Introduction

The Small Blue Butterfly is in decline across the UK and is reliant on Kidney Vetch as a food plant for its larvae. A small population of Small Blue Butterflies has been identified on Greenham Common that seemed to be concentrated in one particular location. It was decided to investigate the possibilities of ensuring their survival by maintaining and extending the suitable habitat available to them.

Greenham Common

Greenham Common, or as it really is called Greenham and Crookham Common, is located in West Berkshire, just to the Southeast of Newbury

Greenham Common has a long history. What follows is an abridged version that hopefully gives a flavour of the events that have occurred there and lead to the unusual habitats that can now be found across the site.

It is from the Middle Ages onwards that the history of Greenham becomes better documented with associations with a monastery administered by the Knights Hospitaller, later confiscated by Henry VIII with abolishment of the Monasteries in 1540. It is fear of French invasions that the common begins use during the 18th and 19th century for training exercises by the military. During the First World War soldiers and tanks again used it for military exercises. In 1941 the Ministry Of Defence (MOD) requisitioned it and an airfield was constructed on the site. The base gained international notoriety during the 1980's when 96 cruise missiles were housed there and a long period of protest occurred around the site lead by the women's peace camps that were created around the base. This culminated in 1983 by a 14-mile human chain that wrapped around the entire site. The airbase was vacated by the

United States Airforce (USASF) in 1992 and put up for sale by the MOD in 1993. During 1994 the MOD gave the Common back to the people of Newbury and English Nature designated part of the site as a Site of Special Scientific Interest (SSSI). Work began on removing the runways in 1995 (which were the longest in Europe) and the concrete and aggregate was used in the nearby construction of the Newbury by-pass. The year 2000 saw the official re-opening of the common to public use, and the following year grazing was re-introduced. Now approximately 100 cattle roam freely. Finally during 2007 a herd of Exmoor ponies were introduced, their welfare is constantly monitored and they number approximately a dozen.

There are a few factors in its recent history that have lead to Greenham containing some unique and diverse habitats in very close proximity. The runways and taxiways that were removed have, over a period of time, leached alkaline into the soil. This has lead to calciole and calcifuge flora growing side by side. A soil survey undertaken during 1998 concluded the following: -

'Sporadic field-testing of heathland and grassland topsoil's within the airbase showed that they often had pH values between 6 and 7. These slightly acidic to neutral values would be generally considered insufficiently acidic for calcifuge heathland communities and insufficiently alkaline for some of the more calcicole species present. This suggests that both plant community composition and soil PH are in a state of flux and that further changes in the balance between calcifugous and calcicolous species are likely. The direction of change is unknown.

These high pH conditions suggest considerable contamination of the heathland soils by calcareous materials, presumably from concrete used in airfield construction and possibly also from surface dust following recent concrete crushing operations. The conditions are far from ideal for heathland and it could be that calcifuge communities are in decline because of this. However, the picture is far from clear.' (Allen, R, 2000)

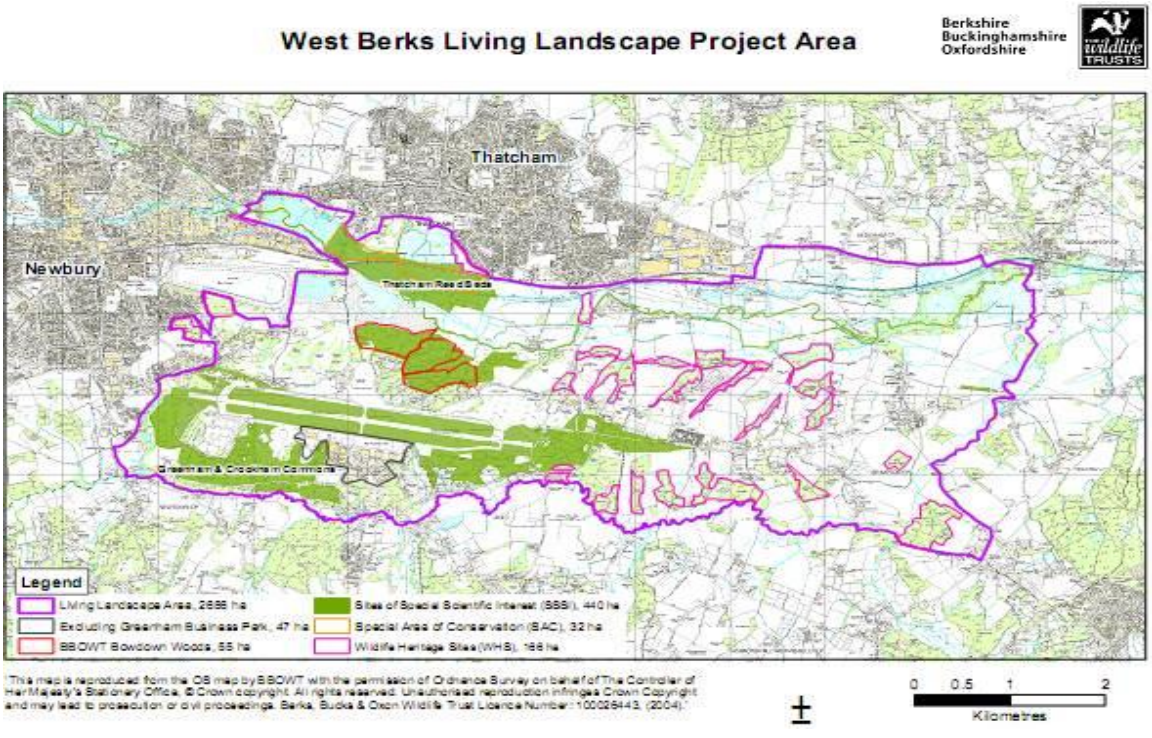
This has created habitats suitable for insect species that are associated with both acid heaths and chalk downlands only a few feet apart. The site is home to nearly a quarter of all UK plant species (http://www.greenham-common-trust.co.uk/wildlifep.htm).

