Fishing with Stationary Wooden Structures in Stone Age Denmark: New Evidence from Sylthom Fjord, Southern Lolland

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APPENDIX S1: EXCAVATION MATERIALS FROM THE FEMERN PROJECT

Numerous publications have previously dealt with different aspects of the extensive and diverse findings of this huge developer-led excavation project, eg, organic residue analysis of pottery (Papakosta *et al*. 2019; Courel *et al*. 2020; Cubas *et al*. 2020; Robson *et al*. 2021; 2022; Lucquin *et al*. 2023; Philippsen 2023), identification of adhesives on artefacts (Koch *et al.* 2024), stable isotope analysis and radiocarbon dating (Philippsen 2018; 2023; Philippsen *et al*. 2019; Gron *et al*. 2024), landscape reconstruction (Mortensen *et al*. 2015; Jessen *et al*. 2018; Out *et al*. 2020; Glykou *et al*. 2021; Bennike & Jessen 2023; Bennike *et al*. 2023), as well as focusing on specific materials, find groups, and features (Sørensen 2016a; 2016b; 2020; Wadskjær 2018; Måge 2019; Jensen *et al*. 2019; 2020; Sørensen 2019; Wadskjær & Nederby 2020; Glykou *et al*. 2021; Stafseth & Groß 2023; Chaudesaigues-Clausen 2023), or the broader archaeological significance of the entire material (Sørensen 2016a; Jensen 2017; Groß & Rothstein 2023; Jensen & Sørensen 2023). However, the quantities of well-preserved and diverse materials recovered from the Femern project's excavations are such that their detailed study, analysis, and multi-disciplinary use will be possible in the long term.

A. Fieldwork at the Femern Belt construction site between 2012 and 2022

The project was the largest developer-led archaeological excavation of a prehistoric landscape in Denmark and beyond. The area affected by the construction of the future Femern tunnel was approximately 368 ha, more than half of which was in the former wetland area of the so-called Sylthom Fjord. Preliminary investigations included core drilling, auger drilling, and mechanical test trenching to identify the most potential areas for further investigation. In total, 25 sites were identified and excavated by Museum Lolland-Falster between 2012 and 2022 (Jensen 2017; Sørensen 2020; Måge *et al.* 2023). The study area, comprising five large site complexes (Fig. S1), was divided into 51 projects consisting of several sub-sites (see Måge *et al.* 2023 for more information).

Site Complex 1 was located on dryland and included sites dating from the Bronze Age to the pre-Roman Iron Age (MLF02811), Iron Age (MLF02928, MLF02929, MLF02930), Late Iron Age and Middle Ages (MLF02933), and Late Viking Age and Early Middle Ages (MLF01853, MLF02926). Five of the sites contained settlement features, including houses, wells, and various pit features. Two burials were also found at site MLF02929 (cf. Harvig *et al.* 2014).

Site Complex 2 on dryland consisted mainly of the large Iron Age settlement of Riksø I/Agersø (MLF01851, MLF02767, MLF02548) and a defence structure (MLF01078, MLF01249, MLF01343, MLF01509) together with a Middle Neolithic (Funnel Beaker) settlement site (MLF01852).

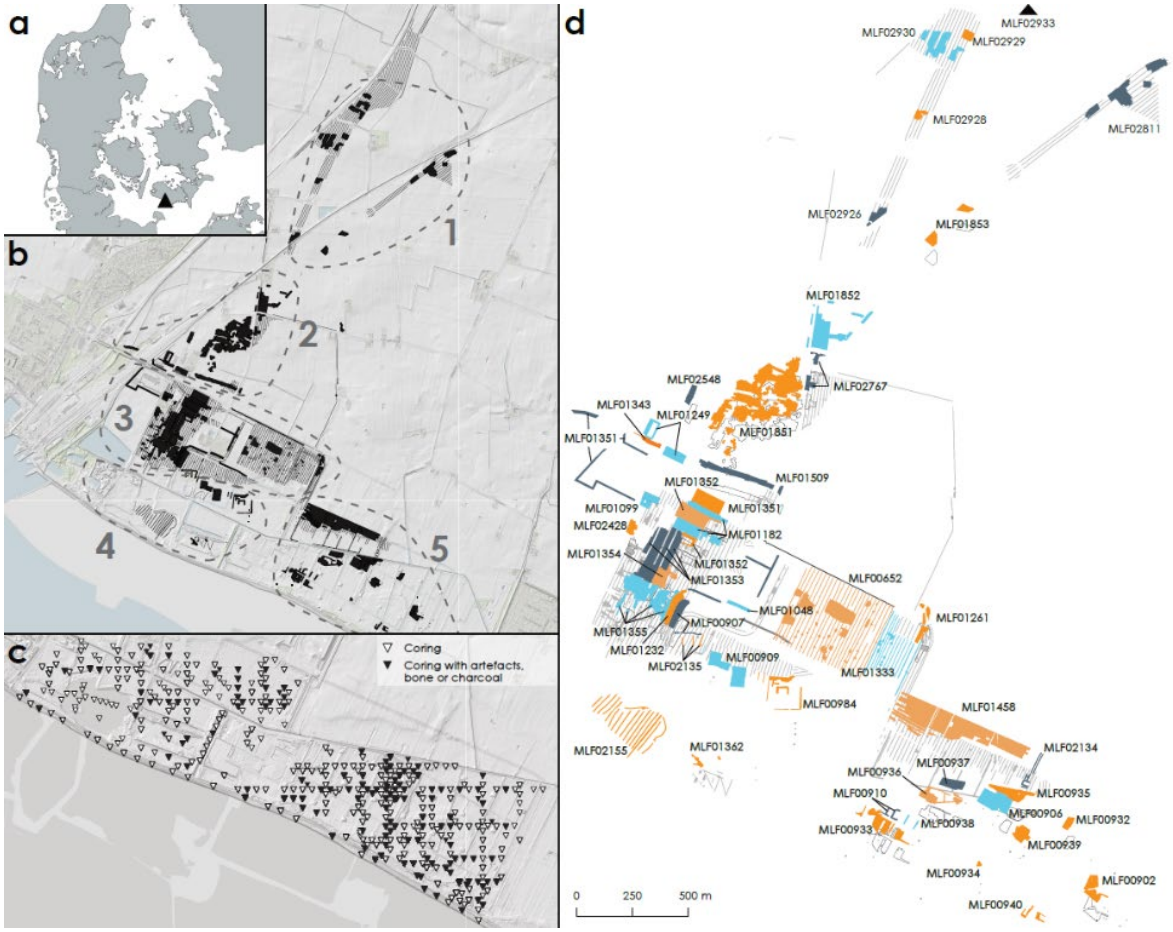

Fig. S1.
A. The location of the Femern project study area in southern Lolland; B. the site complexes (1–5); C. the extent of the geological coring programme; D. the location of the individual sites indicated by their museum ID numbers (© Museum Lolland-Falster)

Site Complex 3 contained the largest number of dryland archaeological sites in the entire study area, with finds and features dating from the Neolithic to the Bronze Age. Two destroyed Neolithic dolmens (MLF00652, MLF01099) and Neolithic and Bronze Age settlement structures were also recorded. Later activity in the area included a *c.* 1400 m long Late Iron Age/early medieval ditch feature (MLF00652, MLF01261, MLF01353, MLF01354, MLF02428) and a Second World War airfield (MLF01261).

Site Complex 4 in the western basin of the prehistoric Syltholm Fjord included a wetland zone in front of the dryland Site Complex 3. Here, a long chronological sequence of prehistoric human activities was identified with the majority dating from the Late Mesolithic to the Final Bronze Age. Due to the waterlogged conditions, the finds were rich in organic materials, including stationary fishing structures and other fishing equipment.

Site Complex 5 in both the dryland (MLF01458/MLF01507) and wetland parts of the eastern basin and its northern shore zone yielded abundant evidence of passive fishing practices with stationary structures. The wetland areas also contained evidence to suggest that certain artefacts had been deliberately deposited in shallow water for an extended period of time, *c.* 4700–3600 BC (Sørensen 2016a; 2020; 2023; Jensen &

Sørensen 2023). A few older sites were also uncovered, including a late Upper Palaeolithic Ahrensburgian site (MLF00902) and an Early Mesolithic Maglemose site (MLF00940; Måge 2019).

B. Field excavation, recovery and post-excavation methods and strategies

The fieldwork, particularly in the wetland parts of the study area with versatile and abundant organic remains, was carried out under challenging conditions, with groundwater occupying the research areas, trench profiles easily collapsing, and organic finds and intact structures requiring detailed documentation and careful handling. Therefore, the fieldwork procedures were carefully planned to allow for later in-depth studies and reconstruction. During the preliminary phase in 2014, excavators and test trenches lined with industrial metal caskets uncovered a number of wattle weir sections along with dozens of tapered wooden stakes and posts, and the actual excavation trenches were then positioned in their find positions. The shapes of the trenches usually followed the outlines of the identified structures, which were extended as new features and structures were encountered. The trenches were protected with tents to prevent the organic finds from drying out and decomposing due to wind and sunlight. Wooden planks were laid around the archaeological structures to allow excavation and documentation. For safety reasons, ditches were dug around the trenches to prevent loose topsoil from spilling into the documentation layers.

