Survey of Aquatic Fauna of Harper's Island Wetlands, Cork Harbour, County Cork. Sept – October 2021

On behalf of Cork County Council



Dr Geoff Oliver Cape Clear Island Skibbereen Co. Cork Tel: 028 39982 Mobile: 087 6197817 Email: golivercape@gmail.com

Summary

This report describes a survey of aquatic fauna at seven sampling stations within Harper's Island Wetlands. Three of these are located on the shoreline of the Borrow dyke, two are in the scrapes and two are in ponds which are part of the Marsh wetlands in the southern part of the wetland. These seven stations were visited in September and October 2021 and at the time of sampling ranged in salinity from 2.3 - 4.6 psu in the marsh wetlands, 7.9 - 19.7 psu in the scrapes and 28.7 psu in the borrow dyke. The fauna recorded reflect this range in salinity with insect species dominating the low salinity sites and crustaceans and marine species dominating the more saline sites. Mid salinity sites (1 and 2) have been colonised by a combination of insects and crustaceans.

A total of 53 taxa was recorded on the site, most notable of which is the water beetle *Hydroglyphus geminus*, which is a <u>first Irish record</u>. Seven other species are regarded as "lagoonal specialists", and comprise two crustaceans, the prawn *Palaemon varians* and amphipod, *Gammarus chevreuxi*, two water beetles *Ochthebius marinus, Agabus conspersus*, the water boatman *Sigara (Halicorixa) stagnalis*, the "back-swimmer" *Notonecta viridis* and the bryozoan *Conopeum seurati*.

These "lagoonal specialists" are characteristic of lagoonal habitat, which is a rare habitat in Ireland and throughout Europe and listed under the Habitats Directive as a Priority Habitat "in special need of conservation". As the habitat is rare the typical animals and plants are as a result also rare or scarce. The amphipod *G. chevreuxi* has been recorded at only six other sites in Ireland (to be confirmed at three), and four of these are in Cork harbour, and in only seven sites in the U.K. The water beetle *Agabus conspersus* is a red data species and regarded as endangered. The other insects are all scarce and more or less confined to this scarce habitat. Another water beetle *Hygrotus confluens* is not a lagoonal specialist, but it is a scarce species, and this may be the first record for Cork County.

This is a remarkable list of lagoonal specialist and rare aquatic invertebrates for such a relatively small site and especially because the scrapes and marsh wetlands were only created in the last 5 years. The marsh wetlands were only dug in 2019. Creation of these additional wetland types has greatly added to the biodiversity and conservation interest of the site and the management committee are to be congratulated. The marsh wetlands are shallow and are likely to be overgrown with emergent vegetation in the near future, and it is therefore

2

suggested that they either be deepened slightly, or that other deeper pools be dug in order to maintain a certain amount of open water.

I would like to thank Brian Nelson for some of the species identifications or verifications (insects) and Eddie McCormack (marine annelids and crustaceans), and Frances Gallagher for help with fieldwork.

Contents:

1. Introduction

- 2. Study Site
- 3. Methods
- 4. Results
- 5. Discussion

List of Figures

Figure 1. Satellite Photograph of Harper's Island, Cork Harbour. Figure 2. Main sampling stations at Harper's Island, Co. Cork, September-October, 2021.

List of Tables

- Table 1. Characteristics of sampling stations in Harper's Island, Co. Cork, September-October, 2021.
- Table 2. Salinity at sample stations at Harper's Island, Cork Harbour, February 10th, 2021.
- Table 3. Fauna recorded at sampling stations in Harper's Island, Co. Cork, September-October, 2021.

Appendices:

- Appendix 1. Fauna recorded at sampling stations in Harper's Island, Co. Cork, September-October, 2021.
- **Appendix 2.** Photographs of sampling stations at Harper's Island, Co. Cork, September-October, 2021.
 - Figure 2.1 Photograph of sampling station 1, on the southern scrape (Scrape 2).
 - Figure 2.2 Photograph of sampling station 2, on the northern scrape (Scrape 1).
 - Figure 2.3 Photograph of sampling station 3, at the sluice on the borrow dyke.
 - Figure 2.4 Photograph of sampling station 4, at the central part of the borrow dyke
 - Figure 2.5 Photograph of sampling station 5, on the southern end of the borrow dyke.
 - Figure 2.6 Photograph of sampling station 6, on the eastern marsh wetland.
 - Figure 2.7 Photograph of sampling station 7, on the western marsh wetland.
- **Appendix 3.** Photographs of selected fauna at Harper's Island, Co. Cork, September-October, 2021.
 - Plate 3.1 Photograph of feeding area of Otter, with remains of shore crab at Station 3.
 - Plate 3.2 Photograph of Conopeum seurati (lagoonal specialist) taken at Station 5.
 - Plate 3.3 Photograph of *Conopeum seurati* and tube of *Crassicorophium crassicorne* on piece of *Ulva* at Station 5.
 - Plate 3.4 Photograph of *Hydroglyphus geminus*, Water beetle. <u>First record for</u> <u>Ireland.</u> Photo Brian Nelson

