

**THE DISTRIBUTION, STATUS AND HABITAT PREFERENCE OF THE MARSH
FRITILLARY *EUPHYDRYAS AURINIA* IN NORTHERN IRELAND.
A REPORT TO ENVIRONMENT AND HERITAGE SERVICE**

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October 2000

Summary

A survey of the Marsh Fritillary population in N. Ireland was attempted in 1999. Coverage was affected by poor weather conditions during the adult flight period. Eight definite colonies of Marsh Fritillaries were confirmed by web counts. Most colonies were found on unmanaged wetland sites. East Down was identified as a key area for the species in N. Ireland. More survey work is needed in some poorly covered regions. No trends can be ascribed to the N. Ireland population but previous published estimates are considered too high. There appears to have been a shift in the population towards the south and east. Recommendations are made for further survey, monitoring and research of the species in N. Ireland.

1. Introduction

The Marsh Fritillary, *Euphydryas aurinia* (Rottemburg), is one of the most attractive of N. Ireland's resident butterfly species. It also has the distinction of being the most protected butterfly species in N. Ireland as it is listed under the Bern Convention, the Habitats Directive and is specially protected by the Wildlife (NI) Order 1985. The species has declined substantially throughout its European range, with a 25-50% decline in distribution (van Swaay & Warren, 1999). In the UK, the trend over the same period was assessed as amounting to a 50-75% decline (van Swaay & Warren, 1999). A review of its UK status was given in Warren (1994) and Barnett & Warren (1995). In 1990, there were 432 definite colonies in the UK of which 58 were in N. Ireland (Warren, 1994). Much effort has gone into surveys of the key populations of Marsh Fritillary in parts of its UK range (e.g Ravenscroft & Gaywood, 1996; Poole, 1996; Lewis & Hurford, 1997). No such survey has been attempted before in N. Ireland. A survey of the Marsh Fritillary in N. Ireland was commissioned by Environment and Heritage Service and conducted in 1999.

The aims of the survey were to:

1. determine the distribution of the Marsh Fritillary in N. Ireland
2. estimate the number of colonies
3. assess status and relative size of colonies
4. gather information on the habitat utilised

This report presents the results of this survey, a review of the species status in N. Ireland and makes recommendations for further work and measures needed to protect the species.

2. Biology and Ecology

The following is a brief account of the lifecycle of the Marsh Fritillary. In Britain, the species has been studied intensively by a number of researchers. This is summarised in Heath *et al.*, 1984 and Barnett & Warren (1995). An account of the biology of the species based on

observation in SW Ireland is given in Lavery (1993). Warren (1994) discusses the possible metapopulation structure of the species in the UK.

The Marsh Fritillary is a univoltine (single-brooded) species throughout its range. Adults fly in May and June in Ireland. Adult males emerge first, followed by adult females. The females emerge with eggs fully developed and are usually mated very soon after emergence. A large initial batch of eggs is laid close to their emergence site. If the female survives, other egg batches may be laid but these are smaller. The eggs are laid on the leaves of Devil's-bit Scabious, *Succisa pratensis*, the food plant used almost exclusively in Britain and Ireland. Caterpillars hatch after a few weeks, then feed communally on the leaves of *Succisa pratensis*, spinning a web over the foodplant. This continues until they are in their 3rd instar in late summer or early autumn, when they enter hibernation in a web spun at the base of the foodplant. Caterpillars emerge in late winter and early spring, basking on webs and feeding. They remain communal until the fifth instar when they start to disperse, and are solitary by the sixth and final instar. The larvae pupate in late April beneath leaves or on low plants with the adults emerging three to four weeks later.

The species is considered largely sedentary and most individuals stay close to the natal site, but large movements are not uncommon (Warren, 1994). The species is also capable of great fecundity, demonstrated in N. Ireland by reports of caterpillar swarms, and the Langham collection in the Ulster Museum, which includes a large number of Marsh Fritillary specimens bred from larvae collected at a single locality in Co. Fermanagh. Caterpillars are attacked by parasitic braconid wasps, *Cotesia bignellii* and *C. melitaeorum*. The former is exclusive to the Marsh Fritillary; the latter parasitises related species. These parasites are believed to have a significant impact on the species and are an integral part of the species population dynamics (Barnett & Warren, 1995).

Marsh Fritillaries populations are believed to be examples of metapopulations (Warren, 1994). This model proposes that colonies operate within a large network of sites, involving periodic extinction and recolonisation. The model allows for either large core permanent populations with a network of smaller satellite sites, or a network of sites at which the species maintains short-lived colonies. A network of sites is needed to allow the species to survive effects of foodplant shortage and the impact of parasites (Warren, 1994). If this model is correct, it has major implications for the conservation of the species.

The Marsh Fritillary colonies in Britain and Ireland occur in two distinct biotopes - dry calcicolous grassland, particularly associated with the NVC community CG2b and damp neutral or acidophilous grassland and mires, particularly in vegetation described by NVC communities M24 and M25 (Warren, 1994). The species is found in both biotopes in Ireland (Lavery, 1993). Grazing is noted as a feature of many of the sites, mainly low intensity cattle grazing. Management of the habitat by spring burning combined with grazing is a feature of areas in western Ireland where many colonies exist (Lavery, 1993) and in Glamorgan (Lewis & Hurford, 1997).

2. Review of the status and distribution in N. Ireland.

Map 1 shows the distribution of the Marsh Fritillary in Ireland based on the records in the CEDaR database plotted by tetrad 2km grid. Up to the end of 1999, there were over 700 records entered in the database dating back to 1893 from 72 10km squares. The distribution covers most of the lowland parts of N. Ireland with major gaps corresponding to the large upland areas of the Sperrins and Antrim. Lavery (1993) states that the species can occur up to 700m in Ireland, but an absence from upland areas is suggested in N. Ireland.

The geographical spread of the records was localised to 100 discrete sites. The interpretation and the definition of the sites was difficult for a variety of reasons but mainly because of the lack of detail available, especially with old records making assigning of grid

references difficult. At the majority of these sites (66), the species has been recorded on one occasion. At the majority of sites only adults have been seen. Larvae have been reported from just 16 of the 100 sites. The sites are listed in Appendix 1, which gives details of the grid reference, county, date of first and last records, number of years recorded and the stage (adult or larvae) recorded. All the records are held on RECORDER by the N. Ireland Branch of Butterfly Conservation on behalf of CEDaR, the N. Ireland Biological Records Centre.

4. Methodology

The 92 sites were prioritised for attention according to the date of the latest record in the following order

1. sites at which the species has been recorded between 1990 and 1995
2. sites at which the species has been recorded between 1980 and 1990
- 3 sites at which the species has been recorded since 1995
- 4 sites with only pre 1980 records

The aim was to visit all priority 1 sites and as many as priority 2 sites as possible. Priority 3 sites were to be visited to count webs if a colony was believed to still exist. The assistance of members of Butterfly Conservation, EHS and National Trust staff was sought in checking these sites, as well as providing information on other sightings.

Site visits were planned for one of the three periods for recording the species - during the adult flight period in May/June, the late summer, August/September, when early instar caterpillars are visible and late spring when caterpillars have re-emerged from hibernation.

