Chapter 3
Registering English Battlefields: The Constructive Conservation of Historic Environments

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Abstract The extensive history of warfare in England offers abundant opportunities for the conservation of historic land and its associated heritage and natural capital. Since 1995, the Register of Historic Battlefields has recognized English battlefields of exceptional historical value. To date, 46 out of at least 500 known English battlefield sites have been formally registered. While registered status provides a degree of extra protection against development, interpretation of undefined terms in planning legislation results in varied levels of conservation. Such challenges emphasize the importance of effective management, as registered sites can make significant contributions to local ecosystems as well as neighboring communities. In this study, we provide a brief history of English battlefield designation and conservation. We describe specific ecosystem services provided by battlefield landscapes through three case studies that vary along a management and land use gradient. For each location, we describe the types of ecosystem services provided, the management methods and goals, and the persisting threats. We also examine the potential differences in land cover for the registered battlefields and the surrounding landscapes. Despite differences in time of relevance, area, and habitat type, Naseby, Bosworth, and Maldon Battlefield each demonstrates the benefits of identifying and recognizing land historically associated with warfare. While formal recognition of the 46 registered battlefields conveys a certain level of appreciation and awareness, maintaining and improving the ecological condition of these sites is necessary to support regional biodiversity as well as surrounding communities and local economies.

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3.1 Introduction

As illustrated throughout this book, battlefield sites are often located in highly productive environments. These complex landscapes blend social and ecological histories, and through their careful stewardship, can provide varied ecosystem functions that serve to benefit local communities as well as regional biodiversity. Revealing the layered character of naturalized military landscapes emphasizes the historical and present-day narratives that embed these sites with meanings and values (Hourdequin and Havlick 2016). Recognizing these stories plays an important role in developing successful conservation strategies. In this chapter, we describe an approach to managing battlefields that pays tribute to their past and paves the way for their sustainable future. Constructive conservation is an adaptive and flexible approach to management that aims to remain faithful to history while carefully considering the diverse values of the land (Drury and McPherson 2008; Catling 2013). The principles of constructive conservation, established by Historic England and practiced by the organization since 2008, guide the sustainable management of historic environments throughout the country (Bruce-Lockhard 2008).

England is home to over 500 recognized battlefields, stretching from the Roman occupation of Britain to World War II (Fig. 3.1), that together exemplify the country's rich and expansive military history (Rayner 2007). Undoubtedly, additional skirmishes occurred for which no accounts survived. Nevertheless, the high density of battlefield sites scattered throughout the English countryside is extraordinary. This long record of warfare is a function of England's turbulent and well-documented history, which can be considered in several, distinct phases.

3.2 A Brief Overview of England's Military History

The surviving documentation of English military activity begins with the invasion and occupation of Britain by the Romans in the first century. Although many accounts of battle exist for the Roman period, extending into the fifth century, they are mostly insufficiently detailed to permit the reliable geolocation of the battlefield sites. The lack of adequate spatial data continues through the Early Middle Ages (410–1065), which were a period of almost continuous warfare dictated by waves of Anglo-Saxon and Viking invaders from Europe, alongside internal struggles for supremacy as the nation of England unified and came into existence. Accounts of these conflicts are usually inadequate to determine even the general location of the battlefields. Where identification has been attempted, these locations remain controversial and the subject of ongoing debate amongst historians. For example, the location of the battle of Maldon (991 A.D.), one of three case studies presented below, has been widely accepted but is not without challengers (Bessinger 1963; Foard 2003). Unfortunately, a robust battlefield archaeology, which could be used to verify battlefield locations, is absent for this period.

Fig. 3.1 England's 46 Registered Battlefields. Stars indicate case study sites. Data from Historic England (2017a): https://historicengland.org.uk/listing/the-list/data-downloads/. Accessed 13 Dec 2016

Beginning around the time of the conquest of England by the Normans under William the Conqueror in 1066 and extending into the Middle Ages, the written evidence for battles grows much more detailed and the identification of sites becomes considerably easier. The years following William's death in 1087 were characterized by sporadic rebellions and civil conflict as different factions fought to gain control of the

Crown, and as the leading families sought to define the limits of the monarch's power. English military activities eventually expanded to other parts of the island of Britain. Edward I set about conquering Wales with an invasion in 1276, and this was completed with the installation of his son (later Edward II) as the first English Prince of Wales in 1301. However, none of the battles of this campaign occurred on England soil.

Edward I also was determined to conquer Scotland. Much of the fighting from this conflict took place in England as the Scottish were frequent invaders of northern England, and several of the most well-known English battlefield sites (e.g., Halidon Hill 1333, Neville's Cross 1346, Otterburn 1388, Homildon Hill 1402, and Flodden 1513) relate to this long, drawn-out struggle, which began in earnest at the end of the thirteenth century and did not reach its conclusion until the middle of the eighteenth century.

For much of the medieval period, England fought many of its major battles on the continent of Europe, primarily in France as part of the Hundred Years War. This conflict stretched from 1347 to 1453 as successive English kings attempted to lay claim to the throne of France. At home, the fifteenth century saw a major domestic conflict, the Wars of the Roses. These wars, which were essentially a series of internecine blood feuds over who had the better claim to the throne of England, included a number of major battles, beginning with the first battle of St. Albans in 1455 and effectively concluding with the defeat of Richard III at the battle of Bosworth in 1485. Bosworth, another of our three case-study sites, represents to many historians the end of the Middle Ages in England and led to the rise of a new dynasty, the Tudors. It is worth noting that the location of almost no battlefield from the Middle Ages period is without suggestions of alternative sites. Even a battle as pivotal as Bosworth was recently found to be incorrectly located in its original designation (Foard and Curry 2013).

A few years earlier, the battle of Towton in 1461 had the dubious distinction of being the bloodiest battle fought on English soil with a death toll estimated at 28,000 out of 75,000 combatants. Towton also is significant in that it is the first English battle for which there is any substantial archaeological evidence that could be used to geolocate the site. A mass grave was discovered in 1996 containing the remains of the soldiers who died on the battlefield.

During the Early Modern Period that followed, there were few battles fought other than a number of doomed attempts to displace the newly established Tudors and occasional reoccurrences of Anglo-Scottish border warfare. Major hostilities resumed in the middle of the seventeenth century with the British Civil Wars.

The period from 1639 to 1651 saw the outbreak of armed conflict between the Stuart king, Charles I, and the forces of Parliament leading to the execution of Charles in 1649, the abolition of the monarchy, and England's only period as a republic, which lasted until 1660 when Charles' son was restored as Charles II. The exact number of battles fought during this short period depends on the particular definition of a battle used but by most accounts was well in excess of 50 (Brooks 2005). Many of these were relatively small, localized affairs. Of the major engagements, the battle of Naseby in 1645 was the pivotal moment after which the king's defeat became inevitable. The sites of these battles were generally well-recorded and changes in the nature

of warfare with the use of firearms has provided useful battlefield archaeology to support the written record. This comes both in the form of recovered artifacts and changes to the landscape associated with warfare, such as the construction of earthworks.

With the end of the Civil Wars, the number of battles fought on English soil decreased sharply, concluding with the two failed uprisings in 1715 and 1745 by the surviving members of the Stuart dynasty. The last battle fought on English soil is often taken to be the battle of Clifton Moor in 1745 between the retreating Prince Charles Edward Stuart ("Bonnie Prince Charlie") and the English forces of the Duke of Cumberland.

Neither of the major World Wars of the twentieth century saw any fighting on English soil. Neither the Battle of Britain in 1940, fought in the skies over southern England, nor the Blitz, the German bombing of London and other major cities, were traditional ground campaigns, despite being significant military actions. A number of other activities associated with these wars, such as building trenches for training in World War I and the construction of airfields and defensive structures during World War II, were later memorialized, but these actions were not strictly battlefields. Smallwood and Lookingbill (Chap. 12 in this book) describe the evolution of warfare away from these formalized battlefields and comment upon the implications for future conservation efforts.

3.3 Conservation Policy and the Realization of Battlefield Significance

The English government began formally recognizing monuments and structures particularly representative of England's heritage in 1882 through the Ancient Monuments Protection Act. The Act provided the first state protection for ancient monuments in the UK; however, it was argued that for the legislation to be effective, an inventory of significant ancient and historical monuments and constructions must be compiled and sustained (Murray 2015; Brown 1905). The Royal Commission on the Historical Monuments of England, a government advisory body, was therefore established in 1908 to supplement the 1882 Act by documenting buildings, monuments, and landscapes of archaeological, architectural, and historical importance throughout England (Sargent 2001).

By 1933, the collection consisted of 273 sites all recognized for qualities particularly illustrative of England's extensive history (English Heritage 2016). The original list, compiled with the primary objectives of recognition and preservation, was at first confined to landscapes and ancient structures such as Stonehenge and Rievaulx Abbey. It would later come to include great stately houses and castles, but did not yet include any areas of conflict.

The conservation and protection of battlefields began in the mid-1990s and is marked by projects such as the Towton Battlefield Archaeological Survey, the founding of the Battlefields Trust, and the development of the English Heritage Register of Historic Battlefields (Ferguson 2013). Although battlefield landscapes

were often acknowledged implicitly alongside ancient structures, buildings, and monuments, these new actions signified a formal effort to identify and protect English battlefields for the first time. The creation of the Battlefield Register and the advocacy for these sites by the Battlefields Trust represents an important transition in the government's relationship with these historic landscapes.

In 1999, English Heritage, then a statutory advisor on all aspects of the historic environment, merged with the Royal Commission on the Historical Monuments of England with the goal of improving management and increasing visitation to historic sites. By the mid-2000s, funds raised from visitors began to contribute to the maintenance and conservation of battlefield sites, and by 2011 the collection of sites produced an operational surplus (English Heritage 2016). In response to this success, the government agreed to transfer the responsibilities of the national heritage collection to a charitable trust. On April 1, 2015, English Heritage separated into two distinct entities: a charity that looks after the collection of sites open to the public, which retained the name English Heritage; and Historic England, a non-departmental public body that runs the statutory protection system, advises the government, and provides various support to a range of bodies and groups.

Despite the significant progress that has been made in identifying and managing England's battlefields, conservation efforts are regularly constrained by equivocal planning policies that continue to impede the effectiveness of battlefield protection.

