

# THE ORCHIDS OF LOUGH CARRA

The current status and distribution of orchids around Lough Carra, Co. Mayo

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## Summary

The orchids of the majority of the Lough Carra lakeshore habitats were surveyed for both distribution and abundance. Three common species (Common twayblade, Early purple orchid and Common spotted orchid) were mapped on the basis of the 1 km<sup>2</sup> grid squares. All other species were mapped on the basis of 1 hectare grid squares.

A total of well over 21,000 orchids of 17 species were recorded. However, although many habitats were species-rich and still contained good numbers of orchids, at least three previously recorded species were not found.

Lesser twayblade, Greater butterfly orchid and Green-winged orchid could not be located. It is possible that these species still exist in the area, perhaps in the few grid squares not covered by this survey, but the loss of suitable habitat suggests that there has been some reduction in orchid diversity around the lake. Irish marsh orchid and Pugsley's marsh orchid were also apparently absent, although the site where the latter had been recorded was not located (probably inaccessible as a result of unusually high lake water levels). Furthermore, Dense-flowered orchid could not be found at the two previously known sites, one of which is now improved agricultural grassland. However, a new site for this species was located.

Loss of semi-natural habitats and damage to those remaining areas of suitable habitat continues to erode the distribution and abundance of the orchids. Overgrazing and heavy use by livestock in spring and summer are serious problems, with many areas denuded of nearly all their flowering orchids. Conversely, there are a few sites where undergrazing presents the long term problem. Feral Fallow deer are also causing considerable damage, especially at the southern end of the lake, as are feral goats in one area.

Recommendations are made with respect to protection and management of the lakeshore habitats, including:

- Improved land management (especially grazing regimes) through cooperation with farmers and landowners.
- Prevention of further loss of or damage to habitats.
- Control of feral deer.
- Urgent implementation of appropriate management in certain key areas.
- Full and proper enforcement of relevant legislation.

## Introduction

The site synopsis for the Lough Carra/Mask Complex cSAC includes “The area is also noted for its diversity of orchid species” and mentions that Dense-flowered orchid (*Neottia maculata*) occurs at the northern limit of its distribution.

Praeger (1934) noted that “the lake shores are remarkably rich in orchids” and that 19 of Ireland’s 26 orchid species occur (in another publication he states 19 out of 24).

The habitats around the lakeshore are very varied and include GA1 (improved grassland), GS1 (dry calcareous and neutral grassland), GS4 (wet grassland), GM1 (marsh), PF1 (rich fen and flush), several woodland habitats and ER2 (exposed calcareous rock). The extent of the habitats of greatest conservation importance is declining as a result of agricultural practices and other developments and it seems probable that pressures on the lakeshore are likely to continue to increase.

The presence of orchids often indicates high ecological status for a location and might be used to identify the most valuable habitats around the lakeshore.

During the course of fieldwork over the last six years, many locations containing orchids have been found, but no systematic record has been kept of their distribution and abundance. However, it is possible to state that there are several locations where very large numbers of individual species are found as well as sites where there are several species in close proximity.

There are limited sources of information on the distribution of orchids around Lough Carra, but field notes have been obtained from Professor Richard Bateman relating to botanical survey work undertaken in 1981, 1984 and 1997 which contain references to various orchid species on the lakeshore. In addition, NPWS has provided data from botanical surveys undertaken in 1974 which include records of some orchid species within transects taken at various sites around the lake. Finally, Julia Nunn at the Ulster Museum has also provided some records.

## The orchids

Orchid taxonomy has been undergoing substantial changes in recent years and, for this reason, it is difficult to be precise about the number of species known to occur. However, the following have been recorded previously:

- |                                   |                          |
|-----------------------------------|--------------------------|
| 1. <i>Neottia cordata</i>         | Lesser twayblade         |
| 2. <i>Neottia ovata</i>           | Common twayblade         |
| 3. <i>Neottia nidus-avis</i>      | Bird’s nest orchid       |
| 4. <i>Epipactis palustris</i>     | Marsh helleborine        |
| 5. <i>Epipactis helleborine</i>   | Broad-leaved helleborine |
| 6. <i>Spiranthes spiralis</i>     | Autumn lady’s tresses    |
| 7. <i>Orchis mascula</i>          | Early purple orchid      |
| 8. <i>Platanthera bifolia</i>     | Lesser butterfly orchid  |
| 9. <i>Platanthera chlorantha</i>  | Greater butterfly orchid |
| 10. <i>Gymnadenia sp.</i>         | Fragrant orchid*         |
| 11. <i>Dactylorhiza incarnata</i> | Early marsh orchid       |

