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Ancient Maritime Communities and the Relationship between People and Environment along the European Atlantic Coasts

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BETWEEN THE SEA AND SKY: THE ARCHAEOLOGY OF AVIAN RESOURCE EXPLOITATION IN SCOTTISH ISLAND ENVIRONMENTS.

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Introduction

Human populations in discrete coastal landscapes (and in particular small or marginal islands) often have an enduring relationship with the wild faunal resources in the locality. In liminal maritime landscapes animals can be gathered from the land, the sea and the air, providing a diverse resource base. In these settings birds, and particularly seabirds, can play an important role in people's diets and lives since they can produce a range of products including meat, eggs, oil, fat, feathers, skins, and bones for tools. Human interaction with these often very mobile resources in the past can inform upon their perception and use of the landscape around them, including the wild resources being targeted, seasonal exploitation, dietary contributions and the range of habitats being utilized. Avian data can also be used to explore changes in the environment or climate, extinct species, and past bird distributions and populations.

This paper explores the exploitation of birds at sites in the Scottish islands via research that involved collating existing data and combining this with the analysis of new assemblages. The Scottish islands include the Western Isles, Shetland and Orkney (Figure 1). The fowling information presented in this paper focuses mainly on the Outer Hebrides (inset of Figure 1) where these new analyses have recently developed the avian data available in the area which had previously had research gaps and relatively little inter-site comparison. The site of Cladh Hallan on South Uist will form an in depth case study. It will be considered alongside other South Uist sites such as Iron Age Dun Vulan and Hornish Point, Late Iron age and Norse Bornais and Norse Cille Pheadair, and within the wider North Atlantic data.

Cladh Hallan

The Site Background

Between 1989 and 2003 the SEARCH project (Sheffield Environmental and Archaeological Research Campaign in the Hebrides) conducted excavations at Cladh Hallan on South Uist in the Outer Hebrides after sand quarrying exposed the prehistoric site. Excavation revealed, among other features, a series of Late Bronze Age to Early Iron Age roundhouses. At least four of these houses were part of a terrace with each being an individual structure but sharing party walls (Pearson et al., 2004, 19; 2005, 530).

Before the construction of this terrace the area had contained Early Bronze Age ploughsoil and a cremation cemetery dated to 1940-1540 cal BC (95% probability) (Marshall *et al.*, 2010, 10). Above one of the cremations a Middle Bronze Age house was built around 1380-1185 cal BC (95% probability), and this produced the earliest bird bone at Cladh Hallan (Marshall *et al.*, 2010, 10; Pearson *et al.*, 2004, 63). After the abandonment of this house but before the construction of the terrace, a series of structures were erected followed by a period of pit digging and filling (Pearson *et al.*, 2004, 64-65). Next a series of human foundation deposits were placed and then roundhouse construction began *c.* 1135-1035 cal BC (95% probability) (Marshall *et al.*, 2010, 12). Then, as the roundhouse terrace was nearing the end of its occupation, around 635-535 cal BC (95% probability), two double roundhouses (House 640 and House 150) were constructed which produced the latest avian remains (Marshall *et al.*, 2010, 13; Pearson *et al.*, 2004, 66-75 and 85-86).

Cladh Hallan produced a large faunal assemblage in which the bird bone only made up a very small part. Over 20,000 identifiable mammal bones were recovered and around 5500 identifiable fish bones (Ingrem in preparation; Mulville in preparation). For both the mammals and fish the majority of the remains came from the Late Bronze age (*c.* 16,700 and 5000 respectively). Shell work has not yet been completed. The birds therefore make up approximately 1.4% of the total NISP (Number of Identified Specimens; mammal, fish, bird), and 1.4% of the Late Bronze Age and Early Iron Age total NISP. The birds have a high species diversity and make up over 4% of the total identifiable wild resources which include deer, fish and sea mammals.

Identification, Recording and Quantification

The bird bones were recovered by hand during excavation and by sieving all material through a one centimetre sieve; additional samples were collected from primary contexts.

