

# 12 Synthesis – A mosaic of habitation at Zeewijk

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## 12.1 Introduction

The results from the integrated approach applied to the Zeewijk site are presented in this chapter. Zeewijk is an important final building block in the better understanding of Neolithic life in Noord-Holland that we set out to achieve in our project. Looking back at the analysis and publication of the fairly small sites at Keinsmerbrug and Mienakker, the new information added by the much larger site Zeewijk is fascinating. Because Zeewijk is very different in many respects – in terms of the backlog, size, quantity of finds and proportion excavated – its story is a valuable outcome of our Odyssey research project.

### Zeewijk so far

Zeewijk was discovered by the landowner K. de Lange in 1983, and reported to the leader of the excavations being performed at the time at Kolhorn. In the years that followed, a test pit was dug and coring campaigns were carried out by the *Biologisch-Archaeologisch Instituut* at the University of Groningen.<sup>437</sup> This research revealed the extent of the cultural layer which appeared to be quite large, over one hectare. Two areas were distinguished, and named Zeewijk-West and Zeewijk-East. Constant erosion of this cultural layer by agricultural activities prompted a decision to excavate. The excavations were carried out by the *Rijksdienst voor het Oudheidkundig Bodemonderzoek* during three campaigns, in 1992, 1993 and 1994.<sup>438</sup> From the beginning the idea was to conduct a partial excavation, covering only 20-25% distributed over the site.

After the excavation, a start was made on the analysis of some find categories excavated in 1992. Studies of the ceramics and the faunal remains were published in 1992 as student theses.<sup>439</sup> In 1997, a first brief outline of Zeewijk based on the preliminary results from the analyses of the 1992 campaign was published by the excavator Hogestijn.<sup>440</sup> This paper focused particularly on the description of the remarkable large structure in Zeewijk-East, and on the comparison of West and East. Hogestijn attributes the Zeewijk site to his group 1 classification, calling the site a permanent residential settlement.<sup>441</sup> He contrasted this

group of sites with the temporary extraction camps in group 2, in his dichotomous model of the Single Grave settlement system.<sup>442</sup> He based his interpretation of Zeewijk on the size and layout of the settlement, the presence of five possible house plans in Zeewijk-West, the arable field of at least one hectare at Zeewijk-East, the high proportion of bones of domestic animals, the large diversity in the flint toolset and the diversity in the pottery assemblage.<sup>443</sup> This hypothesis was however not substantiated by a detailed, thorough and integrated analysis of all cultural and ecological resources.

Drenth and others<sup>444</sup> reviewed the evidence for the Single Grave Culture in the Noord-Holland tidal area, and set the information available within a broader Dutch framework. They offered a critical evaluation of the proposed settlement system and site interpretations (group 1 versus group 2), based on the published archaeobotanical and archaeozoological evidence available at the time, looking for instance at the ratio of wild to domestic mammals. It was concluded that the proposed dichotomous model is weakly founded, when looking at the available published information.

### Zeewijk, the Odyssey results

Given the wealth of information it yielded, Zeewijk was regarded as a very promising final site for analysis in the Odyssey project, but it was also seen as a tough nut to crack considering the amount of work. First of all, in comparison with Keinsmerbrug and Mienakker, the extent of the backlog at Zeewijk was severe. Furthermore, the area had been only partially excavated, reducing its narrative potential in comparison with Keinsmerbrug and Mienakker, which had been fully excavated. The three-quarters of Zeewijk not excavated still holds unknown information. Besides this, the large size and the very large quantity of finds forced the team to make selections. During this process of sampling selections were enlarged or somewhat altered due to the availability of material, the potential of the samples and the time available. In some cases finds and data were missing, which hampered the spatial analysis, among other things. However, in spite of this, the story of Zeewijk is an intriguing one.

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<sup>438</sup> State Service for Archaeological Investigations, the forerunner of the Cultural Heritage Agency of the Netherlands.

