

*This is a pre-copy-editing, author-produced version of an article accepted on August 31, 2022, following peer review, for publication in the Journal Environment and History*

*Sander Govaerts, Ghent University*

**Biodiversity in the Late Middle Ages: Wild Birds in the Fourteenth-Century County of Holland.**

*This article provides a preliminary overview of the species of wild birds that lived in the fourteenth-century County of Holland, now the Netherlands, on the basis of archaeological and historical sources. It argues that scholars should devote more attention to the Late Middle Ages (1300-1500) as a historical baseline for the study of biodiversity, and demonstrates the value of using medieval financial administration (accounts) as a source for such research. The article identifies 46 species of birds, most of which had substantial socio-economic value (birds of prey, wildfowl, herons, and spoonbills). Because some bird populations were actively managed to secure a steady supply, it is possible to gain insight into historical population dynamics. This study can also serve as an example to conduct similar research on other species and geographical regions.*

biodiversity- medieval- Netherlands- historical ecology- population dynamics

\* I am grateful to Jan Luiten van Zanden for giving me a chance to work on this pilot study. I would like to thank Mario Damen, Thijs Lambrecht, and the two anonymous peer reviewers for their helpful comments on earlier draft versions of this article.

## INTRODUCTION

Although biodiversity loss is one of the greatest challenges of this era, our knowledge about changes in the geographical distribution of fauna and flora before the nineteenth century is very limited. It is of course well established that specific species became extinct as result of overhunting and the disappearance of their habitat, but these are almost without exception relatively large mammals, birds and fish. It is still uncertain how representative the fate of these species is for smaller and less well-known animals, not to mention plants. When biologists study the evolution of biodiversity they often take the 'pre-industrial period' as a baseline, which means human history before the early 1800s or more exceptionally the 1700s. By taken the pre-industrial period in general as a starting point researchers assume that ecosystems were still more or less 'natural' before the Industrial Revolution or at least that there were no significant changes in preceding centuries. If we are develop to plans to stop biodiversity loss we need a much deeper understanding of fluctuations that occurred in the long-distance past.<sup>1</sup>

A study of the Middle Ages in particular can make an essential contribution to the history of biodiversity because this is the first period in European history for which enough written sources become available to try to reconstruct species diversity at the regional or even local level. From the year one thousand onwards more and more texts have been preserved, which reflects the increasing importance of the written word, and many of these mention wild animals and plants. So far this evidence has largely been neglected, except for a few well-known works on natural history, charters and legal texts (e.g. Albertus Magnus' writings on animals, the Domesday

---

<sup>1</sup> Goethem and van Zanden, 'Biodiversity'; Lotze and Worm, 'Historical Baselines'; Mihoub et al., 'Setting Temporal Baselines'.

Book). Most attempts to reconstruct the geographical range ('biogeography') of different species in the Middle Ages have been made by biologists and archaeologists, rather than historians. Such studies also tend to rely on archaeozoological and archaeobotanical research rather than on written sources.<sup>2</sup>

Medievalists have largely refrained from studying wild animals on their own terms, meaning as part of larger ecological systems. They instead contributed to a growing volume of literature on historical perceptions of nature and the use of animals and plants for various purposes, such as food or medicine.<sup>3</sup> Corinne Beck's monograph on the management of woodlands and ponds in the Duchy of Burgundy in 1350-1450 has demonstrated, however, that it is possible to use late medieval financial records to reconstruct the geographical range of animals that had considerable economic value (birds of prey, fish), or were perceived as a major threat to human interests (wolves, otters).<sup>4</sup>

The object of this article, therefore, is to further explore the possibilities and pitfalls of using medieval financial accounts as sources for the study of biodiversity in the preindustrial period by comparing them with the results of archaeological research (animal bones). The focus will lie on wild birds in the County of Holland in the fourteenth century. The County of Holland is a logical choice given that we have access to a substantial corpus of published financial accounts, starting in 1299. Furthermore, thanks to the database Boneinfo there exists a complete overview of animal bones found during archaeological excavations in the Netherlands.<sup>5</sup> Birds, mammals and fish are all overrepresented in historical sources, but in northern Europe

---

<sup>2</sup> Badura, Możejko, Święta-Musznicka and Latałowa, 'The Comparison'; Ericson and Tyrberg, *Swedish Avifauna*; Ferrández Verdú, Pujol Fructuoso and Almarcha Martínez, 'Historical Evolution'; Lenders, 'Salmon Stocks'; Walker, Hufthammer and Meijer, 'Birds in Medieval Norway'; Yalden and Albarella, *British Birds*.

<sup>3</sup> Hoffmann, *An Environmental History*; Taylor, 'Where are the Wild Things?'

<sup>4</sup> Beck, *Les eaux et forêts*. See also Stone, 'The Consumption and Supply'.

<sup>5</sup> <https://archisarchieef.cultureelerfgoed.nl/BoneInfo/>; Çakırlar e.a., 'Animals and People'.

the diversity of birds is much greater than that of mammals and fish. The Netherlands is also well known for including some of the most important bird habitats in a European context. Finally, the history of wild birds in the Netherlands has already been studied for the period 1500-1920.<sup>6</sup>

The article will start by giving a critical outline of its source material. The second section provides a preliminary overview of wild birds living in the fourteenth-century County of Holland, on the basis of archaeological and historical evidence, and explains the main ecological changes affecting this diversity. The next sections will further examine three groups of birds that are particularly well represented in financial accounts, which allows us to make some initial remarks about population dynamics: birds of prey (hawks, falcons and owls), wildfowl (swans, geese, and ducks), and herons and spoonbills. The conclusion returns to the main object of this study: the value of medieval financial accounts for the study of biodiversity in the past.

## SELECTION OF SOURCES

The County of Holland was only one of many principalities in the fourteenth-century Low Countries. By the early 1300s the counts had extended their power over a long coastal strip in the west of what is now the Kingdom of the Netherlands (more or less the current provinces of Zeeland, Zuid-Holland and Noord-Holland). They called themselves counts of Holland and Zeeland, and lords of Frisia. Birds mentioned in historical sources related to Zeeland and West-Frisia will therefore be included in this study as well, even though these are lands were not part of the County of Holland in the strict sense of the word.

---

<sup>6</sup> de Rijk, 'Vogels en mensen'.

So far only seven archaeological excavations in the former County of Holland have yielded bones of wild birds and could be dated more or less to the fourteenth century (in some cases the bones may have been deposited in the late thirteenth or early fifteenth century).<sup>7</sup> Most remains come from animals eaten by the human occupants of these urban or noble sites- domesticated animals dominate all assemblages-, but there are also bones of birds that assisted humans during the hunt or were killed because humans perceived them as a nuisance (respectively birds of prey and corvids). In some cases the remains cannot be attributed to a specific bird, because the bones of related species are difficult to distinguish.

The results of these excavations will be compared with references to wild birds found during a systematic examination of the published financial accounts of the counts of Holland, the lords of Schoonhoven-Gouda, and their representatives (bailiffs, stewards, foresters). All surviving accounts of the counts of Holland and their officials have been published for the years up to 1354 (the Avesnes dynasty). For the second half of the century- the reign of the Wittelsbach dynasty- only accounts dating to the years 1358-1361 and 1393-1396 have been published.<sup>8</sup>

In 1308 Count Willem III (1304-1337) gave the lordships of Gouda and Schoonhoven to his younger brother, Jean de Beaumont. An almost continuous series of accounts relating to the reigns of Beaumont's grandsons, Jean and Guy de Blois, have been preserved (dating to 1356-1397).<sup>9</sup> These records are especially valuable

---

<sup>7</sup> Vlaardingen (castle context, 1275-1351), Leiden (1300-1350), Westland (Polanen castle, 1300-1351), Gorinchem (1300-1425), Dordrecht (Huis te Merwede, 1350-1421), Haarlem (1375-1450), and Amsterdam (1373-1420).

<sup>8</sup> de Boer, Faber, and Jansen, *Ambtenaren*; de Boer, Faber, and Jansen, *Rentmeesters*; De Boer, Marsilje, and van Gent, *De rekeningen*; De Boer, Faber, and van Gent, *De rekeningen*; Hamaker (ed.), *De rekeningen*; Janse and van Winter, 'Een bruiloftsmaal'. 187-192; Smit, *De rekeningen*.

