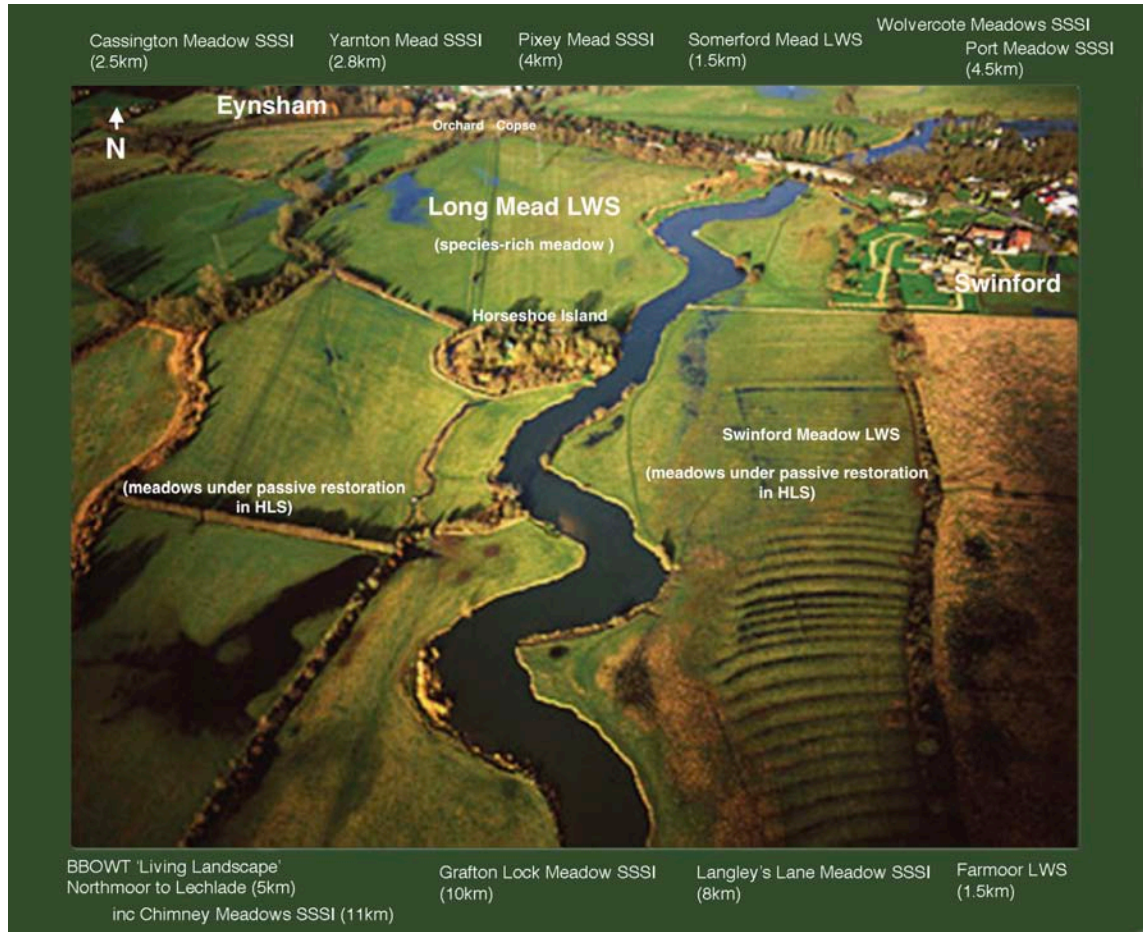


Thames Valley Wildflower Meadow Restoration Project

Reconnecting the wildflower meadows of the Upper Thames floodplain:

