Merino industry brought on by increased international competition—diminished the influence of northern wool growers and began a new era on the dehesa (Llopis 1985). Transhumance declined as Mesta authority faded, which meant landowners could elect to take land out of pasture and turn to raising grain crops and other livestock (Llopis 1989) (Fig. 2.12 and Fig 2.13).

During the early nineteenth century, liberal reforms amplified shifts in Spanish political and economic life (García-Sanz 1985a). Privatization of church properties and the General Disentitlement Act of 1855 accelerated a process of land privatization begun during the War of Independence (Linares 2001). During the sixty-nine years covered by the General Disentitlement Act (*desamortización*, 1855–1924), thousands of municipal and communal estates throughout southwestern Spain once managed as public lands became privately owned properties.

The reforms of the nineteenth century resulted in an almost total disappearance of public land in the Spanish south and west. By the 1860s, few municipal or communal estates had escaped privatization. In 1863 national government officials launched a planning process they hoped would foster more efficient forest management on the remaining public lands. By 1924, efforts to impose rational scientific management on a complex system shaped by centuries of social relationships, cultural practices, and deeply held traditional local knowledge had





**Fig. 2.12** The Iberian black-footed pig was traditionally placed on the dehesa in October to consume acorns that would in turn flavor meat in ways characteristic of Spanish ham ([Chap. 10](#)). While long respected within the regional diet of south-west Spain, the Iberian pig has in the last several decades become a gastronomic superstar, and added considerable value to dehesa live-stock production ([Chaps. 10, 13](#)). Over the long term, only cork and, locally, income from commercial hunting competes with hog production. (Photograph by S. García)

proven futile ([Linares 2007](#)). Since then, the municipalities have once again assumed authority over management of most public lands.

Privatization contributed to dramatically new landscape patterns. The owners and leasers of land invested significant sums toward dehesa improvement. Efforts included thinning forests to create canopy openings, pruning trees to stimulate acorn production, and constructing buildings to provide spaces for living and working—in each case, hired labor and the skills of itinerant specialists were required. These projects were meant to increase dehesa productivity ([Zapata 1986](#)), but they also increased the region's ecological uniformity ([Fig. 2.14](#)).

The spread of the moldboard plow and the use of the first synthetic fertilizers allowed dehesa users to expand the region's cultivated area. Instead of leading to a reduction in livestock, however, the increase in farming only furthered shifts in animal husbandry that had begun in the early nineteenth century ([García-Sanz 1994](#)). Grain production enabled ranchers to increase their herds. Sheep continued to graze in the pastures, but transhumance declined as the flocks became more integrated into local farming systems as producers of manure, wool, leather, and, increasingly, meat. Rising demand for animal protein, which paralleled an increase in per capita income, encouraged a rise in cattle and pig populations. The changing nature of dehesa agriculture also led to the gradual replacement of oxen by mules, donkeys, and horses in many agricultural tasks ([Linares 2007](#)).



**Fig. 2.13** The pruning of holm oaks can go to extremes, as here in the Sierra Morena, leaving oaks a spidery wisp of their former selves. Longstanding traditional knowledge holds that pruning increases the fall of acorns; scientific measurements over the last two decades argue that there is no increase in production from pruning (Chaps. 5, 6, 7, 10). Nonetheless, an area of *encinas recién podadas* (recently pruned oaks) is a distinctive sight. (Photograph by P. F. Starrs)



**Fig. 2.14** In central Badajoz province the full force of dehesa management is readily apparent: the holm oaks show distinct browse lines, where livestock consume oak leaves from the ground; the effects of pigs on the ground cover are apparent both in the oak understory, and in their nighttime enclosure, and the park-like expanse of trees stretch into the distance, seen from Monasterio de Rocamador, near Almendralejo. (Photograph by P. F. Starrs)



**Fig. 2.15** Slabs of cork, steamed and pressed flat, await transport and conversion into cork bottle stoppers, flooring, or other uses. Once considered an essential strategic product, and used as an insulator and as a flexible gasket-sealant, cork remains a high-value product of the *dehesa* (and the Portuguese *montado*), but faces competition from the plastic “stopper” industry in wine-producing countries that are not able to produce cork and must buy their supply. (Photograph by P. F. Starrs)

