

A survey of the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270), in Ireland (2018)



Limosella aquatica, Peterswell turlough

Dr John Conaghan and Dr Janice Fuller

Report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht

December 2018

A survey of the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270), in Ireland (2018)

John Conaghan and Janice Fuller

Project manager: Dr John Conaghan, Enviroscope Environmental Consultancy, 11 Dun Ard, Craughwell, Co. Galway, enviroscope@indigo.ie – 087 2239858

Project coordinator: Dr Deirdre Lynn, NPWS, DCHG, 90 North King Street, Smithfield, Dublin 7, D07 N7CV

Project ID: 0902_FHPM17

Citation: Conaghan, J. and Fuller, J. (2018) *A survey of the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270), in Ireland (2018)*. Unpublished Report to the National Parks and Wildlife Service, DCHG, Dublin.

Ordnance Survey Ireland Licence No EN 0059208;

© Ordnance Survey Ireland / Government of Ireland

Executive Summary

In Ireland the Annex I habitat Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270) is mainly confined to turloughs in the western half of the country. The habitat is restricted to the muddy bottoms of turloughs which are the last areas to dry out during the summer. The habitat is also well developed in the Gearagh, Annahalla Bridge section of the River Lee in Co. Cork where there is a large exposure of bare mud surface.

A survey of *Chenopodium rubri* habitat in Ireland was undertaken between June and September 2018. The main aim of the survey was to document the extent, composition and condition of the habitat in a total of 19 sites throughout the country. Seven of these sites are SACs which are selected for the presence of *Chenopodium rubri* p.p. and *Bidention* p.p. habitat. The remaining 12 sites were surveyed to determine the presence and composition of the habitat. At each site the extent of the habitat was mapped and a list of associated plant species was compiled, along with height of vegetation and the cover of bare mud/soil. A total of 31 relevés were recorded to describe the vegetation composition and structure. In addition, locational details for a number of rare plant species including *Alopecurus aequalis*, *Callitriche palustris*, *Eleocharis acicularis*, *Limosella aquatica*, *Persicaria minor*, *Rorippa islandica* were recorded.

The survey confirms that the habitat has a very restricted distribution in Ireland. The largest areas of the habitat occur at the Gearagh, Annahalla Bridge (39 ha), Co. Cork and Coole Lough (25 ha), Co. Galway. At these larger sites it is difficult to assess the area of the habitat, mainly due to access difficulties caused by high water levels and the presence of soft mud. The majority of the sites visited support less than 1 hectare of the habitat. Bare mud generally dominates the habitat, usually covering greater than 60% of the ground area and the height of the vegetation is typically less than 10 cm. The vegetation is sparse and characteristic species include *Oxybasis rubra*, *Gnaphalium uliginosum*, *Limosella aquatica* and *Callitriche palustris*. Many of these species have a restricted distribution in Ireland which reflects the limited distribution of the habitat.

At the majority of the sites visited, the condition of the habitat is good due to a lack of disturbance, however at a number of turlough sites in Co. Galway excessive levels of grazing and poaching by cattle was noted. In parts of sites this disturbance has prevented the development of annual vegetation while in others it has resulted in a high cover of common, weedy species such as *Persicaria maculosa*, *Polygonum aviculare* and *Plantago major*.

The results and observations noted in this survey have contributed to elements of the National Conservation Status Assessment of the habitat as required under Article 17 of the Habitats Directive.

Table of contents

Introduction	1
Survey methodology and reporting	1
Site reports	3
Site No. 1 – Kilcolman Bog	5
Site No. 2 – The Loughans	8
Site No. 4 – Rathbaun Turlough	11
Site No. 5 – Lough Croan	15
Site No. 6 – Lough Gash	19
Site No. 7 – Coole Lough	23
Site No. 8 – The Gearagh, Annahala Bridge	27
Site No. 9 – The Gearagh, near Knockaunnacrohy	31
Site No. 11 – The Gearagh, Picnic site, South Hartnett’s Cross	34
Site No. 12 – The Gearagh, Rooves Bridge, Co. Cork	38
Site No. 13 – The Gearagh, Amenity Boating Area	42
Site No. 15 – Blackrock/Peterswell- Bullanagh (Turloughnacloghdoo)	45
Site No. 17 – Garryland turlough, Co. Galway	49
Site No. 18 – Caherglassaun turlough, Co. Galway	53
Site No. 19 – Hawkhill turlough, Co. Galway	57
Bibliography	60
Appendix I	62
Appendix II	64

Introduction

The purpose of this project was to gather ecological data at the current and unverified locations of the habitat “Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270)”. These data greatly increase the current knowledge regarding the composition, extent and condition of the habitat in Ireland and fed into the 2013-2018 Article 17 conservation status assessment required under the Habitats Directive (see Appendix I).

Rivers with muddy banks with *Chenopodium rubri* pp and *Bidention* pp vegetation (Habitat code 3270) is a relatively rare habitat in Ireland which is largely confined to frequently inundated areas. In Ireland the habitat is mainly associated with turloughs and lake margins which experience a fluctuating water level. Within areas of the habitat bare mud is typically dominant and the vegetation is typically sparse, generally only developing fully late in summer when water levels are sufficiently low. In some years, where water levels are high during the Summer months, the development of vegetation may be very restricted as a result of the lack of exposed muddy substrate. The ephemeral and species-poor nature of the vegetation often makes the determination of a precise habitat area difficult as the environmental conditions can vary greatly from year to year. Characteristic plant species of the habitat are small, short-lived, fast growing annuals that are poor competitors. Colonisation of the habitat by perennial species is prevented by its exposure late in the growing season for a short period (O Connor, 2017). Typical species of the habitat include *Gnaphalium uliginosum*, *Juncus bufonius*, *Callitriche stagnalis*, *Oxybasis rubra* (*Chenopodium rubrum*), *Callitriche palustris*, *Limosella aquatica*, *Persicaria minor*, *Rorippa islandica*, *Eleocharis acicularis* and *Riccia cavernosa*. Many of these species have a very restricted national distribution which reflects the relative rarity of the habitat in Ireland.

Survey methodology and reporting

Field survey and reporting was conducted by John Conaghan and Janice Fuller between the 26/6/2018 and the 20/9/2018. The survey approach was as follows:

- Prior to the field survey:
 - all available data for each site was compiled from NPWS files and the relevant literature.
 - Data sheets for collecting the field data were prepared.
 - NPWS field staff were contacted prior to the surveys.
 - Permission to enter lands for survey was sought in all cases, where possible.
- The following was recorded in the field surveys:
 - The area of the habitat was estimated. The number and size of patches was recorded on aerial photographs. Grid references were recorded for the centroid of each patch.
 - A species list for the habitat was recorded.

- 10-figure GPS-derived grid references were recorded for plants of *Alopecurus aequalis*, *Callitriche palustris*, *Eleocharis acicularis*, *Limosella aquatica*, *Persicaria minor*, *Rorippa islandica* noted
- The area of bare soil and the sward height was estimated.
- Where there was no existing relevé, a relevé – usually 2m x 2m - was recorded.
- Adjacent habitats were listed and soil type identified.
- Any activities that may be having positive or negative impacts, observed on the site were noted.
- Photographs of the vegetation and an overview of the habitat were taken.
- Where available, existing data were examined to determine whether there have been any anthropogenic changes.

Site reports

19 sites were visited during the survey (see Table 1) and 15 were surveyed in detail. The habitat was not recorded at Mountpleasant Turlough/Ballyglass1 (site no. 3), where water levels were high on the day of survey and no significant areas of colonized bare mud was seen. Light to moderate grazing was observed at this turlough site. The Gearagh, near Ashton (Sullane) (Site 10) could not be surveyed as no landowners were found to grant access. Lough Funshinagh (Site 14) and Glenamaddy turlough/Cloondoyle Beg (Site 16) could not be surveyed as water levels were too high during 2018.

Table 1 Known and potential sites for Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270)" surveyed in 2018.

Site #	Site Name	County	Easting	Northing	Original area estimate (Ha)	2018 survey area estimate (Ha)	Possible max area
1	Kilcolman Bog	Cork	158296	111124	0.03	0.2	0.2
2	The Loughans	Kilkenny	231564	163464	0.2	0.1	0.1
3	Mountpleasant Turlough/Ballyglass1	Mayo	123030	278070	2.1	?	?
4	Rathbaun	Galway	134560	261140	2.3	0.04	0.1
5	Lough Croan	Roscommon	187430	249830	4.6	0.3	0.3
6	Lough Gash	Clare	139209	167819	5.8	3.9	6
7	Coole Lough	Galway	143110	204260	20	25	c.35?
8	The Gearagh, Annahala Bridge	Cork	132992	71213	40	39	c. 50?
9	The Gearagh, near Knockaunnacrohy	Cork	138419	68461	2	1.3	2
10	The Gearagh, near Ashton (Sullane)	Cork	136400	71500	2	?	2
11	The Gearagh, Picnic site, Sth Hartnett's Cross	Cork	135643	71300	2	2.3	4?
12	The Gearagh, Rooves Bridge	Cork	145819	71501	0.4	0.85	0.85
13	The Gearagh, Amenity Boating Area, u/s Inniscarra Dam	Cork	151920	72808	0.01	1.1	1.1
14	Lough Funshinagh	Roscommon	193349	251450	33	?	33
15	Blackrock/Peterswell - Bullaunagh (Turloughnacloghdoe)	Galway	149780	208129	0.9	0.65	0.65
16	Glenamaddy turlough/Cloondoyle Beg	Galway	164300	261200	1.7	?	1.7
17	Garryland	Galway	141749	204049	4.58	2.2	2.8
18	Caherglassaun	Galway	141455	206290	2.4	2.7	2.7
19	Hawkhill	Galway	141139	202320	0.3	0.02	0.03

This section contains the 15 individual site reports. Each report follows a standard format:

1. Site number and name
2. Basic survey data, such as survey date and grid reference
3. **Introduction**, giving an overview description of the site
4. **Vegetation**, presenting the results of the vegetation survey including a table of species recorded and a detailed description of the habitat, Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270), on the site.
5. **Area of *Chenopodium* habitat**, reporting the measured or estimated area of the habitat on the site
6. **Management and threats**, describing the general management of the site and any pressures and threats recorded during the field survey.

Site No. 1 - Kilcolman Bog

Grid ref.	R582111	Elevation	90m	Date of survey	19/09/2018
Designation	Kilcolman Bog SPA (site code 004095)			Geology	Limestone
Surveyors	John Conaghan & Janice Fuller				

Introduction

Kilcolman bog is a relatively large area of quaking fen/wetland habitat located in the north of Co. Cork, 3.5km north-west of Doneraile village. The majority of the fen area is dominated by reedswamp vegetation however in the north-eastern corner of the site there is a small shallow pond where exposed mud occurs. The pond usually dries out during the summer leaving a small muddy central area which is surrounded by marsh/wet grassland vegetation. On the day of survey a small area of shallow (<30cm) open water was still present. The entire fen area lies within the Kilcolman Bog SPA and the site is a Nature Reserve which is partly owned privately and by the National Parks and Wildlife Service. The possible presence of *Chenopodium* vegetation at this site was noted by Dr Deirdre Lynn during a recent visit to the site.

Vegetation

Chenopodium vegetation at Kilcolman Bog is poorly developed. Although a sparse vegetation is colonizing areas of bare mud at the site, characteristic species of the habitat, e.g. *Limosella aquatica* and *Oxybasis rubra* (*Chenopodium rubrum*), are either absent or have a low cover. The vegetation is generally dominated by seedlings of *Epilobium* sp. and *Rorippa palustris* with *Agrostis stolonifera*, *Lythrum salicaria* and *Bidens tripartita* also frequent. Due to the early stage of development it was not possible to determine what *Epilobium* species occurs however it is most likely either *Epilobium palustre* or *Epilobium obscurum*. The vegetation is low-growing with a sward height of between 3 and 10 cm typical. In the quadrats recorded the cover of bare mud is around 60%. A full list of plant species associated with the habitat is outlined in Table 2 overleaf.

Table 2 Species list for Kilcolman Bog.

<i>Agrostis stolonifera</i>	<i>Gnaphalium uliginosum</i>	<i>Phalaris arundinacea</i>
<i>Bidens trifida</i>	<i>Lythrum salicaria</i>	<i>Potamogeton natans</i>
<i>Callitriche</i> sp.	<i>Mentha aquatica</i>	<i>Ranunculus</i> sp.
<i>Eleocharis palustris</i>	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)	<i>Riccia</i> sp.
<i>Epilobium</i> sp.	<i>Persicaria maculosa</i>	<i>Rorippa palustris</i>

The wetland vegetation immediately surrounding the *Chenopodium* vegetation is generally dominated by tall, grassy marsh in which *Lythrum salicaria* and *Agrostis stolonifera* are prominent. Other frequent species in this vegetation include *Phalaris arundinacea* and *Bidens tripartita*.

