Chippenham Fen NNR

Reserve Report

April 2014 - March 2015

Michael Taylor Reserve Manager



Reserve Management

Staff

Management work was carried out by Reserve Manager Mike Taylor and Senior Reserve Manager Chris Hainsworth, together with Paul Lacey for the first half of April, assisted at times by a number of volunteers.

Ruth Angrave completed a three month HLF funded NNR traineeship between September and November. An 18 month traineeship was then advertised. Ruth applied and was successful, and started work with us again on 1 January.

Grazing

Buffalo

The six water buffalo grazed parts of the reserve as follows (grazing units named as on Map 2 Grazing areas) :

7 July – 7 August; 3 November – 10 November (38
days)
1 April – 7 April;22 August – 19 September; 27
November – 31 March (159 days).
9 May – 7 July; 7 – 22 August; 19 September –3
November (119 days).
7 April – 9 May (32 days).
10 – 27 November (17 days).

In 2014-15 remained relatively mild throughout but despite this it was again necessary to supplementary feed the animals with barley straw from 12 January until early April - as last year the animals were fed at Bullock Hill. Two bales per day were given, and in all 180 bales were given to the animals, compared with 150 in 2013-14, 274 in 2012-13, 206 in 2011-12 and 212 bales during the harsh winter of 2009-10. The straw was supplemented with one 15kg bag of carrots per day (a total of around 90 bags).

Lice infestation was evident during the winter, but less severe than in previous years, so no treatment was necessary.

Routine dung samples were taken from four of the animals on 16 March and analysed at the VLA in Bury. Results came back negative for worms and fluke.

The electric fence around the Baxter west grazing compartment was strimmed once over 4 days in July and again partially in September; the fence around Pigeon grazing compartment was strimmed once, over 3 days in late June . Fences were checked several times per week when buffalo were grazing, and any repairs made as necessary. Several fallen or dangerous leaning trees were removed along the fence-lines during the year.

A number of rotted fence posts were replaced in East meadows on 9 July. The gate from Pigeon ride onto compartment 1 was re-hung on new gateposts on 7 July. The tabernackie gate separating the western section of compartment 1 from the rest of the compartment was removed on 17 July and replaced with a permanent metal field gate. Two new pedestrian bridges were installed across the ditches either side of Pigeon ride, allowing the whole of the Pigeon grazing compartment fence to be walked, without having to enter the compartment at any point. Work on these began on 16 September, and was completed by an Environment Agency work party in early October.

The gate across Baxter west (crushed by a tree during winter gales) was replaced on 15 April.

The worst areas of poached ground in the Baxter compartment (Bullock Hill and part of Baxter west ride) were rotovated on 6 May.

The weekend buffalo checking rota, involving NE staff and volunteers, continued throughout the year. For most of the year checking was done only once per weekend, but each day in January-April when we were feeding the animals. Lookering training was given to a number of new buffalo checking volunteers on 12 December and 19 March.

Cattle

Grazier Roger Beecroft started to bring his Redpoll cows and calves on to compartment 1 on 23 June. By 2 July the final total of 14 cows and calves were in place and they remained in this compartment until 9 November, when all cows were removed from the reserve. One cow unexpectedly calved on site in October – this cow and calf were taken away on 18 October, leaving 13 animals on site for the last three weeks or so of the grazing season.

As usual, an electric fence was maintained along the eastern boundary of compartment 1, to separate Beecrofts cattle from any cattle that may be grazing in the neighbouring SSSI meadows. Putting the fence up, taking it down and maintaining it (strimming, changing battery) took a total of about 4 days during the summer.

Rides/ Ride-Cutting (Map 3)

All main rides were cut regularly from early May until late September, using the Gator and flail mower or BCS pedestrian mower. In total 9.5 man-days were spent ride cutting.

Any windblown trees/branches were promptly cleared from rides.

About 1.5 days in late August/ early September were spent filling wet holes with spoil, on Pigeon ride and the ride to East meadows, using tractor and front-loader.

Topping/Cut and gather (Map 4)

Areas of *Phalaris* dominated vegetation in East Meadow were cut with the Ryetec on 19 July.

A rectangular block of *Phalaris* dominated vegetation in compartment 11, just south of Baxter east, was topped with the Wessex flail mower on 7 May.

7.5 man-days were spent cutting selected areas in compartments 1, 2, 9, 11 and 13 using the tractor and Ryetec cut and collect machine between mid-July and early September.

Several area were cut by BCS and brushcutter over 5 man-days in mid August and early September, including all the 'traditional' cut areas. These were raked off during two Cambridge Conservation Volunteer tasks, on 17 August and 7 September. Another 4 man-days were spent extending 'lan Maclean's' plot in compartment 5 from mid-September onwards – cutting, raking and piling/burning the vegetation.

An area in compartment 10 was strimmed and then raked by an Environment Agency work party in October.

The Ryetec was loaned to the NE Collyweston base between 20 October and 21 November, and to the NE Suffolk coast reserves between 24 November and 21 January.

Ruth Angrave strimmed and raked the side of the dyke on the west of the footpath between the workbase and Baxter ride on 18 March.

Sedge Cutting (Map 4)

Marcus Setchell carried out the sedge cutting this year, in compartments 6, 8 and 11 between 19 August and 15 October. In all about 1800 bundles were cut and carted off, and most of the waste material tidied up in October.

Woodland/Scrub

Phil Brown carried out his woodland breeding bird survey in compartments 3 and 12.

There was no woodland management carried out – we are still awaiting the production of the estates woodland management plan, which includes the Fen.

Water

A full trial of the Lodes Granta system was carried out, starting on 22 September. Prior to this there were meetings during the year with Helen Stockham of Atkins, Louise Evans and others from Environment Agency, and Bury Pumps to prepare for the event . Also prior to the trial, the height of collar dam 14 was raised using interlocking plastic panels driven into the ground, strengthened by fence posts. Leaks through the panels were plugged using several bags of Bentonite. Some spoil was spread across the dam to fill in any low points. The Lodes Granta inflow points, collar dams and staff gauges were marked on the ground using fence posts with name/number markers attached (see map at end of report). Subsequent to the trial Ruth Angrave carried out regular water level monitoring for a period of weeks .

