Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex SAC 000470

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1. Introduction

In November of 2022 Allen and Mellon Environmental Ltd was commissioned to complete a survey for whorl snails at potentially suitable habitats within the Bellacorick Bog Complex Special Area of Conservation (SAC), with a focus on Geyer's whorl snail (*Vertigo geyeri*), Narrow-mouthed whorl snail (*V. angustior*) and where possible, for other Red Listed non-marine mollusca.

Initially the project was to include monitoring and condition assessment of the existing *V. geyeri* populations at Fermoyle and Brackloon, however this was part of a wider SAC monitoring project for the species (NPWS, 2017; Moorkens & Killeen, 2011a) and so these areas were removed as target locations. This project instead focused on surveying other potentially suitable sites within and adjacent to the nearby Mullet/Blacksod Bay Complex SAC (000470) (NPWS, 2014), a more easily accessible area with limited Mollusc records.

The Mullet/Blacksod Bay Complex SAC and Special Protection Areas (SPA) consists of a large coastal site, located in north-west Co. Mayo that supports a variety of different habitats including fixed dunes, machair, saltmarsh and shallow freshwater lakes (NPWS, 2014).

The surveyors who carried out the work were Anna Hart Consultant Ecologist for Allen and Mellon Environmental and Dr. Roy Anderson. Anna was formerly the Northern Ireland Conservation Officer for Buglife - the Invertebrate Trust. Roy is an expert entomologist and an acknowledged expert in mollusca who has published many papers on Vertigo snails and other invertebrate taxa.

2. Target Species

Geyer's whorl snail (*V. geyeri*) has a glossy shell with pale red-brown colouration and four narrow teeth, with the animal itself being dark. It has been assessed as being Vulnerable VU (A2c) in the Irish Red List, with the Irish population being of global importance (Byrne, Moorkens, Anderson, Killeen and Regan, 2009). It is listed on Annex II of the EU Habitats and Species Directive. The snail is associated with relict base-rich flushes where it requires an alkaline pH, short mossy vegetation with sun penetration and no excessive trampling or disturbance to thrive (Anderson, 2016a). Suitable habitat is often limited in size to a few metres square and the snail can be found within the saturated and decaying roots of small calcareous sedges and associated fen mosses (Moorkens & Killeen, 2011). The snail was recorded from the Bellacorick Bog Complex at two locations, Brackloon and Fermoyle. These sites were last monitored in 2015 and 2017 respectively as part of the 2013-2018 SAC monitoring cycle. Geyer's whorl snail (*V. geyeri*) has not been recorded from the Mullet/Blacksod Bay Complex.

Another target species was the Narrow-mouthed whorl snail (*V. angustior*). This snail has a shell with mid-brown colouration, a striate surface of fine raised lines and 5-6 teeth in the mouth. It has been assessed as being Vulnerable VU (A2c) in the Irish Red List with the Irish population being of global importance (Byrne, Moorkens, Anderson, Killeen and Regan, 2009). It is listed in the EU Habitats and Species Directive and is considered threatened in most countries (Anderson, 2006-18). This species is usually found in areas of dune grassland, dune slacks and undisturbed marshes (Byrne et al., 2009; National Museums Northern Ireland

(NMNI) Dr Roy Anderson, 2006-18; Anderson, 2016b), often being found in a narrow zone around wetlands, restricted to suitable habitat that is only a few metres wide (JNCC, 2022). The snail has not been recorded from the Bellacorick Bog Complex or the Mullet/Blacksod Bay Complex.

Figure 1. Geyer's whorl snail (*Vertigo geyeri*) © Dr Roy Anderson

3. Materials and methods

The methodology for this work was based on Moorkens and Killeen (2011b) as well as several recent monitoring surveys of different vertigo species; Monitoring of Narrow-mouthed Whorl Snail (*Vertigo angustior*) on the North Coast (Anderson and Hart, 2022), surveys for Demoulin's Whorl Snail (*V. moulinsiana*) carried out in 2019 at Corbally Fen (Allen and Mellon Environmental Ltd), Annex ll snail surveys carried out in 2017 (Anderson et al.) and Long & Brophy (2013). Geyer's whorl snail (*V. geyeri*) surveys can be carried out throughout the year in appropriate habitat. The optimal time for Narrow-mouthed Whorl Snail (*V. angustior*) appears to be between August and October (Anderson and Hart, 2022) though it can also be surveyed throughout the year in appropriate habitat. For this project survey work was completed in November.

Five main areas were surveyed as part of this project:

- Muingnahalloona
- Gladree
- Cross Lough
- Corraun Point
- Doona Point

When determining sampling locations there were various suggestions given by Bord na Mona (BnM) regarding the Bellacorick Bog Complex. Three potential survey locations were identified at Oeninny wind farm and one at Bellacorick wind farm, both sites with restricted access. Two other sites near Ballycroy were also proposed, in areas where BnM is working with landowners to restore the bog. Only one of these locations was visited during the 2022 surveys at a site in Muingnahalloona. Given the vast size of the Bellacorick Bog Complex SAC, the difficulty accessing sampling points and time restrictions, it was decided that focusing survey efforts near Belmullet would be a more efficient use of time. Aerial imagery was used to identify areas of potential habitat in and around Mullet/Blacksod Bay Complex SAC and efforts were made to visit as many locations as possible to determine their suitability for Vertigo monitoring.

Figure 2. Searching through vegetation in tray for target snail species.

A few of the sites visited in 2022 were deemed to have some potential for the target Vertigo species and were searched accordingly. Sampling points were either at or near to these locations. At each site information was also noted on habitats and ecology, with any site management concerns being highlighted and recommendations for future site management being made.

A total of 5 sampling points were surveyed in 2022 (see Table 2). Approximately 20 minutes was taken at each site to search through vegetation, with the two surveyors working in tandem for the prescribed period. At all the locations survey effort consisted of searching through the vegetation and leaf litter by beating over a large white tray laid on or near the ground. The trays were then examined minutely using a hand lens, with all whorl snails being collected to then be identified at the end of the time.

SITE	SAMPLING POINT	GRID REF
Muingnahalloona	1	F 8457 1947
Gladree	2	F 65624 35727
Cross Lough	3	F 6439 3029
Corraun Point	4	F 7330 2490
Doolough Point	5	F 7407 2069

Table 1. Sampling points for the 2022 surveys.

Although the focus of this work was Geyer's whorl snail (*V. geyeri*) and Narrow-mouthed whorl snail (*V. angustior*) all snail species were recorded as bycatch along with a range of other invertebrates present at the sites including, millipedes (Diplopoda); woodlice (Isopoda); beetles (Coleoptera) etc. Many of these were removed from the site for identification because of the technical difficulty associated with that. Information on the snail species recorded, species of interest and other invertebrates can be found on the following pages.

Despite extensive searches the target species were not found. Other endangered vulnerable and threatened species were recorded during the surveys and are included in Tables 3 and 4.

Figure 3. Muingnahalloona.