<sup>9</sup> The Hague, Nationaal Archief (henceforth NA), 3.19.10 Archief van de Graven van Blois, inv. nrs. 38-40, 42-51, 54-56, 84, 86-93, 95-105, 108-117, 122 (transcripts made by H.A. Verhoef available at <https://www.hogenda.nl/hogenda-bronnen/>).

because they contain information on the management of a large heronry located in an alluvial forest near Gouda, the Goudsche bos. It is also the only administration that has been preserved from a fourteenth-century noble family other than the counts of Holland themselves. There are a handful of financial accounts from cities and ecclesiastical institutions, but these contain very few references to birds and have not been examined systematically. Wild animals are mentioned relatively rarely in medieval administrative sources, which means that one has to study large numbers of them to obtain a suitable basis for research.

Of course, during the Middle Ages a standardised scientific nomenclature did not exist. In financial accounts birds were often not identified at species level, but at a higher taxonomic rank, such as a genus or order ('geese', 'owls'). When medieval texts do differentiate between species, their given names can be interpreted by using a hunting treatise written in seventeenth-century Holland (*Jacht-Bedryff*), a well-known eighteenth-century study of Dutch birds (Nozeman's *Vogelen*), and a modern reference work on historical bird names.<sup>10</sup> If there is any doubt about the identification, the medieval Dutch name is given between brackets.

While medieval administrative sources provide data that can be used for the study of biodiversity in the past, a thorough understanding of the society producing this data is necessary in order to interpret it correctly. Many factors play a role in the presence or absence of specific wild animals. Aside from the ecological context, administrative traditions, culinary preferences, hunting techniques, economics and even the political background or a ruler's personal character all have to be taken into consideration. These accounts functioned, at least theoretically, as a controlling mechanism for the financial management of the count's officials. This means that wild

---

<sup>10</sup> Eigenhuis, *Woordenboek*; Nozeman and Houttuyn, *Nederlandsche Vogelen*; Swaen (ed.), *Jacht-Bedryff*.

animals are only mentioned if they were considered as 'income' or if some kind of financial transaction was involved. We know, for example, that animals were regularly presented to the count as gifts because the messengers who brought them received a monetary reward. In some cases the birds mentioned in financial accounts are units of accounting, which may or may not correspond to actual living animals (see the section on herons below).

Using medieval financial accounts as sources for the study of biodiversity in the past is clearly not without problems. Studying these specific sources also has certain advantages however. First of all, it allows us to make a distinction between animals that were killed or caught in the wild and those that lived in captivity. If archaeologists find remains of exotic animals, such as parrots or monkeys, it is obvious that these were kept as pets. In other cases, such as sparrowhawks (*Accipiter nisus*), this is far less clear. Furthermore, accounts often provide information on the date of the capture, which allows us to distinguish between birds that actually bred in the county and those that simply came as winter visitors. They also give information on the context and motivation for the hunt.

The emphasis on financial administration is essential, because so-called artes-literature - medieval texts that give practical information on all kinds of subjects, including hunting, agriculture, and medicine - rarely provide reliable evidence on the geographical range of species in a specific period. Aside from the fact that it is often very difficult to pinpoint when and where a text was first written down, animals and plants could be transported over large distances as commodities or gifts. Establishing that a certain species was known in a designated geographical area in a certain year is not enough to prove that it actually lived there in the wild. Still, artes-literature, such as Jacob van Maerlant's book on nature (late thirteenth century), can be very helpful

to interpret the data provided by financial accounts and bones recovered during archaeological research.

## THE ARCHEOLOGICAL AND HISTORICAL EVIDENCE

When taken together, the aforementioned archaeological excavations and accounts provide us with the names of 46 species of wild birds living in the County of Holland in the fourteenth century (see table 1). This list is not meant to be a definite overview, but rather as a guide to understand the possibilities and limitations of using medieval financial accounts as a source for the study of biodiversity in the past. It is important to note that this table does not include birds mentioned in financial accounts for which there is no unambiguous proof that they lived in the county of Holland in the wild (e.g. the sparrowhawk). Because the available archaeological and historical sources mainly give information about life in noble households, species connected to noble lifestyles and status- birds of prey, swans and herons- are overrepresented.<sup>11</sup> The same applies to larger birds. These are far more visible and easier to identify. Most of the species listed in table 1 also have another trait in common: they have a very large distribution and can be found across the Palearctic. Still, birds living in aquatic habitats dominate the list.

Late medieval Holland was after all defined by its relationship to water. Its inhabitants had to cope with rising sea levels as result of the so-called Medieval Warm Period or Medieval Climate Optimum (approximately 950-1250), but also made themselves more vulnerable to flooding by transforming peat bogs into agricultural fields on a large scale. Draining peat bogs causes the land to sink, which

---

<sup>11</sup> Albarella and Thomas, 'They dined on Crane'; Janse and van Winter, 'Een bruiloftsmaal'; Sykes, 'The Dynamics of Status Symbols'.



in turn makes it more difficult, and eventually impossible, to remove excess water. Drainage difficulties associated with agricultural expansion (mainly during the High Middle Ages) and peat extraction for fuel (mainly during the Late Middle Ages and Early Modern Period), led to the development of large lakes, such as the Bindelmeer or Bijlmermeer to the southeast of Amsterdam and the Haarlemmermeer between Amsterdam and Haarlem. These environments provided an excellent habitat for species such as the European eel (*Anguilla anguilla*) and northern pike (*Esox lucius*).<sup>12</sup>

In the long run problems with water management brought about major changes in Holland's economy. The emphasis gradually shifted from agriculture to livestock breeding (dairy production).<sup>13</sup> It is generally assumed that birds that are now typically associated with meadows originally bred in peat bogs, heath lands, tundra, or marshes, before adapting to meadows.<sup>14</sup> In the fourteenth century, however, peat bogs were disappearing rapidly and not yet being replaced by meadows on a large scale. Only Kennemerland and West-Frisia (more or less the area north of Haarlem) specialised in livestock keeping.

As a result, birds that depended on peat bogs and marshes for their survival were probably relatively uncommon. Bones of waders have been found in fourteenth-century archaeological contexts, but they are rarely mentioned in financial accounts before the 1390s. If we exclude Eurasian woodcocks (*Scolopax rusticola*), which live in woodland, waders are only mentioned six times: plovers (*Charadriinae*) in 1389 and 1393, one pied avocet (*Recurvirostra avosetta*) in 1390, thirty-four northern lapwings (*Vanellus vanellus*) in 1389, and possibly common snipes (*Gallinago*

---

<sup>12</sup> de Bont, *Amsterdamse boeren*; van Dam, *Vissen in veenmeren*.

<sup>13</sup> van Bavel, *Manors and Markets*, 330-338.

<sup>14</sup> Blankers en Kleijn, 'Weidevogels'.

*gallinago*) in 1389 and 1390.<sup>15</sup> It is also significant that there is almost no evidence for the large-scale commercial hunting of ducks or geese before this time. There were still isolated areas that provided a safe refuge for wild birds, but these were the exception rather than the rule. In 1405, for instance, Count Willem VI (1404-1417) prohibited the hunting in Yerseke (Zeeland) of swans, cranes, bitterns, ducks and other birds that breed on peat bogs. This area was probably protected as the count's personal hunting ground, for villagers were also forbidden to cut peat or pasture their livestock there.<sup>16</sup>

Other species might have taken advantage of the drainage of peat bogs. Grey partridges (*Perdix perdix*), for example, were popular game animals. The counts of Holland and lords of Gouda-Schoonhoven employed specialised partridge hunters to catch them and their accounts show that large numbers were eaten.<sup>17</sup> Rabbits were introduced in Holland in the late thirteenth century, which stimulated the extermination of foxes, eagles and other predators in the coastal dunes where the rabbit warrens were located. This could have been to the advantage of many wild birds as well.<sup>18</sup>

Because the counts of Holland claimed ownership of the 'wilderness', the accounts of their officials include animals found stranded on the beach as 'income'. In most cases these were harbour porpoises (*Phocoena phocoena*) or other Cetaceans, but in one instance birds are mentioned. In 1343-1344 thirteen 'geese' were found

---

<sup>15</sup> The accounts use the word 'snipe' (*sneep* or *snip*), which can refer to several species of waders, including woodcocks. Given that the birds were bought alongside geese and ducks, they were most likely common snipes. Guy de Blois bought Eurasian curlews (*Numenius arquata*) and plovers in Bergen Op Zoom in 1389 when staying in Tholen. The city of Bergen op Zoom was part of the lordship of Breda, but lies close to the frontier with Zeeland. NA, 3.19.10, inv. nr. 54-55, f. 47r. 52r., 62v., 67v., 79; 115, f. 94r.; 116, f. 36r.; De Boer, Faber, and van Gent, *De rekeningen*, 120.