Extracts from the Atkins report on the trial are reproduced below:

1. Background

Chippenham and Snailwell Poor's Fen is designated as a Site of Special Scientific Interest (SSSI) and is a component feature of the Fenland Special Area of Conservation (SAC). The notified European features are Molinia meadows on calcareous, peaty or clayey-silt-laden soils (NVC community M24) and Calcareous fens with *Cladium mariscus* and species of the *Caricion davalliannae* (S2).

In December 2008, an Options Appraisal was prepared to assess the impact of licensed abstraction on Chippenham and Snailwell Poor's Fen Site of Special Scientific Interest (SSSI) as required for the Habitats Directive Review under the Habitats Directive (92/43/EEC) and its transposition into UK Law (The Conservation (Natural Habitats, & c.) Regulations 1994). As reported in the Options Appraisal, various lines of evidence point to the fact that the current operation of the Lodes Granta Groundwater Support Scheme is not fully effective at Chippenham and Snailwell Poor's Fen SSSI. During the Options Appraisal an initial investigation into enhanced mitigation was undertaken using a wetland model. This work demonstrated that the current mitigation is not fully effective, and was then used to determine that there was sufficient water available from the Scheme to mitigate any effects from abstraction if a more suitable means of delivery can be designed.

The Options Appraisal identified the preferred option as Enhanced Mitigation. Based on the technical appraisal, the existing Lodes Granta Groundwater Support Scheme (implemented in 1991 to mitigate against the impacts of abstraction from the Chalk) could be enhanced to improve the mitigation on Chippenham and Snailwell Poor's Fen at a lower cost, and with greater sustainability, and fewer social and economic consequences than reducing Public Water Supply licences. The main action recommended was to undertake a detailed physical feasibility study of enhanced mitigation so that the most cost effective and least disruptive means of enhancement could be determined. A new Water Level Management Plan (WLMP) for the site was considered to be a potential mechanism to deliver the enhanced mitigation but has been discounted; the

SSSI is not 'main river' and is therefore outside the Environment Agency remit associated with this process. In order to expedite implementation of the enhanced mitigation study, a decision was made to undertake this work outside the WLMP process.

A staged approach was agreed to investigate enhancing the support provided by the Lodes Granta Groundwater Support Scheme. This trial involved selecting two fen compartments for the trial (fen compartments 8 and 11).

This technical note provides the results of the trial that was undertaken on Chippenham and Snailwell Poor's Fen SSSI in September and October 2014 to assess the potential for using the Lodes Granta Groundwater Support Scheme and the existing surface water level management network in Chippenham Fen to deliver water levels suitable for designated communities during drought conditions.Once the results are confirmed for this trial, if successful the trial can be extended out to other areas of fen by Natural England and the Environment Agency.

5. Conclusions

The objective of the trial was to assess the extent to which summer drawdowns within fen compartments 8 and 11 can be limited using the fen support in relation to stress thresholds. It was proposed (Section 2.3) that the trial used a 0.25m below ground level (mean summer water table) and a 0.5m below ground level (minimum summer water table) as thresholds for increased stress on the M24 community.

Figure 13 shows groundwater levels in fen compartments 8 and 11 were between 0.50m and 0.25m below ground level at the start of the trial, therefore above the minimum summer water table objective and below the mean summer water table objective. Alterations to the collar dams and operation of the Lodes Granta Groundwater scheme successfully increased groundwater levels at all installations above the '0.25m below ground level' target, and as described in above, such raised water levels were slow to recess after the trailhad ended.

Figure 14 shows groundwater levels relative to ground levels before the trial and following support from the Lodes Granta Groundwater Scheme. The figure shows increasing proportions of the fen compartments have groundwater levels similar to the mean summer water table target as shown in Figure 13.

Figure 14 is based on groundwater levels recorded during the trial and ground levels obtained from LiDAR data. The accuracy of the LiDAR data relies on removal of vegetation height through a filtering process, where this does not correctly identify vegetation, ground levels will appear abnormally high. This has occurred in several places where standing water was observed during the trial. These areas are marked on the figure with a green hatching and have been included in the areas calculated in Table 5.

Based on the monitoring data discussed in Section 4.1.2.1 the scheme provided a maximum increase of 0.3 to 0.4m in groundwater levels over the first three days of support. This maximum level was dependent on the height of the collar dam adjustments and did not increase further once collar dam 14 began to flow.

Data from the trial has shown the successful isolation of fen compartments 8 and 11 with no evidence of impacts on water levels outside of this area. The slow decline of water levels following the trial shows a high retention of groundwater within the fen compartments which does not readily drain away. The persistence of higher water levels indicates this to be a suitable method for supporting the fen flora during larger summer recessions.

The trial addresses the uncertainties that remained at the end of the Habitats Directive Options Appraisal in 2008. The options appraisal had identified use of the Lodes Granta scheme with appropriate water level management as the preferred option to achieve acceptable water levels and this trial has shown that this is effective.

The trial has also demonstrated that substantial areas of fen compartments can be supported to achieve hydro-ecological water level 'targets' with just a few days of support from the Lodes Granta scheme. Unless accompanied by water level management actions the scheme is ineffective in supporting the Fen. These findings should be used to revise operation of the Lodes Granta scheme to ensure that it is being used in a cost-effective manner.

Tracks to our dipwells, and the EA dipwells on the north meadows and in compartment 8 were periodically strimmed/mown for ease of access. The rain gauge enclosure in compartment 2 was strimmed and raked in November.

Andy Copsey of Capel Manor College brought ten students to the reserve on 6 June to carry out some basic water quality testing.

