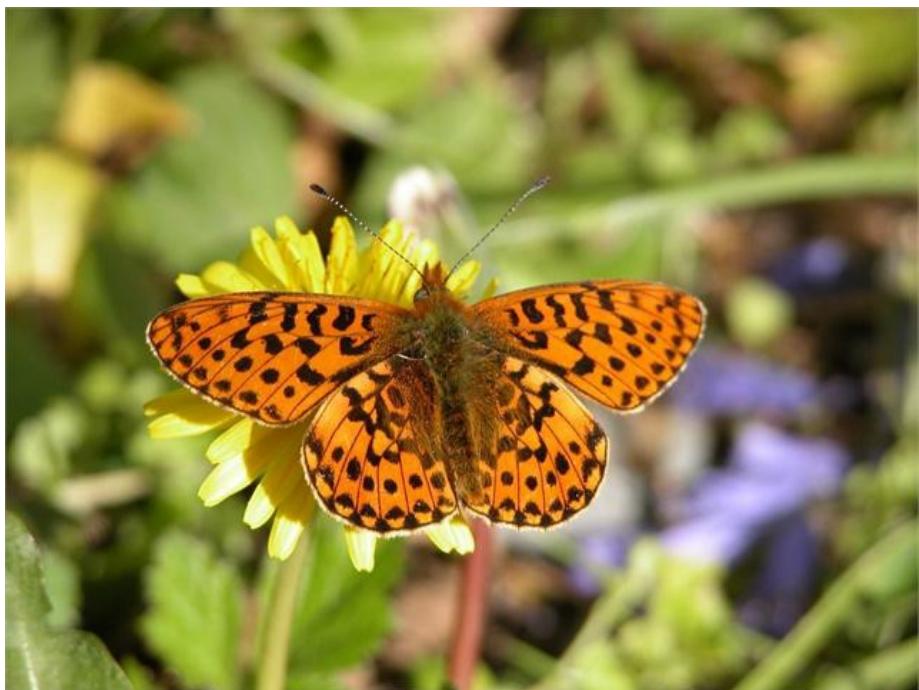


**Cardinham Woods, Cornwall.**  
**A survey to assess habitat suitability for the Pearl-bordered and Small Pearl-**  
**bordered Fritillary**  
**Patrick Saunders**  
**<http://www.kernowecology.co.uk/>**  
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## **Introduction**

*This survey was commissioned by Butterfly Conservation to assess habitat suitability for the Pearl-bordered and Small Pearl-bordered Fritillary. The survey took place between 11/4/14 and 26/5/14. The survey was focussed within the Forest Enterprise Cardinham Woods area. But also included visits to some other relevant sites within the Glynn valley landscape area.*

Historically woodlands in the Glynn valley area supported a great number of rare or high conservation priority Lepidoptera. This is no longer the case. Woodland butterflies have declined dramatically and these declines can be associated with both plantation forestry and lack of woodland open space (Merckx Et. Al. 2012). Within the Lepidoptera on Forestry Commission Land in England; Conservation Strategy 2007-2017 “Forestry Commission England agree to manage their landholding to encourage and support Lepidoptera”. There is huge potential for habitat restoration for the rare fritillaries and other rare woodland invertebrates within the survey area given the large changes in forestry caused by Phytophthora infection and given PAWS (Plantations on Ancient Woodland Sites) requirements.

Within the wider Glynn valley there two sites with populations of Small Pearl-bordered Fritillary and one site with Pearl-bordered Fritillaries (fig 2.). Landscape scale conservation of species is important to provide resilient populations for the future (Ellis et.al. 2012). The Glynn valley and other related areas also have other rare Lepidoptera and the report examines the potential of restoration to FE sites.

## **Summary of survey findings**

- High landscape connectivity in Cardinham woods and wider Glynn valley.
- Moderate/High chance of dispersal to Cardinham FE estate for Small Pearl-bordered Fritillary. Low for Pearl-bordered Fritillary. This likelihood could be improved by improvement of natural corridors and /or stepping stone habitats.
- Only 1 clearing had full habitat suitability (d1) most clearings lacked violets.
- A number of the forest track/ride edges had areas with full habitat suitability although this was patchy and confined to a narrow strip.
- Huge range of potential areas with suitable micro-climate and sheltered open bracken.