<sup>16</sup> Dekker and Baetens, *Geld in het water*, 30-31.

<sup>17</sup> NA, 3.19.10, inv. nr. 38, f. 94v.; 54-55, f. 66r., 118; 115, f. 40r.; De Boer, Faber, and van Gent, *De rekeningen*, 131-134, 387, 656; Hamaker (ed.), *De rekeningen*, vol. 3, 318, 321.

<sup>18</sup> Rentenaar, 'De vroegste geschiedenis', 6; Swaen (ed.), *Jacht-Bedryff*, 26-29, 73.

stranded on the beach in 'Wieringerland' (Wieringen was an island in the Zuiderzee).<sup>19</sup> These birds might have been northern gannets (*Morus bassanus*) weakened after a storm. Remains of gannets are found regularly in Dutch archaeological contexts, and the eighteenth-century naturalist Martinus Houuttuyn claimed that they were common visitors on the coast, especially in the fall.<sup>20</sup> Furthermore, both the English and Dutch names of this bird refer to its similarity to a male goose.

There is no other evidence for the catching of sea birds in the fourteenth century, but the dunes and dune ridges did provide a home for numerous other species, for they encompassed the most extensive woodlands in the county. There was the Haagse bos near the Hague, the Haarlemmerhout to the west of Haarlem, and the Noordwijkerhout in between. Woodcocks are mentioned regularly in accounts, and were sometimes caught on a very large scale: in 1326-1327 the forester of the Hague and the receiver of Noord-Holland supplied 512 woodcocks to the household of Countess Jeanne de Valois.<sup>21</sup> The forester of Holland also provided *hoenders* for the count's table in 1343-1344. The Dutch word *hoender*, which can refer to any gallicenous bird, is normally used in accounts to refer to chickens (*Gallus gallus domesticus*). It is improbable, however, that this official would be required to supply domesticated poultry. Given that hunting regulations from sixteenth-century Holland mention black grouse (*Lyrurus tetrix*), which were called *corhoenders* or *moerhoenders*, it is more likely that these were wild birds.<sup>22</sup> This presumption is

---

<sup>19</sup> Hamaker (ed.), *De rekeningen*, vol. 2, 276.

<sup>20</sup> Nozeman and Houuttuyn, *Nederlandsche Vogelen*, vol. 5, 401.

<sup>21</sup> Smit, *De rekeningen*, vol. 1, 265-266, 288.

<sup>22</sup> de Rijk, 'Vogels en mensen', 14; Smit, *De rekeningen*, vol. 2, 155.

confirmed by an entry in an unpublished account of the forester of Holland (the year 1351-1352). It concerns a payment of *'hoenders'* as rent for the use of peatlands.<sup>23</sup>

Aside from these coastal woodlands there were also alluvial forests, mostly located near Amsterdam and Gouda on the edges of lakes that gradually developed as a result of the drainage of peat bogs. These forests provided a home for heron colonies and will be examined further below. Peat extraction was stimulated by the rapid growth of cities and towns. Some birds took advantage of these urbanisation processes to establish themselves in urban contexts. White storks (*Ciconia ciconia*) are well known for building nests on tall buildings, a behaviour that was actively encouraged in the late Middle Ages. The accounts of Jean de Blois' steward from 1358-1359 and 1377-1378 note the purchase of wood to build stork nests on the house (castle) of Schoonhoven, Jean's formal residence.<sup>24</sup> While storks were welcomed, the same could not be said about carrion crows (*Corvus corone*) and western jackdaws (*Coloeus monedula*). Jean de Blois asked a crow hunter to come to the city of Gouda in 1369, and paid watchmen to catch jackdaws in Schoonhoven castle.<sup>25</sup>

## BIRDS OF PREY (HAWKS, FALCONS AND OWLS)

After this general overview of the ecology of fourteenth-century Holland we will now further examine three groups of birds that are particularly well represented in both historical and archaeological sources. The first group, birds of prey, were essential to the noble hunt in the Middle Ages, and the knowledge necessary for training and taking care of them was well developed (e.g. the production of manuals on hunting

---

<sup>23</sup> NA, 3.01.01 Archief van de Graven van Holland, inv. nr. 1806, f. 20 v.

<sup>24</sup> NA, 3.19.10, inv. nr. 89, f. 11v.; 105, f. 85r.

<sup>25</sup> NA, 3.19.10, inv. nr. 47, f. 50r.; 49, f. 68v.; 50, f. 133v.; 97, f. 22r.; 105, f. 74v.

and falconry). The financial accounts examined here not only distinguish between different species, but also between adult and sub adult, male and female birds.

The importance attributed to these animals has a drawback, however: most birds of prey mentioned in the accounts probably did not live in the County of Holland prior to their capture. The counts regularly received new birds as gifts and ordered subordinates to buy new ones. The following section will therefore only examine species that were undoubtedly caught in the county itself. Even these birds were probably not born there, but migrants from elsewhere that came to Holland as winter visitors or were simply passing through on their search for a territory of their own. There only three mentions of fledglings, and none of these concern birds captured in the county: in 1368 Jean de Blois ordered the transportation of fledgling sparrowhawks from Hainaut to Holland, in 1375 he bought a fledgling northern goshawk (*Accipiter gentilis*) from a 'foreign man', and in 1384 he purchased a male and female fledgling goshawk from an austringer - someone who trains hawks - in Amsterdam.<sup>26</sup>

As far as actual 'native' birds are concerned, the examined accounts mention sixty birds captured in the count's traps (*leggen*), mostly in the 'Houte'. The name Houte refers to woodlands located near Haarlem and The Hague, particularly the Haarlemmerhout. Most (forty-two) birds were peregrine falcons (*Falco peregrinus*), followed by owls (eight), goshawks (six) and lanner falcons (*Falco biarmicus*) (four).<sup>27</sup> We can also add three birds that were captured in the wild and bought by the Jean de Blois in 1364 to this list: one peregrine falcon and two lanner falcons.<sup>28</sup> Of the

---

<sup>26</sup> NA, 3.19.10, inv. nr. 44, f. 66r.; 50, f.136v.; 110; f. 38r.

<sup>27</sup> de Boer, Faber, and Jansen, *Rentmeesters*, 29-30, 77, De Boer, Marsilje, and van Gent, *De rekeningen*, 77, 81; De Boer, Faber, and van Gent, *De rekeningen*, 645; Hamaker (ed.), *De rekeningen*, vol. 1, 351; vol. 2, 64-65, 185, 308-309, 404, 537.

<sup>28</sup> NA, 3.19.10, inv. nr. 40, f. 121.

peregrine falcons fourteen were sub adult females (described as *valk* or *rode valk*), twenty-three were sub adult males (*valk taarsel*) and another five were caught after they had molded in the wild (*haghe muiter* or *muiter valk*). In other words, they had adopted the plumage of an adult bird and were more than one year old. A sub adult female peregrine falcon was worth significantly more than a sub adult male because it is larger: four pounds versus fifteen *schilden* (a pound is worth twenty *schilden* or the equivalent of twenty-four working days for a mason). Adult falcons were considered to be less valuable, because they were more difficult to train: the count paid twenty *schilden* for a female and only ten for a male. An adult falcon with reddish feathers (*haghe muter valk die roet hilt*), meaning a bird that molded in the wild, but still had both sub adult and adult plumage, brought the catcher an income of forty *schilden*.

Archaeozoological research provides a very different picture: it has recovered the bones of sparrowhawks, common buzzard (*Buteo buteo*), long-eared ear owl (*Asio otus*), and an unidentified member of the genus *falco*. Buzzards were not considered suitable for falconry, and are therefore not mentioned in financial accounts, but might have served as prey. Bones of sparrowhawks are commonly found in late medieval archaeological contexts, especially on former noble sites, and are often mentioned in financial accounts as captive birds. However, so far there is no proof that they were caught in the County of Holland in the wild.