<sup>439</sup> Both student dissertations (regarded as internal reports) were published within the framework of the inventory project in 2001; Sier 2001, De Vries 2001.

<sup>440</sup> Hogestijn 1997.

<sup>441</sup> Hogestijn 2001.

<sup>442</sup> Hogestijn 1992.

<sup>443</sup> Hogestijn 1997, 2001, 2005.

<sup>444</sup> Drenth, Brinkkemper & Lauwerier 2008.

### Research questions

This synthesis aims to combine the new analyses of Zeewijk performed as part of the Odyssey project in order to provide an insight into the Late Neolithic in Noord-Holland. Like the synthesis of Keinsmerbrug<sup>445</sup> and Mienakker<sup>446</sup>, the research questions below will serve as a guideline of the integration. These ten questions were formulated at the start of the project. The research questions on the Zeewijk site level (no. 2, 3, 4, 5, 6 and 9) will be addressed in this chapter. Other, more general questions, will be answered in the epilogue (no. 8) and in the future PhD theses (no. 1, 7 and 10) and papers.

1. What is the spatial extent of settlement areas and how can any intra-site spatial differentiation be characterised?
2. What activities are represented in the artefact assemblages (ceramics, lithics, bone/antler tools, ornaments)?
3. What activities are represented in the characteristics of the archaeozoological and archaeobotanical remains?
4. What is the functional nature of structures and features?
5. What indicators exist for duration and seasonality of occupation?
6. What evidence exists for group composition?
7. What variability exists in the 'cultural biography' of objects?
8. What ecozones are represented in the archaeozoological and archaeobotanical assemblages?
9. What is the possible origin of inorganic resources?
10. How do the characteristics of the SGC settlements in Noord-Holland compare to SGC/Corded Ware phenomena in the wider geographical setting?

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## 12.2 Chronology

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### Relative chronology

Like most Late Neolithic sites in Noord-Holland Zeewijk can be characterized as a complex anthropogenic entity in, and to some extent influenced by, the tidal environment. Stratigraphical relationships exist between dark humic cultural layers, natural sandy clay deposits and several shell layers of consumed mussels. At

Zeewijk, the distribution of these phenomena is widespread, covering a hectare, on both sides of a former active gully.

At the base of the anthropogenic entity, a 'contact layer' is present, representing the original surface on which the first settlers of Zeewijk set foot. In the first phase of habitation in particular, trampling by people and animals resulted in a mixture of surface and cultural debris. Over the course of time, deposition of settlement waste, shells, burnt reed and other anthropogenic material continued which resulted in the formation of a midden. A few scattered clay layers are embedded in these numerous deposition events, evidence of flooding episodes, especially in areas near the gully at times of high water levels. The nature, intensity and spatial extent of these episodes is difficult to establish. At Zeewijk-West, periods of high groundwater levels led to the growth of peat in areas used by Neolithic people.

The numerous postholes and ard marks occurring outside the distribution of the cultural layer suggest that the Zeewijk site comprises a large settlement area with farmland divided by a residential gully. During habitation cultural debris and waste were dumped or (re)deposited in this watery area. The question whether this zone could be crossed easily by humans and animals, by foot, or not – did they experienced it as a linear barrier? – remains unanswered. Large deposits of mussel shells might suggest the creation of a ford-like zone, but this is only speculative.

We assume that all human activities, such as habitation, arable farming, cattle rearing, etc. were strongly interlinked, occurring successively while shifting spatially, resulting in multiple habitation phases. The recurrence marks Zeewijk as a palimpsest site.<sup>447</sup> Unravelling these activities in episodes is a great challenge, if not impossible, considering the palimpsest character, the selective excavation in the 1990s and the selections sampled for analysis within our project. Our research results give some clues for a possible differentiation into habitation phases at Zeewijk-West. The posthole distribution, two separate clusters of features, and differences in the ceramic assemblage may point to different episodes of occupation. We have been able to produce a chronological sequence based on comparisons of the pottery groups in three areas of Zeewijk, Keinsmerbrug

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<sup>445</sup> Smit *et al.* 2012.