- Plate 3.5 Photograph of *Agabus conspersus*, Water beetle. Rare, **Red Data species.** Lagoonal specialist (Dabbling Diver)
- Plate 3.6 Photograph of *Ochthebius marinus*, Water beetle. Lagoonal specialist (Marine moss beetle)
- Plate 3.7 Photograph of *Gammarus chevreuxi*, amphipod crustacean. Lagoonal specialist. Rare, five previous records for Ireland (David Fenwick Photomarine)
- Plate 3.8 Photograph of *Palaemon varians* decapod crustacean. Lagoonal specialist. (Wikimedia commons)
- Plate 3.9 Photograph of *Notonecta viridis* hemipteran insect (back-swimmer, Greater water-boatman)). Lagoonal specialist. (© Jim Wilson)
- Plate 3.10 Photographs of *Sigara stagnalis* hemipteran insect (water-boatman)). Lagoonal specialist, strictly coastal (© Researchgate)
- **Appendix 4.** Species records taken from the National Biodiversity Data Centre website, Waterford.
 - Figure 4.1 Agabus conspersus. Coleoptera. Lagoonal specialist.
 - Figure 4.2 Ochthebius marinus Coleoptera. Lagoonal specialist.
 - Figure 4.3 Hygrotus confluens. Coleoptera. Scarce.
 - Figure 4.4 Notonecta viridis. Hemiptera. Lagoonal specialist.
 - Figure 4.5 Sigara stagnalis. Hemiptera. Lagoonal specialist.

1. Introduction

Harper's Island lies on the northern shoreline of Cork Harbour and is accessed by a bridge over the railway line near Glounthaune. The reserve is owned and managed by Cork County Council in partnership with BirdWatch Ireland, Glounthaune Community (Glounthaune Community Association/Tidy Towns/Men's Shed), and NPWS.

This report describes a survey of the aquatic fauna found at seven sampling stations within the reserve in the following areas, described by Tom Gittings:

Borrow Dyke - this is connected to the estuary by an open sluice and has been flooded since 2006. It has a daily tidal range of around 10 cm, annual water level range of around 60 cm, and a salinity range of 10.8-31.2 (mean 23.7)".

Scrape 1 - this was constructed in 2017. It is connected to the Borrow Dyke via a dropboard sluice, but during high water levels in winter the Borrow Dyke overflows into this scrape. It has an annual water level range of around 40 cm, and a salinity range of 9.5-19.5 (mean 13.6)

Scrape 2 - this was constructed in 2018. It is usually hydrologically isolated from Scrape 1 and the Borrow Dyke, but exceptionally high-water levels last winter caused the two scrapes to become connected for a short period. It has an annual water level range of around 35 cm, and a salinity range of 7.0 (mean 3.4). However, before the ingress of water from Scrape 1 last winter, the maximum salinity recorded was 4.5.

Marsh wetlands - these were constructed in 2019. They are hydrologically isolated from the other waterbodies, but the water levels show a spring-neap cycle indicating subsurface connection with the estuary. They have an annual water level range of around 1 m, and a salinity range of 0.8-2.5 (mean 1.7) in the western wetland, and 1.8-5.8 (mean 3.7) in the eastern wetland. The Ruppia occurs in the western wetland.

3. Study Site

The study site comprises a borrow dyke (stations 3-5, Figure 2), created by extracting sediment from the saltmarsh to build the embankments, two ponds referred to as the Marsh Wetlands east and west (stations 6 & 7) and two scrapes, Scrape 1 and Scrape 2 (stations 2 and 1, respectively).



Figure 1. Satellite Photograph of Harper's Island, Cork Harbour.



Figure 2. Sampling Stations at Harper's Island, Cork Harbour. Sept-October 2021.

The seven stations (Appendix 2) ranged in salinity at the time of sampling from 2.3 to 28.7 psu (Table 1) and substratum is mostly bare mud, but the two ponds (6 & 7) have been colonised by *Ruppia* sp. (probably *R. cirrhosa*, still awaiting confirmation) and the scrape at Station 1 contains a dense growth of *Myriophyllum*.

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7
	Scrape 2	Scrape 1		Borrow dyke	e	Marsh v	vetlands
			west	centre	south	east	west
Date sampled	23/09/2021	23/09/2021	06/10/2021	22/10/2021	22/10/2021	22/09/2021	22/09/2021
GPS position	W 78371	W 78362	W 78335	W 78622	W 78652	W 78610	W 78549
	72800	72849	72937	72945	72716	72672	72686
Salinity	7.9 psu	19.7 psu	28.7 psu	28.4	27.5 psu	4.6 psu	2.3 psu
Temperature	17.8 C	13.7 C	13.4 C	13.5	12.8	16.3 C	16.9 C
Substratum	soft mud,	bare mud	bare mud,	bare mud	peat, bare	stones, sand,	gravel, clay
	shells		brick		mud	clay	
Vegetation	Myriophyllum	Scirpus ,	Ulva,	Ulva	Ulva	Ruppia ,	Ruppia ,
-		Ulva	Salicornia			Cladophora,	Cladophora,
						Phragmites	Lemna,
							Phragmites

Table 1. Brief description of sample stations at Harper's Island, Cork Harbour, Sept-October 2021.