Only a small part of the counts' administration has been published, so this could be a coincidence. Still, a study of six unpublished accounts (the years 1354-1355, 1357-1358, 1359-1360, 1374, 1385-1386, and 1389-1390) does not reveal the capture of a single wild sparrowhawk either. They show that sixty-eight peregrine falcons, seven lanner falcons, seven owls, six goshawks, one saker falcon (*Falco cherrug*), one gyrfalcon (*Falco rusticolus*) and one merlin (*Falco columbarius*) were

caught in the Haarlemmerhout and neighbouring woodlands.<sup>29</sup> It is very likely therefore that there were either no wild sparrowhawks in the county, or that their presence was very exceptional. The counts of Holland typically obtained sparrowhawks as gifts from Hainaut, Guelders, Liège, Burgundy and Bavaria.<sup>30</sup>

Goshawks, another woodland bird, were actually caught in the wild. Most were taken in the Haarlemmerhout, the others in the Bindelmeerbroek, an alluvial forest near the Bindelmeer, and 'Oost-Holland'. Financial accounts thus indicate that Holland still provided a suitable habitat for goshawks in the fourteenth century, but not for sparrowhawks. Surviving accounts of the foresters of Holland demonstrate that they gained a considerable income from woodcutting and the pasture of animals.<sup>31</sup> The combination of these two pressures likely impeded the regeneration of these woodlands and created a relatively open park-like landscape. Biological studies have noted sparrowhawks' preference for dense woodlands, while goshawks prefer to hunt in areas with older trees standing somewhat further apart.<sup>32</sup> It could also explain why the majority of birds caught in or near the Haarlemmerhout were species that favour open terrain (peregrine and lanner falcons).

The presence of lanner falcons in late medieval Holland might seem remarkable, given that the species is now restricted to the Mediterranean and Sub-Saharan Africa. Medieval financial accounts describe the bird as 'bluefoot' (*blaeuvoet*). This word can also refer to young peregrine falcons and even ospreys (*Pandion haliaetus*), but in medieval sources it generally refers to lanner falcons.<sup>33</sup> Furthermore, the seventeenth-century hunting treatise *Jacht-Bedryff* uses derivatives

---

<sup>29</sup> NA, 3.01.01, inv. nrs. 1542, 1546, 1548, 1559, 1569, 1570.

<sup>30</sup> Corinne Beck's study confirms the capture of wild sparrowhawks in the late medieval Duchy of Burgundy. Beck, *Les eaux et forêts*, 398.

<sup>31</sup> Smit (ed.), *De rekeningen*, vol. 2, 79-170.

<sup>32</sup> Newton, 'Sparrowhawks', 619-622.

<sup>33</sup> Lindner, *Von Falken, Hunden und Pferden*, 155-156.

of 'bluefoot' (*blaet, blaetgen*) to denote female and male lanner falcons respectively.<sup>34</sup> The financial accounts of the dukes of Burgundy prove that lanner falcons were caught in Flanders, Artois, and Burgundy as well during the fifteenth century. The species only became extinct in Germany at the turn of the seventeenth and eighteenth century.<sup>35</sup> Lanner falcons probably took advantage from the Medieval Climate Optimum to expand their range towards northern Europe. They could also have profited from the clearance of woodlands. Given that most birds of prey were caught in the Haarlemmerhout, the species might even be underrepresented in the count's administration. Two of the three birds caught in the wild and bought by Jean de Blois were lanner falcons. They were captured near the cities of Rotterdam and Gouda.

Still, it is notable that the species might actually have become more common at the turn of the fourteenth and fifteenth century. According to three financial accounts from 1414-1416 it was almost as numerous as the peregrine falcon among birds of prey caught in the wild.<sup>36</sup> The reason for this change is not entirely clear, for the bird traps were still located in the Haarlemmerhout and other woodlands (the Noordwijkerhout). The higher number of lanner falcons might be related to climatic conditions: the summers of the 1410s were relatively long and dry, which could be to the advantage of a species such as the lanner falcon.<sup>37</sup>

Aside from falcons and goshawks the counts' hunters also caught owls. The latter were valuable because they could be used as a decoy to capture songbirds (*Passeriformes*). They were sometimes also hunted with falcons or goshawks.<sup>38</sup> Because the accounts generally only use the word owl (*'uuf'*) it is difficult to identify

---

<sup>34</sup> Swaen (ed.), *Jacht-Bedryff*, 86-89.

<sup>35</sup> Beck, *Les eaux et forêts*, 399-400; Lindner, *Von Falken, Hunden und Pferden*, 155-174; Niedermann, *Das Jagdwesen*, 54-55.

<sup>36</sup> The accounts mention the capture of forty-three birds: nineteen peregrine falcons, eighteen lanner falcons, three owls, and three goshawks. NA, 3.01.01, inv. nrs. 1691, 2201, 2205.

<sup>37</sup> Buisman, *Weer, wind en water*.

<sup>38</sup> Zeiler, 'Hunting the Hunters'.



different species. It is likely that long-eared owls were among them, given that bones of this bird have been recovered. In one instance, however, the account specifically mentions a *scuufuut* or Eurasian eagle owl (*Bubo bubo*). This identification is confirmed by the relatively high price paid, namely four pounds.<sup>39</sup>

## WILDFOWL (SWANS, GEESE AND DUCKS)

After examining the available evidence for birds of prey, we will now consider the family *Anatidae*, which comprises swans, geese and ducks. We know of fourteen species that lived in fourteenth-century Holland, most of which did probably not breed there, but only visited during the winter months or passed through during their seasonal migration. For the identification of these birds we are almost completely dependent on archaeological excavations, because the great majority of accounts only refer to 'swans', 'geese' and 'ducks'. They do not even distinguish between domesticated and wild animals. On the other hand, these administrative sources do give information about the environmental, economic and cultural context of the hunting, and changes therein. They also provide evidence about the number of birds caught in a given year.

Swans were as essential to a noble lifestyle in the Middle Ages as birds of prey. The right to keep, catch and hunt them belonged to the counts of Holland, but could be given in fief to high-ranking noblemen and cities. Many financial accounts comment on the purchase of oats to feed swans kept in moats or ponds. These were all

---

<sup>39</sup> Swaen (ed.), *Jacht-Bedryff*, 40-41.

mute swans (*Cygnus olor*) living in a semi-domesticated state. Their bones are commonly found in both urban and castle contexts, which reflects the fact that they were eaten regularly. The household of Countess Jeanne de Valois, for example, consumed no less than sixty-one swans in one month in 1321.<sup>40</sup> The accounts of the stewards of Kennemerland and West-Frisia, the most northern part of the county, also demonstrate that thousands of wild swans were captured each winter by order of the count. In the fiscal year 1343-1344 4018 swans were caught and in 1344-1345 2132. These flocks probably consisted of whooper (*Cygnus cygnus*), Bewick's (*Cygnus bewickii*), and mute swans, or mixtures of several species. Bones of whooper and Bewick's swan have been found in Haarlem and dated to 1375-1450.<sup>41</sup>

West-Frisia was conquered only relatively recently, in the late thirteenth century, and it is unclear whether this large-scale hunting of wild swans preceded the counts' of Holland incursions into these lands. It is also uncertain how it evolved over time. The financial accounts of the steward of Kennemerland and West-Frisia from 1393-1394 still mention wild swans, but do not specify the exact number caught. If we assume that the average price paid for a wild swan did not differ significantly from the 1340s, the 'income' booked in the account suggests that he received between three and five hundred birds.<sup>42</sup> This significant decline might be the result of decades of overhunting, but without a systematic study of all surviving accounts we cannot be certain. Fluctuations in the number of swans visiting the Netherlands are also related to climatic conditions in their breeding grounds, but the available evidence does not suggest that the winters in 1343-1345 were notably harsher than in 1393-1394.<sup>43</sup>

---

<sup>40</sup> Smit (ed.), *De rekeningen*, vol. 1, 47-48.

<sup>41</sup> Hamaker (ed.), *De rekeningen*, vol 2, 274-275, 365-368.

<sup>42</sup> de Boer, Faber, and Jansen, *Rentmeesters*, 24.

<sup>43</sup> Pfister, Schwarz-Zanetti, and Wegmann, 'Winter Severity'.

Wealthy families from West-Frisia managed the actual hunting process, which involved the use of nets and hoops to trap swans gathering on inland lakes and near the coast.<sup>44</sup> There were significant differences in the value attributed to different groups of captured swans, which may reflect their age and condition, as well as the presence of different species. The stewards distinguished subadult from adult birds, for they explicitly referred to one group of four swans that were only one winter old.<sup>45</sup> It is unlikely, on the other hand, that they recognised whooper and Bewick's swans as different species. Seventeenth- and eighteenth-century works on natural history from the Netherlands only mention two species of swans: mute and whooper swan. The *Jacht-Bedryff* in fact claims that some one-year old swans already had white plumage. This might refer to so-called 'Polish swans' (a colour variant of the mute swan), but it is more likely the result of confusion between whooper and Bewick's swans. The remark comes after all at the end of a paragraph on 'howlers' (referring to the whooper swan's call).<sup>46</sup>

Whereas wild swans are often mentioned in financial accounts, geese and ducks appear far less. The published accounts of the counts of Holland contain few references to geese, and in two instances the birds were imported from the County of Flanders.<sup>47</sup> The surviving administration of Jean and Guy de Blois is more informative. These accounts regularly mention geese and ducks and demonstrate that these were both purchased on the market and kept near the lord's own house (castle) of Schoonhoven. Most, if not all, of these birds were probably domesticated. A few entries, however, unambiguously mention wild birds: Jean de Blois' treasurer

---

<sup>44</sup> Hamaker (ed.), *De rekeningen*, vol 2, 298-299, 313-314, 412-413.