From Oxford to the National Nature Reserve at Chimney



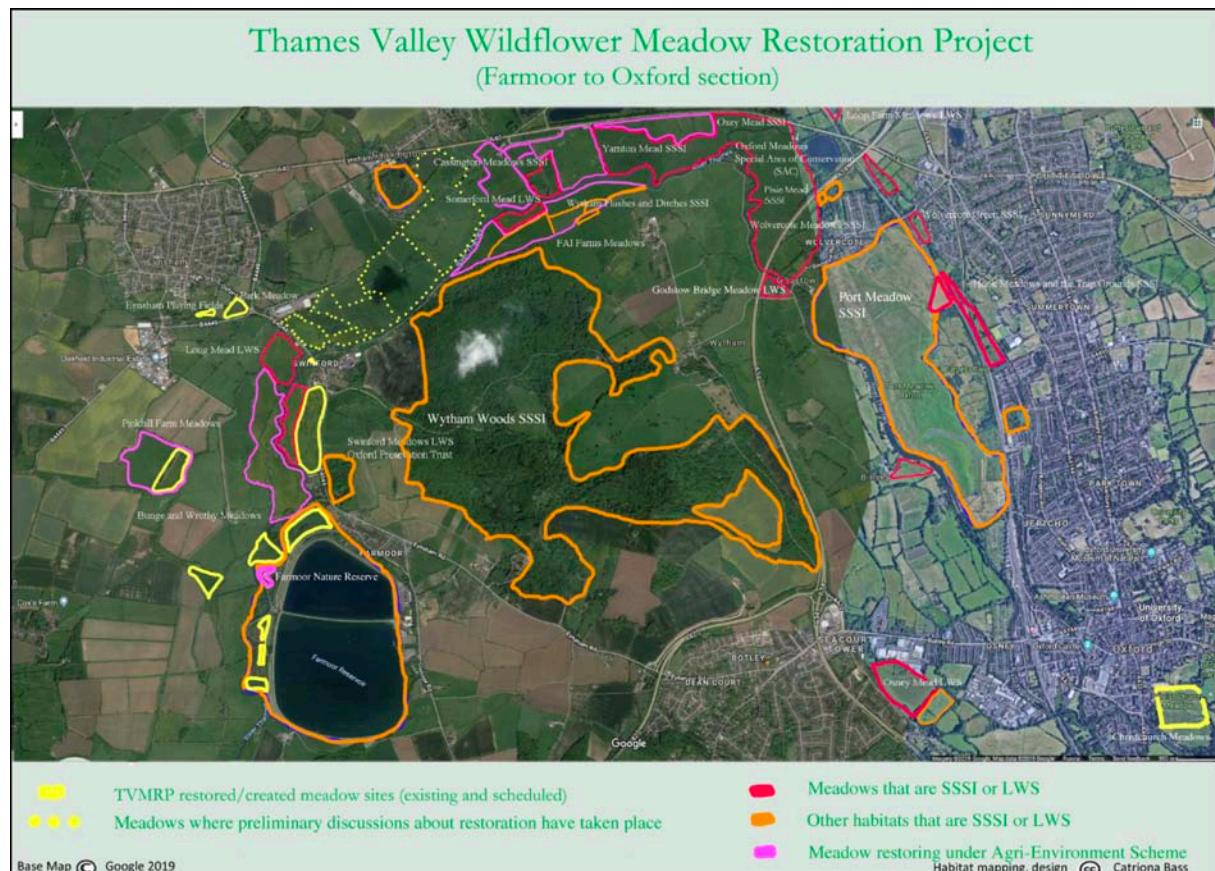
Long Mead Local Wildlife Site (LWS) (species-rich hay meadow) in relation to other species-rich meadows, and meadows under restoration, along the River Thames above Oxford, including LWS, Sites of Special Scientific Interest (SSSI) and land in Natural England's Higher Level Stewardship Scheme (HLS)¹

Introduction

The Thames Valley Wildflower Meadow Restoration Project is a farmer and landowner-led initiative along the Upper Thames that is dedicated to restoring its rare floodplain meadow habitat. Much of this habitat is concentrated upstream of Oxford in fragmented sites that are designated as Sites of Special Scientific Interest (SSSI) or Local Wildlife Sites (LWS). The project aims to connect these up by restoring or recreating the intervening meadows. The map below shows the stretch from Farmoor to Oxford and indicates the work that has already been done to transform the existing Oxford Meadows and Farmoor Conservation Target Area into a joined up wildflower meadow network to contribute to the Nature Recovery Network for the Oxfordshire Plan 2050. The density of designated wildlife sites in this area make the creation of a nature

¹ Photograph © Adrian Warren and Dae Sasitorn. Distances indicated are measured 'as the crow flies'

recovery network in this area particularly appropriate. (A higher resolution copy of this map is attached separately).



