

Winter in a wetland. The bird remains from a Late Mesolithic camp site at Polderweg, municipality Hardinxveld-Giessendam

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Abstract. The late Mesolithic site of Polderweg in the municipality of Hardinxveld-Giessendam, The Netherlands is situated on the intracoastal plain formed by the delta of the rivers Rhine and Meuse on a so-called river dune. Four stratigraphic phases were distinguished of which the most important, phase 1, is dated 5500 – 5300 cal BC. The 643 identified bird remains provide information on the ecological conditions at the time of occupation. Some 90% of the bird remains come from typical wetland species, while the remaining 10% are indicative of a woodland environment. Almost all of the wetland species are either winter visitors or are present in high levels of aggregation during the colder months. Bird species that indicate summer occupation are notably absent. This has led to the unexpected conclusion that the Late Mesolithic occupants of the site choose to establish their winter camp in a wetland environment.

Key words: birds, Mesolithic, seasonality, Polderweg, broad spectrum, hunter/gatherers.

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I. INTRODUCTION

In about 1990 the Dutch government decided to build a rail freight line, the “Betuwelijn”, across the country from Rotterdam to Zevenaar, (Fig. 1). The Betuweroute Archaeology Project Group (PAB) was set up as cooperation between the Betuwe project organisation and the National Service for Archaeological heritage (ROB). From the beginning it was ensured that before the line was laid, archaeologists would be able to investigate the archaeological importance of sites along the route. After extensive field surveys and trial excavations 33 sites were listed as worthy of preserving. Of these 33 sites, 11 could be protected “in situ” and the remaining 22 were excavated.

One of the sites indicated for excavation was site 4, Polderweg in the municipality of Hardinxveld-Giessendam. The site is situated on the intracoastal plain formed by the delta of the rivers Rhine and Meuse. The preliminary survey had shown the presence of an ancient riverdune (Dutch: “donk”) with traces of Mesolithic occupation and a favourable preservation of organic material. The site was excavated in the winter of 1997/98. An area of 16 by 28 m was excavated. Archaeological layers were found at a depth between 5 and 11 m below ground surface, The excellent conditions of preservation became apparent with numerous finds of animal bone, antler and bone

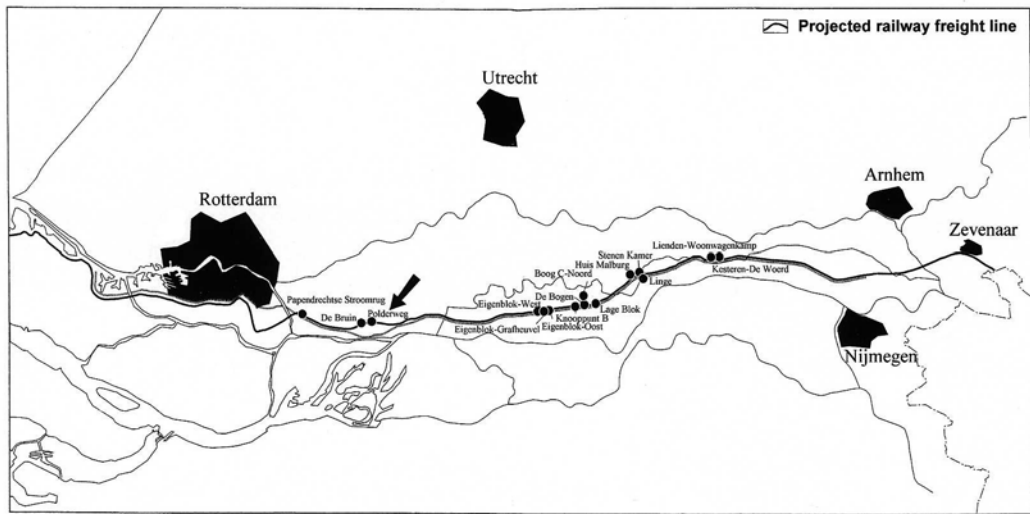


Fig. 1. Projection of the rail freight line across the Netherlands with the position of site 4, Polderweg.

artefacts, wood and wooden artefacts (a paddle and a bow), burials of humans and dogs, etc. Initially two layers or phases were recognized. A series of C14 dates anchors the site in the following chronology:

- * phase 1: ca. 5500 to 5300 cal BC
- * phase 2: around 5000 cal BC

The detailed analysis of the stratigraphy added two extra layers; phase 0 marking the beginning of habitation and phase 1/2 with an extrapolated date of ca. 5100 cal BC. From the amount of debris left on the flank of the dune during phase 1, it is obvious that the site was used intensely during this period. The other three phases produced much less excavated material. This paper will therefore focus in the main on the results from phase 1.