Traditional forestry practices continued to evolve. Wood harvested through felling and pruning operations had low commercial value in forest management, but was considered significant in terms of woodland health (Linares 2007). An important change involved cork (Fig. 2.15). During the nineteenth century, the status of cork production made a transition from a marginal resource into the single most important industrial woody forest product of the *dehesa* (Parsons 1962b). This shift had little to do with regional changes in land ownership or property rights. Rather, it resulted from the emergence of a new bottle and barrel stopper industry, the rise of international demand for cork as a versatile building material, and the role of cork as a sound insulator in strategic defense industries, especially for warships (Metcalf 1947; Zapata 2002).

Additional research remains to be done on the social, economic, and ecological aspects of the *dehesa* during this period. For example, although government foresters of the 1920s noted an increase in hunting and poaching, confirming news reports from the first decades of the Franco era, little is known about specific trends or events (Linares 2012). What is clear is that in the mid-twentieth-century the *dehesa* remained a region of diverse and complementary land uses (Linares and Zapata 2003). In Extremadura the region’s working landscapes offered a source of some social and demographic stability in rural areas, although in the 1960s and 1970s more than half a million residents left Extremadura to go abroad or to other parts of Spain.



### ***2.5.3 The Mid- and Late Twentieth-Century: A Dehesa in Decay***

The third phase—the period of decay—began in the mid-twentieth-century with influences continuing to the present day. Grain production rose during the 1950s when the Franco government required that all arable land be tilled under penalty of law, but declined by the mid-1960s. Since the mid-twentieth-century, the total area covered by dehesa has declined, coinciding with a crisis of traditional agriculture in Spain (Plieninger 2006a). This crisis was, in part, a consequence of the substitution of capital for labor in the farming sector related to a decline in relative commodity prices caused by the Green Revolution. The rapid adoption of new technologies—including tractors, harvesters, fertilizers, herbicides, and pesticides—has increased productivity, but it led to a growing dependence on agricultural inputs purchased from outside the dehesa region.

In recent decades, agricultural mechanization and the deposition of large amounts of soil fertilizer have enabled yet another increase in the total area of croplands in the dehesa region, and a shift from untilled or rested fallow to seeded fallow, where nitrogen-rich cover crops would be plowed under to provide so-called green manure. This intensification of farming practices and an expansion of arable land enabled production of more varied agricultural commodities. Grain for human, and increasingly animal, consumption remains the region's predominant tilled crop, but other species—such as bean, chickpea, sunflower, and vetch—have also proliferated on once-fallow fields (Campos 1984).

Increases in forage crops and external inputs, such as supplemental feeds, along with incentives in the Common Agricultural Policy, have encouraged the continued growth of livestock populations (Plieninger 2006b). As in previous eras, this growth has been accompanied by changes in the composition of herds. Sheep still maintain a slight numerical advantage over other species, but sheep and pigs are both being displaced by cattle and deer, raised commercially on fenced dehesa. The relative simplicity of these latter two species' management, together with the growth of per capita income and demand for red meat facilitated this livestock substitution process (Campos et al. 2003). The adoption of Green Revolution mechanized technologies has reduced the importance of horses as draft power—even while horses have gained ground as pets (Chap. 10; Linares 2012).

Traditional forestry practices face considerable challenges. A decline in demand for biomass energy, including firewood and charcoal, has reduced oak pruning. Many residents believe that this has reduced the quality of acorns and diminished trees' capacity for regeneration. Cork has substantial commercial value, but its days, too, may be numbered. A lack of active management, amounting to neglect by some cork oak owners, along with the emergence of substitute wine stoppers made of plastic or synthetic resin, continues to place downward pressure on cork prices (Zapata 2010).