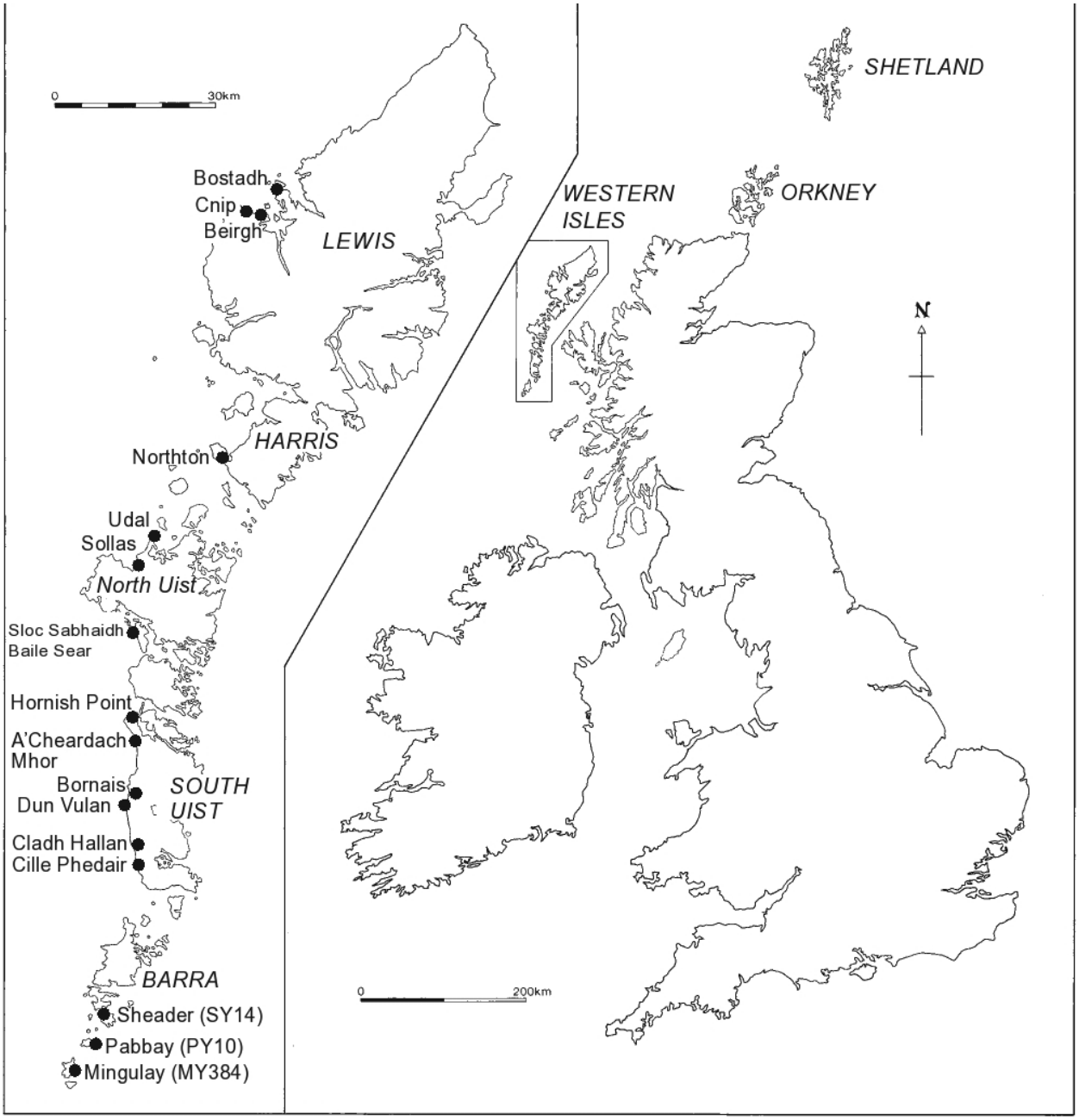

Figure 1. Map showing Cladh Hallan on South Uist and Other Archaeological Sites.

The remains were identified using Cardiff and Southampton University's reference collections and recorded following Cohen and Serjeantson's conventions (Cohen and Serjeantson 1996, 2-10). All of the avian material was analysed. Adrienne Powell conducted initial analysis and Julia Best completed analysis of the material, recorded and reported upon the data (Best and Powell in preparation).

Where not identifiable to species or family bones were assigned to broad size categories (based on Ayres *et al*., 2003, 360-406; Serjeantson 2009, 81-82). Due to the problems associated with identifying birds such as geese to exact species, similar separate groupings (i.e. "Large Grey Goose cf. Greylag" and "Goose Sp.") have been highlighted together in the NISP to help show frequency more clearly and counteract some biases of identification. These categories of confidence can otherwise make overall abundance hard to see, particularly where only a few elements are distinctively identifiable to exact species. These grouped categories were remembered when considering overall abundance alongside species that had not been grouped. Taphonomic features and ageing data were recorded for all fragments. No sexual characteristics (i.e. medullary bone) were present in the assemblage.

The Minimum Number of Elements (MNE) was calculated as the sum of the most frequently occurring zone of each element for a species, taking side into account. The Minimum Number of Individuals (MNI) was taken as the highest MNE for each species. The MNIs in reality are likely to be much higher since the remains come from a variety of phases and locations. However, producing MNI by phase and location would have made the assemblages too small to handle effectively and would not have

considered the dispersal of bones from one individual across a site.

Cladh Hallan Avian Assemblage

The avian assemblage from Cladh Hallan consisted of 497 identified fragments, of which 354 could be assigned to species. The majority came from the Late Bronze Age to Early Iron Age settlement but there were a small number from before the construction of the terrace.