12. <i>Dactylorhiza viridis</i>	Frog orchid
13. <i>Dactylorhiza fuchsii</i>	Common spotted orchid
14. <i>Dactylorhiza maculata</i>	Heath spotted orchid
15. <i>Dactylorhiza traunsteinerioides</i>	Pugsley's marsh orchid**
16. <i>Dactylorhiza occidentalis</i>	Irish marsh orchid***
17. <i>Neotinea maculata</i>	Dense-flowered orchid
18. <i>Anacamptis pyramidalis</i>	Pyramidal orchid
19. <i>Anacamptis morio</i>	Green-winged orchid
20. <i>Ophrys insectifera</i>	Fly orchid
21. <i>Ophrys apifera</i>	Bee orchid

\* n.b. Fragrant orchid is now considered to be three separate species: Common fragrant orchid, Marsh fragrant orchid and Heath fragrant orchid.

\*\* n.b. Pugsley's marsh orchid: also known as Narrow-leaved marsh orchid and previously *D. traunsteineri*.

\*\*\* n.b. *D. occidentalis*: previously *D. majalis occidentalis*.

In addition to the above species list, NPWS data include a single record of *D. purpurella* Northern marsh orchid.

## Objectives

The overall objective of this project was to map the distribution of orchids around the Lough Carra lakeshore with an indication of relative abundance. Additional objectives included assessing the status of each species, evaluating the impact of current land use practices and identifying sites or areas where conservation priorities might lie.

## Methods

Fieldwork was carried out on 43 days between 10 May and 6 September (see Annex 1). Each kilometre grid square was visited on at least two occasions, once "early" in the season (May/June) and once in mid-late season (June/July), with those sites known or suspected of holding Autumn lady's tresses also surveyed in late August or early September. A hand-held GPS was used at all times to record location.

Whilst it had been planned to survey the complete lakeshore, inclement weather and difficult terrain combined to prevent this. The vast majority of the lakeshore is contained within 35 kilometre grid squares (there are also two further squares with tiny sections of lakeshore which were ignored). In view of this practical difficulty, it was decided that it would be better to cover the majority of squares comprehensively and leave some squares unsurveyed, rather than cover all squares less than completely. For this reason, 28 squares were surveyed, leaving 7 for which no records were obtained. In case it proved impossible to survey the remaining seven squares in 2008, those sections of shoreline believed to be of greater importance were included in the 28 squares surveyed.

A data recording sheet was used for all field records (specimen attached as Annex 2).

The distribution and abundance of three species known to be widely distributed and common was recorded at the 1 km<sup>2</sup> level. These were Common twayblade, Early purple orchid and Common spotted orchid. This was done by walking around the shoreline and examining all habitat within about 50-100 metres of the water's edge, recording the number of specimens of each species present up to 100 (after which, the record 100+ was entered on the data sheet). While this is a fairly rough and ready method, it is sufficient to provide a good indication of the abundance of these three common species. It is important to note that the numbers refer to plants growing within about 100 metres of the lakeshore and do **not** reflect total numbers in each grid square. In general, the numbers should provide an index of abundance.

All other species were recorded at the hectare grid square level using the same overall technique of searching a strip of lakeshore around 50 to 100 metres in width (depending on habitat type and terrain). In addition, some areas slightly further away from the lakeshore were surveyed because it was known that they held important orchid populations.

Nearly all of the lakeshore in the 28 km<sup>2</sup> grid squares was surveyed carefully in this manner. However, there were a few short sections that could not be accessed because of the terrain (unusually high lake levels made some marsh and fen areas impossible to survey safely).

In summary, the survey was systematic around the majority of the lakeshore, but selective in certain other areas.

Identification was supported using Harrap and Harrap (2005) as the principle guide, with Delforge (1995) and Ettliger (1997 and 1998) where necessary. In addition, Professor Richard Bateman, the acknowledged authority on the marsh orchids, assisted through the examination of high quality photographs taken by the authors.