All trenches and archaeological finds, features, and structures were mapped in the field using GPS and a total station. Wooden stakes and posts were photographed, drawn to scale and mapped. Remains of wattle structures in profile sections were documented with orthophotography and processed into 3D models. Also, abundant wood remains, which would have been too laborious and time-consuming to record manually, were documented in 3D.

The terms in Table S1 were used during the fieldwork to describe the various structural elements of wood, defined according to their function in the weir structures and not based on the dimensions.

TABLE S1. TYPES OF WOODEN ELEMENTS AND THEIR DESCRIPTIONS USED IN THE FEMERN PROJECT'S EXCAVATION REPORTS

Type	*Description*	*Position*
Stake	A piece of worked wood, eg, bevelled or tapered	Vertical, oblique or horizontal
Upright	A stake in a wattle weir, around which rods are woven	Vertical, oblique or horizontal
Post	Thicker stake to support the weir structure	Vertical, oblique or horizontal
Rod	Woven into wattle	Horizontal or oblique
Bottom rod	Lowest rod in wattle, usually slightly thicker	Horizontal
Pin	A piece of wood adjacent to the wattle but not woven into it	Horizontal

However, at sites with no findings directly associated with preserved wattled weir structures, the stakes were divided according to their diameters: rods/pins < 20 mm, stakes 20–50 mm, and posts > 50 mm.

In conjunction with the most abundant fish weir excavations, a sampling strategy for archaeological wood was developed. All wood could not be recovered and conserved due to storage and budgetary constraints (in a developer-led scheme), so up to four samples were taken of all relevant materials: labelled as A, B, C, and Z within a single feature (P) (ie, A from the lower part of a rod/stake, B representing a sample for species identification, C from the uppermost rod, and Z from above sample A). Most of the vertical structures and their associated elements were recovered and lifted intact as blocks to save time in the field, and it was decided later how many would be conserved and/or used for scientific analyses. All horizontal wood was assessed in the field to determine which parts were of sufficient interest to be recovered intact or sampled. A selection of bulk and column soil samples were extracted for natural scientific analyses.

The observed structures and features, finds, and samples were numbered consecutively, and the digital recording data was converted to MapInfo using ArkDigi and further processed during the post-excavation phase. Structures, finds, drawings, and photo lists as well as report texts were entered into MUD (*Museernes Udgravningsdata*), where they are available for further analysis.

C. Stratigraphy

The former dryland moraine surface of the Femern project study area has been reconstructed by systematic geological coring (see Fig. S1c) (Mortensen *et al.* 2015; Bennike & Jessen 2023). The general rise in sea level is reflected in the stratigraphy as a time-transgressive till-peat-gyttja-sand sequence, starting in the deepest coastal part *c.* 7300 BC and continuing progressively inland. Two prehistoric water basins, first separated by a north-east–south-west oriented lowland peninsula and later merged to form a sheltered shallow-water lagoon with rich aquatic vegetation, have shaped the environmental setting of the study area. The lowest level in the eastern basin was –3.94 m (below the present mean sea level) and in the western basin –3.23 m, while the highest level on the peninsula reached –0.32 m at the surface. Based on the cores, the moraine relief appeared relatively uneven, with variations of up to 0.5 m within a few metres.

The transgression gradually changed the area from dryland woodland to coastal wetland and finally to a shallow, sheltered lagoonal landscape, with successive processes beginning at the lowest parts of the terrain and gradually extending to higher elevations. The two basins were dryland until *c.* 5000 BC (Mortensen *et al.* 2015; Bennike & Jessen 2023), after which the clayey till was gradually covered by brown silty marine clay up to 30 cm thick. The moraine was well-marked along the former shoreline in the western basin and indistinct in the deepest horizons under the peat. It contained several tree stumps (mainly *Quercus* sp. radiocarbon dated to *c.* 5200–3700 cal BC), suggesting a dryland wooded landscape prior to inundation (Bennike & Jessen 2023).

As the transgression progressed, the water table rose, and peat growth gradually extended into the earlier dryland at a rate determined by the local topography of the moraine surface. The inundation resulted in the accumulation of extensive reed vegetation, followed by peat growth and variable accumulation of silts. The marine deposits consisted of clay gyttja, and the transition from reed to gyttja appeared gradual and linked to local sea level rise. As gyttja accumulates in relatively calm waters (eg, Bennike & Jessen 2023), the coast was protected by sand formations and barrier islands. During the excavations most of the organic archaeological remains were found at the boundary between the peat and clay gyttja.

The clay gyttja was heterogeneous throughout the study area and the ratio between minerogenic and organic matter, as well as the shell content, varied over time and space, depending on water depth, current conditions, wind exposure, salinity, and freshwater supply, among other variables. In some areas, the lower parts of gyttja were shell-rich while, in others, only relatively thin layers of shells were found (Bennike & Jessen 2023). Such variations are associated with local sedimentation conditions and erosion. The two lagoons were connected when the transgression reached a level of *c.* –2 m, a process beginning after *c.* 4400 cal BC. Pollen studies indicate the dominance of deciduous trees (eg, alder, oak, hazel, and lime) during this time.

Layers of coarse sand, fine gravel, and shells (both crushed and intact) were observed in many of the profiles, suggesting storm events and indicating that the protective sand formations had been breached or over-washed by water masses (Mortensen *et al.* 2015; Bennike & Jessen 2023). The clay gyttja deposits were overlain by sand with an erosive boundary between them, suggesting that previously existing clay gyttja deposits had been eroded. In the deeper parts of the two basins, up to 3.5 m of sand was recorded on top of the clay gyttja. Some of the sandy deposits, particularly in the eastern part of the eastern basin, may have involved infilled channels.

In the excavated areas close to the AD 1872 shoreline, layers of gravel with varying sand content were also recorded, probably representing younger beach formations. In certain areas, a very coarse layer of gravel was also recorded, indicating a single severe storm event. Interestingly, this layer was rich in archaeological finds – particularly flint – and largely devoid of organic remains, suggesting that the materials had been washed out and redeposited from dryland settlement and activity areas.

D. List of excavations on sites with evidence of stationary wooden fishing structures

Table S2. lists the excavations of the Femern project that have yielded evidence of stationary wooden fishing structures that are included in this study.

TABLE S2. EXCAVATION SITE NAMES, MUSEUM LOLLAND FALSTER'S OFFICIAL SITE IDS, REPORT DETAILS, AND INFORMATION ABOUT THE WOODEN REMAINS FOUND

Name	*Site IDs*	*Trap*	*Wattle*	*Stakes*	*Report*	*Author*
Femern Bælt	MLF00001-VII & VIII	x		x	yes (phase 1)	B. Måge & A.M. Struer
Femern Bælt I	MLF01362		x	x	yes	P.K. Lindholt
Strandholm I	MLF00909-I and II		x	x	yes	T. Stafseth & L. Olesen
Strandholm II	MLF00984			x	yes	T.Z.T. Jensen
Strandholm Sø	MLF02155			x	no	–
Syltholm I	MLF00902-I & II			x	yes	E.M. Madsen & L.G.C. Andersen
Syltholm II	MLF00906-I, II, & III	x	x	x	yes	S.A. Sørensen
Syltholm V	MLF00910	x		x	yes	S.F. Mogensen
Syltholm VII	MLF00933-I, II, & III		x	x	yes (not III)	P.C.M. Deichmann, T. Stafseth & pers. comm. B. Måge
Syltholm VIII	MLF00934-I			x	yes	A.M. Struer
Syltholm IX	MLF00935-I & II			x	yes (not I)	B. Westen & A. Rosendahl
Syltholm X	MLF00936-I	x		x	yes	S. Jensen
Syltholm XI	MLF00937-I			x	yes	A.J. Nielsen
Syltholm XII	MLF00938			x	yes	P.C.M. Deichmann
Syltholm XIII	MLF00939-I & II	x		x	yes	S. Jensen

E. Description of wooden remains at individual sites

Femern Bælt (MLF00001-VII and VIII): This larger area was pre-investigated (Phase 1) in 2012 to provide a basis for the whole archaeological fieldwork project. A total of 187 ha at Syltholm and Strandholm, east of Rødbyhavn, where production facilities and the tunnel portal are to be built was investigated. A new auger drilling (7 cm diameter) method in a 50 m grid was developed to enable work in this vast waterlogged area to reconstruct the prehistoric landscape and locate traces of human activity. Altogether 994 cores were taken, only 236 contained evidence of prehistoric human activity. Areas close to the prehistoric coastline were selected for further investigation, stratigraphically covering the whole area and providing more material for landscape reconstruction.