4. Site summaries

4.1 Muingnahalloona

A site North of Ballycroy was visited on 28th November with conditions being cool and cloudy. This area consists mainly of an upland raised bog mosaic and mire at F84571947 (Sampling point 1). Parking can be found at a layby at F 84997 19373, with a walk over the bog to the survey location. The sampling point was found to be in open and damp habitat, with bog pools and Sphagnum carpets. Surveying consisted of sieving litter/moss on the bog surface. Only two species of snail were recorded here the snail *Columella aspera* (family Truncatellinidae) and Rayed glass snail (*Nesovitrea hammonis*) (family Gastrodontidae). On closer inspection the flush surveyed at this location was more acidic than alkaline. This would explain the absence of the target species and the lack of other snail species being recorded. Most of the invertebrate species recorded from this site are common, being found in a variety of wet and damp habitats.

Figure 4. Bog pools at Sampling Point 1.

The ground beetles *Agonum fuliginosum*, *A. thoreyi* (both family Carabidae), the rove beetles *Gymnusa brevicollis*, *Lesteva sicula ssp. Heeri*, *Myllaena kraatzi*, *Stenus boops*, *S. cicindeloides*, *S. impressus*, *S. nitens* and *S. palustris* (all family Staphylinidae). The Snake millipede (*Proteroiulus fuscus*) (family Blaniulidae), the harvestman *Nemastoma bimaculatum* (family Nemastomatidae) and the ant *Formica lemani* (family Formicidae) were also recorded from this site. Of particular interest was the rove beetle *Myllaena kraatzi* (family Staphylinidae), a Rare species that is Notable (Nb) in the UK.

Figure 5. Scrub at Muingnahalloona site.

Scrub and tree growth is concentrated mainly along the small river flowing next to the site. This could become an issue if it encroaches on the bog. It should be noted that there was a sign indicating the presence of Japanese knotweed (*Reynoutria japonica*) (family Polygonaceae) near the parking area at F 84991 19365.

Figure 6. Gladree Sampling Point 2.

4.2 Gladree

Gladree was visited on 29th November with conditions being cool and cloudy. This site is part of the Mullet/Blacksod Bay Complex SAC (000470) and the area surveyed is found to the North west of Termoncarragh Lake and is made up of a grassy flooded meadow at F 65624 35727 (Sampling point 2). Parking can be found beside the road at F 65681 35707, with a walk through a field via a farm gate at F 65668 35660 to the survey location with permission from the landowner. Surveying consisted of searching through grass and moss at this location. Twelve species of mollusc were recorded at this location; Large black slug (*Arion ater ater*) (family Arionidae), Garden Snail (*Cornu aspersum*) (family Helicidae), the snail *Euconulus alderi* (family Euconulidae), Globular pea mussel (*Euglesa hibernica*), Lilljeborg's pea mussel (*Euglesa lilljeborgii*) (both family Sphaeriidae), English chrysalis snail (*Leiostyla anglica*) (family Lauriidae), Rayed glass snail (Nesovitrea hammonis) (family Gastrodontidae), Pfeiffer's amber snail (*Oxyloma elegans*) (family Succineidae), Dwarf snail (*Punctum pygmaeum*) (family Punctidae), Marsh whorl snail (*Vertigo antivertigo*), Common whorl snail (*V. pygmaea*) and Striated whorl snail (*V. substriata*) (all family Vertiginidae).

Figure 7. Grassy flooded meadow.

Figure 8. Taller vegetation near the edges of Gladree sampling point.

There was some evidence of grazing taking place in the field being surveyed, though this was minimum. Although both target snail species was not recorded, conditions at Gladree appeared to be suitable for Narrow-mouthed whorl snail (*Vertigo angustior*). From aerial imagery there appears to be a vast area of potentially suitable habitat for the snail around Termoncarragh Lake. It should be noted that the limited time available for the survey meant that only a small section of habitat was covered during the 2022 survey. The presence of three species of whorl snail, as well as three other Red-listed species Lilljeborg's pea mussel (*Euglesa lilljeborgii*) (VU(A4c)), English chrysalis snail (*Leiostyla anglica*) (VU (A2c)) and Globular pea mussel (*E. hibernica*) (NT (A2c)), indicates that Gladree could be an important site for other invertebrates (Byrne et al, 2009).

Figure 9. Cross Lough Sampling Point 3.

4.3 Cross Lough

Cross Lough was visited on 29th November with conditions being cool and cloudy. This site is part of the Mullet/Blacksod Bay Complex SAC (000470) and the area surveyed consisted of a grassy lakeshore at F 6439 3029 (Sampling point 3). The survey area can be easily accessed from the road around the lake. Surveying consisted of searching through drift debris along the flooded shoreline. Fourteen species of mollusc were recorded at this location; Wandering pond snail (*Ampullaceana balthica*) (family Lymnaeidae), Moss bladder snail (*Aplexa hypnorum*) (family Physidae), Wrinkled snail (*Candidula intersecta*) Striped snail (*Cernuella virgata*), Pointed snail (*Cochlicella acuta*) (all family Geomitridae), Lesser moss snail (*Cochlicopa lubricella*) (family Cochlicopidae), Globular pea mussel (*Euglesa hibernica*), Lilljeborg's pea mussel (*Euglesa lilljeborgii*) (both family Sphaeriidae), Rayed glass snail (*Nesovitrea hammonis*) (family Gastrodontidae), Pfeiffer's amber snail (*Oxyloma elegans*) (family Succineidae), New Zealand mud snail (*Potamopyrgus antipodarum*) (family Tateidae), Marsh whorl snail (*Vertigo antivertigo*), Common whorl snail (*V. pygmaea*) (both family Vertiginidae) and Shiny glass snail (*Zonitoides nitidus*) (family Gastrodontidae).

Other invertebrate species recorded include the Long-toed water beetle (*Dryops luridus*) (family Dryopidae), the Whirligig beetle (*Gyrinus substriatus*) (family Gyrinidae), the Water scavenger beetle (*Laccobius bipunctatus*) (family Hydrophilidae) and the millipede *Cylindroiulus latestriatus* (family Julidae).

Although both target snail species was not recorded, some patches of habitat at Cross Lough appeared to have suitable conditions for Narrow-mouthed whorl snail (*Vertigo angustior*). Despite the site being well used by walkers, the presence of two species of whorl snail, as well as two other Red-listed species Lilljeborg's pea mussel (*Euglesa lilljeborgii*) (VU(A4c)) and Globular pea mussel (*E. hibernica*) (NT (A2c)), highlight the importance of this site for other species (Byrne et al, 2009).

Figure 10. Corraun Point Sampling Point 4.

4.4 Corraun Point

Corraun Point was visited on 29th November with conditions being cool and cloudy. This site is part of the Mullet/Blacksod Bay Complex SAC (000470) and the survey area consists of a dune slack at F 7330 2490 (Sampling point 4). Parking can be found at F 72454 26633, with a long walk along the beach to the survey location. Surveying consisted of searching through short grass around flooded Iris. Seven species of snail were recorded from this location; Lesser moss snail (*Cochlicopa lubricella*) (family Cochlicopidae), Rayed glass snail (*Nesovitrea hammonis*) (family Gastrodontidae), Pfeiffer's amber snail (*Oxyloma elegans*) (family Succineidae), Dwarf snail (*Punctum pygmaeum*) (family Punctidae), Excentric grass snail (*Vallonia cf. excentrica*) (family Valloniidae), Common whorl snail (*Vertigo pygmaea*) (family Vertiginidae), Pellucid glass snail (*Vitrina pellucida*) (family Vitrinidae).

