

## THE STATUS OF THE GLANVILLE FRITILLARY ON THE ISLE OF WIGHT

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**Abstract:** Members of the Isle of Wight Natural History and Archaeological Society surveyed the main Island breeding sites of the Glanville Fritillary between 1983 and 1987. The results of these surveys are presented together with additional information on the present and past distribution of the insect. This information is discussed with reference to the main factors affecting the distribution and frequency of the Glanville Fritillary on the Isle of Wight.

### Introduction

The Glanville Fritillary, *Melitaea cinxia* L., is a butterfly of Central and Southern Europe which is on the edge of its range in this country, where it is confined to the Isle of Wight. It is one of Britain's rarer butterflies and is listed as a national rarity in the *IUCN Invertebrate Red Data Book*. Many reports this century have expressed concern at its declining numbers. This concern has been based upon subjective observations and there has been no quantitative data available to fully assess its status. In 1979, the Institute of Terrestrial Ecology carried out an intensive survey of the Glanville Fritillary on the Island (Simcox & Thomas 1980). They used the novel approach of estimating the size of the populations from the larval numbers; this proved possible because the larvae live gregariously in conspicuous webs. The results were encouraging and the survey was repeated in 1980.

Our Society has always shown an interest in the Glanville Fritillary and it was adopted on the logo in 1969, the year of the Society's Fiftieth Jubilee. We were anxious to learn of the survey and, in April 1982, Dr Jeremy Thomas addressed members of the Society and others at a two-day symposium on the insect, held at Noah's Ark, Newtown. From discussions at this meeting, it became apparent that our Society could help by monitoring the butterfly on a year by year basis and a group of volunteers were set up to this effect. The survey has now been in operation for five years and this paper is a summary of our findings to date.

### History and status of the butterfly

The Glanville Fritillary is named after Eleanor Glanville, a remarkable lady who startled society in the late seventeenth century by collecting butterflies and moths, even paying her servants to collect insects for her. Shortly after 1700, she sent her collections, taken in various parts of the west of England, to London in order to be named. They included several new to Britain at the time, including the Glanville Fritillary. On her death in 1709, her will was contested by some of her relatives on the grounds of insanity, for it was held that only those who were deprived of their senses would go in pursuit of butterflies. In fact, these allegations were not upheld (Bristowe 1966).

Butterfly collecting became more popular during the eighteenth century but some of

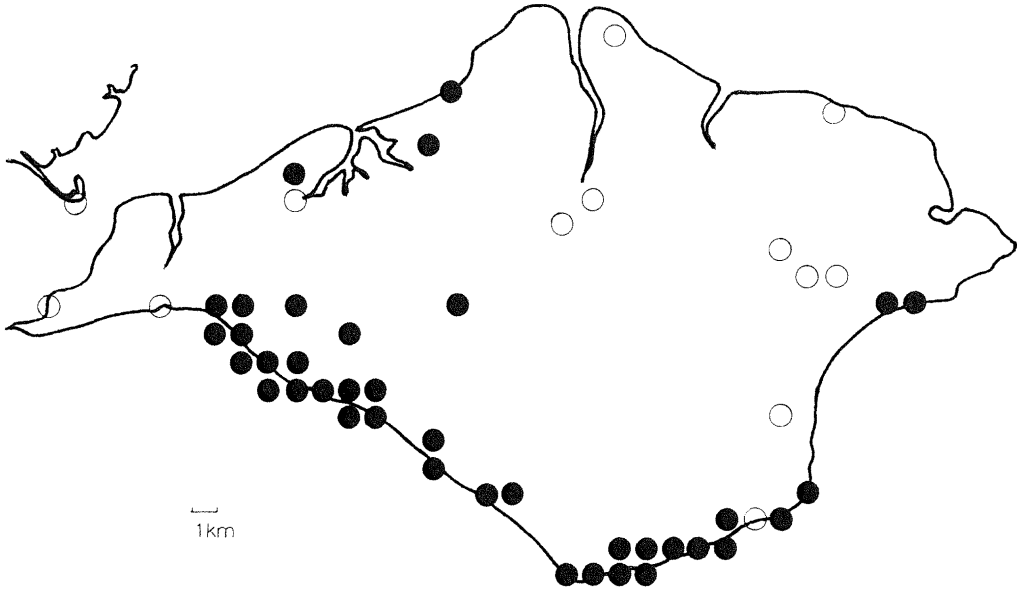


Figure 1. Recorded distribution of the Glanville Fritillary this century. Plotted by 1km squares of the National Grid. Open circles – pre 1982; Closed circles – post 1982.