Pre-Terrace Assemblage

The pre-terrace phases (1-7) produced 15 avian fragments with six identifiable to species. A large grey goose and a butchered curlew/oystercatcher were recovered from the Middle Bronze Age house. A phase six pit produced eight fragments including a gannet, a large grey goose, a medium wader and a probable great northern diver. None were burnt or gnawed but an unidentifiable very large bird fragment was worked into a probable bead. An unidentifiable juvenile bird was present, which (if anthropogenic) shows some exploitation of avian resources during the breeding season. Phase seven structures produced five fragments, only one of which was identifiable; this was a great northern diver, suggesting exploitation of winter visitors. The pre-terrace assemblage will not be considered here on in.

The Terrace Assemblage

This assemblage consisted of 482 fragments of which 348 were identifiable to species, 76 to size category and 13 to likeness (i.e. cf. Gannet) while 45 were unidentifiable. The majority came from the main habitation phases of the roundhouse terrace (9-12) (Figure 2). Interestingly, two partial skeletons were present: a gannet with 42 fragments from a Phase 12 house and 13 bones from a pair of starling wings in Phase 16 House 150. When included in the data for means of comparison they are indicated by an asterisk (*). The percentage NISP is presented both with and without the skeletons to avoid over representing the importance of a species.

Phase	8	9	10	11	12	13	14	15	16
No. of Fragments	29	74	68	101	119	10	1	5	20
% of Assemblage	6.0	15.4	14.1	21.0	24.7	2.1	0.2	1.0	4.1

Figure 2. Count of Cladh Hallan Bird Bones by Phase (minus skeletons).

Avian Species: Patterns of subsistence

Abundance of Species

One of the most visible patterns seen in the avian assemblages from (temporally and geographically varied) archaeological sites in the Scottish islands is, unsurprisingly, the substantial presence of seabirds; in particular those species coming to land to breed in the spring and summer. Although exceedingly broad, this trend shows a continued use of wild resources specific to the maritime environment; a theme which can be seen in many forms across the North Atlantic coastal region. Many of the most commonly exploited seabird species only come to land to breed, making them a visually mobile resource by their presence or absence which could change the landscape of an island depending on the time of year.

Cladh Hallan was no exception to this trend. The avian assemblage was very diverse, containing at least 34 species, but bigger birds, and particularly seabirds, made up a large proportion (Figure 3). One species, the gannet, was dominant at Cladh Hallan making up nearly a third of the NISP (skeleton included). Excluding the skeleton the gannet was still the most numerous species accounting for over a fifth of the remains. The MNI in general reflected the NISP with the gannet again being prominent. The red grouse has a disproportionately high MNI of five for the nine bones present, implying that the bones recovered probably only represent a very small proportion of original avian assemblage.

Cormorant, shag and great auk were the next most frequent species at Cladh Hallan, with geese, gulls and swans also occurring commonly. All of the birds at Cladh Hallan are edible and these large birds would have provided more dietary input per kill. Other seabirds including puffin, guillemot and fulmar were fairly numerous, as was the curlew (a wader), and red grouse (a land bird). Several species such as the gannet and the puffin breed in large colonies providing a concentrated influx of food resources.

While the Cladh Hallan assemblage was dominated by the gannet, many of the 33 other species were sparsely represented with less than five fragments. This pattern has been observed at many geographically and temporally varied assemblages in the Scottish islands, where the avian remains frequently present a pattern of resource use that is both focused and very diverse. The avian assemblages from other sites regularly have high species diversity, but like Cladh Hallan they frequently have a seabird focus and are often dominated by one or two particular species which vary from site to site. For example, the recently analysed Norse assemblage from Cille Pheadair was dominated by large gulls (herring/lesser black-backed gull and great black-backed gull) but out of the 28 species present two thirds had less than ten fragments (Best and Cartledge in preparation). Gulls also dominated the Iron Age avian assemblage at the nearby site of Bornais Mound 1 where they made up nearly two thirds of bird remains with many other species only having one or two bones present (Cartledge and Serjeantson 2012, 343). Other sites such as Iron Age Dun Vulan do not have one dominant species but display a heavy focus on a particular group, in this case the auk family (including great auk, guillemot, puffin and razorbill), but once again a large range of species are only present in small quantities (Cartledge and Grimbly 1999, 283-288).