No specimens that appeared to be hybrids were included in the records (almost all of these were hybrids between Common spotted orchid and Heath spotted orchid).

The Fragrant orchid species: initially, specimens were separated into Common fragrant and Marsh fragrant on the basis of characteristics given in Harrap and Harrap (2005). However, it became clear that either these characteristics are not sufficiently reliable or these two "species" overlap and hybridise in this region. Therefore, when processing the field data, all specimens of these types were grouped under the heading "Fragrant sp." Nevertheless, it is the authors' opinion that both types (species?) occur around Lough Carra and that this is an area where further research is needed.

The Marsh orchids: the situation with respect to the Marsh orchids is far from simple as a result of taxonomic complexity, nomenclatural changes, difficult identification and hybridisation. Previously, four "species" had been recorded around the lake (see above). During this study, no specimens were found that could be allocated to Irish marsh orchid (*D. occidentalis*), despite the fact that the 1975 NPWS survey recorded several. The authors are familiar with this species from elsewhere in Co. Mayo and Co. Galway and believe that it is possible that it does not occur around Lough Carra.

Further, the characteristics given in Harrap and Harrap (2005) to separate Pugsley's marsh orchid do not seem to be applicable around Lough Carra. Prof. Bateman has recorded this species on the lakeshore, but only at one site which could not be found during this current work. Photographs of marsh orchids displaying some of the characteristics of Pugsley's marsh orchid were confirmed by Professor Bateman to be Early marsh orchid.

Just two specimens of Northern marsh orchid were recorded, and this identification was confirmed by Professor Bateman.

In view of these difficulties, all marsh orchids other than the abovementioned two specimens were recorded as Early marsh orchid. A small selection of photographs were sent to Professor Bateman who confirmed this identification.

After collation, DMAP was used to produce distribution maps for each species, with abundance shown using a simple index in five categories:

1. Single specimen
2. 2-10
3. 11-30
4. 31-100
5. 100 +

In addition, a map was produced to illustrate species-rich areas.

## Results

A total in excess of 21,000 orchid specimens of 17 species was recorded (Table 1).

		Total number of specimens recorded
<i>Neottia cordata</i>	Lesser twayblade	nil
<i>Neottia ovata</i>	Common twayblade	1,113 ++
<i>Neottia nidus-avis</i>	Bird's nest orchid	16
<i>Epipactis palustris</i>	Marsh helleborine	6,589 ++
<i>Epipactis helleborine</i>	Broad-leaved helleborine	193
<i>Spiranthes spiralis</i>	Autumn lady's tresses	987 +
<i>Orchis mascula</i>	Early purple orchid	1,257 ++
<i>Platanthera bifolia</i>	Lesser butterfly orchid	97
<i>Platanthera chlorantha</i>	Greater butterfly orchid	nil
<i>Gymnadenia sp.</i>	Fragrant orchid	3,296 ++
<i>Dactylorhiza incarnata</i>	Early marsh orchid	3,788 ++
<i>Dactylorhiza viridis</i>	Frog orchid	49
<i>Dactylorhiza fuchsii</i>	Common spotted orchid	2,319 ++
<i>Dactylorhiza maculata</i>	Heath spotted orchid	1,697 ++
<i>Dactylorhiza purpurella</i>	Northern marsh orchid	2
<i>Dactylorhiza traunsteinerioides</i>	Pugsley's marsh orchid	nil
<i>Dactylorhiza occidentalis</i>	Irish marsh orchid	nil
<i>Neotinea maculata</i>	Dense-flowered orchid	10
<i>Anacamptis pyramidalis</i>	Pyramidal orchid	2
<i>Anacamptis morio</i>	Green-winged orchid	nil
<i>Ophrys insectifera</i>	Fly orchid	200 +
<i>Ophrys apifera</i>	Bee orchid	38
Total (all species)		21,653 ++

Table 1. Number of specimens of each species recorded during fieldwork in 2007.

n.b. the symbol "+" indicates that counting in at least one square exceeded 100.  
the symbol "++" indicates that counting in several squares exceeded 100.

### Species accounts

The following notes should be read in conjunction with the species distribution maps in Annex 3.

*Neottia cordata* Lesser twayblade

Although the authors had recorded this species in the general Lough Carra area previously, none was found in 2007. If it still occurs, it is clearly not a widespread or common species. However, its preference for acid soils suggests that its location in

the area is most likely to be on the eastern side of the lake (which was not surveyed in 2007), perhaps in M2072, or further away from the lakeshore.

