

Breeding birds in the Andakíll Ramsar site: distribution and abundance in 2017

Landbúnaðarháskóli Íslands
Andakíll Ramsar Bird Monitoring Project 2017



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Niall Tierney & Rachel A. Tierney

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Executive Summary

This publication is part of a suite of surveys investigating bird abundance, diversity and seasonality in the Andakill Ramsar site in Borgarfjörður, western Iceland (64°33'N, 21°46'W). Here, farmland and wetland birds are investigated. Greenland White-fronted Geese and the birds of the estuary are covered elsewhere (Tierney & Stroud 2018; Tierney & Tierney 2020).

Iceland supports internationally important breeding populations of 21 bird species, and a large proportion of the world population for some species. Many of these birds breed in wetland habitats. Their dependence on open and wet breeding areas means that they are threatened by changes in land use; such as drainage, agricultural intensification and afforestation.

Understanding how populations are changing is of huge importance, and having baseline information on breeding bird diversity and abundance is a vital first step.

In order to assess abundance and diversity of the breeding birds, 21 surveys were conducted between 5th May and 19th June 2017. Seven 1-km transects, which were well spread throughout the Ramsar site and covered the main habitat types, were surveyed. Each transect was surveyed on three occasions, and the number of breeding waterbirds was estimated based on the behaviour of the counted birds.

In total, 34 species were recorded, and seven species were recorded in all transects. The species diversity in the transects ranged from 16 to 23 species, and there were considerable differences in the number of individuals recorded between transects.

There were no incidences of disturbance recorded during surveys. However, three of the transects cross fields that are managed for silage, and therefore had mowing operations during the breeding season.

This survey was designed so that it could be replicated by others in subsequent years. Conducting repeat surveys, annually or periodic, would allow trends in the number of breeding birds to be generated. Such information would be useful for conservation casework and research purposes.

1. Introduction

Iceland supports internationally important breeding populations of 21 bird species (Einarsson *et al.* 2002), including 10 species of wader (Delany and Scott 2002). It supports a large proportion of the world population for some species, and is especially important for many breeding waders (Gunnarsson *et al.* 2006; Wetlands International 2006; Jóhannesdóttir *et al.* 2014). Iceland is the second most important breeding area for waders in Europe, after the vastly larger Russia (Thorup 2004). It has been estimated that 4–5 million adult and juvenile waders migrate from Iceland each autumn (Guðmundsson 1998). Wetland habitats are of major importance for breeding birds in Iceland (Gunnarsson *et al.* 2006). The abundance of breeding birds is generally highest in wetland and semi-wetland habitats (Jóhannesdóttir *et al.* 2014), with most ground nesting species preferring open areas to nest and avoiding woodland (Gunnarsson *et al.* 2006; Pálsdóttir 2019).

Waterbird populations have been declining worldwide in recent years, mainly as a result of habitat degradation or loss (International Wader Study Group 2003; Piersma *et al.* 2016; BirdLife International 2017; Pearce-Higgins *et al.* 2017). Land use change has led to modification and loss of wetlands and to increased disturbance to birds (van de Kam *et al.* 2004; Boere *et al.* 2007). Similarly, pressure from recreational activities has increased in many important wetlands, and this is among the main causes of population declines for waterbirds (Goss-Custard & Yates 1992; Davidson & Rothwell 1993; van de Kam *et al.* 2004). Over the last century in Iceland, there has been widespread drainage of wetlands and conversion to agriculture. Drainage has occurred at 90% of wetlands in the west and south of Iceland since the middle of the last century (Oskarsson 1998; Thorhallsdóttir *et al.* 1998) and the area of cultivated land is predicted to expand in the near future. However, the amount of cultivated land effects wader densities differently depending on the heterogeneity of the surrounding area. Jóhannesdóttir *et al.* (2019) show that, at higher attitudes (>100 m a.s.l), some conversion to agricultural land may be beneficial to waders, due to the greater productivity of cultivated land. Though further intensification, to landscapes dominated by cultivated land, is likely to be detrimental to breeding waders.

Afforestation is well known to be a major threat to bird populations (Stroud *et al.* 1987; Thompson *et al.* 1988). Most of the internationally important breeding populations that occur in Iceland are vulnerable to impacts from afforestation (AEWA 2016), through the loss of nesting and feeding areas. Climate change is likely to adversely affect migratory birds (Robinson *et al.* 2005), and waterbirds are likely to be particularly affected, as they specialise on habitats that are vulnerable to changes in rainfall and human-demand (Maclean *et al.* 2007).

Therefore, at this time of unprecedented change, information on species trends and site usage is especially important. Given the huge importance of Iceland for breeding birds, and the anticipated future habitat changes (e.g. agricultural intensification/expansion, afforestation), having baseline information on breeding bird diversity and abundance is a vital first step to monitoring these changes.

The aim of this study is simply to generate baseline information on the distribution and abundance of the breeding birds in the natural, semi-natural and agricultural parts of the Andakill Ramsar site. It is hoped that a similar approach can be taken in future years, allowing comparisons with this work, and the generation of trends in species numbers. In order to facilitate further monitoring, comprehensive rationale and methodology for this survey is presented as a separate *Survey Handbook* (Stroud & Tierney 2017).

2. Methods

2.1 Survey area

The Andakill Ramsar site is situated in Borgarfjörður, western Iceland (64°34' N, 21°46' W). The protected area is a 3,086-hectare wetland complex, comprising an estuary, natural saltmarsh, intertidal habitats, a freshwater, wet heath, peatland, natural and managed marshes (Thrainsson *et al.* 2013) intensively managed agricultural land and the village of Hvanneyri.