3.3.1 The Ambiguities of Battlefield Protection

In England, the National Planning Policy Framework sets forth the government's economic, environmental, and social planning policies. The framework provides a system through which local people and their associated councils can construct regional and neighborhood procedures that reflect the needs and priorities of their communities (Department for Communities and Local Government 2012). Land management, including the development of historical landscapes, is in fact referenced in the current framework; however, vague and ambiguous language often prevents the continual protection of battlefields and other "designated heritage assets" (DCLG 2012). It is outlined in the planning framework that "great weight should be given" to the conservation of such assets when considering the impact of proposed development. Section 12 of the framework establishes that "significance can be harmed or lost through alteration or destruction of the heritage asset or development within settings," and that "substantial harm or loss" should require "clear and convincing justification" (DCLG 2012). The standards that define these categories of "harm" and "loss" are never clearly presented, and protection cases presented in favor of battlefield conservation are often lost. The Battlefields Trust's Statement on Planning directly expresses this concern:

> Unfortunately, the NPPF does not spell out what constitutes harm or substantial harm, particularly in the case of battlefields where development impacts on sight lines or micro ter-

> rain are vital to obtaining an understanding of the battle … planning authorities do not always appreciate this, leading them sometimes to underplay the extent of harm resulting from development (Battlefields Trust 2012).

The position stands in reference to registered and unregistered battlefields. Each time a case arises, the Battlefields Trust and other invested entities must argue against poorly defined language that is subject to interpretation. While registered battlefields are technically listed as heritage assets that require consideration through planning procedures, the impact of development is often miscalculated or misunderstood. Current policy is therefore insufficient in providing the necessary protection for these important areas of historical and environmental significance.

3.3.2 Constructive Conservation

England's heritage is paramount to its success as a nation. Historical landscapes, specifically areas of significant conflict, engender a sense of identity, history, and place (Magnus 2015). Historic England maintains that such legacies provide a "powerful stimulus" for domestic and international tourism, attract businesses and worldwide enterprise, "inspire creative industries," and add value to the "national brand" (Magnus 2015). An appreciation of heritage has a profound effect on the way individuals within a society feel and behave, as heritage influences interpretations of the past and aspirations for the future. The physical evidence of warfare evident at English battlefield sites provides a looking glass into past human behaviors and forms a correspondingly important part of the historic environment (Foard 2008). There is substantial public and educational interest in battlefields and similar landscapes of conflict (Pollard 2003); however, "if the battlefield is to have more than commemorative value, than the character of its landscape at the time must be understood" (Foard 2008). Practicing and promoting the principle of constructive conservation, which supports the idea that heritage can act as a dynamic cultural force, has in turn facilitated the development of a society whose support and enthusiasm for the historic environment has never been greater (Magnus 2015).

Constructive conservation is a flexible approach to management that uses change to reinforce the unique features of a site, rather than diminish them. Centered on the core concepts of "repair, care, and sustainability," the aim of constructive conservation is to balance the preservation and adaptation of landscapes in a way that promotes their function and interpretation (Coskun 2015). While skeptics have expressed fear that this method has potential to weaken the protection of historic nature, the active and collaborative creation of new, intensely managed ecosystems instead maximizes land-use in an ecologically viable fashion (Technische Universität Darmstadt 2013). This concept of change that accommodates for historical significance has had a valuable role in the development of conservation philosophy. The emphasis that constructive conservation places on innovative schemes that protect and enhance historical landscapes signifies their potential in terms of ecological, economic, educational, and cultural services.

3.4 Registration Criteria and Battlefield Designation

Battlefield sites are selected for designation based on a set of criteria that seeks to determine which battlefields best exemplify English heritage. The requirements outlined by the English Heritage Register of Historic Battlefields defined what battlefields were, as well as those factors that impact the level of special historic interest (English Heritage 2012). According to the selection guidelines, a site may be considered a battle only if it hosted "wholly or largely formed bodies of armed men, normally deployed and engaged under formal command" (English Heritage 2012). More specifically, the action must involve military forces present on each side in numbers comprising battalion strength (i.e. totaling c.1000 or more), organized in formal battle array (Foard 2008). The areas in which the troops deployed and fought while in battle formation define the boundaries of the battlefield. For management purposes, the immediate context of the battle must be properly delineated to include critical elements of subsidiary action alongside the main action. The Battlefields Registration Selection Guide (Historic England 2017b) includes the further specifications that siege sites, events of civil unrest or rioting, sites of aerial or naval bombardment, aerodromes, and bomb sites are not included in the Register of Historic Battlefields, but may be recognized through other designations.

Sites that qualify as battlefields are then assessed based on two primary criteria: historical significance and securely identified location. If the site of a battle is to merit registration, it has to have been an engagement of national significance that is capable of close definition on the ground (Historic England 2016). Although battlefields have frequently been the setting for crucial turning points in English history, most battlefields pose a challenge of how to locate events within their contemporary landscape. Only when the conflict has been accurately located can the terrain be used to understand the event itself. It is therefore necessary that the battle be placed accurately in context using the written and archaeological record (Foard 2008). However, secure and substantial archaeological evidence has yet to be retrieved from any English battlefield before the fifteenth century, and the comparative scarcity of knowledge of earlier periods of conflict is reflected in the Register entries (English Heritage 2012).

While historical significance and secured location are the key factors in determining a battlefield's merit for designation, other present features may add to the likelihood of registration, or grant increased significance to particular aspects of a site. For instance, *topographic integrity*, the survival of the character of the landscape at the time of the battle, is highly valued for its importance in interpreting the site in its historical context. The *archaeological potential* for the discovery of graves, structures, projectile scars or assemblages of bullets, arrowheads and personal effects, may also be considered, and archaeological evidence presents a unique perspective on the course and location of events. *Research potential* for further interpretation, especially in older sites, is also derived from documentation, including contempo-

rary chronicles and preserved state papers, as well as letters, memoirs, accounts, biographic associations, and commemorations, all of which enhance the historical significance of a site by supplementing explanations of the actions that took place (Historic England 2017b).

From 1994 to 1995, English Heritage assessed 71 actions for inclusion on the Register; 43 qualified for inclusion based on the criteria, and were subsequently added to the Register. Eight sites were denied inclusion due to condition, while five failed to meet sufficient location accuracy. The remaining locations were discarded, as they did not meet the classification qualifications, and could not properly be labeled as battles (Foard and Morris 2012). Since the original evaluations in 1995, three more sites, including Edgcote and two at Lostwithiel, were added to reach the current total of 46 Registered English Battlefields.

The establishment of the Battlefields Register in 1995 was an important step in the conservation of English battlefields; its purpose is to offer protection through the planning system and to promote a better understanding of battlefield significance alongside public enjoyment (Historic England 2016). Unfortunately, ambiguous planning guidelines often inhibit the effective conservation of these sites, and many of the battlefields are still vulnerable to threats including development, contamination, and cultivation (Marsh 2016). However, when preserved and managed in a constructive fashion, English battlefields offer valuable ecological services on local and national scales.

In the sections below, we describe the approach to constructive conservation as it is applied to three historic English battlefields that vary in management focus (Table 3.1). For each site, we describe the ecosystems present and document the range of ecosystem services provided. We illustrate the different management strategies present at each site to highlight the adaptability of the constructive conservation methodology. We address environmental threats and concerns associated with each battlefield and quantify the changes in land cover type within and around each site over a 17-year period from 1990 to 2007. We end with some general lessons for landscape management in an effort to provide guidance for future conservation of historical landscapes throughout England and the world.

Land cover data for the analyses were acquired through the Centre for Ecology and Hydrology for the years 1990 (Fuller et al. 1994), 2000 (Fuller et al. 2002), and 2007 (Morton et al. 2011). Each land cover map comprised a digital dataset providing classification of land cover types at a 25 m resolution. The three land cover datasets varied in number of classes, class names, and projections. The data were reprojected in ArcGIS 10.4 to the original 1990 projection, and then the descriptions of the different land cover classes for the 3 years were compared in order to create aggregate classes. Aggregate class categories (see Table 3.2) were derived from those provided in Table 2 of the "Countryside Survey: Land Cover Map 2007 Dataset Documentation" (Morton et al. 2011). Three-kilometer buffers were then created around the three case study sites (Fig. 3.2), and land cover change was quantified for each case study battlefield and buffer for the 17-year interval.

Table 3.1 Attribute comparison of the three case study sites

	Naseby	Bosworth	Maldon
Size	452 ha	1072 ha	42 ha
Focus	Education	Community	Ecology
Site Features	Viewpoints Interpretive panels Battlefield trail	Battlefield center Battlefield trail Viewpoints	Battlefield trail Bird watching huts
Valuable Ecosystems	Hedges Wetlands	Grasslands Woodlands Wetlands	Mudflats Salt marshes Estuary Intertidal zone
Leading Management	The Naseby Battlefield Project	Leicestershire County Council	The National Trust
Persisting Threats	A14 roadway Lack of hedge maintenance Windfarm construction	Landowner intentions Modern agriculture Development	Land claim Waste pollution Sea level rise

Table 3.2 Aggregation of land cover classes across the three Land Cover Map (LCM) datasets (1990, 2000, 2007). Aggregate classes derived from LCM2007 Dataset Documentation (Morton et al. 2011)

Aggregate Class	LCM 1990	LCM 2000	LCM 2007
Broadleaf Woodland	Broadleaf Woodland	Broadleaf Woodland	Broadleaf Woodland Felled Forest
Coniferous Woodland	Coniferous Woodland	Coniferous Woodland	Coniferous Woodland
Agriculture	Arable and Horticulture	Arable Cereals Arable Horticulure Arable Non-rotational	Tilled Land Scrub/Orchard Mown/Grazed Turf
Grassland	Improved Grassland Calcareous Grassland Neutral Grassland Rough Grassland Acid Grassland Fen, Marsh, Swamp	Improved Grassland Calcareous Grassland Neutral Grassland Setaside Grassland Acid Grassland Fen, Marsh, Swamp	Moorland Grass Meadow/Verge Meadow Rough/Marsh Grass Grass Heath
Saltwater	Saltwater	Saltwater	Saltwater
Freshwater	Freshwater	Water (Inland)	Inland Water
Bare Ground	Inland Rock	Inland Bare Ground	Inland Bare Ground Ruderal Weed
Coastal	Littoral Rock Littoral Sediment Supra-littoral Rock Supra-littoral Sediment Salt Marsh	Littoral Rock Littoral Sediment Supra-littoral Rock Supra-littoral Sediment Salt Marsh	Beach and Coastal Bare Salt Marsh
Developed	Suburban Urban	Suburban/Rural Development Continuous Urban	Suburban/rural Development Continuous Urban