*Neottia ovata*

Common twayblade

This species was mapped at the broader scale (1 km<sup>2</sup> grid square) since it was known to be widespread, abundant and not habitat specific. It occurs commonly and abundantly around Lough Carra in woodland, scrub and grassland. In six of the 28 grid squares over 100 were recorded, but it was absent from five squares and occurred in variable numbers in the remaining 17 squares. However, it was interesting to note that a very large proportion of the specimens recorded during the survey, especially those in woodland, were not flowering. It was also observed that the flower spikes on some plants had been eaten by livestock (probably cattle) and must be considered, therefore, as palatable to herbivores.

*Neottia nidus-avis*

Bird's nest orchid

This species was recorded in small numbers in this survey in two locations around the lake: the Creggaun and Leamnahye woodlands of the Partry House Estate and the deciduous woodland fringing the Derrinrush peninsula. In both cases, the habitat occupied (mature, deciduous woodland) is typical of the species.

In addition, data from Nunn (2007) show a record of the species from the Doon peninsula, also an area of mature, deciduous woodland.

*Epipactis palustris*

Marsh helleborine

This is one of the most abundant of the orchids around Lough Carra, often occurring in large colonies with many "individual" plants not flowering. However, since it is known that a single plant may produce multiple aerial stems from an extensive rhizome, it is quite likely that these dense colonies actually represent a relatively small number of plants.

It occurs in many places where fen habitat is found, in the *Schoenus* zone, and is often abundant close to the water's edge, but was also recorded in damp grassland and even occasionally in dry, limestone grassland.

This species is clearly extremely palatable to cattle (and, probably, sheep) since in many locations most of the aerial stems and leaves had been eaten by livestock. Since it cannot compete successfully in rank vegetation or tall grassland, its habitat requirements include a grazing regime. However, heavy spring and early summer grazing by cattle, as occurs in most parts of the lakeshore, is not likely to be the optimum!

*Epipactis helleborine*

Broad-leaved helleborine

Although primarily a woodland species and found in this habitat in several places on the lakeshore, this orchid also occurs in some of the exposed limestone habitats around the lake, although it is never a very abundant species. During this survey, casual observation suggested that many of the individuals growing in densely shaded woodland appeared less robust than those on limestone and had fewer flowering spikes.

*Spiranthes spiralis*

Autumn lady's tresses

This species was recorded in just five km<sup>2</sup> grid squares, but in several locations in very large numbers. Its requirement for short, nutrient poor grassland is reflected in the fact that its major stronghold is in an area of just this habitat, but where severe overgrazing has occurred in recent years (on the Kilkeeran peninsula). As in many other areas, light autumn/winter grazing would be of greater benefit, and there is clearly a threat of conversion of this excellent habitat (the most species-rich around the lake) into improved grassland.

*Orchis mascula*

Early purple orchid

This species was mapped at the broader scale (1 km<sup>2</sup> grid square) since it was known to be widespread, abundant and not habitat specific. It occurs commonly and abundantly around Lough Carra in woodland, scrub and grassland. In nine of the 28 grid squares over 100 were recorded, but it was absent from four squares and occurred in variable numbers in the remaining 15 squares.

Casual observation and recent research by Lorraine Grimes (2007) suggest that this species is highly palatable to herbivores, including feral fallow deer. The woodlands of Partry House Estate are poor in this species but have a dense deer population. The Doon peninsula woodlands have only occasional deer present, but abundant Early purple orchids. The work of Lorraine Grimes (2007) with deer exclosures supports this and suggests that this species is so attractive to fallow deer that they will break into a fenced area to get to the flowering spikes. In those areas of lakeshore where spring grazing of cattle occurred, many (in some cases most) of the Early purple orchids had been eaten.

*Platanthera bifolia*

Lesser butterfly orchid

A fairly widespread, but rarely numerous species, found in eight of the km<sup>2</sup> grid squares and occurring almost exclusively on unimproved, nutrient poor grassland.

*Platanthera chlorantha*

Greater butterfly orchid

Although the authors had recorded this species in the general Lough Carra area previously, none was found in 2007. If it still occurs, it is clearly not a widespread or common species.