Figure 11. Flooded field at Corraun Point.

Three species of beetle were also recorded here; the ground beetle *Dyschirius globosus* (family Carabidae), the rove beetles *Carpelimus zealandicus* and *Sepedophilus nigripennis* (both family Staphylinidae). The former rove beetle is an invasive species from New Zealand that is now widespread, especially on coastal dunes.

Much of Corraun Point is being grazed by cattle, with evidence of grazing, trampling and enrichment in the dune system. Grassland with nutrient enrichment can be found F 73312 24479, a short distance to the south of the sampling point. Although both target snail species was not recorded, it should be noted that some areas appeared to have suitable conditions for Narrow-mouthed whorl snail (*Vertigo angustior*).

Figure 12. Area of unsuitable, enriched grassland near the sampling point.

Figure 13. Doona Point Sampling Point 5.

4.5 Doona Point

Doona Point was visited on 30th November with conditions being cool and cloudy. This area is mainly made up of dune grassland at F 76543 14775 (Sampling point 5). Parking can be found at F 76837 13667 and a farm track was used to access the survey location with permission from the landowner. Surveying consisted mainly of sieving through moss and grass at this location. Ten species of mollusc were recorded at this location; Hedgehog slug (*Arion intermedius*) (family Arionidae), Lesser moss snail (*Cochlicopa lubricella*) (family Cochlicopidae), Toothless chrysalis snail (*Columella edentula*) (family Truncatellinidae), Common chrysalis snail (*Lauria cylindracea*) (family Lauriidae), Garlic snail (*Oxychilus alliarius*) (family Oxychilidae), Dwarf snail (*Punctum pygmaeum*) (family Punctidae), Moss chrysalis snail (*Pupilla muscorum*) (family Pupillidae), Common whorl snail (*Vertigo pygmaea*) (family Vertiginidae), Milky crystal snail (*Vitrea contracta*) (family Pristilomatidae) and Pellucid glass snail (*Vitrina pellucida*) (family Vitrinidae). Other invertebrate species recorded include the rove beetles *Megasternum obscurum* and *Stenus canaliculatus* (family Staphylinidae), the woodlouse *Philoscia affinis* (family Philosciidae) and Common rough woodlouse (*Porcellio scaber*) (family Porcellionidae).

Figure 14. Flooded field near Doona Point.

Much of Doona Point is being grazed by cattle and although this is mainly taking place in the farmed fields to the south, there is evidence of grazing and trampling in the dune system. Flooded southern fields were found to be unsuitable for Vertigo monitoring as they were inundated with saltwater. Although both target snail species was not recorded, conditions at Doona Point appeared to be suitable for Narrow-mouthed whorl snail (*Vertigo angustior*). The presence of Moss chrysalis snail (*Pupilla muscorum*) a Red-listed species (EN (A2 c)) in the Irish Red List highlights the potential of this site for other important species (Byrne et al, 2009).

Figure 15. Edges of field flooded with saltwater.

5. Results

Despite significant time searching in the field, the two target species were not recorded in 2022 - Geyer's whorl snail (*Vertigo geyeri*) and Narrow-mouthed whorl snail (*V. angustior*). All of the sites surveyed were found to be sub- optimal or unsuitable for the main target species Geyer's whorl snail (*V. geyeri*). Both snails prefer unshaded conditions, and all sampling points were found in open areas. Other factors may explain their absence. Geyer's whorl snail (*V. geyeri*) is usually associated with mossy vegetation in relict base-rich flushes, with no excessive trampling or disturbance (Anderson, 2016a). All of the sampling points during this survey had some level of disturbance, for example the site near Ballycroy has experienced peat cutting in the past. Gladree, Cross Lough, Corraun Point and Doona Point have all experienced trampling from walkers and/or cattle and sheep grazing. This would explain the absence of the target species. It should be noted that the site near Ballycroy appeared to be promising from aerial imagery, however when visited it became apparent that the flush was more acidic than alkaline and so unsuitable. Narrow-mouthed whorl snail (*V. angustior*) is associated with vegetation that has flowing groundwater and high, stable humidity (Anderson, 2016b). Several of the sites appeared to have suitable habitat for Narrow-mouthed whorl snail (*V. angustior*) though this varied in quality and extent.

Gladree and Cross Lough were found to be the most diverse in terms of snail species recorded. Of the three Vertigo species that were recorded in 2022, Common whorl snail (*V. pygmaea*) was found to be the most widely distributed while Striated whorl snail (*V. substriata*) was found to be the most restricted.

Globular pea mussel (*Euglesa hibernica*) and Lilljeborg's Pea Mussel (*Euglesa lilljeborgii*) (family Sphaeriidae) were both recorded from Gladree and Cross Lough. Moss bladder snail (Aplexa hypnorum) (family Physidae) was recorded also recorded from Cross Lough. English chrysalis snail (*Leiostyla anglica*) (family Lauriidae) was recorded from Gladree. Moss chrysalis snail (*Pupilla muscorum*) (family Pupillidae) was recorded from Doona Point.

In terms of beetle species recorded, rove beetles (family Staphylinidae) were found to be the most diverse followed by ground beetles (family Carabidae), and then water scavenger beetles (family Hydrophilidae). Results from the 2022 surveys can be found in the following pages in Table 3, Table 4, Chart 1, Chart 2 and Chart 3. Photographs from the surveys can be found in Appendix 1, a full species list can be found in Appendix 2 and maps with species distributions can be found in Appendix 3.

	Snails and slugs (Mollusca)				
	SITE				
SPECIES	Muingnahal-loona	Gladree	Cross Lough	Corraun Point	Doona Point
Ampullaceana balthica					
Aplexa hypnorum					
Arion ater ater					
Arion intermedius					
Candidula intersecta					
Cernuella virgata					
Cochlicella acuta					
Cochlicopa lubricella					
Columella aspera					
Columella edentula					
Cornu aspersum					
Euconulus alderi					
Euglesa hibernica					
Euglesa lilljeborgii					
Lauria cylindracea					
Leiostyla anglica					
Nesovitrea hammonis					
Oxychilus alliarius					
Oxyloma elegans					
Potamopyrgus antipodarum					
Punctum pygmaeum					
Pupilla muscorum					
Vallonia cf. excentrica					
Vertigo antivertigo					
Vertigo pygmaea					
Vertigo substriata					
Vitrea contracta					
Vitrina pellucida					
Zonitoides nitidus					

Table 3. Mollusca collected during the survey, by site. Sections with darker shading indicate endangered, vulnerable or near threatened species.