<sup>446</sup> Kleijne *et al.* 2013.

<sup>447</sup> Bailey 2007.



Figure 12.1 Although dates on charred food crusts are problematic (due to the reservoir effect), it is one of the very few possibilities to get a grip on the absolute chronology of the site. A sample of a food crust on this vessel (no 30) was taken for  $^{14}\text{C}$  analysis (GrA-56013), resulting in  $4030 \pm \text{BP}$ , which corresponds to Furholt phase D.

and Mienakker. On typo-chronological grounds, the habitation at Zeewijk-East and in the northern part of Zeewijk-West can be seen as the earliest – possibly contemporaneous – phase, whereas the south part of Zeewijk-West is the latest. In this sequence, the construction of the large structure at Zeewijk-East, cutting through numerous ard marks and the tearing down of the exterior posts of this building and reuse of the wood from these wall posts might have been the final acts on the eastern side of the gully. Habitation in the south part of Zeewijk-West continued, while the area of Zeewijk-East was used for other activities or may have been abandoned. The central posts of the large structure remained in the ground, still visible for some time after.

After the dwelling phase at Zeewijk-West south, the settlers moved away. The levees were abandoned and overgrown with peat. In the course of the first centuries AD peat rivers developed at the northern fringe, and with that the draining of the peat started. The stronger influence of the sea was halted in the 13<sup>th</sup> century by human interference, when a dike, the

*Westfriese Omringdijk*, was built. The Zeewijk site, situated outside this protective enclosure, was inundated by Zuyder Zee water, until 1843 when this former seabed was reclaimed to become the Groetpolder.

#### Absolute chronology

Besides identifying stratigraphical relationships between features and cultural layers, several samples were taken for  $^{14}\text{C}$  analysis prior to, during and after the excavations, in order to gain an understanding of the chronology of the site. The resulting eleven dates give a rough chronological outline of the formation of the tidal landscape and the use of the higher parts of the site by Neolithic people. Between 3650 and 3000 BC, a tidal marsh landscape, with gullies, levees and back swamps was formed. Habitation on the high sandy levees started somewhere 3000 and 2500 BC (Fig. 12.1). The last habitation phase covered by  $^{14}\text{C}$  dates is an episode between 2500 and 2200 BC. One date is derived from one of the wooden posts of the large structure at Zeewijk-East.<sup>448</sup> This was built when the arable field was abandoned.

<sup>448</sup> 3910  $\pm$  50 BP (GrN-18488).

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### 12.3 Environment

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The site at Zeewijk is situated on two sandy levees on both sides of an active gully. In the open tidal landscape these levees are somewhat elevated and covered with herbaceous plants and shrubs and a mosaic of different trees including willow, alder, ash, bird cherry and field maple. Ivy and honeysuckle climbed and flourished in these trees.

The site, nestling on levees, is surrounded by different biotopes, ranging from marine to freshwater. The nearby tidal creeks, filled with saline and brackish water, offered great possibilities for fowling and fishing, and mussels could be gathered on the more saline tidal planes. In the high salt marshes marshmallow, common/spear-leaved orache and sea purslane were abundantly present, as well as sea aster, common sea-lavender, various grasses and sedges. Given the great diversity of grasses and other herbaceous plants in the marshes they were probably chosen by the Neolithic farmers for their excellent grazing properties. The extensive reedbeds and patches of woody vegetation on the somewhat higher sandy levees were ideal for sheltering groups of wild boar.

In the lower parts of the salt marshes members of the goosefoot family dominated. Glasswort and sea-blite occurred frequently. Although this landscape is dominated by marine influences, with salt and brackish wetlands, there are also places at or near the settlement where fresh water accumulates. This kind of freshwater environment would have been ideal for beavers.

Oak trees, transformed into worked wood for use as building material, and also used as firewood, along with other species, might have grown on levees outside the reach of saline or brackish water or, most likely, on the Pleistocene boulder clay outcrops at a distance of 10-12 km to the north of Zeewijk.

