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SOCIAL AND SEASONAL ORGANIZATION OF RED DEER HUNTING FROM THE NEOLITHIC TO THE LATE IRON AGE (C. 2000 BC TO AD 1000): STONE-SET HUNTING BLINDS FROM WESTERN NORWAY

Abstract

This is the first paper to examine social and seasonal organization of red deer hunting using stone-set hunting blinds in Norway. The paper examines seven hunting blinds discovered in Gjesdal, western Norway. Four of the hunting blinds are unique; it was possible to date them directly with radiocarbon dating. The sites exhibit multiple construction phases, with a usage period ranging from the Neolithic to the Mid Iron Age, and we would suggest, extending into the Late Iron Age and Middle Ages. The datings and multiple phases make it possible to discuss temporal change in the construction of the hunting blinds, which is unprecedented in a Fennoscandian context. Hunting appears to align with social trends, becoming more prominent during periods of settlement decline and increased use of outfield resources for surplus production. While hunting in the lowlands of western Norway, particularly between 0 and 900 metres above sea level, appears to have been smaller in scale compared to mass-scale hunting in Norway's high-altitude zones and eastern regions, the high population of red deer until about 500 years ago indicates profitable hunting opportunities during specific seasons. The cluster of hunting blinds suggests organized cooperation among neighbours and families, with surplus products potentially sold and exported to local and regional markets.

Keywords: Hunting blinds, outfield resources, red deer, lowlands, Neolithic, Iron Age.

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INTRODUCTION

Big game hunting has been practised in all periods of prehistory around the world as a basis of life, income source, and for use in cult activities and myths (e.g., Kelly 1995; Mansrud 2006; Indrelid & Hufthammer 2011; Fletcher 2013: 83–144; Henkelmann 2013; Weber 2013; O'Shea 2014; Hennius 2020; Pasda et al. 2020). Different trapping systems for large animals are well known throughout the world (e.g., Reagan 1919: 443; Spiess 1979; Indrelid et al. 2007, Reimer 2009; Stormyr 2011; Lemke 2015; 2021). In Norway, mass-harvesting of reindeer in large trapping systems is well known from the alpine, high-altitude zones (Bang-Andersen 2008; Indrelid & Hufthammer 2011), with methods which could also include stone-set

hunting blinds, guiding fences and pitfalls (Pilø et al. 2018; Solli 2018a). Pitfalls for elk are well known from eastern Norway and northern Sweden and can be singular or in systems with up to tens or even hundreds of pits, stretching for several kilometres (Jordhøy et al. 2012; Hennius 2020; Post-Melby & Bergstøl 2020a; 2020b). In total, almost 5000 hunting facilities are known in Norway, with a majority from high altitude zones above 900 m.a.s.l. (e.g., Indrelid Hufthammer & Røed 2007; Indrelid & Hufthammer 2011; Solli 2018b), and new artefacts from reindeer hunting are continuously being found from melting icecaps (Wammer 2007; Finstad & Pilø 2010; Callahan 2013; Høyer 2015; Bjørgo et al. 2016; Martinsen 2016).

While prehistoric hunting of elk from eastern Norway and reindeer from the high-altitude zones is well known, hunting of red deer in the Norwegian lowland areas below 900 m.a.s.l. has only been investigated to a small degree and, as far as we know, none of the structures have previously been dated. This study, however, presents a unique case in which several hunting blinds could be radiocarbon dated, and multiple phases of construction were investigated. While hunting architecture has been well studied across the globe, it is rarely carried out in relation to prehistoric red deer hunting. To remedy that is the aim of this paper.

Several finds from high altitude zones in Norway have shown that large-scale hunting was taking place already from 2500–2280 BC – that is, the Middle Neolithic (Åstveit 2007: 15–16; Finstad & Vedeler 2008: 68; Callahan 2013: 729–740). Hunting of elk intensified during the Neolithic (c. 4000–1700 BC) and further increased in the Bronze Age (c. 1700–500 BC). (Post-Melby & Bergstøl 2020: 319). There is evidence for extensive and systematic hunting in mountain areas from the Roman Iron Age (c. AD 1–400) up to the Middle Ages (c. AD 1050–1536) (Pilø et al. 2018; Solli 2018a). However, when it comes to prehistoric hunting in the lowlands, it has been argued that it was of minor importance because it was only possible to kill one or a few animals at a time (Indrelid & Hufthammer 2011: 8). This seems to indicate that the hunting must have been organized on an individual level, in contrast to the communal organization of mass hunting of reindeer in the mountains, controlled by the king or by elites. This is still an open question, and here we will study how hunting in the lowlands was organized.

Our starting point is a group of seven hunting blinds and one possible guiding fence from the lowlands in Gjesdal municipality, Rogaland County, in western Norway. They are located at two different historical farms, *Haraland* and *Bollestad*, approximately three kilometres apart. The sites were excavated by the Museum of Archaeology, University of Stavanger in 2020. The use of these blinds has been dated from the Neolithic up until the Mid Iron Age (c. 2000 BC to AD 300). We will investigate the chronology of these sites, and spatial and temporal patterns. Our aim is to throw light on the social context and the organization of the red deer hunt in the Scandinavian lowlands during prehistory.

DISTRIBUTION OF ANIMALS AND HUNTING FACILITIES IN NORWAY

There are four large wild ungulates in Norway; elk (*Alces alces*), reindeer (*Rangifer tarandus*), red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*). Reindeer exist in the higher mountain areas of Gjesdal today, but not below 500 m.a.s.l. (Stegarud 2018). The sites at Haraland and Bollestad are located at around 200 m.a.s.l. Historically, the respective distribution of red deer and elk in Norway varies from region to region. Elk has been associated with the more continental eastern inland or boreal bioregion, while red deer were found along the milder Atlantic west coast, separated by the Scandes mountain range (Collett 1912). However, bone material shows that both elk and red deer were present in western Norway in the first part of the Holocene (Rosvold 2013 with refs.). Farming and domestic animal husbandry in western Norway was firmly established in the Late Neolithic, c. 4500–4000 cal. BP (Høgestøl & Prøsch-Danielsen 2006). The landscape then changed, with pollen diagrams showing deforestation and an opening of the landscape following both the beginning of agriculture and the colder climate of the late Holocene (Kaland 1986; Bjune 2005; Hjelle et al. 2006; Hjelle et al. 2010; Høgestøl & Prøsch-Danielsen 2006). Red deer coped with

these changes better than elk, and in the following periods red deer have become the most common big game animal in western Norway (Rosvold 2013). The population of roe deer in Norway has been relatively low through prehistory and up to the 20th century (Hufthammer 1992). Thus, red deer became the predominant ungulate in western Norway during the mid-Holocene warm period, c. 8000–4000 cal. BP. (Rosvold et al. 2013), and it is reasonable to assume that the hunting structures from Gjesdal must have been for red deer.

As mentioned above, c. 5000 hunting facilities are known from Norway. If we disregard those from the high-altitude zones, we are left with c. 600 hunting facilities from lowland areas: the Atlantic region along the coast and the boreal region of eastern Norway (Fig. 1). In the southwestern region, red deer have been the predominant ungulate, while in the northern parts of Norway reindeer and to a lesser extent elk have been predominant. Boreal eastern Norway, on the other hand, is dominated by elk. The Atlantic areas of southwestern Norway and up to mid-Norway (that is, from Rogaland to the Trondheim fjord) have been the most important habitats of red deer both in Norway's prehistory and up to our time (Langvatn 2020a). In all, c. 370 hunting structures are known from these areas. Of these, 230 are from the lowland areas, below 900 m.a.s.l., and the Atlantic bioregion. To our knowledge, none of these sites are dated. All in all, the few sites from the lowlands suggests a more individually organized hunt than the mass hunting of reindeer in the mountain areas and mass trapping sites for elk in eastern Norway.