Once the concrete was removed this left huge gravely tracts. These areas now show early stages of succession that would have naturally occurred at the end of the last ice age. This will give an interesting if somewhat accelerated view of the last 12,000 years since the glaciers melted. The areas that once lay within the runways and would have been heavily mown by the military (the distinctive lozenges as seen overleaf) have become the SSSI heathland.

(Greenham from the air)

Polluted areas were removed leaving large excavations that soon became a series of permanent and ephemeral ponds and undulations of varying depths. A series of woodlands and gullies can be found to the south of the site. Some of these woodlands are mentioned in early Norman maps (Peckmoor Copse, which was then called Peckmoor Wood).

The Common encompasses an area of approximately 414 hectares and is 5.5km east to west. In 2008 a landscape project began and a partnerships formed between Berkshire Buckinghamshire, Oxfordshire Wild Life Trust (BBOWT) and West Berkshire Council. This has 3 reserves at it's heart, Greenham Common, Bowdown Woods (a BBOWT reserve that borders the North side of Greenham Common), and Thatcham Reed Beds (a West Berkshire Council site that is to the Northeast of Bowdown and is also a SSSI and SAC). This will encompass an area of 2,600 ha (26 Sq km) - a landscape which encompasses lowland heathland, ancient woodland, reedbeds, rivers and streams.



The Common is now home to numerous protected and Biodiversity Action Plan (BAP) listed species including, Adders, Grass Snake, Slow Worm, Common Lizard, Great Crested Newt, Dormouse, Badger, Small Blue Butterfly, Woodlark, Nightjar, Woodcock, Nightingale, and Barn Owl.

Kidney Vetch

Kidney Vetch (*Anthyllis vulneraria)* is a plant that appears in the early stages of succession where much open ground is visible. Yellow in colour, though variations in colour pattern do commonly occur. It is a poor competitor and its very light feathery seeds (approximately 350 seeds per gram (http://wildseed.co.uk/species/view/19)) require bare ground on which to germinate. It is a plant most often associated with chalk downlands. The plant is a short-lived perennial that does not flower in its first year.


(Kidney Vetch on Greenham Common)