The surviving original floodplain hay meadows above Oxford have been worked since Saxon times. This is a major reason for their biodiversity and is a strong indicator of the resilience of their flora and fauna, an aspect that needs further study with modern genetic methods. Historically, these meadows have played an important role in mitigating floods and producing our food.

Today they are valuable natural capital, providing critical ecosystem services such as storing carbon and halting the rapid decline in biodiversity, among others. A recent study suggests that the 1.45 million hectares of semi-improved grassland in England stores around 300 million tonnes of carbon; if carbon is valued at £16/tonne, the carbon in those grassland soils would be worth nearly £5 billion. All grasslands store carbon, but species-rich grasslands (ie wildflower meadows) are particularly effective at carbon sequestration. By contrast, intensively managed grasslands are carbon hungry and, being dependent on fossil fuels, they contribute around 5% of England’s greenhouse gas emissions.²

Grasslands also rate as an important sequesterer of carbon relative to trees. Although in a stable climate, trees may store more carbon than grasslands, in the vulnerable, warming climate that we currently experience, and in a drought-likely future, grasslands provide more reliable carbon sinks because they sequester the carbon in the soil rather than above ground. They are therefore not susceptible to wild fires or the subsequent harvesting of trees for biomass, which releases the stored carbon into the atmosphere.

² King, M. *Nature’s Tapestry* Grasslands Trust, 2011

Most importantly for the Thames Valley Wildflower Meadow Restoration Project, restoration to high plant diversity has been shown to increase carbon capture and storage rates dramatically. A recent paper in the journal *Nature Communications* suggests that restoring degraded and abandoned agricultural land to high plant diversity leads to an acceleration in annual carbon storage rates. The study showed that, in the years 13 to 22 after restoration, the high diversity area of the study stored 200% more carbon than the area left abandoned. It also provided 70% more carbon storage than in monocultures.³

Although the rich biodiversity of these floodplain wildflower meadows is almost lost (only 4 square miles of remain in the whole UK - an area the size of Heathrow Airport), a significant proportion of what remains lies in the Thames floodplain above Oxford. Botanical surveys undertaken in 2020 by Catriona Bass and Alison Muldal, who has joined the project having recently retired from Natural England, indicate that creating a connected wildflower meadow network from Farmoor to Oxford may be more within our reach than is currently believed.

It turns out that the habitat maps used by conservation organisations and local government are outdated. A good number of the meadows on this stretch have been in Natural England's Agri-Environment schemes for a couple of decades and have not been surveyed since their restoration began. Our new surveys show that a significant number of these meadows now qualify as species-rich Biodiversity Action Plan Habitats (or are likely to qualify as such in the next few years). This means that, between Farmoor and Port Meadow at least, only a few pieces of the wildflower meadow jigsaw still need to be filled.

Fortunately, since initiating the project, Catriona Bass and Kevan Martin of Long Mead Farm at Swinford have found themselves knocking on open doors, from Christ Church College in the centre of Oxford, who are restoring Christ Church Meadows in July 2020 as part of the project, to Thames Water at Farmoor Nature Reserve and private farmers in Eynsham, Cumnor and beyond. In a situation where only 4% of Oxfordshire retains any real value for wildlife, and with the pressure of unsustainable growth in the county, farmers and landowners are coming together in an attempt to halt the catastrophic decline in biodiversity in our countryside.

This bottom-up approach, operating neighbour to neighbour, and collaborating with environmental organisations and academic experts, is designed to address issues of scale and sustainability that can often undermine attempts at landscape-sized environmental projects.

