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SHORT REPORT



Acoustic surveys of Water Rail *Rallus aquaticus* over-wintering on Alderney

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ABSTRACT

A 'call count' survey of Water Rails *Rallus aquaticus*, using broadcast vocalizations to elicit a response, was carried out on Alderney over two consecutive winters. The species was found to be widespread on the island, with 34 birds found in both winters. Most, 62% in each winter, occurred in habitats associated with water, but 38% unexpectedly occupied drier habitat. The survey presents new information on Water Rail abundance, distribution and habitat use on the island, and indicates that the species does not always require access to wet ground in winter.

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The Water Rail *Rallus aquaticus* population is thought to be in decline (BirdLife International 2020). In Europe, the species is widespread and locally abundant in some wetland habitats but its population trend is unknown and data on this difficult to census species is uncertain (Hagemeijer & Blair 1997, BirdLife International 2020). With rapid changes in wetland habitat occurring and only poor estimates of population available there is a need for more complete survey data (Taylor & van Perlo 1998, BirdLife International 2020).

Water Rails are secretive birds that prefer habitats with dense vegetation and plenty of cover (Cramp & Simmons 1980). Consequently, counting Water Rails is not straight forward, as they are notoriously difficult to see. However, they are highly vocal, particularly in defence of their territory and this trait can be used to reveal their presence using broadcast vocalizations to elicit a response (Dombrowski *et al.* 1993, Gilbert *et al.* 1998, Stermin *et al.* 2013). Many species of rails have been censused in this way (Gibbs & Melvin 1997) and its effectiveness on estimating breeding densities of Water Rail has also been corroborated against local populations of known size (Brambilla & Jenkins 2009).

Call-response surveys have improved our understanding of Water Rail breeding ecology (Jenkins *et al.* 1995, Jenkins & Ormerod 2002, Brambilla & Rubolini 2004, Brambilla & Jenkins 2009, Jedlikowski *et al.* 2014, Jedlikowski *et al.* 2015, Jedlikowski *et al.* 2016) and increased attention on the non-breeding season has also shed more light on habitat use and behaviour in the wintering grounds, where less is known (de Kroon 1972, Bozic 2002, Lislevand & Kjøstvedt 2005, Sikora 2010, Gérard *et al.* 2016, Polak

et al. 2019). To obtain a more complete understanding of the species ecology in winter more data are required, particularly from the western seaboard of Europe where resident populations are boosted by immigrants in the non-breeding season (Lugg *et al.* 2018), presumably to exploit more reliable foraging conditions in a milder climate. There, habitat use may differ from the cooler regions of continental Europe where research on the species winter ecology has been focused so far. In this study, a 'call-response' survey was undertaken to evaluate the abundance and distribution of Water Rails wintering on Alderney and to describe their coarse-scale habitat use.

Alderney is an island in the English Channel, 15 km off the French coast of Normandy. It is the northernmost of the inhabited Channel Islands (49° 43'N 2° 12'W) and covers an area of 7.8 km². Water Rails are a common winter resident on the island (Sanders 2007) but no documented estimates of their abundance exist. Records dating back to the nineteenth century occur between mid-July and April (Sanders 2007). Breeding has not been confirmed although it may sometimes occur (Sanders 2007).

Over two consecutive winters, in between 30th December 2018 and 24th January 2019 and in between 31st December 2019 and 9th January 2020, broadcast vocalizations were used to elicit a response from Water Rails holding territories on Alderney. Vocalizations were played from 80 points across the island, comprising 68 points in 2018/2019 and 72 points in 2019/2020 (Figure 1). Fifty-four (68%) of the points were surveyed in both winters. A 'call count' was used to estimate the population size. Sampling occurred in mid-winter to avoid counting birds on passage.