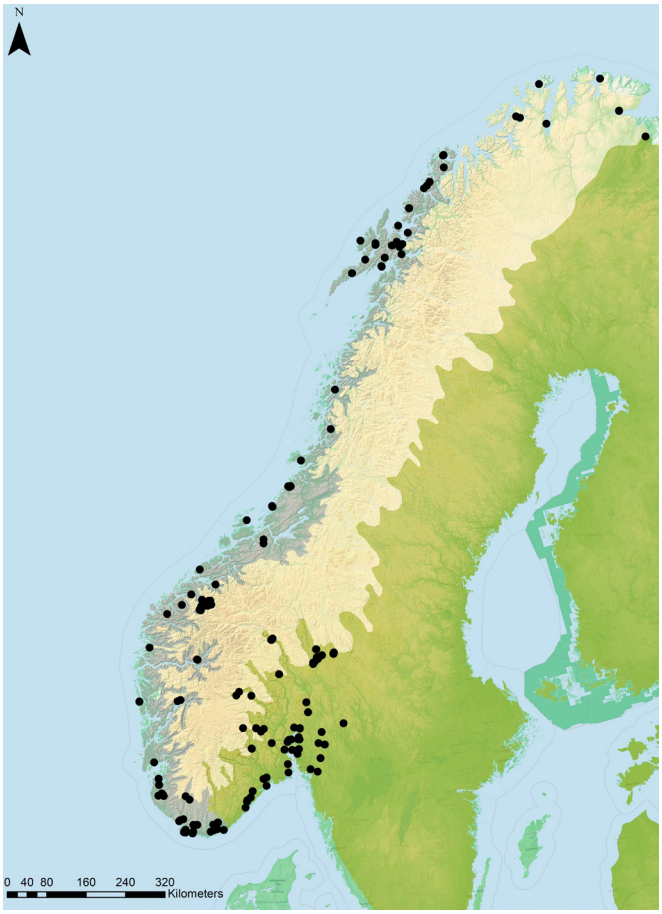


Figure 1. Distribution of hunting sites from the lowland areas of Norway: The Atlantic region along the coast (grey), the mountain regions in inland Norway (yellow) and the boreal region of eastern Norway (green). Map: K. Hillesland (OpenStreetMap and contributors, CC-BY-SA; HERE, Garmin, INCREMENT P, USGS).

HUNTING BLINDS FROM GJESDAL

In the summer of 2020, the Museum of Archaeology, University of Stavanger excavated seven stone-set hunting blinds: three at the farm of Haraland, and four at the farm of Bollestad, both being sites in Gjesdal county (Fig. 2). Hunting blinds are facilities consisting of straight or halfmoon shaped stone walls, usually stacked with naturally occurring stones. To expose details in the construction, all the hunting blinds were excavated by deconstruction in several phases. Gjesdal belongs to the inner parts of the Jæren region in western Norway and is more densely populated than the agricultural regions of the coast. The western part of Gjesdal has a hilly landscape of many small regions separated by lakes, wetlands, and light forest but connected by rivers (Rosvold 2013). Further east, the landscape consists of mountains and valleys, with steep hillsides and rough terrain. There are also flatter

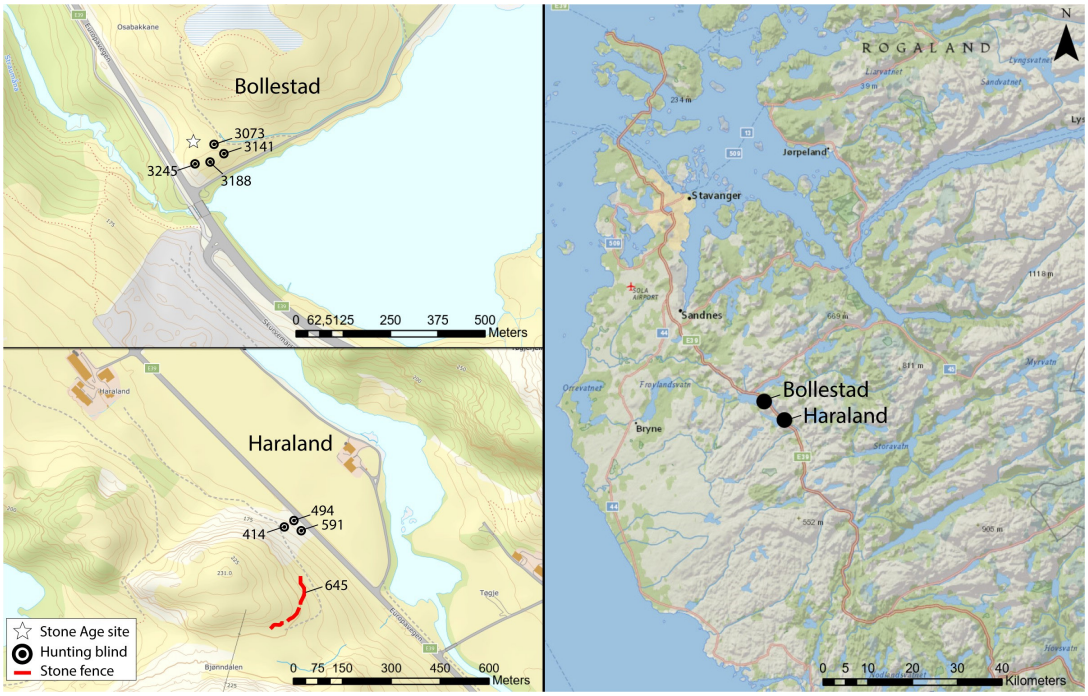


Figure 2. Map of the seven hunting blinds and the guiding fence from Gjesdal county, Rogaland. Map by K. Hillesland (OpenStreetMap [and] contributors, CC-BY-SA; HERE, Garmin, INCREMENT P, USGS).