			SPECIES							
SITE	SAMPLING POINT	GRID REF	*Vertigo antivertigo*	*Vertigo pygmaea*	*Vertigo substriata*	*Leiostyla anglica*	*Euglesa hibernica*	*Euglesa lilljeborgii*	*Aplexa hypnorum*	*Pupilla muscorum*
Muingnahalloona	1	F84571947								
Gladree	2	F65343575	7	3	3	1	SEVERAL	ABUNDANT		
Cross Lough	3	F64393029	1	1			OCCASIONAL	OCCASIONAL	OCCASIONAL	
Corraun Point	4	F73302490		19						
Doolough Point	5	F74072069								7

Table 4. Endangered, vulnerable or near threatened species of Snails and slugs (Mollusca) collected during the survey, by sampling site. *Vertigo pygmaea* was found at the most sites and Gladree was found to have the greatest variety of species.

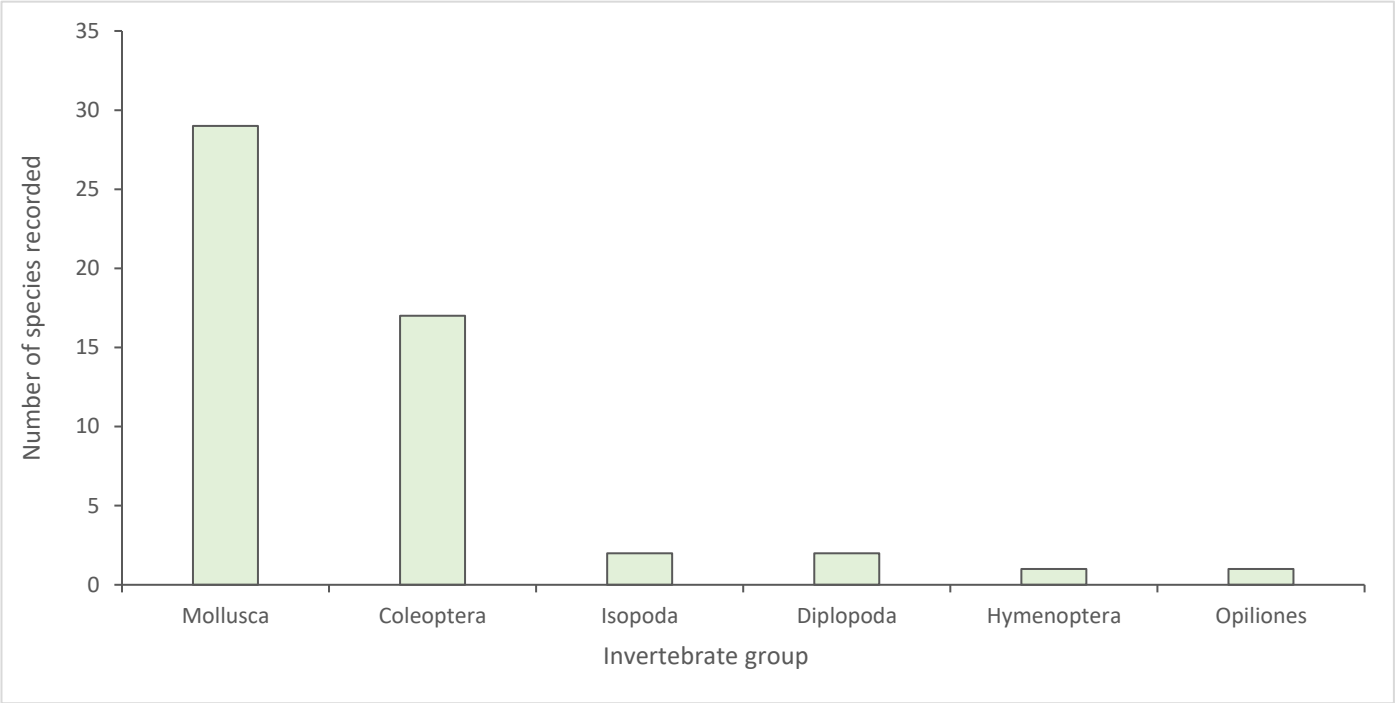


Chart 1. The number of species recorded per invertebrate group. Snails and slugs (Order Mollusca), Beetles (Order Coleoptera), Millepedes (Order Diplopoda), Woodlice and shrimps (Order Isopoda), Bees, wasps and ants (Order Hymenoptera) and Harvestmen (Opiliones).

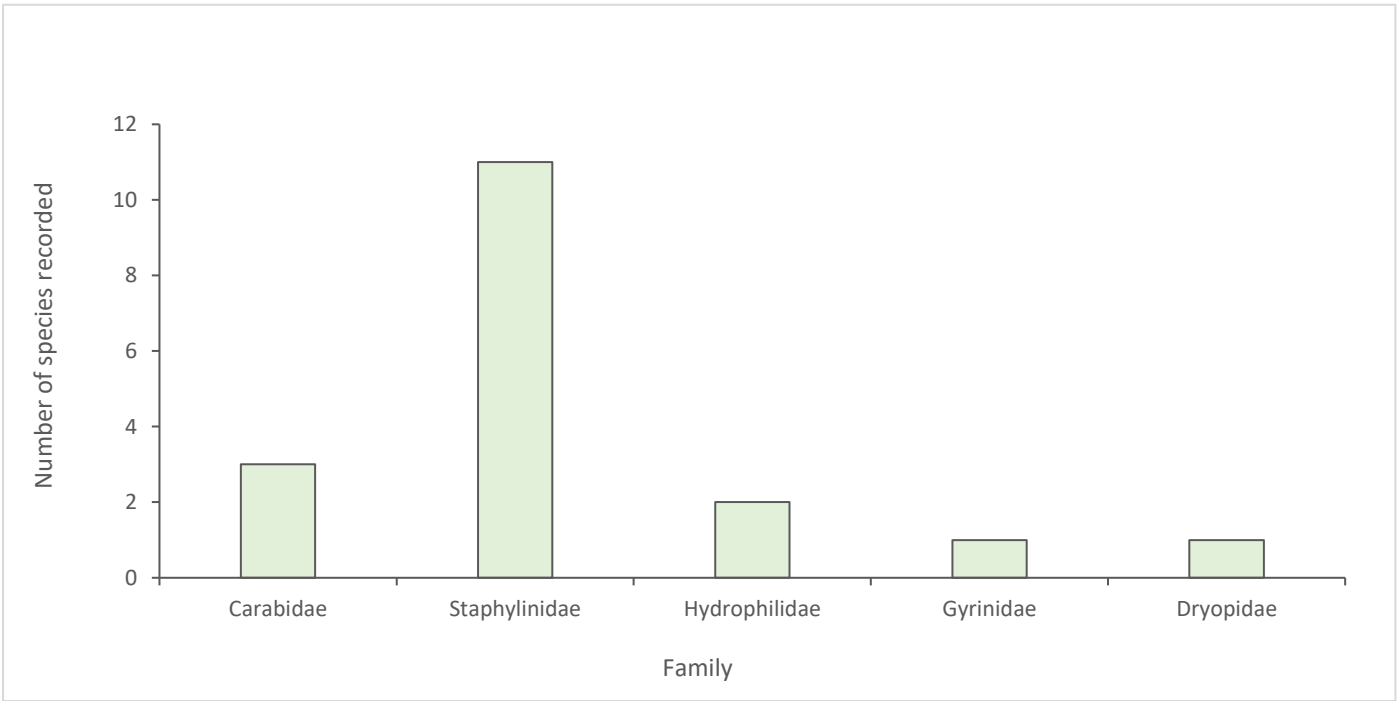


Chart 2. The number of Beetle species (Coleoptera) recorded per family group. Ground beetles (family Carabidae), Rove beetles (family Staphylinidae), Water scavenger beetles (family Hydrophilidae), Whirligig beetles (family Gyrinidae) and Long-toed water beetles (family Dryopidae).