*Gymnadenia sp.*

Fragrant orchid

As noted above, it is believed that both the Marsh fragrant orchid and Common fragrant orchid occur around the lake (if it is accepted that there are two, valid species). However, distinguishing between the two, especially when hybrids may be present and the typical habitats of each species are juxtaposed, is too difficult to attempt in a study of this nature.

Around the lakeshore, Fragrant orchids are found, often in extremely large numbers, in grassland, damp grassland, fen, the *Schoenus* zone and marsh. With well in excess of three thousand recorded during this survey, this is one of the lake's most widespread and abundant species. It was recorded in all but one of the km<sup>2</sup> grid squares (the one grid square lacking this species is also the area where fewest orchid species are found and where heavily grazed, improved grassland is found close to much of the shoreline).

In efforts to identify individuals and colonies as either Common or Marsh, many were examined closely and measured. Some individuals appeared to have the characteristics of Common, and some of Marsh, but the majority seemed to be intermediate between the two. This is an area where it would be useful to obtain the assistance of an expert.

*Dactylorhiza incarnata*

Early marsh orchid

An extremely widespread and abundant species, growing mostly close to the water's edge, and often more or less in the water. Recorded in all 28 km<sup>2</sup> grid squares. The most favoured habitat is probably the *Schoenus* zone, although many individuals are also found in dry grassland.

*Dactylorhiza viridis*

Frog orchid

A localised species, occurring in small colonies in just two km<sup>2</sup> grid squares in nutrient poor, species-rich grassland with a short sward. Never very numerous, its habitat requirements are probably very restrictive.

*Dactylorhiza fuchsii*

Common spotted orchid

This species was mapped at the broader scale (1 km<sup>2</sup> grid square) since it was known to be widespread, abundant and not habitat specific. It occurs commonly and abundantly around Lough Carra, mostly in grassland, but also in woodland and scrub.

It was found in all 28 km<sup>2</sup> grid squares surveyed, with over 100 recorded in 17 of them.

*Dactylorhiza maculata* Heath spotted orchid

Not as widespread or abundant as Common spotted orchid, occurring in half of the km<sup>2</sup> grid squares, but nonetheless very numerous in certain habitats. In particular, it was found mostly in rough grassland where heather occurred. Since these areas are mostly not true heath, the habitat tends to be a mosaic of alkaline grassland with patches of heath vegetation, with the Heath spotted orchid occurring in the latter. Often, and not surprisingly, many hybrids with Common spotted orchid were present as well (as noted above, these were not included in the records).

*Dactylorhiza purpurella* Northern marsh orchid

Two specimens of this species were found at one site, together with a single specimen of what appeared to be a hybrid between this species and Common spotted orchid. In addition to the two specimens in flower, it is possible that a small number of non-flowering specimens were present. The habitat was rather rank, ungrazed damp grassland.

The site where it had been recorded by NPWS in 1975 (in the region of M167710 and M168710) was searched carefully, but without success.

*Dactylorhiza traunsteinerioides* Pugsley's marsh orchid

The location of Bateman's record of this species could not be found. It is possible that the site is located in an area which was inaccessible during this survey as a result of unusually high water levels. It is hoped to locate the site in 2008.

*Dactylorhiza occidentalis* Irish marsh orchid

None of the marsh orchids recorded during this survey could be identified as this species, despite examining specimens carefully in site where the species was recorded by NPWS in 1975. It is concluded that either these previous records should be reclassified as Early marsh orchid, or a closer examination by a marsh orchid specialist should be arranged.

*Neotinea maculata* Dense-flowered orchid

The two sites where this species had been recorded previously were examined extremely intensely and carefully. No specimens were found at these sites. In one case, the area is now almost entirely "improved grassland", and in the other the area of semi-natural habitat remaining has probably decreased. It is concluded that the populations of both these sites have been lost.

Fortunately, this survey discovered a small number of specimens (ten) in a previously unknown area. The species was found in three hectare grid squares, all close together, with eight of the specimens in one site.

There are increasingly few areas of habitat suitable for this species remaining around the lake as a result of conversion of land for intensive agriculture, quarrying and other development. The newly discovered location is also under threat from grazing pressure.