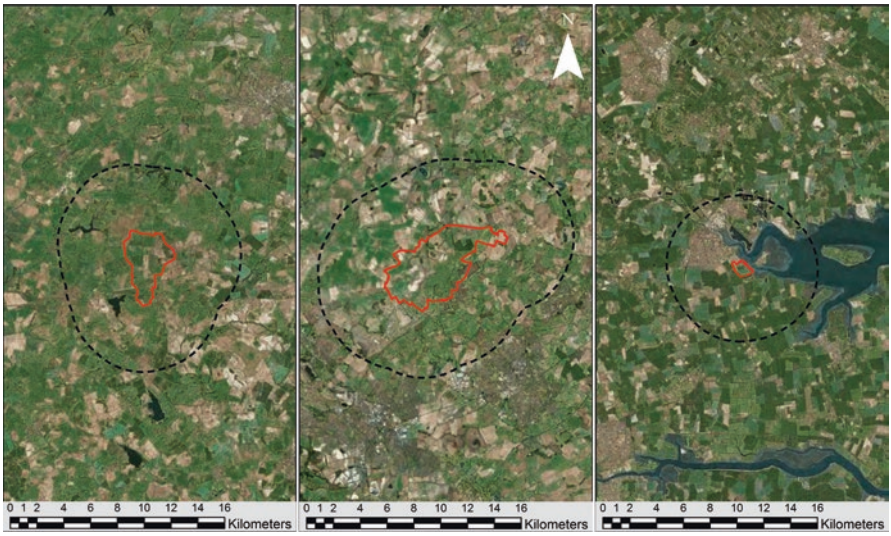

Fig. 3.2 Landscape heterogeneity in and around case study sites: Naseby, Bosworth, and Maldon (shown from left to right). Red boundaries indicate the Registered Battlefield border. Dotted lines represent a 3-km buffer. Boundary lines from the Battlefields Trust and imagery from Google Earth (1 October 2016)

3.5 Naseby Battlefield

Naseby Battlefield (52°24′31” N, 0°59′54” W), which marks the most important battle of the First Civil War, is replete with interpretive features that allow visitors to understand the relationship between the landscape and its history. Fought on June 14, 1645, the Battle of Naseby was the decisive engagement of the British Civil Wars between the main Royalist army of King Charles I and the Parliamentarian New Model Army commanded by Sir Thomas Fairfax and Oliver Cromwell. At the conclusion, practically the whole of the King’s infantry was either killed or taken, marking the end of any realistic chance of victory for the Royalists in the First Civil War, and assuring the supremacy of Parliament in England (Rayner 2007). The battle boundary lines established by English Heritage in 1995 include over 450 ha of land northwest of the village of Naseby within the county of Northamptonshire. While it is most popular for its recognition as a Registered Battlefield, the area also hosts a number of working farms alongside pond and hedgerow ecosystems with high levels of biodiversity. The interwoven nature of Naseby’s natural and military histories contributes to the significance of the terrain itself, as well as the character of the many services it provides.

3.5.1 Ecosystems & Services Provided

The character of the terrain at Naseby is particularly important to its historical interpretation, as a number of the topographic features are understood to have affected the decisions of the commanders, thus altering the course of the battle. The most prominent example involves two ridges: Dust Hill in the north and Naseby Ridge in the south. The ridges run approximately east to west, but are not parallel to one another, so the valley between is wider in the west than the east. From the Royalists' position atop Dust Hill, marked today as Rupert's Viewpoint, they were unable to see the New Model Army concealed by Naseby Ridge. However, as the New Model Army headed north out of Naseby Village, crossing the ridge, they gained view of the entire field of battle, including the position of their Royalist enemies (M. Marix Evans 2016, personal communication, 5 August).

While these high ridges are certainly major features in Naseby's historical topography, also prominent today is a succession of low ridges revealed when the woodland was cut down and replaced by the strip allocation system of agriculture dating back before the 1645 battle. The undulations of ridges and furrows impeded the motion of cavalry during the battle, and served to screen the movements of the two armies from one another (English Heritage 1995a). The steepness of the slopes, then covered with scrub, coppice, and gorse, created a terrain intensely hostile to mounted maneuvers (Marix Evans 2014). While the battlefield area may appear superficially to be no more than plots of common agriculture, the military history of the landscape transforms the undulating fields into a setting that, in every detail, illustrates the happenings of the most significant battle of the British Civil Wars. The terrain, in its character and storytelling, provides a unique opportunity for place-based education that expands across topics of military history, English heritage, geology, and landscape ecology, with the potential to inspire a sense of national identity tied to both the battlefield and environmental conservation.

3.5.1.1 Hedges

The iconic Sulby Hedges are the most illustrative example of a biotic landmark that seamlessly weaves ecology and history (Fig. 3.3). Similar to the site's ridges and furrows, the distinctive vegetation is a defining landscape feature, as the battlefield boundary created by the robust foliage is still present today. The hedges were used at that time as a barrier to enclose or exclude animals, and as a protective force against marauders, but they also mark the area in which Cromwell posted his dragoons (English Heritage 1995a). Despite this seemingly uninviting history, the hedges play an important role in the present-day conservation of wildlife diversity. The thick foliage provides food and shelter resources, and also creates stretches of linear corridors across the countryside. Hedgerows function as exemplar corridor structural elements by (1) facilitating species movement, (2) acting as habitat for

Fig. 3.3 View from Fairfax's Viewpoint to Sulby Hedges in Naseby Battlefield. Image provided by Battlefields Trust: https://www.flickr.com/photos/thebattlefieldstrust/. Accessed 31 July 2018

certain species, particularly edge species, and (3) creating a barrier between adjacent fields (Forman and Baudry 1984). For example, hedgerows throughout lowland farming landscapes in Britain comprise one of the most important surviving elements of semi-natural habitat for birds (Hinsley and Bellamy 2000). In addition to providing cover for local and long-distance movement, hedge habitats promote nesting and act as roosting and foraging sites as well (Whittingham and Evans 2004; Davies and Pullin 2007; Wolton et al. 2013). Butterflies are another major beneficiary, with one review study finding that 64% of all British butterfly species have been recorded within hedgerows (Dover and Sparks 2000). Examples of notable species found within the Sulby hedges include the bullfinch (*Pyrrhula pyrrhula*) and the gatekeeper butterfly (*Pyronia tithonus*). Scrambling and climbing plants such as bittersweet (*Solanum dulcamara*) and hedge bingeweed (*Calystegia silvatica*) also rely on the hedge structures for survival (McCollin et al. 2000). These species in turn produce nectar and berries that support higher trophic levels, including the flesh-fly (*Sarcophaga carnaria*) and common garden spider (*Araneus diadematus*). At the ecosystem level, the vegetation supports its surrounding environment by stabilizing the soil and preventing erosion. Hedges serve as guides for contour cultivation, but also slow and disperse surface runoff (Dabney et al. 1999). Therefore, while the iconic hedges are deemed significant primarily for their presence in Naseby's history, they continue to provide measurable ecological benefits.

3.5.1.2 Wetlands

In addition to the Sulby Hedges, the Northamptonshire Natural History Society has recognized and provided interpretive features for two wetland ecosystems within the Naseby Battlefield borders. Tarry's Pond illustrates a focus on native ecology and the ecological potential of well-managed wetland sites. In the summer of 2011, the pond was cleared of decaying leaves and other natural debris in order to create a potential haven for wildlife in need of freshwater habitat. Since the cleaning, a number of species have colonized the area including frogs (*Rana temporaria*), toads (*Bufo bufo*), grass snakes (*Natrix natrix*), and one of the country's most distinctive native species, the peacock butterfly (*Inachis io*). Dragonfly Pond, an intermittent freshwater source, provides a similar service in its ability to host wildlife. Dragonfly nymphs and invertebrate larvae burrow down into the mud when the pond dries, but survive and re-emerge when water returns. The margin of the pond also supports distinctive marsh vegetation including sedges (glaucous sedge (*Carex flacca*)), rushes (jointed rush (*Juncus articulatus*), soft-rush (*J. effuses*), compact rush (*J. conglomeratus*)), and grasses (marsh foxtail grass (*Alopecturus geniculatus*)).

Both Tarry's Pond and Dragonfly Pond are contained within the borders of the registered Naseby Battlefield, yet they provide supporting and cultural ecological services unrelated to the historic label under which they fall. Compared to other freshwater environments such as rivers, streams, and lakes, ponds generally support the highest number of species and have the highest index of species rarity (Williams et al. 2003; Scheffer et al. 2006; Céréghino et al. 2008a; Davies et al. 2008). Although fish biomass is comparatively low, the high abundance of submerged vegetation increases the richness of aquatic birds, plants, amphibians, and invertebrates. This is especially the case in cultivated areas. Ponds within agricultural landscapes, man-made or natural, make a significant contribution to regional aquatic biodiversity (Céréghino et al. 2008a; Davies et al. 2008). In addition to increased species richness, ponds also provide supporting services such as nutrient interception and hydrological regulation. The many environmental benefits present equally valuable educational opportunities. Tarry's Pond and Dragonfly Pond can be examined as powerful model systems for studies in ecology, evolutionary biology, and conservation biology, and can even be used as sentinel systems in monitoring global change (Céréghino et al. 2008b).