A preliminary study of this area of *c.* 13 ha in the reclaimed Rødby Fjord was then carried out and the results suggested that the western part was largely devoid of finds and heavily disturbed by modern land use. The eastern part was a wetland with thick gyttja and peat deposits, where scattered traces of prehistoric human activities were found, including numerous wooden stakes, most *in situ*, set obliquely or vertically into the blue clay, and worked flint. The 2–3 cm thick stakes were tapered with one or more cuts (pencil-shaped), with no further processing and most with bark. Some of the stakes formed rows and other arrangements at the edges of wetland areas and it was suggested that they represent parts of larger structures, such as fish weirs.

Femern Bælt I (MLF01362): This excavation (total area not described in the report) was carried out on the western of the two prehistoric lagoons, where the subsoil consisted of grey-blue moraines covered by a layer of brownish silty clay and grey-brown clay gyttja. Three wooden fishing structures were revealed and recorded: K1 consisting of two leaders (K1a & K1b), set at a 45° angle, made of 94 uprights, numerous woven rods, and 24 supporting posts (Fig. S2). K1a was *c.* 63 m long and K1b *c.* 33 m long, oriented north-west–south-east and east–west. Constructed of several wattle panels joined together. K2 was a horizontal, probably drifted wattle panel section located *c.* 80 m north-east of K1. It consisted of eight uprights and *c.* 30 woven rods, forming a 6.60 m long, 0.84 m wide structure, oriented from north-west to south-east. Several

Fig. S2.
Excavation of wattle weir K1 underway at MLF01362 (© Museum Lolland-Falster)

uprights were missing from the centre and north-west part of the panel, where the wattle was also very fragmented. K3 was found *c*. 2 m north-east of K1a, and the excavator destroyed 30–50 cm of its western end, but the wattle panel was already badly degraded. Due to preservation, its original design and length could not be fully reconstructed, but it may have consisted of two whole and three fragmented uprights with 23 woven rods, measuring approximately 3.2 × 1 m, oriented from north-east to south-west. In addition to the fishing structures, a few pieces of flint and several animal bones were also recovered.

Strandholm I (MLF00909-I and II)

The excavation at MLF00909-I covered an area of 3500 m² in an enclosed lagoon area. In the Neolithic, it was close to the coast and connected to the preserved part of the reed marsh that bordered the sheltered basin. A high concentration of pottery was found in close association with a stone structure interpreted as stepping stones in the shallow water area. Many of the finds were interpreted as having been intentionally deposited in shallow water. A total of 54 vertical/oblique stakes and posts (mostly of hazel) were also found, some in row-like patterns, with radiocarbon dates spanning long periods. Human activities were undertaken here for a long time, most intensively during the Middle Neolithic, *c.* 3300–2600 cal BC. The site has been interpreted as demonstrating Neolithic depositional (ritual) practices in shallow water in front of the settlement zone (Sørensen 2020; 2023).

MLF00909-II covered a huge area of 6700 m² and was located on the coast in the western of two prehistoric basins. In its northern part, in a layer of sand and gravel, a *c*. 20 m wide belt of stones of varying

Fig. S3.
Excavation of the wattle panel section K1 at MLF00909-II (© Museum Lolland-Falster)

sizes, suggesting a washed-out prehistoric beach zone, was revealed. The archaeological evidence was largely found in the gravel and sand surrounding the stone belt and to the north of it. There were also a few scattered finds in the sand and silt to the south of the stone belt.

Two horizontally lying wattle panel sections (K1 & K2), several dozen obliquely and vertically set wooden stakes, and other finds (eg, worked flint, bone, pottery, and wooden artefacts) were found. The preserved wattle section K1 was *c.* 20 m long and *c.* 80 cm high. It had the shape of an arch or letter U (Fig. S3), the opening facing roughly perpendicular to the water basin. Two uniform, sturdy, and deeply deposited stakes (X1797 & X1809) were interpreted as supporting posts and the section consisted of long, slender, uniform rods that were woven tightly between the uprights with tight spacing. Uprights were only slightly thicker than the rods in wattle, and both had bark. The uprights were set at 20–30 cm intervals, but the nearer towards the arch, far fewer uprights were preserved. The ends of the sections were similarly disturbed, not revealing how they had been completed. Apparently, the whole section had been woven continually rather than being joined from several panels. Immediately below K1, in the apex of the arch, two parallel oblong pieces of wood were found.

K2 was a highly fragmented wattle panel lying horizontally in a layer of sand and shells further to the north. From west to east, the section measured *c.* 16 m. The wattle was not preserved in its entire width, but preserved parts were made of thin uprights and tightly woven, almost equally thin, rods. The resemblance to K1 was striking, although K2, if possible, seemed even more fine in construction. None of the ends was intact, and it remained unclear how they had been completed. It might have been composed of separate sections but, like K1, this was not suggested during the excavations. Despite poor preservation, the two sections probably formed parts of the same structure. However, radiocarbon dates indicate that K1 was slightly older than K2. It was clear that K2 was no longer in its original location but may have floated to this spot from the north-east.

In addition to weir structures, flint, pottery, and bone were found along with tapered, obliquely or vertically deposited stakes, most made of hazel. A total of five rods, 44 stakes, and four posts were recorded. There were no observable concentrations in their locations but, rather, they appeared to be located on the edges of deeper areas. Radiocarbon dates suggest that vertical wood was deposited over a long period – both before and after the construction of two wattle structures – at least from 4230 BC to 1 BC/AD, suggesting the use of the fishing structures before and after the preserved wattle weirs.

Strandholm II (MLF00984)

MLF00984 was one of three sites excavated south of Strandholmgård, totalling 4825 m^2. The area consisted of three larger trenches and four exploratory trenches to the west and south. Very few finds were uncovered, and based on stratigraphy, sea level, and finds from the surrounding sites, the material dates mainly to the Neolithic (3900–1800 BC). A total of 56 vertical/oblique stakes were also recovered, which showed a variety of woodworking techniques and raw materials. In addition, 25 forked stakes were found in the rows of 'ordinary' stakes; ten set vertically into the seabed, 11 obliquely, and the remainder positioned horizontally in isolation. A number of wooden artefacts were also found, such as a fragmented paddle blade and a preform of a shaft, in addition to flint, animal bones, and bone points.

Strandholm Sø (MLF02155)

No reports are available from this preliminary survey and trial excavation, which involved long, mechanically dug, search trenches across an extensive area around the reclaimed Strandholm Sø. Based on fieldwork notes and documentation, 100 wooden vertical/oblique stakes, rods, and posts were encountered in the mechanically opened areas. Ten have been radiocarbon dated to *c.* 4310–3100 BC, ranging from the Late Mesolithic to Middle Neolithic.

Syltholm I (MLF00902-I & II)

The wetland excavations at MLF00902-I covered an area of *c.* 2000 m^2. The southern part consisted of an ancient beach zone, while the north included prehistoric near-shore areas. The excavation covered a small part of a larger activity area that spanned the whole peninsula, running from north-east to south-west, and into the fjord. In the south-west, a Late Mesolithic (Ertebølle) hearth was found and, in the south-east, a washed-out layer of gravelly sand was observed containing flint deposits dating from the Late Palaeolithic (Ahrensburgian) to the Late Neolithic, *c.* 10,000–1800 BC. Bones and pottery were also found in the gravel layer, and in the deeper areas to the north, 12 vertical and oblique wooden stakes together with wooden leister fragments from the Neolithic were found.

The wooden finds consisted of both natural pieces and worked stakes, as well as individual tools. The slender, tapered hazel stakes (n = 12) had tips shaped either with one or two cuts, or pencil-shaped. Both isolated horizontal and vertical/oblique stakes were found, interpreted as preserved parts of fishing structures. Six were found in a cluster and were thought to be part of a single structure. Four have radiocarbon dates ranging from the Early to the Middle Neolithic, although the stakes were found at different depths, suggesting they were placed at different water depths.

Excavations at MLF00902-II covered 3755 m^2 to the west and south of MLF00902-I at the innermost part of a north-west facing inlet with a beach zone and low plateau to the west and a shallow channel in between. In the northern part of a shallow basin with areas of drift gyttja, a few horizontal and vertical/oblique hazel stakes were found driven into the seabed. The basin continued in a channel to the south, and on the western side was a low plateau with settlement activity features such as post-holes, pits, and a cooking pit.

Fig. 4.
The isolated wattle panel from MLF00906-I (© Museum Lolland-Falster)

Syltholm II (MLF00906-I, II, & III)

At MLF00906-I, the excavation of *c.* 5200 m² revealed a rich assemblage of Neolithic finds, mainly deposited in shallow water conditions, together with a few dryland features (from the Late Mesolithic). In the northern part of the trench, a fragmentary, horizontally lying, wattle panel section was found embedded in sand and gravel (Fig. S4). It appeared washed-out and redeposited, forming only a small part of the initial wooden structure. It was composed of 19 uprights (*c.* 2 cm in diameter) and woven rods (*c.* 1 cm in diameter) up to a height of *c.* 100 cm, resulting in a fragile wattled section. However, it was dense and carefully made, with no twists, side shoots, or other irregularities. In the best-preserved section, 44 rods were woven along the entire length of the wattle panel. Due to degradation, it was not possible to follow the weaving technique over longer sections but, in some places, the rods appeared in simple under-over weave, while in other places the rods crossed several uprights. The uprights were spaced 25–30 cm apart with an average thickness of 1.84 cm, making them rather slender. Two radiocarbon dates from the wattle span *c.* 2570–2310 BC.