*Anacamptis pyramidalis*                      Pyramidal orchid

Although a relatively widespread species in Co. Mayo, only two specimens of this species were found during the present survey. The habitat occupied in this instance was intermediate between improved agricultural grassland (GA1) and Dry calcareous and neutral grassland (GS1).

*Anacamptis morio*                      Green-winged orchid

The previous record of this species originates from Praeger (1906), and there is no indication of a precise locality. Much suitable habitat has been lost over the last hundred years, and, since it was not found during this survey, it seems likely that this species no longer occurs around the lake (unless in one of the squares yet to be surveyed).

*Ophrys insectifera*                      Fly orchid

With one exception, this species occurs in relatively small numbers in nutrient poor grassland and the *Schoenus* zone. The exception is a site on the Kilkeeran peninsula where it is very abundant, with over 100 recorded in one hectare grid square. Overall it was found in seven (i.e. 25%) of the km<sup>2</sup> grid squares.

*Ophrys apifera*                      Bee orchid

This species was found at six localities, but was numerous in only two of these. In one case, a colony of 23 flowering spikes was found in an area of excellent habitat, but with a potentially serious problem of inappropriate management (heavy grazing, mostly by cattle in spring and summer). When revisited, most of the flower spikes had been eaten.

A second site held eight flowering spikes, but in a very small area of suitable habitat which was also subject to livestock grazing in spring/summer. When revisited, six of the flower spikes had been eaten.

The Bee orchid colonies of both these sites are clearly under considerable long-term threat unless the land management practices can be adapted to take the needs of the species (and others) into account.

## Discussion

Any survey of this type will, necessarily, be limited in value by variable conditions. In this case, there are two major variables that affect interpretation of results: firstly, the unusual weather conditions pertaining in this year meant that some orchid species may have fared better or worse than usual (for example, observations elsewhere in the region suggest that the Lesser butterfly orchids had a poor year) and, secondly, livestock grazing might have a profound effect on our ability to see the plants. This latter point is exemplified by the observation that the site with the greatest abundance of Autumn lady's tresses was surveyed on 26 August, but when visited a week later there were none to be seen as they had all been eaten by cattle. A similar situation occurred with some of the other species (especially Marsh helleborine) in some locations.

Despite these limitations, the results of this survey illustrate some extremely important points about the orchids around Lough Carra and the management of their habitats.

Firstly, it is clear that much valuable habitat has been lost over the last hundred years. Although it might be claimed that most was lost many decades ago, other recent research (Huxley and Thornton, In Press) has shown that around 25% of the land in the Carra catchment has been converted into improved grassland since the early 1970s. Despite its designation as an SAC, some land within the protected area has been damaged (and some converted to improved grassland with application of seed and chemical fertilizer) within the last seven years. The loss of the two previously known sites for Dense-flowered orchid are, perhaps, the most notable, but the failure to find Green-winged orchid also suggests that its habitat has been destroyed. It is not just agriculture that is causing this loss of and damage to habitats; quarrying activities, illegal developments and boat slipways are also involved.

Apart from the loss of species from the area, it is also important to note that many of the less abundant species, especially those with restricted habitat requirements, have almost certainly suffered a reduction in their local range. For example, it is likely that Bee orchid occurred much more widely (albeit in small numbers), but has been reduced in its extent around the lake by conversion of natural/semi-natural grassland for intensive agriculture.

However, there remains still a great deal of excellent and high status habitat of various types, both within the SAC and around its periphery. What must become a priority is the **strict** protection of these habitats. This survey has identified some specific areas of very high conservation value and it might be appropriate to focus on these as a matter of some urgency.

A second point of great significance is the fact that much of the lakeshore is being managed or used in a manner likely to further degrade or damage habitats. Nutrient enrichment of the soils has occurred since the 1970s, and is still occurring now. Slurry and chemical fertilizers are spread on land relatively close to the water's edge and on soil already saturated with nutrients. This can only reduce the conservation value of the remaining natural and semi-natural habitats. In addition, many of the orchids are growing at the water's edge on land that is flooded for at least part of the year. Since the water of Lough Carra (and its marl bed) is also enriched with nutrients from agricultural sources there is a possibility of ecological changes to the vegetation.