The Thames Valley Wildflower Meadow Restoration Project is underpinned by Long Mead's Biodiversity Research Project, with advisors and collaborators from the Open University, Plant Sciences and Zoology Departments of Oxford University, the Museum of Cardiff, as well as Oxford Brookes University. The project brings together the long-term practical know-how of farmers and the long-term research of scholars, with the experience of environmental organisations and other stakeholders to address key questions of sustainable food production, biodiversity loss and climate change.

The Thames Valley Wildflower Meadow Restoration Project envisions a future where species-rich hay meadows can once again be an integral part of commercial agriculture, rather than objects of historical curiosity, and where the River Thames floods to create the beautiful and fully functioning rural environment, rather than simply causing damage to our urban homes. It envisions a future where citizens and visitors in Oxfordshire can enjoy the Upper Thames river valley with fields of wildflowers, butterflies, birds and other wildlife, experiencing the health and well-being benefits that earlier generations took for granted.

³ Yi Yang, et al. *Soil carbon sequestration accelerated by restoration of grassland biodiversity*, Nature Communications Feb, 2019

To achieve this, we will have to act in a more joined-up way: as a network of farmers, landowners, conservation organisations, local government and academics all working towards a common purpose and for the wider benefit of nature and society. The will is there, the means are there, the expertise is available, and the existence-proof of the viability of restoring such meadows is plainly visible. The Oxford Meads are unique and their role in restoring biodiversity and mitigating climate change is undoubted. The prospect of being able to walk along the Thames in wildflower meadows from Lechlade to Oxford is a once-in-a-lifetime opportunity and within our grasp if we act together now.



Long Mead in bloom, June 2020

“The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide... It is not too late to make a difference, but only if we start now at every level from local to global. Through ‘transformative change’, nature can still be conserved, restored and used sustainably.”

Sir Robert Watson, Chair of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 7th May 2019

Collaborators so far:

Meadow research and restoration:

FAI Farms (Wytham)
Pinkhill Farm (Eynsham)
Glebe Farm (Freeland)
Church Farm, South Leigh (Bungey and Wrothy Meadows, Pinkhill)
Oxford Preservation Trust (Swinford Meadows Local Wildlife Site)
Neves Bees (Parks Meadow, Eynsham)
BBOWT (Chimney Meadows, National Nature Reserve)
Natural England (Upper Thames Tributaries Focus Area)
Environment Agency (River Thames)
Thames Water (Farmoor Nature Reserve)
Floodplain Meadows Partnership, Open University
Freshwater Habitats Trust
Thames Valley Environmental Records Centre (TVERC)
Withymead Nature Reserve
Global Malaise Trap Project
Dr Michael Wilson, Head of Entomology, National Museum of Wales
Alison Muldal, formerly SSSI and Agri-Environment Advisor at Natural England

Education and Carefarming:

School of Education, Oxford Brookes University
FarmAbility, Wytham
Bridewell Therapeutic Gardens, Wilcote
LEAF Education (Part of Linking Environment And Farming)

Sustainable Building in the Community

Dr Paula Sassi, Faculty of Technology, Design and Environment, Oxford Brookes University
Dr Helen Gavin, Environmental Change Institute, Oxford University
Prof David Wallom, Dept of Engineering Science, Oxford University

Business Partners

The Market Garden, Eynsham
Tawneys Farm, Stanton Harcourt

Meadows for restoration using green hay from Long Mead and partners:

Parks Meadow, Eynsham – 7 acres (Neves Bees) in partnership with BBOWT, July 2019
Farmoor Nature Reserve – 3 acres (Thames Water) July 2020; 18 acres 2021/22; 7.5 acres 2024
Swinford Bridge Cottage – 0.5 acres (Russell Crawford) July 2020
Christ Church Meadows, Oxford – 8 acres (Christ Church College) July 2020
Pinkhill Farm, riverside meadows – 17 acres (Pinkhill) 2021
Somersford East and West Meadows – 38.5 acres (FAI farms) 2022, 2023

Advisors:

Dr Camilla Lambrick, Ashmolean Natural History Society of Oxfordshire (ANSHO)
Dr Judy Webb, ANSHO Floodplain Meadows Study Group
Professor Andrew Hector, Oxford University
Professor David Gowing and Emma Rothero, Open University
Associate Professor Lindsay Turnbull, Oxford University
Dr Paola Sassi, Oxford Brookes University
Graham Podbery, Technical Consultant
Anne Cotton, Natural England
Pedro Collins, Environment Agency

“Less than 10,000 hectares (ha) of Oxfordshire retains any special value for wildlife; around 4% of the total land area.” Biodiversity and Planning in Oxfordshire, 2014⁴

Meadow Restoration

In collaboration with a number of local farmers and landowners, the Thames Valley Wildflower Meadow Restoration Project is a far-reaching project whose goal is to reverse the terminal decline of the species-rich floodplain hay meadow habitat of the Upper Thames and to seek ways of enabling farmers to make a good living, farming without fertilisers or intensive grazing. Intensified use of land and water is the major cause of biodiversity loss worldwide.⁵ Today, less than 3 per cent of species-rich hay meadows remain. Floodplain meadows such as Long Mead are rarer still with only 4 square miles remaining in the UK – an area the size of Heathrow Airport. Furthermore, the habitat is now so fragmented that the precipitous decline is accelerating.

“Wildlife of important habitats such as that found on Sites of Special Scientific Interest (SSSI) and Local Wildlife Sites (LWS) cannot survive indefinitely in isolation, but need to be part of a wider network of habitats connected at a landscape scale.” Oxfordshire Conservation Target Areas (CTA)⁶

The ambition of the project is for a future where the function of the River Thames and environs as a vital wildlife corridor is restored and expanded, making its natural capital sustainable for future generations and enabling it, and its ecotones, to provide a full range of vital ecosystem services to society.

These services include *sustainable* food production through commercial agriculture: low intensity grassland management conserves soils, protects water quality and supports vital invertebrate pollinators for other food crops. At the same time, it puts the highest quality beef and lamb on our tables. Old Eynsham farmers talk of the medicinal qualities for livestock of the herbs of these meadows – known to them as ‘hospital fields’. Equally important, in this era of climate change, are the critical services that floodplain hay meadows give us:

- They provide natural flood management, giving the river more space to flood outside our towns. In slowing it down and absorbing its floodwaters, they prevent billions of pounds of damage to our homes.
- They absorb carbon from the atmosphere and so play a major role in limiting global warming.
- They are vital reservoirs of biodiversity in an era of the relentless and rapid loss of species.

The project is underpinned by a long-term research project that brings together scholars and practitioners from a wide range of disciplines on Long Mead to study this vanishing habitat and to provide the scientific basis for restoration and conservation.

Education & Outreach

During the past two decades, Long Mead has worked with the Oxford City Council, with state and private schools, with local farmers, environmental NGOs, as well as organisations supporting adults with learning disabilities and autism, to share the health and educational benefits of Long

⁴ *Oxfordshire County Council, BBOWT and TVERC, 2014*

⁵ “Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services,” 6 May 2019

⁶ <https://www.wildoxfordshire.org.uk/biodiversity/conservation-target-areas/>

Mead. Visitor numbers are kept low for conservation reasons. We are currently working with FarmAbility, Wytham, Bridewell Therapeutic Gardens, Wilcote, Mabel Prichard Special School, Our Lady Abingdon, Cothill School, Bartholomew School and the six primary schools in the Eynsham Partnership Academy. Environmental and other special interest groups visit by appointment.⁷

Long Mead has also facilitated research for doctoral students at the Open University and Oxford University. Through a collaboration with Oxford Brookes University, Catriona Bass runs workshops in outdoor learning on Long Mead for primary school student-teachers.

With the Thames Valley Wildflower Meadow Restoration Project, Long Mead's long-established programme of public education and care-farming has expanded:

- Our existing programme for schools and special interest groups now includes advice and help in creating wildflower meadows for landowners, parish councils, community groups and individual citizens, through our parish-level Nature Recovery Network, currently focused on Eynsham parish and neighbouring villages.⁸
- Our care-farming programme has expanded beyond the farm gates to enable vulnerable adults, who often lead very isolated lives, to make a valuable contribution to an important environmental project. Working alongside environmental volunteers, they can build their skills and their confidence and, most importantly, make new social connections in the local community.