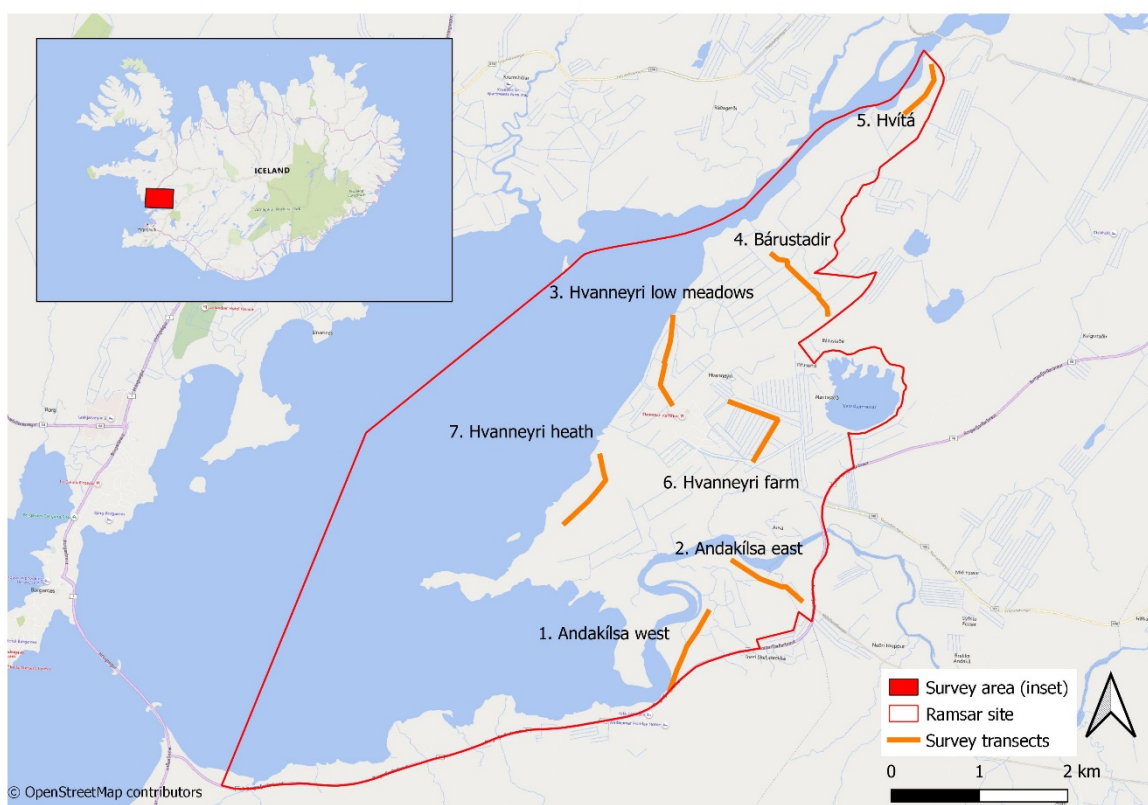


Figure 2-1. The study area the Andakill Ramsar site in Borgarfjörður, showing the location of seven 1-km transects used to survey breeding birds.

Table 2-1. The name and location of seven 1-km breeding bird transect used to survey breeding birds in the Andakill Ramsar site.

Number	Transect name	Start coordinates	Mid coordinates	End coordinates
1	Andakílsa West	64.536285, -21.766115	-	64.544826, -21.757813
2	Andakílsa East	64.545708, -21.736272	-	64.549162, -21.755295
3	Hvanneyri low meadows	64.564846, -21.768569	64.569042, -21.770318	64.573409, -21.768938
4	Bárustadir	64.574877, -21.732819	-	64.581246, -21.748310
5	Hvitá	64.601196, -21.710929	-	64.600328, -21.710336
6	Hvanneyri farm	64.559688, -21.748613	64.563786, -21.743496	64.565095, -21.753313
7	Hvanneyri heath	64.557154, -21.784329	64.557603, -21.784185	64.549468, -21.795325

Seven 1-kilometre transects covering wet grassland, heathland, and hay meadow habitats were surveyed between 5th May and 19th June 2017. Each transect was surveyed on three occasions, during calm, dry conditions; when bird activity was unlikely to be affected by the weather. Surveys were mainly focussed on early mornings, but some surveys took place later in the day, or in the evening.

The transects were walked in the same direction on each occasion.

Table 2-2. The dates when each transect was surveyed.

Number	Transect name	Visit 1	Visit 2	Visit 3
1	Andakílsa West	05-May	23-May	15-Jun
2	Andakílsa East	06-May	03-Jun	15-Jun
3	Hvanneyri low meadows	09-May	10-Jun	19-Jun
4	Bárustadir	09-May	26-May	12-Jun
5	Hvítá	07-May	26-May	16-Jun
6	Hvanneyri farm	18-May	10-Jun	19-Jun
7	Hvanneyri heath	17-May	31-May	12-Jun

2.2 Transect surveys

Each transect was surveyed by two observers on foot. The 1-km route was divided into four 250-metre-long sections to facilitate the observers in focusing on their immediate vicinity, and to prevent looking too far ahead (and potentially double-counting birds). The presence and number of all birds within 100 m of the transect line was recorded. For waterbirds (waders and wildfowl) and seabirds, breeding status was also recorded. Methodology followed Reed and Fuller (1983), O'Brien and Smith (1992), Gilbert *et al.* (1998), and Richardson (1990) for waders, and Gilbert *et al.* (1998) for dabbling and diving ducks. See Table 2-3 for the approach used for each species.

Birds were detected by sound and by scanning with binoculars. Birds that were seen within 100 metres either of the transect line were recorded as being '*in*' the transect. Birds seen or heard greater than 100 metres away were recorded as '*outside*' the transect. Birds observed in flight that were simply commuting through the transect area and not using it (for feeding, roosting or nesting) were recorded as 'Flying over'. All records of individual birds were recorded on recording sheets using two-letter British Trust for Ornithology species codes and standard notation for behaviour (see

Appendix). The presence or absence of disturbance events was recorded.

Equipment used for fieldwork included:

- binoculars (Zeiss Victory 8 x 42, Zeiss Dialyt 10 x 40 B)
- *WeatherWriter* clipboard

bespoke Field recording forms (see

- Appendix)

2.3 Interpretation of census results and estimation of breeding pairs

In general, breeding birds were differentiated from non-breeding birds on the basis that breeders tend to be more vocal, perform courtship and distraction displays and have territorial disputes, while non-breeding birds do not, and tend to congregate in larger numbers. The specific criteria used are provided in Table 2-3. The number of breeding pairs was estimated for all waterbird and seabird species (except Red-necked Phalarope *Phalaropus lobatus*). With the exception of Greylag Goose *Anser anser* and Whooper Swan *Cygnus cygnus* and seabirds, nests were not included when estimating the number of breeding pairs, as this could have resulted in over-estimating the number of pairs, if a nest and the associated adults were counted separately. For Red-necked Phalarope, Rock Ptarmigan *Lagopus muta* and passerines, the total number of adults is reported - the number of breeding pairs was not estimated. On completion of each survey, the records for each of the four 250 metre sections were summarised and the number of breeding pairs was estimated. The survey field sheet facilitates tabulation of the survey results from the notes taken during the survey. When reporting the estimated number of breeding pairs for each transect here, the highest number of pairs from the three visits was used.

Table 2-3. Approach to assigning breeding status to waterbird species.