## **Recommendations**

The recommendations are presented as broad phases (Subject to discussion with FE)

- Phase 1

### **Enhance 2 potential future colony sites**

Site d1 (Deviock woods bike trail) SX11226803 Site t1 (Tawnamoor woods) SX10416721  
- In year 1-3 manage for violet regeneration rather than the butterflies

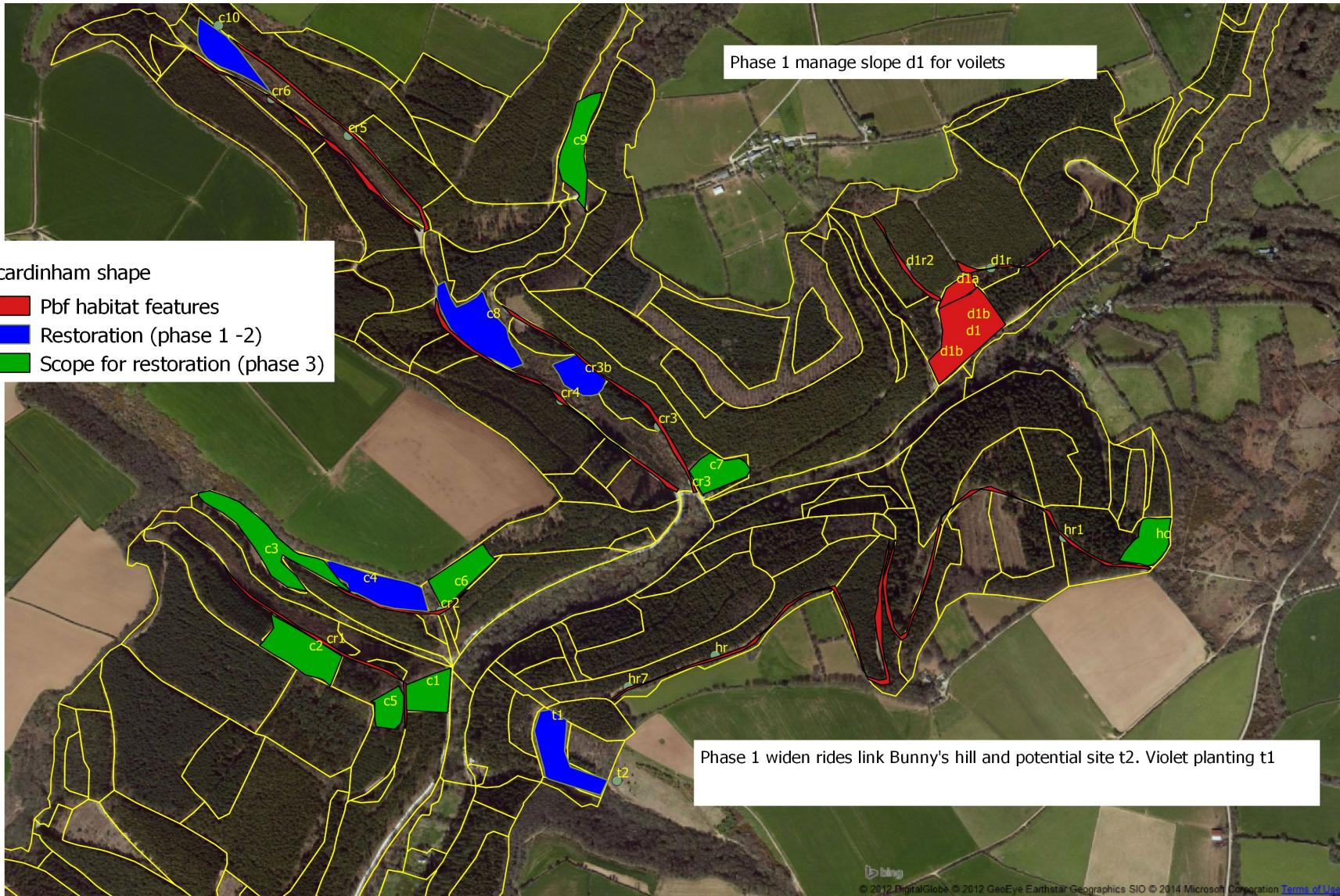
### **Manage stepping stone sites and habitat**

Widen rides and enhance the existing network of glades HR Hurtstock wood ride SX 10708 67375 between potential new site T2 SX10516712 and Bunny's Hill.