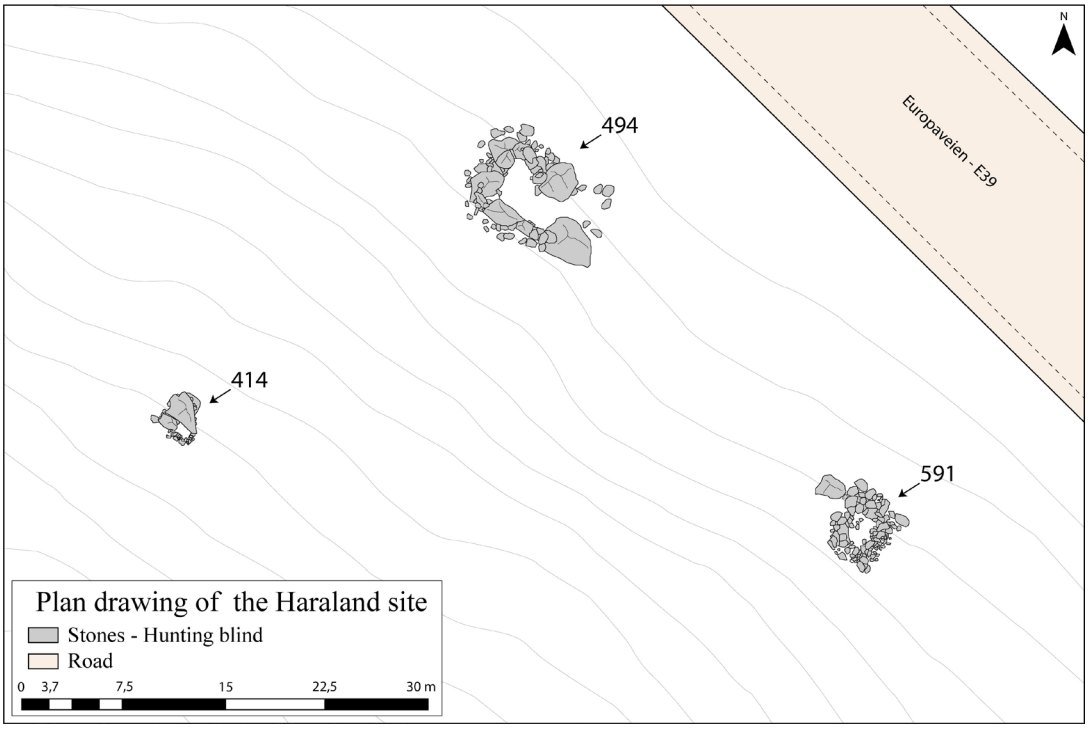


Figure 3. Plan drawing of the Haraland site, showing the three hunting blinds and how they are situated in the landscape. Drawing: K. Hillesland.

areas where agriculture is the dominant land use, and both lightly and heavily forested areas. Both Haraland and Bollestad are located along existing wandering routes for red deer, where the lowlands adjoin more mountainous areas (Forvaltningsplan 2021). This explains the hunting blinds' location: they take advantage of the terrain and of the seasonal wanderings of red deer.

Haraland

The farm of Haraland has three hunting blinds, located in a narrow part of Gjesdal valley along the modern E39 road (Hillesland et al. 2020). They are at the bottom of a rocky hillside consisting of large boulders and glacial deposits, where the sloping terrain merges into the infield areas at the bottom of the valley. The hunting blinds are at an intersection, where a valley from the southwest enters the main valley below. From here, further passage between the lowlands and mountain areas is possible. Thus, the red deer would have passed the hunting blinds when travelling northwards or southwards, or by the narrow valley towards the southwest (Fig. 2).

The hunting blinds at Haraland were situated in a cluster, c. 20 metres apart, and strategically placed in the landscape (Fig. 3). They were built to "fit" the terrain and consisted of naturally occurring rocks laid out in rectangles, all above ground. Id 494 was the largest of the three structures, measuring approximately 4 x 3 metres with a height of about 1.5 metres (Fig. 4). It had an almost rectangular shape, constructed around several large boulders with smaller stones placed between them. Inside the structure, a stone floor was constructed.

To the southeast, we find id 591, with rectangular shape and dimensions of 2.3 x 1.5 metres. Most of the structure was built around several large stones with smaller stones placed between them, ranging in size from 10–40 cm. Id 591 appeared less distinct than the other two blinds at Haraland, with the southern side forming a clear wall, while the northern side was mostly eroded and unclear. The third hunting blind at Haraland, id 414, measured approximately 1.6 x 2.0 metres and 0.8 metres high at its highest point. The structure was partially built

Figure 4: The hunting blind (id 494) at Haraland, looking towards the south. Photo: K. Hillesland and M. Ødegaard. Museum of Archaeology, University of Stavanger. CC-BY-SA 4.0.

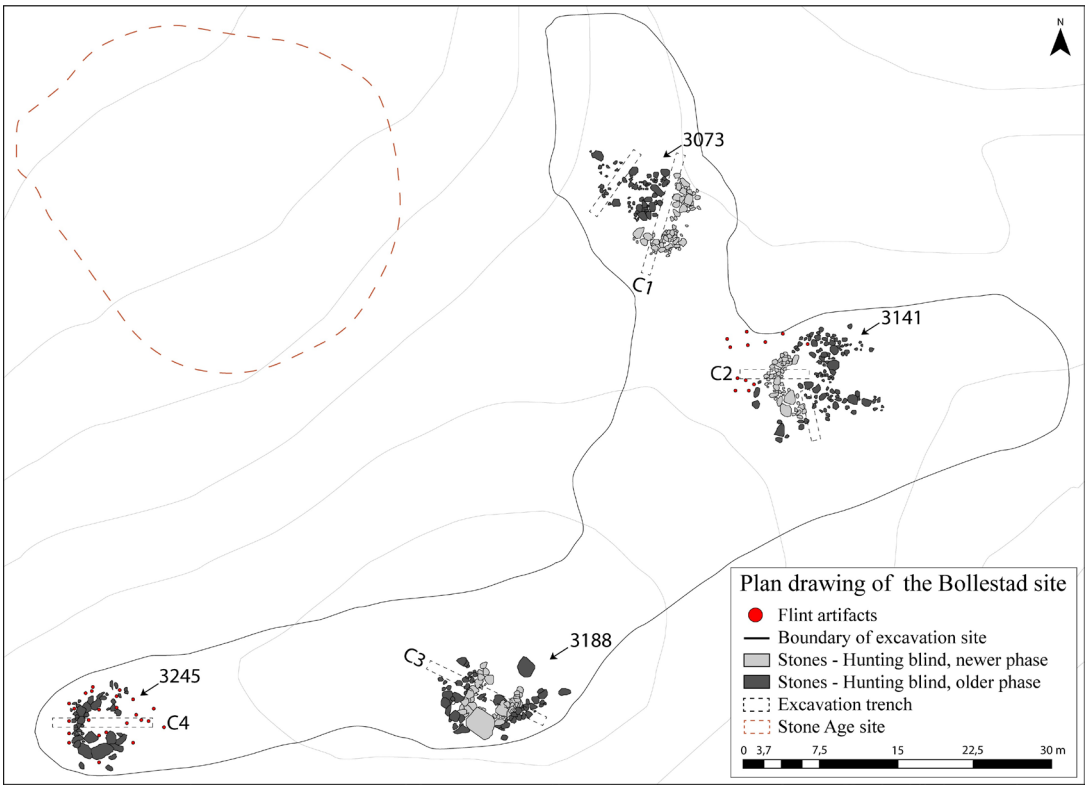


Figure 5. Plan drawing of the Bollestad site, showing the four excavated hunting blinds. Drawing: K. Hillesland.

into the slope towards the southwest of id 494, with 3–4 layers of stones. Id 414 differs from the other two hunting blinds in its smaller construction. No soil or charcoal was found in them, and thus no material for radiocarbon dating, presenting a classic problem with this type of feature.

On the hillside above the site, there are several stone fences running downward from the mountain. Some of these fences could be guiding fences for leading the prey down from the mountain towards the hunting blinds. One stone fence was investigated as part of the excavation (id 645; cf. Fig. 2). It curves in towards the hunting blinds, but is then cut off by a modern road, making it impossible to establish for certain what the original relationship between them was.

Bollestad

Northwest from Haraland we find the site of Bollestad (Fig. 2). The site is located on a hilltop, overlooking lake Klugsvatnet to the south and the lowlands of the valley northwards. The location can be described as a "bottleneck" for travelling up and down the valley, making the location ideal for the placement of a hunting facility, as the animals would have passed through this area between summer and winter habitats. In total, there are four hunting blinds, located 7–17 meters apart (Fig. 5). They all consist of rocks, mostly 10–50 cm^2 in size, built in a dry wall construction in a semi-circular to circular shape with an opening to one side. The two northernmost blinds (id 3073 and 3141) were the largest.