Making hay on Long Mead, July 2019

“Investment in Oxfordshire’s environment presents a unique opportunity. Not only will such investment ensure that the county’s natural capital assets are able to meet the demands placed on them, but it will also make its own distinctive and very significant additional contribution to growth.” Strategic Environmental and Economic Investment Plan for Oxfordshire (SEEIP)

⁷ *“Public understanding and opinion on the value of biodiversity has strong implications for the acceptance and adoption of conservation measures. The level of direct contact with nature is a factor in influencing attitudes towards it, suggesting that the more we can stimulate interest in and access to nature, the more people will be willing to contribute to its protection and enhancement.”* Attitudes and Behaviours towards the Natural Environment among the general public in the UK: A Review of Existing Evidence, COI report for Defra (2008)

⁸ <https://eynsham-pc.gov.uk/org-news.aspx?nid=1280#news>

Biodiversity Research



Devil's-bit-scabious, great burnet, lady's bedstraw – diversity and resilience in the Oxford Meads, 2020

“Nature is consistently undervalued in decision-making and many of the services we get from nature are in decline. Over 40% of priority habitats and 30% of priority species were declining in the most recent analysis. Our challenge is to halt this decline – for the benefit of this and future generations.” Natural England, Biodiversity Strategy 2020

Long Mead's Biodiversity Research Project brings together scholars from a wide range of academic disciplines, experts and professionals from NGO organisations, as well as the farming community whose long-term practical knowledge of the land is sometimes undervalued in the environmental debate. Long Mead Biodiversity Research Project is intended to be a long-term engagement with a threatened environment at a time of rapid change.



Long Mead in flood, July 2007

A scientific knowledge hub: facilitating conservation and biodiversity of floodplain terrain.

Given that knowledge of the ecosystems that produce the biodiversity of floodplain hay meadows remains limited, the prime objective of the Long Mead Research Project is to advance scientific knowledge of floodplain hay meadows and their ecotones. The relatively small size of Long Mead makes it feasible to embark on a long-term programme of fine-grained spatial and continuous temporal sampling. The Project has formed collaborations with experts from a wide range of disciplines to help in developing and carrying out a comprehensive longitudinal study of Long Mead and its environs. The data obtained will contribute to effective methods to preserve and restore these important, and critically endangered habitats, both for their inherent value to society, their natural capital and for their ecosystem services, including their significance in maintaining and increasing biodiversity and well as mitigating the consequences of climate change.



Collecting flower seed from Long Mead to recreate 7 acres of wildflower meadow in Eynsham, July 2019

Studying the process of nature recovery and best practices for facilitating it

With input from local farmers, the Floodplain Meadows Partnership at the Open University and our advisors at Oxford University, Natural England and elsewhere, the Thames Valley Wildflower Meadow Restoration project will be underpinned by trials in a variety of restoration techniques, including methods of soil preparation, the pros and cons of sowing a wildflower seed mix versus spreading green hay from a species-rich site; the benefits of adding species as established plants over time; the advantages/disadvantages over time of different management regimes: aftermath grazing with cattle or sheep or taking a second hay cut. Trials on the benefits of hay as a food supplement for livestock are also planned.

An important part of the project is to carry out long-term detailed studies of wildlife in the meadows under restoration and recreation and their aquatic environs, in collaboration with our scientific partners, to monitor the progress of the nature recovery network.

In May 2020, Long Mead became a survey site for the Global Malaise Trap Project and discussions are in progress to include it in the Darwin Tree of Life Project, which aims to identify and sequence of the genomes of the 66,000 species that exist in the UK.⁹

Since July 2020, further identification of meadow invertebrates has been undertaken by Dr Michael Wilson, Head of Entomology at the National Museum of Wales and by Ryan Mitchell from the Natural History Museum in Oxford. They are planning a long-term study to look at how pollinators and other invertebrates might return to meadows under restoration as their biodiversity increases over time.