Species	Breeding status	Behaviour	Output	Method based on:
Greylag Goose, Whooper Swan	Breeding	1 or 2 birds behaving in a way that suggests a nearby nest (vigilance, agitation, apparent reluctance to leave the area despite approach of surveyors)	Pair	-
		An occupied nest	Pair	
		A family group including one or two adults and one or more juveniles	Pair	
	Non-breeding	Groups of adults larger than two with no juveniles		
Shelduck, Wigeon, Mallard, Pintail, Teal, Tufted Duck, Red-breasted Merganser	Breeding	A group of two birds comprising a male and female	Pair	Gilbert <i>et al.</i> (1998) (p402, <i>Dabbling and diving ducks</i>)
		A lone male	Pair	
		Males in groups of 2-4	2-4 pairs	
	Non-breeding	Groups of 5 or more birds		
Oystercatcher	Breeding	1 bird on ground more than 125 m from another bird	Pair	Reed and Fuller (1983)
		2 individuals within 125 m of each other	Pair	
		2 birds together	Pair	
		3-4 birds together	2 pairs	
		1-2 birds flying into, out of, or through area	Pair	
	3 or more birds remaining in the area on the ground or circling - vocal birds only	2+ pairs		
	Non-breeding	Greater than 5 birds in a flock <i>on the ground not vocalising</i> (assumed non-breeding) Greater than 3 birds (vocal or non-vocal) in a flock <i>flying</i> into, out of, or through the area		

Dunlin, Ringed Plover	Breeding	1 bird on ground more than 50 m from another bird	Pair	Reed and Fuller (1983)
		2 birds on the ground within 50 m of each other	Pair	
		2 birds together	Pair	
		3-4 birds together	2 pairs	
		1-4 birds flying into, out of or through site	1 - 2 pairs	
	5 or more birds on the ground or circling (vocal)	3+ pairs		
Non-breeding	Greater than 5 birds in a flock <i>on the ground not vocalising</i> (assumed non-breeding)			
	Greater than 5 birds in a flock flying into, out of, or through the area Any birds that fly out of the site for more than 150 m without landing			
Black-tailed Godwit, Whimbrel	Breeding	A displaying male	Pair	Gilbert <i>et al.</i> (1998) (Black-tailed Godwit);
		1 bird on ground more than 75 m from another bird	Pair	
		2 individuals within 75 m of each other	Pair	
		2 birds together	Pair	
	Non-breeding	1 or 2 birds behaving in a way that suggests a nearby nest (alarm calling, pair calling, distraction displays)	Pair	Richardson (1990) (Whimbrel)
		Groups of more than 2 birds without vigorous calling / agitation		
Redshank	Breeding	1 bird on ground more than 75 m from another bird	Pair	Reed and Fuller (1983)
		2 individuals within 75 m of each other	Pair	
		2 birds together	Pair	
		3-4 together	2 pairs	
		1-4 birds flying into, out of, or through the site	1 - 2 pairs	
	5 or more vocal birds on the ground or circling	3+ pairs		
Non-breeding	Greater than 5 birds in a flock on the ground not vocalising Greater than 5 birds in a flock flying into, out of, or through the area Any birds that fly out of the site for more than 150 m without landing			
Snipe	Breeding	Total number of individuals drumming or chipping		O'Brien and Smith (1992)
Red-necked Phalarope -		The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.		-
Seabirds ¹	Breeding	Two individuals showing display or agitated behaviour	Pair	-
		An apparently occupied nest	Pair	
Non-breeding	Foraging birds not agitated by the presence of surveyors or other birds			
	Passerines ²	-	The absolute number of birds were recorded with no distinction made between breeding and non-breeding birds	-
Ptarmigan	-	The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.		-

¹ Seabirds: Great Black-backed Gull, Lesser Black-backed Gull, Black-headed Gull, Arctic Skua and Arctic Tern.

² Passerines: Raven, White Wagtail, Wheatear, Redwing and Meadow Pipit.

3. Results

3.1 Species diversity and abundance overall

In total, 34 species were recorded. This includes birds seen within the transects, seen or heard outside the transects (> 100 m from the transect line), and those flying over (and not using) the transects. The highest diversity (23 species) was recorded in Andakílsá west and Hvítá, and the lowest (16 species) in the Bárustaðir transect (Figure 3-1).

The total number of birds recorded per transect varied considerably between survey visits and transects (Figure 3-2). Hvanneyri Farm had the highest abundance of birds in any survey, with 98 individuals recorded on the first visit. Hvanneyri heath had the lowest abundance overall, with fewer than 40 birds recorded in each of the three surveys.

The following seven species were recorded in every transect: Arctic Tern *Sterna paradisaea*, Black-tailed Godwit *Limosa limosa*, Mallard *Anas platyrhynchos*, Meadow Pipit *Anthus pratensis*, Redshank *Tringa totanus*, Snipe *Gallinago gallinago* and Whimbrel *Numenius phaeopus*.

There were no incidences of disturbance recorded during surveys. However, three transects (Hvanneyri farm, Hvanneyri low meadows and Hvítá) were managed for silage, and therefore would have had mowing operations during the breeding season. For example, the fields that the Hvanneyri farm transect crosses were mown (on 4th June) and baled between the first and second visits (18th May, 10th June).

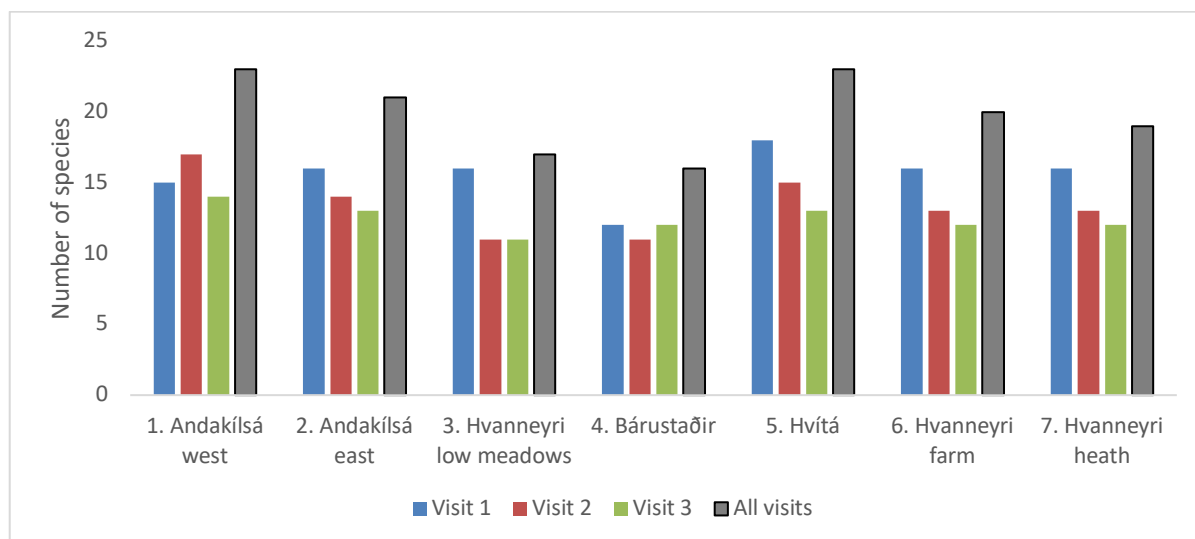


Figure 3-1. The total number of species recorded in each transect during three survey visits to seven breeding bird transects in the Andakill Ramsar site between 5th May and 19th June 2017.