A total of 242 vertical/oblique tapered stakes were also found, most made of hazel. Their function remained unknown, but they were interpreted as being associated with ritual activities. Many of the site's vertically deposited wooden artefacts (axe shafts, spears, paddles, and a bow) and associated materials, as well as the vertical stakes, have been interpreted as remains of such activities (Sørensen 2016a; 2020; 2023; Jensen & Sørensen 2023).

At MLF00906-II, the excavation covered an area of *c.* 5000 m² of which 22% was finalised. Several hundred stakes were also recorded. The majority were found in oblique or vertical angles in the seabed and spanned the whole excavated area, making them a significant group of finds. Their function remains uncertain. Although most occurred in clusters or other formations, their radiocarbon dates suggest that vertical wood was deposited in the area over long periods, with most dates spanning *c.* 4200–3400 BC. They were therefore not interpreted as partially preserved fishing structures. Other finds included chewed birch bark tar, flints, lithic tools, bone and antler, pottery, animal bones, and wooden artefacts, containing a perforated mouth frame of a fish trap and a few small rods bound together with tree bast binding. Tapered stakes and posts had been shaped with a varying number of cut marks, most with bark, and a small group had traces of charring on their surfaces.

MLF00906-III was located near MLF00906-I-II and MLF00935-I and is regarded as part of a larger site complex. It was pottery-rich (Ertebølle and Funnel Beaker wares), accompanied by smaller amounts of lithic tools, bone, amber, antler, wooden artefacts (eg, leister prongs, paddles, spears, fragments of dugout canoes) together with fish trap remains and vertical stakes. Two fragments probably from the same trap were recovered along with 328 vertical/oblique stakes and posts. Since the stakes did not appear to have been systematically arranged, they were not interpreted as the remains of fishing structures. However, some were

associated with a number of vertically placed wooden artefacts and were interpreted as part of the depositional practices suggested at this (and several other) sites in the Femern project.

Syltholm V (MLF00910)

At this site, an area of 2670 m² was opened, of which *c.* 900 m² were finalised. Three concentrations of vertical stakes, a single spear, and some undefined wooden objects were encountered. Two flint deposits were also found, presumably dumped in shallow water. The radiocarbon and typological dating suggests that there was an extensive period of human activity, with a demarcated peak *c.* 3950–3300 BC. During the Early Neolithic, the site was located on the eastern side of an ancient peninsula that ran into the fjord from the north. In addition to flint and bones, the excavations also yielded wooden artefacts, including a perforated wooden mouth frame of a semi-circular fish trap. A total of 31 tapered stakes, four rods, and two posts were also recovered, the majority of which were set vertically into the seabed in three distinct concentrations, *c.* 2–3 m apart. These, together with some horizontal wooden remains, suggest the partial preservation of stationary wooden fishing structures at the site.

Syltholm VII (MLF00933-I, II, & III)

Site MLF00933-I consisted of an approximately 1663 m² mechanically opened trench. The trench was primarily located in the wetland areas of the site and dated to the Mesolithic. The waterlogged area yielded finds of worked wood, including dozens of horizontal, vertical, and oblique tapered stakes, tree stumps, a Late Mesolithic hearth feature, concentrations of flint, and smaller quantities of animal and fish bones. A total of 17 stakes from the area were radiocarbon dated, ranging from the Late Mesolithic to the Neolithic, *c.* 4340–2930 BC.

At the neighbouring sub-site, MLF00933-II, abundant evidence of fishing activities with stationary wooden structures was obtained. Its remains are highlighted and analysed in detail in the main text of this article.

In the western half of this area, the sub-surface topography (Fig. S5) was dominated by two higher elevations *c.* 1–1.5 m above the deeper central area. In the deeper part, between the two ridges, there was a belt of stones representing a partially washed-out shore formation. The excavations revealed three phases of V-shaped weir structures (K1–K2–K3) located in the slightly shallower part of the trench (Figs S5 & S7). Two 'leaders' were oriented towards the opening in the headland, with ends pointing towards the former coastline. The structures were found lying almost directly on top of each other. Based on their stratigraphy, structural relationships, and radiocarbon dates, they could be divided into three phases: K1 (the oldest), K2, and K3 (the youngest).

K1 was the best-preserved structure embedded in the deepest layer. The uncovered parts consisted of supporting stakes and three wattle panel sections forming together one 15 m long 'leader' structure (A4–A40–A46), and four more panels forming another 12 m long 'leader' (A7–A8–A48–A121). Longer sections were found still standing almost vertically (though compressed) in the ancient seabed, while most parts had collapsed and lay horizontally in the trench. The weir was supported by a few sturdier posts set in an irregular spacing, with diameters varying between 2.7 cm and 5.6 cm and made of hazel (*Corylus avellana*), ash (*Fraxinus* sp.), and oak (*Quercus* sp.). The longest post measured 1.6 m in length and was struck 1 m deep into the seabed.

The angle between the two 'leaders' was set at *c.* 45°, and their apex was pointing towards a shallow depression (measuring 0.75 m across and 0.25 m deep) in the seabed, which may have contained the trap. At the edge of the depression in connection with the first wattle panels, a plank of split wood was recorded standing almost vertically in the seabed. It appeared to have been supported by a small post at its foot. The woven panel rods met up within this plank, forming a fan-shaped feature. Another plank was found lying at the beginning of the leader, set at a traverse angle towards the woven rods.

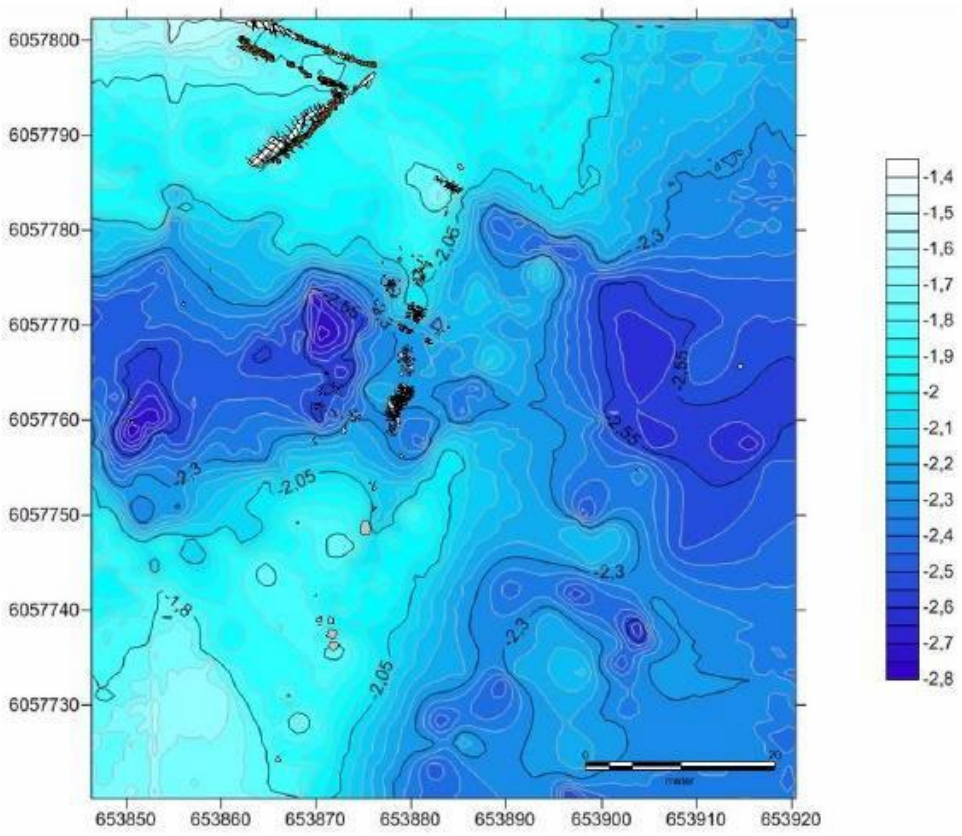

Fig. 5.
The preserved weir structures are shown at the top left corner of the excavation trench at MLF00933-II and the water level is approximately 0.5 m below today's sea level (© Museum Lolland-Falster)

Altogether seven wattle panels were registered in K1. They were not set in a continuous line but were placed in an overlapping system, each panel extending approximately 1 m above the previous panel. The lengths of individual panels varied between 4.5 m and 6.0 m, and the uprights were spaced 45–55 cm apart. Their diameters varied between 2.0 cm and 5.5 cm and most were made of ash (*Fraxinus* sp.), while hazel (*Corylus avellana*) and lime (*Tilia* sp.) dominated in the wattle rods. Four structure types (A–D) could be distinguished (Fig. S6).