Following the restoration of Christ Church Meadows in July 2020, the Plant Sciences Department of Oxford University will use it for teaching botanical survey techniques to its undergraduate students. Long Mead, as the original from which the meadow at Christ Church has been created, will be used as the 'gold standard' for comparison.

Enriching the environmental debate: engaging the traditional and long-term practical knowledge of farmers and farm workers

Long Mead is a working farm embedded in the local agricultural industry and community. An important component of the research will be to engage with Long Mead's network of contacts in the farming world to bring their long-term practical knowledge of the land into the environmental debate. Traditional nature-enhancing farming will be documented as well as the perceived eco-system services provided by old hay meadows in the context of 21st century commercial agriculture and how this might change over time, in the context of climate change events and other impacts.

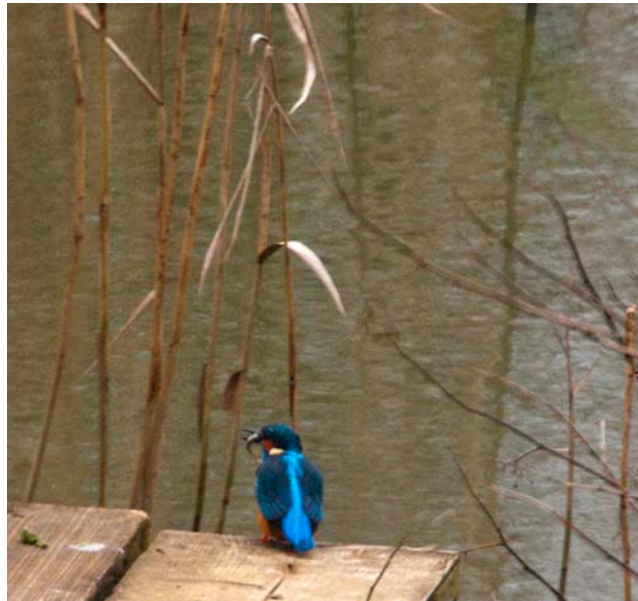
Benefiting society and wildlife: studying the rewards for society and for wildlife of social engagement with nature

Long Mead's long-established outreach programme with schools, special interest groups and adults with learning disabilities and autism, will facilitate long-term research on the physical and mental health benefits to people engaging in nature-based activities. It will enable engagement with the premise that greater public understanding of nature leads to greater support for conservation. A collaboration with Oxford Brookes University School of Education will facilitate the training of student teachers in outdoor learning.

Supporting knowledge generation and habitat protection in perpetuity: creation of a Warden's House and Field Study Centre

The creation of suitable facilities is an important step in developing the Project. The Project has planning permission for Field Study Centre dedicated to floodplain meadow ecosystems. It will be a multi-functional off-grid, carbon-neutral building designed to facilitate: wildlife observation, data collection and analysis, archiving, as well as a place for public education and outreach activities. It will also be the warden's house – thereby facilitating continuous onsite monitoring and protection. Planned collaborations with Oxford Brookes University's Faculty of Technology, Design and Environment and Oxford University's Department of Engineering Sciences means that the construction and finished building will be analysed and monitored in relation to its sustainability features, off-grid energy and low carbon operation.

⁹ <http://biodiversitygenomics.net/projects/gmp/>



Kingfisher with its catch on the Thames at Long Mead

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¹⁰ Catriona Bass has been farming Long Mead for twenty years, restoring and creating habitat, managing it for wildlife, monitoring changes, and running educational and therapeutic visits. Since 2009, she has been involved in habitat creation at other sites, using green hay from Long Mead. She is also a writer and has been consultant for a number of NGOs.

¹¹ Prof. Kevan Martin has co-founded two interdisciplinary Neuroscience Institutes over the last 30 years (one at the University of Oxford and the other in Switzerland, jointly run by the Swiss Federal Institute of Technology (ETH) and the University of Zurich).