- Phase 2

### **Manage other outlying suitable sites** (see map and detailed recommendations)

fig 1. Map of surveyed open areas and recommendations



## **Pearl-bordered and Small Pearl-bordered Fritillary in the Glynn valley**

The Pearl-bordered Fritillary and Small Pearl-bordered Fritillary are both section 41 species. They have similar habitat requirements and can both occur on the same sites. In Cornwall they both use warm sheltered areas with a ground cover of both Bracken litter and Dog violet. Dog violet being the main larval food-plant. Small Pearl-bordered Fritillary can also use wetter and more grassy areas with Marsh violet as a foodplant.

The Pearl-bordered Fritillary is a very rare butterfly in Cornwall and is continuing to decline. With now only 6-7 sites in Cornwall. One of these sites is next door to Cardinham woods: Bunny' Hill (SX118676). On this site only 1 butterfly was seen in 2013 and probably only 1 in 2014. The other Pearl-bordered sites on Bodmin moor are weak and have poor numbers (in my opinion). It is of crucial importance to give greater resilience to the Cornish population by expanding the range of Pearl-bordered sites. Bunny's hill, although having seemingly optimal vegetation for the species, is a cold exposed moorland site. The strongest sites in Cornwall are the coastal sites having a range of sheltered micro-climates. Cardinham is a warm, sheltered area and potentially held bigger colonies than Bunny's hill when the woods were actively coppiced.

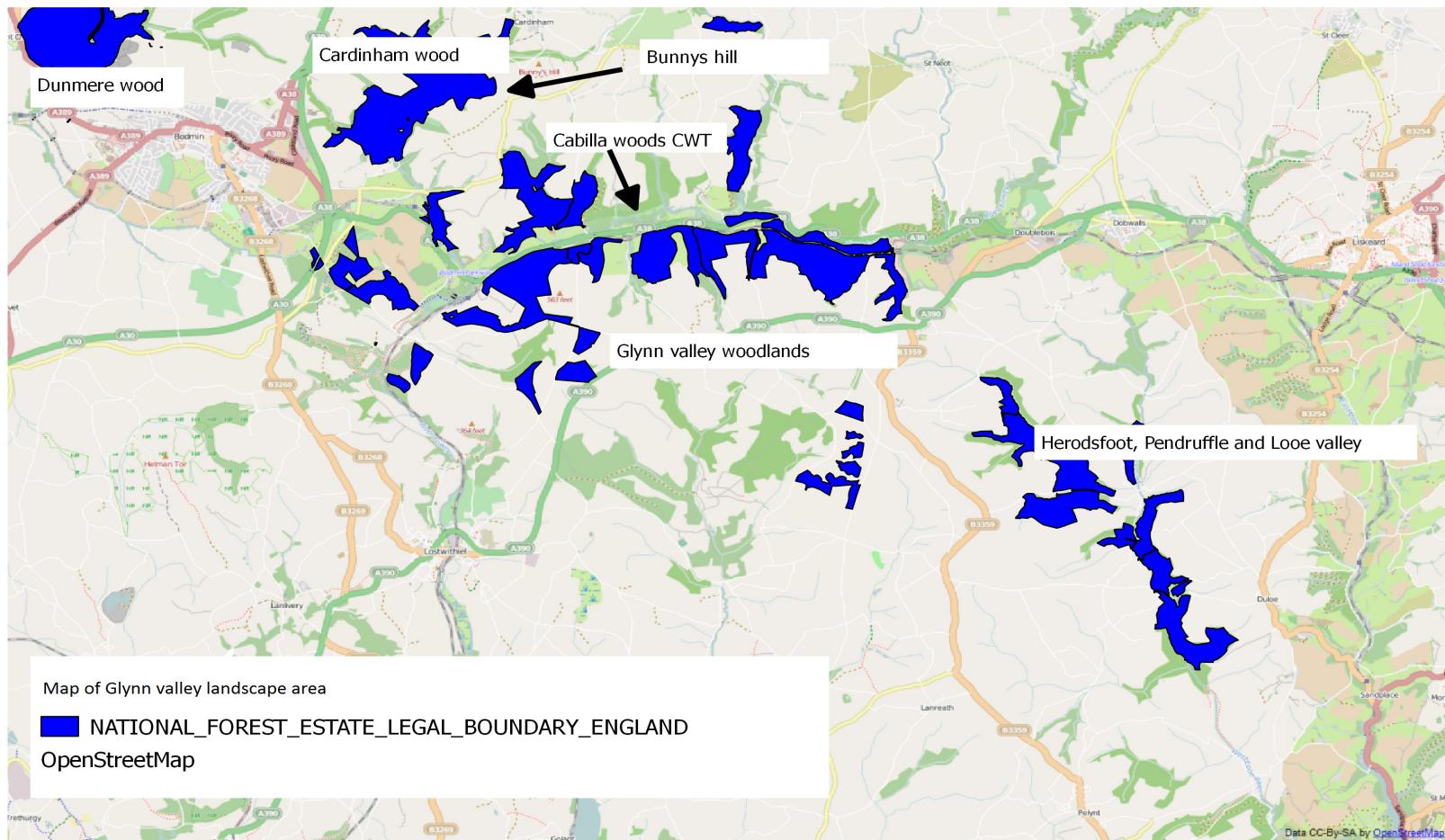
Small Pearl-bordered Fritillaries are local in Cornwall with strong coastal populations but inland sites are usually weaker and more threatened. Nationally the Cornish population is of significance so inland sites are important. The species also occur at Bunny's hill which has a very strong population and possibly Cabilla woods (CWT) in the Glynn valley.