<sup>45</sup> Hamaker (ed.), *De rekeningen*, vol 2, 365.

<sup>46</sup> Swaen (ed.), *Jacht-Bedryff*, 67.

<sup>47</sup> De Boer, Faber, and van Gent, *De rekeningen*, 153, 374, 385, 668; Smit (ed.), *De rekeningen*, vol.1, 266, 288, 331.

purchased 'teals' (*talinghe*) and 'ducks' (*entvoghele*) in December 1373, eight 'teals' in 1389 and two hundred fifty wild geese in January-February 1390. The word *talinghe* denotes either a Eurasian teal (*Anas crecca*) or a garganey (*Spatula querquedula*). The word *e(y)ntvogel* refers both to any species of duck and to the mallard (*Anas platyrhynchos*) specifically.<sup>48</sup>

It is not a coincidence that references to wild geese and ducks increase towards the end of the century, the same period when financial accounts start to mention a larger variety of waders (see above). Wild geese and ducks were probably hunted throughout the Central or High Middle Ages, but there is very little evidence for large-scale commercial hunting before the last decades of the fourteenth century. The customs of Brielle from 1346 do mention the selling of geese, ducks, 'teals' and other birds, but this town was located on the island of Voorne in the Meuse estuary, which means that its citizens probably had greater access to wild birds than most other areas.<sup>49</sup> The oldest surviving customs from the city of Amsterdam (1413), for instance, do not comment on the selling of geese or ducks. The drainage of peat bogs probably led to a significant decline in the numbers of geese and ducks, as well as waders. The right to keep domestic geese was even severely restricted because they caused damage to agricultural fields, meadows and gardens. For this reason they were typically kept in an enclosure (*coye*).<sup>50</sup>

The administrative sources examined here suggest that commercial hunting of geese and ducks developed later than the large-scale hunting of wild swans. It might have started in the same area (Kennemerland and West-Frisia), but could also reflect Flemish influence. In 1394-1395, for example, servants bought young geese in Bruges

---

<sup>48</sup> NA, 3.19.10, inv. nr. 49, f. 43r.; 54-55, f. 52r., 64v.; 115, f. 56r., 57v., 61r., 62v.

<sup>49</sup> de Jager (ed.), *Keuren*, 24.

<sup>50</sup> Breen, *Rechtsbronnen*, 25.

and Haarlem on the count's orders.<sup>51</sup> The oldest mention of a large commercial duck trap (*eendenkooi* or duck decoy) in Flanders dates to the early fourteenth century, in Holland to the sixteenth. In the Low Countries large-scale catching of wild geese and ducks only became an economic viable option in the Late Middle Ages as a result of environmental changes. As mentioned before, it is only during the fourteenth, fifteenth and sixteenth century that many former peat bogs were turned into meadows, because the high ground water level made them unsuitable for agriculture. At the same time a growing number of people lived in cities and purchased meat on urban markets. Catching wild geese and ducks on a commercial scale requires considerable capital investment, including the purchase and feeding of tame birds, the making of nets and other trapping equipment and even the creation of special ponds surrounded by hedges or woodlands. Landowners were unlikely to make such investments if they had other, less capital-intensive, alternatives.<sup>52</sup>

It is revealing that the city council of Dordrecht passed a new law in July 1440, which specified that all wild birds caught in the district of Zuidholland had to be sold on the city's market. Dordrecht held the staple rights on the Rivers Meuse and Rhine since 1299, but apparently did not feel the need to extend this right to the trade in wild birds before the mid-fifteenth-century.<sup>53</sup> Charles V issued official regulations to organize duck trapping in the Netherlands in 1550, which suggests that its economic importance grew significantly in preceding decades.<sup>54</sup> This relatively late development of the large-scale trapping of wild geese and ducks not only explains the relative absence of these birds in financial accounts, but also has important

---

<sup>51</sup> De Boer, Faber, and van Gent, *De rekeningen*, 374.

<sup>52</sup> van Bavel, 'Eendenkooien'; Verstraeten, Karelse and Zwaenepoel, *Eendenkooien*, 27-35.

<sup>53</sup> Dijkman, *Shaping Medieval Markets*, 146-147; Fruin, *Rechten*, 278-279; van Bavel, *Manors and Markets*, 115.

<sup>54</sup> van Bavel, 'Eendenkooien'.

consequences for archaeological research. In many cases the bones recovered during archaeological excavations cannot be dated to a specific century. In the castle of Brederode, the centre of a prestigious lordship near the Haarlemmerhout, for instance, numerous bones of wild birds have been found, that are dated to 1300-1575. The historical evidence examined here suggests that the bones of geese and ducks are more likely to be deposited towards the end of this period than towards the beginning.

## HERONS AND SPOONBILLS

Hérons and spoonbills constitute the third group of birds that is well represented in historical sources. In marked contrast to the two previous groups, the inhabitants of late medieval Holland did not take advantage of seasonal migrations, but rather focussed on the exploitation of breeding colonies. Both the financial accounts of the counts of Holland and the lords of Gouda-Schoonhoven provide evidence on the management and protection of heronries, but the latter are far more comprehensive. They allow us to reconstruct the number of birds taken from the colony in the Goudsche bos from 1357 to 1376, and thus gain insight into population dynamics. Furthermore, while the surviving administration of the counts of Holland simply mention 'herons' and 'bitterns', the stewards of Jean de Blois distinguished between grey herons (*Ardea cinerea*), black-crowned night herons (*Nycticorax nycticorax*), Eurasian spoonbills (*Platalea leucorodia*), great bitterns (*Botaurus stellaris*) and 'white herons'.

Assessing the identity of these 'white herons' provides a good example of the relative value of archaeological versus historical sources, for at first glance they seem to contradict each other. The financial accounts of the stewards in charge of the Goudsche bos indicate that 'white birds', a collective term for 'white herons' and spoonbills, were worth less than both grey and night herons. Given that one grey heron was considered the equivalent of two night herons, presumably because of its size, it seems logical to conclude that these 'white herons' were smaller than night herons. In other words: they were probably little egrets (*Egretta garzetta*), a species that did not live in the Netherlands in the nineteenth and early twentieth century, but has started to breed there more or less simultaneously with great egrets (*Ardea alba*) in 1978-1979. Archaeological research, however, has only recovered bones of great egrets.

The solution for this apparent contradiction is that egrets were simply worth less because their meat was considered to be less tasty. The encyclopaedist Jacob van Maerlant wrote in the late thirteenth century that the meat of white herons was less healthy than that of grey ones. He also made a similar remark about spoonbills. These comments are not found in Thomas Cantimprensis' *De Natura Rerum*, on which van Maerlant's work is based, which makes it very likely that egrets lived in the late-thirteenth-century Low Countries (Flanders and/or Holland), and that they were numerous enough to be eaten regularly. A twelfth-century aviary from northern France also mentions 'white herons', which suggests that the species was already known in northern Europe at this time.<sup>55</sup>

Great egrets probably migrated north during the Medieval Climate Optimum, and might also have taken advantage of the large inland lakes that developed as a

---

<sup>55</sup> Clark, *The Medieval Book*, 229; van Maerlant, *Der Naturen Bloeme*, 135-136 (vers 4985-4990). See also Bourne, 'Egrets, Brewes and Climatic Change'

result of peat extraction. Egrets were not the only newcomers during the Central Middle Ages, for so far no bones of night herons have been found in Dutch archaeological contexts dating to the pre-1200 period. Yet while egrets disappeared from Holland before the 1630s, night herons are still mentioned in seventeenth- and eighteenth-century naturalist studies.<sup>56</sup>

Financial accounts not only give unambiguous evidence about the presence of a mixed breeding colony of grey herons, night herons, spoonbills and egrets in the Goudsche bos in 1357-1376, but even allow us to estimate the relative importance of different species (see table 2). Some caution is advised, for we cannot take the numbers of birds at face value. The stewards distinguished between different kinds of birds based on their price. Still, even though one grey heron was considered the equivalent of two night herons, these species are almost always mentioned together. This means that the number of 'grey and night herons' included in the stewards' accounts rarely corresponds to the real number of living birds taken, for 'heron' is simply a unit of accounting. To make matters even more complicated the stewards calculated one hundred twenty birds as one hundred. In practice this means that the 400 'white birds' sold in 1361-1362 were in fact 480 spoonbills and egrets, and that the 1200 'grey and night herons' may refer to anything between 1441 (all birds are grey herons, except for two night herons) and 2878 (all birds are night herons, except for one grey heron) birds. The stewards could also eat as many herons as they wanted, without specifying the number in their accounts.