Phase 1 was found to be rich in archaeological features and materials of all kinds. These are the remains of multiple activities including hunting, fowling, fishing, gathering, the working of wood, antler, bone and flint. The unexpected find of the burial of an older woman (C14 5692 – 5610 cal BC) merits special attention. A dog was buried at the site around the same time. The dog remains the only domestic animal present during the entire time of habitation of the site. Evidence for plant cultivation is lacking. Both the dating of the site and the lack of domesticates place Polderweg phase 1 securely in the Late Mesolithic. The presence of burials and of traces of the execution of multiple activities characterise the site as a base camp rather than as a hunting camp (LOUWE KOOIJMANS 2001a).

Phase 2 shows continuity with phase 1 in all respects with the exception of the appearance of pottery: pots with a pointed bottom in the tradition of the Blicqy ceramics. This finding characterizes phase 2 as a “ceramic Mesolithic” (LOUWE KOOIJMANS 2001a).

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II. BIRD REMAINS: THE GENERAL RESULTS

A total of 1406 bird remains were recovered at Polderweg of which 643 could be identified (VAN WIJNGAARDEN-BAKKER et al. 2001). Of these 530 belong to phase 1. The sample from phase 0 is very small and the two later phases are also less rich with respectively 69 and 37 remains. With the aid of the reference collection of the Zooarchaeology Laboratory of the Amsterdam Archaeological Centre (AAC) most of the bones could be identified to species level. The more general categories of “ducks” and Anatidae have been introduced where identification was somewhat unsure (Table I). The term “ducks” comprises the genera *Anas*, *Aythya*, *Mergus* and *Bucephala*. In the category of the Anatidae all duck species and small geese have been brought together.

The bones are generally highly fragmented. The three main taphonomic processes, butchering, carnivore gnawing and burning have all left traces. Traces of butchering and gnawing are rare, but ca. 15% of the bird remains are either burned (black colour) or calcined (white colour).

The bird remains are specifically relevant to answer two important research questions:

- * Reconstruction of the ecological conditions at the time of occupation of the river dune
- * Reconstruction of the season of occupation.

With answers to these questions, more general questions can be tackled such as the function of the site, the subsistence strategy and technology of the hunter/gatherers who used the site (LOUWE KOOLMANS 2001a).

III. ENVIRONMENTAL RECONSTRUCTION

Based on the assumption that the ecology of the different species has remained fairly constant, the vast literature on the Dutch avifauna may be used for a reconstruction of the local environment at Polderweg. This reconstruction is based on the 530 remains from phase 1. Within the list of species two ecological groups can be discerned. Circa 90% of the identified bones come from wetland species, foremost among which are ducks, geese and swans. Red-throated Diver, Cormorant, Little Grebe, Grey Heron, Rail and Reed Bunting also belong to this group. Their presence points to open, oxygen rich water bordered by a lush vegetation of reeds. The remaining 10% are characteristic of a more wooded environment: Sparrowhawk, Buzzard, Eagle Owl, woodpecker, Woodcock. The absence of crows (Corvidae) and pigeons (Columbidae) is noteworthy.

Botanical evidence confirms the presence of these two specific habitats. According to BAKELS (2001) the environment was characterised by an extensive swamp with streams and lakes bordered by reed and alder carr. Standing out in this wetland were the river dunes with their high rising deciduous woodlands of oak, lime, elm and ash. Open spaces were bordered with shrubs such as hazel, buckthorn, cornel and hawthorn.

IV. SEASONALITY

Birds can be useful indicators of seasonality (SERJEANTSON 1998). Assuming that the general migratory behaviour of bird species has remained more or less constant in the preceding millennia, present day data on bird migration have been applied to the bird remains from phase 1. The assemblages from the remaining phases were considered too small to draw reliable conclusions.