The number and range of species with low frequencies at Cladh Hallan and other sites suggests opportunistic

Species	Scientific Name	NISP (+Skels)	% NISP (+Skels)	% NISP (-Skels)	MNI
Gannet	*Morus Bassanus*	103	29.6	20.8	5*
Cormorant	*Phalacrocorax carbo*	17	4.9	5.8	2
Goose Sp.	*Anser / Branta* Sp.	11	3.2	3.8	2
Large Grey Goose cf. Greylag	*Anser* Sp. cf. *Anser*	11	3.2	3.8	2
Brent / Barnacle Goose	*Branta bernicla /leucopsis*	5	1.4	1.7	1
Gull Sp.	*Laridae* Sp.	10	2.9	3.4	2
Great Black-Backed Gull	*Larus marinus*	9	2.6	3.1	1
Herring / Lesser Black-Backed Gull	*Larus argentatus / fuscus*	7	2.0	2.4	2
Swan Sp.	*Cygnus* Sp.	17	4.9	5.8	2
Swan cf. Whooper	cf. *Cygnus Cygnus*	4	1.1	1.4	1
Great Auk	*Pinguinus impennis*	14	4.0	4.8	3
Shag	*Phalacrocorax aristotelis*	14	4.0	4.8	2
Curlew	*Numenius arquata*	10	2.9	3.4	2
Small Passerine	Small Passerine	10	2.9	3.4	2
Red Grouse	*Lagopus lagopus*	9	2.6	3.1	5
Puffin	*Fratercula arctica*	8	2.3	2.7	2
Guillemot	*Uria aalge*	7	2.0	2.4	2
Fulmar	*Fulmarus glacialis*	6	1.7	2.0	2
Snipe	*Gallinago gallinago*	4	1.1	1.4	1
Shag / Cormorant	*Phal. aristotelis/carbo*	4	1.1	1.4	1
Large Wader cf. Curlew	cf. *Numenius arquata*	4	1.1	1.4	1
Starling	*Sturnus vulgaris*	16	4.6	1.0	3*
Great Northern Diver	*Gavia immer*	3	0.9	1.0	1
Carrion Crow / Rook	*Corvus corone / frugilegus*	3	0.9	1.0	1
Dunlin	*Calidris alpina*	3	0.9	1.0	1
Rock / Stock Dove	*Columba livia / oenas*	3	0.9	1.0	1
Small Wader	Small Charadriiforme	3	0.9	1.0	1
Razorbill / Guillemot	*Alca torda / Uria aalge*	3	0.9	1.0	1
Golden Plover	*Pluvialis apricaria*	2	0.6	0.7	1
Oyster Catcher	*Haematopus ostralegus*	2	0.6	0.7	2
Crane	*Grus grus*	2	0.6	0.7	1
Jack Snipe	*Lymnocryptes minimus*	2	0.6	0.7	2
Razorbill	*Alca torda*	2	0.6	0.7	1
Shelduck	*Tadorna tadorna*	2	0.6	0.7	1
Water Rail	*Rallus aquaticus*	2	0.6	0.7	1
Lapwing / Godwit	*Vanellus Vanellus/Limosa*	1	0.3	0.3	1
Black Guillemot	*Cepphus grylle*	1	0.3	0.3	1
Curlew / Herring Gull	*Numenius arquata / Larus*	1	0.3	0.3	1
Galliform Sp.	Galliform Sp.	1	0.3	0.3	1
Large Duck cf. Mallard	cf. *Anas platyrhynchos*	1	0.3	0.3	1
Duck Sp.	Duck Sp.	1	0.3	0.3	1
Lapwing	*Vanellus vanellus*	1	0.3	0.3	1
Little Auk	*Alle alle*	1	0.3	0.3	1
Manx Shearwater	*Puffinus puffinus*	1	0.3	0.3	1
Raptor cf. Buzzard	cf. *Buteo buteo*	1	0.3	0.3	1
Eagle cf. White-Tailed	cf. *Haliaeetus albicilla*	1	0.3	0.3	1
Red Breasted Merganser	*Mergus serrator*	1	0.3	0.3	1
Red Grouse / Ptarmigan	*Lagopus lagopus / muta*	1	0.3	0.3	1
Shearwater	*Puffinus* Sp.	1	0.3	0.3	1
Teal	*Anas crecca*	1	0.3	0.3	1
Large Wader	Large Charadriiforme	1	0.3	0.3	1

Figure 3. Cladh Hallan Avian NISP and MNI (including and excluding skeletons "Skels"), arranged by NISP frequency.

fowling of birds when encountered, in addition to the targeted capture of certain species. However, when many different species are exploited in small numbers they can still form a sizable resource and component of the overall fowling economy. This shows a logical and flexible use of the natural resources in these insular environments, which is seen at sites from the Neolithic into the Norse period and sometimes beyond.

Throughout the main habitation phases (8-12) a similar range of species were exploited with an enduring focus on gannet, cormorant, great auk, shag, swans, geese and gulls. Whilst seabirds dominate these phases; waterbirds, waders and land birds are repeatedly caught. The houses and forecourt produced a similar range of species but there is less diversity in the other areas. Gannet is most frequent in Phase 12.