Sites were surveyed by walking through the possible habitat searching for adults, caterpillars and the foodplant. Small sites could be covered reasonably completely but on large sites a different approach was taken, targeting areas which field experience indicated the foodplant and therefore colonies would most likely be found. For example, on a large bog site, the searches were concentrated on the drier margins and modified edges where *Succisa* typically grows rather than on the intact bog surface. The adult flight period in N. Ireland extends from late May to the beginning of July - essentially the month of June. Adult surveys were confined to this period, ideally in suitable weather conditions to find flying adults i.e. sunny, warm weather.

5. Results

Fieldwork and sites visits commenced in June 1999. This month, however, was characterised by dull, cool conditions. Thus, site visits often became an exercise in assessing habitat suitability. A total of 19 sites were visited during this period but at only one site was an adult butterfly seen. David Mitchel of EHS covered two sites in Antrim, both with negative results. Of the 19 sites visited during this period, 10 were assessed as being not suitable for the Marsh Fritillary in their present condition. The reasons are outlined in the individual site reports.

The records during the flight period from BC members, EHS and NT staff and others confirmed the presence of the Marsh Fritillary at nine sites. These were visited during late August and early September for detailed web counts, apart from Murlough NNR which was counted as usual by the National Trust staff. Some additional field visits were made to 4 sites not previously visited to search for webs and assess habitat condition.

In Spring 2000, two sites, the Magilligan and Ballykinler dunes, were covered by a team of people. Both are large sites where access is restricted. During these visits, webs were searched for and the habitat quality assessed. In total, 31 sites were covered in all three periods.

5.1 Surveyed sites

The sites covered in the survey during at least one of the periods are all listed here. For each site, the status of the Marsh Fritillary, the results of the survey and habitat assessment are described together with relevant additional comments.

Co. Antrim

1. Montiags Moss J0965

Marsh Fritillary status: first recorded in 1983; recorded annually since 1990 except for 1997. There are old records from the Aghalee area in the 1960s, which are thought to refer to this site.

Visited: not visited during flight period; web counts on 20 and 23rd August. See section 5.2.

Comments: this is a well-visited site and one of the longest established colonies. The site is a complex mosaic of habitats including acid grassland, cutover bog and scrub with numerous flooded peat cuttings. Peat cutting has largely ceased. Some areas are grazed by cattle and spring burning was formerly a common practice.

Co. Armagh

2. Drumcarn/Drumnavil H8128

Marsh Fritillary status: first recorded here in 1988; no records until 1992, then each year 1995-1998. Larvae seen in 1998 and pupa in 1994. Records in other years all of adults.

Visited: 25 June 1999. A single adult was seen on the brief visit in June. Revisited 7 September 1999 for web counts; see section 5.2.

Comments: this site on the Armagh/Monaghan border has a mosaic of habitats including wet and dry heath, fen, dense gorse scrub and bracken. The Armagh portion of the site consists of rocky outcrops with numerous shallow peaty pools separated by narrow ramparts of uncut peat. *Succisa* was scarce, growing in small clumps or as single plants and much of the site is unsuitable for it, being either too wet or covered in dense scrub.

3. Straghans Lough H8230

Marsh Fritillary status: recorded once - a single adult June 1992.

Visited: 25 June 1999 and 7 Sept 1999. No adults or larvae were seen.

Comments: this is a large site with a mosaic of habitats. Acid grassland is found around Brackly Lough and the west side of Straghans Lough. *Succisa* was locally abundant here. Parts of this site were grazed by cattle and were considered marginally suitable for the Marsh Fritillary. The ungrazed habitat was considered suitable, though scrub is common.

4. Brackagh Moss J0251

Marsh Fritillary status: recorded between 1973 and 1993. All records on RECORDER are of adults, but a colony was apparently established in the 1980s. There have been no records since 1993.

Visited: visited 16 June 1999

Comments: Brackagh is a very well recorded site, regularly visited by naturalists. The lack of records since 1993 is likely to be a true reflection of the status of Marsh Fritillary at this site. The Marsh Fritillary sightings were mainly from the railway meadow, an area of grassland which was lightly grazed or occasionally burnt (accidentally or through vandalism). Cessation of this management has been blamed for the loss of the colony here. However, the area of habitat is also small and may not have been large enough to support a colony. In its present condition, this site was not considered suitable for the species.

5. Peatlands Park H9060

Marsh Fritillary status: first recorded in 1933 and then from 1973. A colony was established between 1990-1994 in Annagharriff fen H905607. The last record was in 1998. Records were from several parts of the park.

Visited: 18 June 1999.

Comments: *Succisa* is very locally distributed over the whole site, but in a few places, such as at Derryadd Lough and at Annagharriff, it is common. So whilst suitable habitat does exist, it is limited in extent. This site is regularly visited and it is unlikely that a colony would have escaped detection.

Co. Down

6. Aughnadarragh Lough, J4459

Marsh Fritillary status: first recorded in 1984. Records in most years since then and annually since 1990. Larvae have been recorded.

Visited: not visited during flight period. Webs counted 31 August 1999. See section 5.2.

Comments: this site has a mosaic of communities including lush fen and swamp communities, thin alder carr, relict bog and acid grassland. A well-recorded site. Fields adjacent to the site were grazed by horses.

7. Ballykilbeg J4540

Marsh Fritillary status: first recorded in 1996. There have been records of adults or larvae each year since.

Visited: not visited during flight period. Webs counted 2 September 1999. See section 5.2.

Comments: this is a small area of ungrazed fen and grassland.

8. Ballykinler J4340

Marsh Fritillary status: larval webs were seen in autumn 1999, the first record from the site.

Visited: 7 April 2000

Comments: an ungrazed and in places highly modified sand dune system. One web and a single caterpillar were seen. *Succisa* is scarce on this site (confined to some dune slacks) and there is little potential habitat.

9. Black Lough J3645

Marsh Fritillary status: adults recorded once 1989.

Visited: 8th June 1999. No adults seen

Comments: a diverse site with wet and dry heath, acid flushed grassland fen and gorse scrub. *Succisa* was frequent to locally abundant in the flushed grassland and on the drier margins of the fens, especially at Black Lough. The site was grazed by cattle and plants in the grassland were rather small, but overall this site appeared to have suitable habitat for Marsh Fritillaries. No adults were seen. This is a well-visited site and the absence of records since 1989 would suggest that a colony is not established.

10. Derryleckagh Fen J1125

Marsh Fritillary status: first recorded in spring 1999 when webs were seen.

Visited: Not visited during flight period but large numbers of adults were reported by others. Web count 1 September 1999. See section 5.2.

Comments: a large fen, very wet in places with pools, *Sphagnum*, *Phragmites* and some scrub. *Succisa* was locally abundant in short *Carex* fen on the eastern side of the site, but scattered plants grow through much of the fen.

11. Inishargy UWT Reserve J6164

Marsh Fritillary status: first reported here in May 1990. Adults have been seen every year since with larvae reported most years.

Visited: not visited during the adult flight period. Large numbers of adults were reported in 1999. Webs counted 26 August 1999. See section 5.2.