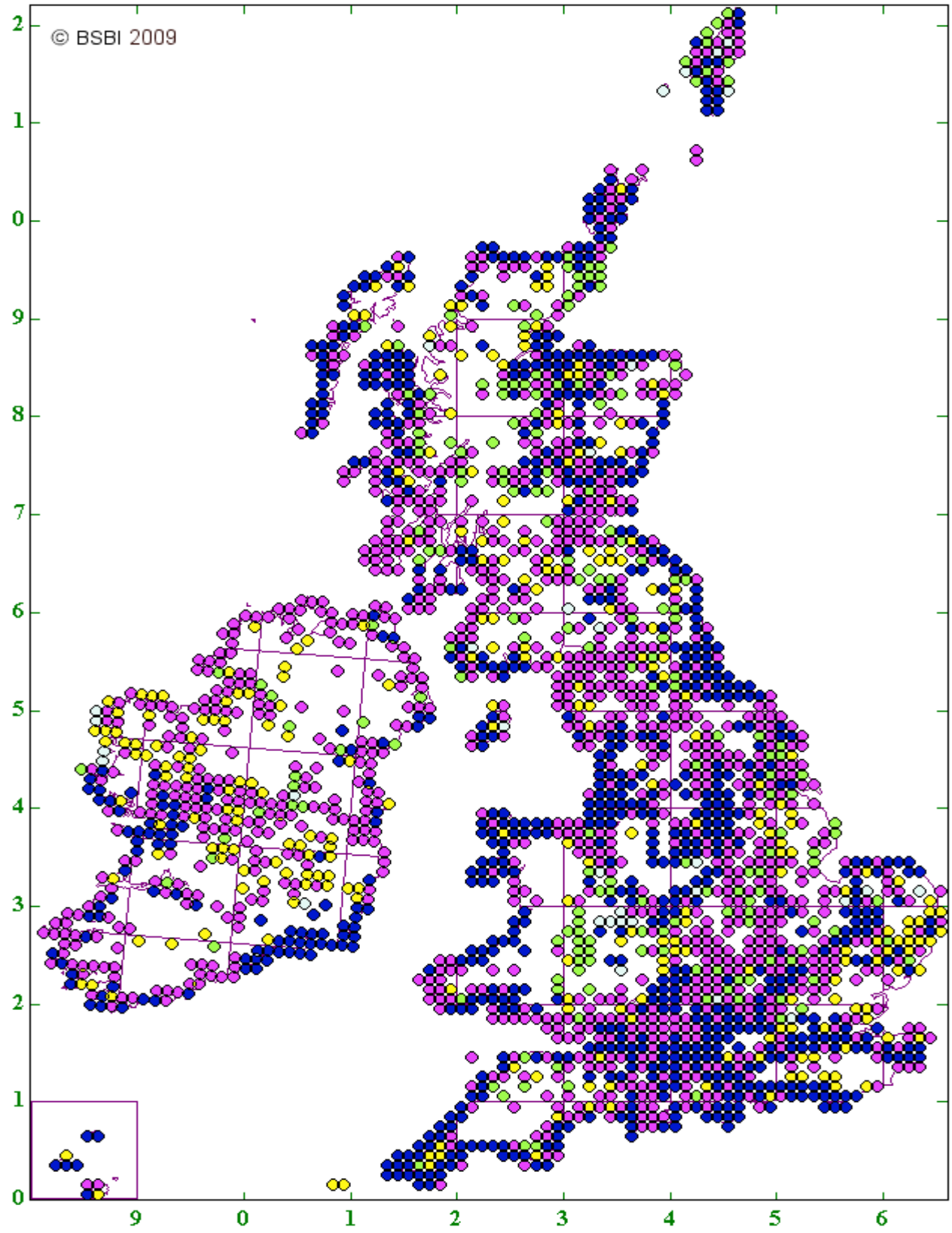
Natural England write 'Kidney vetch is a pretty but very variable perennial plant. It can be prostrate or erect with pinnate leaves, divided into up to seven pairs of leaflets. The leaves are silky white underneath. The stems terminate with compact, round flower heads with a woolly brown coat. The flowers are usually yellow but can also be crimson. Its wild habitat varies from coastal cliffs and dunes to chalk and limestone grassland but it is widely sown on motorway verges and publicly owned land (mainly as an alien fodder variety). Where the conditions are right, kidney vetch can provide good ground cover.' (http://www.plantpress.com/wildlife/o647-kidneyvetch.php)

(A drawing of a Kidney Vetch plant)

The UK distribution of Kidney Vetch is shown below: -

Hectad distribution map of **Anthyllis vulneraria (Kidney Vetch)** in Britain and Ireland

-1930 1930-1969 1970-1986 1987-1999 2000- Show All



Small Blue Butterfly

The Small Blue Butterfly (*Cupido minimus)* is the UK's smallest butterfly but because of its size, its dull-blue, almost black colouration and the fact that most colonies are small and confined to sheltered pockets of grassland, it is often overlooked.
It emerges in mid-May until late June and again a smaller second brood can occur in July through to August. The flight times can vary depending on seasonal weather conditions.


(The Small Blue Butterfly)

Both sexes may be found from late afternoon onwards in communal roosts, facing head down in long grass. Males perch in groups on shrubs or tall grasses in sheltered spots, flying out to intercept females. Once mated, the females disperse to lay eggs. The first brood females lay their eggs singly, tucked well into the flowers of Kidney Vetch plants during late May and June. They will often mate more than once. The caterpillars hatch between 3 and 18 days after laying, and can turn cannibalistic if they encounter another caterpillar on their flower-head. The caterpillars burrow into the flowers and feed on developing seeds. When fully grown (about July) they descend to the ground, where a proportion of the caterpillars will spend the winter amongst vegetation or in soil crevices. They will pupate here in late April and May of the following year, although those that form the second generation will pupate immediately and hatch as adults about 2 or 3 weeks later. Small Blues typically form extremely small, discrete colonies (<30 individuals at peak in most years). These populations fluctuate greatly from year to year, in relation to flowering cycles of the Kidney Vetch. (http://www.sussex-butterflies.org.uk/smallblue.php)