However, the small assemblages from the later phases (13-16) have a much diminished species diversity and gannet is notably rare with only one specimen. The limited fowling may be focused on avian resources available in multiple seasons. The great auk is absent from these later phases, perhaps indicting decline even at this early date (see Chronological Trends, *infra*).

Processing of the Bird Resources

At Cladh Hallan the majority of the bird bone (in all phases) came from within the houses; implying that processing, consumption and some deposition took place within the roundhouse environment. In total 61% came from within a house, 7% from the forecourt of a house and 32% from other areas.

A wide range of elements were represented from all parts of the body, suggesting that birds were taken to the site as entire carcasses and processed there. An element count showed that wing elements dominated the assemblage as a whole, particularly the humerus which alone accounts for nearly 18% of the elements. Long bones of the leg and the coracoid are the next most frequent by count. This pattern is consistently visible in the main habitation phases.

For the most commonly exploited species the MNEs reflect the element count (Figure 4). There is a strong dominance of wing elements with the humerus being the most consistent frequently occurring element, followed by bones of the lower leg (particularly the tibiotarsus) and the pectoral girdle (primarily coracoid but also furcula and scapula). Although wing bones dominate the assemblage, leg bones are not underrepresented with the tibiotarsus in

Element	Gannet	Cormorant	Goose Sp.	Large Grey Goose cf. Greylag	Brent / Barnacle Goose	Gull Sp.	Great Black-Backed Gull	Herring / LBB Gull	Swan Sp.	Swan cf. Whooper	Great Auk	Shag	Curlew	Puffin	Guillemot	Red Grouse	Fulmar
Skull													1				
Quadrate	1																
Premaxila	1												1				
Mandible	1	1	1										1				
Furcula		1	1	1			1				1						
Coracoid	2	1	1	1			1		1		1		1	1			1
Scapula	1	2			1						1				1		1
Humerus	5	2	2	2	1	2	1	1	2		3	2	1	2	1	1	1
Ulna	5	1	2	1	1	1	1				1	2					2
Radius	4	1		1		2			2			1	2	1	2		
Carpometacarpus	2		1						1	1	1	1			1	1	
Proximal Phalanx of the Major Digit	4					1				1							
Distal Phalanx of the Major Digit										1							
Proximal Phalanx of the Minor Digit	1																
Wing Digit			1														
Sternum	2																
Sternal Rib	2																
Cervical Vertebrae	1																
Thoracic Vertebrae	3																
Synsacrum									1			1					
Pelvis			1	1					1								
Femur			1		1	1			2		2	1		1			
Tibiotarsus	2						1	2	2		1	1	2	2	2	1	
Tarsometatarsus	1			1								1				5	1
Phalanx of Foot	1																

Figure 4. MNE for Main Cladh Hallan Species (excluding skeleton).

particular often being as frequent as the ulna or radius. Skulls and lesser phalanges are fairly rare. There is a lack of sternums, ribs, pelves, synsacra and vertebrae even when fragments in the size categories are considered.

Lower representation of the femur (a meat bearing bone) compared to the abundant tibiotarsus and wing long bones could suggest removal of parts of the bird that were not intended for consumption such as the wings and lower legs. Meat bearing bones of the axial skeleton and the upper leg may have been disposed of differently or subjected to different taphonomic biases such as cooking. The low numbers for axial elements and the femur within the size categories show that their scarcity was not due to identification biases. The preferential survival of the main wing and leg long bones over these elements may be influenced by robusticity and density (bulk density, volume density, cortical thickness etc.) (Bovy 2002, 970-976; Serjeantson 2009, 153-164). However, the issues surrounding elemental survivorship are complex and often inconsistent, limiting their application here (Bovy 2002, 970-976; Serjeantson 2009, 161-162).

The sieving scale could have limited the recovery of small elements even for larger birds. However the lack of core body elements such as the sternum, pelvis and synsacrum (which survive well at other sites in the vicinity) even for large birds, combined with the presence of phalanges belonging to medium and tiny birds, and a number of small passerine elements from the processed samples suggest that preservation and recovery is not entirely to blame. This again implies that human processing and depositional practices may have helped create this elemental distribution.

Modification Information: Butchery, Burning and Gnawing

Butchery and burning provide evidence for human processing of the avian resources (Figure 5). Burning was noted on 2% of the assemblage but this low incidence of burning on bird bone is common to other Hebridean assemblages, including Cille Pheadair and Bornais (Best and Cartledge in preparation; Cartledge and Serjeantson 2012, 298).

	Butchered	Burnt	Gnawed
Frequency	83	7	34
% of assemblage	17.2	1.5	7.1

Figure 5. Taphonomic Characteristics of the Cladh Hallan Assemblage.