What these financial accounts do reveal is that the exploitation of heron colonies intensified during the fourteenth century. Financial accounts from the reign of Count Willem IV of Holland (1337-1345), for instance, demonstrate that in 1345

---

<sup>56</sup> Swaen (ed.), *Jacht-Bedryff*, 56.



he ordered the building of a 'bird house' (*vo(e)ghelhuus*) in two alluvial forests: the Bindelmeerbroek to the southeast of the city of Amsterdam and the Nieuwenbroek to the east of Gouda. At the same time ditches were dug to protect both forests.<sup>57</sup> These 'bird houses' were probably cages to keep captive herons, which had to attract wild birds. The building and use of such structures is explained in Charles Estienne's famous 1564 handbook on agriculture and hunting (translated into Dutch in 1566). It specifically recommends their building to establish a new heronry.<sup>58</sup> Still, two charters, from 1285 and 1297, already refer to a heron colony in the Bindelmeerbroek.<sup>59</sup> It is possible therefore that the colony disappeared in the intermediate period or had become very small. There is no mention of a 'bird house' in the Goudsche bos, but only of a 'heron house' (*reygherhuus*) located in the castle of Gouda itself. Captive herons temporarily stayed there until they were sold or given away. Its building, around 1370, seems to have become necessary because of security risks. In 1368 the captive herons were simply kept in the gatehouse that protected the entry to the alluvial forest.<sup>60</sup>

Further confirmation that the commercial management of this heronry was a relatively recent development is provided by the oldest surviving account of the lordship of Gouda, dating to 1357-1358. It shows that the steward could keep the income from selling herons because he did not receive any other compensation for taking care of the forest. Jean de Blois had only recently become lord of Gouda, in 1356, and might have initially continued the management of his grandfather. Starting in 1359-1360 the steward received higher wages, but all revenues from the forest now belonged to his lord. That same year labourers took spoonbills and egrets from the

---

<sup>57</sup> Hamaker (ed.), *De rekeningen*, vol. 1, 348-349, 353, 407-408.

<sup>58</sup> Estienne, *L'agriculture et .maison rustique*, f. 135v.-136v.

<sup>59</sup> Koch et al. (ed.), *Oorkondenboek*, vol. 4, 501-507 (nr. 2237), vol. 5, 912-914 (nr. 3390).

<sup>60</sup> NA, 3.19.10, inv. nr. 99, f. 19; 100, f. 21; 102, f. 18v.

forest for the first time. The oldest evidence from a managed heronry in northern Europe comes from the financial accounts of Robert of Artois, and was located in the hunting park of Hesdin in the early 1300s.<sup>61</sup> Given that both Willem IV and Jean de Blois were well acquainted with French noble culture, it is likely that the earliest Dutch managed heronries were based on French examples.

The 'harvesting' of young herons typically started in May, when the birds were almost fully-grown, but not yet able to fly. Labourers climbed on ladders and used hooks to shake the trees or nests so that the birds fell down in small baskets. They were then moved to larger baskets and transported out of the forest on a wagon or boat (depending on the water level in the forest). The fact that ladders are mentioned proves that many, if not all, birds made their nest in trees (the accounts also mention the planting of alders (*Alnus*), ash trees (*Fraxinus excelsior*), and willows (*Salix*)). It is unclear what percentage of young herons, egrets and spoonbills were taken. Not all pairs in the colony would have started to lay eggs at the same time, and it is possible that some pairs made a second nest. In later years the labourers often returned to the colony in the late summer- early fall to shake the nests for a second or even third time.<sup>62</sup>

The financial accounts do provide clear evidence that the population of grey herons declined over the years. From 1363 onwards the stewards started to give away night herons alongside grey herons, while originally only the later were considered suitable as gifts. In 1365 no grey herons were taken by order of Jean de Blois. In 1374 some of the birds presented as gifts were egrets and in 1376 the merchants who bought grey and night herons received thirty for free because there were so few grey herons among them. That same year the steward sent a subordinate to Diemerbroek,

---

<sup>61</sup> Farmer, 'Aristocratic Power', 662-667

<sup>62</sup> NA, 3.19.10, inv. nrs. 84-104.

on the Holland-Utrecht frontier, to buy herons. Also revealing is that the stewards started to pay bounties to kill carrion crows from 1372 onwards, because they caused 'great damage' among the heron colony.

The extermination of the local crow population could have contributed to the higher number of herons captured in succeeding years, but ultimately remains an insufficient explanation. It is more likely that the number of grey herons declined in the 1360s because labourers preferably caught their young. Grey herons were the most prestigious, and thus most expensive, birds. We also know, however, that mortality rates among sub adult grey herons are very high, up to sixty-nine percent, mostly because of food availability.<sup>63</sup> In other words: the large-scale capture of young herons could have heightened the survival chances of the non-disturbed nests. The impact of inclement weather should therefore not be underestimated: the lower number of herons taken in the spring of 1364 and 1369 corresponds with relatively harsh winters. European grey herons have different survival strategies: some migrate south during the fall, while others stay near their breeding habitat. Egrets, night herons and spoonbills are far more likely to migrate south and are thus less affected by cold temperatures.<sup>64</sup>

Still, it is remarkable that night herons, a relatively recent arrival in the fourteenth century and now a very rare bird- there are less than forty breeding pairs in the Netherlands-, dominated the colony as early as 1357. This is probably not an isolated example, but part of a larger pattern. Surviving financial accounts from 1573-1575, which list the number of birds taken in Zevenhuizen, the largest herony in the Dutch Republic at that time, only mention night herons and great cormorants

---

<sup>63</sup> North and Morgan, 'Modelling Heron Survival'.

<sup>64</sup> Buisman, *Weer, wind en water*, 216-222, 237-238, 242-243; Fasola et al., 'Long-Term Trends'.

(*Phalacrocorax carbo*).<sup>65</sup> Night herons might thus have been better adapted to these man-made environments. The naturalist Houttuyn noted in 1789 that the species continued to breed in the Zevenhuizense bos until the late seventeenth century despite widespread peat cutting.<sup>66</sup> This colony, which was located approximately ten kilometres to the west of Gouda, is mentioned for the first time in 1396, and could have provided a new home for birds of the Gouda colony.<sup>67</sup> The Goudsche bos was flooded by seawater during a storm in the fall of 1376, which led to the death of many trees. Starting in 1377 the stewards' accounts no longer mention the taking of herons, but do refer to large-scale woodcutting and the transformation of former woodlands into agricultural fields. There might have still have been a herony left in the forest in 1377, but making its exploitation profitable again probably required too much investment.

Finally, it should be mentioned that bitterns are mentioned fairly regularly in financial accounts. They were far more expensive than other kinds of herons, possibly because they were the most difficult to hunt. It is generally not specified where the bitterns came from, but in the summer of 1394 Duke Albert of Bavaria (Count of Holland, 1358-1404) ordered the cities of Haarlem, Alkmaar, Medemblik and Hoorn to supply bitterns to the court. This area still provides a home to some of the largest populations of bitterns in the Netherlands.<sup>68</sup>

## CONCLUSION

---

<sup>65</sup> Labourers took 8350 cormorants and 1100 night herons in three years. Cormorants are not mentioned in fourteenth-century accounts, possibly because they were not considered suitable food for noble households at that time. The species' rising importance in the Netherlands might have been stimulated by both ecological and culinary changes. Ibelings, 'Oogst en consumptie', 39.

<sup>66</sup> Nozeman and Houttuyn, *Nederlandsche vogelen*, vol. 2, 151.

<sup>67</sup> NA, 3.19.10, inv. nr. 122, f. 31v.

<sup>68</sup> Cormont e.a., 'Population Dynamics'.