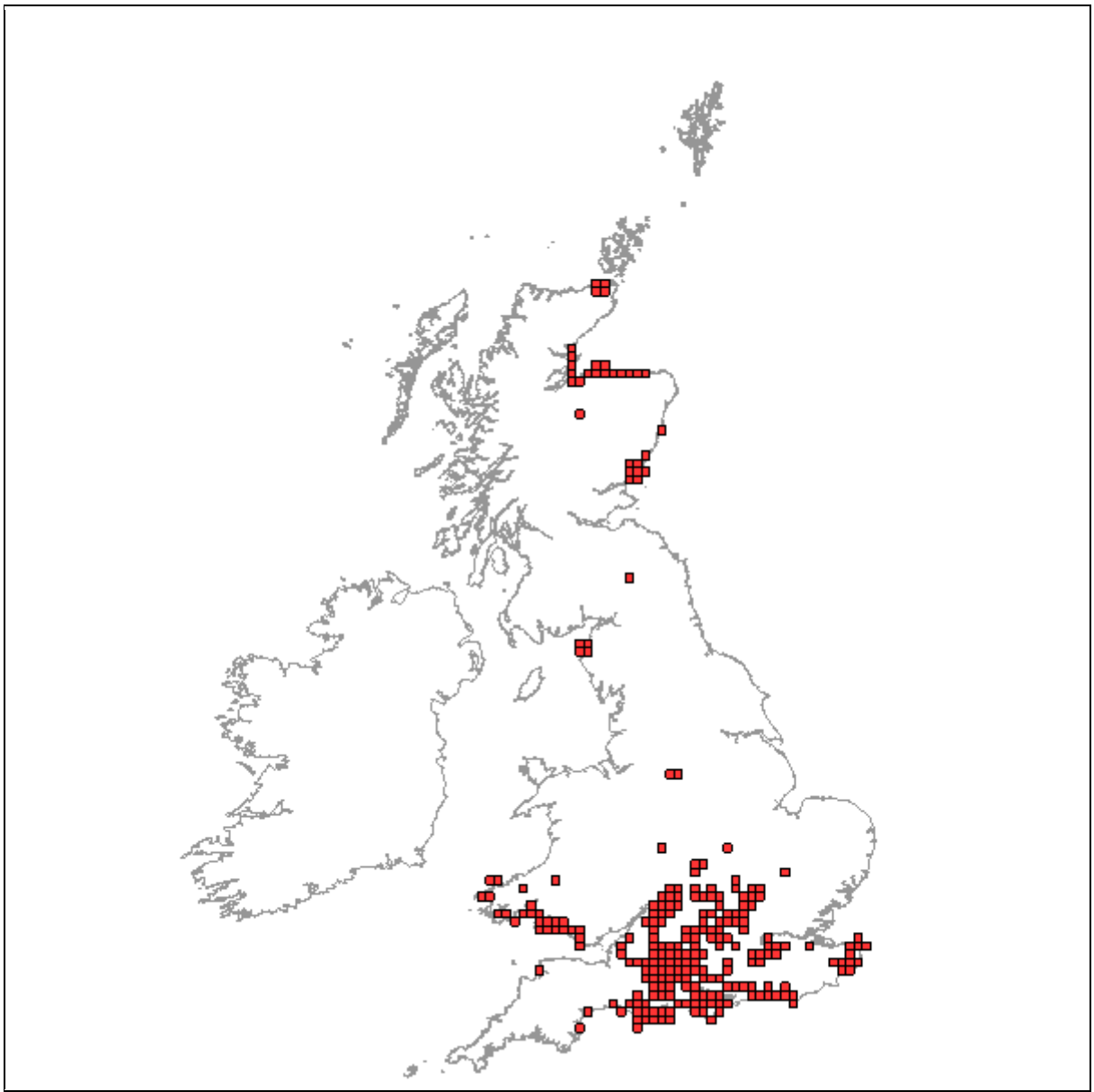
(A Small Blue caterpillar head first into Kidney Vetch)

It is the requirements of sheltered locations amongst Kidney Vetch that severely limit the sites in which the Small Blue butterfly can be found. Habitat loss has lead to the extinction of many colonies, and many populations are now becoming isolated. The species is now severely in decline (Tomlinson,D 2002, p.76)

Distribution and status: -

10km squares with records for *Cupido minimus* (Small Blue) in Great Britain and Ireland

Includes the following taxa: *Cupido minimus*, *Small Blue* & *Cupido minimus*.