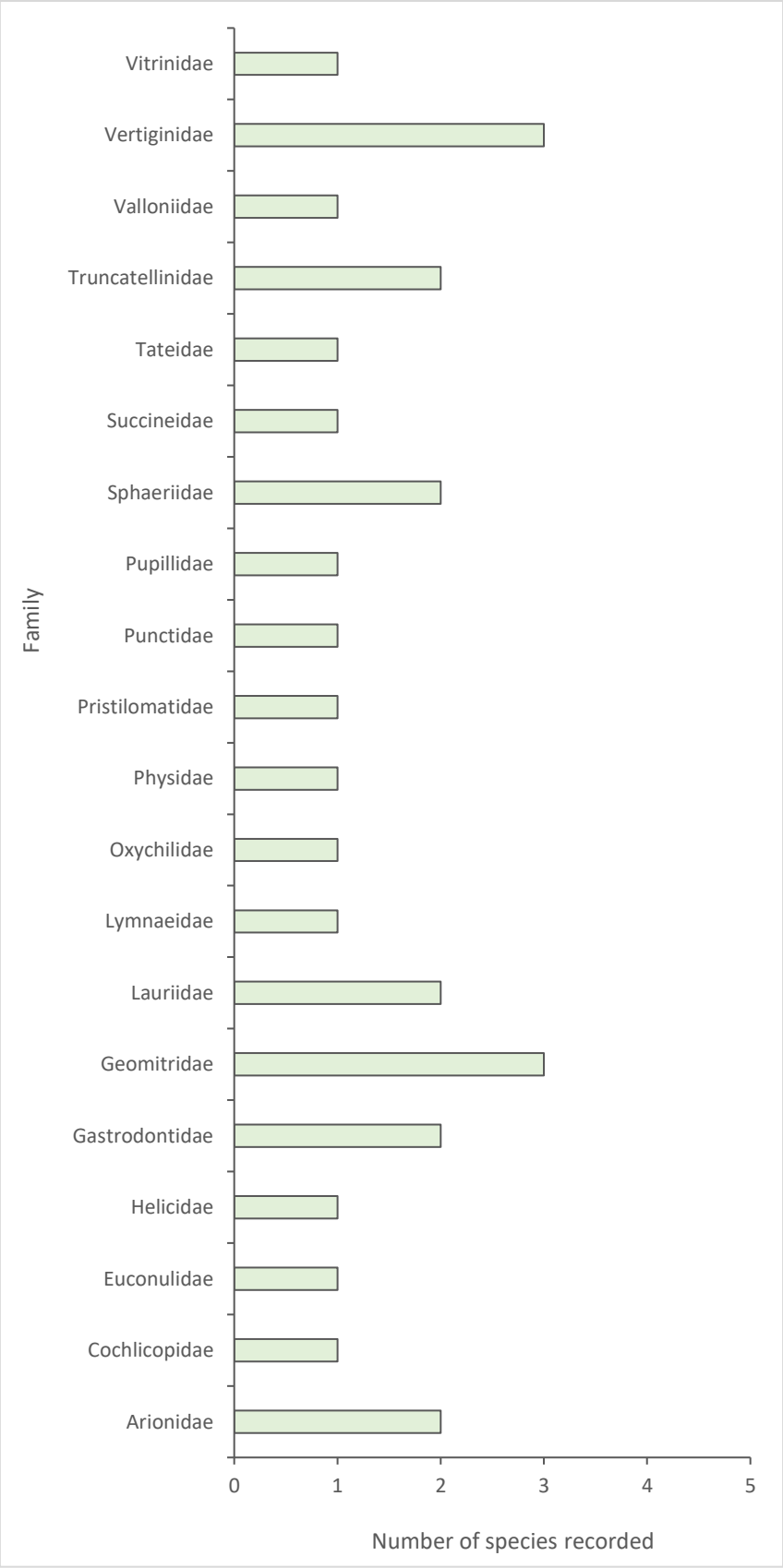


Chart 3. The number of mollusc species recorded per family group.

6. Other Species of Interest

Several other mollusc of interest were recorded during the 2022 surveys. Marsh whorl snail (*V. antivertigo*) has been assessed as being Vulnerable (VU (A1c)) in the Irish Red List (Byrne et al., 2009) and is associated with fens, marshes, unimproved grassland, lakeshores and riverbanks (Anderson, 2016c). Common whorl snail (*V. pygmaea*) has been assessed as being Near Threatened in the Irish Red List (Byrne et al., 2009) and is associated with damp pastures and the margins of wetlands, though in the north and west it is mainly found in coastal habitats like dune grassland (Anderson, 2016d). The Striated whorl snail (*V. substriata*) has been assessed as being Near Threatened in the Irish Red List (Byrne et al. 2009) and is associated with wet unimproved pasture in areas with underlying calcareous bedrock and at the margins of calcareous flushes in upland sites, though is also found in wet scrub, particularly in the west (Anderson, 2016e).

Moss chrysalis snail (*Pupilla muscorum*) (family Pupillidae) was recored from Doona Point. This snailhas been assessed as being Endangered (EN) in the Irish Red List and has become rare. It is usually associated with coastal dunes and is threatened by improvement of pastures for agriculture (Anderson, 2016f; Byrne et al. 2009). Moss bladder snail (*Aplexa hypnorum*) (family Physidae) was recorded from Cross Lough. This species has been assessed as Vulnerable (VU (A2c)) and is associated with temporary habitats subject to seasonal flooding. It is mainly threatened by intensive agriculture (Anderson 2016g; Byrne et al. 2009).

Lilljeborg's Pea Mussel (*Euglesa lilljeborgii*) (family Sphaeriidae) has been assessed as Vulnerable (VU(A4c)) in the Irish Red List (Byrne et al. 2009). This species is found in Western loughs and is associated with sands or gravels on the margins (Anderson, 2016h). Globular pea mussel (*Euglesa hibernica*) (family Sphaeriidae) has been assessed as Near Threatened (NT (A2c)) in the Irish Red List (Byrne et al. 2009). Both of these species can often be recorded together. The latter species, although more common and found in a wider variety of habitats than the former, appears to be in decline particularly in the South east of Ireland (Anderson, 2016i; Byrne et al. 2009). During the 2022 surveys both species were recorded from the Gladree and Cross Lough sites. English chrysalis snail (*Leiostyla anglica*) (family Lauriidae), a species assessed as being Vulnerable (VU (A2c)) in the Irish Red List, was recorded from Gladree (Byrne et al. 2009). This is a local marsh/woodland snail that is usually associated with wet, shaded habitats on neutral to base-rich soils (Anderson, 2016j).