Ruth Angrave took a series of water samples in November, using similar sampling points to those used when water quality was last tested, in 1989. Here is Ruth's summary of the work:

26 sample of Fen water were taken on the morning of 13/11/14. The samples were taken in the same places as those taken in the 1989 testing sessions (see map in 1989 report). The samples were then sent to ALS for testing for key nutrients and pH. The results of these tests and graphs from both 1989 & 2014 can be found in a spread sheet in ...\..\Survey & Monitoring\Hydrology\Water Quality

Prior to the samples being taken a Lodes granta test took place (22/09/14 - 5/09/14); this involved pumping water from the aquifer that naturally feeds the fen. This may have affected the some of the samples, particularly 1, 5, 6, 12,11,10,22 & 23, as these samples were taken from the area where the test took place.

It should be noted that the 1989 analysis were taken in August and for samples 24, 25 & 26 May. This could affect some of the results eg N can increase in autumn/ winter due to leaching from surrounding farm land (fen management handbook pg61). Points of note:

Please refer to map for sample point positions <u>..\..\Survey & Monitoring\Hydrology\Water</u> Quality\Location of Water Quality sampling points..pdf

Nitrate levels: have increased overall particularly in 4,8,9,10,13,14,15,25, & 26. Run off from Farm land? Buffalo??

Potassium levels: Have increased noticeably at, 10, 11, 12, 14, 15, 22 & 26. Sodium levels have increased overall

pH has dropped. Is rainwater feeding fen more than the aquifer?

Alkalinity as $CaCO_3$ increased slightly overall, particularly at 11, 20, 21 & 24. Similar for alkalinity as HCO_3 peaks at same sample points. Sample point 24 has more than doubled for both.

Sulphates as SO4 more than doubled at points 1, 2, 3, 4 & 5

It is difficult to comment on Phosphate and Phosphorus both appear to have a higher level than 1989, as does Ammoniaical Nitrogen, but these are less than figures rather than exact amounts in most cases.

Area's for possible further investigation could include;

Changing level of pH,

Increase in nitrate levels.

How are changes in the nutrients in the water affecting the soil nutrients? Ruth Angrave.

Access

Numerous fallen trees were cleared from rides around the reserve during the year. The western arm of the top footpath was strimmed once during the summer.

New vinyls were fitted to the NNR headboard signs.

Deer/Pest control

No cull information was available at the time of writing.

NNR Workbase

The office, lobby and w.c/shower were cleaned every two weeks by Mark Day on contract. The workshop and tractor area were swept/tidied by NE staff when time allowed.

The fire alarm system were serviced by M-Fire on 13 February. NE staff tested the fire alarms on a monthly basis. Fire extinguishers were serviced by M-Fire on 13 February.

The septic tank was emptied by Redstripe on 22 August and 23 January, taking away a total of 4300 gallons of waste. Willow Pumps serviced the septic tank pump on 23 May.

All portable electrical appliances were tested by M-Fire 26 February.

The two tractors, Gator, Wessex flail mower, Votex flail, rotovator, Ryetec and BCS were serviced by Stephen Eyles on 13 and 17 March. Stephen Eyles also looked at the Wessex mower, when the filter needed replacement.

Two bird feeders in front of the workbase, and later two more near the buffalo pen, were kept filled throughout the year, two with peanuts and two with sunflower hearts.

On 24 April Anglian Water fixed a long-term leak in the water meter, opposite the cottages. Apparently a faulty washer had been fitted on the original installation. On 14 October a new electric meter was fitted in the workbase.

On 16 December BT installed a second telephone line to the office.

Browns of Burwell delivered diesel to our tank on 21 July.

For a number of years we have recorded environmental data for the work base each month, together with vehicle mileage data. Charts showing the annual totals



of mileage, electricity consumption, water consumption, rubbish and recycling produced are below:









Health and safety

Access structure checks and zone 1 and 2 tree safety checks were carried out on 4 November.

During the year, and as a result of recent occupational health screening, Natural England became aware of the risks associated with the use of vibrating machinery (Hand Arm Vibration). Considerable time was spent researching the vibration output of all our machines, labelling and recording daily usage and exposure. It was discovered that one of our Stihl brushcutters had dangerously high vibration levels – this machine was scrapped and a new, low vibration replacement purchased.

We hosted a Norfolk and Suffolk field staff H&S workshop on 17 February, led by Helen Jackson.

HLF trainee Ruth Angrave had brushcutter and tractor training on the Fen on 4 and 5 February.

Volunteers

We are extremely grateful to a large number of volunteers who contributed greatly to the management and surveying of the reserve this year. In all, a total of 131 man-days were worked by volunteers, and this can be broken down into 70.5 days of practical management and 60.5 days of survey work.

With thanks to:

Bruce Martin, Phil Brown, Woodcock survey (3 days) Terry and Glen Riley, Nick Sibbett, Dale Hing, Alastair Burn.

> Spent two days assisting with practical management works (15 days)

Breeding bird survey (3+ days)

Amphibian and orchid surveys (4 Days)

Weekend buffalo checks (6 days)

Practical management (29 days)

Plant recording (10+ days)

Bird ringing (21 days)

Work experience (8 days)

Hydrological recording/Cambs milk parsley count (4 days)

Phil Brown

Terry and Helen Moore

Paul Lacey, Phil Brown Dale Hing, Natasha Rooney Sonja Kaup, Monica O'Donnell Alex Nichols, Ruth Angrave Nick Sibbett, Bill Mansfield

Cambridge Conservation Volunteers

Valerie Brookes, Natasha Rooney Phil Brown, Alistair Sibbett

Alan Leslie

Mike Holdsworth et al

Ewan Evans, Toby Hainsworth, James Tillyard

Valerie Brookes, Natasha Rooney

Moth recording (3.5 days)

Louise Bacon, Vince Lea, Bill Mansfield , John Dawson

Survey and Monitoring

Water levels/Rainfall

Dipwell readings were taken every two weeks, and rainfall readings weekly. All data were entered onto the dipwell spreadsheet.



Monthly Rainfall Totals 2014-15

Rainfall in 2014 was considerably above the long term average (red line in the chart below). In particular, May, August and November were well above average wet months.