Comments: a small, isolated cutover bog. *Succisa* was locally abundant growing in damp hollows and in burnt areas.

12. Kernan fen (Blue Road Bog) J0946

Marsh Fritillary status: recorded once in 1993 when 2 adults were seen.

Visited: 8 June 1999. No adults seen during suitable weather.

Comments: this is an ungrazed fen with relict bog vegetation. Site is very grassy and eutrophic and *Succisa* was rare. This site was not considered suitable for the Marsh Fritillary in its present condition.

13. Lackan Bog J2437

Marsh Fritillary status: first recorded June 1990. A colony was established in the southern edge of the site. Adults were seen each year until 1995 and larvae seen in late summer or early spring from Sept 1991 to August 1994.

Visited: not visited during flight period. Visited on 27 August 1999 but no webs were seen.

Comments: the colony here was in an open area of rank grassland at the western side of the site. *Succisa* was scarce growing as scattered plants amongst rank grass tussocks. No larval webs were found and the colony appears to have died out. The remainder of site is very wet cutover bog or birch covered bog with little suitable foodplant.

14. Lakeview House Fen at Cloghskelt J238421

Marsh Fritillary status: two records, both of larvae, in May 1992 and May 1993. No other records.

Visited: 9 June 1999

Comments: site was being actively infilled and at least 50% of open fen had been destroyed.

15. Murlough NNR J43

Marsh Fritillary status: first recorded in 1973 and continuously since early 1980s.

Visited: not visited. This site was covered by National Trust staff. See section 5.2.

Comments: the best documented site in N. Ireland, where the species is monitored by annual larval web counts.

16. Tullybrannigan or Outspan J3631

Marsh Fritillary status: adults recorded in 1995 and 1998. Mating behaviour seen in 1995, but no larval records.

Visited: not visited during flight period. Visited 2 September 1999 but no webs seen.

Comments: habitats on this site include dense gorse scrub, bracken-invaded heath and flushed wet grassland around a small stream valley. *Succisa* was very rare here, restricted to the flushed area. This site was formerly lightly grazed by horses but this appears to have been reduced and

the site has become much more scrubby. It was considered unsuitable for the species in its present condition.

Co. Fermanagh

17. Cavans Bog H40472

Marsh Fritillary status: recorded once on 15 June 1986. Between 6 and 20 adults were seen

Visited: 11 June 1999.

Comments: peat was being extracted by machinery from this site and the bog appeared entirely devoid of vegetation. Site appeared no longer suitable.

18. Randalshough Bog H155509

Marsh Fritillary status: recorded once 14 June 1992 - 1 adult was seen

Visited: 24 June 1999. Weather suitable but no adults seen.

Comments: this is a small area of ungrazed fen and relict bog. The fen is rank and eutrophic and disturbed in places and only small amounts of *Succisa* were present. The habitat was considered unsuitable for the Marsh Fritillary in its present condition.

19. Glennasheevar H0453

Marsh Fritillary status: adult Marsh Fritillaries were seen here first in 1988. None until 1998, seen each year since. A pupa was seen in 1998.

Visited: 24 June briefly during flight period but weather unsuitable. Web count 14 September 1999. See section 5.2.

Comments: a wet blanket bog site with some drier flushed grassland on steeper slopes. *Succisa* was locally abundant especially in the flushed grasslands. Whole site is cattle grazed but especially the drier grassy areas where *Succisa* is most abundant. *Succisa* also grows locally abundantly on roadsides and edges of ditches.

20. Inishreenry, U. L. Erne H2932

Marsh Fritillary status: adult recorded once on 3 June 1985.

Visited: 17 June 1999. No adults were seen in suitable weather.

Comments: the Inishreenry peninsula has a mosaic of habitats including wet grassland, fen, swamp, woodland and improved grassland. *Succisa* was locally common in unimproved grassland and in light scrub in the western part of the peninsula at Curraghgole. The habitat was grazed and the plants were small and it was considered marginally suitable for the species.

21 Killee Lough H2950

Marsh Fritillary status: recorded once - a single adult on 15th June 1985

Visited: 11 June 1999 briefly but weather poor and no adults seen.

Comments: a small lake with relict bog around its edge. *Succisa* was present only in small amounts on drier areas and habitat did not appear suitable.

22 Kilmore G9654

Marsh Fritillary status: adults seen once in June 1998

Visited: 24 June during flight period. No adults seen but weather poor. Web count visit 14 September 1999. No webs were seen.

Comments: an area of cutover blanket bog. *Succisa* was locally abundant on drier parts of site, especially along the road.

23 Legalough H0834

Marsh Fritillary status: recorded once, 2 adults were seen 1st June 1985.

Visited: 10 June 1999 in suitable weather. No adults were seen.

Comments: Legalough is in a karst area. Rocky outcrops have thin limestone soils and calcicolous grassland. Unimproved damp grassland was present on deeper soil and along stream valleys. Here *Succisa* was locally abundant, but the whole area was grazed by cattle and sheep and the plants were consequently small. This site was considered marginally suitable for the species.

24. Lough Lea region H4235

Marsh Fritillary status: adults recorded once in June 1999

Visited: 17th June. Weather was marginally suitable and no adults were seen.

Comments: there is a mosaic of habitats in this area of east Fermanagh, including blanket bog, and acid grassland. Large areas have been planted. Low intensity cattle grazing is the main management but areas are also affected by mechanised peat cutting. *Succisa* was present but was never common in areas searched at Carrickyheenan (H428373) and Lough Lea. Areas looked at were considered marginally suitable for Marsh Fritillary but much potential habitat exists.

25. Monawilkin Lough and Hill

Marsh Fritillary status: adults have been reported from this site in 1974, 1984, 1985 and 1993.

Visited: 24th June in suitable weather. No adults were seen.

Comments: Monawilkin is regularly visited during the flight season of the Marsh Fritillary and it is unlikely a persistent colony would escape notice. *Succisa* was frequent to locally abundant in the wet flushed grasslands, especially near Monawilkin Lough. The whole area was grazed by cattle, the sward is short and *Succisa* plants were small. Site was considered unsuitable in its present condition.

26. Watsons Lough H3049

Marsh Fritillary status: recorded once - a single adult seen in 1985.

Visited: 11 June 1999. No adults seen but weather poor.

Comments: this lake has a remnant area of bog on eastern side with acid grassland and gorse scrub. *Succisa* was locally frequent here and the site appeared still to have suitable habitat. Suitable habitat also exists on the margins of the unenclosed bogs close to this site e.g. at Lough Mulshane.

Co. Tyrone

27. Black Bog H6481

Marsh Fritillary status: One record of 15 adults in a field at edge of bog in 1985.

Visited: 7 June 1999 in suitable weather. No adults were seen.

Comments: Potential habitat was limited to a lagg area around the stream which flows through the bog. Here, *Succisa* was locally frequent. Fields in the area also have *Succisa* growing in flushed areas of acid grassland, but these were all grazed and were not considered suitable for Marsh Fritillary due to small size of plants.

28. Drumquin Lough H3274

Marsh Fritillary status: adults were recorded here in 1985 and 1991.

Visited: 9 June 1999 in suitable weather but no adults were seen.