Changes in forest and range management practices have accompanied a general decline in oak tree prevalence and health on the dehesa. A massive

government-driven reduction in Iberian pig population in the 1960s, as a response to an infestation of African swine fever, slashed an important market for acorn-bearing trees, although pig numbers have recovered in the decades since. A second pervasive problem is the high cost of the traditional practices required to promote oak regeneration. A third issue is the lack of public programs to encourage resource management by private landowners, many of whom do not believe that conservation is their responsibility (Campos 2008). Public sector reforms, such as incentive programs, could help promote sustainable and diversified dehesa management. However, the public sector no longer has the leverage it once did, and European Union subsidies and initiatives have met with varying degrees of enthusiasm, and sometimes even outright rejection. Two centuries of economic liberalism have left private landowners largely in control. Today, public ownership is residual, while private property is dominant.

Not surprisingly, these economic, technological, and administrative changes have had serious repercussions for the social fabric of the dehesa region. Once an area of relative demographic stability, the region's agricultural industrialization has become a significant push factor promoting out-migration to urban areas. In recent decades there has been an unprecedented exodus from the countryside to the city.

There is, however, a positive side to these changes. During the past couple of decades, increases in income have fostered a revival of traditional crafts and land use practices, such as stone working and hunting, and increased the value of newer recreational uses, including horseback riding, hiking, and nature tourism. The dehesa is now recognized for its potential to maintain biodiversity and ecosystem services, in particular by the European Union. The growing appreciation of these new values will only promote conservation, however, if it can be converted into profits for people who live and work in the dehesa (Campos 2008), and who depend on the land for their livelihoods.

#### ***2.5.4 A Post-millennial Dehesa, Resurgent?***

Today, livestock production remains the dominant commercial activity in the dehesa. Most livestock income depends to a degree on subsidies under European Union agricultural policies. With surplus production in many EU countries, policies tend to favor products that are locally sought-after and use this to encourage low-intensity agriculture linked to biodiversity hot spots (Chap. 8). This fits the dehesa well (López-López et al. 2011). The current livestock census of the dehesa also shows a significant dependence on supplements from outside sources. Yet such reliance on subsidies and inputs increases the vulnerability of commercial operations that are faced with the dual uncertainties of changing subsidy policies and input prices. In some cases, landowners have responded by increasing the size of their herds, with consequent improvements in labor productivity, but this can increase their dependence on outside inputs even more. In other cases, landowners have switched the species they cultivate from swine and sheep to cattle and wild

game—and even the semi-domesticated game that are fed grain and other supplements to add their size and increase their desirability as trophy animals.

Recreational hunting is increasing in the dehesa, but subsistence and social hunting remains important for private landowners. Some landowners see hunting as an alternative to livestock production that can contribute to the conservation of ecological services in the dehesa. Many newer, wealthier landowners value hunting, but usually more for recreation. Wildlife is not the only source of biodiversity worth conserving in the region. The dehesa contains several unique breeds of domestic livestock, some of which may be in danger of extinction (Chap. 10). Concern about this has led to the establishment of public compensation programs that support the maintenance of some of these native or heritage breeds.

The value of dehesa forest products—including grass, cork, and firewood—has continued to decline as an income source for most landowners. Decreases in tree pruning and brush trimming permits shrubs to reinvade the oak woodlands, and pastures increasingly show signs of trampling by pigs, cattle, sheep, and goats—sometimes in sequence—searching out palatable forage. The decline of oak and cork trees, only partially offset by recent reforestation efforts, reduces acorn production for swine fodder, known as *montanera*. Agricultural crops with several year rotations traditionally encouraged soil recuperation and prevented the livestock compaction typical of shrub lands. Today, however, the decline of farming has an unintended effect of diminishing soil quality and productivity.

Increasingly, income to landowners does not justify the private investments required to produce livestock, wild game, forest products, and crops in an integrated system. To make dehesa ranching worthwhile, residents must accept that non-commercial environmental services have value. Landowners may accept lower incomes and higher expenses for the opportunity to live in a dehesa setting that provides them with non-commercial environmental values (Fig. 2.16). All that some landowners need is a modest financial return to justify the considerable additional benefits of their dehesa ranch life. In this way, the dehesa is moving toward a management system that may be both commercially remunerative and ecologically healthful.