10km square legend

Present in 10km squares

- UK BAP status: Proposed Priority Species
- Butterfly Conservation priority: high
- European threat status: not threatened
- Fully protected in Northern Ireland, protected in Great Britain for sale only

The Kidney Vetch at Greenham Common is predominantly on the gravely areas that once were the runways and taxiways of the airfield, and along the bund which was built to screen the industrial estate from the Common. The bund was built from material that came from the Common as the restoration work was undertaken.

The old runway areas tend to experience a lot of wind, as the area is located on a plateau, hence making an ideal location for an airport. The bund does however provide some shelter from these conditions. The bund is also fenced from the common. This means it does not experience any of the grazing that the cattle and ponies provide on the common itself, therefore the grasses on the bund tend to be longer and provide additional shelter for the Small Blue Butterfly in times of poor weather. It is these factors, Kidney Vetch, longer grasses to roost in, and access to scrub within which to shelter, that means the Small Blue Butterfly colony is located mainly on the bund though some have been recorded in low numbers in other locations across the common.

(A view of the bund from the common looking Southwest.)

(A view across the bund looking West. Kidney Vetch can be seen on the bund in the distance.)

Unfortunately this same process where the bund is slowly scrubbing over, the longer grasses, the requirement of Kidney Vetch to germinate on bare ground, the lack of grazing cattle to tread the seeds in, and the tree planting that was done when the bund was constructed now limits the butterfly colony. This combined with the longer-term objective of the bund, which must be to screen the common from the buildings on the industrial estate does mean the viability of Kidney Vetch at this location must be limited. This in turn will have a negative impact on the Small Blue Butterfly colony that is currently located here.

The Plan for the Kidney Vetch and the Small Blue Butterfly colony

The Small Blue Butterfly is currently part of a Butterfly Conservation/West Berkshire Council-monitoring programme and was initiated in 2008.

A visit to Greenham Common occurred earlier in 2009 by Gail Jeffcoate and Grahame Hawker from Butterfly Conservation, along with Adrian Wallington, Adrian Hickman, John Lerpiniere, and Lloyd Garvey from West Berkshire Council/ volunteers working with West Berkshire Council. After this visit Gail Jeffcoate in an email suggested that: -

'Absence of shelter from strong wind is likely to limit Small Blue numbers here. Strong winds are likely to prevent the Small Blues from flying any distance across the heath. Days during the flight period when conditions are calm will allow them to travel further and reach other areas of Kidney Vetch. Weather during the flight period has a huge impact on the number of eggs laid and the size of the population the following year. Numbers here are likely to be limited by wind, as well as cloud/rain, to a greater extent than populations in habitat with plenty of sheltered hollows (e.g. quarries), and the full potential of the site in terms of numbers of Small Blue is unlikely to be realised unless the amount of shelter can be increased.
Currently a few small features such as remnants of old trackside banks, provide small amounts of low shelter, and their value in providing local, small-scale shelter and bare ground should be taken into account, but they are scarce.
Large-scale creation of hollows or banks would not fit in with the character of the open, flat heath, and hollows of any depth may be too damp for Kidney Vetch. Small-scale creation of banks and hollows that did not intrude on the landscape would valuable for a range of invertebrates a well as the Small Blue.'

Grahame Hawker advised that the area near the bund would be the best place to try to create 'crescent shaped bunds'; either from local material or using imported chalk rubble, if a source is readily available. Careful thought is needed before creating structures that may change the character of the heath (although only very locally), though they could benefit a range of invertebrates as well as the Small Blue Butterfly.

An area close to the existing Kidney Vetch and the bund has been identified for this work to take place.

Objectives of the project

The objective of this exercise is to monitor the population of the Kidney Vetch in the following locations to ascertain the population of Kidney Vetch available for the Small Blue Butterfly colony: -

The bund: -	This, over an extended period of time, will provide evidence as to whether the population is in fact declining as is the current perception.

The new managed area: -	This will provide the evidence as to whether the management initiated is successful or not.
A Control area: -	This is an area similar to the above in close proximity that will be used to monitor the outcome if no management takes place.

The 2009 survey will provide baseline data. The survey must be simple enough and clear enough to enable an annual survey to continue. The following will be surveyed: -

The Population of Kidney Vetch in the 3 given areas.

The number of adult, and juvenile (first year plants).

The soil PH in each area.

The break down of adult to juvenile, overtime will indicate the quantity of young plants that will provide flowers in future years. This may provide early indication to whether our management of the areas is effective.

The testing of the soil will show whether the expected leaching, and slow acidifying effect is in fact occurring. This will enable us if needed to take the necessary action to rectify this by importing small amounts of chalk/limestone to the site.