the early collectors confused the present species with the Heath Fritillary, so that not all the records of this period are reliable. However, it was clear that at this time and in the nineteenth century, the butterfly was not confined to the Isle of Wight. Between 1858 and 1863, the Glanville Fritillary was locally common on the Kentish coast between Folkestone and Sandgate (South 1906). It was first recorded in the Isle of Wight by Edward Newman in 1824 from Sandown, where he described it as '*most abundant*'. Stephens, writing in *Illustrations of British Entomology* (1827) says '*recently the places where it has been chiefly observed have been near Ryde and the Sandrock Hotel, in the latter place in plenty.*' In the present century, British colonies have been virtually confined to the Isle of Wight and the Channel Islands, apart from occasional, short-lived introductions to the mainland. In the Channel Islands the butterfly remains frequent around the coasts of the larger islands. On the Isle of Wight, colonies of the butterfly have been largely confined to the south coast, which remains its stronghold, but it has also been reported elsewhere (fig. 1). It has been recognised for many years that numbers of the butterfly fluctuate considerably from year to year. It was considered to be at a low ebb in the early 1900s but increased considerably up to the 1920s (Goater 1974), a period of fine summers. After the Second World War it was abundant, even breeding alongside The Cascade in Ventnor (O.H. Frazer pers. comm.).

The butterfly is fairly mobile; indeed it is recorded in some years from Hurst Castle Spit on the Hampshire mainland (M. Burnhill pers. comm.), presumably as wind-blown individuals. In favourable years, the species is able to expand its range considerably and colonies have been reported from the central Chalk ridge and the northern half of the Island. These colonies tend to be short-lived and Fearnough (1972) considers that many of them were introductions made by the release of surplus insects bred by entomologists. Thomas (pers. comm.) also has evidence of vast numbers being released both on the Island and the mainland.

Early records give Sandown and the Undercliff as strongholds but these areas were more frequented by entomologists. It may well be that the southwest coast has always

been the stronghold of the species but that it was overloaded. Old records are rarely comprehensive but those which we have, together with comments like '*widespread on the chalk and north*' and '*on the railway banks near Shanklin and between Brading and Ryde*' (Frohawk 1913), suggest that it was at one time widespread in suitable sites throughout the Island. What constitutes a suitable site is unclear. J. Thomas comments, '*My incomplete understanding of a "suitable site" is one with an extremely warm microclimate, almost by definition a sheltered southerly facing slope, where the sward is also sparse and fairly but not very short (say 10cm tall), allowing tens of thousands of ribwort plantains to grow as fresh young leaves, although not necessarily on young plants (many of the regrowths from old stumps that are nibbled down each year are just as palatable as now plants)*.' Today the populations are almost exclusively coastal, but a few inland colonies were reported during the study period on open, south-facing Chalk slopes such as quarries, and such sites must have satisfied many populations in the past. Along the coast, the Undercliff stretch has suffered the most change and consequently the greatest reduction in population. Much of the coastline here has become overgrown with scrub during this century, severely limiting suitable breeding sites for the insect. Populations survive in more suitable spots on the sheltered face of the Upper Greensand cliff behind.

Today populations on the Island are reduced and much fragmented. At present it seems unlikely that the butterfly will ever be able to regain its former high status. Fig. 1 gives a false impression of abundance as it is a cumulative record of reports received between 1983 and 1987. Not all of these are breeding sites and in no one year would all these extant sites be occupied. Simcox and Thomas (1980) have demonstrated by marking that there is some movement of butterflies from one colony to another but some sites, particularly at the east end of the range, are sufficiently isolated to be vulnerable to local extinction with little chance of replenishment naturally.