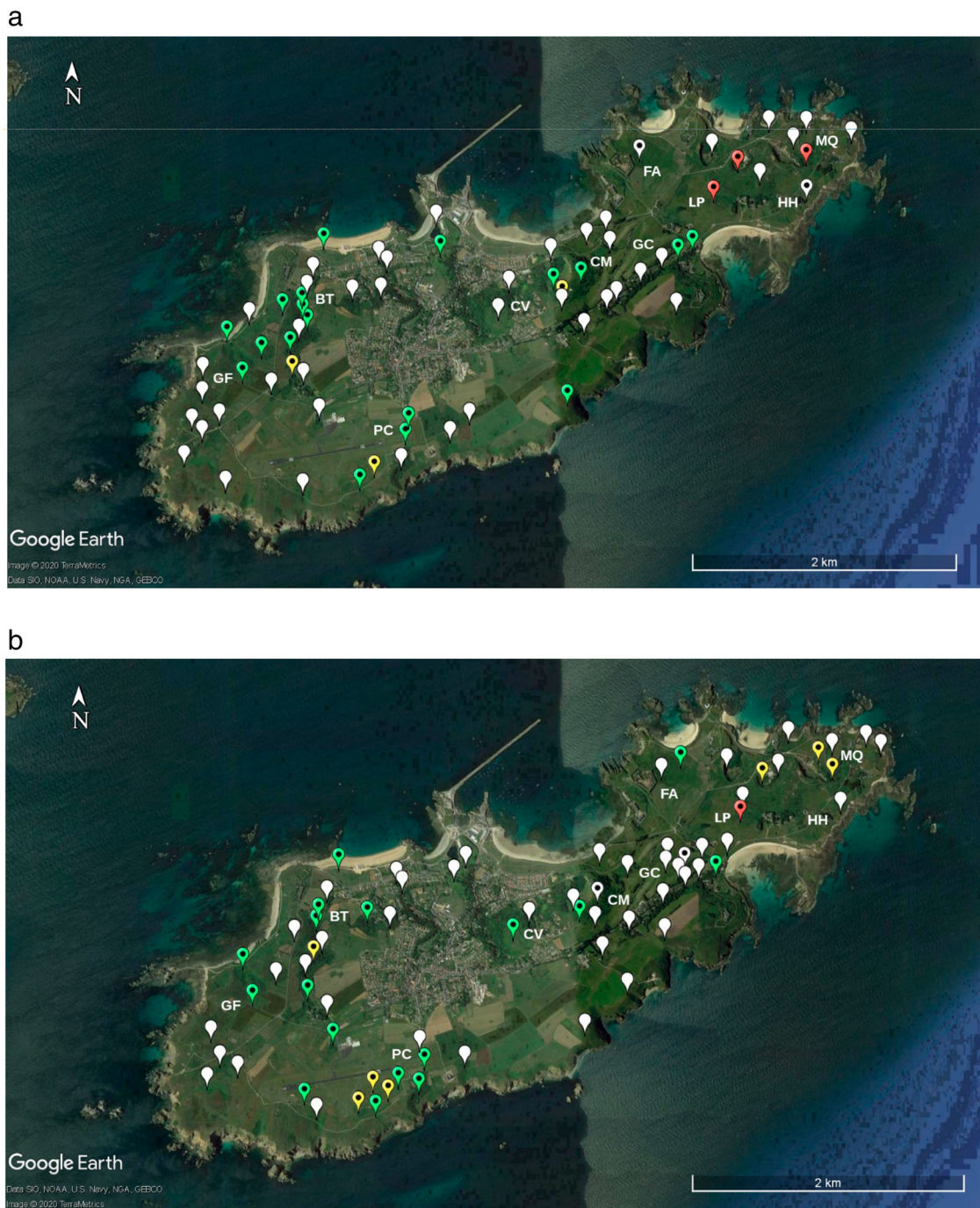


Figure 1. The sample points where Water Rail calls were broadcast during call-response surveys in winters (a) 2018/2019 and (b) 2019/2020. The points show where no response was heard (white), one bird responded (green with black spot), two birds responded (yellow with black spot), three or more birds responded (red with black spot) and no response was heard but other signs of presence were found (marked white with a black spot). Sites mentioned in the text; BT = Bonne Terre valley, CM = Community woodland, CV = Cotil du Val, FA = Fort Albert, GC = Alderney golf course, GF = Giffoine, HH = Houmet Herbe, LP = Longis Pond, MQ = Mannez Quarry and PC = Plat Côtil.