Pearl bordered Fritillaries can disperse up to 4.6km. On a capture mark-recapture study on Dartmoor 2 of the 64 females recorded on one day travelled 1.75km and 3.0km (Green 2008). This puts large areas of Cardinham within the range of Pearl-bordered fritillaries from Bunny's hill. But the weakness of the 2013/14 population means any colonisation is very unlikely. But applying this same research to Small Pearl-bordered Fritillary the likelihood of a colonisation event is good. There is a strong colony with at least 59 being seen on one timed count in 2013. The sheltered hot slopes of Cardinham d1 are under 600m from the edge of Bunny's hill (as the crow flies). The most likely way to encourage colonisation is by drawing the fritillaries into the FE estate through sunny rides and stepping stone habitats as close as possible to Bunny's hill.

### **Other species**

The Glynn valley and Looe valley has lost 3 of the Section 41 butterflies. But still does support a range of other priority Lepidoptera. Open woodland species have greatly declined and should be a priority when preparing forest plans.

The clearings and open space within the woodland complex are of value for other species. There were mosaics of Calluna/Vaccinium heath alongside bracken scrub in new clearings these were of importance for a range of other invertebrates. Local species such as *Formica rufa* Wood ant occurred nesting in open areas. Fig.4 contains a preliminary assessment of species of importance.



**Fig 3. Survey area**

**Fig 4. Species relevant to survey area**

Common Name	Scientific Name	NERC s41	SW RAP 2001	
Argent & Sable	<i>Rheumaptera hastata</i>	Y	H	Cabilla 2008
Waved Carpet	<i>Hydrelia sylvata</i>		H	Cabilla 2013 Quite a few records in glyn valley and Looe valley
Double Line	<i>Mythimna turca</i>		H	Cabilla 2013 Quite a few records in glyn valley and Looe valley
Scarce Merveille du Jour	<i>Moma alpium</i>		H	2012 Kilmnorth Looe valley
White-line Snout	<i>Schrankia taenialis</i>		H	Cabilla 2013 and older records Pendruffle
Pearl-bordered Fritillary	<i>Boloria euphrosyne</i>	Y	H	Bunny's hill 2013 and Cabilla 2008
Small Pearl-bordered Fritillary	<i>Boloria selene</i>	Y	M	Bunny's hill 2013 and Looe valley 1910
High Brown Fritillary	<i>Argynnis adippe</i>	Y	H	Dumere 1950
Heath Fritillary	<i>Mellicta athalia</i>	Y	H	Pendruffle Herodsfoot 1958
Dingy Skipper	<i>Erynnis tages</i>	Y	M	Bunnys Hill 2004
Wall	<i>Lasiommata megera</i>	Y		Cardinham woods 2006
Marbled White	<i>Melanargis galathea</i>		M	Herodsfoot 2005 and Cabilla 2006
Silver-washed Fritillary	<i>Melanargis galathea</i>		M	Widespread Glynn valley Looe valley
White-letter Hairstreak	<i>Satyrium w-album</i>	Y	M	Dumere 1977 and 2013 ?