Type A could be distinguished in panels A4 and A8, with a slight variation in the thickness of the rods. Most were long and slender with few irregular branches/twigs. Panels A7, A40, A46, and A121 were of Type B. The wattling was tighter and included horizontally forked, locking rods at the panel ends and a mixture of thicker and thinner rods. Some rods had branches and twigs at the top end, which were braided back into the wattle around the last upright. The weaving technique and the direction of the rods could be distinguished in the best-preserved panels, which represented simple over-under weave, but occasionally a rod could overlap two uprights. The thick ends of the rods pointed towards the end of the panel and the thinner ends either overlapped in the middle or ran the full length of the panel. In summary, the individual panels in K1 showed some variation in the manufacturing techniques used.

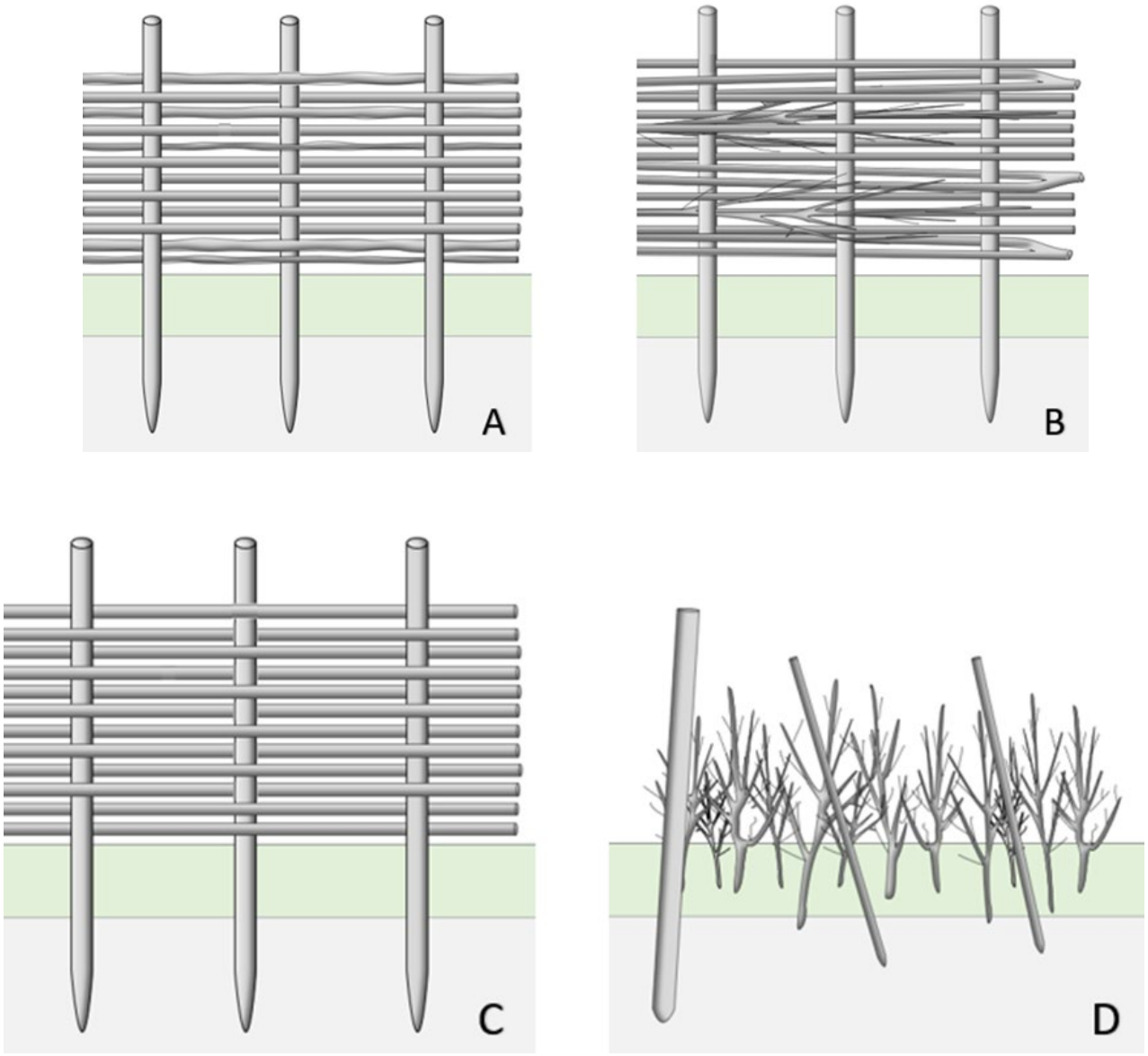

Fig. S6.
The four structure types (A–D) in K1–K3 at MLF00933-II (© Museum Lolland-Falster)

K2 was identified as the subsequent construction phase that preceded K3. It was not well-preserved and its relationship to the other phases remained uncertain. The construction included wattle panels (A9, A12, and A47) and a cluster of solid stakes and split wood placed at the apex (A137–A49). In contrast to K1, its full extent remained unclear due to poor preservation. However, one of the leaders seemed to have been moved a couple of metres to the south where a new apex was placed on top of a 'leader' belonging to K1. Some of the uprights of panel A9 were still standing vertically in clay, penetrating through the panels from the older weir structure (K1). It measured 7.5 m in length and consisted of 15 rods and eight uprights, spaced at 60–65 cm intervals. In general, the panel was woven with long, regular and smooth rods with simple under-over weave. The wattle techniques indicate a pattern where the rods in the lower half were woven with the thick end towards the south end, and in the upper half, the thicker ends pointed towards the north end.

Fig. S7.
The complex of weir elements (K1–K3) during the excavation of MLF00933-II (© Museum Lolland-Falster)

K3 was identified as the youngest phase of weir construction during excavations. The uncovered part consisted of two stretched clusters of uprights integrating 121 stakes, branches, and twigs of varying shapes and sizes forming a north-west running (A52–A138–A139) and a south-west running (A129) 'leader' in a V-formation. The apex consisted of split horizontal wood and vertical posts. The uprights were of hazel (*Corylus avellana*), while a post and slightly oblique uprights in the apex were oak (*Quercus* sp.). The 'leaders' (60 m and 65 m long) consisted of two stretched-out clusters of upright wood, made of branches and twigs of varying shapes and dimensions (Type D). The degree of preservation was poor, and there were gaps in several of the structural elements.

A total of 59 isolated vertical or oblique stakes (2.0–5.5 cm in diameter) – without a clear connection to the V-shaped weir structure – were also registered at the site. Similar finds were encountered at most of the sites with marine sediments on the Femern project. Their function remained uncertain, but they were identified as stationary fishing structures from other periods than the preserved wattle weirs at the site. The site's fish weirs were embedded in thick layers of marine sediments, with laminations and layering in between, suggesting changes in sedimentation conditions over time. Detailed stratigraphic analysis of profile sections also revealed light impressions, interpreted as leister imprints in the seabed (A140), as well as human footprints in the gyttja layer along the V-shaped weir (A141).

MLF00933-III, located approximately 25 m to the west of the above site, was excavated later (in 2019) and its results are not yet available. However, it served as an extension to the trenches with V-shaped wooden structures, whose landward connection (if any) and variations in form remained undetermined. A vertical section of a similar structure facing south-west–north-east was uncovered. The K1 'leader' probably extended across the 25 m interval between the sub-sites, and the new structure was interpreted as another 'leader' facing in the opposite direction, together forming a Z-shaped weir (see details in the main text of this

article). In addition, dozens of vertical/oblique and horizontal stakes and posts and at least five isolated wattle panel sections were uncovered in different parts of the new trench. The northernmost of these probably formed an isolated V-shaped structure, 8–10 m from the Z-shaped structure.

Sylthom VIII (MLF00934-I)

At this site, approximately 400 m² of the initial 1200 m² machine-opened area were fully excavated. Very few finds were made, but in the north-west part of the trench two tapered (pencil-shaped) hazel stakes and a worked rod were found, driven through gyttja and peat into the moraine base, and dated to *c.* 3400–3200 BC. A concentration of flint was also found to the south-east, suggesting a single short-lived activity during earlier dryland conditions in the area.

Sylthom IX (MLF00935-I & II)

At MLF00935-I (not yet reported) pottery, lithic tools, and their debris, a total of 62 vertical/oblique stakes, 49 stake impressions, and four wooden axe shafts were found in the blue clay. The stakes formed a V-shaped cluster: a *c.* 25 m long series, oriented south-west–north-east (towards the former coastline), and an 18 m long series, oriented west–east (parallel to the coastline), which met in the west by a 2.5 m wide opening. A number of other rows and semi-circular features were also observed in the clusters of stakes and their imprints, concentrated mainly in the southern part of the trench at the boundary with MLF00935-II.