Method and Actions

The Bund

The area on the bund containing the Kidney Vetch and Small Blue Butterfly colony has been identified and mapped onto a grid using a GPS.

The location is SU49526 64606 to SU 49541 64601 (accuracy to 6m)
This was a rectangle covering 780m2
The West Berkshire countryside team does not manage the bund, so access was requested and gained, from Stuart Tagg (Chief executive of Greenham Common Trust).
After consultation with Adrian Wallington (Countryside Ranger for Greenham Common) and Adrian Hickman (Independent ecologist working on projects on behalf of West Berkshire council) it was decided to survey just 1% of the area on the bund. Though this is a small amount we wanted to ensure the following.

Limited damage was done to the Kidney Vetch and the Small Blue Butterflies that were active during the survey.
The survey being undertaken was small enough to be undertaken with limited resources in future years.

I broke the bund area down onto a grid of 1metre squares and used a random number generator (http://www.random.org/) to provide two numbers the first being a number between 1 and 10 to give longitude then a number between 1 and 78 to give Latitude. I did this 8 times to provide the 8 locations to be surveyed and marked them on the grid: -

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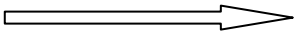
North 

Using a tape measure I located the areas to be surveyed on the bund and placed a 1m2 grid on the ground. The following was then surveyed in each grid: -

1/ Average swathe height: - This was measured using a 30cm circular piece of cardboard with a hole in the centre. A cane was then put through the hole and placed in the centre of the quadrat. The card was dropped onto the vegetation below and the height from the ground to the card measured.

2/ The percentage ground coverage of different vegetation: - This was the percentage ground cover that each plant or type of vegetation covered. As the flora is layered it is likely the overall coverage will be more than 100% (i.e. Moss may cover all of the area so would be 100% other types of vegetation are likely to have grown through the moss to different levels so creating figures greater than 100%)

3/ Where possible identify species of plant: - This was limited to my knowledge of plant species, and was only to give an indication of other plant species living in the quadrats. I am at present unable to identify individual species of grasses, so I have simply written grasses.

4/ Number of flowering Kidney Vetch: - This is to give the number of adult plants that are currently available for the Small Blue Butterfly to feed and lay eggs.

5/ Number of non-flowering Kidney Vetch: - These are the juvenile (first year plants) and provide an indication to what will hopefully flower next year. Over a period of time this figure can provide evidence to the health of the community (if year on year the number of juveniles falls we will know that the population is in decline)

At the end of this process I will not only have numbers of Kidney Vetch but an indication to what else is growing in the area and how dense the ground vegetation has become.

A quick visual assessment was then noted as to what was in the vicinity of the defined area. This will provide information as to what may cause interference in future years (i.e. A small oak of 1 metre height will cause little problem now, but over a period of years this will likely shade out the area and the vegetation structure below is likely to change)

Finally a soil sample was taken at the following location: - SU 49606 64594 (accuracy to 8m)

The future managed area

This new managed area was identified and the location taken by GPS as SU 49611 64603.The area was bordered by tall Gorse (as can be seen on the photographs overleaf) and this will be used as the natural border as it offers shelter from the prevailing winds across the Common. The area was measured using a GPS (you walk the perimeter with the GPS and it calculates the area for you) and was calculated as 163m2.As the area had so little visible Kidney Vetch present the whole area was searched and a total population counted. A soil sample was then taken from the area (GPS location recorded as SU49617 64613 (accuracy to 6m))

(Area identified for future management of the Small Blue Butterfly, looking North)

(Area identified for future management of the Small Blue Butterfly, looking South)

The Control area

The control area was identified just to the West of the new proposed managed location and a GPS reading taken as SU49586 64619. This has a similar appearance to the managed area, and is similarly bordered by tall Gorse. The area was again calculated using the GPS and recorded as 178m2. This area had few visible Kidney Vetch so the whole area was searched and counted. A soil sample was taken from the area (GPS location recorded as SU49580 64618 (accuracy to 5m))

(The Control area looking West)

(The control area looking South)

Results of the survey

The Bund

Area 6 across and 15 down as identified on the grid

Swathe height	**40cm**
1 metre quadrat coverage: -	**65% Kidney Vetch** **40% Moss** **30% Grasses** **5% bare ground**
Plant species counted: -	**15 flowering (adult) Kidney Vetch** **13 non-flowering (juvenile) Kidney Vetch** **1 Thistle** **2 Dandelions**

Area 6 across and 22 down on the grid

Swathe height	**19cm**
1 metre quadrat ground coverage: -	**80% Moss** **20% Yarrow** **10% Thistle** **30% Grasses** **10% Birdsfoot Trefoil**
Plant species counted: -	**16 Yarrow** **1 Thistle** **8 Birdsfoot Trefoil**