Area of *Chenopodium* habitat

It is estimated that the area of the habitat at Kilcolman is very small at approximately 0.2 hectares, including the central bare mud/shallow water area.

Management and threats

The area in which the habitat occurs at Kilcolman lies within a nature reserve (privately owned) and is well protected. There is no grazing or poaching by livestock evident and the condition of the habitat is good. There are no obvious threats to the hydrology of the habitat or the surrounding wetland vegetation.



Distribution of *Chenopodium* habitat at Kilcolman.



View of the north-western end of the pool feature at Kilcolman with muddy margins evident.



Close-up of *Chenopodium* vegetation at Kilcolman.

Site No. 2 – The Loughans

Grid ref.	S312634	Elevation (m)	130	Date of survey	19/09/2018
Designation	The Loughans SAC (Site Code 000407)			Geology	Limestone
Surveyors	Janice Fuller and John Conaghan				

Introduction

The Loughans is a turlough located c.4km east of Urlingford, Co. Kilkenny which occurs at the south-eastern edge of the turlough habitat range in Ireland. The turlough contains several small depressions or basins including one with a permanent pond, in the centre of the site. *Chenopodion* vegetation occurs along the western edge of this small muddy pond.

Vegetation

The vegetation growing on the mud surface at the Loughans is dominated by *Glyceria fluitans*, *Agrostis stolonifera* and *Oxybasis rubra* (*Chenopodium rubrum*). *Chenopodion* vegetation is poorly developed at this site as most of the good character species of the habitat, e.g. *Limosella aquatica* and *Rorippa islandica*, appear to be absent. The vegetation cover is sparse (<50%) and low growing (<5cm). The area is lightly grazed and poached by cattle. A full list of plant species associated with the habitat at this site is provided in Table 3 below.

Table 3 Species list for The Loughans.

<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)	<i>Riccia</i> sp.
<i>Apium inundatum</i>	<i>Urtica dioica</i>
<i>Persicaria maculosa</i>	<i>Chenopodium album</i>
<i>Glyceria fluitans</i>	<i>Agrostis stolonifera</i>
<i>Cirsium</i> sp.	<i>Eleocharis palustris</i>
<i>Sparganium erectum</i>	

Immediately adjacent to the *Chenopodion* vegetation is an area of wet grassland dominated by *Elytrigia repens* and *Mentha aquatica*. *Sparganium erectum*, *Eleocharis palustris*, *Potentilla anserina*, *Juncus effusus* and *Juncus acutiflorus* are also present. Another area of

mud surface adjacent to the main basin contains *Myosotis* sp., *Glyceria fluitans* and *Mentha aquatica*.

A separate small basin/depression to the east contains wetland vegetation but was not considered to be 'Chenopodion' vegetation. Species present included *Galium palustre*, *Potamogeton* sp., *Glyceria fluitans*, *Phalaris arundinacea*, *Juncus articulatus* and *Ranunculus flammula*.

Area of *Chenopodion* habitat

The very small area of *Chenopodion* habitat present is estimated to be c. 0.1ha.

Management and threats

The Loughans Turlough is managed by more than one landowner (Jimi Conroy pers. comm.). Much of it is managed for hay and then grazed lightly by cattle. The south-eastern margins of the turlough was more heavily grazed than the remainder of the turlough area however the current management regime poses no threat to the *Chenopodion* vegetation.



Distribution of *Chenopodion* vegetation at the Loughans.



A general view of the north-western edge of the permanent pond at the Loughans.



Close-up view of *Chenopodium* vegetation at the Loghauns, poached by cattle.

Site No. 4 – Rathbaun Turlough

Grid ref.	M345612	Elevation	30m	Date of survey	08/08/2018
Designation	Rathbaun Turlough pNHA (site code 000215)			Geology	Limestone
Surveyors	John Conaghan & Janice Fuller				

Introduction

Rathbaun turlough is a large turlough located on the Galway/Mayo border, 10 kilometres north-west of Tuam. The bed of the turlough is generally grassy with abundant *Carex nigra*, *Potentilla anserina* and *Ranunculus repens*. A small area of *Chenopodion* vegetation was recorded at the north-eastern part of the turlough where it is associated with a small, relatively shallow depression where water lies.

Vegetation

The *Chenopodion* vegetation at Rathbaun tends to be dominated by *Persicaria maculosa*, *Gnaphalium uliginosum*, *Oxybasis rubra* (*Chenopodium rubrum*) and *Agrostis stolonifera*. *Rorippa islandica* is also frequent in the vegetation. The vegetation is low-growing with a sward height of between 5 and 10 cm typical. In the quadrats recorded, the cover of bare mud is between 40 and 50%. A full list of plant species associated with the habitat is outlined in Table 4 below.

Table 4 Species list for *Chenopodion* habitat at Rathbaun.

<i>Agrostis stolonifera</i>	<i>Mentha aquatica</i>	<i>Polygonum aviculare</i>
<i>Capsella bursa-pastoris</i>	<i>Myosotis laxa</i>	<i>Potentilla anserina</i>
<i>Cirsium arvense</i>	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)	<i>Ranunculus repens</i>
<i>Galium palustre</i>	<i>Persicaria amphibium</i>	<i>Rorippa islandica</i>
<i>Gnaphalium uliginosum</i>	<i>Persicaria maculosa</i>	<i>Stellaria media</i>
<i>Matricaria discoidea</i>	<i>Plantago major</i>	

The small *Chenopodion*-dominated depression at Rathbaun is surrounded by turlough grassland/marsh vegetation. To the west and south the vegetation is relatively rank and species-poor with *Potentilla anserina*, *Persicaria maculosa* and *Molinia caerulea* the main

species dominating. To the east there is sloping ground with small areas of rock outcrop dominated by *Molinia* and *Potentilla anserina*.

Area of *Chenopodion* habitat

The area of *Chenopodion* habitat recorded at Rathbaun is very small at approximately 0.04 hectares. This is much smaller than the estimated area of the wet annual habitat (2.3 ha) noted in the early 1990s (Goodwillie, 1992). It is not obvious if there has been an actual decline in the area of wet annual vegetation since the early 1990s however the area appears to be heavily utilised for agriculture.

Management and threats

The small area of *Chenopodion* vegetation at Rathbaun is heavily grazed and trampled by cattle and is in poor condition. This heavy grazing and trampling results in a high cover of weedy species such as *Persicaria maculosa*, *Plantago major*, *Polygonum aviculare* and *Stellaria media*.

Reference

Goodwillie, R. (1992). *Turloughs over 10ha. Vegetation Survey and Evaluation*. Unpublished Report to the National Parks and Wildlife Service, Office of Public Works.



Distribution of *Chenopodium* habitat at Rathbaun.



View of the small muddy depression which contains *Chenopodium* vegetation at Rathbaun.



Close up view of heavily trampled *Chenopodium* vegetation at Rathbaun with a high cover of *Persicaria maculosa*.

Site No. 5 – Lough Croan

Grid reference	M877495	Elevation(m)	70	Date of survey	07/09/2018
Designation	Lough Croan SAC (Site Code 000610); Lough Croan SPA (Site Code 004139)			Geology	Limestone
Surveyors	Janice Fuller and John Conaghan				

Introduction

Lough Croan is a long narrow turlough c.8 kilometres south-east of Athleague, Co. Roscommon. From a vegetation/habitat point of view, it is a complex site that contains a varied mix of turlough, fen and reedswamp vegetation communities, as well as small areas of *Chenopodion* vegetation. *Chenopodion* vegetation is generally confined to small depressions scattered throughout the central and southern parts of the turlough basin.

Vegetation

The small areas of *Chenopodion* vegetation that occur tend to be characterised by *Oxybasis rubra* (*Chenopodium rubrum*), *Persicaria maculosa* and *Agrostis stolonifera*. *Rorippa* species are locally frequent however the rare *Rorippa islandica* was not positively identified at the site. In one of the depressions surveyed there was occasional *Hippuris vulgaris* growing. Most of the area is lightly grazed and poached by cattle. Vegetation cover is sparse and mostly low-growing (<5cm). A full list of plant species associated with the habitat at this site is provided in Table 5 overleaf.

Table 5 Species list for Lough Croan.

<i>Agrostis stolonifera</i>	<i>Glyceria</i> sp.	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)
<i>Apium inundatum</i>	<i>Hippuris vulgaris</i>	<i>Persicaria maculosa</i>
<i>Cardamine pratensis</i>	<i>Juncus bufonius</i>	<i>Rorippa</i> sp.
<i>Eleocharis palustris</i>	<i>Myriophyllum</i> sp.	<i>Urtica dioica</i>
<i>Epilobium</i> sp.	<i>Plantago major</i>	

Adjacent vegetation is quite variable. In places the small depressions adjoin reedswamp dominated by *Phragmites australis*, while wet grassland/marsh containing *Agrostis stolonifera*, *Eleocharis palustris*, *Filipendula ulmaria*, *Mentha aquatica*, *Juncus effusus* and *Potentilla anserina* is also a frequent adjoining vegetation type.

Area of *Chenopodion* habitat

The small patches of *Chenopodion* vegetation noted at Lough Croan only add up to c. 0.3 hectares. This is much smaller than the area of the “wet annuals” community (c. 4.5 ha) noted in the early 1990s (Goodwillie, 1992).

Management and threats

Most of the accessible areas of this he is lightly grazed by cattle. The current grazing regime does not pose a threat to the *Chenopodion* vegetation.

Reference

Goodwillie, R. (1992). *Turloughs over 10ha. Vegetation Survey and Evaluation*. Unpublished Report to the National Parks and Wildlife Service, Office of Public Works.



Distribution of *Chenopodium* habitat at Lough Croan



An example of *Chenopodium* vegetation growing in a small depression at Lough Croan.



Close-up view of *Chenopodium* vegetation at Lough Croan, lightly poached by cattle.

Site No. 6 – Lough Gash

Grid ref.	R 390677	Elevation	10m	Date of survey	14/08/2018
Designation	Lough Gash Turlough SAC (Site Code 000051)			Geology	Limestone
Surveyors	John Conaghan				

Introduction

Lough Gash is a medium-sized turlough (c. 22 hectares) which is located just west of Newmarket on Fergus in south Co. Clare. The geology of the area is dominated by limestone. The turlough is generally very slow to empty and, as a result, there is usually some shallow open water present even in late summer. A relatively large expanse of partly vegetated, open mud occurs in the bed of the turlough and usually this mud surface is too wet to access safely on foot. This late-emptying turlough site is one of the best known sites for *Chenopodion* vegetation in Ireland, with characteristic plant species such as *Oxybasis rubra* (*Chenopodium rubrum*), *Rorippa islandica*, *Alopecurus aequalis* and *Bidens tripartita* recorded in the past (Goodwillie 1992).

Vegetation

Lough Gash supports a good example of *Chenopodion* habitat with a good representation of characteristic plant species present. On the day of survey a large proportion in the centre and east of the turlough bed was dominated by bare mud with a sparse cover of *Oenanthe aquatica*, *Agrostis stolonifera* and *Bidens tripartita*. Occasional *Polygonum* plants were noted however it was not possible to identify the species due to the treacherous nature of the mud surface. Along the western margins of the turlough, to the west of the stone causeway, there is development of a firmer, marly mud surface which is dominated by varying proportions of *Oenanthe aquatica*, *Bidens tripartita*, *Rorippa islandica* and *Persicaria maculosa*. The vegetation is low-growing with a sward height of less than 5 cm typical and the cover of bare mud is generally between 30 and 60%. A full list of plant species associated with the habitat is outlined in Table 6 overleaf.

Table 6 Species list for *Chenopodion* vegetation at Lough Gash.

<i>Alopecurus aequalis</i>	<i>Mentha aquatica</i>	<i>Persicaria maculosa</i>
<i>Agrostis stolonifera</i>	<i>Oenanthe aquatica</i>	<i>Polygonum aviculare</i>
<i>Bidens tripartita</i>	<i>Oxybasis rubra (Chenopodium rubrum)</i>	<i>Potentilla anserina</i>
<i>Chenopodium album</i>	<i>Persicaria amphibia</i>	<i>Rorippa islandica</i>
<i>Eleocharis palustris</i>		

Much of the vegetation surrounding the central muddy areas at Lough Gash tend to be dominated by swamp vegetation with a high cover of *Eleocharis palustris* and *Oenanthe aquatica*.