3.5.2 Management

3.5.2.1 Ownership

The key to revealing the significance of Naseby's landscape lies in its interpretation. The layered history should be accessible to the modern, casual visitor as well as the scholar, and the responsibility of this great task has been divided among multiple participants over the years. In 1823, a large obelisk commemorating the battle was erected about a mile southeast of the battlefield (English Heritage 1995a). During the 1930s, the Cromwell Association installed a second memorial on the battlefield

itself. In 1991, the Northamptonshire Archaeology Unit produced the first interpretive panels for the Battle of Naseby to accompany the two historic monuments (English Heritage 1995a). In 1995, the location was designated a Registered Battlefield by English Heritage with the hopes of introducing viewpoints and visitor access points throughout the privately-owned countryside. However, as news of such plans spread to the resident landowners, so did local panic and rumors of compulsory purchase of the land by the state. This miscommunication, which at the time blunted any sort of visitor access or interpretive development, led to almost 5 years of careful relationship building between the farmers and battlefield historians. While matters remain delicate, the relationship has greatly improved since the initial conflict in 1995, and the importance of landowner respect and consultation has been thoroughly acknowledged by those responsible for site conservation (M. Marix Evans 2016, personal communication, July 24).

In 2001, the Naseby Battlefield Project was established to raise funds for the refurbishment of the two monuments, as well as their integration into the Naseby Battlefield Tour, complete with interpretation panels, guided walks, and parking facilities. Through personal communication, public meetings, and open and honest conversation, lingering tensions with landowners were reduced, and interpretive development and public visitation finally began to flourish. In 2006, Chair of the Project Management Committee, Martin Marix Evans, told BBC news that "after five long years, the Naseby Project [had] truly begun" (BBC 2006). By 2007, the charitable company was established, and since 2008, it has been possible to visit the landscape and follow the events of that day using the Battlefield Trail (Marix Evans 2011). The project was funded in bulk by East Midlands Tourism, Biffaward, Northampton County Council, and the Sealed Knot, England's leading Civil War re-enactment society, but was also made possible by a grant from the Heritage Lottery Fund (Marix Evans 2011). Furthermore, alliances with the Field Studies Council, local primary schools, the Northamptonshire Natural History Society, and even the Royal Society for the Protection of Birds, have all contributed to the active interpretation of Naseby Battlefield for both its political and natural history.

3.5.2.2 Interpretive Features

The viewpoints, trails, and panels available at Naseby are designed to fully immerse visitors into the perspectives of the participating forces during the war. Viewers are encouraged to compare what can and cannot be seen at Fairfax and Rupert's viewpoints, respectively. Moving across the two ridges and through the Broadmoor Valley reinforces the limitations of a static viewing of a battlefield, and emphasizes that one must travel through the landscape to understand the perceptions of the combatants and their leaders (M. Marix Evans 2016, personal communication, 16 August). Independent military historian, and former trustee of the Battlefields Trust, Marix Evans reflects:

> My personal belief is that it is vital to travel, on foot or cycle, through the landscape, rather than attempt to understand it from a static viewpoint. Moving along, it is inevitable that you will pass crops, hedges, trees, and so forth, together with flowers and various sorts of cover. I have seen buzzards and red kites flying over Naseby field, as well as many songbirds.

> Rabbits abound, and one may spot the occasional fox or deer. Insects are numerous and pond life is visible, all because you are following in the footsteps of a 17th century soldier. Immersed in the terrain, you experience far more than what an academic study of a battle would give you. The battle and its landscape are unavoidably intertwined. The more versatile your appreciation of then and now, the richer your experience.

The interpretation boards located at the platforms are intended to help the visitor "make an independent valuation of the scene from the eye-level of [a mounted] officer" (Marix Evans 2014). From the elevated platform, viewers can personally assess the validity of the contested belief that the New Model Army initiated contact. An additional interpretation board at Rupert's Viewpoint provokes further analysis of the landscape, as it juxtaposes a modern map against the 1630 field map, highlighting the differences in terrain and biota. Other helpful interpretive features include three-dimensional diagrams, panoramas, and identifying flagpoles that are displayed when visitors are expected in larger numbers. The Battlefield Trail at Naseby is successful because it not only invites visitors to think thoughtfully and imaginatively about the site's history, but also because it encourages new and creative ideas about the way in which individuals interact with their environment. The installation of such features allows the historic terrain to benefit visitors on a recreational, educational, and emotional level.

Interpretative guides in battlefield parks provide a cultural service to the community by weaving together a national consciousness and helping visitors to develop a sense of place (Ryan 2007). Naseby Battlefield is largely undeveloped, with the key areas and views "unspoilt" (Rayner 2007). The potential of battlefield landscapes is realized when they inspire individuals across generations, rather than a narrow group of enthusiasts. The working members of the Naseby Project have recognized the benefits of broad outreach, and have subsequently devised projects and field days with local colleges and primary schools (Fig. 3.4). As an example of these efforts, an audio package project, devised with the Abbeyfield School, was the recipient of a regional award for Work with Children and Young People in 2010 (Marix Evans 2011). In that instance, primary children were prompted to consider both the natural and historical properties of the landscape under a constructive conservation-type framework by investigating the site's flora and fauna under the aegis of OPAL (Open Air Laboratories) and the Northamptonshire Natural History Society.

3.5.3 Threats

Despite the many successes in management of its historical and environmental resources, the site still faces a number of persisting threats. In the early 1990s, the A14 dual carriageway was built across the southern edge of the battlefield, separating the village of Naseby from the remainder of the battlefield (Rayner 2007). In 1995, when Naseby was added to the Battlefield Register, it was noted that "although [the road is] largely hidden by being set in a cutting, it is as yet uncertain how much

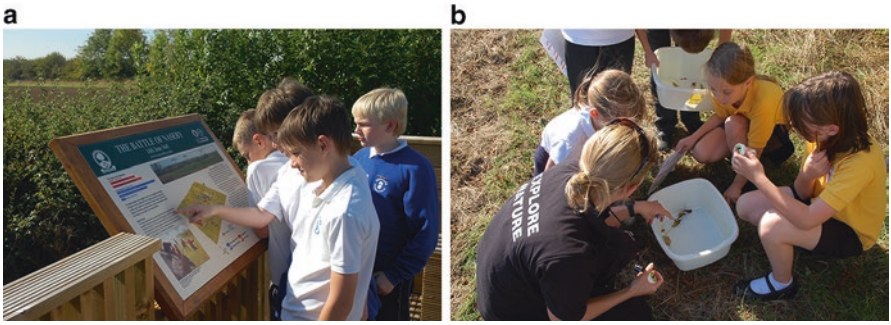

Fig. 3.4 Naseby Battlefield's educational ecosystem services. (**a**) local students reading the information panel at the Sulby Hedges Viewpoint; (**b**) students identifying collected insects during a "Natural History Day" assisted by OPAL (Open Air Laboratories). Images provided by the Naseby Battlefield Project, 2011

traffic noise will be audible in the battlefield area" (English Heritage 1995a). Later sources report consistently negative impacts of the road, describing it as the "most obvious intrusion…[that] cuts a swathe across the landscape," (Partida et al. 2013) and "an irreversible decision…to commit sacrilege across the battlesite of Naseby" (Chandler 1989). As reflected by these critiques, noise and compromised aesthetic have the potential to alter visitor experience and diminish the ecosystems services provided.

The damage is not restricted to the cultural sphere. Habitat loss and deterioration are often directly related to the expansion of roads and urbanization. The pervasiveness of transportation infrastructure in all European countries has fragmented ecosystems on an expansive scale, reducing core habitat area and connectivity (Torres et al. 2016). When road construction and associated human activity interrupt a historically and environmentally significant landscape, the ability of the landscape to provide a robust set of ecosystem services is jeopardized. In this instance, the construction of the A14 provoked a new dedication to the preservation of English battlefields that has led to protect those services. The controversial issue sparked the concern of historians as well as neighboring communities, and eventually resulted in the publication of the Battlefields Register and the establishment of the Battlefields Trust (Rayner 2007; Ryan 2007). While the primary focus of the Register and Trust was never explicitly to preserve ecosystems or biodiversity, that has been a collateral outcome.

Another ongoing threat is the lack of maintenance of the iconic bordering hedges. In their report on the historic environment of Naseby, the Rockingham Forest Trust describe the current state of the hedges as compromising the character of the battlefield and preventing the land from being thoroughly appreciated (Oreszczyn and Lane 2000; Partida et al. 2013). The potential construction of the Kelmarsh wind farm adjacent to the battlefield presents a similar threat to park aesthetics and ecology. The windfarm, if completed, would comprise four 415-ft turbines and two 397-ft turbines built in the area where the Parliamentarians were drawn into battle

formation and first spotted by the Royalists (Copping 2012). Although the government-appointed planning inspector acknowledged that the turbines would "introduce another modern element into views" and "detract from the significance of the battlefield," it was ultimately concluded that "the degree of harm would be less than substantial" (Griffiths 2011). Word of the project brought forth heated objections from heritage conservation groups; however, leaders of the project ultimately decided, "in terms of the age of the designated heritage assets affected … [the disturbance] is relatively insignificant" (Griffiths 2011). While the central concern of those contesting the wind farm is historically based, massive wind turbines introduce a variety of threats to the area's ecology as well. The large size and extensive placement of turbines presents potential hazards to birds and bats, while the associated infrastructure including roads and transmission lines can cause further habitat fragmentation and provide avenues for invasion by exotic species (Kuvlesky et al. 2007).

Such conflict between competing uses of the land bring into focus the scope of research and high level of coordination required to preserve and utilize battlefields more effectively as a resource. Academic research about site military and natural history is vital but must be complemented by effective organizational structures and appropriate funding. While the passion for battlefield conservation and interpretation has been fervent since the creation of the Register, financial obstacles often present challenges for the charitable societies dedicated to preserving English heritage. Resolving these challenges can require creative partnerships. For example, in 2013, the Naseby Battlefield Project had hoped to purchase land overlooking the battle site in order to construct a new museum (BBC 2013). However, the project fell short of the £300,000 necessary, and the committee had to adjust planning based on available funds. A new joint project with Naseby Church was then established in order to facilitate the curation of a visitor center museum for the battle within a historic place of worship (BBC 2013).

3.5.4 Naseby Land Cover Assessment

The 2000 land cover data (Fuller et al. 2002) indicate that Naseby Battlefield is composed mainly of agricultural and grassland habitats with small patches of broadleaf woodland (Figure 3.5a). This is a landscape highly representative of the historical British countryside. Many of the small, intermittent man-made lakes and ponds created in the agricultural areas, as well as other natural wetland habitats, are not readily apparent in this coarse-grained dataset. The highly valued hedgerows between fields are also difficult to discern at this resolution. Put together, the wetlands and hedgerows provide a substantial portion of the ecological benefits within this largely agricultural landscape but are not easily identifiable using standard land cover data.