Good land management for habitats of the types occurring around Lough Carra must involve careful use of grazing livestock. Unfortunately, this is not happening at all. Around most of the lakeshore, livestock, especially heavy cattle, are being grazed primarily in spring and summer, rather than autumn or winter. This is causing considerable damage to the vegetation. The fact that most livestock are also allowed free access to the lake itself is also a source of concern. In some areas there is significant overgrazing, but in a few sections of lakeshore the opposite problem occurs: i.e. little or no grazing, resulting in invasion and proliferation of rank vegetation, scrub and, eventually, woodland.

Some of the orchid species are clearly highly palatable to livestock and are, therefore, preferentially selected. This is certainly true of Early purple orchid and Marsh helleborine, but probably applies to many other species. Those that are not numerous, such as Lesser butterfly orchid, Frog orchid, Dense-flowered orchid and Bee orchid are especially vulnerable and, whilst a single year of damage is unlikely to be of great concern, continual pressure from livestock is likely to reduce these populations further.

The presence of feral Fallow deer and feral goats in several areas is also a serious problem. The former have been shown to be damaging at least the population of Early purple orchids and the latter are destroying much natural or semi-natural vegetation in one area of lakeshore.

## **Recommendations**

Since virtually all of the area surveyed is included in a designated SAC (and NHA), the following suggestions should be regarded in this context, i.e. they relate to areas of habitat that should, in principle, receive strict protection and should be the subject of carefully formulated management prescriptions. Unfortunately, there is no management plan in operation for Lough Carra and its terrestrial lakeshore habitats and, partly because of this, valuable habitat continues to be lost, degraded or managed inappropriately. In the absence of a proper management plan and the knowledge that such a mechanism is many years away, the following recommendations seem appropriate:

### 1. Land management

- The problems of overgrazing, undergrazing, and particularly grazing at inappropriate times should be addressed. Farmers and landowners need to be made aware of the damage being done and provided with advice, incentives

and alternatives. For example, simple electric fencing placed five or ten metres back from the water's edge during spring and summer would prevent much of the damage observed during this survey.

- Further habitat loss through conversion of natural and semi-natural habitats to improved grassland should be prevented.
- The numbers of feral Fallow deer should be drastically reduced and controlled.
- Those landowners already demonstrating or expressing a desire to manage for conservation should be encouraged through provision of advice and, wherever possible, through grant aid.

## 2. Key areas

- Those “key” areas of lakeshore habitat identified through this study (and studies of other taxa, including birds, dragonflies and butterflies) should be made the subject of urgent, priority management attention. The cooperation and support of relevant landowners should be sought and steps taken to ensure that appropriate management regimes are put in place as quickly as possible.
- There is a very strong case for purchase of certain areas for designation as a Nature Reserve. In particular, a major part of the Kilkeeran peninsula and its associated fen habitats more than justifies such action.

## 3. Real protection?

- The legal protection afforded to the lakeshore should be properly enforced, with landowners made aware of the importance of the site and the certainty of prosecution in the case of infringements that damage habitats or species in contravention of the law.
- The full support of Mayo County Council should be obtained to preclude the possibility of “buck passing” and avoidance of responsibility.

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Dates on which fieldwork was undertaken

May	10, 20, 22, 23, 24, 26, 27, 29, 30,
June	1, 3, 4, 9, 10, 11, 16, 17, 18, 20, 21, 22, 23, 24, 27, 29,
July	1, 2, 6, 10, 11, 12, 13, 14, 18, 19, 20, 21, 23, 24, 27,
August	26
September	1, 6



The following maps show:

1. The outline of Lough Carra with the OS 1 km grid.
2. The diversity of orchid species in each 1 km grid square, together with those squares which could not be surveyed in 2007.
3. The distribution and abundance of the three “common” species (Common twayblade, Early purple orchid and Common spotted orchid) by 1 km grid square.
4. The distribution and abundance of all other species by hectare grid square.

Please note the following points with respect to these maps:

- The unsurveyed squares are marked only in the second map. In all the distribution and abundance maps it should be remembered that the nine of the 1 km grid squares shown as unsurveyed in the second map will be blank because they were not surveyed and not because there are no orchids present.
- It may appear that some orchids are growing in water! This is not the case. Where a symbol appears to be in water it is because the symbol is always positioned in the **centre** of the hectare grid square, although the orchids will have been positioned in a corner of the square.
- For some species, two maps are presented. The first shows distribution over the whole lake, the second shows distribution in more detail over the restricted range of that species.