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### 12.4 Exploitation of animal resources

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The exploitation of animal resources at Zeewijk was based on stock breeding, fowling and fishing, with cattle, duck and flatfish as the most

important species. The hunting of wild boar played a minor but significant role.

Cattle were by far the most important food source in terms of meat supply. Age data suggest mostly adult and subadult animals were slaughtered. There is no evidence of any bovine 'secondary products': in terms of milk for human consumption and cheese production and manure for the cultivation of the plots. The abundance of cattle hoof prints, which barely overlap with the dense pattern of postholes in Zeewijk-West, shows the importance of keeping cattle close by. Pig/wild boar and sheep/goat were of minor importance when it came to the meat supply. Occasionally dogs might have been eaten.

The presence of deer (red deer and roe deer) and wild boar in this kind of open tidal landscape is not strange; they both are lovers of marshy environments as long as dry spots are present. The question is whether these deer animals are hunted. The deer remains at Zeewijk – antlers and phalanges – are specific elements. Antlers could have been shed and collected, while the phalanges might have been attached to imported hides. The same line of argument applies to the fur animals stoat, brown bear and wildcat, and the hide of the common seal. Their furs could have come into the possession of the Zeewijk inhabitants as exchanged goods. The beaver bones most probably come from locally hunted animals, as does the grey seal. The furs from these animals or the imported hides could be processed into clothing or (in the case of the seal hides) into watertight buckets or skin-lined canoes, as has been suggested at Mienakker.<sup>449</sup>

The fowling catch consisted mainly of ducks, especially mallard and teal or garganey. The quantity of ducks and geese consumed was high. As at Mienakker and Keinsmerbrug, traces of slaughtering are absent. Apart from ducks and geese, waders were also caught for consumption. Small numbers of other species were also found. The cut marks on a swan humerus might indicate that swan was eaten. The find of great crested grebe is remarkable, as it is rare in a Dutch archaeological context, and the presence of guillemot and falcon is also quite special.

Fishing, mainly for flatfish (flounder/plaice), occurred largely in saline and brackish waters of the tidal creeks. It is likely that the people of Zeewijk used fish traps, fish weirs or fences and may have caught the flatfish by treading

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<sup>449</sup> Nobles 2013b.

(‘flounder treading’ or *bottrappen* in Dutch). In this environment mussels were collected, mostly likely in trusses, and transported to the site. The importance of shellfish gathering for subsistence was probably limited, as shellfish are low in calories. Marine resources like the haddock at Mienakker were exploited far less. Also, fish from fresh water, such as cyprinids were caught only incidentally. The fact that the inhabitants of Zeewijk caught both small fish (small cyprinids and flatfish) and also large fish like cod and large mullet indicates that they were experienced in different fishing techniques.

Animal bones were used for the production of common utilitarian objects. Several ‘ripples’, made of cattle ribs were found. Some of these tools were too fragmented for use-wear analysis. Others had been consolidated using a chemical preservative that covered the traces on the surface, so no functional information could be obtained. Bone material from medium-sized mammals, including sheep/goat, was worked to produce needles, an awl and two toggles.

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## 12.5 Crop cultivation and the use of wild plant resources

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Besides the cultivation of the common Late Neolithic cereals naked barley and emmer wheat, flax was also important for the settlers of Zeewijk. This crop was probably cultivated both for its oil-rich seeds and for its fibres. The intertwined flax fibres were probably made into cords. These cords were probably used for the production of textiles and possibly also used for the decoration of pottery. Flax is very elastic, soft, and easy to twist into cords.<sup>450</sup> These cords can be used for impressions in the soft clay of freshly made vessels.