Area of *Chenopodion* habitat

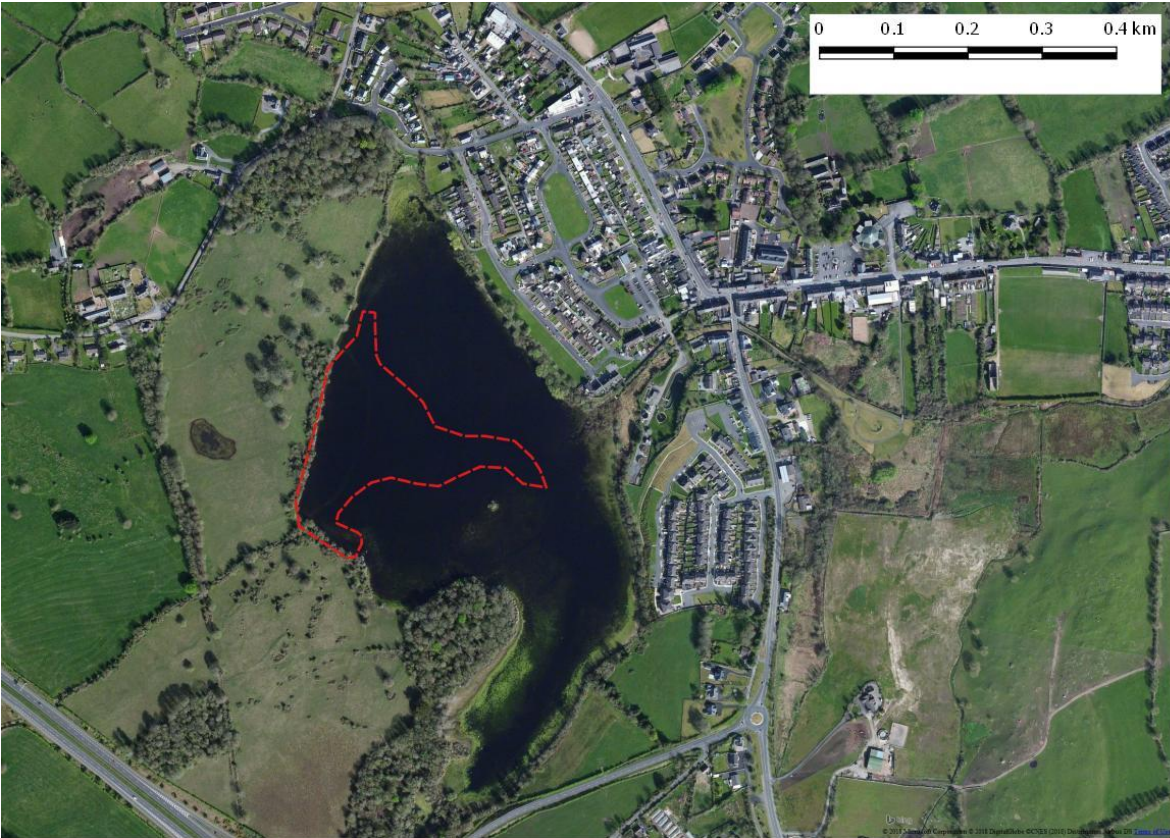
It is estimated that the area of mud surface with *Chenopodion* type vegetation at Lough Gash is approximately 3.9 hectares, although some of this area (c. 25%) includes unvegetated bare mud and shallow open water. It was not possible to accurately delimit the eastern margins of the area with GPS due to the very soft and treacherous nature of the mud surface at Lough Gash.

Management and threats

On the day of survey approximately 20 cattle were noted grazing in the northern half of the dry turlough bed. This has resulted in the poaching of firmer mud along the western margins of the turlough, however due to the very wet and soft nature of the mud in much of central area there was only occasional poaching by cattle. Treated waste water from the Newmarket on Fergus sewage treatment plant is discharged into Lough Gash however it is not clear what long term effects this discharge is having on the vegetation composition of the turlough itself.

Reference

Goodwillie, R. (1992). *Turloughs over 10ha. Vegetation Survey and Evaluation*. Unpublished Report to the National Parks and Wildlife Service, Office of Public Works.



Distribution of *Chenopodium* habitat at Lough Gash.



View of the recently exposed central muddy area at Lough Gash showing a sparse vegetation mainly dominated by *Agrostis stolonifera* and *Oenanthe aquatica*. *Polygonum* species also occur.



Vegetation dominated by *Persicaria maculosa* and *Agrostis stolonifera* with frequent *Rorippa islandica* along the western margins of the turlough floor at Lough Gash. Poaching by cattle is occasional in this part of the site.

Site No. 7 – Coole Lough

Grid ref.	M431042	Elevation (m)	10	Date of survey	05/07/2018
Designation	Coole-Garryland Complex SAC (Site code 0002520)			Geology	Limestone
Surveyors	Janice Fuller and John Conaghan				

Introduction

Coole Lough forms part of Coole Park and Nature Reserve, a popular natural amenity located 3km north-west of Gort, Co. Galway. Coole Lough is a large turlough which dries out most summers, but the extent of water that remains can vary greatly from year to year. The Coole River flows through the site. There was an extensive area of exposed mud present in the dry summer of 2018 with abundant *Chenopodium* habitat.

Vegetation

The majority (90%+) of the *Chenopodium* vegetation at Coole Lough is dominated by an open mud surface with abundant *Limosella aquatica* and *Riccia* sp. This vegetation is very sparse and low-growing (<2cm). *Callitriche palustris* and *Gnaphalium uliginosum* are also locally frequent in these relatively bare areas. At the northern end of the turlough there are also small areas with a high vegetation cover dominated by *Persicaria amphibia* and *Persicaria minor*, which have affinities to *Chenopodium* vegetation. Small patches of low swamp dominated by *Eleocharis palustris* and *Carex vesicaria* also occur. Vegetation in these areas is well-developed and relatively tall (20-30cm). A full list of plant species associated with the habitat at this site is provided in Table 7 below.

Table 7 Species list for Coole Lough.

<i>Bidens</i> sp.	<i>Persicaria amphibia</i>
<i>Callitriche palustris</i>	<i>Persicaria maculosa</i>
<i>Carex vesicaria</i>	<i>Persicaria minor</i>
<i>Eleocharis palustris</i>	<i>Riccia</i> sp.
<i>Gnaphalium uliginosum</i>	<i>Rorippa</i> sp.
<i>Limosella aquatica</i>	

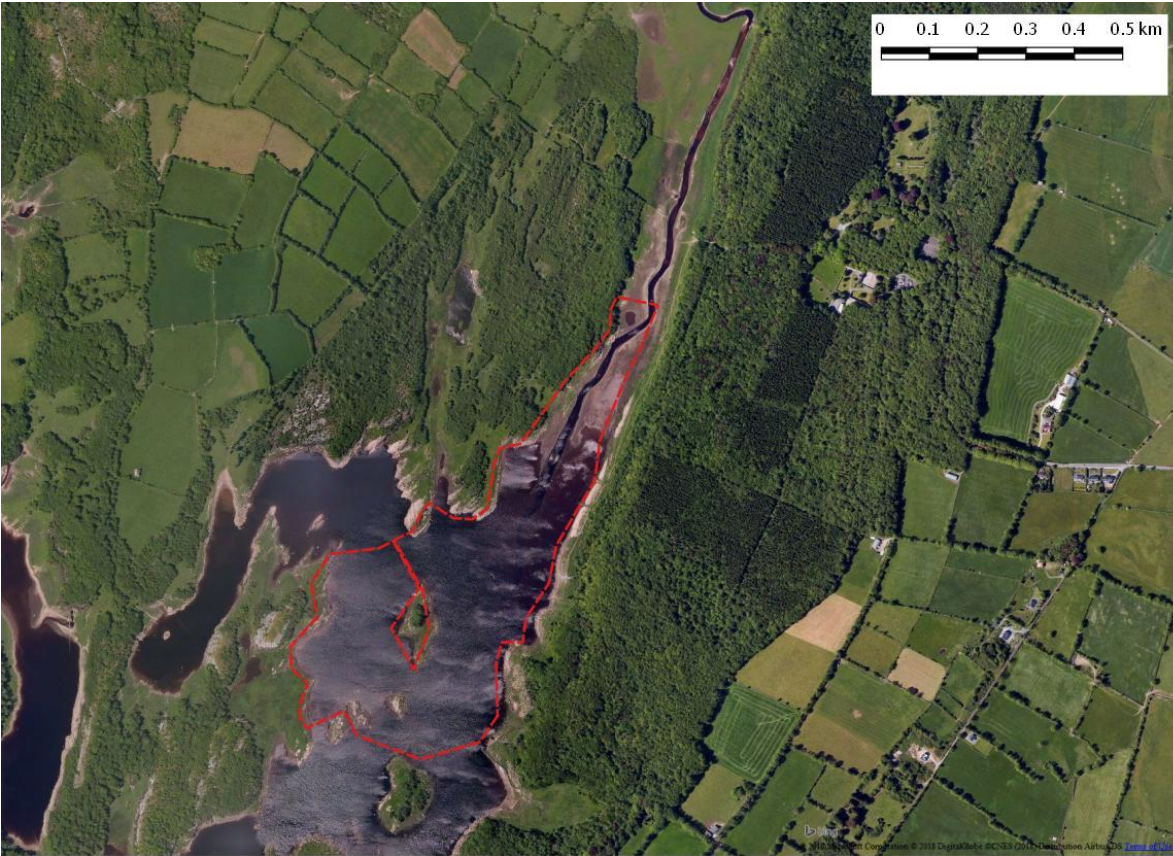
The vegetation in the adjoining areas tends to be dominated by species-rich marsh/grassland with *Filipendula ulmaria*, *Potentilla anserina*, *Carex flacca*, *Anthoxanthum odoratum*, *Galium boreale* and *Briza media*.

Area of *Chenopodium* habitat

An extensive area (c. 25 hectares) of *Chenopodium* vegetation was observed during the current survey due to the low lake levels following a dry summer. It should be noted that this area is only approximate as it is difficult to accurately delimit the extent of vegetated mud surface with sparse *Limosella aquatica*. It is possible that the area of the habitat is larger, perhaps as much as 40 hectares, if turlough basins to the west are included.

Management and threats

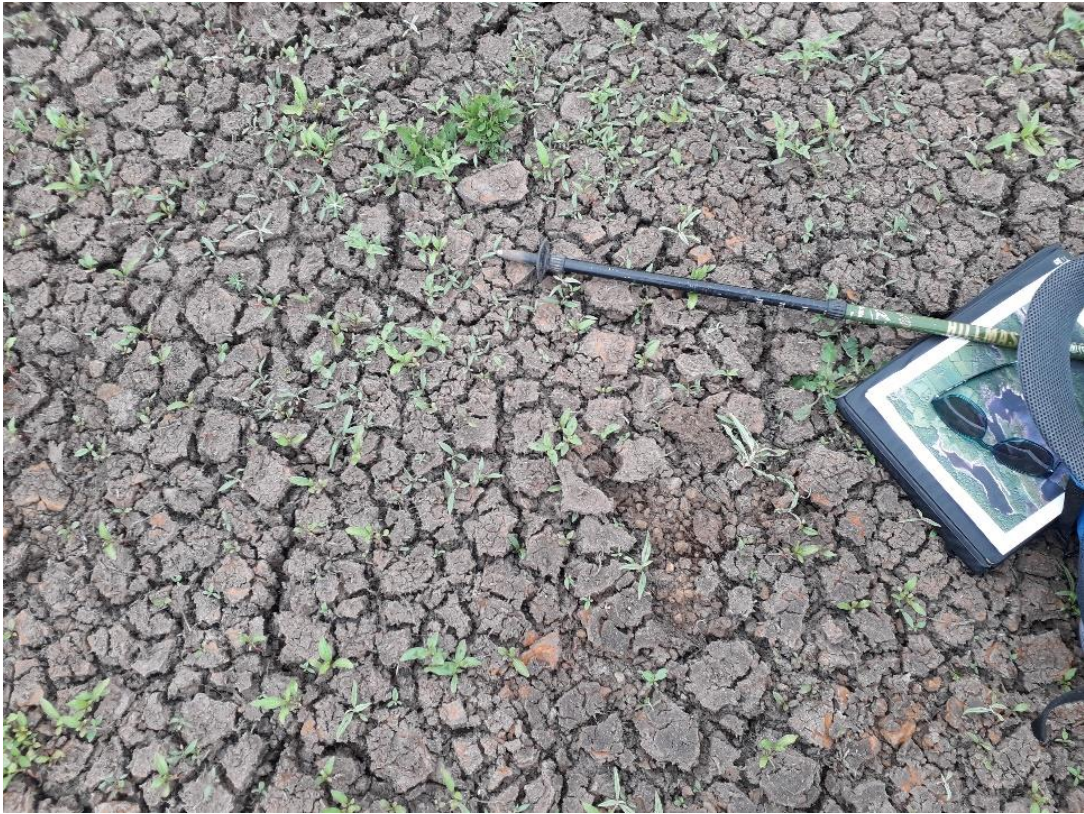
No grazing or poaching by livestock was noted within the survey area. Coole Lough lies within a State-owned Nature Reserve and is designated as an SAC and SPA. It therefore enjoys a high level of protection and no threats were noted.