Table 2. Salinity at sample stations at Harper's Island, Cork Harbour, February 10th, 2021.

	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7
	Scrape 2	Scrape 1		Borrow dyke	e	Marsh v	vetlands
			west	centre	south	east	west
Date sampled	10/02/2022	10/02/2022	10/02/2022	10/02/2022	10/02/2022	10/02/2022	10/02/2022
GPS position	W 78371	W 78362	W 78335	W 78622	W 78652	W 78610	W 78549
	72800	72849	72937	72945	72716	72672	72686
Salinity	5.3	11.7	25.6	23.9	24.7	3.1	1.5

4. Methods

Faunal sampling at each station was shore-based and confined to depths of less than 1 metre, accessible in chest waders. Faunal samples were collected by a combination of sweepnetting, sediment cores and timed searches. Sweep nets (1 mm. mesh, 25 x 25cm. diam., Alana Ecology) were used for a timed period of 20 seconds and were replicated three times per station. This was not always practical when the abundance of weed and associated periphyton made this difficult. In this situation it was necessary at times to avoid the weed and concentrate on open areas. Therefore, the sweep net samples are not strictly quantitative. Three sediment cores (8cm. diam., 0.005m²) were taken at each station, and sieved (1 mm. mesh) *in situ*. Timed searches were carried out by close inspection of stones and vegetation for a maximum duration of one hour at each station. As additional species became harder to find the "5-minute rule" was applied, such that if, in a timed period of 5 minutes, no additional species were recorded the search was terminated. If any new species were found the search continued for an additional 5 minutes.

Faunal samples were preserved in 70% alcohol and stored for subsequent identification. Nomenclature used in results for the marine fauna is according to the World Register of Marine Species (WoRMS. <u>www.marinespecies.org</u>.) and for non-marine is the Catalogue of Life database (www.gbif.org).

5. Results

Table 3. Fauna recorded at sampling stations in Harper's Island, Co. Cork, September - October 2021. Lagoonal specialists and notable species in bold.

			Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7
Nematoda	a	indet.			9	4			
Annelida	Oligochaeta	Tubificoides brownae				1	30		
	Polychaeta	Tharyx sp.			63	15	9		
		Glycera sp.			6	2	5		
		Hediste diversicolor		30	32	35	42		
		Polydora cornuta				5			
		Streblospio shrubsolii		1	1	10	4		
Crustace	Copepoda	Daphnia major							3
		Eurvtemora velox	13						-
	Ostracoda	indet.	2	1	13		1	5	1
1	Mysidacea	Neomysis integer	_	1	10	9	3	-	-
		Praunus flexuosus		_	5	13	7		
	Isopoda	A sellus aquaticus							2
	Isopotu	Lekanesphaera rugicauda		11			23		-
	Amphipoda	Coronhium volutator		15	7	3	25		
	rinpinpoda	Crassicorophium crassicorne		15	,	2	5		
		Gammaridae indet	371	7	07		5		
		Gammarus chovrouri	371	7					
		Migrodautopus apullotalna	9	/	117				
		Microdeulopus gryuoluipu			117	5	2		
	Decenedo				18	2	3		
	Decapoda	Curcinus maenas			2	5			
		Crangon crangon	60	22	40	3	26		
Turcasta	Odorata	Falaemon varians	68	33	10	11		1	0
Insecta	Odonata	Iscentura elegans	15					1	8
	TT-4	Libellula quaarimaculata						10	1
	Heteroptera		110					10	39
		Callicorixa praeusta						5	1
		Notonecta viridis							4
		Plea leachtí							16
		Sigara lateralis	10					-	1
	<u> </u>	Sigara (Halocorixa) stagnalis	55					3	6
	Coleoptera	Agabus conspersus						1	7
		Hygrotus confluens						6	1
		Ochthebius marinus					1		1
		Haliplus sp.							1
		Hydroglyphus geminus						1	1
		Laccophilus minutus							4
		Beetle larvae							3
	Trichoptera	cases					1	1	
	Ephemeropte	indet.						4	10
ļ	Diptera	Ceratopogonidae indet.						7	
ļ		Chironomidae indet.	59				1	43	28
		Culicidae indet.						4	
		Ephyda riparia pupae				5	16		
Arachnid	a	Hydracarina sp1						1	
		Hydracarina sp2							4
		Hydracarina sp3							1
Mollusca	Prosobranch	Peringia ulvae			4	4	30		
ļ		Potamopyrgus antipodarum						125	2
	Pulmonata	Lymnaea peregra						97	1
Bryozoa		Conopeum seurati			1		1		
		Membranipora membranacea		1	1		1		
Pisces		Pomatoschistus microps				1	7		

Further details for individual stations in Appendix 1.