Before the excavation began, id 3073 appeared as a depression in the landscape. Below the turf, a stone wall was revealed, forming a circular structure approximately 4.5 metres in length and 4 metres in width, with a depth of about 80 cm (Fig. 6). The highest part was oriented to the southeast. The opposite side, the northwest, was slightly lower with a discernible entrance leading into to the centre. At the lowest point in the northwest, a less robust stone wall was visible, likely part of an earlier phase of the structure. The stones of the

hunting blind were possibly stacked directly on an underlying peat layer. Additionally, a darker layer, potentially a cultural layer, containing charcoal, was observed below this peat. This cultural layer (Layer 3) at the structure's base was undisturbed by the overlying stone packing.

Id 3141 was about ten metres southeast of 3070 (Fig. 5). It measures approximately 6 x 5 metres. The circular structure had a noticeable depression in the centre, devoid of stones. The stone wall around it was clearly added in several phases, with larger stones (20–60 cm in diameter) forming the upper layer with relatively "loose" stacked stones. This part was oriented to the west. Beneath this, a more compact stone wall with smaller stones was found (5–20 cm in diameter), suggesting an older use-phase, like in id 3141. The wall's construction seemed to be integrated with existing, natural stones and had a slightly more northwest orientation. Thirty-one Stone Age artifacts were found between this stone layer, and slightly north of the structure (Fig. 5 & 7). These artifacts are presumed to be contemporary with the construction, or older than the structure itself. A linear stone layer with smaller stones extended eastward from the structure, both in the northeast and southeast. These might be remnants of an older and now disturbed wall construction, or possibly a guiding barrier for leading animals towards the blinds.

Approximately 20 metres to the southwest were two smaller hunting blinds, id 3245 and id 3188 (Fig. 5). Id 3188 was positioned on the highest point of the ridge, offering a strategic vantage point overlooking lake Klungsvatnet and the southern valley. The blind measured approximately 4 metres in length and 3 metres in width. The dry-stone wall construction featured stones ranging from approximately 20 to 60 cm in diameter. After excavation, an older phase became apparent, marked by a more compact

Figure 6. Hunting blind (id 3073) at Bollestad in Gjesdalen valley, looking towards the south. Photo: M. Ødegaard. Museum of Archaeology, University of Stavanger. CC-BY-SA 4.0.

construction with stones ranging from 15 to 50 cm in length, below the upper layer and traced on the outer edge of the structure. A slight elevation of soil, 10–20 cm high, with stones measuring 15–40 cm, was discovered on the structure's west-northwest side during the survey. However, this feature could not be clearly identified in the profile sections. It suggested the possibility of a third usage phase for the blind.

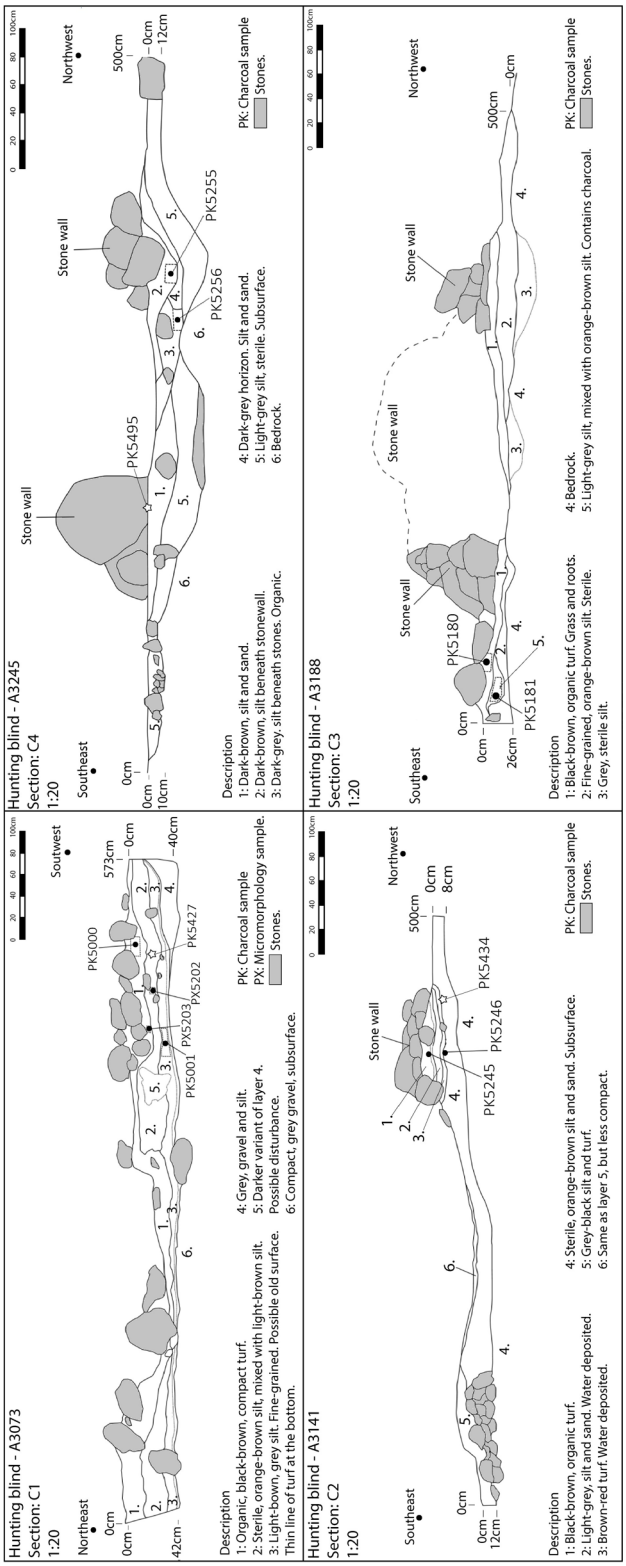
The south-westernmost hunting blind (id 3245) was on the same ridge and about 15 metres west of id 3188. This blind was the smallest on the site, measuring about 2.4 metres in length and 2 metres in width. Constructed with dry-stone walls, the structure featured a large boulder at its base, surrounded and incorporated by other stones. The wall was highest to the southwest, which was likely the route of approaching animals. This part of the construction had clearly been modified in recent times. There was an opening into the centre of the structure from the northwest. After excavation, a larger portion of the structure became visible beneath the peat, with the wall appearing more compact and mixed with soil/peat at the base. This section was interpreted as belonging to the oldest phase of the structure. An exposed profile through the structure revealed natural soil layers, but no distinct cultural layers were visible. Flint artifacts were, however, found here. Some finds were beneath the walls of the blind and may belong to an older activity phase. In total, 71 stone artifacts were found in association with this hunting blind. Their distribution pattern around the structure suggests that they all relate to the structure (Fig. 7).

Figure 7. Collection of flint artifacts found in hunting blinds id 3245 and id 3141. Here, platform core, parts of one blade and two micro-blades. Photo: A. G. Øvrelid. Museum of Archaeology, University of Stavanger. CC-BY-SA 4.0.

DATING AND CHRONOLOGY OF THE SITES

In total, nine samples for ^{14}C-dating were taken from soil layers in different profiles during the 2020 excavation at Bollestad (Table 1; Fig. 8 & 9). In addition, three samples (Beta 546911; 546910 and 546909) were taken during the pre-excavation registration by Rogaland County Council (Tegby & Samuelsen 2020). The ^{14}C-data was calibrated using Ox.cal. 4.4.4. (Bronk Ramsey 2021) and the Intcal20 calibration curve (Reimer et al. 2021). All dates are presented as calibrated dates BC/AD, 1. sigma. The samples were taken in distinct cultural layers below the stone constructions, and in some cases from between the rocks in the walls.