Forest and grass management are essential for maintaining dehesa environmental services. Yet given the scope of the problems and the vast area involved, effective public policy will require the prioritization of management objectives for woodlands, pastures, habitats, and species. There may be increases in public investments and incentive programs in the coming years with financial instruments of the EU Common Agricultural Policy. Such support can contribute to maintaining the economic viability of the dehesa with its associated high biodiversity. However, incentives should also finance timely solutions to complex biodiversity issues. For example, moderate shrub cover can encourage oak recruitment, although it may reduce local biodiversity and forage productivity. Management choices will need to be made, some with considerable social and ecological trade-offs.

Although dehesa landownership is largely privatized (Fig. 2.17), a public support system provides resources for fire protection, visitor services, biodiversity conservation, and environmental management programs. Future public programs





**Fig. 2.16** Most Spanish fighting bulls are and have been raised on dehesa lands, and perhaps unsurprisingly, bullfighters and their managers were among the prominent purchasers of dehesa properties in the late twentieth century. On a dehesa north of Córdoba, a bullfighter-owned property offers a testimony to the source of wealth that allowed the new property owner to acquire his land. (Photograph by A. Caparrós)

must be linked to credible priorities, with implementation of territorial agreements that provide adequate compensation to landowners for the provision of environmental services. The implementation of such agreements requires better economic data on the costs and benefits of various approaches to dehesa management.

## 2.6 Synchronicity and Divergence: A Conclusion

California oak woodland ranches and the dehesa of south-west Spain have many common attributes. With similar climates and physiographic features, they are defined by graceful oak trees, often arranged in park-like stands (Fig. 2.18); they each have annual grass understories that change from bright green during the winter growing season to golden brown during long, dry summers. In some areas, ranches and dehesas appear so similar that landscape photographs taken in the two places can be virtually indistinguishable, even for educated naturalists and long-time residents. It is no wonder that the Spanish padres who arrived in California during the eighteenth century felt so at home compared to Catholic missionaries in other parts of the New World.

Despite the similarities of their climates, terrains, ecologies, and appearances, the ranchos and dehesas have experienced markedly different histories. California's ranchos emerged in landscapes occupied for more than 13,000 years by Native



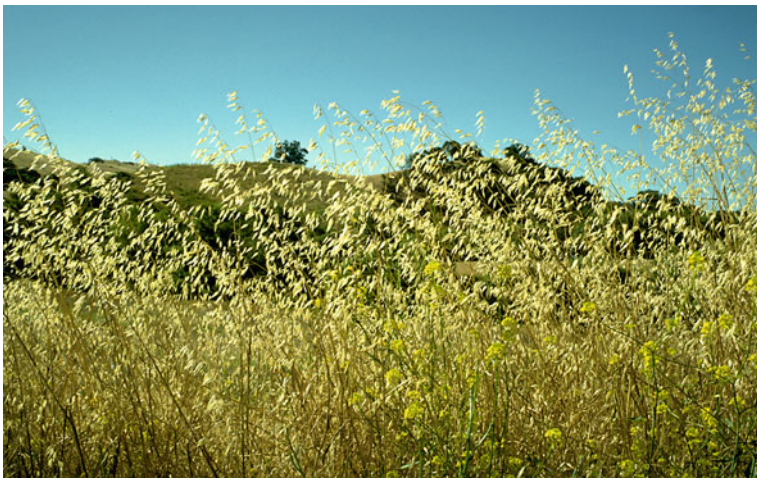
**Fig. 2.17** Hunting was once an activity largely pursued by village men during non-agricultural seasons, and by the gentry who would seek out game on their own land or as invited guests on the property of neighbors. Hunting today is highly commercialized, especially on dehesa lands where hunting is reserved, as indicated by the sign declaring a hunting preserve near Guadalcanal, north of Seville. Fees to hunt on attractive properties where hunters can take trophy-quality animals may rise to \$10,000 or more, and fees above \$1,000 are routine. (Photograph by P. F. Starrs)

Californians whose primary tool for landscape manipulation was fire. Some exotic plants probably made it to California well before the Spanish colonial era, but the introduction and proliferation of European livestock and cultivation occurred in the span of just a few decades. The emergence of a pastoral empire in California, during the periods of Spanish and Mexican control, came with a host of ecological changes that scholars are even now still struggling to understand (Fig. 2.19). It is astonishing to recognize that by the time California became part of the United States, it had supported large-scale livestock grazing for less than eight decades—no more than the length of a single human lifetime. The contemporary rural geography of California's oak woodlands emerged during the late nineteenth century, as the state's fertile valleys shifted to intensive agriculture and federal officials began to regulate seasonal grazing on public lands in the higher elevation mountains.