Birds

Woodland CBC

For the third year Phil Brown carried out a modified woodland CBC in compartments 3 and 12. A draft report of the first two years results can be found at:

..\..\Survey & Monitoring\Birds\Chippenham Bird survey - Brown

Woodcock survey

The annual dusk survey was carried out on 28 May. A minimum of 4 roding woodcock were recorded in the air at any one time; also recorded on the evening were 5 grasshopper warblers, 1 barn owl, 2 tawny owls and 1 sedge warbler. The minimum figure for woodcock is down on previous years, but there did seem to be plenty of activity from some points on the night, just not in the one-minute recording periods. A table summarising the results of the dusk survey since 2001 can be found at:

S:\DesignatedSites\NNRs\ChippenhamFen\Survey& Monitoring\Birds\Chippenham woodcock dusk survey.xlsx

Chris Hainsworth repeated the BTO national woodcock survey, counting birds at dusk on three occasions in May and June from a point in Poors Fen.

Bird ringing

Mike Holdsworth, Peter Bircham and others continued to ring birds at the Fen through the year; mostly near the feeders in the shed area in winter and spring, moving out into Poors Fen later in the summer to concentrate on warblers (standards sessions). Mikes report on the 2014 standards sessions together with full results of ringing sessions can be found at:

..\..\Survey & Monitoring\Birds\Chippenham bird ringing

Amphibians

Dr Terry Moore and wife Helen continued to look at amphibians on the Fen in 2014. Their 2012 report and summary table can be found at :

..\..\Survey & Monitoring\Amphibians

Invertebrates Butterflies

The butterfly transect was carried out weekly between April and September. Data was entered onto Transect Walker and sent to the National Butterfly Monitoring Scheme. For the first year, data were also submitted to the scheme online Generally favourable weather through the summer contributed to 2014 being the best year for butterflies since at least 2004, as shown on the chart below.



Chippenham Fen Butterfly transect-total butterflies recorded

Several species had excellent years, for example brimstone, meadow brown, orange tip and peacock and it was encouraging to again record good numbers of small tortoiseshell after several very poor years. Ringlet had another record-breaking year. The charts below show annual indices for some of these species:





BMS Index







One of the few species not to fare well in 2014 was the small white:



Moths

After emerging slightly earlier than average (first seen on 16 May) silver barred moth had another record breaking year, with the highest annual total recorded since the transect began in 2003. Numbers have increased year on year (with a slight blip in 2013 due to the cold spring) since 2009.



The index in the above table is the total number of moths recorded divided by the number of transects walked during the season.

Louise Bacon again co-ordinated a group of volunteers to carry out light trapping on the reserve, although there were only a couple of sessions in 2014. A spreadsheet of the results so far can be found at:

..\..\Survey & Monitoring\Moths

With assistance from Louise Bacon, Vince Lea and Cambs moth recorder John Dawson we put on a moth trapping event at the Fen on 3 July for National Moth night. 6 members of the public attended and good numbers of silver barred and reed leopards were recorded, amongst many other species.

Plants Cambridge milk parsley

Mike Taylor, together with Val Brookes and Tasha Rooney carried out the annual Cambridge milk parsley census on 31 July. Only flowering plants were counted, and this year numbers were about average with approximately 3400 recorded. A spreadsheet of the annual counts can be found at:

..\..\Survey & Monitoring\Plants



The chart below shows results from all the counts on file:

M13 monitoring

Sue Shaw and Ros Tratt came to the reserve to monitor quadrats in M13 areas on 19 June.

Reports of previous years monitoring can be found at:

..\..\Survey & Monitoring\Plants\Shaw M13 reports

Botanical recording

Alan Leslie, the botanical recorder for Cambridgeshire, made numerous visits to the Fen through the year, continuing to compile an up to date species list for the reserve. It is hoped that the annotated list will be published in a special edition Nature in Cambridge in 2015. Part of the draft is reproduced as an appendix to this report.

In the course of recording, Alan found a rare *Apium-Berula* hybrid on Ian Macleans plot in compartment 5. Here is a summary of this exciting find:

A hybrid umbellifer new to science to be described from Chippenham Fen NNR

In 1979 Max Walters collected floating plants of an umbellifer along the Main Ride at Chippenhem Fen. These were initially determined as *A. repens*, a species not otherwise recorded in the county. However, the subsequent discovery that they had irregular pollen and no mature fruits, plus a chromosome count of 2n=19, led to their treatment as *Apium repens* (2n=18) x *A. nodiflorum* (2n-22). The supposition was that the *A. repens* was a rare native that had since become extinct on the Fen. More recently the chromosome number of this plant was redetermined as 2n=20, with the consequence that the plants were also redetermined, this time as a depauperate form of *Berula erecta*, whose chromosome number was thought to be 2n=20. However, in the field, plants still present on the Fen in two separate colonies did not show much relation to *Berula* in their habit and further investigations were instigated and undertaken at Leicester University in the autumn of 2014. Whilst the chromosome count of the plants in question was again confirmed as 2n=20, that for *Berula* on the Fen was 2n=18 (this is the first British count for this species) and it now transpires this is the most common count elsewhere too. *Apium nodiflorum* on the Fen has 2n=22.

Molecular studies, using a series of different approaches and techniques, and have shown conclusively that these plants are in fact hybrids between *Berula erecta* and *Apium nodiflorum*. This combination has never been determined anywhere else before and will shortly be given a name of its own (Desjardins *et al.*, in press). Hybrids within the family *Apiaceae (Umbelliferae)* are very uncommon and intergeneric hybrids very rare indeed. This discovery raises questions about the generic relationships between the parents and with regards to a number of allied species and genera. Molecular work to resolve this has not yet been completed, but it is clear that the type of *Apium (A. graveolens*, Celery) is not the closest relation of a group of species including *A. nodiflorum* and the latter are now to be treated in the genus *Helosciadium*, a genus familiar to nineteenth century botanists for this group of plants. This new hybrid will thus be described as a hybrid between *Berula* and *Helosciadium*. Herbarium material thought to represent this hybrid has been identified from at least two other British sites.