Four samples were dated from hunting blind id 3073 (for all samples see Table 1; Fig. 8 & 9). One sample from an intact cultural layer below



the construction was dated to the Late Nordic Bronze Age, 800–595±30 calBC (Beta-586355; Fig. 9 & 8. Layer 3, sample 5001). A sample from higher up in the same profile shows activity in the same period of the Bronze Age, 760–545±30 calBC (Beta-586360; Fig. 8. layer 2, sample 5427). A sample from in between the rocks of the stone wall, further west in the hunting blind, was dated to the Pre-Roman Iron Age, 360–200±30 calBC (Beta-586358; not in Fig. 8). This sample was taken in the structure where the stones are smaller and where they lay more compactly in the subsoil. The last sample (Beta 546911) was taken from higher up in the stratigraphy, and dated to the Late Roman Iron Age, calAD 220–325±30 (Fig. 8. Layer 1, sample 5000). The dating indicates that the hunting blind may have been built in the Bronze Age, and that there was some activity here in the pre-Roman Iron Age, while the youngest phase, which corresponds with the expanding construction phase with larger stones, dates to the Late Roman Iron Age.

The hunting blind id 3141 has the oldest date from the site (see Table 1; Fig. 8 & 9). Two samples in the northern profile indicate activity in the Late Neolithic (2020–1900±30 calBC; Beta 586362; Table 1; Fig. 8. Layer 4, sample 5434), and the Early Nordic Bronze Age (1620–1540±30 calBC; Beta 586357; Table 1; Fig. 8. Layer 1, sample 5245). The samples were taken just below the stone construction. In the same layers flint artefacts, such as a cylindrical blade core and a microblade, dating to the

Figure 8. Profile drawing showing four sections from the hunting blinds at Bollestad. The drawings show where the ^{14}C samples were taken, and the different layers within the structures (Samples 5427, 5434 and 5495 were added to the drawings post excavation). Drawing: K. Hillesland.

Id	AM lab no.	Beta no.	Wood Species	BP	±	Cal. BC/AD, from	Cal. BC/AD, to	Z1	Cal. BC/AD, from	Cal. BC/AD, to	Z2	Askeladden id
3073	2020/76-2	586355	Unknown	2560	30	-800	-595	68.2	-805	-560	95.4	265650
3073	2020/76-14	586360	Betula sp.	2490	30	-760	-545	68.2	-775	-485	95.4	265650
3073	2020/76-9	586358	Betula sp.	2210	30	-360	-200	68.2	-380	-175	95.4	265650
3073		546911	Unknown	1800	30	220	325	68.2	165	350	95.4	265650
3188	2020/76-4	586356	Pinus sp.	3280	30	-1610	-1505	68.2	-1620	-1460	95.4	265645
3141	2020/76-6	586357	Pinus sp.	3320	30	-1620	-1540	68.2	-1680	-1505	95.4	265648
3141	2020/76-15	586361	Pinus sp.	2460	30	-750	-480	68.2	-760	-415	95.4	265648
3141	2020/76-17	586362	Deciduous tree	3600	30	-2020	-1900	68.2	-2115	-1880	95.4	265648
3141		546910	Unknown	2450	30	-750	-420	68.2	-755	-410	95.4	265648
3245	2020/76-10	586359	Pinus sp.	2440	30	-735	-415	68.2	-755	-405	95.4	265646
3245	2020/76-20	586363	Deciduous tree	2890	30	-1120	-1015	68.2	-1205	-940	95.4	265646
3245		546909	Unknown	1890	30	120	205	68.2	75	235	95.4	265646

Table 1. The table shows the hunting blinds' id number, the internal Museum of Archaeology (AM) lab. number, the wood species, the date in BP, and calibrated dates in 1. and 2. sigma as well as the Askeladden id (Askeladden is the Norwegian Cultural Heritage database). Table: M. Ødegaard.

Early and Middle Neolithic, were found. Two other samples from another profile further south were dated to the Late Nordic Bronze Age with a transition to the Pre–Roman Iron Age (750–420±30 calBC, Beta-586361; 750–420±30 calBC, Beta 546910). These samples are from the southern profile and were not marked in the profile drawing. The samples were taken from below the stone construction, thus the same layer as the previously mentioned sample (ID Beta 586357). This indicates activities at the site and changes in the construction at that time.

From the westernmost hunting blind, id 3245, two radiocarbon (^{14}C) samples were taken (Fig. 8). One sample from below the stone wall was dated to the Late Nordic Bronze Age with transition to the Pre-Roman Iron Age, 735–415 calBC±30 (Beta-586359; Fig. 8. layer 2, sample 5255). Another sample was taken below a large boulder that was part of the wall construction, located directly over the bedrock and assumed to be from the oldest part of the construction. The sample was dated to 1610–1505±30 calBC (Beta-586356; Fig. 8: below stonewall, sample 5495), corresponding to the transition between the Early and Late Nordic Bronze Age. From this hunting blind, and id 3141, several flint artefacts dating from the Late Neolithic to the early Pre-Roman Iron Age were found, including a single platform-core, ten micro-blades and various debitage from tool production (Fig. 7). The two ^{14}C samples and the flints are from the same period, suggesting their use may be contemporaneous. The last sample was taken from underneath the stones in the middle part of the structure and was dated to calAD 120–205±30 (Beta 546909; Fig. 9), indicating activity also in the Early Roman Iron Age. The southwestern hunting blind, id 3188, was placed on top of the bedrock. It was only possible to get one sample from within its walls, and according to this single sample the structure is dated to the Early Nordic Bronze Age; 1610–1505±30 calBC (Beta-586356; Table 1; Fig. 8. Layer 5, sample 5181).