Distribution of *Chenopodium* habitat at Coole Lough



View of extensive area of exposed mud at Coole Lough looking northwards



Close-up view of *Chenopodium* vegetation in quadrat 7A, Coole Lough.

Site No. 8 – The Gearagh, Annahala Bridge

Grid ref.	W332710	Elevation (m)	60	Date of survey	13/09/2018
Designation	The Gearagh SAC (Site Code 000108)			Geology	Sandstone
Surveyors	John Conaghan & Janice Fuller				

Introduction

The Gearagh, Annahala Bridge is located c. 1.5 km south-west of Macroom, Co. Cork. The site occurs east of Annahala Bridge and comprises a wide floodplain of the river Lee. To the east of the bridge the former river channel is dominated by open water with old stumps of dead trees which were clearfelled prior to the flooding of this section of the river Lee in the 1950s. *Chenopodium* vegetation grows on the extensive areas of bare silty mud present. On the day of survey the majority of the area east of the bridge was dominated by open water and it is not known if water levels were much lower earlier in the summer.

Vegetation

Chenopodium vegetation at this site is well developed to the east of Annahala Bridge and the composition and structure has been surveyed and described in the past (see White 1985). In the areas of exposed mud, *Limosella aquatica* is locally abundant and the species is generally accompanied by frequent *Juncus articulatus*. Other frequent species in the vegetation include *Persicaria maculosa*, *Juncus bufonius*, *Mentha aquatica*, *Rumex crispus*, *Gnaphalium uliginosum*, *Elatine hexandra*, *Lythrum portula* and *Cyperus eragrostis*. The vegetation is generally less than 10cm in height, however if *Juncus articulatus* is prominent the vegetation can be up to 30cm. The cover of bare mud and stone is generally between 10 and 50%. The vegetation recorded during this survey has a high cover of *Juncus articulatus* along the accessible western margins of the area. It must be noted however that the majority of the *Chenopodium* area was not accessible due to high water levels. A full list of plant species associated with the habitat at this site is provided in Table 8 overleaf.

Table 8 Species list for the Gearagh, Annahala Bridge.

<i>Agrostis stolonifera</i>	<i>Lythrum portula</i>
<i>Alisma plantago-aquatica</i>	<i>Lythrum salicaria</i>
<i>Callitriche</i> sp.	<i>Mentha aquatica</i>
<i>Cyperus eragrostis</i>	<i>Myosotis laxa</i>
<i>Elatine hexandra</i>	<i>Persicaria maculosa</i>
<i>Eleocharis palustris</i>	<i>Polygonum aviculare</i>
<i>Epilobium obscurum</i>	<i>Ranunculus flammula</i>
<i>Galium palustre</i>	<i>Ranunculus repens</i>
<i>Gnaphalium uliginosum</i>	<i>Rorippa palustris</i>
<i>Juncus articulatus</i>	<i>Rumex acetosa</i>
<i>Juncus bufonius</i>	<i>Rumex crispus</i>
<i>Juncus bulbosus</i>	<i>Salix cinerea</i> (seedling)
<i>Limosella aquatica</i>	<i>Sonchus oleraceus</i>
<i>Littorella uniflora</i>	<i>Typha latifolia</i>
	<i>Urtica dioica</i>

Most of the *Chenopodion* vegetation at this site is generally adjoined to the east by tall marsh/wet grassland vegetation dominated by either *Phalaris arundinacea* and/or *Juncus effusus*.

Area of *Chenopodion* habitat

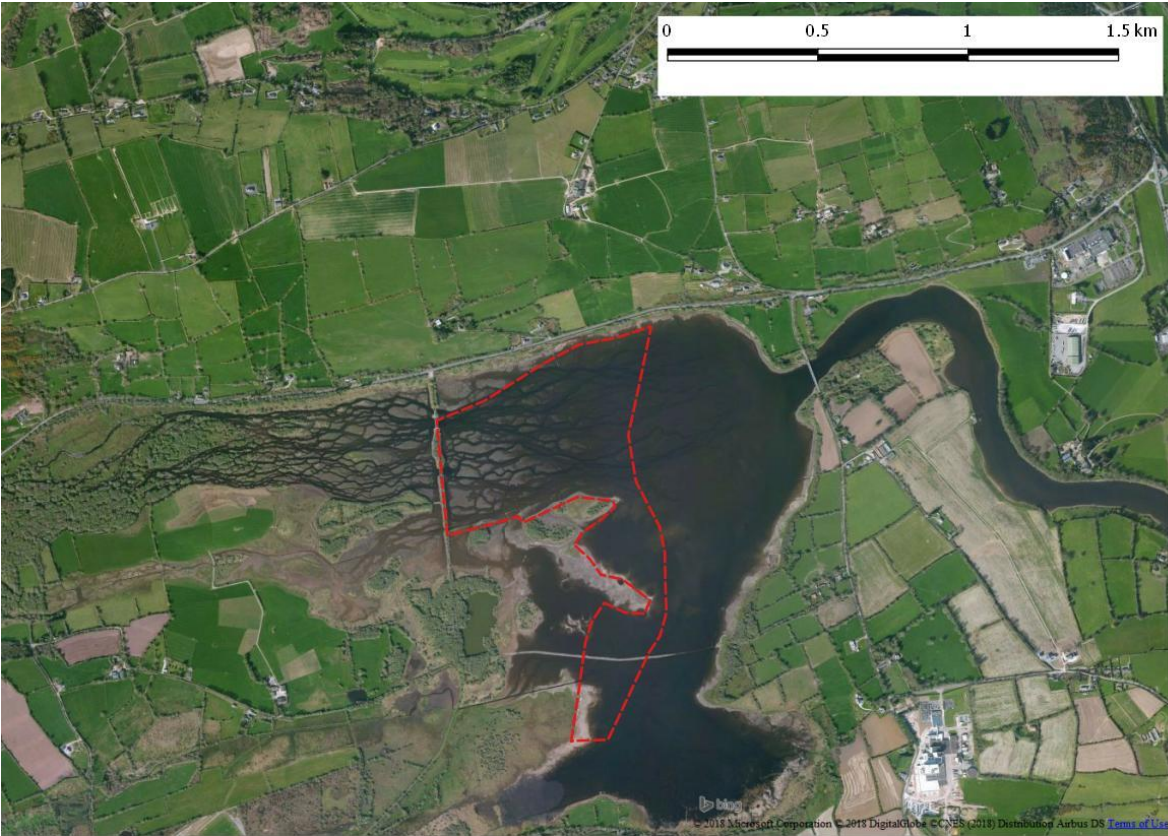
This site contains the largest areas of the habitat in Ireland. A conservative estimate of the *Chenopodion* habitat area at this site suggests that the habitat extends to at least 39 hectares however the area could be as large as 50 hectares. It must be noted however that it was impossible to delimit the eastern extent of the habitat due to the high water levels present on the day of survey. A further survey of habitat extent during a period of low summer water levels is recommended.

Management and threats

There is was no evidence of grazing or poaching by livestock seen during the survey. The alien wetland plant species *Cyperus eragrostis* appears to be relatively rare at this site however its' distribution should be monitored in the future. The extent of the habitat at this site is controlled by the water levels in this section of the Lee which are ultimately controlled by the ESB.

Reference

White, J. (1985). *Limosella aquatica* L. and the Vegetation of Exposed Mud at the Gearagh, Co. Cork (H3). *The Irish Naturalists' Journal*. **21** (12): 509-515.



Distribution of *Chenopodium* habitat at The Gearagh, Annahalla Bridge



A general view of the *Chenopodium* vegetation on muddy/stony ground east of Annahalla Bridge.



A close-up view of the typical *Chenopodion* vegetation encountered which has a high cover of *Juncus articulatus* and *Limosella aquatica*.

Site No. 9 – The Gearagh, near Knockaunnacrohy

Grid ref.	W384684	Elevation (m)	60	Date of survey	14/08/2018
Designation	None			Geology	Sandstone
Surveyors	Janice Fuller, John Conaghan				

Introduction

The Gearagh, near Knochaunnacrohy is a narrow bay of the River Lee where the Buingea River enters the Lee. The bay is cut off from the Lee to some extent by a bridge over the river (part of the N22). The site was inaccessible due to the steep banks on either side and the presence of dense briar scrub. It was surveyed with binoculars from the N22.

Vegetation

Chenopodium vegetation appears to occur on the site growing on very soft mud. Although the vegetation could not be surveyed in close detail, large quantities of *Limosella aquatica* could be easily seen with binoculars and the species was generally accompanied by sparse *Eleocharis palustris* and *Typha latifolia*. It was not possible to determine what species of *Persicaria* was growing however *Persicaria minor* has been noted from the site previously (NPWS records). A partial list of plant species associated with the habitat at this site is provided in Table 9 below.

Table 9 List of species at The Gearagh, Knockaunnacrohy.

<i>Limosella aquatica</i>	<i>Eleocharis palustris</i>
<i>Alisma plantago-aquatica</i>	<i>Persicaria</i> sp.
<i>Typha latifolia</i>	

Area of *Chenopodium* habitat

It was difficult to estimate the area of *Chenopodium* habitat due to access difficulties but from aerial photographs a conservative estimate suggests that approximately 1.3 hectares of the habitat occurs.

Management and threats

There is no active management of the area and no obvious threats to the site were noted. The site is not accessible to grazing animals.



Distribution of *Chenopodium* habitat at the Gearagh, near Knockaunnacrohy.



View of the site from the N22 looking south-eastwards, showing sparsely vegetated soft mud.

Site No. 11 – The Gearagh, Picnic site, South Hartnett’s Cross

Grid ref.	W357710	Elevation (m)	60	Date of survey	14/08/2018
Designation	None			Geology	Sandstone
Surveyors	Janice Fuller and John Conaghan				

Introduction

The Gearagh, Picnic Site is located c.2 kilometres south-east of Macroom, Co. Cork. The site occurs close to where the Sullane River meets the River Lee. On the day of survey there was an extensive area of exposed, flat, stony/muddy riverbank at the site and in the wider area. Chenopodion vegetation occurs across the site and possibly occurs on adjacent muddy riverbanks north of the site (where the Sullane and Laney Rivers meet) however these areas were not surveyed due to access difficulties.

Vegetation

Vegetation at the Gearagh, Picnic Site is quite variable, but is generally dominated by varying proportions of *Cyperus eragrostis*, *Rorippa palustris*, *Juncus articulatus* and *Limosella aquatica*. *Limosella* is locally abundant both on muddy and stony areas. *Callitriche* was recorded but it was not possible to identify to species level due to the absence of fruit. The vegetation is generally low growing (<5cm) and the cover of bare mud and stone is generally greater than 50%. Cattle are present in the area and there is some light poaching and grazing. A full list of plant species associated with the habitat at this site is provided in Table 10 overleaf.

Table 10 Species list for the Gearagh, Picnic Site, South of Hartnett's Cross.