Area 7 across and 27 down on the grid

Swathe height	**36cm**
1 metre quadrat ground coverage: -	**70% Moss** **15% Bare gound** **50% Kidney Vetch** **40% Grasses** **10% Yarrow** **5% Thistle**
Plant species counted: -	**15 Flowering (adult) Kidney Vetch** **6 non-flowering (juvenile) Kidney Vetch**

Area 5 across and 35 down on the grid

Swathe height	**22cm**
1 metre quadrat ground coverage: -	**30% Bare ground** **30% Moss** **3% Thistle** **40% Grasses** **3% Oxeye daisy** **10% Black medik** **5% Plantain** **2% Yarrow** **1% Kidney Vetch**
Plant species counted: -	**1 Flowering (adult) Kidney Vetch** **2 Yarrow** **5 Black Medik** **1 Oxeye Daisy**

Area 3 across and 37 down on the grid

Swathe height	**25cm**
1 metre quadrat ground coverage: -	**100% Moss** **5% Yarrow** **5% Grasses** **5% Black Medik** **1% Purple Clover**
Plant species counted: -	**3 Yarrow** **2 Black Medik** **1 Purple Clover**

Area 5 across and 43 down on the grid

Swathe height	**63cm**
1 metre quadrat ground coverage: -	**100% Moss** **65% Grasses** **20% Black Medik** **10% Thistle** **5% Kidney Vetch** **2% Yarrow** **2% Dandelion**
Plant Species counted: -	**1 non-flowering (juvenile) Kidney Vetch** **7 Black Medik** **1 Thistle** **2 Yarrow** **1 Dandelion**

Area 7 across and 51 down on the grid

Swathe height	**42cm**
1 metre quadrat ground coverage: -	**100% Moss** **80% Grass** **15% kidney Vetch** **2% Black Medik** **1% Yarrow**
Plant species counted: -	**9 Flowering (adult) Kidney Vetch** **2 non-flowering (juvenile) Kidney Vetch** **3 Black Medik** **1 Yarrow**

Area 10 across and 57 down on the grid

Swathe height	**26cm**
1 metre quadrat ground coverage: -	**50% Moss** **50% bare ground (stones)** **30% Grasses** **10% Dandelion** **3% White Clover** **3% Yarrow** **2% Birdsfoot Trefoil** **2% Kidney Vetch**
Plant species counted: -	**2 Yarrow** **2 White Clover** **2 Birdsfoot Trefoil** **1 Dandelion** **2 Flowering (adult) Kidney Vetch** **1 non-flowering (juvenile) Kidney Vetch**

Visual assessment of vegetation in and around the specified location on the bund: -

On the East side there are Broom, Willow, Ash, and Silver Birch. The approximate average height is 3 metres. In the area amongst the Kidney Vetch are planted young Ash, Oak, Blackthorn, Hazel, Rowan, and some Broom, and bramble scrub is present. The Western side is dominated by 4-5 metre tall Silver Birch. Approximately 25 metres to the South of the bund is the factory wall, and to the North is a footpath across the common (East/West). It was noticeable that the ground was very mossy. This will cause a significant barrier to successful germination by the Kidney Vetch

The population of Kidney Vetch on the bund was calculated by: -

Adding the number of Kidney Vetch from each area to provide a total count for all area surveyed.

65 Kidney Vetch plants counted

This was broken down into adults and juveniles

23 Non-flowering (juvenile) plants
42 Flowering (adult) plants

To calculate the estimated population I then divided the total by 8 (the number of 1m2 areas surveyed) and multiplied by 780 (as the area on the bund was 780m2) this gave us the following

6337 Kidney Vetch plants

Of which the adult to juvenile break down was

2242 Non-flowering (juvenile) plants
4095 Flowering (adult) plants

From this we could calculate the percentage of adults and juveniles by dividing the number of juveniles (or adults) by the total number counted and multiplying the result by 100.

2242/6337 * 100 = 35.4%

or percentage of adults

4095/6337 * 100 = 64.6%

We can also calculate the average number of pants per m2 by dividing the total population (6337) by the area covered (780).

The number of plants per m2 for the bund is 8.1

Soil survey result for the Bund area was PH7.0 (neutral) (see photograph overleaf)

The proposed Managed area

This area is the other side of the footpath mentioned above and is surrounded by tall gorse. (As can be seen in the photographs previously). As the visible Kidney Vetch numbers were to low the whole area was searched and the population recorded.