Medieval financial accounts are clearly a valuable addition to naturalist studies and archaeozoological evidence, even though they are not the most accessible of sources, and the information they contain can often not be taken at face value. They allow us to gain a deeper understanding of the complexity of historical ecosystems, and trace changes in the geographical distribution of species that had substantial economic value during the pre-industrial period. By using both archaeological and historical evidence this study has been able to provide a preliminary overview of bird diversity in fourteenth-century Holland and make some initial remarks about population dynamics. Human activities, notably the transformation of peat bogs into agricultural fields, had a significant impact on many species, by destroying the breeding habitats of wild geese, ducks, cranes and waders, and creating new opportunities for herons, egrets, spoonbills, partridges, storks and corvids. Night herons, large egrets, and lanner falcons took advantage of the relatively warm climate and the clearance of woodlands to migrate to northern Europe. Far from living in natural habitats, birds in late medieval Holland had to adapt to ecosystems that were to a large extent man made.

The overview presented here is of course rather limited. It does reveal very little about passeriformes, the largest order of birds, for example. The results can also not be considered representative for other geographical regions - even within the Netherlands - or time periods. They do imply, however, that scholars should devote more attention to the Late Middle Ages as a baseline for the study of biodiversity in the past. Given that in the Netherlands the keeping of detailed financial accounts developed later than in England, Italy and Spain, it might even be possible to conduct similar research on the High Middle Ages as well. Comparing different baselines

within the pre-industrial period will help us ascertain the relative importance of human influences versus natural phenomena for the historical evolution of biodiversity, and inform current ecological conservation.

## BIBLIOGRAPHY

### Archival Sources

The Hague, Nationaal Archief,

3.01.01 Archief van de Graven van Holland, 1189-1581

inv. nrs. 1542, 1546, 1548, 1559, 1569, 1570. 1691, 1806, 2201, 2205

### Digital Sources

<https://archisarchief.cultureelerfgoed.nl/BoneInfo/>

<https://www.hogenda.nl/hogenda-bronnen/>

### Published Sources

Boer D.E.H., Faber D.J., and Jansen H.P.H. (eds), *De rekeningen van de grafelijkheid van Holland uit de Beierse periode. Serie III. De rekeningen van de gerechtelijke ambtenaren*, deel: 1393-1396 (Baljuws en drossaards) (The Hague: Martinus Nijhoff, 1980).

Boer D.E.H., Faber D.J., and Jansen H.P.H. (eds), *De rekeningen van de grafelijkheid van Holland uit de Beierse periode. Serie II. De rekeningen van de rentmeesters der domeinen, deel: 1393-1396* (The Hague: Martinus Nijhoff, 1983).

Boer D.E.H. de, Marsilje J.W., and Gent M.J. van (eds), *De rekeningen van de grafelijkheid van Holland uit de Beierse periode. Serie I. De hofrekeningen en de dijkgraafsrekeningen van de Grote Waard, deel: 1358-1361* (The Hague: Instituut voor Nederlandse Geschiedenis, 1997).

Boer D.E.H., Faber D.J., and Gent M.J. van (eds), *De rekeningen van de grafelijkheid van Holland uit de Beierse periode. Serie I. De rekeningen van de tesorier en de dijkgraaf van de Grote Waard, deel: 1393-1396* (The Hague: Instituut voor Nederlandse Geschiedenis, 1997).

Breen Joh. C. (ed.), *Rechtsbronnen der stad Amsterdam* (The Hague: Martinus Nijhoff, 1902).

Clark Willene B. (ed.) , *The Medieval Book of Birds: Hugh of Fouilloy's Aviarium* (Binghamton, NY: Medieval & Renaissance Texts & Studies, 1992).

Estienne Charles, *L' agriculture et maison rustique* (Paris, 1564).

Fruin J.A. (ed.), *De oudste rechten der stad Dordrecht en van het baljuwschap van Zuidholland* (The Hague, 1882).

Hamaker H.G. (ed.), *De rekeningen der grafelijkheid van Holland onder het Henegouwsche huis*, 3 vols (Utrecht, 1875-1878).

Hamaker H.G. (ed.), *De rekeningen der grafelijkheid van Zeeland onder het Henegouwsche huis*, 2 vols (Utrecht, 1879-1880).

Jager H. de (ed.), *De middeleeuwse keuren der stad Brielle* (The Hague: Martinus Nijhoff, 1901).

Koch A.C.F. et al. (eds.), *Oorkondenboek van Holland en Zeeland tot 1299*, 5 vols (The Hague: Martinus Nijhoff, 1970-2006).

Maerlant Jacob van, *Der Naturen Bloeme*, ed. Maurits Gysseling, *Corpus van Middelnederlandse teksten (tot en met het jaar 1300) Reeks II: Literaire Handschriften Deel 2, Der Naturen Bloeme* (The Hague: Martinus Nijhoff, 1981).

Nozeman Cornelius, and Houttuyn Martinus, *Nederlandsche Vogelen*, 5 vols (Amsterdam, 1770-1829).

Smit H.J. (ed.), *De rekeningen der graven en gravinnen uit het Henegouwsche huis*, 3 vols (Amsterdam: J. Müller, 1924-1939).

Swaen A.E.H. (ed.), *Jacht-Bedryff* (Leiden: Brill, 1948).



## Literature

Albarella Umberto and Thomas Richard. 'They dined on Crane: Bird Consumption, Wild Fowling and Status in Medieval England', *Acta Zoologica Cracoviensia* **45** (2002): 23-38.

Badura Monika, Możejko Beata, Święta-Musznicka Joanna and Latałowa Małgorzata, 'The Comparison of Archaeobotanical Data and the Oldest Documentary Records (14th-15th century) of Useful Plants in Medieval Gdańsk, Northern Poland', *Vegetation History and Archaeobotany* **24** (2015) 441-454.

Bavel Bas van, 'Eendenkooien in het Hollandse en Gelderse rivierengebied', *Historisch geografisch tijdschrift* **20** (3) (2002): 16-20

Bavel Bas van, *Manors and Markets: Economy and Society in the Low Countries 500-1600* (Oxford: Oxford University Press, 2010).

Beck Corinne, *Les eaux et forêts en Bourgogne ducal (vers 1350 - vers 1480) Société et biodiversité* (Paris: L' Harmattan, 2008).

Blankers Piet and Kleijn David, 'Weidevogels natuurlijk: nieuwe inzichten in het Nederlandse weidevogelbeheer', in Joop Schaminée, John Janssen and Eddy Weeda (eds), *Gewapende vrede: Beschouwingen over plant-dierrelaties* (Zeist: KNNV Uitgeverij, 2011): 130-149.

Bont Chris de, *Amsterdamse boeren: Een historische geografie van het gebied tussen de duinen en het Gooi in de middeleeuwen* (Hilversum: Verloren, 2014).

Bourne W.R.P., 'Fred Stubbs, Egrets, Brewes and Climatic Change', *British Birds* **9** (7) (2003): 332-339.

Buisman Jan, *Duizend jaar weer, wind en water in de Lage Landen, deel 2: 1300-1450* (Franeker: Van Wijnen, 1996).

Canan Çakırlar e.a., 'Animals and People in the Netherlands' Past: >50 Years of Archaeozoology in the Netherlands', *Open Quaternary* **5** (13) (2019): 1-30.

Cormont Anouk e.a., 'Population Dynamics of Great Bittern (*Botaurus stellaris*) in the Netherlands: Interaction Effects of Winter Weather and Habitat Fragmentation', *Regional Environmental Change* **14** (3) (2014): 943-952.

Dam Petra J.E.M. van, *Vissen in veenmeren: de sluisvisserij op aal tussen Haarlem en Amsterdam en de ecologische transformatie in Rijnland 1440-1530* (Hilversum: Verloren, 1998).

Dekker Cornelis and Baetens Roland, *Geld in het water: Antwerps en Mechels kapitaal in Zuid-Beveland na de stormvloed in de 16e eeuw* (Hilversum: Verloren, 2010).

Dijkman Jessica, *Shaping Medieval Markets: The Organisation of Commodity Markets in Holland, c. 1200- c. 1450* (Leiden: Brill, 2011).

Eigenhuis Klaas J., *Verklarend en etymologisch woordenboek van de Nederlandse vogelnamen* (Amsterdam: Dutch Birding Association, 2004).

Ericson Per G.P., and Tyrberg Tommy, *The Early History of the Swedish Avifauna. A Review of the Subfossil Record and Early Written Sources* (Stockholm: Kungl. Vitterhets Historie och Antikvitets Akademien, 2004).

Farmer Sharon, 'Aristocratic Power and the "Natural" Landscape: The Garden Park at Hesdin, ca. 1291-1302', *Speculum* **88** (3) (2013): 644-680.