<i>Agrostis stolonifera</i>	<i>Persicaria hydropiper</i>
<i>Alisma plantago-aquatica</i>	<i>Persicaria maculosa</i>
<i>Callitriche</i> sp.	<i>Phalaris arundinacea</i>
<i>Cardamine pratensis</i>	<i>Plantago major</i>
<i>Cyperus eragrostis</i>	<i>Polygonum aviculare</i>
<i>Elatine hexandra</i>	<i>Ranunculus repens</i>
<i>Epilobium</i> sp.	<i>Rorippa palustris</i>
<i>Galium palustre</i>	<i>Rumex crispus</i>
<i>Gnaphalium uliginosum</i>	<i>Rumex obtusifolius</i>
<i>Juncus articulatus</i>	<i>Rumex acetosa</i>
<i>Juncus bufonius</i>	<i>Salix cinerea</i> (seedling)
<i>Juncus tenuis</i>	<i>Sonchus asper</i>
<i>Limosella aquatica</i>	<i>Taraxacum officinale</i> agg.
<i>Littorella uniflora</i>	<i>Typha latifolia</i>
<i>Myosotis laxa</i>	<i>Urtica dioica</i>

The adjoining vegetation in the surrounding area consists mainly of wet grassland with some reed swamp and willow scrub. The adjoining wet grassland is dominated by *Juncus effusus* with *Agrostis stolonifera*, *Rumex crispus*, *Dactylis glomerata* and *Lythrum salicaria*. The reedswamp is composed mainly of *Phalaris arundinacea* and *Typha latifolia*.

Area of Chenopodion habitat

It is estimated that the area of the habitat at The Gearagh, Picnic Site is approximately 2.3 hectares but there is additional potential adjacent habitat upstream of the site.

Management and threats

The area in which the habitat occurs at the Gearagh, Picnic Site is lightly grazed and poached by cattle which does not currently pose a major threat. The alien species *Cyperus eragrostis* is abundant and widespread in the vegetation and poses a significant threat if the spread of the species continues. Monitoring of the species at this site is recommended. There appears to have been some recent clearance of wet willow woodland adjacent (north of) to the site and erection of fencing, which could pose a threat to the site if continued or extended.

Reference

O'Mahony, T. (2002) A report on the flora of Cork (v.cc. H3–H5), 2001. *Irish Botanical News* 12: 27–35.



Distribution of *Chenopodium* habitat at the Gearagh, Picnic site, South of Hartnetts Cross.



View north-eastwards showing the expanse of *Chenopodium* vegetation at the site.



Close-up view of *Chenopodium* vegetation at The Gearagh, Picnic Site. Note the stony nature of the substrate in this area.

Site No. 12 – The Gearagh, Rooves Bridge, Co. Cork

Grid ref	W45857150	Elevation	45m	Date of survey	13/08/2018
Designation	None			Geology	Sandstone
Surveyors	John Conaghan & Janice Fuller				

Introduction

At the survey area east of Rooves Bridge *Chenopodium* vegetation occurs as a long (c. 450m) and narrow (5 to 10m) strip on the southern banks of the River Lee. The substrate is generally stony with a shallow cover of alluvial mud in places. The geology of the area is dominated by sandstone. The presence of *Chenopodium* habitat at this site was inferred by the presence of *Limosella aquatica*, which was first recorded at this location by Tony O' Mahony (O'Mahony, 2005), and other characteristic species of the habitat such as *Oxybasis rubra* (*Chenopodium rubrum*) and *Persicaria minor*.

Vegetation

The *Chenopodium* vegetation at Rooves bridge is very well developed. Vegetation is generally dominated by *Limosella aquatica* and *Littorella uniflora* with frequent *Rorippa palustris*, *Cardamine flexuosa* and *Gnaphalium uliginosum*. *Limosella* is locally abundant at this site with many thousands of plants observed growing on the cracked mud surfaces on the day of survey. The locally rare aquatic species *Elatine hexandra* is also frequent in muddy areas. The *Chenopodium* vegetation is low-growing with a sward height of less than 5 cm typical. In the quadrats recorded, the cover of bare mud/stone is generally between 30 and 60%. A full list of plant species associated with the habitat is outlined in Table 11 below.

Table 11 Species list for Rooves Bridge.

<i>Agrostis stolonifera</i>	<i>Gnaphalium uliginosum</i>	<i>Phalaris arundinacea</i>
<i>Alisma plantago aquatica</i>	<i>Hypochoeris radicata</i>	<i>Plantago major</i>
<i>Cardamine flexuosa</i>	<i>Limosella aquatica</i>	<i>Polygonum aviculare</i>
<i>Cirsium</i> sp.	<i>Littorella uniflora</i>	<i>Rorippa palustris</i>
<i>Eleocharis palustris</i>	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)	<i>Sonchus arvensis</i>
<i>Epilobium</i> sp.	<i>Persicaria maculosa</i>	

The vegetation in areas immediately south of the *Chenopodium* vegetation at Rooves Bridge comprises a narrow zone of tall wet grassland vegetation dominated by *Phalaris arundinacea* and *Juncus effusus*.

Area of *Chenopodium* habitat

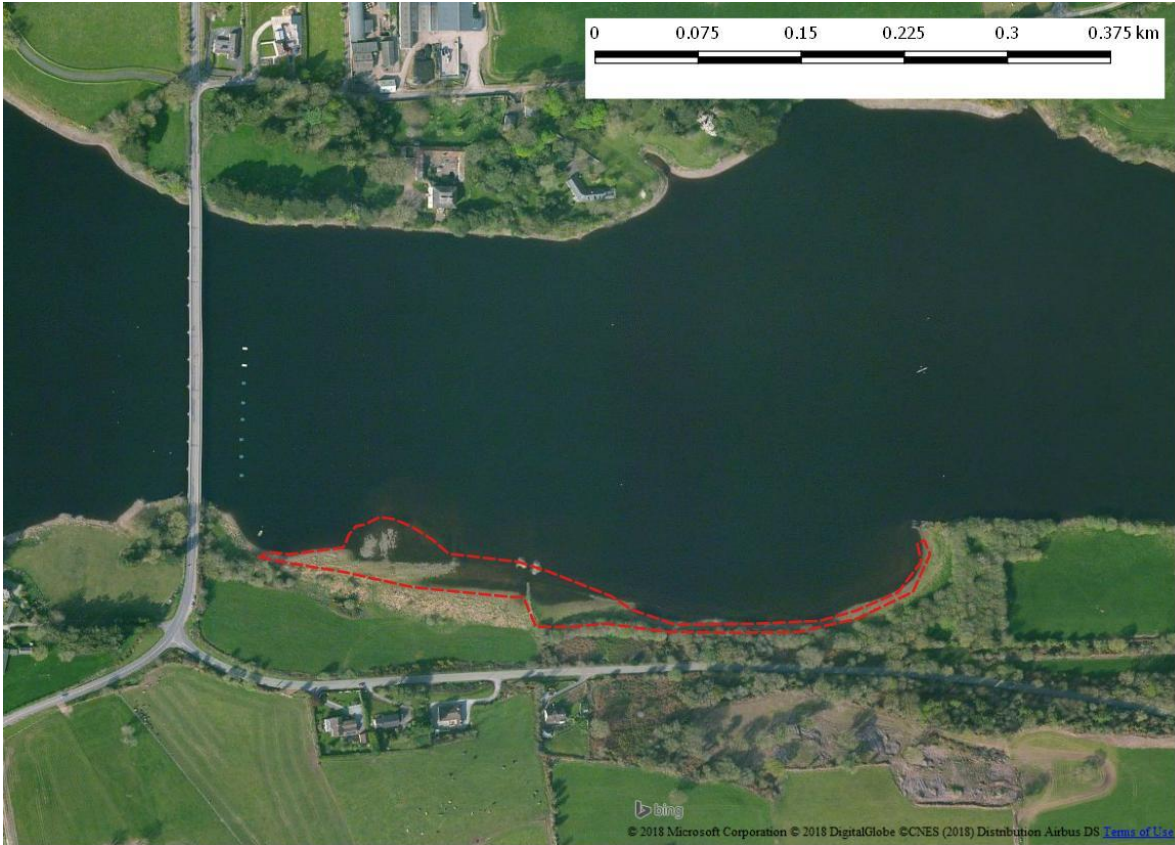
It is estimated that the area of the habitat east of Rooves Bridge is approximately 0.9 hectares although this could be larger depending on the water levels from year to year.

Management and threats

The *Chenopodium* habitat at Rooves bridge is currently in good condition. On the day of survey there was some evidence of slight poaching and grazing by cattle however there was no significant damage to the soil or vegetation observed. The future prospects of the habitat at this location is also dependent, to some degree, on the management of water levels in the river Lee by the ESB.

Reference

O'Mahony, T. (2005) A report on the flora of Cork (v.cc. H3–H5), 2004. *Irish Botanical News* **15**: 29–38.



Distribution of *Chenopodium* habitat at the Gearagh, Rooves Bridge.



View of low-growing *Chenopodium* vegetation along the southern banks of the River Lee, east of Rooves Bridge, looking in an easterly direction.



Abundant *Limosella aquatica* growing on mud east of Rooves Bridge.

Site No. 13 – The Gearagh, Amenity Boating Area

Grid ref.	W519727	Elevation (m)	55	Date of survey	13/08/2018
Designation	None			Geology	Sandstone
Surveyors	Janice Fuller and John Conaghan				

Introduction

The Gearagh, Amenity Boating Area occurs c. 3.5km east of Drispey village, Co. Cork. The site is dominated by a wide, elevated stony river bar that extends out into the River Lee (c. 1.5ha in area). Well-developed *Chenopodium* vegetation occurs mainly in the western half of the stony bank and is very sparse in the eastern half. It must be noted however that this vegetation cover may vary from year to year depending on the amount of the bank that is exposed and the duration of exposure.

Vegetation

Chenopodium vegetation at the Amenity Boating Area occurs on a stony bank with a thin cover of alluvial mud in places. The vegetation is typically sparse with *Rorippa* cf. *palustris*, *Limosella aquatica* and *Littorella uniflora* generally conspicuous. *Gnaphalium uliginosum* and *Oxybasis rubra* (*Chenopodium rubrum*) are also locally common. The vegetation is sparse and low growing (<5cm) with the cover of bare stone/mud generally greater than 80%. A full list of plant species associated with the habitat at this site is provided in Table 12 below.

Table 12 Species list for The Gearagh, Amenity Boating Area.

<i>Agrostis stolonifera</i>	<i>Littorella uniflora</i>	<i>Plantago major</i>
<i>Cyperus eragrostis</i>	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)	<i>Polygonum aviculare</i>
<i>Eleocharis palustris</i>	<i>Persicaria maculosa</i>	<i>Rorippa palustris</i>
<i>Epilobium</i> sp.	<i>Persicaria minor</i>	<i>Rumex obtusifolius</i>
<i>Gnaphalium uliginosum</i>	<i>Phalaris arundinacea</i>	<i>Sonchus oleraceus</i>
<i>Limosella aquatica</i>		

The vegetation in the adjoining area, along the riverbank to the north, is mainly composed of wet/semi-improved grassland with *Lolium perenne*, *Juncus effusus*, *Plantago lanceolata*,

Taraxacum officinale agg., *Bellis perennis*, *Rumex crispus*, *Trifolium repens*, *Ranunculus repens* and *Centaurea nigra*. The alien species *Cyperus eragrostis* is locally frequent with occasional low bushes *Salix cinerea* subsp. *oleifolia*.

Area of *Chenopodium* habitat

It is estimated that the area of the habitat at the Gearagh, Amenity Boating Area is relatively small at approximately 1.1 hectares.

Management and threats

The area in which the habitat occurs at the Amenity Boating Area is used by a local sailing club. There was little evidence of disturbance of the river bar but there was one set of tracks that were presumably created by a boat and trailer. The alien species *Cyperus eragrostis* is abundant on the nearby shoreline and there were a few plants noted on the river bar itself. This species could potentially pose a threat if it continues to expand.

Reference

O'Mahony, T. (2002) A report on the flora of Cork (v.cc. H3–H5), 2001. *Irish Botanical News* 12: 27–35.



Distribution of *Chenopodium* habitat at the Gearagh, Amenity Boating Area.



View of site looking eastwards with the relatively stony substrate and abundant *Limosella* and *Gnaphalium uliginosum*



Close-up view of *Chenopodium* vegetation. Note the very stony nature of the substrate.

Site No. 15 – Blackrock/Peterswell- Bullanagh (Turloughnacloghdoe)

Grid ref.	M499080	Elevation (m)	25	Date of survey	01/08/2018
Designation	Peterswell Turlough SAC (Site code 000318)			Geology	Limestone
Surveyors	Janice Fuller and John Conaghan				

Introduction

Peterswell Turlough is located c. 8km north-east of Gort, Co. Galway. The turlough was empty of water on the day of survey and dries out every year (Justin Flannery pers. comm.). *Chenopodium* vegetation appears to be confined to the south-eastern corner of the basin where there is exposed mud, much of which was heavily poached by cattle. Another obvious patch of bare ground to the north-west, with a relatively sandy and dry substrate, did not support *Chenopodium* vegetation.