A total of 53 taxa was recorded on the site, most notable of which is the water beetle *Hydroglyphus geminus*, which is a <u>first Irish record</u> (Figure 3.4, Appendix 3). Seven other species are regarded as "lagoonal specialists" and comprise two crustaceans, the prawn *Palaemon varians* and amphipod, *Gammarus chevreuxi*, two water beetles *Ochthebius marinus, Agabus conspersus,* the water boatman *Sigara (Halicorixa) stagnalis*, the "back-swimmer" *Notonecta viridis* and the bryozoan *Conopeum seurati*.

The amphipod *G. chevreuxi* (Figure 3.7, Appendix 3) has been recorded at only six other sites in Ireland (to be confirmed at three), and four of these are in Cork harbour, and in only seven sites in the U.K. Further details of the other records have been requested.

The water beetle *Agabus conspersus* (Figure 3.5, Appendix 3) is a red data species and regarded as endangered and there are very few recent records from Ireland (Figure 4.1, Appendix 4). Many of the other insects are scarce and more or less confined to this scarce habitat. Another water beetle *Hygrotus confluens* is not a lagoonal specialist, but it is a scarce species, and this may be the first record for Cork County (Figure 4.3, Appendix 4)

6. Discussion

This is a remarkable list of lagoonal specialist and rare aquatic invertebrates for such a relatively small site and especially because the scrapes and marsh wetlands were only created in the last five years. The marsh wetlands were only dug in 2019. Creation of these additional wetland types has greatly added to the biodiversity and conservation interest of the site.

The fauna recorded reflect the range in salinity of the different wetlands with insect species dominating the low salinity sites and crustaceans dominating the more saline sites. The mid salinity stations (1 and 2) have been colonised by a combination of insects and crustaceans. Many of the species recorded are regarded as "lagoonal specialists" which are very typical of brackish waters. Lists of animals and plants have been drawn up in the UK (e.g., by Barnes (1989) and Bamber (1997) and in other European countries and proposed lists have been drawn up for Ireland (Oliver and Healy 1998, Oliver 2005) (Appendix 5). These "lagoonal specialists" are characteristic of coastal lagoons, which are relatively rare in Ireland and throughout Europe and listed under the Habitats Directive as a Priority Habitat "in special need of conservation". As the habitat is rare the typical animals and plants are, as a result, also rare or scarce.

Agabus conspersus (Plate 3.5, Appendix 3) is a good example of this. It is rare and largely confined to "lagoonal habitats", strictly coastal and in "permanent, shallow, brackish water". (The reader will notice an odd record in Figure 4.1, Appendix 4, for Lough Atorick, County Galway. This record is apparently genuine, and explained by the fact that beetles fly, and occasionally land in odd places). Many of the records held by the National Biodiversity Data Centre (NBDC) are nearly 100 years old and this species is now believed to be extinct in Northern Ireland. It is sometimes known as the "Spattered diver" and described as "Rare and coastal in south-east Ireland, not seen in N. Ireland since before 1950 and possibly extinct" by Roy Anderson (Northern Ireland Priority Species).

The list of species for Ireland differ in some respects to UK lists. For example, *Sigara concinna* is regarded as a lagoonal specialist in the UK but there are numerous inland records for Ireland and its distribution may be more to do with temperature and it is therefore not regarded as a specialist in Ireland. These lists are changing as more is known about the ecology of the species and *Plea leachi* which was recorded at Harper's Island was listed as a proposed specialist for Ireland on early Irish lists. Halbert (1935) recorded it from L. Gill

12

(Co. Kerry) and described it as widespread, but local, usually "in stagnant water near the coast". but it now appears to be spreading north and inland and is no longer regarded as a specialist.

The back-swimmer, *Notonecta viridis* (Plate 3.9, Appendix 3) was described as a rare brackish water species in Ireland. According to Southwood and Leston (1959), it was recorded only for Wexford and North Kerry. It has since been recorded at many coastal lagoons but is still a relatively scarce insect (Figure 4.4, Appendix 4). It is found at inland sites in the U.K. but appears to be largely restricted to lagoons in Ireland. Another hemipteran insect *Sigara stagnalis*, water-boatman, (Plate 3.10, Appendix 3) is a fairly common lagoonal specialist found at 36 of the 87 (41.4%) lagoons surveyed during the lagoon surveys (Oliver 2007) but is still scarce in any other habitat (Figure 4.5, Appendix 5). *Ochthebius marinus* (Plate 3.6, Appendix 3) is another specialist beetle with a very restricted range (Figure 4.2, Appendix 4).