For this study of seasonality, the data on migration and distribution of the Dutch avifauna from the SOVON project were used. This project was initiated in 1976 by a group of organisations with the aim of producing monthly distribution maps of all bird species occurring in the Netherlands (SOVON 1987). In the years 1978 to 1983 some 3400 (amateur) ornithologists made over 5,000,000 observations. In order to process the data the country was divided into 1767 blocks of 5 by 5 km. In each

Table I

Frequency and distribution of the bird remains from Polderweg

Species	Phase	Phase				Total
		0	1	1/2	2	
<i>Gavia stellata</i> (PONTOPPIDAN, 1763)	Red-throated Diver	–	9	–	1	10
<i>Tachybaptus ruficollis</i> (PALLAS, 1764)	Little Grebe	–	5	–	–	5
<i>Phalacrocorax carbo</i> (LINNAEUS, 1758)	Cormorant	1	10	–	–	11
<i>Ardea cinerea</i> LINNAEUS, 1758	Grey Heron	–	8	–	–	8
<i>Ardea purpurea</i> LINNAEUS, 1766	Purple Heron	–	–	–	1	1
<i>Botaurus stellaris</i> (LINNAEUS, 1758)	Bittern	–	7	–	–	7
Ardeidae indet.	Hérons	–	1	–	1	2
<i>Cygnus olor</i> (J. F. GMELIN, 1789)	Mute Swan	–	10	1	2	13
<i>Cygnus bewickii</i> YARRELL, 1830	Bewick's Swan	–	2	–	–	2
<i>Cygnus cygnus</i> (LINNAEUS, 1758)	Whooper Swan	–	2	–	–	2
<i>Cygnus</i> sp.	Swans	1	27	1	1	30
<i>Anser fabalis</i> (LATHAM, 1787)	Bean Goose	–	4	–	–	4
<i>Anser anser</i> (LINNAEUS, 1758)	Greylag Goose	–	6	2	1	9
<i>Anser</i> sp.	Geese	2	34	5	2	43
<i>Anas penelope</i> LINNAEUS, 1758	Wigeon	–	2	2	2	6
<i>Anas crecca</i> LINNAEUS, 1758	Teal	–	4	3	–	7
<i>A. crecca/A. querquedula</i> LINNAEUS, 1758	Teal/Garganey	–	5	–	–	5
<i>Anas platyrhynchos</i> LINNAEUS, 1758	Mallard	1	165	21	12	199
<i>Aythya</i> sp.	Diving ducks	1	41	3	–	45
<i>Mergus merganser</i> LINNAEUS, 1758	Goosander	–	25	–	3	28
<i>Bucephala clangula</i> (LINNAEUS, 1758)	Goldeneye	–	3	1	–	4
Anatinae indet.	Ducks	–	54	21	1	76
Anatidae indet.	Duck family	–	36	7	9	52
<i>Accipiter nisus</i> (LINNAEUS, 1758)	Sparrowhawk	–	3	–	–	3
<i>Buteo buteo</i> (LINNAEUS, 1758)	Buzzard	–	3	–	–	3
<i>Haliaeetus albicilla</i> (LINNAEUS, 1758)	White-tailed Eagle	1	30	1	1	33
Accipitridae indet.	Birds of prey	–	2	–	–	2
<i>Rallus aquaticus</i> LINNAEUS, 1758	Water Rail	–	1	–	–	1
<i>Gallinula chloropus</i> (LINNAEUS, 1758)	Moorhen	–	7	–	–	7
<i>Fulica atra</i> LINNAEUS, 1758	Coot	–	9	1	–	10
Rallidae indet.	Rails	–	2	–	–	2
<i>Grus grus</i> (LINNAEUS, 1758)	Crane	–	1	–	–	1
<i>Charadrius</i> sp.	Plover	–	1	–	–	1
<i>Scolopax rusticola</i> LINNAEUS, 1758	Woodcock	–	1	–	–	1
<i>Bubo bubo</i> (LINNAEUS, 1758)	Eagle Owl	–	1	–	–	1
<i>Dendrocopos major</i> (LINNAEUS, 1758)	Great Spotted Woodpecker	–	3	–	–	3
<i>Turdus</i> sp.	Thrushes	–	4	–	–	4
<i>Emberiza schoeniclus</i> (LINNAEUS, 1758)	Reed Bunting	–	2	–	–	2
Subtotal		7	530	69	37	643
Aves indet.		5	598	139	21	763
Total		12	1128	208	58	1406

block the presence/absence of species was noted in a standard manner. The result is an atlas that gives for each species:

- * monthly distribution maps (for an example see Fig. 2)
- * monthly frequency histograms (see Fig. 3)

Goosander *Mergus merganser*

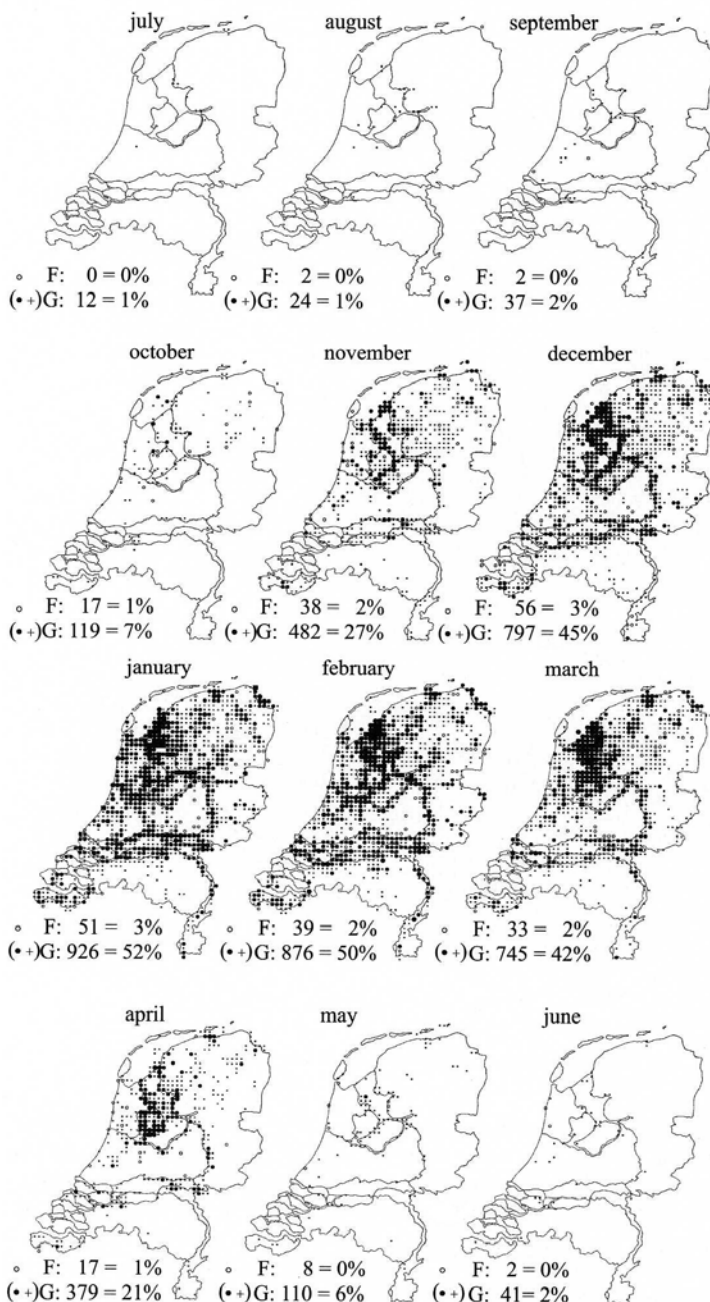


Fig. 2. Monthly distribution maps of the Goosander 1978-1983 (after SOVON 1987). Abbreviations: G – observed on the ground; F – observed flying.