In the field the plants most closely resemble *Apium nodiflorum* but have several bracts below the umbel and at least some peduncles longer than the rays; from *Berula* it is immediately told by the lack of the distinctive ring on the petiole.

A.C. Leslie 15 December 2014

Orchid survey

NNR volunteers Terry and Helen Moore spent some time studying orchids on the reserve.

2014 was generally quite a reasonable year for marsh orchids, and 6+ bee orchids were recorded in compartment 1. There were 20 fragrant orchids on Baxter east on 4 July and 40 fragrant orchids at the eastern end of compartment 2 on 9 July. At least 1 marsh helleborine was seen near the 'bridge to nowhere' in compartment 2.

No *ochroleuca* Early Marsh orchids were found this year – the last flower was seen in 2004.

..\..\Survey & Monitoring\Plants

Bogbean

The bogbean at the main site in compartment 4 was first seen in flower on 22 April, much earlier than last year. On 5 May 317 flower spikes were counted – slightly down on the 2013 count. The flowering period appeared to be quite short with the flowers quickly going over.

Ash die-back

Signs of ash-dieback continued to be obvious around the reserve.

CEH/NE long term monitoring network (LTMN)

MT carried out the breeding bird survey (BBS) for the second year, using the BTO breeding bird methodology, and the required two visits were made on 22 April and 30 May. A summary of results so far can be found at <u>...,LTMN\BBS</u>

Initially we were anticipating a weather station being installed on site, but due to the proximity of other stations in the area, and in order to reduce project costs, Chippenham will not now be having one. We will, however, monitor air pollution here, and although anticipated to begin in 2014 there has been no progress on this yet.

Soil samples were taken from selected quadrat locations by contractors on 25 September.

Species surveillance (Biodiversity 2020 s.41 species)

Grey carpet moth

There were no records this year.

Ochroleuca

Despite searches in the last known location in compartment 2, no flowering plants were found. The species has not been seen in flower here since 2004.

Rossers sac spider

Work continued to try and develop a protocol for monitoring this species. Pitfall trapping and sweep netting in the known location in compartment 8 were unproductive. On 14 July MT found a mature male (confirmed by lan Dawson) in this area by shaking a clump of vegetation over a white tray. On 27 March, Ruth Angrave found a mature female when sieving a litter pile in a similar location to where the species was re-discovered by lan Dawson in 2010. It is hoped to continue work in 2015/16 – particularly to gain information on the distribution of the species across the site.

Miscellaneous species records

Plants

On 7 May CH found a previously unknown location for adders-tongue – 6+ plants were found along the scrub edge in compartment 2.

Butterflies

The first butterfly of 2014 was brimstone, on 6 March. The latest recorded butterflies of 2014 were 3+ red admirals on 4 November. A clouded yellow was near the main entrance on 28 October – this coincided with an unseasonably warm spell with southerly winds.

Moths

John Knowler trapped on the reserve on 18/19 July.

A trapping session on 29 August produced 2 lunar yellow underwings and frosted orange, amongst many other species, together with 2 traps full of hornets. Trapping on 28 November produced 11 December moths and little else.

Odonata

Cadell Beckman visited at least once, searching for exuviae.

The first large red damselfly of the year was recorded on 15 April, with the first broad bodied chaser on 5 May. Several hairy dragonflies were seen around the reserve in May.

During August and September large groups of migrant hawkers could be seen, for example 40+ near the shed on 22 August. On 18 September 30+ pairs of common darters were actively egg laying on the recently cut Ian Macleans plot. The last common darter of the year was seen on 19 November.

Other invertebrates

A glow-worm was seen on Baxter east on 22 May. John Dawson recorded 17 glow-worms between the workbase and Baxter east during the National Moth night event on 3 July.

Mammals

Otter spraints were found on the ditch between compartments 4 and 5 on 16 April, and on Pigeon ride on 6 January.

Amphibians

Several clumps of frogspawn were found in the ditch between the main spring and Bullock Hill on 23 March.

Birds

Bird records are given as an appendix to this report. A pair of marsh harriers nested in compartment 5, and raised at least one young to fledging. A minor local 'twitch' ensued when Dave Collins found a Richards pipit on the set-aside field to the north of the reserve on 26 October. The bird stayed in the area until at least 10 November, and was seen in the north meadows on a couple of occasions.

Visitors/Meetings

Rachel Cawte of NE (Paul Laceys line manager) visited on 8/9 April.

CH met Alice Skinner on 25 April, discussing climate change adaptation.

James McGill (RSPB trainee ecologist) visited on 2 May.

Graeme Lyons of Sussex Wildlife Trust, John Creedy and a farmer from Lincolnshire visited on 13 May to see the buffalo.

Dougal McNeil and Pamela Abbot (both NE) visited on 15 July.

A freelance photographer visited on 23 July to take photos of buffalo wallowing.

Volunteer Val Brookes had her final day with us on 31 July, before going to the Congo to study mountain gorillas.

40+ field staff and others attended a NE SE NNR network meeting on 30 September – 1 October.

Clive Doarks of NE carried out an H&S audit on 16 October.

Sarah Koets, a Woodland Trust volunteer, visited on 21 October, intending to set up a tree health monitoring transect on the reserve.

On 10 November freelance journalist Vincent Price met CH to prepare an article on the NNR.

Alex Prendergast of the NE field unit came to look at stoneworts on 13 November.

Emma Bogaard from Warwickshire College came to see Ruth Angrave (and CH and MT) regarding the NVQ component of her HLF traineeship.

20+ NE staff visited the reserve on 11 March as part of an internal ecohydrology course, run by Anna Wetherall and Ian Diack.

Justin Tilley of NE field unit gave RA, CH, MT and volunteer Phil Brown some deer damage assessment training on 23 March.