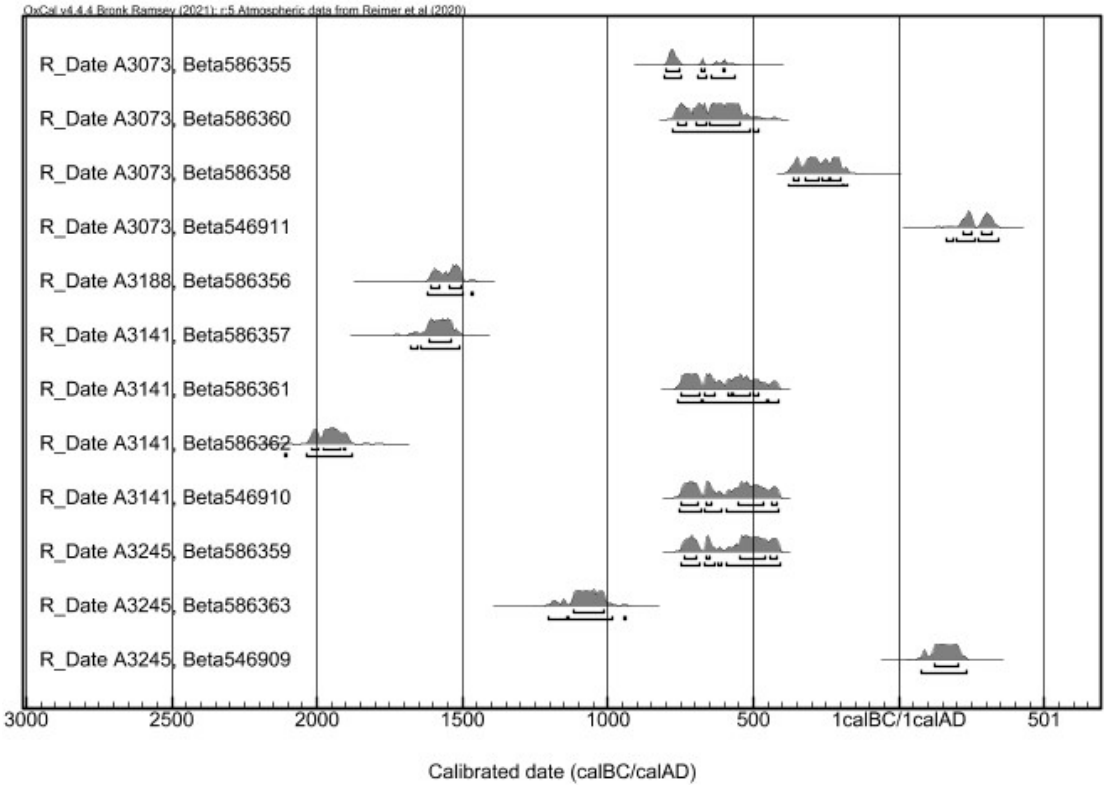


Figure 9. The dates from the farm of Bollestad in Gjesdal, Rogaland County, western Norway (Ox.cal. 4.4.4: Bronk Ramsey 2021. Intcal20 calibration curve: Reimer et al. 2021).

Altogether, the samples indicate activities in several phases. The oldest dates are from the Late Neolithic and Bronze Age, and the youngest from the Roman Iron Age (Fig. 9). The oldest dates coincide with the dates of some of the flint objects. The flint indicates tool production for hunting activities in and around the hunting blinds, and this could be seen in relation to a neighbouring Stone Age site, excavated the same year. This site is slightly lower in the terrain, about 30–50 m north of the hunting blinds. A total of 8992 processed stone materials were found, of which 35% are various forms of blades, with a particularly high number of microlites, in addition to scrapers, arrowheads, and various other flint-tools and debitage (Viken & Lagemaat 2022: 38-40). This implies that the activities taking place on the site were specialized, and connected to hunting, further emphasized by the presence of the blinds nearby. Although most of the finds date to the Mesolithic, some of them also show activity in the late Neolithic and the early Bronze age. A few finds, one Neolithic leaf-shaped arrowhead, and two possible neolithic flint-scrapers, correspond with the earliest ^{14}C-datings from the hunting blinds, possibly linking the two localities. It has been suggested that the leaf-shaped arrowhead may be an arrow shot from one of the hunting blinds, as no other secure finds were made from that period on the Stone Age site (Viken & Lagemaat 2022: 35).

The indications are that hunting in the area took place here from Mesolithic times. The hunting blinds, at least id 3141 and id 3245, were constructed somewhat later, in the Neolithic. It is unclear if the Bollestad Stone Age site was still in use at that time. The presence of the Neolithic leaf-shaped arrowhead and the two possible flint-scrapers do indicate a possible usage of the site in this period, possibly related to activity at the hunting blinds. However, as most artifacts from the site are Mesolithic, it is likely that the site was no longer used as an active dwelling site. The dates from the hunting blinds also show activity in the Late Bronze Age and Pre-Roman Iron Age, as indicated by id 3073. Most dates are from the Pre-Roman Iron Age; however, as some of the samples (e.g., Beta- 586355 and 586360) are from the same layer, it does not necessarily indicate more activity at that time. Signs of activity are also found at the hunting blinds in the Roman Iron Age, and the extension of the stone walls seems to have been carried out in this period. Although the hunting blinds at Haraland could not be dated, it is likely that they were in use at the same time as those at Bollestad, as it is only approximately 3 km between the sites.

To our knowledge, all other prehistoric hunting blinds in Norway have been dated based on various archaeological artifacts and organic material found on or near the hunting blinds and from melting ice caps (e.g., Åstveit 2007; Finstad & Vedeler 2008; Callahan 2013; Hole 2017; Pilø et al. 2018; Solli 2018a) or assumedly related archaeological features (Ramstad 2015). The dated localities are all from the mountain high altitude zones. In these cases, the hunting blinds are constructed above ground with little overlaying soil masses, thus making them very difficult to date. Hunting blinds, constructed with non-organic materials or subject to decay and disturbances, may lack suitable samples. Moreover, the potential re-use, reconstruction, and movement of blinds by later activity may further complicate dating efforts. Since the Bollestad hunting blinds have been dug down into the ground, it was possible to extract ^{14}C samples from soil and cultural layers, making the site unique in terms of dating prehistoric hunting blinds. However, if we look at other types of hunting facilities, such as pitfalls for elk, which were also dug down into the ground, many of these have been dated (e.g., Post-Melby & Bergstøl 2020; Hennius 2020). Nevertheless, several source-critical issues relating to the origin of the dating material from dug down hunting facilities should be discussed. Such dates are based on samples from old ground surface, consisting of humus and remnants of, for example, burnt grass or trees that were on-site when the hunting facilities were constructed. This means that the dating sample of charcoal in the soil in most instances may be older than the construction phase and does not have a direct connection to the construction itself. It will however show the earliest possible construction phase of the structure. The dates, therefore, do not necessarily reflect the date of hunting activity, but they do indicate activity in the area. However, the fact that we could discern different layers and unique construction phases at Bollestad suggests important phases of usage of the sites at these times.

TEMPORAL PATTERNS

The temporal patterns derived from the ^{14}C datings of Bollestad align well with the general patterns in Norway from this period. Several other sites in Norway have indications of hunting this early, such as of elk and reindeer from the Late Stone age (3000–2000 BC) and reindeer from the Middle Neolithic (2500–2280 BC) in the high-altitude zones of Norway (Åstveit 2007: 15–16; Finstad & Vedeler 2008: 68; Callahan 2013: 729–740; Post-Melby & Bergstøl 2020: 315). The finds from Bollestad suggest that this was also the case in the lowlands. This could also explain the presence of the Stone Age site next to the hunting blinds at Bollestad. In this context it is also important to point out that there are several other Stone Age sites in the Gjesdal valley, the closest one being on the other side of lake Klugsvatnet (Lagemaat 2021; Mansrud 2022), around 500 m southeast of Bollestad. This could indicate that the Bollestad site was important for hunting ungulates early in the Stone Age.

Hunting intensified in the Neolithic (from 2800 BC) and further increased in the Bronze Age (c. 1800 BC) in Scandinavia (Post-Melby & Bergstøl 2020: 319; Hennius 2020; Prescott 2012). The forests in western Norway (Høg-Jæren) were burned around 2500–2200 BC, giving room for grassland for grazing (Prøsch-Danielsen et al. 2020). This process of domesticating the landscape is likely reflected in the samples from Bollestad. Similar anthropogenic fires to improve pastures are attested around hunting architecture at many sites around the world (e.g., Oetelaarr 2014; Svizzero 2016). This may have been part of a seasonal utilization of the open field areas, as animals moved between grazing areas in the spring and autumn seasons (Odden et al. 1996; Lovari et al. 2019).

The Early Iron Age was a period of greater use of outfield resources and scorching in western Norway, creating the historical heathlands used for winter fodder (Hjelle 2015; Prøsch-Danielsen et al. 2020). In this period, there was an increase in the number of farms in the valleys of western Norway, with a subsequent need to use outfield areas for fodder for husbandry. This is also seen in Gjesdal with several settlements and increased agricultural traces from this period, the nearest one being the farm of *Heio*, only c. 400 m southwest of Bollestad, containing an Early Iron Age farmstead with two grave mounds, several fences and 44 clearance cairns (id 64633). These changes in the human use of the landscape are likely reflected in the usage of the hunting blinds in Gjesdal. The last datable phase at Bollestad was in the Roman Iron Age. The hunting blinds' stone walls also seem to have been extended in this period, suggesting an increase in hunting activity, and a connection between the temporal and spatial patterns of the hunting blinds.