The comparison between the battlefield landscape and the surrounding 3-km buffer demonstrates the representativeness of the site to the greater region. The two areas of analysis are similar in composition. Both the battlefield and its buffer feature large swaths of agricultural land, comprising nearly 50% of both areas

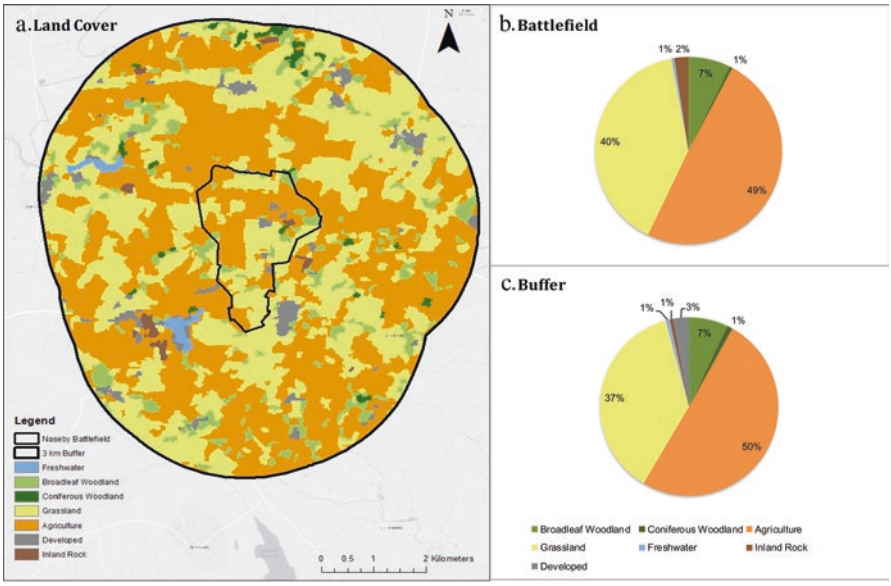

Fig. 3.5 Comparison of land cover in and around Naseby Battlefield. (**a**) Spatial distribution of land cover types has been converted to percentages within (**b**) the Battlefield and (**c**) the surrounding 3-km buffer. Data represent land cover breakdown in 2000 (Fuller et al. 2002)

(Fig. 3.5b, c). Percentages are also similar when assessing the less prominent land cover classes. It is apparent from these data that, at least at present, the land cover within Naseby Battlefield is characteristic of its surrounding and historical area. If these are landscapes that are deemed valuable, then battlefield identification, registration, and management through the tenets of constructive conservation can be a useful tool for their preservation into the future.

3.6 Bosworth Battlefield

The Battle of Bosworth stands alongside Naseby as one of the most iconic battles fought on English soil. The decisive battle on August 22, 1485, saw a dramatic military reversal in which the forces of Henry Tudor defeated a larger royal army led by Richard III, the last king of the House of York (Foard and Curry 2013). At the conclusion of the battle, Henry VII, the most favored alternative candidate for the throne, was crowned victorious, bringing to an end the dynamic struggle known as the Wars of the Roses (English Heritage 1995c; Ingram 2016). Today, Bosworth Battlefield (52°35′07.02” N, 1°25′35.72” W) represents what is “possibly the best-preserved battle site in the country” (Conduit 2004), despite the numerous contradictory

theories regarding the location boundary set by English Heritage in 1995 (English Heritage 1995c). The original battlefield borders, which covered approximately 632 ha of land, were drawn to include the outer reasonable limit of the battle in a way that could be easily appreciated on the ground (English Heritage 1995c). This area has since been expanded to 1071.76 ha based on evidence revealed by an archaeological survey in 2009, and the discovery of Richard III's remains in 2012 (Hinckley & Bosworth Borough Council 2014). The Bosworth Battlefield Visitor Centre established by Leicestershire County Council in 1976 has, based on the recent findings, redeveloped its extensive indoor interpretive facilities, adjusted the 6.5-mile footpath trail, and established new viewpoints across the battlefield landscape (AFA et al. 2013; Conduit 2004). Although the evolving interpretation of the landscape has greatly changed its composition, the extensive battlefield area continues to host a mix of ecosystems that provide agricultural, economic, and cultural benefits while simultaneously supporting natural cycles and regional biodiversity.

3.6.1 Ecosystems & Services Provided

The only aspect of the 1485 Bosworth Battlefield terrain that can be confirmed with any certainty is the presence of a marsh, mentioned independently by more than one contemporary or near-contemporary writer (English Heritage 1995c). During the time of the battle, the ground is said to have been a flat plain, mainly composed of fenland crossed by streams with an area of peat marsh, known as Fen Hole (Ingram 2016). Since the conclusion of the battle, however, the landscape has seen a considerable amount of activity and development, with land improvement practices occurring as soon as the sixteenth century, and enclosure of the land beginning around 1600 (English Heritage 1995c). The underlying geology of the battlefield area, including mudstone, sandstone, and drift deposits of boulder clay, as well as sand and gravels, results in a varied and agriculturally productive landscape (AFA et al. 2013). In recent years, the battlefield area, farmed by over 12 separate landowners in its southern portion, has been awarded an Agricultural Land Classification of Grade 3: good to moderate quality (AFA et al. 2013). The land use is therefore predominately agricultural, including crops of wheat, barely, and fodder beans (AFA et al. 2013). Although modern farming methods have resulted in a decrease of biodiversity (Jeeves 2010), this tranquil piece of English countryside is still said to provide a "sense of identity and belonging for locals," while "supporting local business" and offering "a range of recreation and leisure interests" (AFA et al. 2013).

3.6.1.1 Grasslands

The Leicester, Leicestershire, and Rutland Biodiversity Action Plan (BAP) recognizes 19 priority habitats in need of conservation and restoration (Jeeves 2010), including field margins and neutral grass fields, two habitats present throughout the

Bosworth Battlefield area. Field margins are defined as buffer zones that mark the boundaries between fields, crops, and roads. These ecosystems provide important wildlife corridors between species-rich areas, reduce soil erosion, enhance crop pollinator populations, and support arable weeds, one of the most threatened categories of plant in the UK (Marshall and Moonen 2002). Seeds from arable weeds, such as fat hen (*Chenopodium album*), are an important resource for many species of farmland bird. Sympathetic management of arable field margins therefore provides support to species such as the grey partridge (*Perdix perdix*), corn bunting (*Emberiza calandra*) and skylark (*Alauda arvensi*).

Species-rich neutral grassland once dominated Leicestershire and Rutland (Fig. 3.6); however, this ecosystem has since been damaged by agricultural practices such as ploughing and reseeding, as well as the use of extensive fertilizer and herbicide treatments (Potts et al. 2009). Characteristic species of this environment, including common knapweed (*Centaurea nigra*), cowslip (*Primula veris*), pepper-saxifrage (*Silaum silaus*), yellow-rattle (*Rhinanthus minor*), adder's-tongue fern (*Ophioglossum vulgatum*), and green-winged orchid (*Orchis morio*), have all been in decline since 97% of the habitat was destroyed between 1930 and 1984. The abundance of flowering plants in these meadows is crucial for pollination as they provide a source of nectar for many invertebrates including the common blue (*Polyommatus icarus*) and meadow brown (*Maniola jurtina*) butterflies as well as

Fig. 3.6 Bosworth Battlefield's meadow and grassland ecosystems. Image provided by the Battlefields Trust: https://www.flickr.com/photos/thebattlefieldstrust/. Accessed 13 Dec 2016

the chimney sweeper moth (*Odezia atrata*) (Öckinger and Smith 2006). Redemore Plain, the likely location of the physical Battle of Bosworth, is described in a Landscape Character Assessment (AFA et al. 2013) as relatively flat, low-lying land featuring linear transport corridors as well as fragmented areas of species-rich meadow. Kendall's Meadow, within Redemore Plain, was designated a Site of Special Scientific Interest (SSSI) as it is valued for its grassland and orchids, and illustrates the biological and scientific benefits of open, grassy environments.

3.6.1.2 Woodlands

The variety of woodland ecosystems within Bosworth Battlefield provides a wide range of ecosystem services. Categorized into four main categories (lowland wood pasture and parkland, mature forest, broadleaved woodland, and wet woodland), these priority habitats regulate local climate and air quality, sequester and store carbon, prevent erosion, and provide habitat for a number of rare and diverse species (Valatin and Starling 2010; Freer-Smith et al. 1997; Milne and Brown 1997; Yan et al. 2003). Lowland wood pasture and parkland is characterized by open grown trees at various densities visible across a matrix of grazed grassland, but the primary interest in these sites, similar to mature forest, is for their ancient trees. English oak (*Quercus robur*) is typically ubiquitous on these sites, but other non-native species may be present as well. Most importantly, these live and rotting trees are incredibly valuable for fungi; the Bosworth habitat specifically hosts five Red Data Book (RDB) species of beetle, two RDB species of spider, and two RBD species of lichen. The mature forest ecosystem is similarly significant for its diverse lichen communities, which include at least 50 species that are known to be locally rare. Additionally, the hollow and decaying wood provides roosting sites for seven species of bat, as well as birds including the redstart (*Phoenicurus phoenicurus*) and barn owl (*Tyto alba*), both BAP species.

In addition to providing habitat for a range of key species, the mature and lowland wood areas are also responsible for the landscape's distinctive scenic quality (AFA et al. 2013). The Shenton Parkland area within the battlefield border is especially notable for its inclusion of these woodlands, as well as its strong recreational and interpretative values (AFA et al. 2013). The broadleaved and wet woodland habitats, although less accessible to the public, are equally significant due to their regulating and supporting services. Approximately 11% of the broadleaf woodland habitat in Leicestershire and Rutland was totally destroyed between 1930 and 1985. The relatively small percentage of woodland that remains includes an ecologically important ancient semi-natural woodland found only on sites that have been continuously wooded since before 1600 A.D. (Jeeves 2010). Nearly 50% of the broadleaf woodland habitat today is fragmented into parcels, each less than 10 ha in size. Wet woodland, although it similarly hosts stands of ancient semi-natural woodland, is differentiated by its particularly high water table and dominant alder and willow species. Together, what is left of the broadleaved and wet woodland habitats has

developed into species-rich sites of high conservation value, housing populations of rare species such as the small-leaved lime (*Tilia cordata*) and the sessile oak (*Quercus petraea*).