The sample points were not randomly selected but chosen according to their suitability for Water Rails following information on habitat preferences available in Cramp & Simmons (1980) and Taylor & van Perlo (1998). On Alderney, the sample points were selected from three types of habitat or biotopes with the

following characteristics: (1) water bodies, including ponds and flooded quarries with standing water and emergent vegetation such as reed *Phragmites sp.*, *Typha sp.* and *Iris Iris pseudocorus* or sometimes sedges *Carex sp.*, rushes *Juncus sp.* and willow carr *Salix sp.*; (2) running streams in wooded valleys or creeks with

dense ground vegetation such as Ivy *Hedera helix*, ferns *Asplenium sp.*, willow carr *Salix sp.* and Alder *Alnus glutinosa* in wet woodland or rushes and Bracken *Pteridium aquilinum* elsewhere and (3) bramble thickets *Rubus sp.*, with various amounts of bracken, rank grass and interspersed scrub, overgrowing disused fields, plantations, amenity or waste land and rough ground between golf fairways. Habitats not assessed included urban areas, recreational green spaces and gardens, brownfield sites, beaches, open grassland, open agricultural land such as pasture, tilled fields and allotments, woodland without ground cover, tall scrub, steeped sided hills, cliff edges, poorly vegetated quarries and heathland comprising gorse and heather.

At each sample point vocalizations were played using an MP3 player (SanDisk clip) and a voice amplifier (Aker MR1505). Vocalizations comprised the generic sequence of territorial calls (Roche 1990) or 'sharming' pig-like squeals that typically initiates a response from either sex at any time of the day (Dombrowski *et al.* 1993, Gilbert *et al.* 1998, Gérard *et al.* 2016). The calls were broadcast following the methodology given by Gilbert *et al.* (1998) but also incorporated amendments recommended by Lislevand & Kjølsvædt (2005) and Stermin *et al.* (2013) to allow more time for the birds to respond. A single sequence of 'sharming' calls, lasting 20 s, was played to completion at a natural volume then stopped for 2 min to listen for a response. If no response was heard the calls were played again before stopping and waiting another 5 min to listen for a response. Any responses were noted and their location judged to identify the habitat but also to help count the number of birds present where more than one bird was heard to reply. At sites that required several sample points to adequately cover the habitat each sample point was located a minimum 80 m apart and care was taken not to re-record the same individuals. Experience indicated that birds greater than 50 m away may not respond. Most sample points were surveyed over the space of one week (91% in 2018/2019 and 99% in 2018/2019) to avoid possible double counting of birds that may sometimes move between sites (de Kroon 1972, Jenkins *et al.* 1995). Points were sampled throughout the day (between 08:00 and 16:00) in calm weather conditions. Days with winds greater than Beaufort four and/or prolonged rain were avoided to reduce sound interference and possible behavioural diffidence.

The Water Rails actively responded to the broadcast calls by 'sharming', only two birds used an alarm note instead. Thirty-four Water Rails were detected in both winters (Figure 1(a,b), Table 1) and responded from 35% of the sampled points in each winter. The rate of