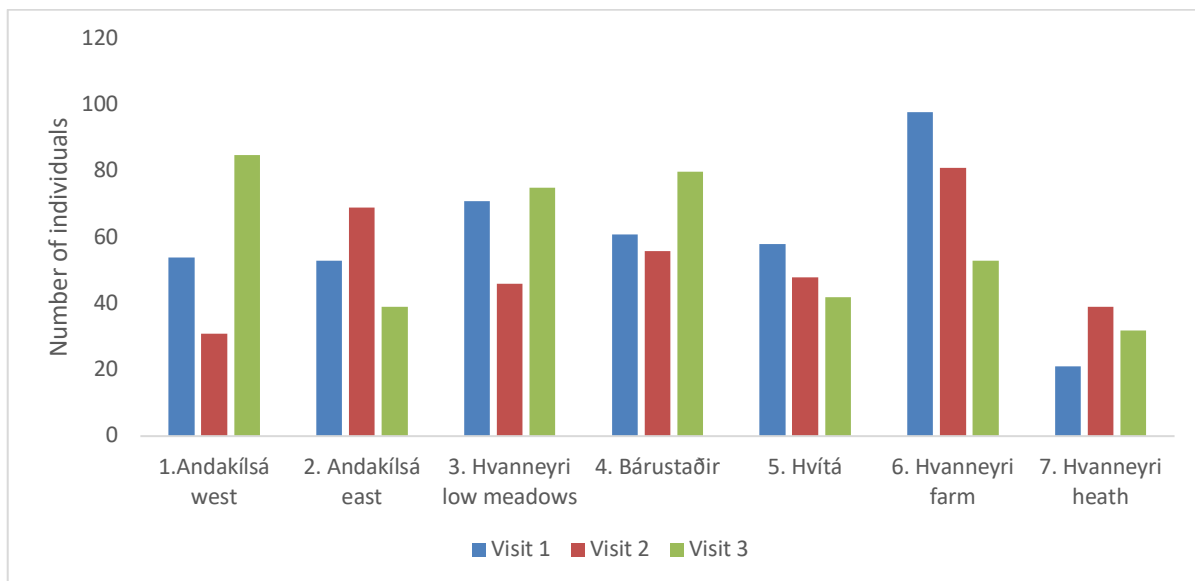


Figure 3-2. Total number of individuals recorded during three visits to seven breeding bird transects in the Andakill Ramsar site between 5th May and 19th June 2017. Birds seen or heard outside the transect (i.e > 100 m from the transect), or flying over are not included.

Table 3-1. The estimated number of breeding pairs recorded during three surveys to seven 1 km transects in the Andakill Ramsar site between 5th May and 19th June 2017¹. Dots indicate a species' presence in a transect without evidence of breeding.

		1. Andakilsá west	2. Andakilsá east	3. Hvanneyri low meadows	4. Bárustaðir	5. Hvítá	6. Hvanneyri farm	7. Hvanneyri heath
Wildfowl and allies								
Greylag Goose	<i>Anser anser</i>	3	1			•	1	
Pink-footed Goose	<i>Anser brachyrhynchus</i>	•						
Whooper Swan	<i>Cygnus cygnus</i>	1			2	2	•	
Common Shelduck	<i>Tadorna tadorna</i>	•		2		•		1
Mallard	<i>Anas platyrhynchos</i>	1	3	2	1	1	2	1
Eurasian Wigeon	<i>Anas penelope</i>		•	2	1	3		
Northern Pintail	<i>Anas acuta</i>					•		
Eurasian Teal	<i>Anas crecca</i>	1	1	1			1	
Tufted Duck	<i>Aythya fuligula</i>				1			
Red-breasted Merganser	<i>Mergus serrator</i>		1		1			
Gamebirds								
Rock Ptarmigan ²	<i>Lagopus muta</i>			1		1		4
Waders								
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	1				1	6	•
European Golden Plover	<i>Pluvialis apricaria</i>	1			1	4	3	1
Ringed Plover	<i>Charadrius hiaticula</i>					1	1	
Common Snipe	<i>Gallinago gallinago</i>	13	12	16	12	7	10	4
Black-tailed Godwit	<i>Limosa limosa</i>	3	7	4	7	3	7	1
Whimbrel	<i>Numenius phaeopus</i>	1	3	4	4	3	4	4
Common Redshank	<i>Tringa totanus</i>	9	8	7	6	5	10	4
Ruddy Turnstone	<i>Arenaria interpres</i>	•						
Dunlin	<i>Calidris alpina</i>	4	3	1	4	2		1
Red-necked Phalarope ²	<i>Phalaropus lobatus</i>	19	5	12	1			
Seabirds								
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	•			1	•	•	
Great Black-backed Gull	<i>Larus marinus</i>	•					•	
Lesser Black-backed Gull	<i>Larus fuscus</i>					•	•	
Arctic Tern	<i>Sterna paradisaea</i>		•		•	•		•
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	•	1	1	1	1		1
Passerines								
Common Raven ²	<i>Corvus corax</i>	1						
Redwing ²	<i>Turdus iliacus</i>	2		13		1	14	
Northern Wheatear ²	<i>Oenanthe oenanthe</i>							1
White Wagtail ²	<i>Motacilla alba</i>					1	1	
Meadow Pipit ²	<i>Anthus pratensis</i>	8	5	10	10	9	6	7

¹ All birds recorded within 100 m of the transect line. Birds flying over, and not 'using' the transect are not shown. Birds seen or heard outside the transect (>100 m from the transect line) are not shown, but are included in the accounts of each transect below.

² Maximum number of adult birds recorded across the three survey visits. The number of breeding pairs was not estimated.

3.2 Transect 1 - Andakílsá west

Survey dates: 5th & 23rd May, 15th June.