3.6.1.3 Wetlands

Although the construction of the Ashby Canal between 1768 and 1804 severed the low-lying area of Redemore Plain, the waterway is still a historically and ecologically significant feature within the Bosworth landscape. In fact, the canal was designated a conservation area in 2009 for its historical significance, and included in the 2010 BAP for its importance as an ecological and recreational resource (NWLDC 2001; Hinckley & Bosworth Borough Council 2009; Jeeves 2010). The eutrophic standing water is nutrient-rich and particularly important for the nationally scarce grass-wrack pondweed (*Potamogeton compressus*) and the rare flat-stalked pondweed (*Potamogeton friesii*) (Jeeves 2010). Those who choose to walk the battlefield trail are directed along "an attractive part of the Ashby Canal which supports many species of aquatic wildlife" (Biggs and Biggs 2002).

The canal is not the only significant wetland feature, as the 2010 BAP also includes natural springs and flushes, reedbeds, and floodplains. The natural springs, present on steeper slopes such as Ambion Hill and King Dick's Well, occur where water wells up to the surface from underground aquifers, and are notable for their long history of hydrological continuity. Typical plants of springs include marsh-marigold (*Caltha palustris*), tussock sedge (*Carex paniculata*), great horsetail (*Equisetum telmataei*), soft rush (*Juncus effuses*), and marsh valerian (*Valeriana dioica*). Contrastingly, reedbeds are dominated by stands of common reed (*Phragmites australis*), and are notable in the UK for their support of four species of specialist birds: reed warbler (*Acrocephalus scirpaceus*), bearded tit (*Panurus biarmicus*), marsh harrier (*Circus aeruginosus*), and bittern (*Botaurus stellaris*). Floodplains, which encompass a range of wetland habitats, are not only important for wildlife, but for their role in natural filtration and flood alleviation as well.

3.6.2 Management

3.6.2.1 Ownership

Bosworth Battlefield, located near the town and civil parish of Market Bosworth, is owned in part and managed by the Leicestershire County Council (LLC) (Buhalis et al. 2012). Two other major landowners within the registered battlefield include the Shenton Estate and the Sutton Cheney Estate; the southern portion of the area hosts several private farms as well. The Heritage Centre and County Park are both run by the LLC on land leased from the two major estates, with a small strip along

the disused railway owned entirely by the LLC (AFA et al. 2013). Daily maintenance and security of the landscape and associated footpaths is provided by the Ranger Team as a part of the Council's portfolio of county parks (AFA et al. 2013). As the area spans a range of natural, historic, and private land, development and management are often dependent on active cooperation between Natural England, English Heritage, the LLC, the Hinckley & Bosworth Borough Council, the Canal and Rivers Trust, and others (AFA et al. 2013).

Despite the various interests and priorities of stakeholders, the goals set forth in the 2013 Conservation Plan have been widely accepted by the associated parties. Included in this report are not only environmental and historic conservation strategies, but corporate aims as well (Hinckley & Bosworth Borough Council 2014). Specifically, the county looks to maintain the battlefield and surrounding suburbs as a vibrant place to work and live that will "empower communities" and provide "value for money and pro-active services" (Hinckley & Bosworth Borough Council 2014). The Conservation Plan highlights the special nature of the area resulting from "the interplay of many different qualities: physical historical evidence, historical value through continuity and landscape features; the aesthetic value of quintessential, peaceful English landscape, and communal value – the importance of a place giving people a sense of identity, a place for commemoration, as well as being a working agricultural landscape" (AFA et al. 2013). With such a wide scope of benefits, many of the stakeholders have recognized the importance of a holistic and sustainable approach that encourages visitors and supports the local economy, while reducing damage to the fabric of the countryside (AFA et al. 2013).

3.6.2.2 Attractions and Amenities

Two attractions that contribute to this overarching goal of active and holistic conservation are the visitor center and the accompanying battlefield trail. The Bosworth Battlefield Visitor Centre, the first of its kind in England, was established in 1976 in order to provide descriptions of the battle and explain its historical context (Rough Guides 2012). Compared to other on-site, interpretive features such as monuments and viewpoints, the Centre offers a more sophisticated approach that includes extensive visitor amenities such as a bookstore and restaurant, as well as indoor space for conferences, meetings, and educational visits (Buhalis et al. 2012). The Centre helps distinguish Bosworth from other English battlefields as a tourism destination site, with annual visitation rates peaking at 37,000 paying visitors a year (Ryan 2007).

The battlefield trail has a similar allure, as it provides opportunity for both environmental and historical education as well as recreation. The route begins where Richard III's armies were camped, runs over Ambion Hill, from which the whole battlefield can be surveyed, passes through the plains that saw the majority of the fighting, visits the alleged site of Richard's death, and passes close to where Henry Tudor's troops camped (Conduit 2004). The majority of the trail crosses fields and follows quiet footpaths. The grassy track follows a footbridge over a stream, passes through areas of woodland, and concludes along the Ashby Canal (Biggs and Biggs 2002). In an effort

to diversify and increase visitation, the LLC has begun to reach out to older visitors in an attempt to facilitate multi-generational experiences between children and their grandparents (Buhalis et al. 2012). The renovated interpretative facilities, supported by the Heritage Lottery Fund in 2003, have developed an environment in which children and adults alike are able to discover how the Battle of Bosworth finally ended the feuding between the great houses of York and Lancaster (Biggs and Biggs 2002).

3.6.3 Threats

As noted, numerous landowners manage the area; while the 2013 Conservation Plan was seemingly well-received, separate entities have expressed different views and aspirations regarding the future of their land. These interests cover a wide scope, including farming, conservation, and educational, economic and environmental ambitions; however, if the area is to continue to provide its many, diverse services, it may be necessary to emphasize conservation more than it has been in the past. The land has been impacted by agricultural practice since the late Medieval and post Medieval periods, which each brought significant change to the landscape through field reorganization and the planting of hedgerows and trees (AFA et al. 2013). By 1807, much of the area had been enclosed, low-lying land was drained, and fences were grown up to establish property divides (English Heritage 1995c). As communities developed around the successful agriculture, the need for improved transportation infrastructure grew, resulting in the construction of the canal and subsequent railway. Although the area's rate of industrialization has been significantly reduced as preservation concerns have increased, threats to key habitats and species continue into the present.

Modern agricultural practices, which include fertilizer, pesticide and herbicide use, and mowing, all contribute to the decline of grassland and woodland species. Spray drift and eutrophication in particular have contaminated a number of local wildlife sites, causing impoverishment of woodland flora and a loss of native species (Jeeves 2010). Over-management is particularly damaging to lowland wood pasture and mature trees, as removal of deadwood through perceptions of tidiness is occurring at sites with high public use (Jeeves 2010). Water-based ecosystems face similar threats, as pollution by toxic chemicals causes a loss of fish and amphibians and the accumulation of poisons in the food chain. River straightening, dredging, and other flood defense works employed in an attempt to regulate natural systems have also resulted in a decline of priority habitats. Drainage of springs and groundwater extraction for agricultural irrigation also indicate a potential mismanagement of ecosystem resources. Constructive conservation of Bosworth Battlefield has resulted in a flourishing historical landscape commended for its perceptive and welcoming facilities; however, the ability of the land to provide its multitude of services relies on thorough and balanced management of its coupled human and natural systems (Smith et al. 2012). If the aforementioned threats continue to reduce priority habitats, the historic, cultural, and economic aspects of the interconnected landscape will likely become diminished.

In September 2018 Hinckley and Bosworth Council planning committee agreed to permit Horiba Mira to build a test track for electric vehicles on land which it owns on the western edge of the Bosworth battlefield. In the Battlefields Trust's view the development will cause substantial harm to the position where Henry Tudor first saw Richard III's army. This determined Henry's subsequent tactical decisions and approach to engage in battle. Despite identifying this approach as a key element of the internationally important registered battlefield, Historic England was unwilling to characterise the harm as substantial and this judgement appears to have been central to the planning committee's decision to pass the application (Battlefields Trust 2018). At the time of writing, this work is at a very early stage and it is not yet possible to form a clear view of the harm that will be caused. However, it serves as a reminder of the continuing pressure on battlefield sites from the threat of development.

3.6.4 Land Cover Assessment

In order to assess larger patterns in land cover usage and change, the aggregate classes shown in Table 3.2 were further simplified into three broad categories: agricultural, developed, and natural. The first category includes any land set aside for agricultural purposes, thus incorporating subclasses such as horticultural land, tilled land, and orchards. Developed land includes areas described as urban, suburban, or rural, while natural land includes areas of woodland, grassland, fresh and saltwater, and undeveloped coastlines. The purpose of this broader aggregation was to compare the expansion or reduction of each category's area over time.

Between 1990 and 2007, the overall changes in land cover are strikingly similar between Bosworth Battlefield and its surrounding 3-km buffer (Fig. 3.7). In both areas, agricultural land cover decreased and natural areas increased. This indicates a general trend towards the restoration of natural areas, perhaps through the conversion of abandoned agricultural plots to grassland and woodland areas. It is noteworthy that the increase in natural areas occurred concurrent with the site's addition to the Battlefield Register in 1995. Developed areas simultaneously decreased within both the battlefield and its boundary over the 17-year period; the reduction of developed area within the battlefield is slightly greater (13.5%) than that within the buffer (10.2%). This discrepancy, although slight, would be consistent with the acknowledgement of the historical significance of the battlefield landscape through the Battlefield Register. Nevertheless, the primary conclusion drawn from the land cover analysis is that the changes within the battlefield closely resembled those in the surrounding area, both following trajectories towards more natural landscapes.