### Life cycle

The Glanville Fritillary is single-brooded in this country, although it has two broods in Southern Europe. The adults fly in late May and June. In good years, butterflies can be found in mid-May or occasionally earlier; exceptionally, they can be found much later than June. One was seen at Gore Cliff on 21st July 1985 (pers. obs.) and Lobb (1954) reports seeing several on the wing in a chalkpit at Upper Ventnor during the first week of August. These later butterflies may be the result of a partial second brood in good years. Interestingly, in the Channel Islands, the butterfly emerges almost a month later than ours (J. Peet pers. comm.).

The female lays batches of usually 100 to 200 eggs on the undersides of leaves of ribwort plantain (*Plantago lanceolata*). This is a common and widespread plant but Simcox and Thomas (1980) have found that only small, young plants in sheltered, sunny sites are selected. Hatching occurs in July and the young larvae live gregariously, spinning a conspicuous silk nest over their foodplant. In the autumn, a dense hibernation nest is made and the larvae retreat into this amongst the vegetation and are very difficult to find. They re-emerge in the spring and again spin conspicuous webs and feed communally. The mild, sunny climate along the south coast of the Island enables the larvae to emerge early in the year and they have been seen sunning themselves on their webs in sheltered spots when snow is lying on nearby exposed ridges.

During the spring the larvae feed and grow rapidly and it is at this time that they are most easily found. Many insect books repeat the myth that the larvae feed on sea plantain (*P. maritima*). This is not so. The plant is absent at most of the sites where the butterfly occurs and extremely scarce at the others. A problem faced by the developing larvae is that they frequently eat all the available foodplant to which they have ready access. Under these conditions they will sometimes feed on buckshorn plantain (*P.*

*coronopus*). During the study period, this was reported from Sandown and Chilton Chine. Buckshorn plantain is clearly not a favoured species. Larvae will occasionally nibble the leaves of other plants if no plantain is available. They have been seen to take the leaves of daisy (*Bellis perennis*) (pers. obs.) and Stokoe (1944) mentions hawkweeds (*Hieracium* spp.) and speedwells (*Veronica* spp.) as foodplants. It is most unlikely that they can survive for long on these alternative foods.

The rate of development of the larvae in spring appears to be related to the available warmth. Microtopography is important and sheltered, sunny sides of hummocks and ridges are favoured. Grove-Smith (pers. obs.) reports that on 19 April 1986, larvae were considerably larger and better developed in the sunny, west-facing Shepherd's Chine than in the colder, shady Cowleaze Chine. 1986 was a particularly cold, late spring and larvae at all sites emerged later than usual.

As the larvae near maximum size they disperse from the webs in search of food and pupation sites. It is at this time that they tend to be noticed by the public. Very locally, the hairy black, red-faced caterpillars swarm over the vegetation and footpaths. They pupate during late April and early May amongst dense vegetation and are very difficult to locate. Emergence depends upon conditions and those larvae which have developed rapidly will appear first. It is possible to find both larvae and adults at the same time. Herbert (pers. obs.) found a full-grown larva at the top of Gore Cliff in mid-May (1985) when butterflies were flying at sea level.

### Method of survey

Commencing in the spring of 1983, estimates of larval numbers have been carried out at all the main breeding sites by members of the Society. The method used and the selection of areas covered is based on the work by Thomas and Simcox in 1979 and 1980. Counts are made by traversing the ground, zig-zag fashion, for a fixed period of time which is constant for each observer and for the site. All the webs seen are counted. In addition, an estimate is made of the number of larvae per web for a small sample of the webs. Each observer works an area at his or her own speed. Some may be more astute at spotting webs than others; very rough or recently slipped land may not always be covered thoroughly. It would be unrealistic to pretend that the counts reported reflect the total number of webs present at a site. This does not matter because it is the comparative figures from year to year rather than the actual numbers which are important. Provided the same observer surveys the same site in the same manner each year then he or she should be able to pick up trends from one year to the next. Comparisons between sites can be made although a certain degree of caution is necessary in interpreting these figures.

Eleven areas covering most of the insect's coastal breeding range were selected. These were based on the survey areas used by Simcox and Thomas (1980). Eleven observers or pairs of observers covered the ground (Table 1). Inevitably, with a survey of this nature using volunteers, some people were unable to continue for various reasons or missed a year and replacements had to be found. Where this has occurred, comparisons from one year to the next cannot always be made. Nevertheless, the observers are to be congratulated on the results which have been obtained.