## BEES

Andrena bucephala	Scarce	Bunny's Hill 2013
Andrena praecox	Scarce/under recorded	Bunny's hill 2013 Herodsfoot FE 2014
Andrena apicata	Scarce	Largin wood FE 2013

Wood Ant Formica rufa      Local/under recorded      Cardinham 2014 Other recent records Cabilla FE Dunmere,

## **Methodology**

The Cardinham woods complex was visited on the 17/4/14, 29/04/14, 31/4/14, 01/05/2014 and 26/5/14. Habitat monitoring took place using Butterfly Conservation structured walk method (Ellis, 2005). Suitable managed areas and as many rides as possible were covered using this methodology recording relevant attributes for each species using a DAFOR scale. Visits were made on 14/5/14 and 26/5/14 in good weather to search for adult Butterflies.

Ad hoc visits and local knowledge of a number of FE sites in the Looe valley and Glynn valley also took place. These were not formally recorded but are included in the broader assessment of landscape area.

## **Survey results**

Within the Cardinham estate the only clearing with areas of suitable bracken litter and violets was d1a SX11206810 and d1b SX11226803. The other areas with scores for pbf habitat were all the sides of the forestry tracks/rides such as notably hr SX1070867375. The area with the best score for Total PbF Habitat occurred outside the woods and this was surveyed by viewing with binoculars from access land within the woodland t2 SX10516712.

Clearings with low values for fritillaries did have value for other species such as the developing open *Vaccinium* / *Calluna* heaths in the clearings had good numbers of Bumblebee and solitary bee species. Heathland specialists such as *Andrena Lapponica* a local mining bee associated with bilberry potentially occurs. This is beyond the scope of this report.

On 26/5/14 about 20 Small Pearl Bordered were observed at Bunny's hill (without covering all the site) No fritillaries were observed with binoculars in suitable weather on the same day at t2 SX10516712. No fritillaries were observed at Cabilla woods (CWT) although there is some suitable habitat around SX13426535 and some large new clearings with potential SX129654.

**Fig 5. Results of survey**

Com partm ent	Area Managed_ Centroid	Area ha	Mana ged_ e	PbFDAF Valu	TotalPbFHa bitat_ha	feature
t2	SX10516712	1.8	50.00	0.900	0.900	Not within access land viewed with binoculars
hr	SX1070867375	0.4	18.00	0.072	0.072	Ride/ Forestry track
cr2	SX10156747	0.2	14.50	0.029	0.029	Ride/ Forestry track
cr1	SX09996738	0.3	9.00	0.027	0.027	Ride/ Forestry track
d1b	SX11226803	1.5	0.25	0.003	0.003	Clearfell un-planted
cr6	SX0987668554	0.5	0.50	0.003	0.003	Ride/ Forestry track
cr5	SX1001968466	0.5	0.50	0.003	0.003	Ride/ Forestry track
cr4	SX1042667917	0.4	0.50	0.002	0.002	Ride/ Forestry track
cr3	SX1062567857	0.4	0.50	0.002	0.002	Ride/ Forestry track
d1a	SX11206810	0.2	1.00	0.002	0.002	Open space with natural regeneration
d1r2	SX11106815	0.15	0.50	0.001	0.001	Ride/ Forestry track
d1r	SX1129168163	0.1	0.50	0.001	0.001	Ride/ Forestry track
c8	SX10226809	1.4	0.00	0.000	0.000	Open space with natural regeneration
c3	SX09776768	1.3	0.00	0.000	0.000	Clearfell planted with broadleaves
t1	SX10426722	1.08	0.00	0.000	0.000	Clearfell un-planted
c2	SX09876740	1	0.00	0.000	0.000	Clearfell planted with broadleaves
c4	SX10006754	0.9	0.00	0.000	0.000	Clearfell planted with broadleaves
c10	SX0977168701	0.8	0.00	0.000	0.000	Clearfell planted with broadleaves
hc	SX1159067575	0.8	0.00	0.000	0.000	Clearfell planted with broadleaves
c6	SX10196752	0.7	0.00	0.000	0.000	Clearfell planted with broadleaves
c7	SX10706773	0.7	0.00	0.000	0.000	Clearfell planted with broadleaves
c1	SX10146733	0.6	0.00	0.000	0.000	Clearfell some nat.regen
cr3b	SX10466795	0.6	0.00	0.000	0.000	Clearfell un-planted
c5	SX10066728	0.3	0.00	0.000	0.000	Clearfell planted with broadleaves
c9	SX1045868323	1.1	0.00	0.000	0.000	Clearfell planted with broadleaves