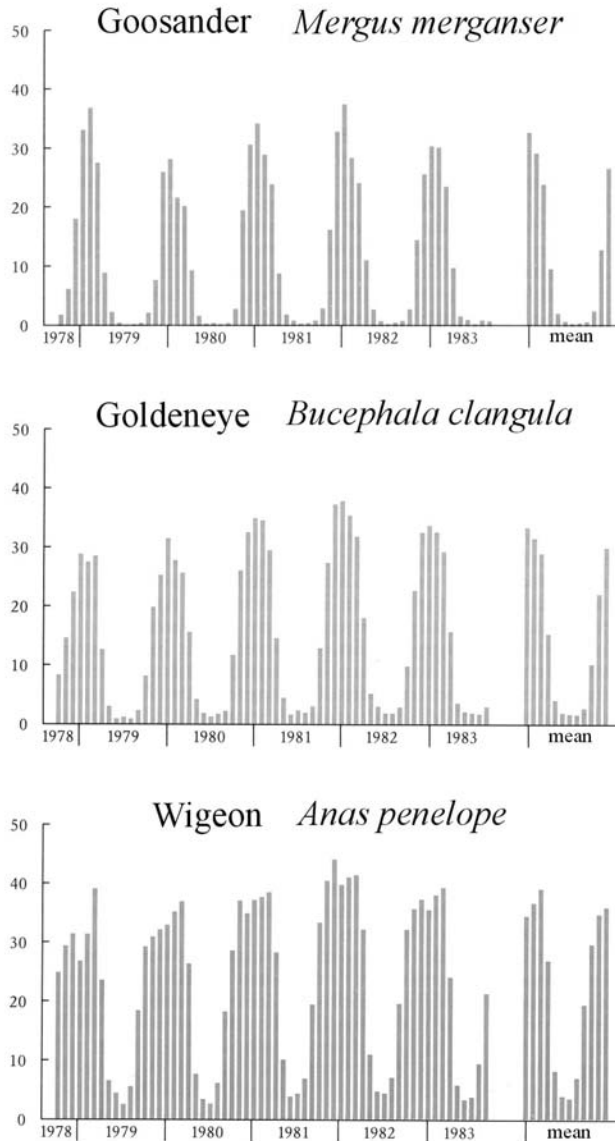


Fig. 3. Monthly frequency histograms of winter visitors: Goosander, Goldeneye and Wigeon (after SOVON 1987).

The maps are based on cumulative evidence over 5 years. They do not represent the actual distribution in a single year. Extreme weather conditions may greatly influence the distribution of species, for example, those that overwinter in the Netherlands in far greater numbers during severe winters than in more moderate ones. The histograms on the other hand show the 12 months per year from 1978 to 1983 on the horizontal axis and the percentage of the total number of blocks where the species was observed on the vertical axis. The data of the five separate years are assembled into a histogram of the mean presence per month, which is presented to the right of the yearly graphs.

With the aid of the data in the SOVON (1987) atlas the list of species from Polderweg phase 1 has been subdivided into seasonal groups (Table II). The first group, ca 11% of the bones, is that of the

winter visitors. The species in this group are virtually absent during the summer months. A typical representative of this group is the Goosander. The distribution maps (Fig. 2) show its first arrival in November, its presence in December to March, leaving again in April. The histogram (Fig. 3) clearly indicates that the species is a winter visitor. The Goosander belongs to a group of bird species that breed in northern Scandinavia and northern Russia and overwinters in the wetlands of the Netherlands. They are here only part of the cold season:

Red-throated Diver	January – March
Bewick's Swan	December – February
Whooper Swan	December – February
Bean Goose	December – February
Wigeon	November – March (Fig. 3)
Goosander	December – March (Fig. 3)
Goldeneye	December – March (Fig. 3)

Table II

Seasonality of bird remains from phase 1 Polderweg (5500 – 5300 cal BC)