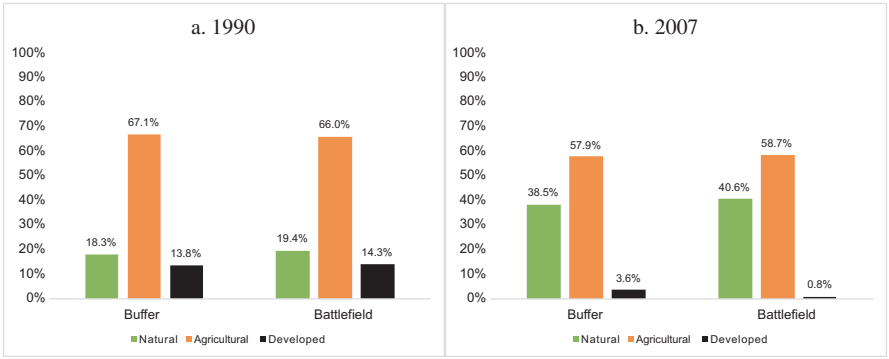

Fig. 3.7 Comparison of simplified land cover in and around Bosworth Battlefield in the years (**a**) 1990 and (**b**) 2007. Despite an overall increase in natural areas in both the battlefield and its buffer, the similar pattern of land cover change between the two years indicates a need for statutory protection of the battlefield area

3.7 Maldon Battlefield

The area designated by English Heritage as Maldon Battlefield (51°43′02.74” N, 0°42′05.58″ E) is often acknowledged more for its status as a Local Wildlife Site than for its historical significance. The Registered Battlefield borders officially include approximately 42 ha of mixed coastal farm and salt marsh along the western bank of the River Blackwater, but the neighboring Northey Island (51°43′19.74” N, 0°43′18.47″ E) is also understood to represent key components of the battle’s landscape.

The Battle of Maldon occurred on August 10, 991 A.D. between the Anglo-Saxons and a Danish Viking Army. It is the oldest site included on the list of Registered Battlefields, and marks the first occasion on which the Vikings met resistance from an English army (English Heritage 1995b). The Viking’s boats, commanded probably by Swein “ForkBeard” or possibly by Olaf Tryggvason, arrived in the Blackwater estuary and landed on Northey Island, hoping to raid the burh and mint at Maldon (Rayner 2007). Initially hindered by the high tide, the Vikings attempted negotiation; however, Brihtnoth, the Anglo-Saxon commander, refused to pay the invaders to depart and instead challenged them to battle. When the water retreated, the opposing forces met in savage hand-to-hand combat. At the conclusion of the battle, Saxon Ealdorman Brihtnoth had been slain, and the Viking Army was victorious; however, the loss in numbers had been so great the invaders returned to their ships and departed, rather than pursuing Maldon.

Despite the topographical indicators present in the Old English poem “The Battle of Maldon” that support the boundaries determined by English Heritage (Laborde 1925; Petty and Petty 1976), there is still considerable debate over the precision with which this historical event has been located (Nunn 2013). This controversy

does not inhibit the services provided by this site, however, as both Maldon Battlefield and Northey Island are owned by the National Trust and managed mainly as wildlife sanctuaries. The coastal ecosystems present at these protected sites are therefore able to provide a combination of provisioning, supporting, and cultural services on a local and national scale.

3.7.1 Ecosystems & Services Provided

Maldon lies on the estuary of the River Blackwater, which flows into the North Sea. Northey Island (121.5 ha) and the Registered Battlefield (42 ha) compromise approximately 163 ha of mixed coastal farm and salt marsh that support a plethora of plant and animal life. Northey Island is accessible from the mainland only during low tides when the narrow causeway is exposed. Although coastal changes and the building of sea walls have altered some features of the original battlefield, it is still a rewarding site for visitors (Rayner 2007).

3.7.1.1 Mudflats

Mudflats are fine-grained habitats characteristic of estuaries and other protected, low-energy environments (Larsen and Doggett 1991). Such areas, where freshwater seepages provide transition from fresh to brackish conditions, support specialist invertebrate species that rely on particular habitat characteristics such as thin films of water or oxygenated surface layers of mud (EBP 2012). Mudflats and seepages also provide habitat for generalist invertebrates, especially those that have an aquatic stage in their life cycle. Due to the availability of such particular ecosystems, a number of Priority List invertebrate species can be found in the Maldon District. Notable species include the small heath butterfly (*Coenonympha pamphilus*), the white-letter hairstreak butterfly (*Satyrium w-album*), the starlet sea anemone (*Nematostella vectensis*), a saline lagoon specialist, and *Anisodactylus poeciloides*, a seed-eating ground beetle found at the margins of salt marshes and seawall seepages (EECOS 2007).

The expansive communities of invertebrates present throughout the intertidal mudflats are of vital importance to the thousands of migratory birds that pass through and overwinter in the area (EECOS 2007). International migrant birds, including the brent goose (*Branta bernicla*), dunlin (*Calidris alpina*), redshank (*Tringa totanus*), godwits (*Limosa lapponica*) and wigeon (*Anas penelope*), are all supported by the enormous biomass of invertebrates available in the mudflat ecosystems that exist on Northey Island and at Maldon Battlefield (Masero and Pérez-Hurtado 2001; EECOS 2007). These environments are crucial not only for their benefit to wildlife, but for their role in ecological succession as well. The development of saltmarsh vegetation is dependent on the presence of intertidal mudflats. It

is therefore no wonder that the habitat types in Essex County with the most international designations are coastal mudflats and marshes (EBP 2012; EECOS 2007).

3.7.1.2 Salt Marsh

In the UK, the upper, vegetated portions of intertidal mudflats, particularly those that lie between mean high-water neap tides and mean high-water spring tides, are considered coastal salt marshes (EBP 2012). In total, the Essex County estuaries support approximately 2878 ha of salt marsh extending from the River Stour through to north Thames (EBP 2012). On its own, Northey Island provides 90 ha of this threatened habitat, as three-fourths of the island's area consists of salt marsh and muddy creeks (National Trust 2014). Present on the island are large assemblages of saltmarsh plants, from pioneer to upper marsh communities, and scarce species such as shrubby sea-blight (*Suaeda spp*.) and golden samphire (*Limbarda crithmoides*) (National Trust 2014). These coastal habitats provide important high-tide refuges and breeding sites to wading birds and wildfowl, and they act as food sources for passerine birds, especially in autumn and winter (EBP 2012). They also provide habitats for fishes, act as nutrient and sediment sinks, and establish coastline protection, and the restoration of salt marshes has been given particular attention (Colclough et al. 2005; Moller and Spencer 2002; Shepherd et al. 2005; Garbutt and Wolters 2008).

Unlike Northey Island, the Maldon Battlefield area has had the structure and composition of its salt marsh altered by grazing, which reduces the height of vegetation and the diversity of plant and invertebrate species (EBP 2012). Such changes have, in turn, favored species associated principally with agricultural systems, such as the corn bunting (*Emberiza calandra*), turtle dove (*Streptopelia turtur*), gray partridge (*Perdix perdix*), and skylark (*Alauda arvensis*), all of which are included under Essex County BAPs (EECOS 2007). The diversity of habitats in the coastal strip surrounding Maldon, including the pristine salt marsh and coastal grazing salt marsh alongside arable land, has allowed these species to flourish. Due to their immense value to bird, plant, and invertebrate communities, the Essex marshes as a whole are among the top five coastal wetlands in the country (National Trust 2014).

3.7.1.3 Estuary

Although Northey Island and the Registered Maldon Battlefield are important conservation sites in their own right, they both contribute to the significance of the internationally important Blackwater Estuary (Fig. 3.8). The Blackwater is not only a Site of Special Scientific Interest (with Local Wildlife Sites spread throughout), but also a Special Protection Area and a Special Area of Conservation because it has one of the largest and least disturbed areas of salt marsh in East Anglia (National Trust 2014). As mentioned previously, the estuary supports large populations of wintering birds, and Northey Island in particular becomes a highly valuable

Fig. 3.8 Maldon Battlefield's estuary and mudflat ecosystems. Julian Humphrys leads the Battlefields Trust members on a tour of Maldon's Battlefields Trust Walk. Image provided by the Battlefields Trust 2012. https://www.flickr.com/photos/thebattlefieldstrust/. Accessed 13 Dec 2016

high-tide roost when the floodwaters cover the inner Blackwater (National Trust 2014). The estuary has also been recognized for its role in preserving marine species; offshore the Blackwater has been designated as a Marine Conservation Zone, mainly due to its role as the national stronghold for a threatened species of native oyster (National Trust 2014).

The Blackwater also plays an important role in the local and national movement of wildlife populations. The rushing water of the estuary, which bisects much of the district with a broad, and to many species inhospitable, environment, can act as a significant physical barrier. But for others, the Blackwater serves as a corridor, bringing some of the most internationally important species into the heart of the district (EECOS 2007).

The estuary also provides a number of provisioning services. In addition to marketable seafood, the estuary provides a source of salt. The Maldon Crystal Salt Company, established in 1882, has been producing salt for more than 200 years and represents the only place in the country where sea salt is still manufactured (Christy 1906). Beyond providing a useful and plentiful product, Maldon salt has also contributed to the reputation of the area, as the town was at one point recognized as a center of the salt-making trade (Christy 1906).

3.7.1.4 Intertidal Zone

Isostatic adjustment since the glacial withdrawal at the end of the last Ice Age has caused the South East of England to slowly sink (English Heritage 1995b). This isostatic rebound, combined with contemporary global warming and sea level rise, has resulted in an appreciable increase of relative sea level since the Battle of Maldon occurred in 991 A.D., which has subsequently altered a number of the coastal landscapes. While the rise has led to the establishment of extensive intertidal salt marsh and flood plains, the trend may ultimately result in a loss of these crucial habitats. In response to this concern, Northey Island became the subject of the country's first monitored coastal realignment project in 1991 (National Trust 2014). As an experimental study, an 0.70-ha area was enclosed inside the existing sea wall and breaches were constructed to allow one in three tides to cover the new area. The intricately planned project provided critical insights that may inform future management (National Trust 2014). By adjusting to a changing environment and remaining mindful of the location's historic character, the Northey Island project exemplifies the successful application of constructive conservation. As the practice of managed realignment becomes more widespread, so will an increase in the amount of salt marsh and mudflat habitats across the district of Maldon (EECOS 2007).