Surplus production from hunting, trapping and iron production in Norway was already an important part of the economy from the centuries after the beginning of the Common Era onwards. Evidence for extensive and systematic hunting in the high-altitude zones of Norway testifies to a significant level of hunting activity from the Roman Iron Age up to the Middle Ages (Pilø et al. 2018; Solli 2018a). Dates from hunting and trapping in eastern Norway and Sweden show an increase in hunting and trapping during the third and fourth centuries and onwards, with suggested activity peaks in the fifth to sixth and seventh to eighth centuries (Gundersen 2021: 293; Hennius 2020). There is also growing evidence in the use of outfield resources in Scandinavia in these periods. These include extensive bear hunting (Lindholm & Ljungkvist 2016), as well as exploitation and distribution of gaming pieces and reindeer antler (Hennius 2020), and use of resources, such as iron (Stenvik 2015), coinciding with a significant settlement and agricultural expansion (Myhre 2002: 127–159; Pilø et al. 2018; Pilø & Barrett et al. 2020). The increased use of outfield resources, including hunting and trapping, may have been a result of land-use pressure from farming communities (Bergstøl 2008: 195–198). The structural changes of the blinds at Bollestad during the Roman Iron Age must reflect these societal and land use changes.

Although there were no ^{14}C datings from the Haraland site, their close location in the same valley makes it probable that the sites had a similar temporal development and substantiates the use of the valleys as primary hunting areas. In the Early Iron Age, it is plausible that the sites were used by people living on the nearby Early Iron Age farmstead at Heio.

SPATIAL PATTERNS

Several spatial patterns can be observed from the two excavated sites in Gjesdal. At Bollestad, three of the hunting blinds are oriented to the west-southwest, overlooking a river and a flat terrace area with good grazing. The animals could thus be spotted far from the blinds. This way, their natural behaviour was exploited, placing the blinds in natural bottlenecks along migration routes and on elevated ridges (cf. Bar-Oz & Nadel 2013; Smith 2013; Lemke 2015: 76; Lemke 2021). Using hunting blinds, such as those at Bollestad and Haraland, was a form of active hunting, in which hunters would wait behind stone-set hunting blinds, strategically placed in the terrain at a post located along a known animal route (Lemke 2021). Behind them hunters with bows and arrows would wait for the animals to appear within shooting range, and then shoot arrows at their targets, usually at a range of around 20 metres (Ramstad 2015). After hunting rifles, with a range of several hundred metres, were introduced hunters still found it expedient to lie hidden until the prey was up close. One therefore finds hunting blinds dating from relatively recent times (Ramstad 2015). This was also evidenced at Bollestad, where hunting in the blinds still took place in 2019, the year before the excavation (Hillesland & Ødegaard 2021). Interestingly, it thus seems that even if the projectile technology differs, developing from bow and arrow, to thrown spear, and then to rifle (see Friesen 2013), the hunting architecture is the same (e.g., Lemke 2021).

The west-southwest orientation at Bollestad indicates hunting of animals coming either from the direction of the small lake Skurvetjørna, c. 800 meters to the southwest of the site, from the western side of Klugsvatnet, or through the small valley northwest of the site, where the E39 road is situated today. This may, given the dates from the site, indicate a possible shift in the hunting pattern through time, since there is a strong possibility that the nearby Iron Age farm at Heio changed the movement of red deer by disturbing their wandering routes. Further back in time, the exploitation of the red deer wandering routes also explains the presence of the Stone Age site at Bollestad, as well as a small cluster of Stone Age sites at the northwestern end of Klungvatnet.

The undated Haraland site, situated in the same valley, was, we would argue, used at the same time, exploiting the movement of the red deer throughout the landscape. However, the Haraland hunting blinds do not have a half-moon/horseshoe form but are more closed enclosures with only minor openings. This might indicate that their intended use is not hunting from one direction only, but possibly from two, three or even four directions. This could indicate a local adaptation of the blinds to fit the animal routes in the area without having to change the structure of the blinds. It might also be explained by the topography as they are at the intersection between two valleys.

The spatial patterns of the two sites can be interpreted in several ways. At Bollestad, we see that all the hunting blinds have a different orientation in the landscape; three of them are oriented to the south-southwest, and one to the east. This indicates that their individual orientation shifted over time, likely to adapt to red deer approaching from a given direction, and the structures were likely changed to adhere to changes in the movement of deer through the landscape. Hunting techniques and strategy always consider the movement patterns of the hunted animals. While some red deer are sedentary throughout the year, others have wandering routes of varying lengths between summer and winter habitats. A common pattern is that, over winter, the animals stay near the coast or in the lowlands, where there is little snow and mild weather, and at springtime, when the snow withdraws and new vegetation sprouts, they move further inland to higher areas. During these spring migrations, large packs of deer can often be seen moving together (Odden et al. 1996; Lovari et al. 2019).

It could also mean that there were multiple animal routes in the area, or that their routes changed over time. Both id 3141 and id 3245 at Bollestad, with ^{14}C datings from the Bronze Age, give evidence for this, as they have similar datings, but a different orientation. Alternatively, it could suggest that the animals were chased to the blinds from a set direction (e.g., Lie 2004). There are several stone fences near the sites that might indicate this. There are several stone fences outside of the excavated area as well, and while hard to prove, some of them might have

originated as guiding fences. Built structures to aid hunting activities, such as fences, have been documented on every continent except Antarctica, and the sites show similarities across time, space, environments, and cultures (Lemke 2015; 2021).

It is possible that the changes in the spatial pattern at Bollestad relate to nearby changes in the landscape during prehistoric times. The already mentioned Heio farm, situated c. 400 metres southeast of Bollestad, was established during the Iron Age. At Bollestad, the hunting blind id 3073, with ^{14}C dates to the Bronze and Iron Age, has an eastward orientation, in contrast to the other three blinds. Maybe the establishment of the farm in the area changed the wandering routes of the deer, causing the change in orientation. This is, however, hard to prove, as id 3245, with southwestern orientation, has ^{14}C dates from the same period. In addition, no evidence of any other prehistoric changes has been found in the landscape in direct proximity to the site. However, there are several other prehistoric settlements in Gjesdal that could have triggered changes in animal routes, and consequently changed the spatial arrangements for the hunting blinds at Bollestad. For the Haraland site, all the blinds face the same direction, and there is no evidence of changes in orientation over time.

Regarding hunting strategy, the two sites likely represent local hunting. Nevertheless, it is possible that the two sites were part of a larger cooperated hunt. In the adjoining eastern valley c. 1700 m to the south of Haraland, an additional hunting blind is seen. This might suggest that the hunting blinds were part of a larger system with coordinated exploitation of red deer movement in the landscape along the valleys. This is a singular blind, possibly an outlier post, where they could have directed the animal movements into the possible guiding fences going into the main hunting site at Haraland, and again further north in the valley towards Bollestad. The placement of the hunting blinds in the landscape in Gjesdal shows detailed familiarity with animal behaviour, seasonal migration routes, local environment, and topography.

ORGANIZATION OF THE RED DEER HUNT

The red deer was a major source of meat in prehistoric societies, especially for hunter-gatherers, in large parts of Europe, as evidenced by the archaeological bone record (Bergsvik 2001; Fletcher 2014: 84). Even so, we have not found any comparative studies of red deer hunting in Norway, and thus the hunting blinds from Gjesdal offer valuable insights into how red deer hunting was organized during prehistoric times.