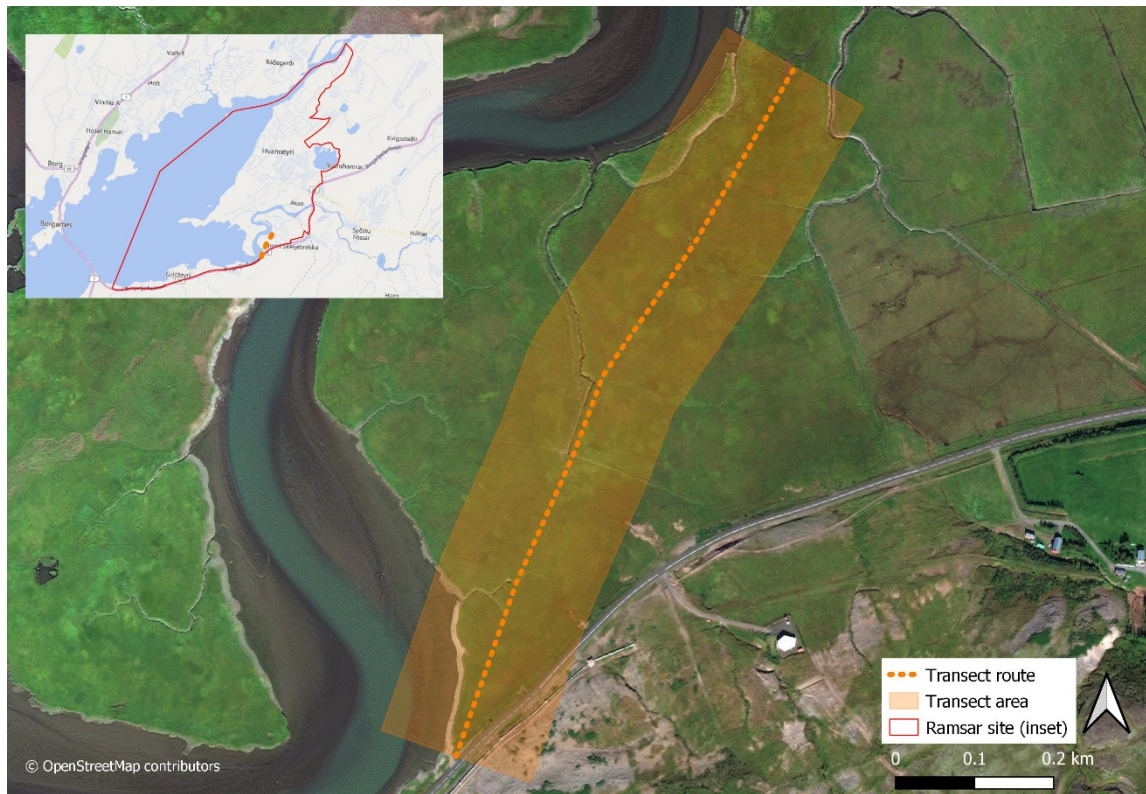


Figure 3-3. Andakílsá west transect route, including the transect area 100 m either side of the transect line.

Table 3-2. Summary of the numbers of birds recorded during three visits to the Andakílsá west transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Greylag Goose	<i>Anser anser</i>	3	22	0	
Pink-footed Goose	<i>Anser brachyrhynchus</i>	0	1	0	
Whooper Swan	<i>Cygnus cygnus</i>	1	1	0	
Common Shelduck	<i>Tadorna tadorna</i>	0	1	0	✓
Mallard	<i>Anas platyrhynchos</i>	1	2	0	
Eurasian Teal	<i>Anas crecca</i>	1	1	0	
Northern Fulmar	<i>Fulmarus glacialis</i>	0	0	1	✓
Waders					
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	1	2	0	
European Golden Plover	<i>Pluvialis apricaria</i>	1	1	0	
Common Snipe	<i>Gallinago gallinago</i>	13	13	0	
Black-tailed Godwit	<i>Limosa limosa</i>	3	5	0	✓
Whimbrel	<i>Numenius phaeopus</i>	1	1	0	✓
Common Redshank	<i>Tringa totanus</i>	9	13	0	✓
Ruddy Turnstone	<i>Arenaria interpres</i>	0	1	0	
Dunlin	<i>Calidris alpina</i>	4	9	0	✓
Red-necked Phalarope ¹	<i>Phalaropus lobatus</i>	-	19	0	
Seabirds					
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	0	4	13	
Great Black-backed Gull	<i>Larus marinus</i>	0	1	0	
Arctic Tern	<i>Sterna paradisaea</i>	0	0	3	
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	0	1	3	✓
Passerines					
Common Raven ¹	<i>Corvus corax</i>	-	1	0	
Redwing ¹	<i>Turdus iliacus</i>	-	2	0	
Meadow Pipit ¹	<i>Anthus pratensis</i>	-	8	0	

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

3.3 Transect 2 - Andakílsá east

Survey dates: 6th May, 3rd & 15th June.

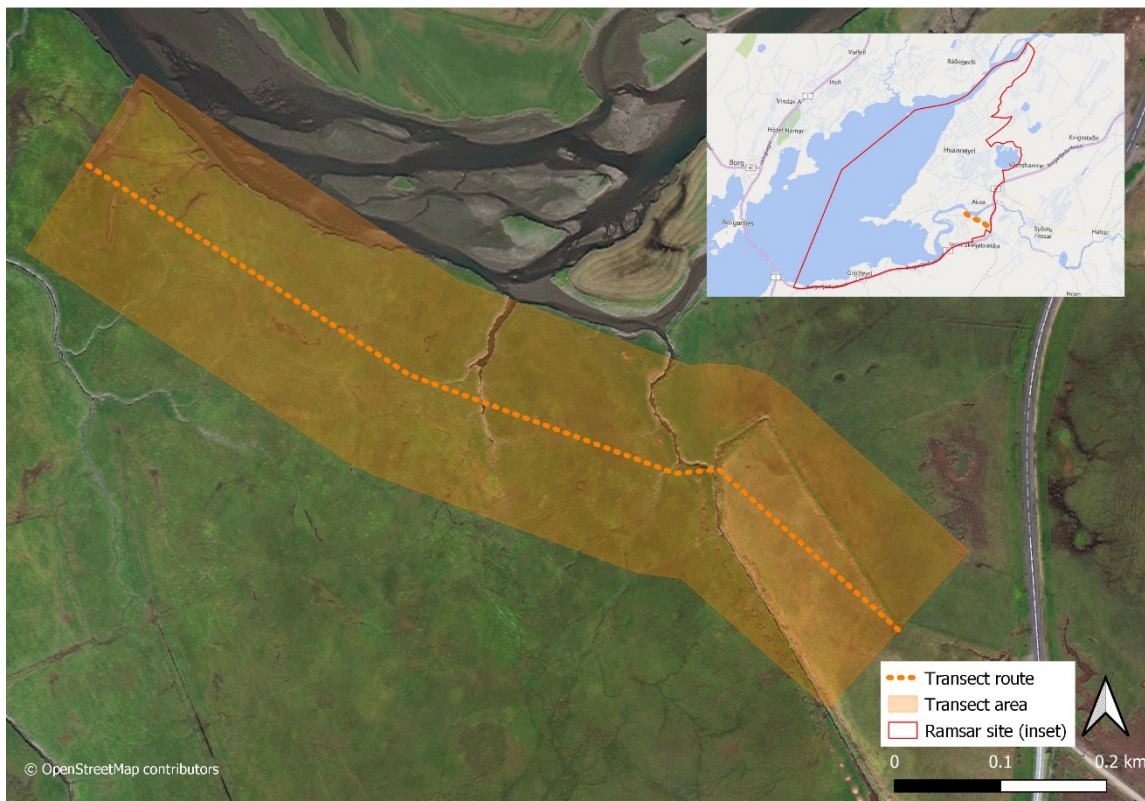


Figure 3-4. Andakílsá east transect route, including the transect area, 100 m either side of the transect line.