At MLF00935-II (the extent of the excavated area is not given in the report) stone packings and a Late Mesolithic hearth feature with associated finds (flint, lithic tools, pottery, and bone), mainly from the Early Neolithic but also some from the Bronze Age, were found, together with five vertical tapered wooden posts (close to the stone packings), four of which appeared in a slightly curved row formation. During the Neolithic, the site was waterlogged, part of a shallow lagoon that extended into the area. Further east of the trench was another area of several vertical or oblique wooden posts/stakes, a few in pairs, most isolated, some in clusters, probably from the same structures.

Interestingly, one of the isolated stakes (X13) had the remains of a woven horizontal rod (and four fragments), presumably from wattle, which was found together with pieces of a fragmentary paddle dating to the Middle Neolithic (3030–2910 BC), a tapered stake, a possible wooden shaft, and a forked stake. All of these lay horizontally on top of each other. More vertical stakes/posts were found to the west, which seemed to follow the contours of the seabed, forming two semi-circles, one outer and one inner. Concentrations of bone, pottery, and flint were found, as well as a few wooden artefacts (eg, spear-shaped stakes) in close proximity to the rows of stakes. A possible wooden mouth frame of a semi-circular fish trap was also found lying vertically on the seabed, probably indicating its re-use in wooden structures.

Sylthom X (MLF00936-I)

A total area of 5175 m² was excavated on the ancient seabed, yielding individual features as well as numerous finds of flint, pottery, bone, and wood. The features, including a hearth, dated to the Late Mesolithic (early/middle Ertebølle), while the majority of the finds were Early Neolithic. The artefacts were concentrated in two 'find belts' running from the higher to the lower areas. The finds included stone axes, pottery, bone points, fragments of wooden leisters, shafts, spears, and vertical/oblique wooden stakes. A woven fragment of a fish trap was also found, dated to the Ertebølle/Early Neolithic transition (woven from red dogwood withies). The wooden artefacts and structures consisted of stakes, fish trap fragments, shafts, spears, leister prongs, and bone points. The traps and leisters suggest fishing practices, while other materials have been interpreted as intentional depositions in shallow water.

The wooden finds included 194 rods/stakes/posts; most set vertically/obliquely on the seabed. In addition, 28 horizontal stakes and posts were also recorded. The vertical wooden remains were densest within the belts of other find materials. Some of the auger drillings from the preliminary survey also contained wooden stakes, clustered in the same areas where stakes were found later during excavation. Some differences in their distribution could be distinguished: rods were found almost exclusively within the

western find belt, while stakes were distributed over larger parts of the study area. Vertical posts were found outside the find belts but were concentrated at the highest elevations of the trench.

The woven fish trap fragment from this site is described in the main text of this article.

Syltholm XI (MLF00937-I)

An area of *c.* 3790 m² was mechanically excavated at this site. Worked flint and half a dozen wooden stakes were found, nine driven vertically into the seabed. The lowest layer also contained two isolated horizontal stakes. Some of the vertical stakes formed clusters in the near-shore areas and the isolated ones were interpreted as anchoring posts for fishing gear, such as traps. The larger group of vertical stakes found in the westernmost part of the trench were interpreted as belonging to the same structure, perhaps a weir. The stakes were dated to the late Early and early Middle Neolithic, *c.* 3500–2900 BC.

Syltholm XII (MLF00938)

The excavation covered an area of *c.* 500 m² in the south-west part of the study area. The most numerous finds were horizontal, oblique, and vertical tapered stakes: 47 in total, most still standing vertically in the ancient seabed. In addition, 17 horizontal stakes were found, probably moved from their original location. The majority were made of hazel, with smaller quantities of ash, birch, and deciduous wood being present. Woodworking varied slightly; there were both cracked specimens and tapered points with one or more cut marks. In the western trench, the stakes appeared rather scattered, with a few driven very deeply (up to 1 m) into the seabed. As the trench was narrow, it was not possible to observe any major systems or structures in their distribution. However, similar isolated and deeply embedded stakes were also found in the neighbouring site of MLF00933-I to the south. They were interpreted as elements of larger fishing structures that have only been partially preserved.

To the east, a larger concentration of vertical/oblique stakes was also uncovered, consisting of an almost north–south aligned row, designated as K1. As the trench was narrow, the full extent of this structure was not revealed. Three were made of hazel and one of ash, and their radiocarbon dates overlapped (*c.* 4040–3715 BC), suggesting they may have formed an individual structure interpreted as the remains of a fishing structure from the Early Neolithic. Observations made on other Femern project sites with better-preserved weirs, such as MLF00939, demonstrates that weirs do not necessarily have to be regular straight rows but can form irregular, curved, C- and U-shaped formations, or just small clusters of rods.

Another row of stakes (K2) crossed the central part of Trench 1 from east to west. The structure was not fully uncovered in the narrow trench, so its extent remains unknown. One of the stakes was made of ash and dated to the Late Mesolithic (*c.* 4230–3980 BC). K3 consisted of 13 horizontal and vertical stakes and pieces of wood, which appeared to belong to an individual structure, probably a weir. As it was also partially uncovered, its whole extent and further characteristics remained unknown. The dates indicate that it was contemporary with K2. The structure was clearly associated with a similar collection of horizontal stakes revealed during the test pitting with metal caskets of the pre-survey area immediately south of K3 (MLF00001-VIII, Casket 15). The excavations thus showed that the area was used for fishing from the Late Mesolithic, continuing into the Early and Middle Neolithic.

Syltholm XIII (MLF00939-I & -II)

At MLF00939-I, an area of 2583 m² on the ancient seabed was excavated, yielding numerous finds of flint, pottery, bone, and wood from the Late Mesolithic and the earliest Neolithic, including two Funnel Beaker vessels, bone points, wooden leister fragments, shafts, spears, and a bow from the Middle Neolithic. The site also included numerous vertical/oblique wooden stakes clustered in defined areas, but without forming recognisable structures. Based on the radiocarbon dates, the site was used between 4500–2600 BC, with a peak in human activities *c.* 4350–3700 BC. Wooden finds totalled 881, incorporating shafts, spears, a bow, leister prongs, forked sticks, tapered stakes/rods, possible net floats, and various indeterminate pieces.

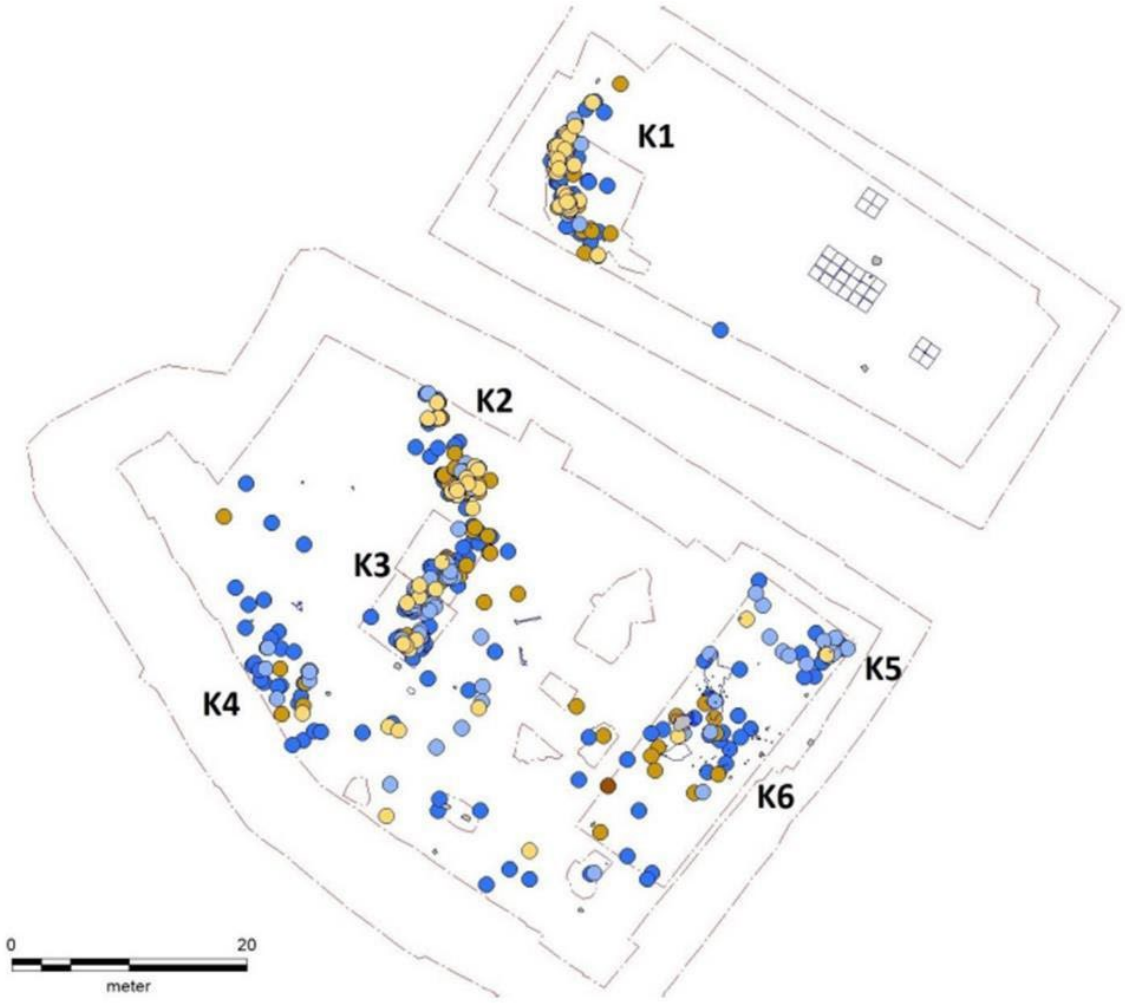

Fig. S8.
Concentrations (K1-K6) of vertical (yellow) and oblique (blue) wooden rods, stakes, and posts on the trenches at MLF00939-I (© Museum Lolland-Falster)