Species	Winter	Most in winter	Year round	Summer
Red-throated Diver	9	–	–	–
Little Grebe	–	5	–	–
Cormorant	–	–	10	–
Grey Heron	–	–	8	–
Bittern	–	7	–	–
Mute Swan	–	10	–	–
Bewick's Swan	2	–	–	–
Whooper Swan	2	–	–	–
Swans	–	27	–	–
Bean Goose	4	–	–	–
Greylag Goose	–	6	–	–
Geese	–	34	–	–
Wigeon	2	–	–	–
Teal	–	4	–	–
Teal/Garganey	–	5	–	–
Mallard	–	165	–	–
Diving ducks	–	41	–	–
Goosander	25	–	–	–
Goldeneye	3	–	–	–
Sparrowhawk	–	3	–	–
Buzzard	–	3	–	–
White-tailed Eagle	–	30	–	–
Water Rail	–	–	1	–
Moorhen	–	–	7	–
Coot	–	–	9	–
Crane	–	–	–	1
Woodcock	–	1	–	–
Eagle Owl	–	–	1	–
Great Spotted Woodpecker	–	–	3	–
Reed Bunting	–	–	2	–
TOTAL	47	341	42	1
%	10.9	79.1	9.7	0.2

The presence of these species points to hunting in the period from November to March with an emphasis on the period from December to February.

The most numerous group (80%) consists of species where the resident population is either augmented or substituted by overwintering birds. Their numbers increase substantially in the winter. This concerns the following species: Little Grebe, Bittern, Mute Swan, Teal, Mallard, Sparrowhawk, Buzzard and White-tailed Eagle. Their monthly frequency histograms differ from the preceding group by their presence, albeit in low numbers, during the summer. Histograms for Teal, Greylag Goose and Little Grebe are presented here as examples (Fig. 4). The Mallard has also been

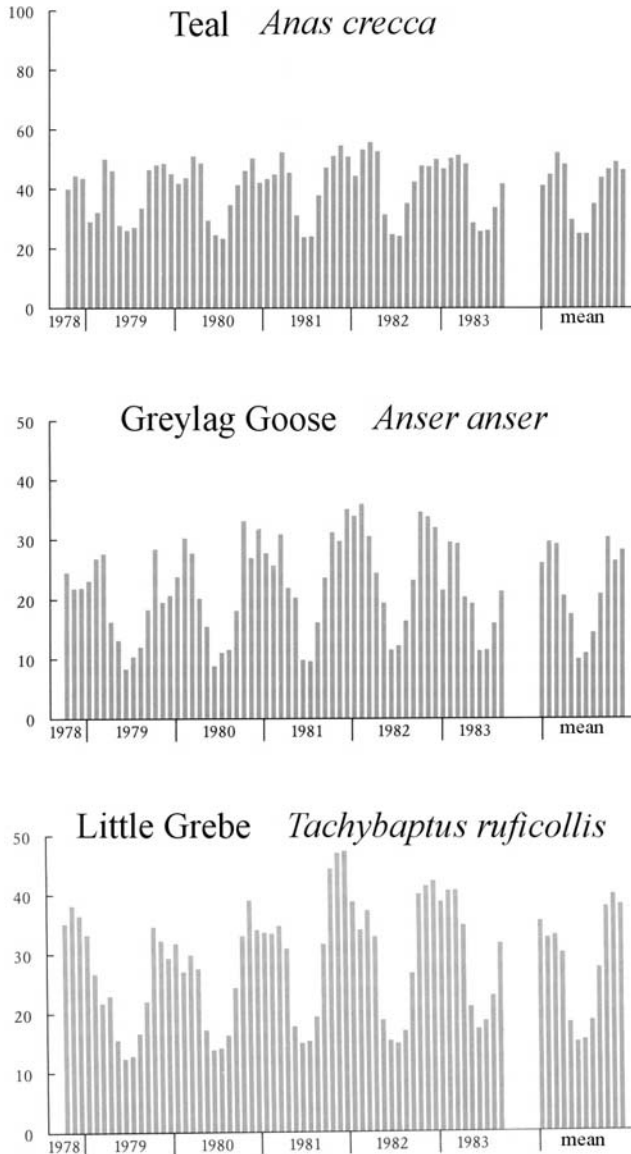


Fig. 4. Monthly frequency histograms of bird species with a higher frequency in winter: Teal, Greylag Goose and Little Grebe (after SOVON 1987).

included in this category as it is not only present in greater numbers in winter, but its level of aggregation is also much higher in winter than in summer. This must have made hunting in winter more advantageous. The general categories of “ducks” and Anatidae are not included because theoretically they comprise a great number of species with different seasonal behaviour.