Comments: this lake has a small area of lush ungrazed fen. No *Succisa* was seen. Habitat was considered unsuitable for the Marsh Fritillary.

29. Fairy Water Bogs H37

Marsh Fritillary status: adults have been recorded once at Drumgallan bog (H340724) 4 June 1985.

Visited: 9 and 29 June 1999. No adults seen but weather poor on both visits.

Comments: the bogs here are treated as one site. Drumgallan is a cutover raised bog. *Succisa* was locally abundant but patchily distributed but appears to be suitable habitat. The other bogs in the Fairy Water at Claraghmore and Bomackatall are less disturbed and *Succisa* was largely absent from the intact bog surfaces and only appeared at modified margins in small amounts. The unimproved acid grassland at Claraghmore Lough was also surveyed. Here, *Succisa* was locally common but this habitat was badly degraded.

30. Skea Bog H7566

Marsh Fritillary status: recorded once in May 1992 when 5 larvae were seen.

Visited: 6 June 1999.

Comments: A cutover lowland raised bog. The margins of the site are wooded with birch and willow. Central part consists of rank, leggy *Calluna* with long disused peat cuttings. No evidence of recent management on site. *Succisa* was scarce on this site and confined to marginal enriched areas. This was not considered to provide suitable habitat in its present condition.

Co Londonderry

31. Magilligan Dunes

Marsh Fritillary status: first recorded in 1933. Recorded in 10 separate years between 1973 and 1997. Most of the records are from the Umbra end of the system.

Visited: 2 June 1999 (Umbra only); 3 April 2000.

Comments: this is a large sand dune system. Ungrazed fixed dune grassland, with more herb rich slacks are the main habitats. Some wet slacks occur at the Umbra. For many years, there has been grazing, but winter cattle grazing has been reinstated in recent years. Ballymaclary and the Umbra were searched in April 2000 by a team of recorders. No *Succisa* was found on Ballymaclary and is believed to be absent further west. *Succisa* was locally common on the Umbra around the damper slacks. Whilst suitable habitat appears to exist here, no webs were found.

5.2 Web counts

For the web survey, a similar methodology to the preliminary site visits was used. As much of the available habitat as possible was walked, searching for patches of foodplants and webs. Other UK surveys have used timed transect counts, although this method was not adopted for this survey. The aims were not just to assess colonies but also to get information on the habitat usage. There was the difficulty of moving around on the sites due to the topographical conditions, which would have made transects inappropriate as ground often had to be walked twice. Small sites were covered as thoroughly as possible. On very large sites, *Succisa* patches could be identified by the presence of flowers and searches were concentrated in these areas. The webs were counted if active i.e. had caterpillars. The precise number of webs could be hard to determine, especially where webs were at high density. The counts from each site therefore can be best viewed as a measure of the relative size of the colony, rather than a precise count of the population. Details of the dominant plant species, vegetation height and structure around the

webs were noted at each site. On three sites, Derryleckagh, Ballykilbeg and Aughnadarragh, the vegetation height at each web was measured within 10cm bands with a graduated stick. The results are shown in Table 1.

The sites at which webs were seen are covered in more detail below. Searches were made for webs at Kilmore, Lackan Bog, Magilligan, Straghans Lough and Tullybrannigan. No webs were found on these sites.

Maps are provided for each site which shows the areas covered and the location of the main concentrations of webs on each site. Locations are approximate as precise fixes were hard to determine. The extent of the site covered is also indicated.

5.2.1 Montiaghs Moss

A total of 89 webs were counted in the areas surveyed, distributed as shown on Map 2. The advice of the warden, Stephen Foster, was taken regarding access to this site and consequently some areas were not visited.

The population on the Montiaghs was very dispersed throughout the site. No large concentrations of webs were found, which reflects the observed distribution of *Succisa* on the site. This is undoubtedly due to the microhabitat diversity on this site, especially in the areas which have numerous flooded peat cuttings.

Area 1 is an area with numerous flooded peat cuttings, separated by narrow uncut ramparts covered in ungrazed *Molinia*-dominated acid grassland. Most of the peat cuttings were filled with poor fen vegetation with much *Sphagnum* and little open water visible. A total of 54 webs were found in this area, dispersed throughout. In 1999, this was clearly the main area used by the colony. The remaining webs were dispersed through four other parts of the site. All were in *Molinia* dominated grassland.

5.2.2 Drumcarn/Drumnahavil

Drumcarn/Drumnahavil is a large area of cutover bog, wet heath and fen on the Armagh/Monaghan border. The Armagh portion of the site consists of rocky outcrops covered in dry heath, dense gorse scrub and bracken, with numerous shallow peaty pools separated by narrow ramparts of uncut peat. *Succisa* was scarce, growing in small clumps or as single plants. Much of the site is unsuitable for *Succisa* and consequently the Marsh Fritillary, being either too wet or covered in dense scrub. The records do indicate that there is a colony in the area. However, as the Armagh portion of this site is considered unlikely to support a large colony in its present condition, the conclusion must be that this colony is maintained on the Monaghan side of the border.

5.2.3 Aughnadarragh Lough

A total of 48 webs were counted, distributed as shown on Map 3. Webs were found in one localised part of the site to the south of the lake. Over the remainder of the site, the habitat was unsuitable and *Succisa* was rarely seen.

The main concentration of webs (27) was in an area of fen and acid grassland, amongst open willow and birch scrub with *Menyanthes*, *Potentilla palustris*, *Carex* and *Eriophorum*. The vegetation here was short, mostly less than 20cm high. Five webs were found in very short vegetation alongside the boundary fence, where horses from a neighbouring field grazed the vegetation. The remaining webs were in ungrazed fen alongside a drain. The *Succisa* plants were growing in vegetation between 25-40 cm in height.

5.2.4. Ballykilbeg

A total of 168 webs were counted, distributed as shown on Map 4. Webs were only found in the NW part of the site.

There was one large and one smaller concentration of webs. The largest concentration with 123 webs was found in a small area of short grassland and fen mosaic with fine grasses, *Potentilla anserina* and locally dominant *Succisa*. A group of 12 webs, which was notable for the size and extent of the webs, was found in dry grassland (possibly abandoned pasture) with *Plantago lanceolata*, *Anthoxanthum odoratum*, *Potentilla anserina*, *Cirsium palustre* and locally abundant *Succisa*. The remaining webs were dispersed through the fen vegetation on relatively isolated *Succisa* plants. Table 1 shows the height of the vegetation surrounding the webs.

5.2.5 Ballykinler

This dune site was visited in 2000. A single caterpillar and a group of caterpillars were seen during this visit (see Map 8). Larval webs were seen in the main dune slack in 1999. It was too late to do a web count, but the amount of *Succisa* is limited to a relatively small area within the site. The vegetation at Ballykinler is mainly rank ungrazed Marram grassland

5.2.6 Derryleckagh

A total of 75 webs were counted, distributed as shown on Map 5. Webs were found only on the eastern side of the fen. They were well-scattered but with some concentrations of up to 29.