Vegetation

The *Chenopodium* vegetation on the site was dominated by *Polygonum aviculare*, *Persicaria maculosa* and *Oxybasis rubra* (*Chenopodium rubrum*). *Eleocharis palustris* dominates in patches and *Rorippa islandica* is common. *Limosella aquatica* is abundant in the southern end of the *Chenopodium* area and the rare *Callitriche palustris* is also occasional in this area. Although a number of characteristic species of the habitat occur the vegetation is heavily poached by cattle and is very sparse in some areas. It is generally low growing (<10cm). A full list of plant species associated with the habitat at this site is provided in Table 13 overleaf.

Table 13 Species list for Peterswell Turlough.

<i>Agrostis stolonifera</i>	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)
<i>Callitriche palustris</i>	<i>Persicaria maculosa</i>
<i>Capsella bursa-pastoris</i>	<i>Plantago lanceolata</i>
<i>Cirsium arvense</i>	<i>Plantago major</i>
<i>Cirsium vulgare</i>	<i>Polygonum aviculare</i>
<i>Eleocharis palustris</i>	<i>Potentilla anserina</i>
<i>Equisetum arvense</i>	<i>Rorippa islandica</i>
<i>Gnaphalium uliginosum</i>	<i>Rumex crispus</i>
<i>Juncus bufonius</i>	<i>Salix cinerea</i>
<i>Limosella aquatica</i>	<i>Sonchus asper</i>
<i>Nasturtium officinale</i>	

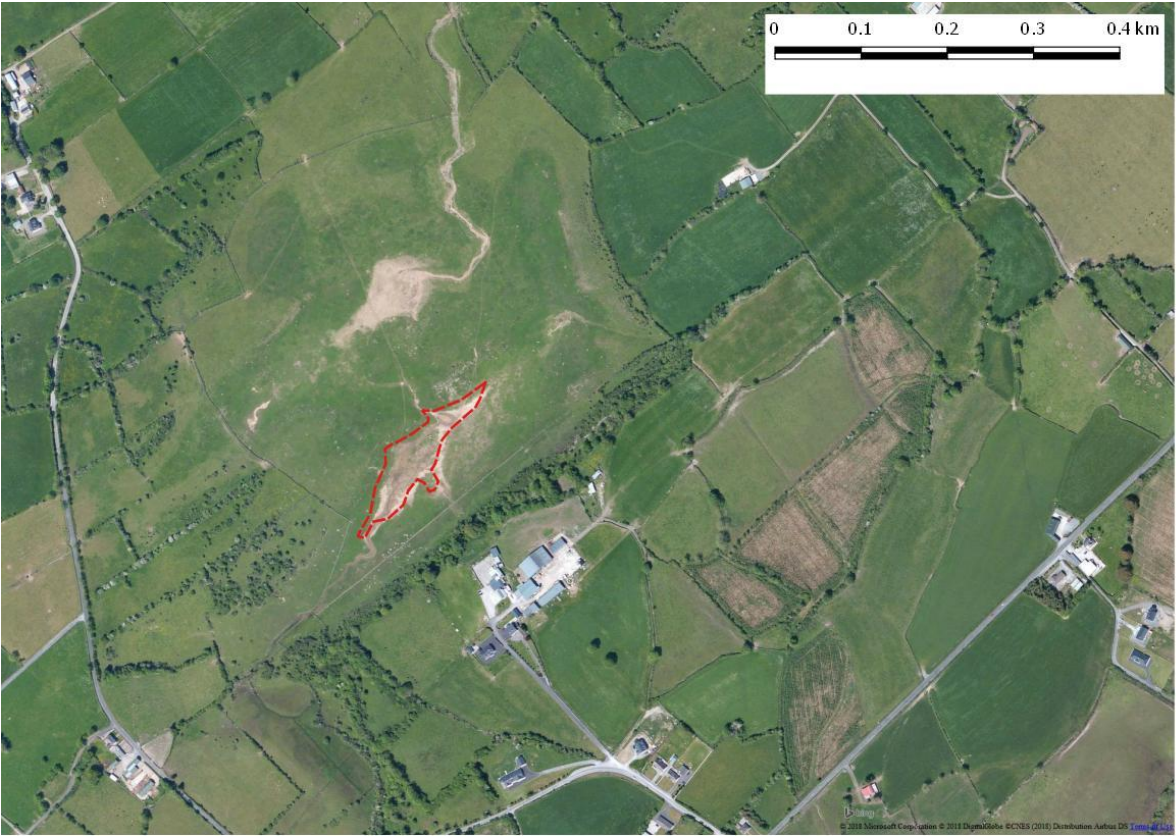
The vegetation in the surrounding area consists mainly of heavily grazed turlough grassland with abundant *Potentilla anserina*. Weedy species such as *Rumex crispus*, *Persicaria maculosa* and *Persicaria aviculare* are also present.

Area of *Chenopodium* habitat

It is estimated that the area of the habitat in Peterswell Turlough is 0.6 hectares.

Management and threats

Peterswell Turlough is managed as a commonage and was heavily grazed and poached by cattle at the time of survey. As a result of this heavy poaching the vegetation has a high cover of 'weedy' species such as *Persicaria maculosa* and *Polygonum aviculare*. The current high level of grazing and poaching poses a threat to the *Chenopodium* habitat at the site.



Distribution of *Chenopodium* habitat at Peterswell turlough.



General view of Peterswell Turlough basin from higher ground looking southwards. *Chenopodium* vegetation occurs in the dark, muddy area in the middle of the photograph.



Close-up view of *Chenopodium* vegetation at Peterswell Turlough occurring on heavily poached mud.

Site No. 17 – Garryland turlough, Co. Galway

Grid ref.	M415040	Elevation	10m	Date of survey	26/06/2018
Designation	Coole - Garryland Complex SAC (Site Code 000252)			Geology	Limestone
Surveyors	John Conaghan & Janice Fuller				

Introduction

Garryland turlough is located approximately 800 metres west of Coole Lough in South, Co. Galway. Two basins occur within the site, a large western basin and a smaller eastern basin and these are separated by a low, partially wooded, mineral ridge. The turlough area is completely surrounded by tall deciduous woodland dominated by ash and beech. On the day of survey the western basin was almost completely dry while a large pond of shallow water dominates the eastern basin. Most of the *Chenopodion* vegetation within the site occurs in the larger western basin.

Vegetation

Chenopodion vegetation at Garryland turlough is characterised by a dominance of the low growing rush *Eleocharis acicularis*. This species has very fine, thread-like stems and the widespread occurrence of the species is a particular feature of this turlough. The cover of *Eleocharis acicularis* generally exceeds 50% and the associated vegetation is quite species-poor. Additional species generally have a low cover and include *Limosella aquatica*, *Eleocharis palustris*, *Agrostis stolonifera*, *Alisma plantago-aquatica*, *Potentilla anserina*, *Lythrum portula* and *Persicaria minor*. The rare species *Callitriche palustris* and *Rorippa islandica* are also occasional in the vegetation. In the western basin the *Chenopodion* vegetation occurs in a complex mosaic with *Carex nigra*-*Potentilla anserina* wet grassland. In the eastern basin of the turlough *Chenopodion* vegetation occurs as a long and narrow band (<5 metres wide) along the eastern shore of the large pond.

The *Chenopodion* vegetation at Garryland is less than 5 cm in height and cover bare mud is generally between 20 and 40%. A full list of plant species associated with the habitat is outlined in Table 14 overleaf.

Table 14 Species list for *Chenopodion* vegetation at Garryland turlough.

<i>Agrostis stolonifera</i>	<i>Lythrum portula</i>
<i>Callitriche palustris</i>	<i>Persicaria maculosa</i>
<i>Eleocharis acicularis</i>	<i>Persicaria minor</i>
<i>Eleocharis palustris</i>	<i>Potentilla anserina</i>
<i>Fontinalis antipyretica</i>	<i>Rorippa islandica</i>
<i>Gnaphalium uliginosum</i>	<i>Rumex crispus</i>
<i>Limosella aquatica</i>	

The main vegetation type adjoining areas of bare mud at Garryland is *Carex nigra*-*Potentilla anserina* wet grassland which dominates the adjoining stony, mineral soil. In the western basin there are occasional wet channels running through the area which are dominated by *Eleocharis palustris* swamp.

Area of *Chenopodion* habitat

It is estimated that the area of *Chenopodion* habitat in the western basin of Garryland covers approximately 3 hectares in extent, although c.40% of this area is dominated by *Carex-Potentilla* wet grassland. Approximately 0.4 hectares of *Chenopodion* vegetation, dominated by *Eleocharis acicularis*, occurs as a long strip in the eastern basin of the turlough.

Management and threats

In June 2018 Garryland turlough was heavily grazed and poached by cattle and horses with poaching particularly intensive in the western basin. It is evident that the current levels of grazing observed at Garryland are high and continuing high levels of trampling is a significant threat to the habitat/vegetation.



Distribution of *Chenopodium* habitat at Garryland turlough.



General view of the heavily poached western turlough basin at Garryland, dominated by the low-growing *Eleocharis acicularis*.



Close-up view of vegetation dominated by *Eleocharis acicularis* at Garryland turlough.

Site No. 18 – Caherglassaun turlough, Co. Galway

Grid ref.	M410059	Elevation	10m	Date of survey	19/07/2018
Designation	Caherglassaun Turlough SAC (Site Code 000238)			Geology	Limestone
Surveyors	John Conaghan & Janice Fuller				

Introduction

Caherglassaun turlough is a relatively long and large turlough which lies to the west of Coole/Garryland turlough Complex in south, Co. Galway to which it is hydrologically linked. The floor of the turlough occupies a linear depression which measures approximately 850 metres long by 150 metres wide and is surrounded by higher ground on all sides. The majority of the adjoining land along the eastern, southern and northern shores is dominated by agricultural grassland with hazel scrub on limestone pavement dominating the land to the west. During the very dry summer of 2018 the northern two-thirds of the turlough basin was dominated by open water with the southern third of the turlough floor dominated by recently exposed mud.

Vegetation

Caherglassaun supports a well-developed example of *Chenopodion* habitat which is characterised by a good range of the characteristic plant species. At the site *Chenopodion* vegetation is largely restricted to the southern third of the turlough basin where a muddy surface is exposed most years. Here the vegetation typically supports varying mixtures of *Limosella aquatica*, *Rorippa* spp., *Persicaria maculosa*, *Eleocharis palustris*, *Oxybasis rubra* (*Chenopodium rubrum*), *Gnaphalium uliginosum* and *Agrostis stolonifera*. The rare species *Callitriche palustris*, *Rorippa islandica* and *Eleocharis acicularis* are also found growing occasionally in this vegetation. A narrow band of *Chenopodion* vegetation, characterised by the growth of *Limosella*, also occurs at the margins of open water along the north-eastern shore of the turlough.

The *Chenopodion* vegetation at Caherglassaun is typically low-growing with a sward height of less than 5 cm typical. In the quadrats recorded the cover of cracked, bare mud is generally greater than 90%. A full list of plant species associated with the habitat is outlined in Table 15 overleaf.

Table 15 Species list for *Chenopodium* vegetation at Caherglassaun turlough.