Around 17% of the total assemblage showed some form of butchery. This is notably higher than the typical butchery frequencies for comparable avian assemblages such as: 7% Cille Pheadair, 3-8% Shiant Isles (multiple periods), 5% Bornais Mound 1, 5% Bornais Mound 2/2a, and 2% Bornais Mound 3 (Best in preparation; Best and Cartledge in preparation; Best and Mulville 2010, 87-95; Cartledge 2005, 177; Cartledge and Serjeantson 2012, 298). Knife cuts were present on 55 fragments, 24 were worked, and four were worked and had separate knife marks. There were an additional 12 fragments with probable knife cuts. Every phase and location (except house 640 and the northwest area) produced butchered bone, demonstrating that birds modified and consumed by humans ended up in a variety of places.

Butchery marks were present on a diverse range of species, mainly seabirds, but also waders, water birds (e.g. goose), land birds such as the rock/stock dove and possibly on one raptor (Figure 6). The species suggest that birds were being processed for food at all times of the year, with cut marks appearing on breeding species and on winter visitors such as the great northern diver. Two out of the three great northern diver bones were cut implying exploitation for food when other subsistence resources may have been limited. The knife cuts on species such as puffin and curlew show that not just the largest birds were being processed.

Species	Knife Cut	Worked	Knife Cuts & Separate Working	Possible Knife Cuts
Gannet	14	2		3
Cormorant	6	1		
Very Large Bird	5	3		
Great Auk	4			
Swan Sp.	4	1	1	
Goose Sp.	3	2	1	
Great Black-Backed Gull	2	2		
Great Northern Diver	2			
Large Bird	2	1		
Bird	2	7		1
Carrion Crow / Rook	1			
Crane	1			
Curlew	1			
Gull Sp.	1			
Herring / LBB Gull	1			
Lapwing / Godwit	1			
Puffin	1	1		
Red Grouse	1			
Rock / Stock Dove	1			
Shag	1	2	2	1
Very / Large Bird	1			
Large Duck cf. Mallard		1		
Black Guillemot				1
cf. Raptor				1
Fulmar		1		
Guillemot				1
Razorbill / Guillemot				1
Shag / Cormorant				1
Starling				2

Figure 6. Cladh Hallan Butchery Counts by Species.

Butchery occurred on a wide range of elements but particularly the humerus (20 fragments) followed by tibiotarsus, radius and ulna. Disarticulating cuts were present, mainly on the proximal ends of humeri suggesting the removal of wings. Cuts were noted mid shaft of some wing elements, implying that meat or feathers were being removed from larger birds' wings (Serjeantson 2009, 130-144). The mid-shaft of the tibiotarsus was only cut in very sizable birds perhaps suggesting meat removal in these larger species. There are possible butchery marks on the starling wings, implying that the small passerines at the site might be anthropogenic. The axis and furcula of the gannet skeleton were butchered. Even where butchery is present on this individual bird it is still difficult to interpret; it appears that the wings may have been removed and the rest of the body/skeleton disposed of mostly whole.

Eleven fragments with butchery marks were gnawed showing that animals had access to remains after human processing and consumption.

Young Birds as a Resource

Several species of juvenile bird were present and formed 7% of the assemblage (Figure 7). During the main

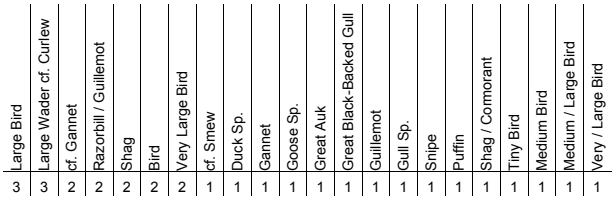

Figure 7. Count of Cladh Hallan Juvenile Bird Bone.

occupation phases many of the seabirds were hunted during the spring and summer breeding season. Knife cuts were present on a young gannet, great auk and two large birds indicating consumption of young birds which are good eating and provide valuable dietary fat.

Landscape Use and Seasonal Resources

The Cladh Hallan assemblage provides a valuable insight into human use of the landscape and their interaction with it at different points of the year. The range of species present shows that avian resources were collected from multiple areas of the landscape and at several points of the year. These different species and habitats suggest that a variety of capture techniques would have been employed. Habitats used include the machair (a fertile plain of sandy, grassy duneland), moorland, inland water, grassland, rocky coasts, shorelines and sea cliffs. Gulls and geese could have been found upon the machair at several times of the year, and ducks and geese around inland water (Heinzel *et al*., 1992, 46-66; Nelson 1980, 118-127). The greylag goose and several of the gulls (particularly lesser black-backed and herring gull, but also and great black-backed gull), may have ground nested on the machair, a possibility supported by the juvenile species (Cartledge and Serjeantson 2012, 232; Heinzel *et al.,* 1992, 150). The cormorant and shag could have been found on the rocky areas of coastline year round, with cormorants sometimes coming inland. Many small waders such as the golden plover populate muddy shores and marshes, while birds such as the curlew favour moors, sand dunes and damp grassland (Best and Cartledge in preparation; Heinzel *et al.,* 1992, 32, 122 and 138).