Palaemonetes varians Decapod crustacean listed as a lagoonal specialist in the U.K. by Barnes (1989) and Bamber (1997), but apparently is no longer regarded as such. Although found in estuaries, this species appears to be far more characteristic of lagoons in Ireland, found in 64 of the 87 lagoons surveyed (73.6%) and may require a lagoonal environment for reproduction. Therefore, it remains on the proposed list of lagoonal specialists for Ireland.

Gammarus chevreuxi was confirmed only recently as an Irish species by DeGrave & Myers (1997) as a small population from saltmarshes in the nearby Douglas estuary. Previously recorded from "N. Ireland, rarely" by Spooner in the Plymouth Marine Fauna (1957) and subsequently from Ireland by Pinkster (1978), but confirmation of these records was described as desirable by Costello *et al.* (1989). Recorded more recently from four other sites in Cork and one in Galway (Rostellan L. and Commoge Marsh, Co. Cork and recently (unconfirmed) from Ballyvodock and Raffeen (Cork) and Rincarna (Galway) (requiring confirmation) by Oliver (2007). *G. chevreuxi* is known only from six sites in England and Wales (Bamber *et al.* 2001) where it is regarded as a rare lagoonal specialist. These records from Co. Cork and possibly Galway are of high conservation interest.

Finally, the habitat of the bryozoan *Conopeum seurati* (Plate 3.2, Appendix 3) is described by the IUCN Red Data Book as "limited to brackish lagoons and riverine areas, frequently on plant stems (e.g., *Ruppia*). It is not listed in a recent review of Irish marine

13

Bryozoa (Wyse Jackson 1991). Either the species is under-recorded or is truly a lagoonal specialist.

This is a remarkable list of lagoonal specialist and rare aquatic invertebrates for such a relatively small site and especially because the scrapes and marsh wetlands were only created in the last 5 years. The marsh wetlands were only dug in 2019. Creation of these additional wetland types has greatly added to the biodiversity and conservation interest of the site and the management committee are to be congratulated. The marsh wetlands are shallow and are likely to be overgrown with emergent vegetation in the near future, and it is therefore suggested that they either be deepened slightly, or that other deeper pools be dug in order to maintain a certain amount of open water. The fact that the water levels and salinity vary is not a problem and may even be beneficial to the lagoonal specialists . In this respect "specialist" is not a good description as they as they can tolerate a wide range of variations in many environmental factors which more strictly specialised freshwater or marine species are unable to withstand. At the moment the mean salinity of the five main areas of 1.7, 3.4, 3.7, 13.6 and 23.7 psu are a very interesting range.

References & Bibliography

- Bamber, R.N, Gilliland, P.M. & Shardlow, M.E.A. 2001. Saline lagoons: a guide to their management and creation (interim version).ISBN 1 85716573 X. Peterborough, English Nature.
- Barnes, R.S.K. 1989. Coastal lagoons of Britain: an overview and conservation appraisal. *Biological Conservation* 49: 295–313.
- Costello, M.J., Holmes, J.M.C., McGrath, D. & Myers, A.A. 1989. A review and catalogue of the Amphipoda (Crustacea) in Ireland. *Irish Fisheries Investigations*. Series B (Marine), 33: 3-70.
- De Grave, S. & Myers, A.A. 1997. The occurrence of *Pontocrates arcticus* in Ireland and confirmation of *Gammarus chevreuxi* as an Irish species (Crustacea: Amphipoda). *Irish Naturalists' Journal*, **25**: 383.
- Halbert, J.N. 1935. A list of Irish Hemiptera (Heteroptera and Cicadina). Proc. R. Ir. Acad. 97B: 33-51.
- Healy, B. 2003. Coastal Lagoons. In: *Wetlands of Ireland*. R. Otte (ed). Chapter 4. University College Dublin Press. Dublin. 44-78.
- Oliver, G.A. 2005. *Seasonal changes and Biological Classification of Irish Coastal Lagoons*. PhD Thesis. U.C.D., Dublin. Available on <u>www.irishlagoons.com</u>
- Oliver, G.A. 2007. Inventory of Irish coastal lagoons. Unpubl. Report to NPWS. Dublin.
- Oliver, G.A. and Healy, B. 1998 Records of aquatic fauna from coastal lagoons in Ireland. *Bulletin of the Irish Biogeographical Society*. **21**: 66-115.
- Pinkster, S. 1978. Amphipoda. In: Limnofauna Europea. Illies, J. (ed), 2nd, ed., Stuttgart,

Fischer. 244-253.

- Southwood, T.R.E. & Leston, D. 1959. *Land and water bugs of the British Isles*. Wayside and Woodland Series. Warne & Co. London. 436 pp.
- Spooner, G.M. 1957. Amphipoda. In: *Plymouth Marine Fauna*. (ed. 3), Marine Biological Association of the United Kingdom, Plymouth. 207-234.
- Wyse Jackson, P.N. 1991. Distribution of Irish marine Bryozoa, together with biographical notes relating to the chief researchers in the group. *Bulletin of the Irish Biogeographical Society*. **14:** 129-18.