<i>Agrostis stolonifera</i>	<i>Oxybasis rubra</i> (<i>Chenopodium rubrum</i>)
<i>Callitriche palustris</i>	<i>Persicaria minor</i>
<i>Eleocharis acicularis</i>	<i>Persicaria maculosa</i>
<i>Eleocharis palustris</i>	<i>Polygonum aviculare</i>
<i>Gnaphalium uliginosum</i>	<i>Potentilla anserina</i>
<i>Juncus bufonius</i>	<i>Ricca</i> sp.
<i>Limosella aquatica</i>	<i>Rorippa islandica</i>
<i>Lythrum portula</i>	<i>Rumex crispus</i>

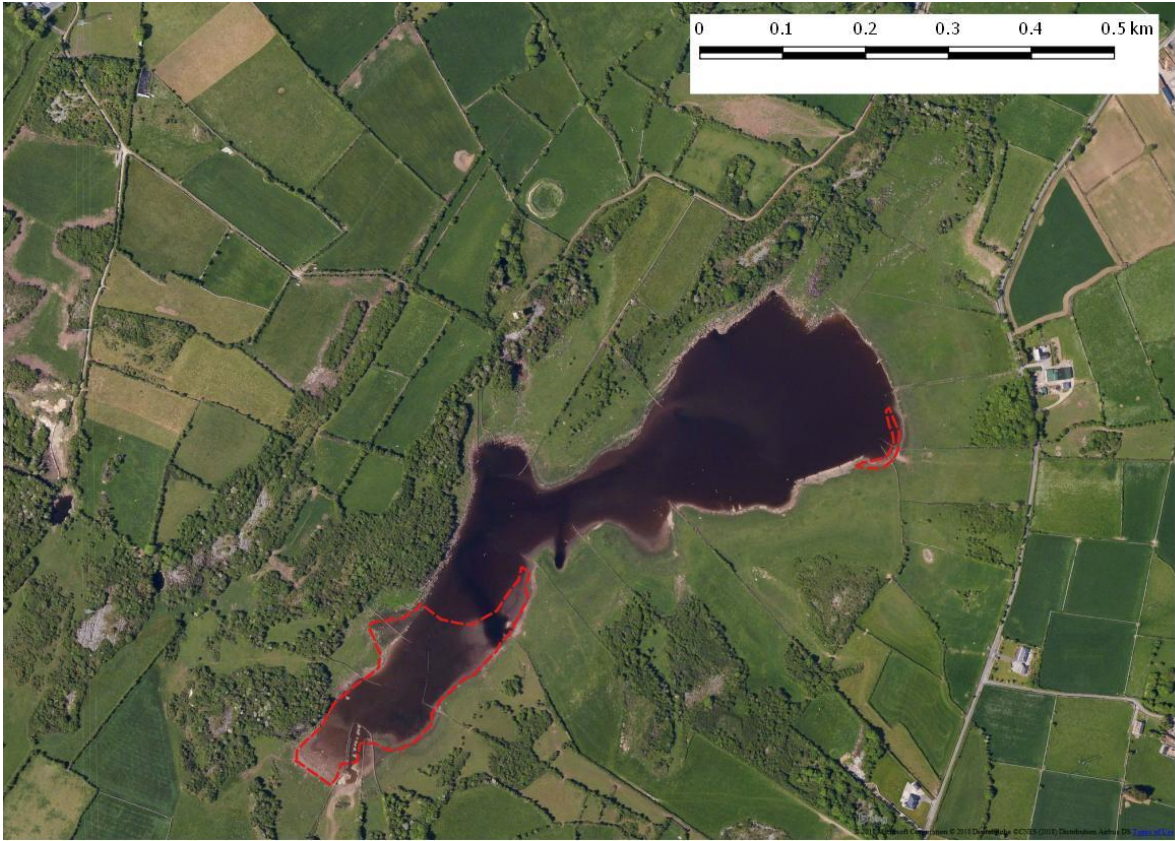
The main vegetation type adjoining areas of bare mud at Caherglassan is low-growing *Eleocharis palustris* swamp/marsh which then grades into the typical *Carex/Potentilla anserina* grassland on the adjoining stony, mineral soil.

Area of *Chenopodium* habitat

It is estimated that the main area of *Chenopodium* habitat at Caherglassaun covers approximately 2.5 hectares although a small proportion of this area (c. 10%) does include areas of low *Eleocharis palustris* swamp. The narrow band of *Chenopodium* vegetation at the north-eastern end of the turlough is less than 0.1 hectares in extent.

Management and threats

On the day of survey cattle grazing and poaching was very heavy on the exposed mud surfaces at the southern end of Caherglassaun. The soil was most severely churned up along the western margins of the turlough bed (see Photograph). Whilst a low level of soil disturbance is not necessarily damaging for *Chenopodium* vegetation the poaching levels observed at Caherglassaun are thought to be excessive.



Distribution of *Chenopodium* habitat at Caherglassaun.



A general view of the southern end of Caherglassaun turlough, looking in an easterly direction, with heavily poached and dried out mud visible in the foreground.



Typical sparse vegetation on cracked mud at Caherglassaun with *Limosella aquatica* and *Callitriche palustris* visible.

Site No. 19 – Hawkhill turlough, Co. Galway

Grid ref.	M41190236	Elevation	15m	Date of survey	25/06/2018
Designation	Coole-Garryland Complex SAC (Site Code 000252)			Geology	Limestone
Surveyors	John Conaghan & Janice Fuller				

Introduction

Hawkhill turlough is a small turlough which lies to the south-east of Coole Park in south, Co. Galway and forms part of the hydrologically linked Coole-Garryland turlough complex. The turlough occupies a depression which is surrounded by higher ground on all sides. Most of the surrounding land is dominated by agricultural grassland with limestone pavement/hazel scrub adjoining to the north. Most the turlough area itself is dominated by species-poor *Eleocharis palustris* swamp which surrounds a small oval area of open mud/marl surface, c. 20 metres in width. On the day of survey there was a very shallow, i.e. <5cm, depth of standing water present and the area of exposed mud was too wet to walk on.

Vegetation

At Hawkhill the identification of clear *Chenopodium* vegetation is difficult due to the widespread occurrence of *Eleocharis palustris* swamp. The central area of open mud surface had no associated vegetation on the day of survey. A narrow zone of *Chenopodium* vegetation occurs in a somewhat indistinct band along the north-eastern shore of the turlough. Here the vegetation is dominated by *Galium palustre* and *Rorippa islandica* with occasional *Eleocharis palustris*, *Potentilla anserina* and *Alisma plantago-aquatica*. The locally rare *Eleocharis acicularis* also occurs sparingly in the vegetation.

The *Chenopodium* vegetation at Hawkhill is low-growing with a sward height of less than 5 cm typical. The cover of bare soil is generally around 10% with outcropping limestone rock occasional. A full list of plant species associated with the habitat is outlined in Table 16 below.

Table 16 Species list for *Chenopodium* vegetation at Hawkhill turlough.

<i>Agrostis stolonifera</i>	<i>Carex vesicaria</i>	<i>Galium palustre</i>
<i>Alisma plantago aquatica</i>	<i>Eleocharis acicularis</i>	<i>Potentilla anserina</i>
<i>Carex nigra</i>	<i>Eleocharis palustris</i>	<i>Rorippa islandica</i>

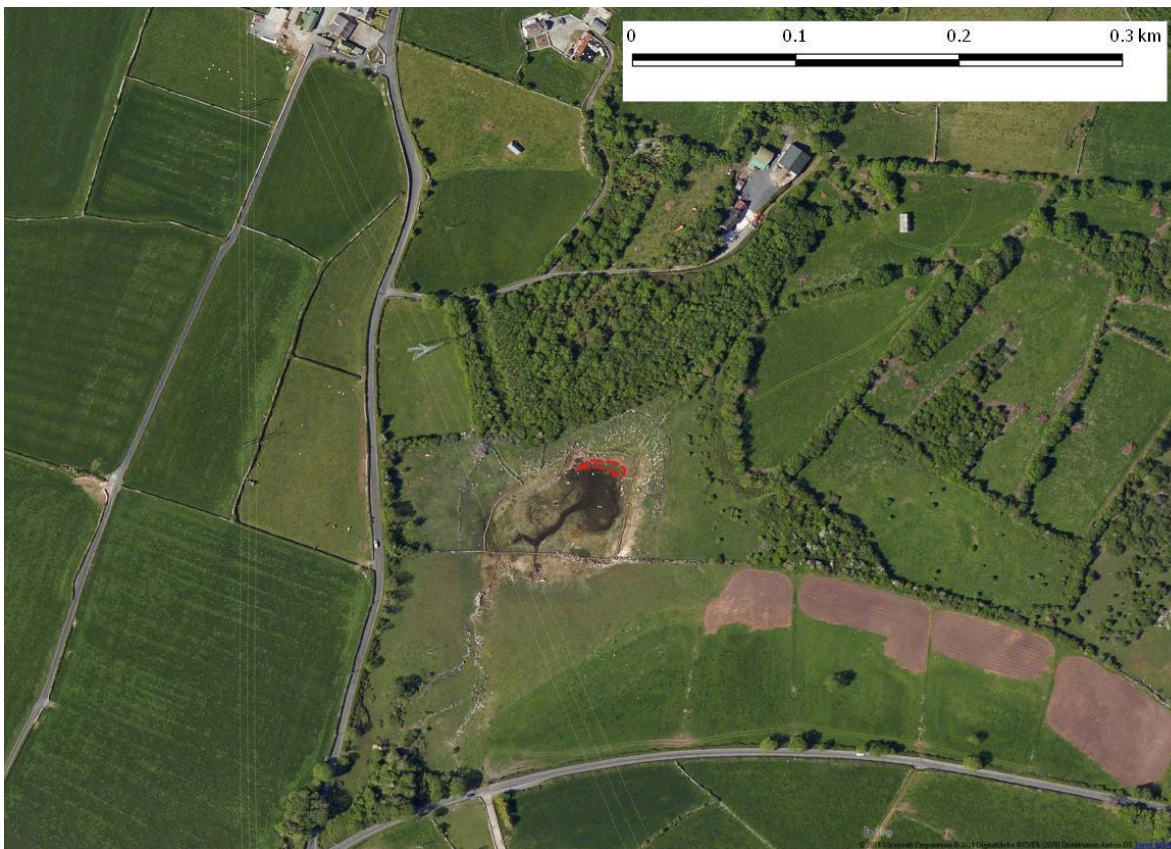
Most of the vegetation adjoining *Chenopodion* vegetation at Hawkhill is dominated by *Eleocharis palustris* swamp. This swamp vegetation contains a low cover of *Chenopodion* species such as *Rorippa islandica* and *Eleocharis acicularis*.

Area of *Chenopodion* habitat

Chenopodion vegetation at Hawkhill covers an area measuring approximately 30 metres long by 6 metres wide therefore the area of the habitat is only c. 0.02 hectares. The central open mud area had no associated vegetation and was not considered to form part of the habitat.

Management and threats

Although cattle graze the fields adjoining Hawkhill turlough it appears that they do not access the wetter bottom of the turlough area much due to the presence of well-maintained stone walls. There are no obvious threats to the turlough habitat itself although the surrounding fields are intensively managed for silage and are cattle-grazed.



Distribution of *Chenopodion* habitat at Hawkhill turlough.



General view of the muddy central pool at Hawkhill, looking in a northerly direction. On the day of survey the central pool did not support any vegetation.



Low-growing *Chenopodium* vegetation along the north-eastern margins of Hawkhill turlough. Note the general dominance of *Eleocharis palustris* swamp throughout much of the turlough basin.

Bibliography

- Conaghan, J., Roden, C. and Fuller, J. (2006). *A Survey of Rare and Scarce Vascular Plants in County Galway*. Vols 1–3. Unpublished report to National Parks and Wildlife Service, Dublin.
- Curtis, T.G.F., Ryan, J.B. and McGough, H.N. (1985). The status and ecology of *Limosella aquatica* L. in Clare (H9) and south-east Galway (H15). *Irish Naturalists' Journal* **21** (9): 406–407.
- Goodwillie, R. (1992). *Turloughs over 10ha. Vegetation Survey and Evaluation*. Unpublished Report to the National Parks and Wildlife Service, Office of Public Works.
- Goodwillie, R. (1995) Additions to the Irish range of *Rorippa islandica* (Oeder ex Murray) Borbas. *Irish Naturalists' Journal* **25** (2): 57–59.
- Goodwillie, R. (1999) *Alopecurus aequalis* Sobol., new to Clare (H9) and S.E. Galway (H15). *Irish Naturalists' Journal* **26** (7/8): 286–287.
- Goodwillie, R. (2003) Vegetation of turloughs. In: M.L. Otte (ed.) *Wetlands of Ireland: Distribution, ecology, uses and economic value*. University College Dublin Press, Dublin. pp. 135–144.
- Goodwillie, R.N. (2007) Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270): Conservation Status Assessment Report. In: *The Status of EU protected Habitats and Species in Ireland*, Volume 2. Unpublished Report to the National Parks and Wildlife Service. pp. 1330–1342.
- Goodwillie, R., Heery, S. and Keane, S. (1997) Wetland vegetation on the Gort lowlands. In: Southern Water Global and Jennings O'Donovan and Partners (eds.) *An Investigation of the Flooding Problems in the Gort–Ardrahan Area of South Galway. Ecology Baseline Study Vol. I*. The Office of Public Works, Dublin. pp. 1–131.
- MacGowran, B. (1979) *Rorippa islandica* (Oeder ex Murray) Borbás in turloughs of south-east Galway (H15). *Irish Naturalists' Journal* **19** (9): 326–327.
- NPWS, 2013. *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. <http://www.npws.ie/publications/search?title=article+17>
- NPWS (2016a) The Gearagh SAC (site code: 108) Conservation objectives supporting document – 3260 and 3270. V1. *Conservation Objectives Supporting Document Series*. National Parks and Wildlife Service, Dublin.
- NPWS (2016b) Lough Lurgeen Bog/Glenamaddy Turlough SAC (site code: 301) Conservation objectives supporting doc- turloughs and rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation. V1. *Conservation Objectives Supporting Document Series*. National Parks and Wildlife Service, Dublin.
- O'Mahony, T. (1996) A report on the flora of Cork (v.cc. H3–H5), 1995. *Irish Botanical News* **6**: 35–40.
- O'Mahony, T. (2002) A report on the flora of Cork (v.cc. H3–H5), 2001. *Irish Botanical News* **12**: 27–35.
- O'Mahony, T. (2005) A report on the flora of Cork (v.cc. H3–H5), 2004. *Irish Botanical News* **15**: 29–38.