There were three main concentrations. Area 1 was an area of rich fen with tussocky grasses 50-60cm tall with *Molinia caerulea*, *Angelica sylvestris*, *Filipendula ulmaria*, *Achillea ptarmica*, *Menyanthes trifoliata*, *Rhinanthus minor*, *Narthecium ossifragum* and frequent rosettes of *Succisa pratensis*. Area 2 was short (10-20cm) *Carex* fen with *Hydrocotyle*, *Mentha aquatica* and *Succisa*. Area 3 was acid grassland with *Molinia*, *Caltha palustris*, *Narthecium ossifragum*, *Centaurea nigra* and *Menyanthes trifoliata* and abundant and locally dominant *Succisa*. The vegetation height was mainly in the range of 20-30cm.

The remaining webs were scattered in lush more grassy vegetation with *Molinia* and *Narthecium* and well scattered *Phragmites*.

Table 1 shows the height of the vegetation around each web.

5.2.7. Inishargy

A total of 99 webs were counted, distributed as shown on Map 6. They were concentrated in the western side of the site within the UWT reserve. Most webs were found growing on *Succisa* plants in mats of *Polytrichum* moss up to 30cm deep with *Juncus*, *Carex*, *Eriophorum* and *Potentilla palustris*. Some were found on *Succisa* plants on a part of the site which was burnt a few years previously. This area had open widely-spaced bracken 40-70cm high, with a ground vegetation of *Polytrichum*, grasses, regenerating *Calluna* and many large *Succisa* rosettes. This ground layer was less than 10cm high.

5.2.8 Murlough

This site was counted as usual by the National Trust and the summary information was provided by the warden, Hugh Thurgate. A total of 178 webs were counted in 23 locations. The number of webs was less than in 1998. The vegetation at each web was between 6.5 and 24 cm, with mean height of 14.5cm.

The colony at Murlough is found in the dune heath where *Succisa* grows in a mossy vegetation, amongst ericaceous plants and *Rosa pimpinellifolia*. Grazing by ponies of the heath and acid grassland has been introduced on the site since the Marsh Fritillary colonised the site. The large concentrations of *Succisa* are partially protected by small exclosures, which reduces grazing of the foodplant.

5.2.9 Glennasheever

Only one web was found at Glennasheever (see Map 7). This was found in an area of uncut grassland behind a roadside sign at the junction of the forest drive and the main road.

Succisa grows abundantly on the road verges and on the sides of roadside drains. These are mown occasionally or unmanaged. The Forest Drive verges were recently cut and the web seen survived as the sign prevents cutting.

This site is a wet blanket bog with areas of flushed grassland with *Succisa* and *Myrica gale* on sloping ground. The site is grazed by cattle. The main area with *Succisa*, where most adult butterflies have been seen, is used as a resting area by the cattle so is heavily poached and grazed. This was searched in 1998 as well as in 1999 for webs without finding any. It may be that the failure to find webs in 1998 was because the verges were not searched.

6. Discussion

6.1 Number of colonies.

This survey has been the first attempt to determine the number of extant Marsh Fritillary colonies in N. Ireland in a single year. Proof of the colonies was sought through the finding and counting of the larval webs. In 1999, eight definite Marsh Fritillary colonies were shown to exist in N. Ireland. An adult was seen at another site but no webs were seen. The figure of 8 colonies has to be considered as an underestimate. The initial survey period, during the adult flight period, was hampered by poor weather and it is highly likely that colonies were missed, especially in the western counties. Additionally, there is a large area of potentially suitable habitat both in the west of N. Ireland but also in small isolated sites in the east, which could not be covered in this survey. Adequate coverage of these would require dedicated surveys to cover all possible ground.

The figure of 8 definite colonies is clearly much less than the 58 colonies estimated to exist in 1990 (Warren, 1994), which suggests a huge decrease. In Warren (1994), it is stated that the estimate of 58 is based on the number of sites with records between 1960 and 1990. Whilst it is acknowledged that many sites are poorly surveyed (Warren 1994), the published data to support this. Furthermore, the unpublished records show that at 66 of the 100 recorded sites, the Marsh Fritillary has only been seen on one occasion. Proof of successful breeding, measured by the recording of stages other than adults, has been noted from only 16 sites in N. Ireland. Figure 1 shows the number of sites at which the Marsh Fritillary has been seen in each year since 1970. Since 1990, the number of sites per year has varied between 7 and 13. This all suggests that the 1990 figure of 58 colonies was an overestimate and the true figure was much lower. The figure of 8 is a more realistic figure on which to base conservation decisions, though it should always be stated with a caveat that it is a minimum figure. The implications of accepting this lower figure is that not only is the Marsh Fritillary much rarer than previously thought in N. Ireland, it also means that each colony contains a greater proportion of the total population.

6.2 Trends in the populations

In the absence of reliable data on the past status of the Marsh Fritillary at most of its N. Ireland localities, no trend in the population can be estimated. The number of site records per year shown in Figure 1 shows no appreciable trend. Whilst this can only crudely be equated to population trend, it does not suggest any large-scale change in the number of colonies.

The periodic establishment and extinction of individual Marsh Fritillary colonies is part of the natural metapopulation dynamics of the species. The increasing fragmentation of habitats and isolation of sites preventing the operation of metapopulations is believed to be one of the main reasons why this species has declined so much (Warren, 1994). There is insufficient long-term data from sites in N. Ireland to identify metapopulations, but the pattern of site occupancy in some areas such as NW Fermanagh and the Magilligan dunes and the appearance of 'new' colonies at Ballykilbeg and Derryleckagh in the 1990s, appear to show that the metapopulation model applies here. Further research on this aspect is needed and in particular, an investigation of

core populations. It would appear that the colonies at the Murlough and the Montiags may be core populations as both have been in existence for many years and both have gone through periods of abundance and rarity. The area of habitat on both sites appears large enough to allow these natural cycles to operate. Research is needed to determine if the occupied sites close to Murlough and the Montiags are connected to these core sites by dispersal.

A key aspect to the functioning of a metapopulation is the dispersal ability of the adults. Whilst the Marsh Fritillary is considered sedentary, the species is apparently more mobile than previously thought and a colonisation range of 15-20 km is possible (Warren, 1994). The potential for long-range movement of the species is indicated in the N. Ireland records, as many records refer to one-off sightings of adults. The appearance of new colonies such as Derryleckagh in the late 1990s is encouraging as it indicates the species can still disperse through the N. Ireland countryside. This aspect also needs further investigation.

6.3. Geographical distribution

Six of the 1999 colonies were in Co Down, with single colonies in Antrim and Fermanagh. The single adult record was from an additional site in Armagh. This concentration in the east is perhaps a surprising result for a species which is confined to the west of Britain (Barnett & Warren, 1995). Maps 8 to 11 show the change in the distribution of the Marsh Fritillary over time. Since 1970, the species has become less common in the north and west with an increase in records in Armagh and especially Down. Whilst differences in recording effort may account for some of this apparent shift, there does appear to have been a genuine shift in the distribution. This concentration of colonies within the most densely populated part of N. Ireland clearly has implications for the conservation of the species.