Of the other invertebrate species recorded, the rove beetle *Myllaena kraatzi* (family Staphylinidae) is of particular interest. This is a Rare species that is Notable (Nb) in the UK and is mainly found on western bogs e.g. Ballyogan Loughs, Burren. During the 2022 surveys it was recorded from the Ballycroy site by sieving litter/moss on the bog surface. The woodlouse *Philoscia affinis* (family Philosciidae) was recorded from Doona Point. This species is a recent addition to Irish fauna being discovered in Ireland in 2018. It is very local in Britain, through in Ireland appears to be more widespread in moderately damp places.

Figure 16. Annagh Marsh Reserve.

7. Habitat Management Issues & Recommendations

The 2022 surveys have highlighted potential habitat management issues that will require site specific action. Scrub encroachment does not appear to be a problem at present however it should be monitored closely particularly at Muingnahalloona, where invasive species have been found. The main threat to areas such as Gladree, Corraun Point and Doona Point is overgrazing and nutrient enrichment, for example through feeding of stock and run off from fertiliser. Land managers should be advised of this and if possible, keep grazing light especially on dunes to avoid damaging habitats.

Figure 17. Invasive species near Muingnahalloona.

Surveyors looked at Annagh Marsh Reserve from the road and it was noted that the landscape appeared to have habitat suitable for the target species. The Mullet/Blacksod Bay Complex SAC has high ornithological importance particularly for breeding waders (NPWS, 2014). As Vertigo surveys can take place outside the

breeding season (after August) monitoring could take place here. Birdwatch Ireland should be contacted to see if access to the site is possible. The 2022 surveys have provided a snapshot of mollusc diversity near Termoncarragh, though it is highly likely that other rare species of invertebrate are yet to be found there. Given the large area of potentially suitable habitat around Termoncarragh Lake, it is recommended that targeted surveys take place for other invertebrate taxa including bees, wasps, butterflies and moths.

As surveys took place late in the year there are no records of bees, butterflies, dragonflies etc. that would be expected in sites such as Gladree, Corraun Point and Doona Point. It is recommended that these areas be visited earlier in the year to account for these groups.

8. Conclusions

- Geyer's whorl snail (*Vertigo geyeri*) and Narrow-mouthed whorl snail (*V. angustior*) were not recorded in any of the 5 areas surveyed.
- Three of the more common species of Vertigo were recorded; Marsh whorl snail (*V. antivertigo*), Common whorl snail (*V. pygmaea*) and Striated whorl snail (*V. substriata*) (all family Vertiginidae).
- The best areas for these species are Gladree, Cross Lough and Corraun Point.
- Sampling points with damp ground conditions tended to have a greater chance of finding Vertigo snails.
- At drier sampling points conditions appeared to be sub-optimal and Vertigo species occur at lower densities.
- Cross Lough had the greatest variety of invertebrate species recorded, followed by Ballycroy and then Doona Point.
- Management should be site specific within each of the areas surveyed.
- Where grazing is taking place, this should always remain light.
- Several rare species of Mollusca were recorded; Moss chrysalis snail (*Pupilla muscorum*) (family Pupillidae), Moss bladder snail (*Aplexa hypnorum*) (family Physidae), Globular pea mussel (*Euglesa hibernica*), Lilljeborg's Pea Mussel (*E. lilljeborgii*) (both family Sphaeriidae) and English chrysalis snail (*Leiostyla anglica*) (family Lauriidae).

- The rare rove beetle *Myllaena kraatzi* (family Staphylinidae) was recorded during the 2022 surveys.
- Dune systems at Corraun Point and Doona Point should be managed sensitively.
- Consider using Aerial imagery to monitor scrub encroachment in survey areas particularly at Muingnahalloona. If this becomes an issue targeted scrub removal will be needed.
- Consider targeted surveys of Annagh Marsh Reserve for Vertigo monitoring.
- Consider targeted surveys of area around Termoncarragh Lake for a wider range of invertebrates.

Figure 18. Blacksod Bay.

References

- Anderson, R. and Hart, A. (2022) Monitoring of Narrow-mouthed Whorl Snail (Vertigo angustior) at the Giant's Causeway SAC. A Buglife report for the National Trust.
- Dr. Roy Anderson; Dr. Maria P. Long; Dr. Mark G. Telfer; Adam Mantell; Anna Hart (2017) Survey Report Annex II species of Vertigo within Northern Ireland
- Anderson, R., (2016a). Vertigo (Vertigo) geyeri Lindholm 1925 Whorl Snail [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=183 Accessed on 2022-12-20.
- Anderson, R., (2016b). Vertigo (Vertilla) angustior Jeffreys 1830. [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=188 Accessed on 2022-12-20.
- Anderson, R., (2016c). Vertigo (Vertigo) antivertigo (Draparnaud 1801). [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=182 Accessed on 2022-12-20.
- Anderson, R., (2016d). Vertigo (Vertigo) pygmaea (Draparnaud 1801). [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=186 Accessed on 2022-12-20.
- Anderson, R., (2016e). Vertigo (Vertigo) substriata (Jeffreys, 1833). [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=187 Accessed on 2022-12-20
- Anderson, R., (2016f). Pupilla (Pupilla) muscorum (Linnaeus 1758). [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=148 Accessed on 2023-02-02.
- Anderson, R., (2016g). Aplexa hypnorum (Linnaeus 1758). [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=15 Accessed on 2023-02-02.
- Anderson, R., (2016h). Pisidium lilljeborgii Clessin 1886. [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=130 Accessed on 2023-02-02.
- Anderson, R., (2016i). Pisidium hibernicum Westerlund 1894. [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=101 Accessed on 2023-02-03.
- Anderson, R., (2016j). Leiostyla (Leiostyla) anglica (A. Férussac 1821). [In] MolluscIreland. http://www.habitas.org.uk/molluscireland/species.asp?ID=102 Accessed on 2023-02-02.
- Anderson, R. & McFerran, D., (2001) [In] The Ground Beetles of Ireland - http://www.habitas.org.uk/groundbeetles/
- Buglife (2022a) Fens. Accessed from: https://www.buglife.org.uk/advice-and-publications/advice-on-managing-bap-habitats/fens
- Buglife (2022b) Maritime cliffs and slopes. Accessed from: https://www.buglife.org.uk/resources/habitat-management/maritime-cliffs-and-slopes/
- Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) Ireland Red List No. 2 – NonMarine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Denver Ecology (2021) Petrifying spring survey and assessment Moy Estuary, Co. Mayo. Report produced by Denyer Ecology for 'River Moy Search and Rescue Ballina.
- JNCC (2022) 1014 Narrow-mouthed whorl snail Vertigo angustior. Accessed online at https://sac.jncc.gov.uk/species/S1014/
- Moorkens, E.A. & Killeen, I.J. (2011a) Implementation of a Vertigo monitoring programme: Vertigo geyeri monitoring at Brackloon & Fermoyle NPWS unpublished
- Moorkens, E.A. & Killeen, I.J. (2011b) Monitoring and Condition Assessment of Populations of Vertigo geyeri, Vertigo angustior and Vertigo moulinsiana in Ireland. Irish Wildlife Manuals, No. 55. NPWS, Dublin
- NBN (2022) Vertigo angustior Jeffreys, 1830. Accessed online at https://species.nbnatlas.org/species/NBNSYS0000006675
- NPWS (2014) Conservation Objectives: Mullet/Blacksod Bay Complex SAC 000470. Version National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2017) Conservation Objectives: Bellacorick Bog Complex SAC 001922. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

Appendix 1: Photos

Figure 19. Habitats at Gladree.