				Station 1						
			SW 1	SW 2	SW 3	Sed 1	Sed 2	Sed 3	Search	Total
Crustacea	Copepoda	Eurytemora velox	1	4	8				0	13
		Ostracoda indet.	2						r	2
	Amphipoda	Gammaridae indet.	99	109	163				а	371
		Gammarus chevreuxi				3		6	а	9
	Decapoda	Palaemonetes varians	55	8	5				С	68
Insecta	Odonata	Ischnura elegans	5	4	6				С	15
	Heteroptera	Corixidae indet.	47	51	12				С	110
		Sigara lateralis			10				0	10
		Sigara (Halicorixa) stagnalis	15		40				С	55
	Diptera	Chironomidae indet.	1			2	30	26	С	59

Appendix 1. Aquatic Fauna recorded at Harper's Island, Cork Harbour September-October 2021.

				Station 2						
			SW 1	SW 2	SW 3	Sed 1	Sed 2	Sed 3	Search	Total
Annelida	Polychaeta	Hediste diversicolor	1			9	8	12	С	30
		Streblospio shrubsolii	1						r	1
Crustacea	Ostracoda	indet.	1						r	1
	Mysidacea	Neomysis integer		1					r	1
	Isopoda	Lekanesphaera rugicauda	3		5				3	11
	Amphipoda	Corophium volutator	3			3	3	6	0	15
		Gammaridae indet.	2	3					2	7
		Gammarus chevreuxi	2		3				2	7
	Decapoda	Palaemon varians	9	2	22				С	33
Bryozoa		Membranipora membranacea		1					r	1

				Station 3						
			SW 1	SW 2	SW 3	Sed 1	Sed 2	Sed 3	Search	Total
Nematoda		indet.		6	2	1			0	9
Annelida	Polychaeta	Tharyx sp.	2			1	13	17	с	33
		Glycera sp.					3		0	3
		Hediste diversicolor			1	25	3		С	29
		Streblospio shrubsolii								
Crustacea		Ostracoda indet.	1				1	5	0	7
	Mysidacea	Neomysis integer	1	5	3	1			0	10
		Praunus flexuosus			5				0	5
	Amphipoda	Crassicorophium crassicorne	38		28	3		15	С	84
		Corophium volutator				4		3		7
		Microdeutopus gryllotalpa	61	5	30	8		13	а	117
		Melita palmata	13		5				С	18
	Decapoda	Carcinus maenas							С	2
		Palaemon varians							0	10
Mollusca	Prosobranchia	Hydrobia ulvae	1		3				0	4
Bryozoa		Conopeum seurati	1						r	1
		Membranipora membranacea	1						r	1

				Station 4						
			SW 1	SW 2	SW 3	Sed 1	Sed 2	Sed 3	Search	Total
Nematoda		indet.	2		1		1		0	4
Annelida	Oligochaeta	Tubificoides brownae						1		1
	Polychaeta	Tharyx sp.	2			1	1	11	С	15
		Glycera sp.				2			0	2
		Hediste diversicolor	2			2	13	18	С	35
		Polydora cornuta								5
		Streblospio shrubsolii				7		3	С	10
Crustacea	Mysidacea	Neomysis integer	8			1			0	9
		Praunus flexuosus		7	5	1			0	13
	Amphipoda	Corophium volutator		2			1		0	3
		Crassicorophium crassicorne	2						0	2
		Melita palmata	4	1					0	5
	Decapoda	Carcinus maenas	2						0	2
		Crangon crangon	2	2	1				0	5
		Palaemon varians		11					0	11
Insecta	Diptera	Ephyda riparia pupae	3					2	0	5
Mollusca	Prosobranchia	Hydrobia ulvae	3		1				0	4
Pisces		Pomatoschistus microps		1					r	1

Appendix 1 continued. Aquatic Fauna recorded at Harper's Island, Cork Harbour September-October 2021.

				Station 5						
			SW 1	SW 2	SW 3	Sed 1	Sed 2	Sed 3	Search	Total
Nematoda		indet.		3					0	3
Annelida	Oligochaeta	Tubificoides brownae				8	4	18	с	30
	Polychaeta	Tharyx sp.						9	0	9
		Glycera sp.						5	0	5
		Hediste diversicolor	1			15	17	9	с	42
		Streblospio shrubsolii		1			1	2	0	4
	Ostracoda	indet.						1	0	1
Crustacea	Mysidacea	Neomysis integer		1	2				0	3
		Praunus flexuosus		4	3				0	7
	Isopoda	Lekanesphaera rugicauda	12	6	5				с	23
	Amphipoda	Crassicorophium crassicorne	2	1	1			1	0	5
		Melita palmata			1			2	0	3
	Decapoda	Palaemon varians	4	4	28				С	36
Insecta	Coleoptera	Ochthebius marinus	1						r	1
	Trichoptera	cases	1						r	1
	Diptera	Chironomidae indet.	1						r	1
		Ephyda riparia pupae	5	3	8				0	16
Mollusca	Prosobranchia	Peringia ulvae	8	6	14	2			0	30
Bryozoa		Conopeum seurati				1			r	1
		Membranipora membranacea							r	1
Pisces		Pomatoschistus microps		1	6				0	7

Appendix 1 continued. Aquatic Fauna recorded at Harper's Island, Cork Harbour September-October 2021.