Barnett & Warren (1995) identified key areas for the species in the UK. Four areas were identified in N. Ireland - SE Down, N. Armagh/NW Down, S. Fermanagh and SE Londonderry/W. Antrim. N. Armagh/NW Down and south Fermanagh were designated as priority areas as they were believed to have large populations and dense aggregations of populations. These key areas were recognised as provisional and in the light of this survey would need to be revised.

East Down is currently the key area for the species in N. Ireland, holding 5 of the confirmed colonies and the two largest populations in 1999. The number of occupied sites in North Armagh appears to have declined as no active colonies have been found here since the mid 1990s. Across the north of N. Ireland, especially in Londonderry, there have been few recent records and a decline is also suggested. In Fermanagh, colonies were never common in the south and east and designation of this part of the county as a key area cannot be justified. The main concentration of recent sites in Fermanagh has been in the Conagher, Lough Navar and Garrison areas. The status of the species in this region remains unclear, but suitable habitat is common. An intensive survey of this area is needed to clarify the situation.

6.4 Habitat

The 1999 colonies were found on mires and wet grasslands (6 sites), in dune heath (1 site) and dune grassland (1 site). The habitat used in N. Ireland appears to be similar to that described in other parts of its UK and Irish range. The vegetation height on the sites appears somewhat taller than in other parts of its UK range. In Glamorgan, most webs were found in vegetation under 25cm tall (Lewis & Hurford, 1997). In western Scotland, the mean height of the vegetation around the webs was under 20 cm on all 11 occupied sites and at 5 it was under 10cm (Ravenscroft & Gaywood, 1996). This difference may be related to the grazing pressure on British sites, but it also indicates that the species can cope with quite tall vegetation.

The major difference between the N. Ireland sites and those in Britain, relates to the type and nature of the site management. Most of the confirmed localities in N. Ireland were unmanaged, whereas in Britain, surveys show the majority of sites are grazed (Warren, 1995).

Cattle are the commonest stock on Marsh Fritillary sites, followed by horses and sheep and cattle combined (Warren, 1994). No colonies exist on solely sheep-grazed vegetation, as the sheep selectively graze on *Succisa* (Warren, 1994; Barnett & Warren, 1995). Grazing by non-domestic stock such as deer occurs on Scottish sites. It is true a few webs were in grazed situations such as at Aughnadarragh, but this was a small proportion of the overall total. At Murlough, the *Succisa* patches utilised are protected from heavy grazing pressure by small exclosures. At Glennasheevar, whilst the blanket bog and grassland habitat is grazed, the only web seen here was on a patch of uncut grassland on a roadside verge.

It is however not true to say that the sites were completely unmanaged. The wetland sites are all created by human activity in the first place. Many of the fens and acid grasslands utilised by the Marsh Fritillary have been created from intact bogs by human activity. This can be seen today where *Succisa* is able to colonise bogland edges as they are drained or disturbed. One of the traditional management practices on bogs is burning which encourages growth of grasses and holds back succession. Fires are known to have affected a number of the confirmed colonies including the Montiaghs, Inishargy, Derryleckagh and Drumcarn/Drumnavil. One of the main concentrations of webs at Inishargy was in an area which was still recovering from a fire a few years previously. A large part of the Montiaghs containing the main concentrations of webs was burnt in the spring of 2000. This unplanned experiment could provide information on the ability of the Marsh Fritillary and *Succisa* to survive and recolonise a burnt area. The evidence from Britain of the effect of burning on the Marsh Fritillary is contradictory. Fires will kill caterpillars or destroy foodplants if they happen during the flight period (Warren, 1994). However, colonies in Glamorgan appear to survive fires and one of the largest colonies was found on a site burnt just 6 months before (Lewis & Hurford, 1997).

So whilst the sites are currently unmanaged, it appears that the Marsh Fritillary will utilise sites after they have recovered from fire or other forms of disturbance. Short-term neglect of sites appears to promote the vegetation condition favoured by colonies. The unknown factor is how long colonies can survive without additional management. This needs to be studied in more detail as this has implication for the long-term survival of the colonies. The monitoring of colonies to determine their response to vegetation changes over time is needed to formulate management prescriptions for the species and the sites. Experimental manipulation of vegetation to test the response of *Succisa* could yield valuable information.

6.5 Future work

This survey had limited goals and not all of these could be attained. The poor weather in June 1999 was unpredicted, but it lessened the chances of detecting colonies by finding adults during the flight period. The status of the Marsh Fritillary in some parts of N. Ireland is still unclear and more survey effort is needed in north-west Fermanagh in particular.

Most N. Ireland records of the Marsh Fritillary have been of adults, but these do not confirm the presence of colonies. As detection of adults is highly weather dependent, webs surveys are recognised as being a much more reliable means of finding and monitoring colonies. Unfortunately, recorders rarely revisit sites in autumn to search for webs, but they should be encouraged to do so. The colony at Murlough is the only N. Ireland colony which has been counted annually and this good practice should be extended to as many of the other sites as possible. This data is needed to determine the viability of the colonies and the long-term trends on individual sites. EHS should take the lead in this by monitoring the species sites on its own land or where it has privileged access.

As stated in section 6.4, research on the impact of management or the lack of it on the vegetation communities used by Marsh Fritillaries is needed. The fire in 2000 which affected the Montiaghs also gives an opportunity to see how the foodplant and the butterfly respond to this form of management. This work would be most appropriately done through a postgraduate

studentship. This work would also benefit our understanding of the development of the vegetation and species assemblages on these important wetlands.

7. Recommendations

The following are the main recommendations based on the results of this survey

1. Targeted surveys should be done in poorly covered areas especially in NW Fermanagh. These surveys should cover both adult flight period and early autumn for the web.
2. Annual monitoring of all colonies should be implemented using a standardised method of web counts.
3. Further research into the ecology of the species needs to be undertaken in N. Ireland, looking particularly at the possible functioning of metapopulations, adult dispersal and the response of the vegetation of cutover mires to different management. This is urgently needed so that management prescriptions and a targeted action plan can be written for this species.
4. A local steering group should be set up to co-ordinate effort, share information and arrange monitoring of this species. This should involve EHS, the National Trust, Ulster Wildlife Trust and Butterfly Conservation.

8. Acknowledgements

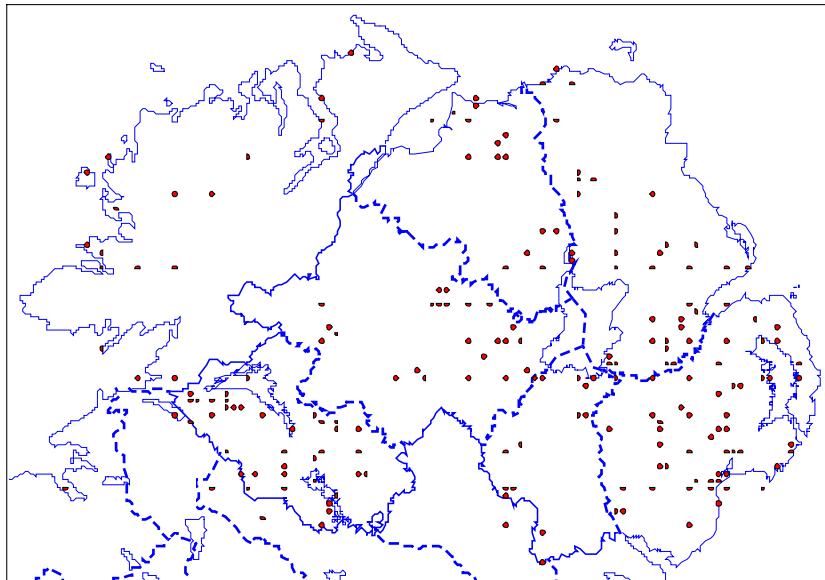
Many people have assisted in this work and their help is gratefully acknowledged especially David Mitchel and Renny McKeown from EHS, Trevor Boyd, Ian Rippey and the Conservation Staff of Butterfly Conservation, Hugh Thurgate (National Trust), Andrew Warwick and Dermot Hughes (UWT) and finally all the naturalists who have recorded this species in N. Ireland.