**D1a SX11206810 Sheltered area of bracken above cycle track with some violets. Some planted by volunteers**



**Hr SX1070867375 Hurtstock woods ride with some patches of viola and suitable bracken. But narrow and shaded by conifer and too much grass.**



Ride cr2 SX10156747 some nice patches of bracken and violet but very small and isolated from other areas of violets



Good fritillary larval habitat: frequent violets with a light bracken litter

## Detailed recommendations for Fritillaries

The recommendations are presented as broad phases. A more detailed management plan and discussion with site managers is needed. Although these recommendations are focussed on fritillaries they can be expected to benefit other woodland biodiversity

- Phase 1

Enhance 2 potential future colony sites

Site d1 (Devoeck woods bike trail) SX11226803 Site t1 (Tawnamoor woods) SX10416721

- In year 1-3 manage for violet regeneration rather than the butterflies

Manage stepping stone sites and habitat

Widen rides and enhance the existing network of glades HR Hurtstock wood ride SX 10708 67375 between Potential new site T2 SX10516712 and Bunny's Hill. Widen ride d1r2

- Phase 2

Manage other outlying suitable sites

The key focus should be to manage some permanent clearings and some permanent rides suitable for fritillaries , with the aim to create core populations. The future aspiration should be other populations within additional clear fells created during woodland management operations, giving more long term viability to any populations.

The two areas worthy of enhancement are d1 (Devoeck woods bike trail) and Site t1 (Tawnamoor woods) violets. The initial stages of management should be mainly aimed at increasing violets rather than any of the other habitat features used by the butterflies (Site t1 has very few violets). It is of important to stress that management for good violet regeneration/establishment on this site may be very different to management for fritillaries. With violets establishing well in areas with frequent cutting and disturbance.

Initial short term management of areas with violets and/or around any planted violets should be an annual autumn/winter cut and with a rake of cut material to create some disturbance for seed regeneration.

Once there is sufficient violets. Long term management should be cutting on rotations of every 3-8 years. But this needs a more detailed site specific management plan.

The rides themselves had good numbers of violets and some good areas of bracken. But are restricted to a very narrow strip. Although the track side management regime has promoted violet regeneration it has created very grassy margins with poor litter layer. Management of HR Hurtstock wood ride should widen the ride/track by felling the edge of the plantation by at least 3m around SX 10708 67375 and widening on the south side where possible between Hurtstock mine and Bunny's hill. High priority should be given to micro-management of existing small glades around hr1 SX 11406 67594. To establish a breeding and flight corridor. Management should use the existing track side annual management regime close to the forestry track. But cut on longer rotation an outer area between the tracksides and treeline (such as 2-4 years). In places with good violets but excessive grass cover graminicide could be trialed.

Rides around d1 in particular d1r2 would benefit from similar management

### **Other areas to consider for management at phase 2.**

Widen forest track Cr3 SX 10625 67857 Callabarrett woods. Enhance Cr3b SX10496793 and clearing C8 SX10226809

The actual forest track Cr3 had good numbers of violets. Below the track area Cr3b looked suitable but with no violets annual or biannual management of this clearing below the track could encourage violets into this section.

C8 was a large sheltered area with developing birch, gorse and willow scrub. Although there were no violets, management of this area as permanent open space on a 3-8 year scrub cutting rotation would enhance this area and provide an open glade feature for a range of species.

### **Phase 3.**

Management around Cr3 widening rides and glades around the hot slopes of C4.

Consider in more detail FE sites surrounding Cabilla woods. But also wider Glynn valley and Looe valley.

### **Comment**

There may be some benefit to consider greater development of linkage between FE Estate with other potential partners such as Cornwall / National BC and CWT. Broader partners could include the Woodland Trust's work in the Fowey and Looe catchment, there also has been some work on dead wood invertebrates on sites within important Parkland in the wider Glynn valley such as Lanhydrock and Bocconoc which may be relevant.

### **Future survey requirements**

This survey had a brief scope. More detailed survey and monitoring is needed.

- Monitoring of habitat quality and management regimes for target butterflies  
Cardinham FE
  
- Monitoring and surveys for occupancy of adult butterflies  
Cardinham FE
  
- Survey and assessment of wider Lepidoptera and other invertebrates both in Cardinham, around Cabilla but also wider Glynn valley and Looe valley

## References

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## Appendix