Four fragmented, debarked, Y-shaped/forked sticks were found, made of hazel, the longest measuring 119.8 cm, but none of the specimens was preserved in their entirety. Better-preserved specimens from other Femern project sites have been tapered at the end. Altogether 430 vertical/oblique stakes, rods, and posts were also recorded in addition to some horizontal wood. Their lengths varied between 2 m and a few centimetres. Most retained their bark and were made of hazel. They were spread across the whole trench but there were a few denser clusters where they appeared in curved row formations. The distribution in the upper level of blue clay followed the contours of the underwater topography. The same applied to their distribution in the upper level of drift gyttja. The distribution of stakes thus clearly followed the edges of natural depressions.

The stakes were classified into six concentrations (Fig. S8), each containing 30–110 vertical/oblique stakes and/or rods. Outside the concentrations, there were also dozens of scattered stakes which were radiocarbon dated to *c.* 4350–3353 BC. They were also interpreted as the remains of fishing structures.

K1 was a concentration of about 80 stakes within an area of 13 × 5 metres, forming a regular 7.8 m long curved row that followed an underwater ridge. Many were set on the edge of a depression and the

other artefacts in the area followed the extent of the stake belt. Radiocarbon dates from stakes within this cluster ranged from *c.* 4350–2600 BC.

K2 was a concentration of *c.* 90 stakes within an area of 10 × 4 m, forming a 7.4 m long straight row. In the unexcavated area between the two trenches, *c.* 4 m north of K2, an auger borehole was drilled in the preliminary phase and encountered wood, probably associated with the same concentration. The stake concentration may therefore have continued further north.

K3 was a concentration of *c.* 110 stakes within an area of 12 × 6 m following the contours of the seabed. During the pre-survey of the site, a core was taken *c.* 1.5 m east of K3 which also contained wood, probably from this concentration. Radiocarbon dates separated K3 into two phases: *c.* 4400–4200 BC and *c.* 4200–4000 BC. Some of the stakes in K3 were spaced 40–45 cm apart, similar to preserved wattled structures in the study area.

K4 was a concentration of 36 stakes within an area of 14 × 4.5 m, forming a few curved rows. During the preliminary survey of the area, a core was taken within the eastern part of K4 which contained wood, probably from the same concentration. Interestingly, it was noted at the time that one of the pieces 'appeared to have been woven' (ie, wattled remains), but no photographs were taken, or wood samples collected. Radiocarbon dates from K4 ranged from *c.* 4000–3706 BC.

K5 was a concentration of *c.* 30 stakes in two roughly equal rows with radiocarbon dates between *c.* 4300 and 4050 BC.

K6 was a cluster of *c.* 30 stakes within an area of 6.5 × 6.5 m, forming an irregular circle around a large rock and several curved rows of stakes spaced 2.1–3.4 m apart. Particularly leister prongs and bone points were found around the large rock area. The radiocarbon dates of the stakes clustered into two groups: *c.* 4500–4400 BC and *c.* 4250–4050 BC.

Stones were also recorded in several areas of the trenches. Stratigraphically, they were associated with drift gyttja layers and may therefore have been artificially deposited on the seabed. They were therefore interpreted as possible remains of stepping stones. These were particularly clustered around the large boulder in the shallow water area and to the north-east of it. Other clusters were also observed and at least two were partially framed by stakes. All three assemblages appeared to lie on the edge of a smaller depression. Most of the stones were comparatively small, except one larger one, approximately 50 × 50 cm, which lay in the drift gyttja at the easternmost find area.

The woodworking of the stakes varied, most were tapered on one side, followed by two-sided, unworked, multi-sided, three-sided, and four-sided specimens. A total of 48 stakes have radiocarbon dates ranging from the Late Mesolithic to the Middle Neolithic, with the majority dating to the late Ertebølle and earliest Neolithic.

At MLF00939-II, a total of 2245 m^2 was mechanically opened, of which 1522 m^2 were completed (for safety reasons). In addition to flint, animal bones, and pottery, two wooden mouth frames of semi-circular or conical fish traps were found lying horizontally in shell-filled sand on the higher parts of the site. One (X96) was re-used as a stake with a rectangular hole at one end. The other (X36) had a thinned-out section at each end. Similar specimens were also found at Syltholm V (MLF00910, X7) and Syltholm X (MLF00936, X1805 A & X4814), with late Middle Neolithic and Early Neolithic dates. The wooden finds also included forked rods, shafts, spears, and dozens of vertical, oblique, and horizontal tapered stakes, rods, and posts.

The stakes were distributed in a few clusters across the excavated surface. The eastern group formed an irregular north-east–south-west oriented row of 19 stakes, following the local underwater topography. The western group formed a slightly curved, roughly north-east–south-west oriented belt, with some very closely spaced stakes, especially in the southern part. In the north, the stakes were set to frame the edge of a natural depression. Both to the north and south of the stake belts, similar wooden remains were recorded during the preliminary phase of the excavation (MLF00939-I), probably belonging to the same concentrations. The radiocarbon dates of the western cluster span from the late Ertebølle to the earliest Neolithic, whilst the eastern one similarly dated to the same periods. There were only two younger stakes dating after 3700 BC – both were located outside of the two stake concentrations.

Combining the observations at MLF00939-I and MLF00939-II (above), a total of 1172 wooden finds were recorded. Two distinctive belts of vertical and oblique stakes from MLF00939-II complemented the adjacent clusters of stakes from MLF00939-I. They appear to have been placed in confined areas, often in association with natural depressions in the seabed. Few stakes were found outside these core areas. The vast majority of the stakes were made of hazel.

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APPENDIX S2: DETAILS ON THE CHRONOLOGICAL MODELLING FOR THE Z-SHAPED FISH WEIR FROM THE SITES OF MLF00933-II AND MLF00933-III

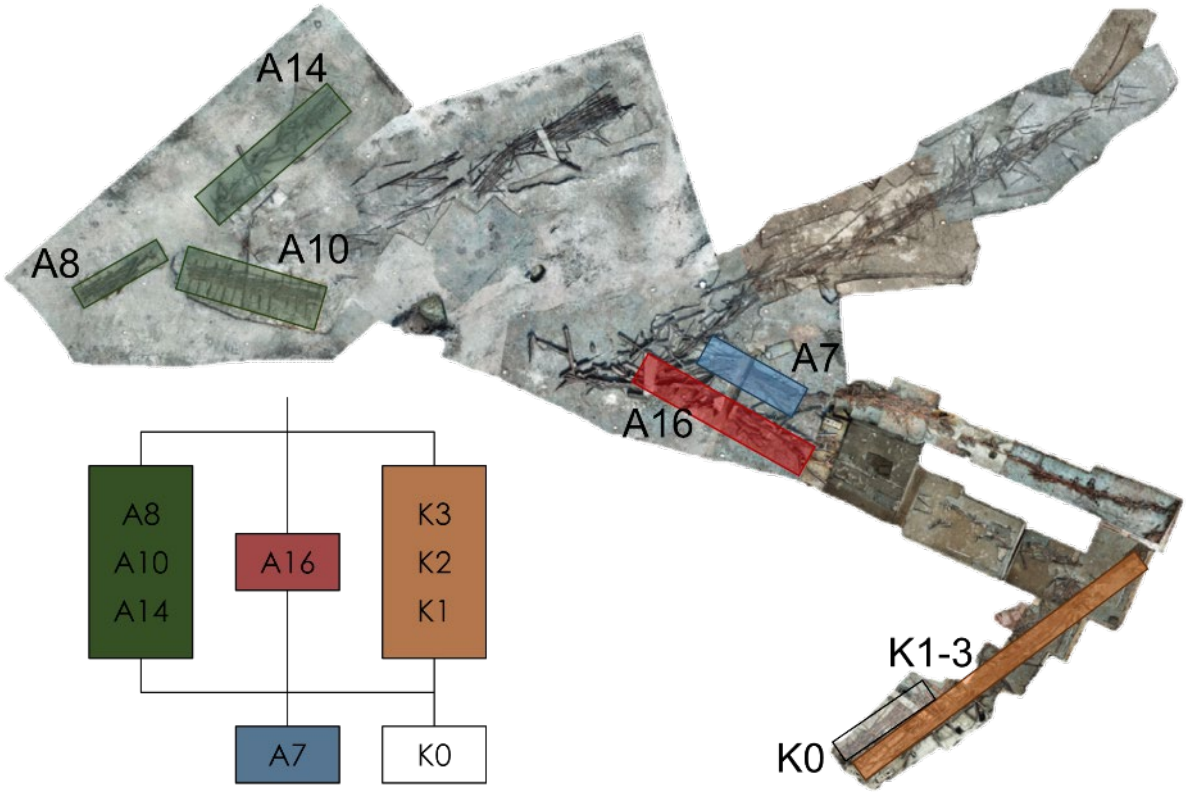

Fig. S9.