Fasola Mauro et al., 'Long-Term Trends of Heron and Egret Populations in Italy, and the effects of Climate, Human-Induced Mortality, and Habitat on Population Dynamics', *Population Ecology* **52** (2010): 59-72.

Ferrández Verdú Trinitario, Pujol Fructuoso Juan Antonio, and Almarcha Martínez Francisco, 'Historical Evolution of Medieval Fauna in the Lower Segura, Alicante (Spain)', *Anthropozoologica* **52** (2) (2017): 203-214.

Goethem Thomas van, and Zanden Jan Luiten van, 'Who is Afraid of Biodiversity ? Proposal for a Research Agenda for Environmental History', *Environment and History* **25** (2019): 613-647.

Hoffmann Richard C., *An Environmental History of Medieval Europe* (Cambridge: Cambridge University Press, 2014).

Ibelings Bart, 'Oogst en consumptie van vogels. Het Zevenhuizense bos in de late zestiende eeuw', *De Schatkamer. Regionaal Historisch Tijdschrift Midden-Holland* **26** (2012): 37-46.

Janse A. and van Winter J.M., 'Een bruiloftsmaal aan het Hollandse hof in 1369', *Jaarboek voor Middeleeuwse Geschiedenis* **3** (2000): 162-195.

Lenders H.J.R. et al., 'Historical Rise of Waterpower initiated the Collapse of Salmon Stocks', *Scientific Reports* **6** (2016) 1-9.

Lindner Kurt, *Von Falken, Hunden und Pferden: deutsche Albertus-Magnus-Übersetzungen zu der ersten Hälfte des 15. Jahrhunderts* (Berlin: Walter de Gruyter, 1962).

Lotze Heike K. and Worm Boris, 'Historical Baselines for Large Marine Animals' *Trends in Ecology & Evolution* **24** (5) (2009): 254-262.

Mihoub Jean-Baptiste et al., 'Setting Temporal Baselines for Biodiversity: the Limits of Available Monitoring Data for Capturing the Full Impact of Anthropogenic Pressures', *Scientific Reports* **7** (2017) 1-11.

Newton Ian, 'Highlights from a Long-Term Study of Sparrowhawks', *British Birds* **101** (2008): 607-623.

Niedermann Christoph, *Das Jagdwesen am Hofe Herzog Philipps des Guten von Burgund* (Brussels: Archives et bibliothèques de Belgique, 1995).

North Philip M. and Morgan Byron J.T., 'Modelling Heron Survival Using Weather Data', *Biometrics* **35** (3) (1979): 667-681.

Pfister C., Schwarz-Zanetti G., and Wegmann M., 'Winter Severity in Europe: The Fourteenth Century', *Climatic Change* **34** (1996): 91-108.

Rentenaar Rob, 'De vroegste geschiedenis van het konijn in Holland en Zeeland', *Holland* **10** (1978): 2-16.

Rijk Jan Hendrik de, *Vogels en mensen in Nederland 1500-1920*. (PhD Thesis, Vrije Universiteit Amsterdam, 2015).

Stone David J., 'The Consumption and Supply of Birds in Late Medieval England', in Christopher M. Woolgar (ed.), *Food in Medieval England: Diet and Nutrition* (Oxford: Oxford University Press, 2006), 148-161.

Sykes Naomi, 'The Dynamics of Status Symbols: Wildfowl Exploitation in England AD 410-1550', *Archaeological Journal* **161** (1): 82-105.

Taylor Anna Lisa, 'Where are the Wild Things ? Animals in Western Medieval European History', *History Compass* **16** (2018) 1-12.

Verstraeten André, Karelse Désiré, and Zwaenepoel Arnout, *Eendenkooien in Vlaanderen en Nederland en 7 andere Europese landen* (Lokeren: Durme vzw; IJsselstein: Eendenkooi Stichting, 2011).

Walker Samuel J., Hufthammer Anne Karin, and Meijer Hanneke J.M., ' Birds in Medieval Norway', *Open Quaternary* **5** (5) (2019) 1-33.

Yalden D.W. and Albarella U., *The History of British Birds* (Oxford: Oxford University Press, 2009).

Zeiler Jørn T., 'Hunting the Hunters: Owls and Birds of Prey as Part of Falconers' Game Bag', in Wietske Prummel, Jorn T. Zeiler and Dick C. Brinkhuizen (eds.), *Birds in Archaeology. Proceedings of the 6th Meeting of the ICAZ Bird Working Group in Groningen* (Groningen: Barkhuis 2009) 163-168.

Bird Group	Species	Archaeological	Historical
gallinaceous birds	Coturnix coturnix	X	
	Lyrurus tetrix		?
	Perdix perdix	X	X
	Phasianus colchicus		X
pigeons	Columba		X

	<i>Columba oenas</i>	X	
	<i>Columba palumbus</i>	X	
ducks	<i>Anas</i>		X
	<i>Anas crecca</i>	X	
	<i>Anas crecca</i>   <i>Anas querquedula</i>	X	X
	<i>Anas penelope</i>	X	
	<i>Anas platyrhynchos</i>	X	X
	<i>Mareca penelope</i>	X	
	<i>Mareca strepera</i>	X	
	<i>Spatula clypeata</i>	X	
	<i>Spatula querquedula</i>	X	
geese and swans	<i>Anser</i>	X	X
	<i>Anser albifrons</i>	X	
	<i>Anser anser</i>	X	
	<i>Anser brachyrhynchus</i>	X	
	<i>Branta bernicla</i>	X	
	<i>Cygnus</i>		X
	<i>Cygnus bewickii</i>	X	
	<i>Cygnus cygnus</i>	X	
	<i>Cygnus olor</i>	X	X
herons and spoonbills	<i>Ardea cinerea</i>	X	X
	<i>Botaurus stellaris</i>	X	X
	<i>Casmerodius albus</i>   <i>Egretta garzetta</i>		X
	<i>Casmerodius albus</i>	X	
	<i>Nycticorax nycticorax</i>		X
	<i>Platalea leucorodia</i>	X	X
storks	<i>Ciconia ciconia</i>	X	X

cranes and ralls	Grus grus	X	X
	Fulica atra	X	
gannets	Morus bassanus		?
birds of prey and owls	Accipiter nisus	X	
	Accipiter gentilis		X
	Buteo buteo	X	
	Falco	X	
	Falco cherrug		X
	Falco columbarius		X
	Falco biarmicus		X
	Falco peregrinus		X
	Falco rusticolus		X
	Asio otus	X	
	Bubo bubo		X
Strigiformes		X	
passerines	Corvidae	X	
	Corvus	X	
	Corvus corone	X	X
	Corvus monedula	X	X
	Pica pica	X	
	Fringillidae		X
	Passeriformes	X	
waders	Charadriinae		X
	Gallinago gallinago		?
	Numenius arquata	X	
	Recurvirostra avosetta		X
	Scolopax rusticola	X	X



	Vanellus vanellus	X	X
--	-------------------	---	---

Table 1 Overview of birds present in the fourteenth-century County of Holland, according to archaeological and historical sources. Based on sources given in notes 7, 8, 9 and 29.

Years	Grey and night herons sold	Egrets and spoonbills sold	Birds presented as gifts or eaten by the count's household	Bounties for heads of carrion crows
1357-1358	564 grey herons and 2000 night herons		468 grey herons	
1358-1359	1375 (1651-3298)		633	
1359-1360	1375 (1651-3298)	750 (900)	725	
1361-1362	1200 (1441-2878)	400 (480)	706	
1362-1363	1750 (2101-4198)	600 (720)	679 grey and night herons	
1363-1364	1250 (1501-2998)	400 (480)	475	
1364-1365	1000 night herons (1200)	600 (720)	825 night herons	
1367-1368	2662 (3195-6386)	1125 (1350)	988 grey and night herons	
1368-	775 (931- 1858)	775 (930)	1084	

1369				
1369- 1370	1475 (1771- 3538)	675 (810)	1002	
1370- 1371	1800 (2161- 4318)	537 (644)	992	
1371- 1372	1375 (1651- 3298)	700 (840)	866	
1372- 1373	1250 (1501- 2998)	837 (1004)	811	50
1373- 1374	1800 (2061- 4118)	925 (1110)	1712 grey herons, night herons, and egrets	40
1374- 1375	2350 (2821- 5638)	975 (1170)	1007	20
1375- 1376	1675 (2041- 4078)	1000 (1200)	1135	53

Table 2 Overview of birds taken in the Goudsche bos, 1357-1376 according to the financial accounts of the stewards. If the numbers mentioned are units of accounting, the real number of birds is given between brackets. Based on NA, 3.19.10, inv. nrs. 84-104.