Burrow nesting species such as the puffin, Manx shearwater and shelduck may have made their nests in the machair. It is likely that these birds were captured in the burrow when more easily accessible (Nelson 1980, 118-127). Land birds such as the red grouse, carrion crow/rook, rock/stock dove and the raptors could have been found in open country, heather moors, rocky cliffs and agricultural land. Certain species such as the now extinct flightless great auk could physically only access certain locations such as gently sloping rocky shores where it bred. Although habitat preferences could have changed, even very broad categories can testify to the variety of habitats exploited: land bird, seabird, water bird and waders.

The juveniles do not just inform upon seasonality but allow further insight into habitat use by implying that nesting sites were harvested. Some eggshell was recovered suggesting that breeding sites were visited at multiple times to collect eggs and young birds. Certain species (such as the gannet) will lay again if their egg is taken (Maclean 1992, 92; Serjeantson 2001, 51). This means a multiple harvest could be reaped, increasing the total number of eggs laid and making the young mature and fledge at different times. This would increase the period in which birds and eggs could be eaten fresh while ensuring enough young birds survive to maintain the population. Logical summer exploitation of breeding birds was important, however this was part of a year round fowling calendar.

Several of the species identified are winter visitors. The great northern diver, the black geese (Brent and Barnacle) and whooper swan today return to Britain for the winter. The curlew gathers around the coast for the winter (Heinzel *et al.,* 1992, 138; Hull 2001, 175-176). Wintering birds (and resident species) could have provided fresh meat and valuable dietary fat and oil at a time of the year when other resources may have been limited. In liminal, marginal island landscapes the wild avian resources could have been more than a valuable dietary and economic addition: a buffer that could prevent disaster in times of need.

Focused Fowling

For investigating landscape use and seasonality at Cladh Hallan the domination of the assemblage by gannets is a particularly interesting feature. The gannet is one of the birds most commonly exploited in large numbers across Scottish island sites geographically and temporally. Today there is no suitable habitat on South Uist for cliff nesting seabirds that only come to land to breed, such as the gannet, razorbill and guillemot (Cartledge and Serjeantson 2012, 227; Serjeantson 2001, 44 and 46-48). Despite this gannets were also prominent at Norse Cille Pheadair and Iron Age Dun Vulan (with guillemot also being very numerous at the latter) (Best and Cartledge in preparation; Cartledge and Grimbly 1999, 283-287). The high proportion of gannets at Cladh Hallan suggests a number of possible scenarios: either that the surrounding environment was different enough to support them, that they bred more widely in the past, that the birds were caught at sea, or that they were captured beyond the immediate vicinity of Cladh Hallan. Sites with only a few gannet bones could suggest a small population breeding locally, however at sites where gannets are dominant or very numerous, trips may have been made to catch them at breeding colonies further afield. The juvenile gannet at Cladh Hallan does suggest capture at a breeding site.

The gannet is one of the most greasy, fatty birds and this combined with its size and colony based breeding habits may have made it worth particular fowling effort (Maclean 1992, 68, 98-103). Even today the men of Ness on Lewis travel to the rock of Sula Sgeir annually to catch and preserve the nearly mature youngsters. These are called "guga" and are considered a delicacy. The gannet was a staple food source for the population of St Kilda (an island group 41 miles west of the Outer Hebrides) into the 19th century AD. The fat and oil from gannets and fulmar were used by the St Kildans as a nourishing dietary addition (Maclean 1992, 68, 98-103). Its value to past populations should therefore not be underestimated.

CHRONOLOGICAL TRENDS IN DISTRIBUTION

One species identified at Cladh Hallan which may have had a different breeding pattern in the past is the fulmar. It occurs consistently in moderate numbers in assemblages from the Mesolithic into the Norse period. Today the fulmar only comes ashore to breed (being otherwise highly pelagic), however it may be present at this site for much of the year and only absent for around three months in the autumn/winter (Maclean 1992, 92-94). There are reasonable numbers at Cladh Hallan (perhaps not enough for a dedicated fowling trip) including a possible juvenile. Three sub-adult bones from Norse Cille Pheadair show that young birds were in the vicinity of the site in this later period, or had been brought there. Unless these birds were being taken at sea or at breeding grounds further afield this could suggest a wider past breeding distribution, prior to the 19th century expansion of its historically constricted breeding range.