occupancy was greatest from water bodies with emergent vegetation and lowest among bramble thickets in both winters (Table 1). Single birds responded from most occupied sample points (75% in 2018/2019 and 68% in 2019/2020) but up to four were heard (Figure 1(a)), and, on average, more birds were detected at each occupied sample point around water bodies than elsewhere (Table 1). Birds were present in both winters at all the occupied water bodies too but only 46% and 31% of the occupied points with running streams and dense cover or bramble thickets, respectively (Table 1). Most birds in both winters (62%) occupied the two biotopes associated with either standing or flowing water (Figure 1(a,b)). However, an unexpectedly large proportion (38%) were found among bramble thickets (the third biotope) with no standing or flowing water present (Table 1) and 92% of these sites were not water-logged (Figure 1(a,b)). The occupied thickets on wet ground overgrew disused fields around the airport perimeter near Plat Côtîl (Figure 1(a,b)) and lay adjacent to wet flushes. The results of the surveys demonstrated that Water Rails were widespread on Alderney in winter and the island supported higher than anticipated numbers of birds due to their unexpected occupation of bramble thickets in often dry terrain.

In winter, wetlands provide important habitat for Water Rails. Studies of wintering birds indicate a preference for habitats that provide dense vegetation with flowing water such as estuaries, rivers, ditches and ground water flows (de Kroon 1972, Bozic 2002, Sikora 2010, Wink 2010, Gérard *et al.* 2016, Polak *et al.* 2019) but also standing water such as lakes or coastal marshes (Lislevand & Kjølsvædt 2005). These sites provide cover necessary for protection from predators, and moving water that ensures soft ground for foraging which remains accessible even under freezing conditions or snow cover (Polak *et al.* 2019).

On Alderney, most Water Rails were found where these criteria were met too, and occupied the two biotypes that comprised standing or flowing water with dense cover. There was also some indication that the wetter habitats were preferred, particularly the water bodies with emergent vegetation where birds were present at all the occupied sample points in both years and their numbers were higher, on average, than elsewhere (Figure 1(a,b), Table 1). However, preference for a particular biotope was difficult to interpret as birds were absent from most sample points (65%) and the coarse-scale derivations used to define the three sampled biotopes probably overlooked key features that acted on the birds' preferences. Further research that took a multi-scale approach and used environmental

Table 1. The number of points sampled (*n*) in three biotypes during call-response surveys of Water Rails in the winters of 2018/2019 and 2019/2020 on Alderney, including the percentage of points occupied, the count of birds heard to respond in each habitat and the mean number of birds responding from each occupied point as well as the percentage of occupied points with birds present in both winters.

Biotope	Habitat description	2018/2019				2019/2020				% of occupied sites with birds in both winters
		<i>n</i>	% occupied	Count	Mean (range)	<i>n</i>	% occupied	Count	Mean (range)	
1	Water bodies with emergent vegetation	10	40	11	2.8 (1–4)	8	63	10	2 (1–3)	100
2	Streams with dense ground vegetation	26	35	10	1.1 (1–2)	26	38	11	1.1 (1–2)	46
3	Bramble thickets	32	34	13	1.3 (1–2)	38	26	13	1.3 (1–2)	31

variables quantified at a finer level of detail would likely better predict Water Rail presence in winter (Jedlikowski & Brambilla 2017).

Nevertheless, the number of birds found in bramble thickets was noteworthy as most were on dry terrain and did not occur under the poorly drained or flooded circumstances that this habitat is otherwise known to harbour the species in winter (Cramp & Simmons 1980). It indicated that the presence of standing or flowing water, even water-logged ground, were not necessarily essential habitat requirements, at least, where the need for sufficient cover and access to soft ground were likely met.

The occupation of habitats without wet ground by Water Rails is unusual although not unknown. Jenkins *et al.* (1995) noted some dry reed beds and scrub were occupied in the breeding season but less frequently than wetter sites and Lundberg (2011) found a pair breeding in completely dry terrain in Sweden. On passage and in winter, birds may occupy dry places such as island bracken too (Cramp & Simmons 1980).