### Results

Our results illustrate the relative size and importance of the different colonies, in line with the findings of Thomas and Simcox (1982). Fig. 2 shows the number of webs counted at each survey site during one spring and illustrates the great importance of sites



*Plate 1.* Life cycle of the Glanville Fritillary.  
a. Eggs on underside of ribwort plantain leaf.  
b. Larvae in silken nest in April.  
c. Fully grown larvae.  
d. Chrysalis.  
e, f. Adult butterfly.



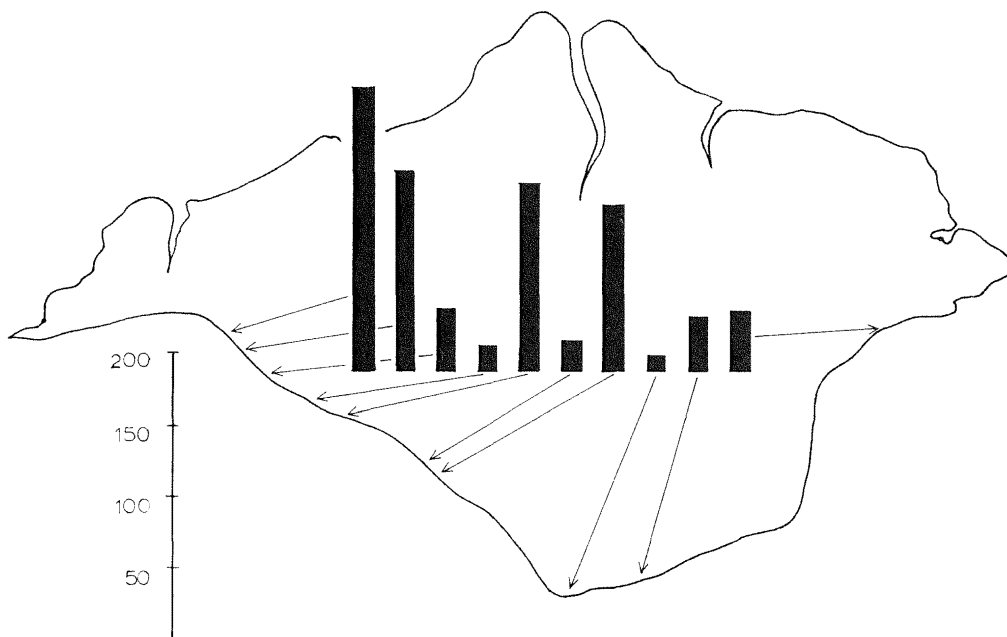


Figure 2. Recorded number of spring larval webs at each survey site in 1985.

at the western end of the range which hold a large proportion of the total population. Each of the sites indicated on the map held viable populations during the study period but the butterfly undoubtedly bred in small numbers at other sites which were not surveyed. The survey period has shown considerable fluctuations in the number of larval webs from one year to another. Fig. 3 illustrates the change in counts of spring webs at those sites for which we have a continuous series of observations from the same recorders. It is interesting that at most of these sites similar trends are recorded during the five year period. In the spring of 1983, numbers were considered to be slightly above average according to the results of surveys in 1979 and 1980 by Thomas and Simcox. 1984 counts showed a considerable increase, with very high densities recorded. These figures reached, and in some cases exceeded, the counts made in 1979 which was generally considered to be a particularly good year. In 1985, numbers were generally lower although perhaps still somewhat above average, but the 1986 counts were well down and gave rise to fears for the continued survival of the butterfly at some of its smaller sites. These fears were shown to be groundless in 1987 when numbers had picked up again. The same trends were evident at many but not all of the sites. In particular, those colonies in the Ventnor/St Catherine's area consistently behaved differently. The terrain used by the butterflies in these areas is different from other sites and tends to be more stable. Suitable breeding sites are very localised and scattered over wide areas so that it is particularly difficult to survey all the area used by the insects. The fluctuations recorded may, in part, be due to the butterfly occupying less accessible spots within a site to a greater or lesser degree and escaping detection.

Many recorders remarked on the fluctuating use of subsites from one year to the next. Sometimes a subsite becomes unsuitable for the butterfly, or lost through erosion, but other apparently suitable subsites were well utilised in some years and hardly used at all in others. This was not necessarily related to the overall numbers using a site, but it appeared that, if other suitable areas for egg-laying were available close at hand, then a particular subsite was not necessarily favoured.