Guided Walks

31 May
22 June
25 June
Alastair Burn led a walk for 6 Isleham villagers
Nick Sibbett led a walk for the Bury Woodland Ways group
Chris Hainsworth led a walk for 23 members of Fordham
Garden Club

Michael Taylor Reserve Manager May 2015

Appendix

Annotated Checklist of the Flora of Chippenham Fen

Chippenham Fen lies in a shallow depression, in a triangle formed by the villages of Chippenham, Fordham and Snailwell, and is separated from the main body of Cambridgeshire Fenland. Although the majority falls within the parish of Chippenham, both the other parishes have land within the Fen: compartment 3 being in Fordham parish and the Poors Fen (cpt 4) being in Snailwell. The site covers c.115 hectares and has been a National Nature Reserve since 1963; it was notified additionally as a Site of Special Scientific Interest in 1988. It is currently managed by Natural England and is renowned in particular for its vascular plant flora and the associated very rich invertebrate communities.

The Fen in underlain by the Lower Chalk, with a basal chalk marl overlain by an extensive area of Tottenhoe Stone, which unlike the marl is well-jointed and permeable and is the source of the springs on the Fen; it is itself exposed in one spot in a ditch along Pigeon Ride. In some areas the Tottenhoe Stone is overlain by Grey Chalk. Over this sold geology is a layer of drift from 1-3m in depth, consisting of a chalky downwash or head,

which is usually rather dry, in contrast to the overlying peat deposits. The peat, which varies in thickness from a few centimetres to a maximum of c.2m (i.e. much shallower than at Wicken Fen), lies directly on the head along the southern and eastern borders of the Fen, but in other areas there is an upper peat layer at the surface, overlying a marly clay which in turn lies above a drier lower peat layer (this account is adapted from Mason, 1990). The north-western fringe of the Fen has river terrace sands and gravels overlying a bed of Upper Chalk and these have an important influence on the Flora of this part of the Fen.

The Fen is drained to the south-west, across to the R. Snail, by the rather grandly named Chippenham River, which runs through the northern part of the Fen having entered from the north-east; it rises as a spring in the lake in Chippenham Park. There are also several springs arising on the Fen, most notably on the southern margin just south of Bullock Hill. Mason (1990) demonstrated that with few exceptions the water levels in the current system of ditches throughout the Fen may have little direct effect on the water levels within the compartments, except in areas adjacent to the watercourses themselves. The water table in the bulk of the compartments is determined by precipitation and the water retentive abilities of the peat.

The Fen as we see it today was largely shaped by the work undertaken for Thomas Tharp, who had purchased the Chippenham estate from the Earl of Orford in 1791. He commissioned extensive drainage works on the Fen, which are said to have lowered the water levels by 1.5m, and planted mostly coniferous trees over significant areas, notably the areas we see now as Forty Acre Wood and the Jerusalem Plantations. In a letter from Tharp to his son, written in 1803, we can get a glimpse of what he was hoping to achieve, as he says 'If I am right there are many spruce firs planted in the Fen and more will here after be there when I return [he was writing from his extensive sugar plantations in Jamaica], but we must have other trees to give beauty and profit to that creation, which when mature will give ample room and cover for all the pheasants Chippenham can support' (taken from Mowl & Mayer, 2013). The conifers did not prosper, although a few remaining Picea abies and perhaps some of the Pinus sylvestris may derive from this period of planting, together perhaps with some oaks and a few other trees and shrubs. There were probably later planting as well, but at present there seems to be little information about this. More of the past history of the fen drainage and its vegetation can be found in Kassas (1951, 1952), where it is evident that over the years the maintenance of the ditches has waxed and waned. Thus at the end of the nineteenth century, at the end of a period of agricultural depression, the Fen may have been quite a bit wetter than we see today. This is suggested by comments made by H. J. Riddelsdell when he visited the fen in August 1903 to see the Cambridge Parsley (Selinum carvifolia), noting that he 'came across it several times...when 50-75 yards distant from the edge of the fen on wading in 18 inches to 2 feet of water' (Riddelsdell, 1904). Today water levels in the ditches at least are controlled by a sluice on the river and several bund dams in the ditches with associated overspill culverts. There have been concerns about the effect of water extraction elsewhere in the aquifer reducing the level of flow into the Fen and this can now be supplemented when required by water drawn from outside the fen and pumped into ditches at the south-eastern end of Forty Acre Wood.

In the past the Fen was used as a source of at least peat, litter (Molinia caerulea) and fen hay, as well as a source of Sedge (Cladium mariscus), but today only the beds of Sedge are harvested and taken as a crop for use in thatching. The North and East Meadows have been used for grazing, but the remainder of the Fen was often too wet for grazing and bones of animals lost in the Fen were unearthed at the time the ditches were first dug. Current management is largely a combination of mowing and grazing, together with some scrub clearance. The rides are regularly mown throughout the season. Ride margins, however, do not get quite so much attention as they might deserve and are now often dominated by reeds (*Phragmites australis*), which it is clear would cover most of the Fen if left entirely to their own devices! Those ride margins that do get intermittent mowing (or a combination of mowing and grazing), such as the Baxter Rides, are exceptionally rich botanically. Some areas within most compartments are mown each year, whilst grazing by the small resident herd of water buffalo aids vegetation control in the North and East Meadows (cpts 1,2 and 13) and in the former litter fields of cpts 8,9,10 and 11, as well as in one section of Forty Acre Wood in cpt 7. The buffalo have been on the Fen since 2001. The North Meadow (mostly cpt 1) is also grazed in the summer by a small herd of Suffolk Redpoll cattle.