Table 3-3. Summary of the numbers of birds recorded during three visits to the Andakílsá east transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Greylag Goose	<i>Anser anser</i>	1	8	1	
Pink-footed Goose	<i>Anser brachyrhynchus</i>	0	0	0	✓
Common Shelduck	<i>Tadorna tadorna</i>	0	0	6	✓
Mallard	<i>Anas platyrhynchos</i>	3	8	2	
Eurasian Wigeon	<i>Anas penelope</i>	0	3	0	
Eurasian Teal	<i>Anas crecca</i>	1	4	0	
Red-breasted Merganser	<i>Mergus serrator</i>	1	2	1	
Waders					
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	0	0	0	✓
European Golden Plover	<i>Pluvialis apricaria</i>	0	0	0	✓
Common Snipe	<i>Gallinago gallinago</i>	12	18	0	
Black-tailed Godwit	<i>Limosa limosa</i>	7	11	0	
Whimbrel	<i>Numenius phaeopus</i>	3	5	0	✓
Common Redshank	<i>Tringa totanus</i>	8	12	0	
Dunlin	<i>Calidris alpina</i>	3	4	0	
Red-necked Phalarope ¹	<i>Phalaropus lobatus</i>	-	5	0	
Seabirds					
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	0	0	1	✓
Great Black-backed Gull	<i>Larus marinus</i>	0	0	2	
Lesser Black-backed Gull	<i>Larus fuscus</i>	0	0	1	✓
Arctic Tern	<i>Sterna paradisaea</i>	0	8	3	
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	1	2	0	
Passerines					
Meadow Pipit ¹	<i>Anthus pratensis</i>	-	5	0	

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

3.4 Transect 3 - Hvanneyri low meadows

Survey dates: 9th May, 10th & 19th June.

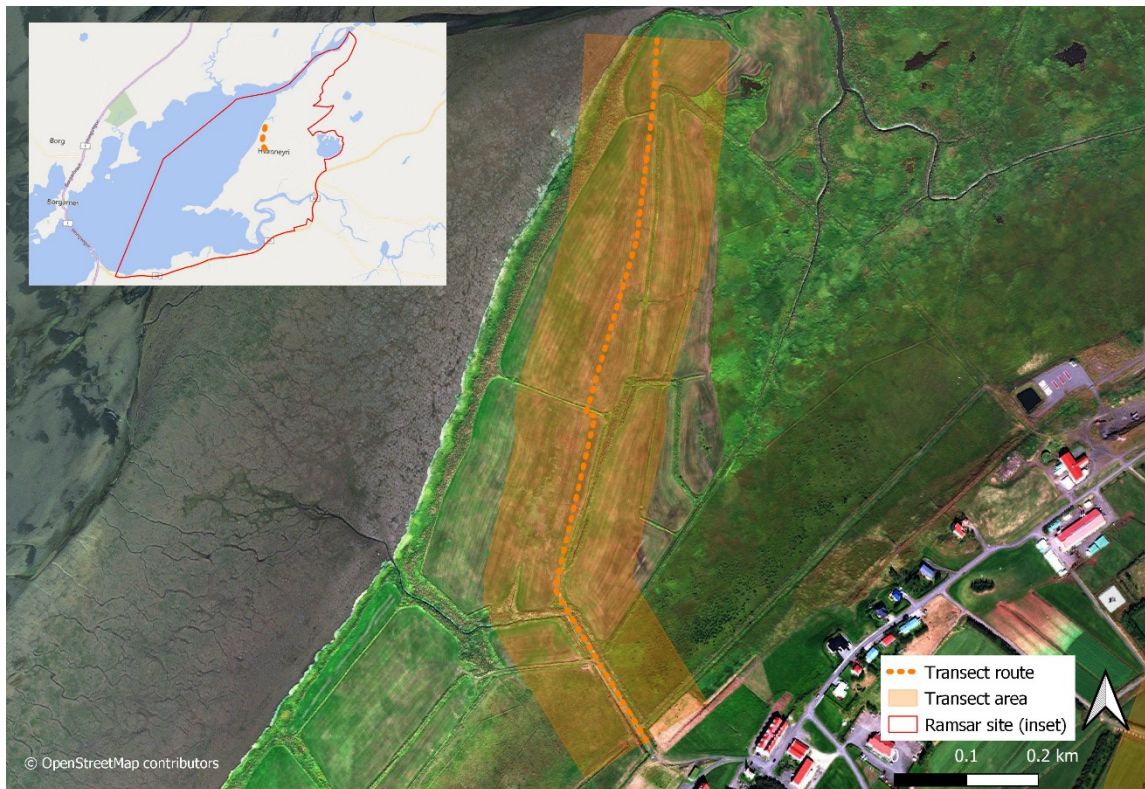


Figure 3-5. Hvanneyri low meadows transect route, including the transect area, 100 m either side of the transect line.

Table 3-4. Summary of the numbers of birds recorded during three visits to the Hvanneyri low meadows transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Greylag Goose	<i>Anser anser</i>	0	0	0	
Whooper Swan	<i>Cygnus cygnus</i>	0	0	4	
Common Shelduck	<i>Tadorna tadorna</i>	2	3	1	
Mallard	<i>Anas platyrhynchos</i>	2	5	0	
Eurasian Wigeon	<i>Anas penelope</i>	2	5	0	
Eurasian Teal	<i>Anas crecca</i>	1	3	0	
Gamebirds					
Rock Ptarmigan ¹	<i>Lagopus muta</i>	-	1	0	
Waders					
Common Snipe	<i>Gallinago gallinago</i>	16	19	0	
Black-tailed Godwit	<i>Limosa limosa</i>	4	6	0	
Whimbrel	<i>Numenius phaeopus</i>	4	5	0	
Common Redshank	<i>Tringa totanus</i>	7	26	0	
Dunlin	<i>Calidris alpina</i>	1	4	0	
Red-necked Phalarope ¹	<i>Phalaropus lobatus</i>	-	19	0	
Seabirds					
Lesser Black-backed Gull	<i>Larus fuscus</i>	0	0	2	
Arctic Tern	<i>Sterna paradisaea</i>	0	4	2	✓
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	1	2	0	
Passerines					
Redwing ¹	<i>Turdus iliacus</i>	-	13	0	
Meadow Pipit	<i>Anthus pratensis</i>	-	10	0	

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

Other sightings: An Arctic Fox was seen on 9th May.

3.5 Transect 4 - Bárustaðir

Survey dates: 9th & 26th May, 28th June.