- O Connor, Á. (2017) *Conservation objectives supporting document: Turloughs* and Rivers with muddy banks with Chenopodium rubri p.p. and Bidention p.p. vegetation*. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin.
- Roden, C., Conaghan, J., Fuller, J. and Reynolds, S. (2006) *A Survey of Rare/Threatened and Scarce Vascular Plants in County Clare*. Unpublished report to National Parks and Wildlife Service, Dublin.
- White, J. (1985). *Limosella aquatica* L. and the Vegetation of Exposed Mud at the Gearagh, Co. Cork (H3). *The Irish Naturalists' Journal*. **21** (12): 509–515.
- Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) *Ireland Red List No. 10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Appendix I

Summary Table of 2018 Survey the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270), in Ireland

Dr John Conaghan and Dr Janice Fuller

Table I Summary data from 2018 survey

		Presence of habitat/area	Management	Original area estimate	2018 survey area estimate	Possible max area	Notes
1	Kilcolman Bog*	Poorly developed, Small area	No grazing	0.03	0.2	0.2	
2	The Loughans*	Poorly developed, Small area	Light/moderate grazing	0.2	0.1	0.1	
3	Mountpleasant Turlough/Ballyglass1*	Habitat not recorded but water levels high	Light/moderate grazing	2.1	?	?	No significant areas of colonized bare mud seen.
4	Rathbaun*	Poorly developed, Small area	Heavily grazed and poached	2.3	0.04	0.1	Area of wet annuals much smaller than reported by Goodwillie (1992). No obvious reason as to why this might be.
5	Lough Croan*	Poorly developed, Small area	Light/moderate grazing	4.6	0.3	0.3	No extensive area of marly ground with annuals as reported by Goodwillie (1992) to be seen along southern margins. Area dominated by grasses and sedges.
6	Lough Gash	Well developed, large area	Light/moderate grazing	5.8	3.9	6	Difficult to accurately map area as it impossible to walk the very wet mud in the centre and east of the site.
7	Coole Lough	Well developed, Very large area	No grazing	20	25	c.35?	Difficult to map this large area.
8	The Gearagh, Annahala Bridge	Well developed, Very large area	No grazing	40	39	c. 50?	Water levels high on the day of survey, only the western margins of area could be surveyed. Potential for much larger area if summer water levels are very low, consult with ESB over water levels and duration.

		Presence of habitat/area	Management	Original area estimate	2018 survey area estimate	Possible max area	Notes
9	The Gearagh, near Knockaunnacrohy	Well developed, Small area	No grazing	2	1.3	2	Surveyed with binoculars. Remainder of bay is dominated by reedswamp vegetation.
10	The Gearagh, near Ashton (Sullane)	Not surveyed, area not accessible	?	2	?	2	Called to 2 houses in adjoining land for access permission but no replies.
11	The Gearagh, Picnic site, Sth Hartnett's Cross	Well developed, Large area	Moderate grazing, <i>Cyperus eragrostis</i> frequent	2	2.3	4?	Extensive area of shallow water over mud adjacent.
12	The Gearagh, Rooves Bridge	Well developed, Small area	No grazing	0.4	0.85	0.85	Potential for expansion of habitat if reservoir levels are maintained at a lower level.
13	The Gearagh, Amenity Boating Area, u/s Inniscarra Dam	Well developed, Small area	No grazing. <i>Cyperus eragrostis</i> occasional	0.01	1.1	1.1	Includes area of potential habitat dominated by stony soil.
14	Lough Funshinagh	Not surveyed, very high water levels in 2018	?	33	?	33	This large turlough dries out sporadically. During 2018 the water levels were very high.
15	Blackrock/Peterswell - Bullaunagh (Turloughnacloghdoo)	Poorly developed, Small area	Heavily grazed and poached	0.9	0.65	0.65	
16	Glenamaddy turlough/Cloondoyle Beg	Not surveyed, very high water levels in 2018	?	1.7	?	1.7	
17	Garryland	Well developed, large area	Heavily grazed and poached	4.58	2.2	2.8	Area of <i>Chenopodion</i> vegetation could be larger if water levels were lower
18	Caherglassaun	Well developed, large area	Partly heavily grazed and poached	2.4	2.7	2.7	Good agreement with original area estimate.
19	Hawkhill	Poorly developed, Small area	No grazing	0.3	0.02	0.03	Small central area of bare mud has no vegetation.

Appendix II

National Conservation Assessment for Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270) for the 2013-2018 cycle – Assessment of *Structure and Functions*

Dr Deirdre Lynn and Dr Áine O Connor

Article 17 Reporting under the Habitats Directive

Article 17 reports on progress with the implementation of the Habitats Directive are submitted by EU Member States every six years. The conservation status of all habitats and species of Community interest, as listed in Annex I, II, IV and V, is the focus of these reports. The two previous Article 17 reports by Ireland for habitat 3270 are detailed in Goodwillie (2007) (2000-2006 cycle) and NPWS (2013) (2007-2012 cycle). The results of the 2018 survey by Dr John Conaghan and Dr Janice Fuller, detailed in the main report, were the basis of the report on the national conservation status of habitat 3270 for the 2013-2018 cycle. In addition to the Dr John Conaghan and Dr Janice Fuller survey, results of a 2018 botanical survey of the Gearagh were made available to the NPWS by the ESB.

The national conservation status of a habitat is assessed under four parameters: *Range*, *Area*, *Structure and function* and *Future Prospects* (see D.G. Environment, 2017 for further information).

Kilcolman Bog was not included in the *Range* of the habitat and, therefore, its conservation condition was not used in the *Structure and functions* assessment. The vegetation recorded at Kilcolman Bog by Conaghan and Fuller was poorly-developed and sparse. The authors (DL and ÁOC) did not consider the vegetation at Kilcolman Bog to be representative of Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270) as the typical, characteristic species of the habitat were absent or had low cover.

The minimum and maximum areas estimated in the 2018 survey by Dr John Conaghan and Dr Janice Fuller were used to inform the *Area* assessment.

Article 17 Structure and functions assessment

The observations on site condition, management practices, pressure and threats made by Dr John Conaghan and Dr Janice Fuller were the basis of the *Structure and functions* assessment. The authors (DL and ÁOC) assessed the conservation condition of each site as Good, Poor or Bad, based on the individual site reports (see table II). Sites that were not surveyed in detail in 2018 (i.e. Mountpleasant Turlough/Ballyglass1 (site no. 3), the Gearagh, near Ashton (Sullane) (Site 10), Lough Funshinagh (Site 14) and Glenamaddy turlough/Cloondoyle Beg (Site 16)) were assumed to be in Good conservation condition.

No sites were assessed as in Bad conservation condition. Four sites were assessed as in Poor condition, largely based on heavy livestock grazing and trampling and the occurrence of 'weedy' species. These were Rathbaun Turlough (site no. 4), Blackrock/Peterswell- Bullanagh (Turloughnacloghdoo) (site no. 15), Garryland turlough, Co. Galway (site no. 17) and Caherglassaun turlough, Co. Galway (site no. 18).

Whilst the widespread occurrence of the non-native *Cyperus eragrostis* at the Gearagh is of concern, in the absence of clear evidence that the species is negatively impacting on the habitat, it was not used to down-grade sites from Good to Poor status. The species has been known from the Gearagh since at least 2001 (picnic site south of Hartnett's Cross) (O'Mahony, 2002). There is a need for on-

going, regular monitoring of the distribution, extent and abundance of *Cyperus eragrostis* within and adjacent to habitat 3270 at the Gearagh.

14 sites were assessed as in Good conservation condition. As a result, approximately 96% of the habitat by area is considered to be in Good condition. This figure was heavily influenced by the three large sites (the Gearagh, Coole Lough, and Lough Funshinagh, sites no. 8-13, 7 and 14).

There was no evidence of major changes in condition since the last reporting period. However, this was largely based on expert opinion, rather than repeat monitoring.

Table II Conservation condition of sites with habitat 3270, Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270) for the 2013-2018 reporting period. Assessment by DL and AOC, 2018

Site #	Site Name	Conservation Condition	Minimum Area in Good Condition (ha)	Maximum Area in Good Condition (ha)	Minimum Area in Poor Condition (ha)	Maximum Area in Poor Condition (ha)
2	The Loughans	Good	0.1	0.1		
3	Mountpleasant Turlough/Ballyglass1	Good	2.10	2.10		
4	Rathbaun	Poor			0.04	0.1
5	Lough Croan	Good	0.3	0.3		
6	Lough Gash	Good	3.9	6		
7	Coole Lough	Good	25	35		
8	The Gearagh, Annahala Bridge	Good	39	50		
9	The Gearagh, near Knockaunnacrohy	Good	1.3	2		
10	The Gearagh, near Ashton (Sullane)	Good	2	2		
11	The Gearagh, Picnic site, Sth Hartnett's Cross	Good	2.3	4		
12	The Gearagh, Rooves Bridge	Good	0.85	0.85		
13	The Gearagh, Amenity Boating Area, u/s Inniscarra Dam	Good	1.1	1.1		
14	Lough Funshinagh	Good	33	33		
15	Blackrock/Peterswell - Bullaunagh (Turloughnacloghdoe)	Poor			0.65	0.65
16	Glenamaddy turlough/Cloondoyle Beg	Good	1.70	1.70		
17	Garryland	Poor			2.2	2.8
18	Caherglassaun	Poor			2.7	2.7
19	Hawkhill	Good	0.02	0.03		
	Total area in Good and Poor condition	118.3	112.67	138.18	5.6	6.25
	Percentage area in Good and Poor condition	144.33	95.3%	95.7%	4.7%	4.3%

Revised typical species list for habitat 3270

The typical species of habitat 3270 have been revised for each Article 17 report (Goodwillie, 2007; NPWS, 2013; O Connor, 2017). The typical species list was again updated for 2013-2018 based on findings of the 2018 survey and the recommendations of Dr John Conaghan and Dr Janice Fuller. *Chenopodium rubrum* (*Oxybasis rubra*) and *Gnaphalium uliginosum* were added to the 2007-2012 list (NPWS, 2013; O Connor, 2017). These were previously listed as typical species of the habitat for the 2000-2006 cycle (Goodwillie, 2007). The full typical species list for Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270) for 2013-2018 is therefore:

Callitriche palustris^{VU}

Oxybasis rubra

Gnaphalium uliginosum

Limosella aquatica

Persicaria minor

Rorippa islandica

Alopecurus aequalis^{NT}

Eleocharis acicularis

Riccia cavernosa

Regional Red List status (Wyse Jackson *et al.*, 2016) is given, where relevant, as a superscript.

References

- DG Environment. (2017) Reporting under Article 17 of the Habitats Directive: Explanatory notes and guidelines for the period 2013-2018. Prepared by the European Environment Agency (EEA) and its European Topic Centre on Biological Diversity (ETC/BD). Brussels.
- Goodwillie, R.N. (2007) Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation (3270): Conservation Status Assessment Report. In: *The Status of EU protected Habitats and Species in Ireland*, Volume 2. Unpublished Report to the National Parks and Wildlife Service. pp. 1330–1342.
- NPWS, 2013. *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.
- O'Mahony, T. (2002) A report on the flora of Cork (v.cc. H3-H5), 2001. *Irish Botanical News* 12: 27-35.
- O Connor, Á. (2017) *Conservation objectives supporting document: Turloughs* and Rivers with muddy banks with Chenopodium rubri p.p. and Bidention p.p. vegetation*. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin.
- Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. & Wright, M. (2016) *Ireland Red List No. 10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.