The Spanish dehesa landscape began to acquire many of its contemporary characteristics during the Catholic repopulation of the thirteenth century, and has remained under Spanish and Portuguese control. Their cultural lineage supported the gradual development of an intricate agro-forestry system built on seasonal grazing, foraging, cultivation of tree- and understory crops, and relatively intensive forest management practices designed to promote these primary uses. Until the nineteenth century, the church, military orders, municipal councils, and northern nobility—with their rangy flocks of Merino sheep—controlled the



**Fig. 2.18** Massive holm oaks can be sizable acorn producers, as here in southern Salamanca province. Oaks can live for several hundred years, but during that time must eventually regenerate through seedlings that have to survive the hunger of livestock and wildlife that are well accustomed to eating sweet acorns and shrubs in an oak understory. The long-term future is uncertain. (Photograph by P. F. Starrs)



**Fig. 2.19** The oak woodland landscape of California, much of it in private ownership, reflects a 250 year-old presence of grasses, weeds, and other exotic species introduced by livestock that came with Spanish and Mexican colonizers who arrived even before the first permanent Spanish settlement at Mission San Diego de Alcalá in 1769. Wild oats (*Avena fatua*), pictured here, is a grass common to both places. As a result, the look of the land is remarkably familiar to almost any visitor from the southern Mediterranean, and especially from Spain. (Photograph by P. F. Starrs)



dehesas. A series of liberal economic and legal reforms, beginning with the Spanish War of Independence, resulted in the transfer of most dehesas to private control. Changes in commodity markets, such as increased demand for meat and cork, shaped the use of the dehesa and contributed to modern landscape patterns.

At the beginning of the twentieth century, California oak woodland ranches and Spanish dehesas were mostly in private ownership. By the early 1920s, officials in Spain had largely given up on efforts to institute scientific management. In California, however, such efforts were just getting underway, as ranchers voluntarily joined cooperative, university-sponsored programs to restore and improve the productivity of their lands. California ranches have never been as intensively managed or used as the Spanish dehesas. Yet both landscapes experienced dramatic escalations in the scope and intensity of agricultural mechanization following World War II. Growth in demand for meat was one reason, but public subsidies, private investments, and complex changes in global agricultural markets also fostered important shifts in land use programs and patterns.

Local residents and conservationists increasingly recognize both landscapes as valuable, for their amenities as for their commodities, and for their ability to support sustainable agriculture while promoting biodiversity conservation and the maintenance of ecosystem services ([Chap. 12](#)). But a range of economic factors—



**Fig. 2.20** The huge black, long-legged and fast-traveling Negra Avileña cow is a feature of the dehesa, once common but still in evidence in an annual transhumant movement from Extremadura up the old Roman roads to the *Sierra de Gredos* and, eventually, Avila. Native (autochthonous) breeds such as these are a prized part of dehesa life, and currently encouraged under EU policies, but the duration of support remains an uncertain affair. (Photograph by L. Macaulay)

including international competition and increases in property values, rents, and other development pressures—continue to promote land use change. This makes it more important now than ever to articulate the value of the diverse social, cultural, and ecological goods and services these systems provide (Fig. 2.20).

California ranches and the dehesas of Spain have dramatically different histories. Yet, during the past 250 years their stories have converged. They look now more similar than ever before, with more plants and animals in common than at any previous point in time. They have experienced similar privatization and modernization efforts. Each region has been shaped by global agricultural markets. Today, both landscapes are the subjects of intensive study and conservation efforts, and face similar social and ecological challenges. The remaining chapters in this book examine these congruencies and departures in greater detail.

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