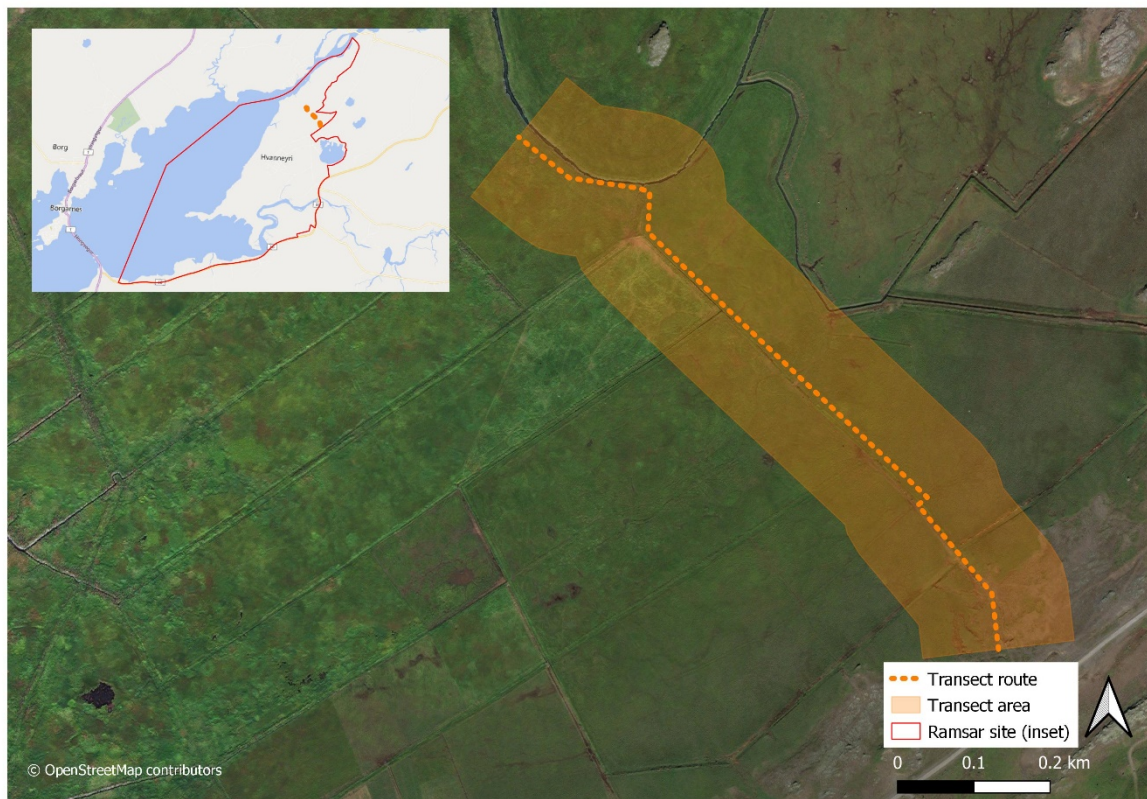


Figure 3-6. Bárustaðir transect route, including the transect area, 100 m either side of the transect line.

Table 3-5. Summary of the numbers of birds recorded during three visits to the Bárustaðir transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Whooper Swan	<i>Cygnus cygnus</i>	2	3	0	
Mallard	<i>Anas platyrhynchos</i>	1	3	0	
Eurasian Wigeon	<i>Anas penelope</i>	1	2	0	
Eurasian Teal	<i>Anas crecca</i>	0	0	0	✓
Tufted Duck	<i>Aythya fuligula</i>	1	2	0	
Red-breasted Merganser	<i>Mergus serrator</i>	1	2	0	
Waders					
European Golden Plover	<i>Pluvialis apricaria</i>	1	2	0	
Common Snipe	<i>Gallinago gallinago</i>	12	16	0	
Black-tailed Godwit	<i>Limosa limosa</i>	7	13	0	
Whimbrel	<i>Numenius phaeopus</i>	4	6	0	✓
Common Redshank	<i>Tringa totanus</i>	6	10	0	
Dunlin	<i>Calidris alpina</i>	4	5	0	
Red-necked Phalarope ¹	<i>Phalaropus lobatus</i>	-	1	0	
Seabirds					
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	1	3	0	
Arctic Tern	<i>Sterna paradisaea</i>	0	34	0	
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	1	2	0	
Passerines					
Meadow Pipit ¹	<i>Anthus pratensis</i>	-	10	0	

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

3.6 Transect 5 - Hvítá

Survey dates: 26th May, 16th & 28th June.



Figure 3-7. Hvítá transect route, including the transect area, 100 m either side of the transect line.

Table 3-6. Summary of the numbers of birds recorded during three visits to the Hvítá transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Greylag Goose	<i>Anser anser</i>	0	3	6	✓
Whooper Swan	<i>Cygnus cygnus</i>	2	3	0	✓
Common Shelduck	<i>Tadorna tadorna</i>	0	2	0	
Mallard	<i>Anas platyrhynchos</i>	1	2	0	
Eurasian Wigeon	<i>Anas penelope</i>	3	5	0	
Northern Pintail	<i>Anas acuta</i>	0	2	0	
Red-throated Diver	<i>Gavia stellata</i>	0	0	0	✓
Gamebirds					
Rock Ptarmigan ¹	<i>Lagopus muta</i>	-	1	0	
Waders					
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	1	2	0	✓
European Golden Plover	<i>Pluvialis apricaria</i>	4	6	0	
Ringed Plover	<i>Charadrius hiaticula</i>	1	2	0	
Common Snipe	<i>Gallinago gallinago</i>	7	10	0	
Black-tailed Godwit	<i>Limosa limosa</i>	3	6	2	✓
Whimbrel	<i>Numenius phaeopus</i>	3	7	0	✓
Common Redshank	<i>Tringa totanus</i>	5	8	0	
Dunlin	<i>Calidris alpina</i>	2	6	0	✓
Seabirds					
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	0	3	0	
Lesser Black-backed Gull	<i>Larus fuscus</i>	0	5	0	
Arctic Tern	<i>Sterna paradisaea</i>	0	2	1	
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	1	2	0	
Passerines					
Redwing ¹	<i>Turdus iliacus</i>	-	1	0	
White Wagtail ¹	<i>Motacilla alba</i>	-	1	0	
Meadow Pipit ¹	<i>Anthus pratensis</i>	-	9	0	

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

3.7 Transect 6 - Hvanneyri farm

Survey dates: 18th May, 10th & 19th June.



Figure 3-8. Hvanneyri farm transect route, including the transect area, 100 m either side of the transect line.

Table 3-7. Summary of the numbers of birds recorded during three visits to the Hvanneyri farm transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Greylag Goose	<i>Anser anser</i>	1	5	4	
Whooper Swan	<i>Cygnus cygnus</i>	0	31	0	
Mallard	<i>Anas platyrhynchos</i>	2	6	1	
Eurasian Teal	<i>Anas crecca</i>	1	1	0	
Red-breasted Merganser	<i>Mergus serrator</i>	0	0	1	
Waders					
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	6	9	2	
European Golden Plover	<i>Pluvialis apricaria</i>	3	5	1	
Ringed Plover	<i>Charadrius hiaticula</i>	1	2	0	
Common Snipe	<i>Gallinago gallinago</i>	10	13	0	
Black-tailed Godwit	<i>Limosa limosa</i>	7	13	0	
Whimbrel	<i>Numenius phaeopus</i>	4	6	0	✓
Common Redshank	<i>Tringa totanus</i>	10	20	0	
Seabirds					
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	0	2	1	✓
Great Black-backed Gull	<i>Larus marinus</i>	0	1	0	
Lesser Black-backed Gull	<i>Larus fuscus</i>	0	1	1	
Arctic Tern	<i>Sterna paradisaea</i>	0	0	2	
Passerines					
Common Starling ¹	<i>Sturnus vulgaris</i>	-	0	29	
Redwing ¹	<i>Turdus iliacus</i>	-	14	0	
White Wagtail ¹	<i>Motacilla alba</i>	-	1	0	
Meadow Pipit ¹	<i>Anthus pratensis</i>	-	6	0	

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

3.8 Transect 7 - Hvanneyri heath

Survey dates: 17th & 31st May, 12th June.