Figure 3. Recorded number of spring larval webs at eight sites for each of the years 1983 to 1987 inclusive.

Table 1. Recorders for each of the survey sites from 1983 to 1987.

Site Number	Corresponding site no. in Simcox & Thomas 1980	Recorders
1	1 A,B,C	1983–1985, 1987 F. & M. Heap
2	1 D,E	1983–1987 F. Basford
3	2 A,B,C	1983 O. Frazer; 1984–1987 R. Herbert
4	3 A,B	1983–1987 O. & D. Frazer
5	4 A,B,C,D	1983–1987 J. & M. Cull
6	5 A	1983–1984 R. Hodgson; 1985 C. Pope; 1986–1987 D. Grove-Smith
7	5 B	1983–1985 F. & M. Lee; 1986–1987 M. Lee
8	7 A,B,C	1983–1984 A. Wilkinson; 1985–1987 C. Pelham
8	8	1983–1987 C. Pelham
9	9	1983–1987 R. Edmonds
10	12	1983–1987 J. Cheverton
11	13	1983–1987 C. & J. Pope

Average counts of the numbers of spring larvae per web were made at each site. Numbers within sites varied greatly but were generally in the order of 25 to 150 larvae. The lowest counts may have been made from dispersing or split webs. Although it is

difficult to generalise from the results of these counts, there seems to be a tendency for webs containing fewer larvae to be more prevalent in:

- a) The smaller colonies
- b) At many sites in poor years.

Considerable fluctuations within sites were recorded from year to year.

### **Factors affecting the populations of the Glanville Fritillary**

From the results of our survey to date, it is clear that a number of quite different factors have an influence on the distribution and population size of the butterfly. The interaction of these factors is undoubtedly complex.

#### *1) Weather*

The distribution of the Glanville Fritillary in this country suggests that it is on the very edge of its climatic range. Certainly the coasts where it occurs experience mild winters and high sunshine levels. Cold winters are probably not damaging to the insect. It is widespread in continental Europe where winters are far more severe than ours and, during our study period, the highest larval numbers were recorded in spring 1984 after a particularly cold winter. Numbers also showed an increase over the previous year in 1987, following the coldest January since 1962–63.

It is unclear what components of the weather are particularly significant. Clearly, settled, sunny weather in May and June is beneficial when the butterflies are flying. In recent years, the weather at this time of year has been poor. We have also experienced a succession of cold, late springs. 1986 was particularly remarkable. Caterpillars are susceptible at this time because they emerge early, sunning themselves in warm weather. Warmth will accelerate the rate of development of the larvae. Even with our uncertain springs, conditions are ameliorated along the south coast of the Island.

*Plantago lanceolata* produces evergreen rosettes, but cold, windy winter weather can burn-off the vegetation as happened in 1984–85, severely limiting the amount of foodplant available before the spring flush of leaves. A late spring prevents the rapid growth of the plants and consequently the food supply is used up sooner and many larvae will starve. In adverse conditions, the larvae feeding on a good supply of plants in the most sheltered spots are the ones likely to survive. Thomas (pers. comm.) has demonstrated a good correlation between the abundance of young plantains and the size of neighbouring colonies in any one year. Widespread deaths through starvation are probably the main way in which population growth is limited on individual sites and may well account for some of the local (often temporary) slumps in numbers that occur. This is certainly the case with Heath and Marsh Fritillaries, which have been better studied.

#### *2) Coastal erosion*

Most of the colonies are located along actively eroding stretches of coastline and indeed erosion creates suitable conditions for the invasion of *Plantago lanceolata*. Populations are highest in areas where bare ground is being created and declines have been greatest where the cliffs have become stabilised by vegetation. Erosion is a naturally occurring process essential to the survival of the species. However, excessive erosion combined with other factors can result in a reduction of suitable habitat. Slumping of prime areas brought about by winter wet or freeze and thaw can bury winter webs and isolate larvae from their food source. In Guernsey, the butterfly is confined to a cliff-top habitat which is less prone to erosion but it only occurs where the soil is thin and warms quickly and where the foodplant is under stress for much of the growing season (pers. obs.).