Figure 20. A decaying whale carcass washed up on the beach at Corraun Point (F 73229 24584).

Figure 21. Exposed peat at Corraun Point beach.

Figure 22. Coastal erosion at Doona Point.

Figure 23. Exposed tree roots on Corraun beach.

Figure 24. Erosion at Doona Point showing exposed peat layer.

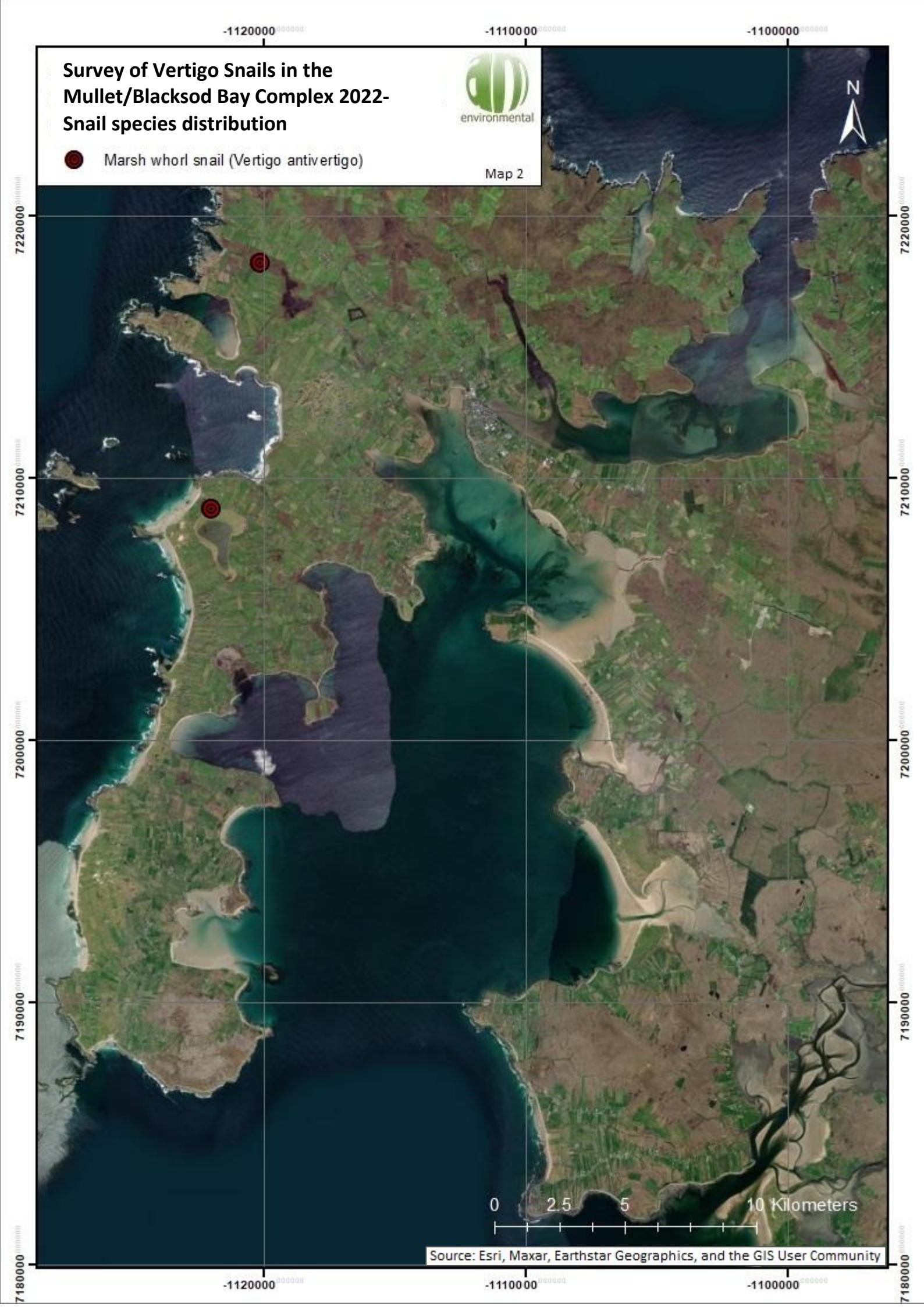
Figure 25. Mud bank at Enniscrone Dunes.