				Station 6						
			SW 1	SW 2	SW 3	Sed 1	Sed 2	Sed 3	Search	Total
Crustacea	Ostracoda	indet.	1		4				0	5
Insecta	Odonata	Ischnura elegans		1					r	1
		Libellula quadrimaculata	3	3	4				с	10
	Heteroptera	Corixidae indet.	10						0	10
		Callicorixa praeusta	4	1					0	5
		Sigara (Halocorixa) stagnalis	3						o	3
	Coleoptera	Agabus conspersus			1				r	1
		Hygrotus confluens	2	3	1				с	6
	Ephemeroptera	indet.		3	1				0	4
	Trichoptera	cases		1					r	1
	Diptera	Ceratopogonidae indet.	3	2			1	1	0	7
		Chironomidae indet.	5	8	17	10	2	1	с	43
		Culicidae indet.	2	1			1		0	4
Arachnida		Hydracarina sp1	1						r	1
Mollusca		Potamopyrgus antipodarum	22	33	53	7	10		с	125
	Pulmonata	Lymnaea peregra	17	44	36				с	97

			Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7
Nematoda]	indet.			9	4		20	~,
Annelida	Oligochaeta	Tubificoides brownae			,		30		
Amenua	Dokychooto	Themer sp			63	15			
	1 Olychaeta	Chicara sp.			6	15	5		
		Hadiata diversicalar		20	22	25	5		
		Debudena comuta		30	32	55	42		
		Polyaora cornula				10			
C. A.	C 1	Strebiospio snrubsoli		1	1	10	4		
Crustace	Copepoda	Daphnia major							3
	0 / 1	Eurytemora velox	13					-	
	Ostracoda	indet.	2	1	13		l	5	1
	Mysidacea	Neomysis integer		1	10	9	3		
		Praunus flexuosus			5	13	7		
	Isopoda	Asellus aquaticus							2
		Lekanesphaera rugicauda		11			23		
	Amphipoda	Corophium volutator		15	7	3			
		Crassicorophium crassicorne			87	2	5		
		Gammaridae indet.	371	7					
		Gammarus chevreuxi	9	7					
		Microdeutopus gryllotalpa			117				
		Melita palmata			18	5	3		
	Decapoda	Carcinus maenas			2	2			
	-	Crangon crangon				5			
		Palaemon varians	68	33	10	11	36		
Insecta	Odonata	Ischnura elegans	15					1	8
		Libellula avadrimaculata						10	1
	Heteroptera	Corixidae indet.	110					10	39
	incuroptura	Callicoriza praeusta						5	1
		Notonecta viridis						5	1
		Plag lagehij							16
		Sigara lateralis	10						10
		Sigara (Haloooring) staanalis	10					2	1
	Coloontono	Anghua congroupus	55					3	0
	Coleoptera	Agabus conspersus						I	/
		Hygrotus confluens						6	1
		Ocntnebius marinus					1		1
		Haliplus sp.							1
		Hydroglyphus geminus						1	1
		Laccophilus minutus							4
		Beetle larvae							3
	Trichoptera	cases					1	1	
	Ephemeropte	indet.						4	10
	Diptera	Ceratopogonidae indet.						7	
		Chironomidae indet.	59				1	43	28
		Culicidae indet.						4	
		Ephyda riparia pupae				5	16		
Arachnid	a	Hydracarina sp1						1	
		Hydracarina sp2							4
		Hydracarina sp3							1
Mollusca	Prosobranch	Peringia ulvae			4	4	30		
		Potamopyrgus antipodarum						125	2
	Pulmonata	Lymnaea peregra						97	1
Bryozoa		Conopeum seurati			1		1		
		Membranipora membranacea		1	1		1		
Pisces		Pomatoschistus microps				1	7		
		inter of s			1	-			

Appendix 2. Photographs of sampling stations at Harper's Island Wetlands, Cork Harbour. September - October 2021.



Figure 2.1 Photograph of sampling station 1, on the southern scrape, Scrape 2.



Figure 2.2 Photograph of sampling station 2, on the northern scrape, Scrape 1.

Appendix 2 continued. Photographs of sampling stations at Harper's Island Wetlands, Cork Harbour. September - October 2021.



Figure 2.3 Photograph of sampling station 3, at the western end of the borrow dyke.