Kidney Vetch counted: - **54 Kidney Vetch**
This can be broken down to: -

12 Non-flowering (juvenile) Kidney Vetch
42 Flowering (adult) Kidney Vetch

Using the same calculation as on the bund this equates to: -

22.2% Non-flowering (juvenile) plants
77.7% Flowering Adult plants

The number of plants per m2 for the Managed area is 0.3

Soil survey result of the Managed area was PH7.0 (neutral) (see photograph overleaf)

The Control area

This is the area that is going to be left without any specific management for the Small Blue Butterfly. It too is located next to the bund and is just West of the managed area. Again, as the visible population of kidney Vetch was low the whole area was searched and counted.

Kidney Vetch counted: - **42 Kidney Vetch**
This can be broken down to: -

8 Non-flowering (juvenile) Kidney Vetch
34 Flowering (adult) Kidney Vetch

Using the same calculation as on the bund this equates to: -

19% Non-flowering (juvenile) plants
81% Flowering (adult) plants

The number of plants per m2 for the Control area is 0.23

Soil survey result for the Control area was PH7.0 (neutral) (see photograph overleaf)

Visual assessment of Proposed Managed area and control area: -

The area was more densely grassed than the bund, and Heather (both Ling and Bell) and Gorse was beginning to encroach. The swathe height of the grasses was significantly lower than that on the bund.

Proposed Managed Area Sample

The Bund Sample

The Control Area Sample

Though in these images the colour does vary. In reality the colour was almost identical.

Summary of results: -

	The Bund	The Managed Area	The Control Area
Kidney Vetch	**6337**	**54**	**42**
Adult Kidney Vetch	**4095**	**42**	**34**
Juvenile Kidney Vetch	**2242**	**12**	**8**
No. Per m2	**8.1**	**0.3**	**0.23**
% Adult	**64.6**	**77.7**	**81**
% Juvenile	**35.4**	**22.2**	**19**
PH reading	**7.0**	**7.0**	**7.0**

Proposed Management to assist the Kidney Vetch

Though the bund has a limited life as a long-term habitat it's suitability can be extended. The trees appear to be growing quite slowly (though future monitoring will actually prove this) and simple small-scale management may be appropriate to assist the Kidney Vetch. The surface was very stony and moss covered. Simply scraping back the moss to create ground disturbance, leaving bare ground, and treading in Kidney Vetch seed into these new areas may help. These are the techniques that are in use in Surrey as suggested by Gail Jeffcoate of Butterfly Conservation (http://www.surreybiodiversitypartnership.org/xwiki/bin/view/Species/SmallBlue)

The proposed area to be managed on the common has better long term potential, as there is no conflict of purpose. The management would be under control of the West Berkshire Countryside team, and if successful, could be extended to other parts of the common. At the visit from Butterfly Conservation earlier this year it was suggested that small crescent shaped bunds could be created to shelter the area from the prevailing wind. This along with the gorse that is present will help create a better microclimate for the Small Blue Butterfly. By then scraping back the surface of the proposed area to bare ground and laying seed taken from the bund it will hopefully encourage the Kidney Vetch to grow. The soil samples taken indicate that the soil is not acidic (this will need to be monitored over a period of time) so is suitable for Kidney Vetch.

Conclusion

As a single survey there is little we can tell about the health of the population of Kidney Vetch. It does show that the quantity of Kidney Vetch per m2 on the bund is significantly larger than the areas surveyed off the bund. The reasons for this are unclear. The soil samples taken were similar. I was told however that the bund was created by using the earth removed from under the runways, so maybe of poorer nutrient quality (hence slow growth of the trees) but there is no proof of this. The ground on the bund is visibly of a more stony appearance but it is not known whether this is an attributing factor. An annual survey of all 3 areas will be key to proving the success or failure of the project and this survey does provide a baseline from which we can work upon.

Appendix.

Whilst undertaking the survey of Kidney Vetch we attempted to identify Small Blue Butterfly Caterpillars. In the 8 areas on the bund we found 2. (Photograph of caterpillar on a Kidney Vetch can be found in main document).
In the Proposed Managed area and the Control we found no evidence of any caterpillars on the days we surveyed.

If I were to make the same assumptions in calculating the population of Kidney Vetch the estimated population on that day would be calculated as

2 Caterpillars /8 (as the number of m2 areas surveyed)

This equates to 0.25 caterpillars per m2

Multiply this by the area (which is 780m2)

Giving an estimated population of Small Blue Butterfly Caterpillars present on this day to be 195.

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Drawing of Kidney Vetch: -
Otto Wilhelm Thomé: *Flora von Deutschland, Österreich und der Schweiz* (1885) - Permission granted to use under GFDL by Kurt Stueber. Source: www.biolib.de
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Small blue distribution map courtesy of Map courtesy of National Biodiversity Network (NBN)

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