The third group in Table 2 consists of species that are present all year round. Depending on the weather conditions the size of the local population often fluctuates and some typical wetland species may be more numerous in winter. Members of this group are the Cormorant, Grey Heron, Water Rail, Moorhen, Coot, and Reed Bunting. Only two species are true residents. The Eagle Owl and the Great Spotted Woodpecker are sedentary residents that stay in their breeding territory during the whole year. The presence of the Eagle Owl merits some special attention, as the species is actually very rare in the Netherlands. There have been only nine documented sightings between 1800 and 1999 of which eight are presumed to be the direct consequence of a successful reintroduction project in Germany since 1980 (VAN DEN BERG and BOSMAN 2001: 210). Eagle Owls breed as early as February or March and the specimen from Polderweg may well have been caught at this period (VAN WIJNGAARDEN in prep.). It is however also known that young Eagle Owls are dispersive and can show up almost anywhere (TYRBERG pers. com). Therefore the species can not be considered a useful seasonal indicator.

There is single bone (a tibiotarsal) of a Crane. The Crane today is a common passage migrant in spring and autumn, but the species was breeding in the Netherlands in historic times. Therefore, in prehistoric times, it might also be included in a group of summer visitors. The bone however is an artefact and thereby loses its value as a seasonal indicator.

V. DISCUSSION

The bird remains from Polderweg give clear evidence for the hunting of birds in winter. The assemblage is dominated by winter visitors and by species that overwinter and/or aggregate in wetlands during the colder months. In his research on more than 57,000 fish remains from Polderweg BEERENHOUT (2001) comes to the same conclusion that winter occupation is indicated. The fish spectrum is dominated by the pike (*Esox lucius*), for which he reconstructs a seasonal catch during the spawning period, i.e. February and March. The mammal bones (ca. 56,000 examined) show a high presence of fur animals including otter, beaver, marten and wild cat. Their presence at hunting sites is usually interpreted as evidence for autumn and winter occupation. In the case of Polderweg the frequent presence of shed antler points to late winter (VAN WIJNGAARDEN et al. 2001).

Negative evidence may also be used as an argument for the reconstructed season of habitation. In this respect the absence of typical summer species such as the Pelican and Crane is noteworthy. Among the mammal remains the absence of brown bear – hibernating! – should be mentioned. As regards the fish spectrum, the virtual absence of eel, catfish and sturgeon equally points to an absence of summer occupation.

The site of Polderweg presents evidence for a “broad spectrum economy” so typical for the Mesolithic period. The exploitation of wetlands, with their high biodiversity and resource density, forms an excellent base for such an economy. The data from Polderweg leads to the unexpected conclusion that the site was occupied during winter. The question arises as to what made this wetland environment so attractive in winter. Biodiversity and resource density have already been mentioned, but perhaps more important was the fact that so many wetland species show a predictable pattern of behaviour. It has been shown above that seasonal bird migration and aggregation are highly predictive patterns. The same goes for the spawning behaviour of pike. In winter it is also easier to choose spots for trapping fur animals because the customary pathways of these animals are easier to find. The prediction of their movements is even easier with a snow cover.

The reconstructed pattern of seasonal activities at the site seems to have continued after the introduction of pottery. In phase 2 of Polderweg only a single bone of a summer visitor (Purple Heron) has been identified. But at the neighbouring site of De Bruin, ca. 1 km to the west, in layers dating to the first half of the fifth millennium, evidence was found for an incidental use of that site during the

summer period (LOUWE KOOIJMANS 2001b; OVERSTEEGEN et al. 2001). As regards the bird remains this evidence was based on the presence of the Purple Heron, a femur of a Mute Swan with medullary bone and some bones of juvenile swans, geese and herons. For the rest the bird bone assemblage from De Bruin does not differ greatly from that from Polderweg (OVERSTEEGEN et al. 2001).

VI. CONCLUSION

The bird remains from Polderweg phase 1 (5500 – 5300 cal BC) show that the Late Mesolithic camp site was occupied in the winter season from November to March with an emphasis from December to February. Fowling in this period focussed on typical wetland species – ducks, geese and swans. The predictable patterns of migration and aggregation of these species may have formed a powerful incentive for the Late Mesolithic hunter/gatherer/fishers to choose river dunes for their winter camps.

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