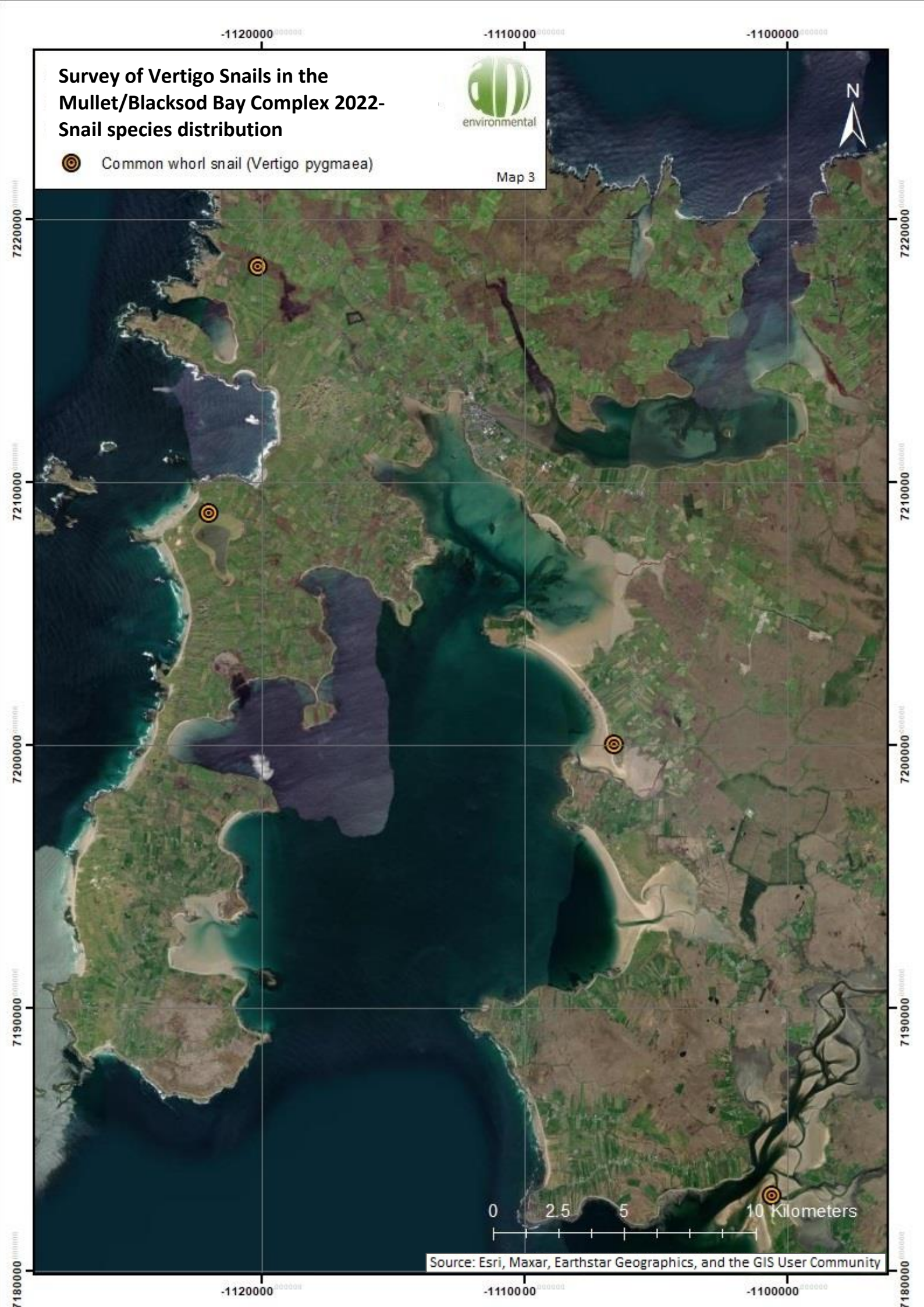
Appendix 2: Species list

Common name	Species	Family
Large black slug	*Arion ater ater*	Arionidae
Hedgehog slug	*Arion intermedius*	Arionidae
Wandering pond snail	*Ampullaceana balthica*	Lymnaeidae
Moss bladder snail	*Aplexa hypnorum*	Physidae
Wrinkled snail	*Candidula intersecta*	Geomitridae
Striped snail	*Cernuella virgata*	Geomitridae
Pointed snail	*Cochlicella acuta*	Geomitridae
Lesser moss snail	*Cochlicopa lubricella*	Cochlicopidae
A snail	*Columella aspera*	Truncatellinidae
Toothless chrysalis snail	*Columella edentula*	Truncatellinidae
Garden snail	*Cornu aspersum*	Helicidae
A snail	*Euconulus alderi*	Euconulidae
Globular pea mussel	*Euglesa hibernica*	Sphaeriidae
Lilljeborg's Pea Mussel	*Euglesa lilljeborgii*	Sphaeriidae
Common chrysalis snail	*Lauria cylindracea*	Lauriidae
English chrysalis snail	*Leiostyla anglica*	Lauriidae
Rayed glass snail	*Nesovitrea hammonis*	Gastrodontidae
Garlic snail	*Oxychilus alliarius*	Oxychilidae
Pfeiffer's amber snail	*Oxyloma elegans*	Succineidae
New Zealand mud snail	*Potamopyrgus antipodarum*	Tateidae
Dwarf snail	*Punctum pygmaeum*	Punctidae
Moss chrysalis snail	*Pupilla muscorum*	Pupillidae
Eccentric grass snail	*Vallonia cf. excentrica*	Valloniidae
Marsh whorl snail	*Vertigo antivertigo*	Vertiginidae
Common whorl snail	*Vertigo pygmaea*	Vertiginidae
Striated whorl snail	*Vertigo substriata*	Vertiginidae
Milky crystal snail	*Vitrea contracta*	Pristilomatidae
Pellucid glass snail	*Vitrina pellucida*	Vitrinidae
Shiny glass snail	*Zonitoides nitidus*	Gastrodontidae
A ground beetle	*Agonum fuliginosum*	Carabidae
A ground beetle	*Agonum thoreyi*	Carabidae
A ground beetle	*Dyschirius globosus*	Carabidae
A rove beetle	*Carpelimus zealandicus*	Staphylinidae
Long-toed water beetle	*Dryops luridus*	Dryopidae
A rove beetle	*Gymnusa brevicollis*	Staphylinidae
Whirligig beetle	*Gyrinus substriatus*	Gyrinidae
Water scavenger beetle	*Laccobius bipunctatus*	Hydrophilidae
A rove beetle	*Lesteva sicula ssp. heeri*	Staphylinidae
A rove beetle	*Megasternum obscurum*	Staphylinidae
A rove beetle	*Myllaena kraatzi*	Staphylinidae
A rove beetle	*Sepedophilus nigripennis*	Staphylinidae
A rove beetle	*Stenus boops*	Staphylinidae
A rove beetle	*Stenus canaliculatus*	Staphylinidae
A rove beetle	*Stenus cicindeloides*	Staphylinidae
A rove beetle	*Stenus impressus*	Staphylinidae
A rove beetle	*Stenus nitens*	Staphylinidae
A rove beetle	*Stenus palustris*	Staphylinidae
A millipede	*Cylindroiulus latestriatus*	Julidae
Snake millipede	*Proteroiulus fuscus*	Blaniulidae

Common name	Species	Family
A harvestman	*Nemastoma bimaculatum*	Nemastomatidae
A woodlouse	*Philoscia affinis*	Philosciidae
Common rough woodlouse	*Porcellio scaber*	Porcellionidae
An ant	*Formica lemani*	Formicidae

Appendix 3: Maps


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Snail species distribution
Marsh whorl snail (Vertigo antivertigo)
Map 2
environmental
N
-1120000
-1110000
-1100000
7220000
7210000
7200000
7190000
7180000
0
2.5
5
10 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Snail species distribution
Common whorl snail (Vertigo pygmaea)
Map 3
environmental
N
-1120000
-1110000
-1100000
7220000
7210000
7200000
7190000
7180000
0
2.5
5
10 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Snail species distribution
Striated whorl snail (Vertigo substriata)
Map 4
environmental
N
-1120000
-1110000
-1100000
7220000
7210000
7200000
7190000
7180000
0
2.5
5
10 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Snail species distribution
One species
Two species
Three species
Map 5
environmental
N
-1120000
-1110000
-1100000
7220000
7210000
7200000
7190000
7180000
0
2.5
5
10 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Other snail species distribution
environmental
N
English chrysalis snail (Leiostyla anglica)
Moss bladder snail (Aplexa hypnorum)
Moss chrysalis snail (Pupilla muscorum)
Map 6
-1120000
-1110000
-1100000
7220000
7210000
7200000
7190000
7180000
0
2.5
5
10 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Other snail species distribution
Lilljeborg's pea mussel (Euglesa lilljeborgii)
Map 7
environmental
N
-1120000
-1110000
-1100000
7220000
7210000
7200000
7190000
7180000
0
2.5
5
10 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community


Survey of Vertigo Snails in the Mullet/Blacksod Bay Complex 2022- Distribution of other species
The rove beetle (Myllaena kraatzi)
Map 8
environmental
N
-1120000
-1110000
-1100000
-1090000
7230000
7220000
7210000
7200000
7190000
7180000
0
3
6
12 Kilometers
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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