Each of the 13 Fen compartments has its own distinctive combination of features and this variation is reflected in the flora. However, in all but cpt 3, one of the features shared by all the areas is the often irregular fen surface: there are lots of 'lumps and bumps', which in the list below are referred to as fen islands and these are of considerable importance to the diversity of the fen flora. Some of these derive from banks thrown up in the digging of the drainage ditches, others are the spoil heaps from the various ponds dug over the Fen – although the soil from the largest body of water, Malcolm's Pond, dug in compartment 4 in 1998, was spread out evenly on the surrounding fen. A much larger number of the 'islands' may however be the result of periglacial activity, of which there is considerable evidence over large parts of the south of the county. These processes may have resulted in the head deposits being displaced, resulting in what we now see as irregular mounds, sometimes barely higher than the surrounding fen, or in other cases (such as in cpts 1,9,10 and 13 in particular) as long, low sinuous mounds. These areas are usually much drier than the surrounding fen and have a rich flora, often rather reminiscent of boulder clay grassland. In the North Meadow the higher ground along the NW margins also extends down as fans or fingers of higher ground into the lower-lying fen and at least in part these have a strong contribution from the terrace sands and gravels forming the bank beyond the Fen margin. At the south-western end of compartment 2 there is another long low bank which has traditionally been known as the 'chalk bank', although it is not clear if this is derived from the nature its flora or a knowledge of its geology.

The Fen seems to have been little visited by our earlier botanists, and although both Relhan and Babington made a few records in the general area, it seems it was not until W.J. Cross (from Ely) found *Selinum carvifolia* on the Fen in 1882, that serious attention was paid to its flora. Alfred Fryer and Arthur Bennett in particular made many records in the 1880s and Fryer's listings in particular are often the source of first records for the Fen: he was clearly a careful and thorough recorder. Recording effort seemed to tail off in the early part of the twentieth century, but from the Fen archives it seems that more systematic attempts to the record the flora began again in the 1950s and 1960s, notably with the particular interest taken in the Fen by Max Walters. This culminated in the preparation of the first formal (but unpublished) checklists of the fen flora compiled by Martin Musgrave (Musgrave 1977, 1980), the then Senior Warden. A later version of this list (certainly created post 1996) has been in use on the Fen recently, but it is not clear who produced it or exactly when it was put together. Over the last twenty years or so the Fen management has commissioned a number of reports concerned at least in part with the flora of parts of the Fen (e.g. Shaw & Wheeler, 1996, Smith & Harding, 2001,Spencer & Stone, 2009, Shaw & Tratt, 2014) and their records have been extracted for this list.

The Fen retains a notable flora, many of its wetland elements shared with Wicken Fen. There are still large areas dominated by Sedge and Reed (referred below in the list as tall herb fen) and other areas often dominated by extensive beds of Molinia, Juncus subnodulosus or species of Carex, which are referred to here as open fen. For further details on the plant communities on the Fen see Smith & Harding (2001). The Fen holds certainly the largest and perhaps now the only site in the British Isles for Selinum carvifolia. At a regional level it is notable, for example, for it healthy populations of Sparganium natans and Salix myrsinifolia, both now essentially more northern taxa in the British Isles. The status of the willow is a matter for debate, but is seems a rather unlikely introduction as it has no evident ornamental or practical use. Here too are the only extant sites in the county for Epilobium palustre, Luzula multiflora subsp. multiflora and Gymnadenia densiflora, as well as by far the most extensive population of the sweetbriar Rosa micrantha. There are also significant populations of a number of locally uncommon sedges, notably Carex pulicaris, C. lasiocarpa and C. paniculata, as well as of plants such as Serratula tinctoria, Cirsium dissectum, Thelypteris palustris, Potamogeton coloratus, Anagallis tenella and Schoenus nigricans, as well as perhaps our only remaining native site for Bogbean, Menyanthes trifoliata. There is also a good list of scarce (or at least rarely recorded) hybrids. Chief amongst these is the previously unknown cross between Apium nodiflorum and Berula erecta. This was first brought to attention by Max Walters in 1979 and initially attributed to A. repens, a species not otherwise recorded in the county. Its poor pollen and lack of mature fruit subsequently led to it being treated as hybrid between repens and nodiflorum. Latterly it had been identified as a variant of Berula erecta! Now thanks to some elegant molecular work undertaken by Stuart Desjardins at Leicester University (Desjardins et al., in press), we know the reason for our confusion.

Some significant species have been lost from the Fen over the years, in some cases probably reflecting the much wetter conditions prevailing at the end of the nineteenth century when they were first recorded and also subsequent changes in use and management. These include several species of Cottongrass (*Eriophorum* spp.) and Bladderwort (*Utricularia* spp.), *Drosera rotundifolia* and *Liparis loeselii*. Some locally very notable species persisted until much later e.g. *Parnassia palustris* (1980), *Pedicularis palustris* (1995) and *Pinguicula vulgaris* (1995) and there is continuing hope that at least some of these might reappear. Nor has the very scarce, pale yellow-flowered

variant of *Dactylorhiza incarnata*, subsp. *ochroloeuca*, been seen on the Fen since 2004 and indeed this species in general now seems to be very scarce indeed on the Fen. Other losses have also occurred in the exceptionally rich communities on the 'chalk bank' in cpt 2 and on the higher ground along the north-western margin of cpt 1. The latter is usually heavily grazed, but in 2014 grazing did not commence until well into the summer which allowed several 'missing' species to be refound, so there is still some hope that plants such as the following may be seen again: *Anacamptis pyramidalis*, *Campanula rotundifolia*, *Clinopodium acinos*, *Gentianella amarella*, *Hippocrepis comosa*, *Onobrychis viciifolia*, *Pilosella officinarum*, *Pimpinella saxifraga*, *Plantago media* and *Scabiosa columbaria*. In compensation for this rather gloomy list of absentees this area has seen more species added to the Fen flora in the current survey than any other!