9. References

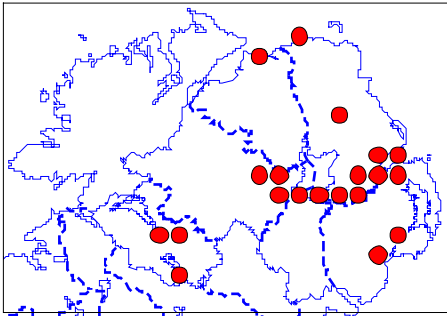
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Site	Count	Vegetation height (cm)					
		0-10	10-20	20-30	30-40	40-50	50-60
6. Aghnadarragh Lough	48	25	10	8	5		
10. Derryleckagh	75	0	12	30	5	18	10
7. Ballykilbeg	168	3	19	52	66	21	7
11. Inishargy	99						
1. Montiaghs	89						
19. Glennasheear	1						
15. Murlough	172						
8. Ballykinler	na						
2. Drumcarn/Drumnavil	0						

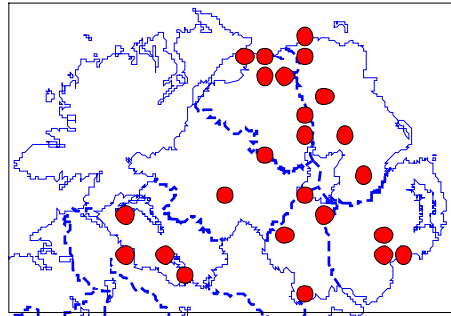
Table 1: number of webs counted at each site in 1999/2000 and the height distribution of the vegetation at each. Vegetation height was measured at three sites using a graduated rule within 10cm bands. Webs were also seen at Ballykinler in April 2000 but this was counted in a comparable manner so no figure is included from the table.



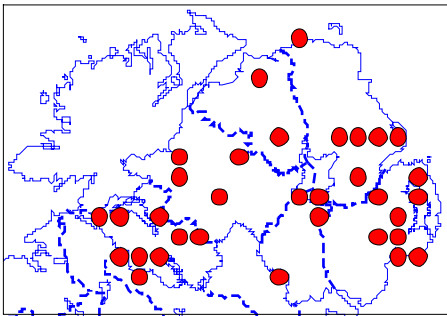
Map 1 The distribution of the Marsh Fritillary *Euphydryas aurinia* in N. Ireland, showing all records plotted on a tetrad (2km) scale.



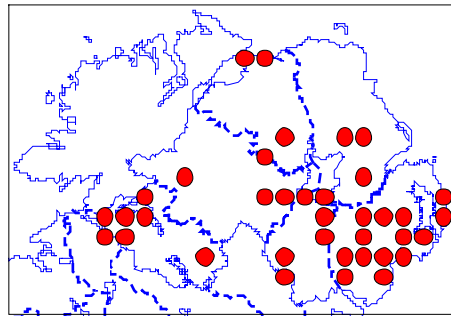
Map 8 The distribution by 10km square of pre 1970 records of Marsh Fritillary in N. Ireland



Map 9 1970-79 records



Map 10 1980-89 records



Map 11 1990-99 records

Appendix 1 List of Marsh Fritillary sites in N. Ireland listed alphabetically by county

Site name	Grid	County	First/last record	No of years	Sex/stage
Ballybracken T.d., 1km NE of Ballynure	J326965	Antrim	1989	1	adult
Boghill, Granagh T.d.	D005150	Antrim	1972	1	adult
Breckenhill Dam	J238956	Antrim	1985-1988	3	adult
Cave Hill	J322790	Antrim	1937-1942	3	adult
Crow Glen, Wolf Hill	J287769	Antrim	1950-1951	2	adult
Divis Mountain	J2875	Antrim	1998	1	adult
Drumraymond Bog	H990940	Antrim	1977	1	adult
Dundrod	J217773	Antrim	1986	1	adult
Friends School, Magheralave Rd., Lisburn	J247650	Antrim	1960s	?	adult
Frosses Bog, Glarryford	D0515	Antrim	1975	1	adult
Garry Bog ASSI	C942315	Antrim	1970	1	adult
Giant's Causeway (Unlocalised)	C950444	Antrim	1941	1	adult
Lisnagunogue Bog	C984416	Antrim	1975-1985	3	adult
Montiaghs Moss ASSI	J0965	Antrim	1933-1999	15	adult, larva
Rabbit Hill, Ballygarvey T.d.	D118047	Antrim	1952	1	adult
Sharvogues Bog	J104955	Antrim	1997-1998	3	adult
Slievenacloy T.d., nr. Black Mountain	J2471	Antrim	1961-1992	4	adult
Tildarg Hill	J248977	Antrim	1997	1	adult
White Head, Whitehead	J474911	Antrim	1986	1	adult
White Mountain, Aghrim	J2468	Antrim	1950-1965	2	adult
Abraham's Bog, Ballynery T.d.	J0259	Armagh	1981	4	adult
Annaghmare Lake	H9018	Armagh	1971	1	adult
Brackagh Moss National Nature Reserve	J0251	Armagh	1973-1993	9	adult
Drumcarn/Drumnahavil	H812287	Armagh	1988-99	9	adult
Manor House, Milford	H859428	Armagh	1970	1	adult
Oxford Island National Nature Reserve	J045615	Armagh	1983	1	adult
Peatlands Country Park	H904607	Armagh	1933-1998	15	adult, larva
Straghans Lough	H820309	Armagh	1992	1	adult
Aughnadarragh Lough	J443593	Down	1984-1999	13	adult, larva
Ballykilbeg Fen	J448407	Down	1996-1999	4	adult, larva
Ballykinler T.d.	J439406	Down	1999	1	larva
Bishops Mountain, Tievenadarragh T.d.	J408463	Down	1989-1995	3	larva
Black Lough ASSI	J360450	Down	1989	1	adult
Blue Road Bog SE of Kernan Lake	J096462	Down	1993	1	adult
Bohill Wood National Nature Reserve	J397462	Down	1970-1983	3	adult
Clandeboyne Estate	J4977	Down	1950-58	5	adult
Creevy Lough	J396564	Down	1990	1	adult
Cultra	J4180	Down	1950	1	adult
Darragh Island, Strangford Lough	J538602	Down	1985	1	adult
Derry T.d., 1km NE of Portaferry	J609517	Down	1993	1	adult
Derryleckagh	J1125	Down	1999	1	adult, larva