Overview of the different phases and construction elements of the Z-shaped fish weir from the sites of MLF00933-II and MLF00933-III, including a Harris matrix showing the stratigraphic relationship between them

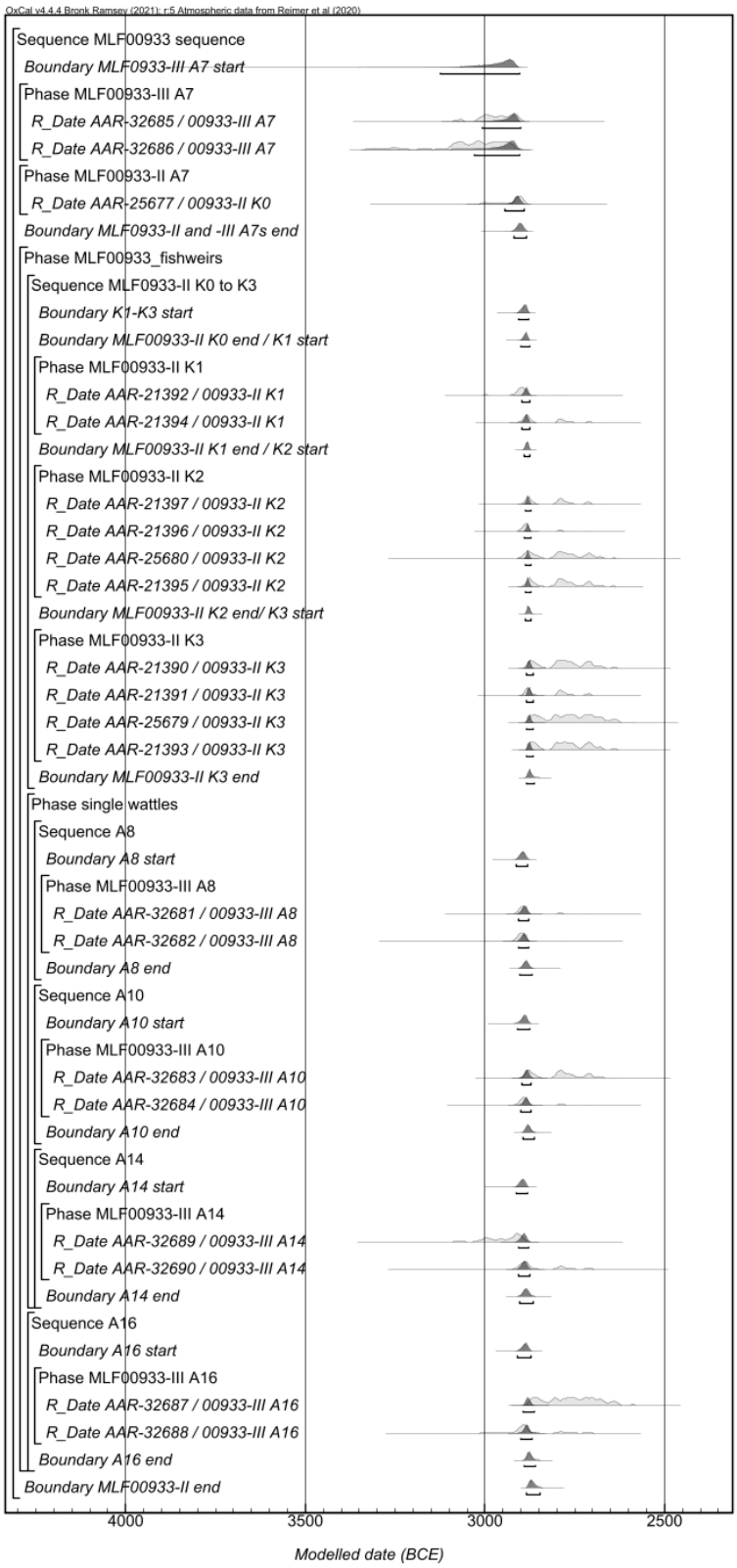

Fig. S10.
Bayesian chronological model of ^{14}C dates related to the Z-shaped fish weir from the sites of MLF00933-II and MLF00933-III

OxCal CQL Code

```
Plot()
{
 //MLF00933 as contiguous phase model, due to phases as documented in the excavation
 Sequence("MLF00933 sequence")
 {
  Boundary("MLF0933-III A7 start");
  Phase("MLF00933-III A7")
  {
   R_Date("AAR-32685 / 00933-III A7",4346,37);
   R_Date("AAR-32686 / 00933-III A7",4400,33);
   Interval("A7");
  };
  Phase("MLF00933-II A7")
  {
   R_Date("AAR-25677 / 00933-II K0",4304,29);
  };
  Boundary("MLF0933-II and -III A7s end");
  Phase("MLF00933_fishweirs")
  {
   Sequence("MLF0933-II K0 to K3")
   {
    Boundary("K1-K3 start");
    Boundary("MLF00933-II K0 end / K1 start");
    Phase("MLF00933-II K1")
    {
     R_Date("AAR-21392 / 00933-II  K1", 4281, 29);
     R_Date("AAR-21394 / 00933-II  K1", 4233, 25);
     Span("Span 933-II K1");
     Interval("K1");
    };
```

```
 Boundary("MLF00933-II K1 end / K2 start");
 Phase("MLF00933-II K2")
 {
  R_Date("AAR-21397 / 00933-II  K2", 4218, 25);
  R_Date("AAR-21396 / 00933-II  K2", 4246, 25);
  R_Date("AAR-25680 / 00933-II K2",4214,44);
  R_Date("AAR-21395 / 00933-II  K2", 4204, 25);
  Span("Span 933-II K2");
  Interval("K2");
 };
 Boundary("MLF00933-II K2 end/ K3 start");
 Phase("MLF00933-II K3")
 {
  R_Date("AAR-21390 / 00933-II  K3", 4188, 27);
  R_Date("AAR-21391 / 00933-II  K3", 4223, 26)
  {
  };
  R_Date("AAR-25679 / 00933-II K3",4167,32);
  // R_Date("AAR-26330 / 00933-II  K3", 5310, 64); not part of the structre!
  R_Date("AAR-21393 / 00933-II  K3", 4179, 25);
  Span("Span 933-II K3");
  Interval("K3");
 };
 Boundary("MLF00933-II K3 end");
 Span("MLF00933 K0 to K3");
 Interval("K1 to K3");
};
Phase("single wattles")
{
 Sequence("A8")
 {
```

```
 Boundary("A8 start");
 Phase("MLF00933-III A8")
 {
  R_Date("AAR-32681  / 00933-III A8",4265,32);
  R_Date("AAR-32682 / 00933-III A8",4286,32);
 };
 Boundary("A8 end");
 Interval("Interval A8");
};
Sequence("A10")
{
 Boundary("A10 start");
 Phase("MLF00933-III A10")
 {
  R_Date("AAR-32683 / 00933-III A10",4211,31);
  R_Date("AAR-32684 / 00933-III A10",4260,31);
 };
 Boundary("A10 end");
 Interval("Interval A10");
};
Sequence("A14")
{
 Boundary("A14 start");
 Phase("MLF00933-III A14")
 {
  R_Date("AAR-32689 / 00933-III A14",4319,38);
  R_Date("AAR-32690 / 00933-III A14",4252,37);
 };
 Boundary("A14 end");
 Interval("Interval A14");
};
```

```
  };
  Sequence("A16")
  {
   Boundary("A16 start");
   Phase("MLF00933-III A16")
   {
    R_Date("AAR-32687 / 00933-III A16",4162,34);
    R_Date("AAR-32688 / 00933-III A16",4266,35);
   };
   Boundary("A16 end");
   Interval("Interval A16");
  };
  Span("MLF00933 all weirs");
  Interval("MLF00933 all weirs interval");
 };
 Boundary("MLF00933-II end");
};
};
```