It is feasible that the use of bramble thickets has been overlooked as, so far, studies of Water Rails in winter have targeted wetland habitats in regions where freezing conditions and snow cover can persist and likely limit the species habitat choices in winter (de Kroon 1972, Bozic 2002, Lislevand & Kjøstvedt 2005, Sikora 2010, Gérard *et al.* 2016, Polak *et al.* 2019). On Alderney, and perhaps other islands or places in the south and western regions of Europe, there may be several factors that enable Water Rails to use bramble thickets more habitually than might be the case elsewhere in the wintering range. These may include: (1) the island's mild oceanic climate where regular rainfall with few days of frost and snow cover (Perry 2014) ensure the ground beneath the thickets remains soft and suitable for foraging throughout the winter and (2), the absence of some mammalian predators, notably mustelids, and the Red Fox *Vulpes vulpes* (Crawley *et al.* 2020), that would otherwise likely increase predation risk and extirpate birds from similar dry sites (Jedlikowski *et al.* 2015).

Furthermore, in the absence of significant predation risk from mammals, the occupation of bramble thickets may have some advantages over other cover types. Its dense canopy may provide better overhead protection from aerial predators and, in heavy snow, an insulating layer that retains access to the ground underneath (Cramp & Simmons 1980). Where the availability of wetlands is limited either by area or competition from conspecifics, bramble thickets may also provide a viable alternative habitat for subordinate birds or birds choosing to float between sites (Brown & Long 2007, Polak *et al.* 2019).

In addition to describing coarse-scale habitat use, the study also demonstrated that indirect observation by acoustic survey can be used to estimate Water Rail numbers in winter, although the accuracy of the results was untested and should be regarded as a minimum count of the birds present. The counts were likely to be under-estimates of the number of birds actually present for several reasons. First, the response of the birds to the playback varies and a few (between 5% and 10%) may not respond at all (Lislevand & Kjøstvedt 2005, Polak *et al.* 2019). Jenkins *et al.* (1995) also obtained a higher estimate of a local population when birds were trapped rather than counted by indirect methods. Second, birds may have been missed because they responded after the specified sampling time. Lislevand & Kjøstvedt (2005) noted that a few birds were slow to respond to the broadcast calls and recommended waiting up to 10 min for a response. Gérard *et al.* (2016) also found only 60% of birds responded after 1 min and that up to 12 min might be needed to hear 98% of the birds present. In this study all the birds found were heard within 5 min of the last broadcast. Most birds responded after the first sequence of calls were broadcast but some took longer and these often first approached the player before responding unseen at closer quarters several minutes later. Much to my amusement this sometimes happened from just a few metres away but it also confirmed the recommendation by Lislevand &

Kjøstvedt (2005) to wait for a response much longer than the 1 min advised by Gilbert *et al.* (1998). Third, birds were present in places that were inaccessible. Water Rails are occasionally seen in Alderney's private gardens (Sanders 2007); although these records tend to occur during harsh weather when birds normally occupying other habitat are seeking food elsewhere. Finally, the survey was undertaken after some wintering birds may have been lost to predation or starvation. There was evidence found that this was the case following both surveys. For example, in winter 2018/2019 the remains of predated Water Rails were found on the slopes of Fort Albert and at La Grande Folie near the coast at Houmet Herbe (Figure 1(a)) where no birds were later detected during the survey. A dead Water Rail with signs of malnourishment was also found at Longis pond just 10 days before the survey (Figure 1(a)). In winter 2019/2020, no Water Rails were found during the survey on the golf course and at another site in the community woodland where birds had been heard calling earlier in the winter (Figure 1(b)).

Taking these issues into account, more birds might be detected if surveys were conducted earlier in the winter nearer the likely end of autumn migration and adjusting up the duration of time spent waiting for a response after each broadcast. Further research to compare the 'call count' against a local site of known population size would help corroborate the findings but also establish a standard proportion of likely non-responders that may be applied to surveys elsewhere. This might be feasible if all birds at one location could be trapped, ringed and then monitored using camera traps and/or observation (Colyn *et al.* 2017). Similar research conducted over a wider area of the species winter quarters could identify a greater variety of occupied habitat (such as bramble thickets) and perhaps help redefine what is currently known of their distribution in the non-breeding season.

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