Figure 2.4 Photograph of sampling station 4, at the central part of the borrow dyke

Appendix 2 continued. Photographs of sampling stations at Harper's Island Wetlands, Cork Harbour. September - October 2021.



Figure 2.5 Photograph of sampling station 5, on the southern end of the borrow dyke.



Figure 2.6 Photograph of sampling station 6, on the eastern marsh wetland.

Appendix 2 continued. Photographs of sampling stations at Harper's Island Wetlands, Cork Harbour. September - October 2021.



Figure 2.7 Photograph of sampling station 7, on the western marsh wetland.

Appendix 3. Interesting animals recorded at Harper's Island Wetlands, September – October 2021.



Figure 3.1 Photograph of feeding area of Otter, with remains of shore crab at Station 3



Figure 3.2 Photograph of Conopeum seurati (lagoonal specialist) taken at Station 5.

Appendix 3 continued. Interesting animals recorded at Harper's Island Wetlands, September – October 2021.



Figure 3.3 Photograph of *Conopeum seurati* and tube of *Crassicorophium crassicorne* on piece of *Ulva* at Station 5.



Figure 3.4 Photograph of *Hydroglyphus geminus*, Water beetle. <u>First record for Ireland.</u> Photo Brian Nelson Appendix 3 continued. Interesting animals recorded at Harper's Island Wetlands, September – October 2021.



Figure 3.5 Photograph of *Agabus conspersus*, Water beetle. Rare, **Red Data species.** Lagoonal specialist (Dabbling Diver)



ICONOGRAPHIA COLEOPTERORUM POLONIAE Copyright \mathbbm{G} by Lech Borowiec

Figure 3.6 Photograph of *Ochthebius marinus*, Water beetle. Lagoonal specialist (Marine moss beetle)

Appendix 3 continued. Interesting animals recorded at Harper's Island Wetlands, September – October 2021.



Figure 3.7 Photograph of *Gammarus chevreuxi*, amphipod crustacean. Lagoonal specialist. Rare, 5 previous records for Ireland (David Fenwick Photomarine)



Figure 3.8 Photograph of *Palaemon varians* decapod crustacean. Lagoonal specialist. (Wikimedia commons)

Appendix 3 continued. Interesting animals recorded at Harper's Island Wetlands, September – October 2021.



Figure 3.9 Photograph of *Notonecta viridis* hemipteran insect (back-swimmer, Greater water-boatman)). Lagoonal specialist. (© Jim Wilson)



Figure 3.10 Photographs of *Sigara stagnalis* hemipteran insect (water-boatman)). Lagoonal specialist, strictly coastal (© Researchgate)



Appendix 4. Species records taken from the National Biodiversity Data Centre website, Waterford.

Figure 4.1 Agabus conspersus. Coleoptera. Lagoonal specialist. Figure 4.2 Ochthebius marinus Coleoptera. Lagoonal specialist.



Appendix 4 continued. Species records taken from the National Biodiversity Data Centre website, Waterford.

Figure 4.3 Hygrotus confluens. Coleoptera. Scarce.

Figure 4.4 Notonecta viridis. Hemiptera. Lagoonal specialist.

Appendix 4 continued. Species records taken from the National Biodiversity Data Centre website, Waterford.



Figure 4.5 Sigara stagnalis. Hemiptera. Lagoonal specialist.

Appendix 5. Proposed list of lagoonal specialists for Ireland (Based on Oliver & Healy 1998; Oliver 2005, with recent addition of *Gammarus insensibilis* and *Palaemon adspersus*)).

Flora	
Non-charophyte algae	Charophyte algae
Chaetomorpha linum	Chara baltica ?
Cladophora battersii	Chara canescens
Spermatophyta	Chara connivens ?
Ruppia cirrhosa	Lamprothamnion papulosum
Ruppia maritima	
Fauna	
Cnidaria	Insecta
Cordylophora caspia	
Gonothyraea loveni	Coleoptera
Crustacea	Agabus conspersus
Idotea chelipes	Enochrus bicolor
Jaera nordmanni ?	Enochrus halophilus
Lekaneshaera hookeri	Enochrus melanocephalus ?
Allomelita pellucida ?	Ochthebius marinus
Corophium insidiosum	Ochthebius punctatus
Gammarus chevreuxi	-
Gammarus insensibilis	Hemiptera
Leptocheirus pilosus	Notonecta viridis
Palaemon adspersus	Sigara selecta
Palaemon varians	Sigara stagnalis
<u>Mollusca</u>	
Ecrobia ventrosa	Diptera (Chironomidae)
Littorina tenebrosa	Glyptodentipes barbipes
Onoba aculeus	
Rissoa membranacea	Bryozoa
Cerastoderma glaucum	Conopeum seurati

NB. There are taxonomic problems with some of the charophytes. Similarly with lagoonal forms of *Chaetomorpha linum*, *Littorina tenebrosa* and *Rissoa membranacea*.