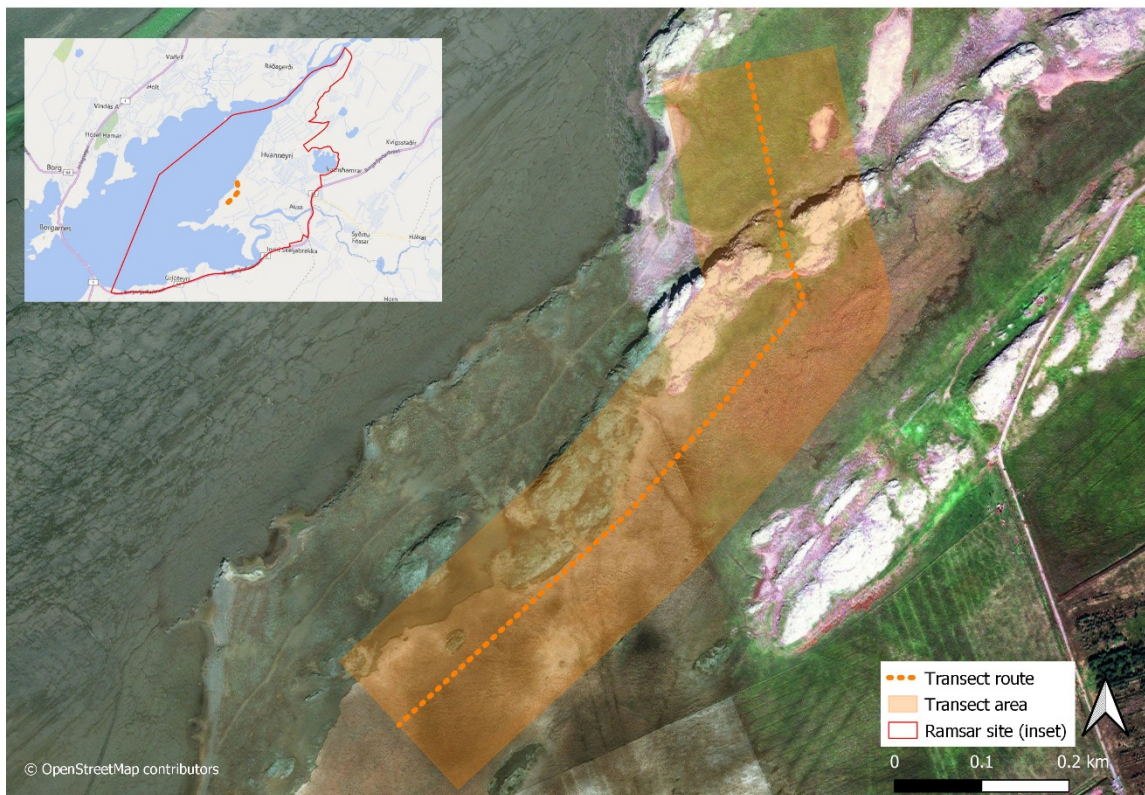


Figure 3-9. Hvanneyri heath transect route, including the transect area, 100 m either side of the transect line.

Table 3-8. Summary of the numbers of birds recorded during three visits to the Hvanneyri heath transect.

Species	Scientific name	Breeding pairs	Total adults	Flying over	Outside transect
Wildfowl and allies					
Common Shelduck	<i>Tadorna tadorna</i>	1	2	3	
Mallard	<i>Anas platyrhynchos</i>	1	2	0	
Red-throated Diver	<i>Gavia stellata</i>	0	0	0	✓
Gamebirds					
Rock Ptarmigan ¹	<i>Lagopus muta</i>	-	4	0	
Waders					
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	0	1	0	
European Golden Plover	<i>Pluvialis apricaria</i>	1	1	0	✓
Common Snipe	<i>Gallinago gallinago</i>	4	7	0	
Black-tailed Godwit	<i>Limosa limosa</i>	1	4	0	✓
Whimbrel	<i>Numenius phaeopus</i>	4	7	0	✓
Common Redshank	<i>Tringa totanus</i>	4	5	0	✓
Dunlin	<i>Calidris alpina</i>	1	1	0	✓
Seabirds					
Great Black-backed Gull	<i>Larus marinus</i>	0	0	2	
Lesser Black-backed Gull	<i>Larus fuscus</i>	0	0	1	
Arctic Tern	<i>Sterna paradisaea</i>	0	1	2	
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	1	3	0	
Passerines					
Common Raven ¹	<i>Corvus corax</i>	-	0	1	
Redwing ¹	<i>Turdus iliacus</i>	-	0	0	✓
Northern Wheatear ¹	<i>Oenanthe oenanthe</i>	-	1	0	
Meadow Pipit ¹	<i>Anthus pratensis</i>	-	7	0	✓

¹ The absolute number of birds was recorded with no distinction made between breeding and non-breeding birds.

4. Conclusions

The species diversity and their abundance was generally as expected for farmland, semi-natural wetlands and heaths in lowland Iceland. No effort was made to record habitat variables within, or surrounding the transects, but this is certainly something that could be investigated in the future. The main terrestrial habitat types in the Ramsar site were covered, however the core area of human habitation, the village of Hvanneyri, was not.

Human disturbance was generally low throughout the survey period, but due to their respective land uses, some transects will experience more disturbance than others. The transects that cross fields managed for silage in 2017, namely: Hvanneyri low meadows, Hvítá and Hvanneyri farm, had associated machinery activities during the breeding season. The timing of mowing and other silage-related activities in relation to the timing of waterbird breeding was not investigated. The other transects crossed land that was used for grazing (horses) (Andakílsá west, Andakílsá east, Bárustaðir and Hvanneyri heath) and therefore did not have machinery activities. However, they would have been subjected to some level of disturbance and nest-trampling risk from horses. Again, the effect of these factors on nesting success was not investigated.

These data provide an understanding of the diversity and abundance of birds in Andakíll Ramsar site, but this should only be considered a starting point. As these data were collected in a single season, only baseline data can be provided, and therefore nothing can be said of trends. To facilitate future monitoring of breeding birds, comprehensive instructions and field recording materials are provided in Stroud & Tierney (2017) as a 'Counter Manual'. The value of these data would significantly increase when collated with data collected in subsequent iterations of the survey. Undoubtedly, some species' populations will be increasing, and others declining. By repeating this survey, population trends for each species can be generated and then analysed in the context of changes happening on the site. Changes in land management, climate change and predation rates are all likely to affect the bird populations in the Andakíll Ramsar site. Long-term monitoring schemes have many advantages compared to once-off or reactive surveys. A long-term scheme, with regular surveys and standardised methodology will yield data of a consistent nature. Furthermore, some important questions can only be answered using a suite of consistent surveys carried out at regular intervals over a longer time period. These include the effects of climate change, or gradual changes in land management or human disturbance. Waiting for a problem to be identified before carrying out a survey can greatly reduce the chance of being able to measure its impact.

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