3.7.2 Management

3.7.2.1 Ownership

The National Trust, short for the National Trust for Places of Historic Interest or Natural Beauty, is an organization in England, Wales, and Northern Ireland dedicated to the conservation of heritage. Given statutory powers through the National Trust Act of 1907, the independent charity aims to permanently preserve and protect the character of natural and historic sites for the benefit of the nation (National Trust 2013). The Maldon Registered Battlefield and Northey Island are both owned entirely by the National Trust. Other invested stakeholder organizations, including the Essex Wildlife Trust, the Maldon District Council, and Historic England, work in collaboration to help describe and preserve the biodiversity present. Protection of the land, however, is ultimately dictated by its ownership. The National Trust is actively pursuing eastward expansion of the Maldon footprint along the Blackwater Estuary so Northey Island and the adjacent battlefield grounds can continue to flourish as an ecological hub.

3.7.2.2 Visitation

Maldon Battlefield and Northey Island are advertised as wild and undeveloped. The sites are depicted as an area where one comes face-to-face with nature in its most dynamic forces: strong winds and fast-moving tides (National Trust 2014). At low tide, a rough causeway is revealed, surrounded on all sides by extensive marshland and mudflats. At high tide, the causeway is fully submerged, isolating visitors on the island to fully explore the coastal environment and its many unique inhabitants. Described as a birdwatcher's paradise, the island invites guests to observe the wildlife from special hides in order to pursue rare species without disturbing them (National Trust 2014). The seemingly inaccessible nature of Northey Island has allowed it to maintain an intriguing air of mystery. An annual "Castaway" camping event, during which friends and family are encouraged to partake in guided walks and geocaching, draws visitors who wish to experience Northey's peaceful solitude (National Trust 2014). Such events occur not only to entertain guests, but also to illustrate the local character of the land in terms of its assemblages of animals and plants (EECOS 2007). The ecological oddities and unique landscapes, including the battlefield, incite a desire to understand, conserve, and maintain the intrinsic character of the land (EECOS 2007). The attitudes produced by this understanding facilitate the creation of local biodiversity action plans, which allow for the further recognition and conservation of local distinctiveness, whilst simultaneously contributing to the goals of regional and national conservation objectives (EECOS 2007).

3.7.3 Threats

Although the National Trust prevents the direct influence of threats such as development within the Maldon landscape, there are persistent anthropogenic and environmental pressures that contribute to the degradation of its habitats at the boundaries. Centuries of over-exploitation, habitat modification, and pollution have led to a loss of estuarine and coastal habitats at the international level in terms of reduced area, biodiversity loss, and loss of ecological resilience (Lotze et al. 2006; Garbutt and Wolters 2008). In Essex County, the overall net saltmarsh area lost between 1973 and 1998 is 25%, which represents a loss of nearly 1000 ha at an average rate of approximately 40 ha per year (EBP 2012). In the past, a portion of this loss was attributed to land claim for industry and port facilities; however, today large-scale land claim schemes for agriculture are considered rare (EBP 2012). Comparatively, waste disposal is still relatively common alongside marina development on saltmarsh sites. Similar developments, such as coast protection works or the dredging of shipping channels, may also impact sediment dynamics, altering flow and weakening flood defenses (EBP 2012).

Other human influences that typically contribute to the decay of coastal environments include turf cutting, oil pollution, recreational pressures, agricultural improvement including re-seeding and draining, and eutrophication (EBP 2012). Erosion and "coastal squeeze" are additional stressors that are particularly pronounced in southeast England. Erosion of the seaward edge of salt marshes occurs widely in high-wave energy locations as a result of coastal processes (EBP 2012). Additionally, many salt marshes are quickly dissolved when "squeezed" between an eroding seaward edge and fixed flood defense walls. As the area of coastal environments continues to shrink, the risk of rising sea levels only increases. Because the mudflats that surround Northey Island's grass field are lower than those on the mainland, the island faces frequent overtopping during spring tides and storm surges (EECOS 2007). Increasing rates of sea level rise exacerbate the situation, resulting in the potential loss of freshwater habitats (National Trust 2014). Recognition of these pressures has led to deliberate coastal realignment at Northey Island, which is likely to be practiced more widely in the future and will hopefully contribute to the security of coastal habitats (EECOS 2007).

While the grassy grounds within the Registered Battlefield borders are less impacted by coastal degradation, these habitats are vulnerable to other pressures, such as human disturbance and agriculture encroachment along the borders of National Trust owned land. In the winter months, the fields on both the island and the battlefield are important feeding grounds and refuge for up to 5000 brent geese. The birds rely on a plentiful supply of short grass for their survival. The depletion of fine-scale mosaics of arable, pastoral, and semi-natural habitats, in tangent with an increase in agrochemicals, has resulted in a national decline of similarly important agricultural species.

3.7.4 Land Cover Assessment

Of the three case studies presented here, Maldon is unique in having a single land owner. This simplifies its management in some ways, and a comparative analysis of land cover change between Maldon Battlefield and its surrounding 3-km buffer clearly indicate the advantage of statutory protection in preserving and restoring natural ecosystems and their services. Owned and managed by the National Trust, the area contained within Maldon Battlefield is entirely protected from expansion of developed areas and agriculture. The surrounding area, however, has seen an increase in both its agricultural and developed areas from 1990 to 2007 (Fig. 3.9). While the battlefield has experienced an increase in natural areas of about 11% during the 17-year period, natural areas in the surrounding buffer have decreased by close to 13%. The diverging trends between the battlefield and its buffer were more apparent for Maldon than any of the other battlefield sites examined. The results

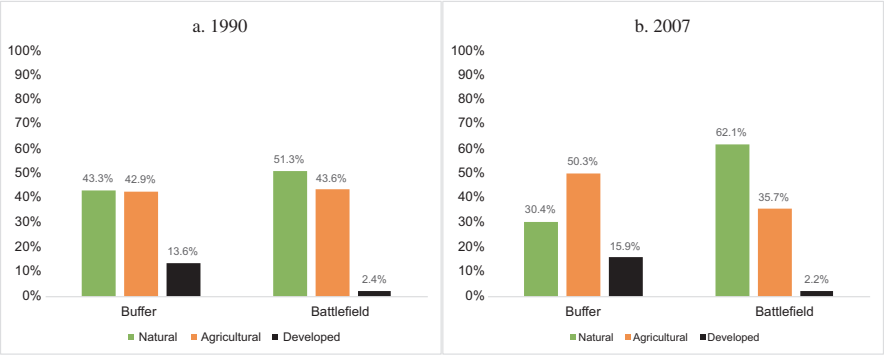

Fig. 3.9 Comparison of simplified land cover in and around Maldon Battlefield between (**a**) 1990 and (**b**) 2007. Natural areas within the battlefield borders increased while agriculture and developed areas decreased within the 17-year period. The opposite occurred in the buffer area, as natural areas decreased and agriculture and developed areas expanded. The pattern of divergence evident at Maldon demonstrates the importance of statutory protection in preserving natural areas and their ecosystem services

indicate that while the recognition conveyed by listing sites on the Battlefield Register alone is an important first step in conserving these ecosystems and their associated services, it seems that a clear system of ownership and management, similar to the U.S. National Battlefield Park system described in Madron and Tilton (Chap. 2 of this book), for example, still conveys the highest likelihood of long-term conservation success.

3.8 Conclusions

England's extensive military history has resulted in over 500 recognized battlefields spread throughout the country. In 1995, the Register of Historic Battlefields was established to recognize the importance of these landscapes. To date, Historic England has registered 46 sites. Although the registered sites are not awarded statutory protection, local communities and scholars have begun to acknowledge the many diverse values of these multi-layered landscapes. The opportunity to experience and understand nature and history simultaneously has resulted in increased communal worth of the lands, which in turn has inspired passionate movements for their more comprehensive management. From this movement, the concept of constructive conservation has emerged as a flexible and adaptive management style that remains faithful to history while considering the ecological value of the land. The approach has allowed a wide range of ecosystem services to flourish across sites like Naseby, Bosworth, and Maldon Battlefields.

Through its personable interpretive features, Naseby Battlefield connects viewers to their landscape in a manner that provokes not only a sense of pride and identity, but curiosity and creativity as well. The hedgerow and small wetland ponds increase landscape biodiversity, provide opportunities for research and education, and enhance social and cultural identity. A comparison of the land cover of the site to its surroundings indicates that the landscape is broadly representative of the historical British countryside, with an intermixture of grassland and agricultural patches. Notably, many of the small landscape features that provide a large number of the ecosystem services at the site are not resolvable on standard land cover products.

Bosworth Battlefield's Conservation Plan, developed in 2013, illustrates the results of purposeful and organized constructive conservation. Bosworth's ability to effectively manage overlapping historical and environmental themes is attributable to the funding provided by the Heritage Lottery Fund, as well as cooperation with private landowners and environmentally focused organizations. These partnerships acknowledge the need for a flexible management strategy that continuously facilitates intergenerational and cultural identity alongside the preservation of priority habitats. Perhaps in response to this collaborative effort among multiple stakeholders, land cover change over the past couple decades has followed similar trajectories inside the formally recognized battlefield boundary and within a 3-km buffer surrounding the battlefield. For both analysis areas, the amount of land in natural cover increased by about 20%.

In contrast, Maldon Battlefield represents a more traditional protected area model, where the entire landscape is owned and managed by a single entity, the National Trust. This coastal landscape commemorates the oldest battle recognized on the Register of Historic Battlefields. The site's value is clearly recognized as both historical and ecological, and its significance as an ecological hub and wildlife sanctuary has played a leading role in its acquisition and conservation. Here we see the effectiveness of control by a sole owner in protecting and even restoring natural areas and their historic character when surrounded by wide-scale habitat degradation and land cover change.

These examples illustrate the considerable range in conditions under which constructive conservation can be successfully applied. The approach is not a prescriptive mandate of management rules, but instead it is meant to inspire a creative and careful consideration of the multitude of potential regulating, supporting, provisioning, and cultural services delivered by the unique ecosystems at each particular site. The ecosystem services provided at each site, whether they are agriculturally influenced, highly heterogeneous, or dominantly coastal, should be inventoried, weighted, and properly accounted for in management decisions if true constructive conservation is to be achieved. This holistic approach provides a guide for cooperation between representative parties of scientists, naturalists, historians, and community members in order to prioritize the many ecological and cultural benefits of battlefield landscapes.

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