After the Neolithization, when people became sedentary, the hunting of red deer became less of an economic necessity, but the animals' ritual value grew. Rock art, myths and archaeological finds tell of the red deer's place in prehistory (Fletcher 2014). Hunting, trapping and fishing, in combination, were vital for settlement along the coast and in inland and higher-lying areas of Norway. Hunting rights were an important resource. Meat, fat, skin and hides of animals were key products. Bone and antlers were indispensable raw materials for tools and ornaments. Their importance grew over time, especially from the seventh century onwards when trade and craft production became increasingly significant in the emerging trading ports and emporiums of northern Europe (e.g., Røed & Hansen 2015; Skre 2017; Baug et al. 2018; Sindbæk & Ashby 2020: 8). As discussed above, hunting seems to have followed social trends in general and become more important in periods where the general use of the outfield resources increased, creating surplus production for barter and trade.

Ungulates formed an important economic basis for many chiefs and powerful men in prehistory. It has been argued that individual hunting, before rifles replaced spears, bows, and arrows, gave a poor outcome, so it was expedient to hunt on a larger scale (Ramstad 2015). Large-scale hunts can be seen in many societies dependent on ungulates as a resource, where people have secured the animals by some sort of driving or enticement with varying types of fences and "scare sticks", luring them into containment facilities, waterbodies, or even, as is known from the high-altitude zones of Norway, the edges of steep cliffs (e.g., Bang-Andersen 2008; Indrelid & Hufthammer 2011; Solli 2018a; Lemke 2021).

In Greenland, the North American Arctic, and in some parts of Norway, stone-set hunting blinds for reindeer hunting were also used for large-scale hunting. Many of the previously investigated trapping systems for elk and reindeer in Scandinavia also indicate large-scale organization (Indrelid et al. 2007; Bang-Andersen 2008; Ramstad 2015; Bergstøl 2016). At Sumtangen on Hardangervidda, in southern Norway, it was calculated (based on minimum number of individuals [MNI]) that the extent of the hunt of reindeer could have yielded an annual average of 3.85 tons over a 50-year period, and 7.7 tons for 25 years (Indrelid & Hufthammer 2011). As mentioned earlier, it has been suggested that this mass hunting in the high-altitude zones in the Viking Age and early Middle Ages was so extensive that local communities and individual farmers could not have organized it themselves, and that the organization must have been the work of the king or the church (Mikkelsen 1994: 178; Indrelid & Hufthammer 2011), or of a local elite (Solli 2018a: 22; see also Hansen & Olsen 2004: 186). This is more unclear when it comes to hunting in the lowlands and in western Norway, where deer hunting must have been close to dominant. As our study indicates, the limited extent of hunting blinds from the lowland zone, and the fact that most of these blinds are located alone or in small clusters, suggest that the hunt was on a much smaller scale than that known from the alpine bioregion. Our investigations at Haraland and Gjesdal support this theory.

Nevertheless, the building and manning of clusters of hunting blinds must have demanded a certain degree of organization. The hunting blinds at Haraland and Bollestad were set in groups, and at Haraland there might have been a drive line, suggesting this was an organized hunt carried out by several people. On the other hand, it can be argued that an absence of drive lines could indicate that there were plenty of animals within reach of the hunting blinds, requiring less organization (Morrison 1981: 175). How many animals could have passed the site in one season, and what type of hunting was practised in the lowland-zone sites? Red deer follow, almost without exception, the same routes, even the same paths, each year, and at the same time. The population of red deer is larger today than in prehistory; today game cameras have documented that over 160 deer can pass through an area in two weeks. On some nights as many as 30 animals pass (Jegeravisen 2020). In 1889 only 150–200 red deer were reported hunted in Norway each year – however, that was after red deer had almost become extinct due to heavy exploitation and the increased numbers of predators in the eighteenth century (Lunden 2002: 263). This was likely the culmination of a lengthy process, starting at the end of the Iron Age (i.e., before AD 1000) (Rosvold et al. 2012). Before AD 1500, the numbers were, as has been mentioned, relatively high (Rosvold et al. 2012) and the hunt may have been relatively large-scale, dependent on the season. The three to four hunting blinds at each site in Gjesdal suggest that at least three to four people were needed to man them at each site. This suggests that this was done in cooperation by several people, perhaps by cooperating neighbours, probably including several families of men, women and children (e.g., Spiess 1979; Hockett et al. 2013).

A comparison may be made with another important resource and export industry from the Late Iron Age, namely iron. Iron production from southern Norway consisted of small-scale production sites, initiated and organized by skilled farmers (Loftsgarden 2021). The relatively low number of animals to be shared between many people suggests that the meat and other products from hunting activities in these lowland sites most likely were consumed and/or used by the hunters and their families on nearby farms, and that leftovers of meat, and surplus products, may have been bartered or traded in exchange for other goods at local and regional markets.

CONCLUSION

In this paper we have discussed two sites in Gjesdal, Rogaland County, in western Norway, with a total of seven hunting blinds used for red deer hunting. Two to three different construction phases of the hunting blinds at Bollestad could be discerned, meaning that the hunting blinds were modified over time. This indicates the importance of the hunt and points to transmission of cultural traditions and knowledge of animal

behaviour to new generations. The orientation of the blinds also varies, meaning that they were adapted to several animal routes or changes in the wandering patterns of the deer, further implying good knowledge of the animals' behaviour. The use of hunting blinds dates from the Neolithic up until the Mid Iron Age (c. 2000 BC to AD 300), but it is likely that the sites were also in use later in the Iron Age and Middle Ages. The site at Bollestad was actively in use by local hunters as late as in 2019, bearing witness to the long-lasting tradition in using such sites and the stability in the animal's behaviour and migration patterns. The long timespan suggests that the assets and resources acquired from red deer hunting were highly sought after in both prehistoric and historical periods, and highlights the importance of these hunting activities.

Hunting, trapping, and fishing were important economic activities in past societies, providing meat, fat, skins, hides, bone, and antlers for various purposes. The red deer was an important contributor in this context, providing food, and raw materials for tools and ornaments. The red deer was relatively abundant until 500 years ago, suggesting the potential for profitable hunting during seasonal periods. We have shown that the hunting in the lowland zones below 900 m.a.s.l. (Atlantic and boreal bioregion) was small-scale compared to the mass hunting of elk and reindeer known from the high-altitude zones and from eastern Norway. Nevertheless, the number of animals killed in the lowlands may have been large enough to provide a surplus production at certain times of the year, or surplus production in certain seasons. Hunting in the lowlands was likely done by hunters and their families on nearby farms, with surplus products sold and exported to local and regional markets.

Anthropogenic fires to improve pastures is an attested activity in the Neolithic and Bronze Age, at the time when traditional hunter-gatherer societies started to orientate towards agriculture and a more sedentary way of life. Dates from Bollestad from the Early Iron Age coincide with periods of greater use of outfield resources and scorching in western Norway, creating the historical heathlands used for winter fodder. Interpreting the spatial and temporal patterns, hunting thus seems to follow social trends in general and become more important in periods where settlement declined and the use of the outfield resources increased, creating surplus production for trade and barter. The spatial patterns at Bollestad could also indicate that the social changes in the landscape impacted the wandering routes of the deer, leading to structural changes and changes in the orientation of the hunting blinds.

Overall, the study highlights the importance of red deer hunting in the lowlands as a valuable resource in prehistoric and historic societies, both for subsistence and other usage. The findings suggest a complex relationship between hunting, settlement patterns, social trends, and the exploitation of natural resources in prehistoric western Norway.

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