The great auk is fairly numerous in the Cladh Hallan assemblage and the juvenile specimen shows exploitation of this flightless species when it came ashore to breed. However, the presence of great auk in the archaeological record suffers a notable decline by the Late Iron Age and Early Norse period, and unsustainable over-exploitation appears to have been a factor in its decline and eventual extinction. These large birds only came ashore to breed but being flightless it was easy prey and provided a lot of meat per kill. It laid a solitary egg and if this was taken or lost it could not lay again (Serjeantson 2001, 48-51).

In the Neolithic the great auk is exploited at a range of sites including the Knap of Howar and Tofts Ness on Orkney (Serjeantson 2001, 48; 2010, 147). On South Uist it is quite frequent at Cladh Hallan and is present in the Iron Age at Hornish point and Bornais, but is completely absent from Norse Bornais (Best in preparation; Cartledge 2005, 145; Cartledge and Serjeantson 2012, 195 and 227; Serjeantson 2003, 151). At Iron Age Dun Vulan the great auk has the highest NISP, and even when the partial skeleton is excluded it still dominates the assemblage by MNI and has a high NISP. However, it is decreasing by the latest Iron Age layers and absent from the later deposits (Cartledge and Grimbly 1999, 282-288). It is entirely absent from Norse Cille Pheadair (Best and Cartledge in preparation). On neighbouring North Uist at the Udal it is frequent in the Beaker and Bronze Age levels, quite common in the Early and Middle Iron Age, but has declined by the Late Iron Age and is absent in the Norse period onwards (Finlay 1984, 177; Serjeantson 1988, 218-224; 2001, 48). From the Late Iron Age at the Udal the assemblage is dominated by gannet, while domestic fowl also become prominent. This temporal increase in gannet and domesticates is a reoccurring pattern also seen at sites such as Cille Pheadair. An increased focus on waterfowl such as geese or ducks also appears to be present at sites from the Norse period.

BEYOND FOOD

The birds exploited at Cladh Hallan provided more than dietary products. The assemblage contained 28 worked bird bones most of which came from large birds including gannet, gulls, shag and cormorant. Wing bones such as the ulna and humerus were most often selected for working due to their strength, size and shape. The number of worked bird bones is high compared to other analogous sites, which may suggest a degree of resource maximisation. Awl-like points were the most commonly occurring form with 22 examples (Figure 8). These points were in themselves varied with some being very thin and sharp and others of more broad form. Several exhibited high polish indicative of use. The worked material also included a complete swan humerus with extensive polish on the shaft which may have been an unfinished prepared shaft, or polished during use.

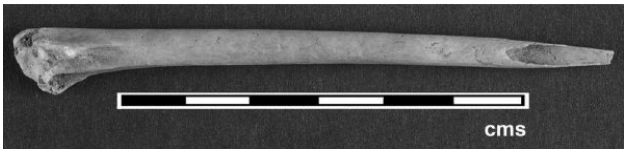

Figure 8. Awl-like Object with Shaped Point.

The butchery marks also show that avian exploitation was not entirely food orientated. The knife cuts upon the proximal phalanx of the major digit of a carrion crow/ rook are indicative of feather removal (Serjeantson 2009, 138; Powell pers. com.). This specimen proves that the corvid bones were anthropogenic and suggests that feather collection may have been an additional resource and reason for fowling. Feathers are a versatile product which can be used for decoration, insulation, fletching etc. and also may have symbolic or ritual uses.

Collecting, working and using these avian products and objects can contribute to complex relationships connecting people with the bird resources they were utilising. These relationships and associations can take many forms. The skill needed to catch certain birds may have resulted in successful fowling providing prestige. The birds themselves could have formed an intrinsic part of life in the Scottish islands with their movements, arrivals and departures being a valuable indication of weather, time of year, or even where fish were likely to be caught.

Finally, one bone of particular interest is the eagle talon found in one of the houses. Species such as this might not have been eaten and could have been killed for their feathers and talons, or to protect livestock (Serjeantson 2010, 151-153). It is also worth considering the ritual aspects of avian-human relations, as could be implied by the inclusion of white-tailed sea eagle bones in Neolithic tombs such as the Point of Cott Westray, and also at Isbister where they were deposited 1000 years after construction (Pitts 2006; Serjeantson 2010, 152). Perhaps the mobility of birds between land and over sea bore associations of movement between life and death.

CONCLUSION

In conclusion Cladh Hallan exemplifies the valuable role that avian resources may have played in Scottish island landscapes and how their presence or absence at certain times of the year dictated use. A focus on breeding

seabirds in the summer months has been identified alongside the use of resident species and winter visitors. The focused and diverse nature of fowling has also been explored. The decline of the great auk and changes in past bird populations have been examined and avian-human relationships investigated. It has been shown that a variety of habitats and areas of the landscape were used, and a number of techniques needed to catch the birds. This paper has also demonstrated that birds may have been acquired from beyond the immediate vicinity of a site.

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