### 3) *Predation*

Little is recorded of natural predators but in the spring the larvae are conspicuous and can be numerous. They present an easy food source. The caterpillars' hairs probably prevent them from being taken by many birds although recently arrived cuckoos have been seen feeding on the caterpillars (R. Ford pers. obs.). R. Herbert reports an adder very close to a depleted web of spring larvae. Adders are frequent in many of the sites where the butterfly occurs and they may be predators. Hymenopterous parasites can take a heavy toll of larvae and R. Ford considers them to be a major factor in controlling numbers. He also (1973) records a fungus disease which killed numbers of larvae in the dry spring of 1970.

### 4) *Man's activities*

This is a large category which covers many different practices.

a) Insect collectors. Amateur entomologists still come over to the Island to collect larvae in the spring to breed. This is illegal without a permit on most sites because they are in the ownership of the National Trust. Sometimes the adults are returned to the site and it is argued that this helps to conserve the species by ensuring that a large number of larvae reached adulthood. The scientific evidence for this is unclear and in practice this can result in saturating an area with adults.

Commercial entomological suppliers should no longer collect the insect from the wild in this country but at least one supplier offers larvae bred in captivity which have originated from Island stock but are now maintained artificially. Under the 1987 amendments to the Wildlife and Countryside Act, it has become illegal to collect *M. cinxia* for sale, although not to sell old stock taken into captivity before the act was passed.

b) Farming. The current practice of farmers to plough and cultivate almost up to the cliff edge severely restricts the extent of semi-natural cliff-top habitat. Frequently a very narrow strip remains, occupied by the coastal footpath. The butterfly will breed on these cliff-tops but become susceptible to trampling in the spring. The immediate reaction of the larvae to disturbance is to curl up and drop into the vegetation. Simcox and Thomas (1980) have demonstrated that this behaviour saves many of them from being squashed, but this protection would be greater in longer vegetation than on the very short vegetation on and around footpaths. Thus modern farming practices can bring the insect into conflict with the visiting public.

c) Coastal protection works. Erosion maintains the rich biological diversity of the undercliff habitats but causes severe problems for people who choose to set up home or maintain roads on or alongside this unstable substrate. This leads to all manner of coastal protection schemes being implemented of varying success but all having some impact on the area as a wildlife habitat. The major works during the study period have been at Small Chine, Compton, designed to slow down erosion threatening the Military Road. It has resulted in the destruction of a prime area of breeding habitat and no butterflies have used the area for breeding since the work has been carried out. However, the open ground created has subsequently become invaded by *P. lanceolata* and in 1987 represented a good breeding habitat.

d) Tourism developments. Some important breeding sites are established around existing holiday camps outside of National Trust land. Planning applications to extend and develop facilities sometimes impinge upon breeding sites. At Chilton Chine, dumping on the cliffs from the camp above and inadequate sewer drainage has destroyed and rendered unsuitable a significant area of habitat.

## Conclusions

The future for the butterfly on the Island seems fairly secure at present. Fortunately, many of the best sites are assured some form of protection by being in the ownership of the National Trust. Habitat management is largely taken care of by natural erosion. The butterfly fluctuates considerably in numbers from year to year but is able to capitalise on favourable years. However, although the species is likely to survive on the Island, it is by no means so sure that all existing colonies are able to do so. The more isolated colonies less liable to recruitment from outside are particularly vulnerable and need special attention. This applies particularly to those colonies at the eastern end of the range. The annual monitoring programme has yielded valuable information and is an important measure to keep a check on populations and as a basis on which to formulate conservation measures where appropriate. It should be continued and perhaps extended to other sites.

One conservation measure adopted by recorders has been to move spring larvae onto nearby foodplants when they are found to have eaten out all their available supply. At some sites this can involve translocating large numbers of larvae. It is assumed that this will result in a higher survival rate for individuals although we have no data to substantiate this. Another measure has been to introduce plantain seed onto freshly slipped sites. This has not however resulted in the expected flush of young plants and perhaps more work should be done along this line in suitable sites.

A considerable benefit of our work has been a much greater appreciation and understanding of the insect by those persons involved in the annual counts. The knowledge gained has been and will continue to be increasingly valuable.

## Acknowledgements

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