The recording that forms the core of this report was informally commissioned by Chris Hainsworth, the current Senior Warden, in late 2011 and has resulted from numerous visits paid to the fen by the author during 2012-2014. I have tried to cover the whole of the area of the Fen, and at all times of the year, but have to admit that some areas of dense Sedge and Reed in compartments 4 & 5 have not had quite the same level of attention as others: these can be daunting areas to traverse, with uncertain footing and vegetation well over head height! Nevertheless I hope this report contains a reasonably thorough picture of the fen flora over this period. The distribution over the 13 Fen compartments given in the list below is based entirely on my records in this period. The list however also includes a note of any species ever recorded from the Fen and in doing so draws heavily upon the Musgrave lists and Gigi Crompton's magnificent *Catalogue of* Cambridge Flora records since 1538 (Crompton, 2001, 2004, 2004 and on www.cambridgeshire flora.com). I have endeavoured to trawl other potential sources, but would welcome notice of any further records which have not yet come to light. A much more detailed set of individual records for many species at individual sites on the Fen has also been compiled during this survey and will also be lodged with the fen archive. More work needs to be done to fully understand some of the variation encountered on the Fen. In particular the sometimes bewildering variation exhibited by species of Salix, Ulmus, Betula and Agrostis would benefit form further study, as would the populations of Euphrasia on the Fen. In addition little systematic work has been undertaken on the *Taraxacum* species present and these might well yield interesting results.

I have attempted to give the date and the name of the recorder for the first record for each species on the Fen: these are listed in brackets after the species name. This poses some problems as many historical records which potentially could have been from the Fen are just listed as 'Chippenham'; these have been omitted. In addition a number of the key early listings are undated: notably many of the records made by Fryer. There seems good reason to suppose that most of these were made in the 1880s, but if there was another, dated record, from that decade made by another recorder, that has been preferred in this list. Some other undated listings might have been earlier than a Fryer record and I would welcome clear evidence of this to amend the list. Any species in the following list in square brackets is not accepted for the Fen flora. The decision to reject any record is not always an easy one and to some extent is a subjective choice based upon knowledge of

the site, and of frequent or likely identification problems. I should be more than happy to have good evidence to reinstate plants that have been rejected below.

The boundaries of the area recorded are shown in figure??. It excludes the parallel fields that adjoin the north-western border of the East Meadow (cpt 13) and the Fordham Belt plantation along the north-western border of the Fen. Divisions between the compartments are taken as running either down the centre of the rides when there are ditches on both side, or where relevant along the centre of the Chippenhan River, or down the centre of the ditch separating cpts 4 from 5 and 9 and that between 10 and 12.On the exterior borders recording has generally been to the existing fence line, except in cpts 1 & 13 where it has extended to the ditch line along their north-eastern borders

With a few exceptions the botanical nomenclature of this list follows Stace (2010).

The full annotated list can be found at:Survey & Monitoring\Plants









Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total	Index	Weak Index
Mean Temp	17.00	18.00	15.00	16.00	18.00		16.00	22.00		19.00	22.00	18.00	18.00	17.00		23.00	25.00	23.00	20.00	19.00	16.00	18.00	20.00	17.00	20.00	19.00			
Mean Sun	60.00	100.00	100.00	50.00	88.00		68.00	93.00		100.00	90.00	100.00	50.00	43.00		87.00	100.00	100.00	50.00	80.00	82.00	100.00	100.00	75.00	90.00	80.00	1		1
Small/Essex Skipper						-			1			1	17	36		29	14	3									100	-1	137
Large Skipper	2.502	· · · · · · · · · · · · · · · · · · ·			100			1000		2	5	30	71	23	11	8	100	12 . 12	C	1.1.1	1 8	12 3	- 0				139	150	148
Clouded Yellow	3 1723			1.1.1					-										1								1	1	1
Brimstone	1	7	7	8	23	23	8	10	8	4	2	2			3	24	25	10	3	1	1	14	4	4	4	1 3	162	196	178
Large White	S - S	1 8	1 23	1 12	05		1	1	1		5 - 3		1			2	6	7		4	2			5	2	2	30	31	31
Small White			4	2	2	1	1	1	1						1	9	2	5		2	1	S			1	-	29	32	31
Green-veined White	1 8	6	17	16	17	11	4	2	T	1	1		12	11	21	32	47	22	15	6	3	10	9	15	4	1	251	284	275
Orange-lip	8	-	3	9	8	4	1			1	-	- ŝ						12 12	1	5 3		3 3/			-	8 9	22	26	22
Green Hairstreak	2 3 2		E	1000			S		-							-		10 (A)	-					-		2 12	0	0	0
White-letter Hairstreak	1		-	-				-	+					-			1		1	<u> </u>						1	0	0	0
Small Copper	5 5			200			8 1							-			200	3	-	8 B		2 2				5 5	0	0	0
Brown Argus				-	-			-				-		-				3	3		-			-		-	6	6	6
Common Blue	200-0	- 5	i ne	100		1	5	-		1		2			1	1	3	7	7	10		3		<u> </u>		1. 0.00	34	36	36
Holly Blue	1			1		-	-		1					-					-								0	0	0
Red Admiral	1			11-2			S	2	2		£	57 8	-		1 1	-	1	5	4	11	6	3		2	10 1	8 9	34	36	36
Psinted Lady			-							-				-		<u> </u>							-			÷	0	0	0
Small Tortoiseshell	4	2		C. 3			2007-0			1	1	- 2		1	2		a	S	2	1	1	S 8			2	2 3	13	15	15
Peacock	19	23	18	23	11	6	3	7	5	1	3	1 3	8	-	4	21	97	34	2	1		1	1	<u> </u>	1		268	281	276
Comma	2	4				-	-						-		1.5	2	-	3		2		2	1	1	2	5 0	16	16	16
Speckled Wood	8 8		3	5	. 2	4	1	1	2	4	9	1	1	2	2	1	3	2	1	2	1	3	5				47	55	53
Gatekeeper				1	-		2			1		-		4	12	18	21	16	6	2		-		<u> </u>	0.00	1.1157	67	79	69
Meadow Brown	0 0			1			1				5	30	48	50	61	85	73	74	22	22	10	1	2	6	1	. .	429	490	471
Ringlet	<u> </u>								1	-		19	197	207	165	99	14	10	5		10			<u> </u>		1.11.11	551	716	695
Small Heath	1	S					S							-			-									-	0	0	0
Total	26	42	52	63	63	50	17	24	20	15	26	85	347	334	283	331	306	198	71	64	25	37	22	33	15	1	2197	2450	2496

Chippenham Fen Butterfly Transect 2014