Site name	Grid	County	First/last record	No of years	Sex/stage
Drumawhy Bog	J547758	Down	1985	1	adult
Inishargy Bog	J615645	Down	1990-1999	8	adult, larva
Lackan Bog 2km E of Ballyroney	J238368	Down	1990-1995	5	adult, larva
Lakeview House, Cloghskeelt T.d.	J238421	Down	1992-1992	2	larva
Lough Aghery, 3.5km N of Dromara	J290534	Down	1990	1	adult
Monlough T.d., 2km E of Carryduff	J395643	Down	1983	1	adult
Mount Stewart House and Gardens	J556704	Down	1983	1	adult
Murlough National Nature Reserve	J4034	Down	1973-	17	adult, larva
Saval More T.d., 3km NE of Newry	J123317	Down	1992	1	larva
Strand Lough, Killough	J5437	Down	1987	1	adult
Tollymore Forest Park	J33	Down	1938-1970	2	adult
Trassey River, Trassey Glen	J324328	Down	1930	1	adult
Tullybrannigan Road, Newcastle	J362311	Down	1993-1998	4	adult
2.5km SE of Garrison	G953495	Fermanagh	1998	1	adult
Braade T.d., Lough Navar Forest Park	H056543	Fermanagh	1986-1999	3	adult, larva
Brollagh	G943558	Fermanagh	1984	1	adult
Carricknagower Forest Nature Reserve	H001542	Fermanagh	1979	1	adult
Cavans Bog	H404472	Fermanagh	1986	1	adult
Conagher Upper	H045537	Fermanagh	1978	1	adult
Cullen Hill	H158512	Fermanagh	1992	1	adult
Devenish Island, Lower Lough Erne	H2247	Fermanagh	1933	1	adult
Drumanacabranagher Bog	H206358	Fermanagh	1979	1	adult
Farnamullan	H298394	Fermanagh	?	1	adult
Glenasheevar	H047535	Fermanagh	1985	1	adult, larva
Inish Rath Island, Upper Lough Erne	H337272	Fermanagh	1893-1895	2	adult
Inishcreenry shore, ULE	H295325	Fermanagh	1985	1	adult
Killee Lough, Ballinamallard	H293506	Fermanagh	1985	1	adult
Killymore Td	G965554	Fermanagh	1998	1	adult
Knocks T.d., ENE of Lisnaskea	H414353	Fermanagh	1992	1	adult
Legalough	H089348	Fermanagh	1975 - 85	2	adult
Lusty More Island	H1061	Fermanagh	1993	1	adult
Marlbank	H1234	Fermanagh	1985	1	adult
Monawilkin District	H087537	Fermanagh	1974-93	4	adult
Monelegny Bog	H349294	Fermanagh	1976	1	adult
Reilly Wood	H3325	Fermanagh	1985 -1986	?	adult
Shore N of Magho, Lower Lough Erne	H058576	Fermanagh	1992	1	adult
Tempo	H3547	Fermanagh	1887	1	adult, larva
Tullynacor	H055413	Fermanagh	1997	1	adult
Watsons Lough	H305497	Fermanagh	1985	1	adult
Ballymacombs Moss, Bellaghy	C954005	Londonderry	1977	1	adult
Ballymacpeake	C953010	Londonderry	1977	1	adult
Cam Forest SE of Limavady	C7821	Londonderry	1981	1	adult

Site name	Grid	County	First/last record	No of years	Sex/stage
Curran Bog, 5km N of Magherafelt	H864945	Londonderry	1997	1	adult
Macosquin	C815270	Londonderry	1970	1	adult
Ringsend	C790240	Londonderry	1970	1	adult
The Umbra	C7335	Londonderry	1936-1997	10	adult
Ballynasollus T.d. at Davagh Forest Park	H737830	Tyrone	1996	1	adult
Black Bog ASSI	H640810	Tyrone	1985	1	adult
Cashel Wood, Formil T.d.	H6584	Tyrone	1984	1	adult
Craigs nr. Orritor	H763801	Tyrone	1975-79	3	adult
Derrygoon T.d., 2km SW of Baronscourt	H304801	Tyrone	1985	1	adult
Drumquin Lough	H325748	Tyrone	1985 - 1991	2	adult
Lisnanane sandholes	H796708	Tyrone	1947	1	adult
Skea Bog	H759664	Tyrone	1992	1	larva
Slievedivena, Altcloughfin T.d.	H5762	Tyrone	1970-1980	5	adult
Stewartstown Lough	H8570	Tyrone	1920	1	adult
Tamnamore, Tamlaghtmore T.d.	H8762	Tyrone	1920	1	adult
Unshinagh Glen, Drumhonish T.d.	H340724	Tyrone	1990	1	adult

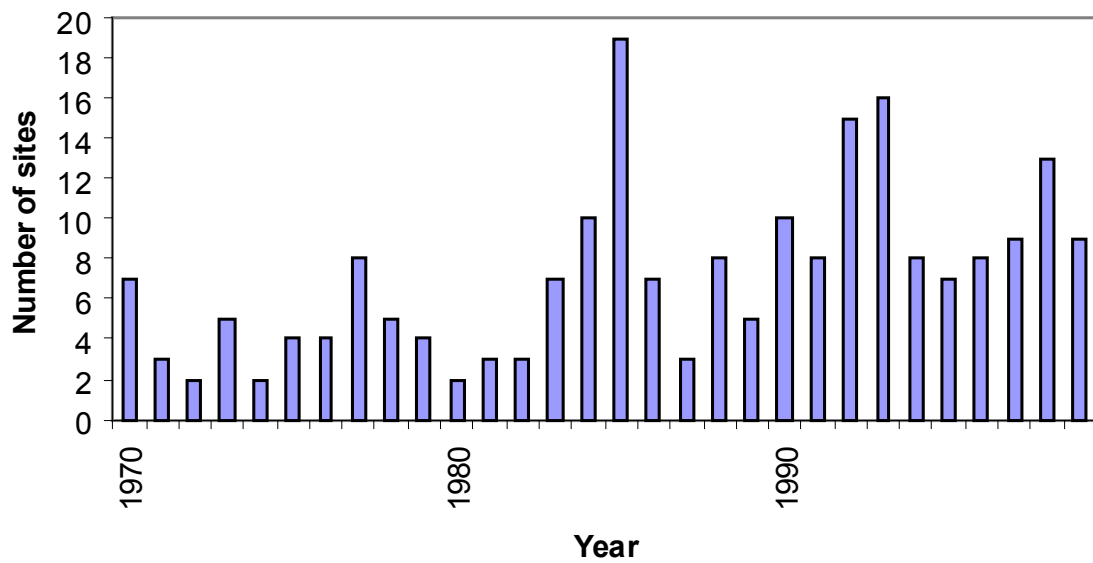


Figure 1 Number of annual site records of Marsh Fritillary in N. Ireland between 1970 and 1999 (Source: N. Ireland Butterfly Conservation unpublished data in CEDaR databases)