It seems that the higher-lying sandy levees were the most stable elements in the coastal landscape for settling down and for establishing small arable fields next or near the houses. The nature of the agriculture that was practiced at Zeewijk (but also in Mienakker) may have resembled one of the models proposed for Neolithic farming in Europe referred to as intensive or garden cultivation, with small cultivated plots located close to the settlement.<sup>451</sup>

The people of Zeewijk worked their fields,

perhaps in an initial phase with a hoe, and later with an ard. They ploughed these plots, sowed, grew, possibly controlled the weeds and harvested the crops nearby. Both barley and emmer wheat were brought to the site as ears of grain, and possibly as complete plants. Cereals were processed and cooked.

Various wild plant foods were gathered to supplement the cereal-based diet. Crab apples, acorns and hazelnuts were available from the boulder clay outcrops at Wieringen, while sea club-rush tubers, knotgrass rhizomes and orache seeds could have been found nearby. Wood was mainly brought in from levees within the reach of fresh water, but also from the drier soils that will have been found at Wieringen (at a distance of approx. 10-12 km).

Various, locally available grasses, rushes and sedges would have served many purposes as raw material. The stems and leaves of reed, great sedge and sea club-rush may all have been used for thatching roofs and making the walls of shelters and/or houses. The stems of grey club-rush may have been used to make sitting and sleeping mats, floor coverings and to insulate the walls of the houses. Dried stands of reed, rushes, sedges, and even glasswort and sea aster may have been collected for fuel. It would have been poor-quality fuel for domestic fires, but nonetheless a welcome addition to firewood.

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## 12.6 Food preparation and consumption

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Food processing at Zeewijk shows an interesting variety, reflecting a broad choice and certain preferences. Meat from mammals, birds and fish was probably roasted in hearths. These hearths were recognised not as features in the spatial distribution but as charcoal and ash layers in the sections of the cultural layer. These layers of hot ashes probably were also the place where crab apples were dried and acorns were roasted to enhance their palatability. Use-wear traces on flint tools show that fish were cut and their skin scraped.

It seems that cereals were ground and/or pounded prior to cooking. Use-wear analysis of the querns and grinding stones show that, with one exception, these tools were used to process plant materials, especially cereals. At least two different types of cereal products were

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<sup>450</sup> Grömer & Kern 2010.

<sup>451</sup> Bogaard 2005; Jones 2005.

identified in the isolated lumps of processed cereal food: a porridge-like food, made of coarsely crushed or ground cereal grains and a compact, mushy food made of finely ground grain. In the cooking process also stone pebbles could be used to boil water.

The remains of food encrusted on ceramic vessels gave more insight into the methods of food preparation and kind of foods that were cooked at Zeewijk. Combined botanical and chemical analysis suggest that emmer grain was often cooked with various other components, such as fat (or meat) of animal or fish sources. The consumption of acorns as an important, starch-rich food source is very distinct in the botanical evidence. Various methods would have been used at Zeewijk to prepare acorns for consumption. Prior to cooking, however, the acorns' shells would have been cracked using hammer stones. The shells were peeled off and the de-husked acorns would have been roasted, then pulverised and cooked in ceramic vessels to a mush or soup.

The remarkably mushy nature of many food residues encrusted on ceramic vessels from Zeewijk (and on some from Mienakker) suggests that food prepared in these vessels was well processed prior to cooking, possibly crushed, pounded or even pulverized and subsequently cooked, possible with addition of water, into a mush or a thick paste. All the mushy residues from Zeewijk share the well-defined chemical signals for the presence of proteins and polysaccharides, often with the addition of lipids. This suggests that both plant and animal components were used in the cooking of these mushy meals. A few plant resources can be proposed as the starchy components of these organic residues: cereals, acorns, tubers of sea club-rush and seeds of various orache species. Orache seeds and other closely related chenopods are also rich in protein. Interestingly, the absence of lipids from some of Zeewijk mushy residues suggests a plant origin for the proteins traced back in these residues, suggesting that orache seeds may have been indeed the source of plant protein for the people of the Single Grave Culture.

Even though at Zeewijk only the thinner ceramic vessels were used for cooking, their use demonstrates a broad range of cooking practices. Thin-walled decorated beakers were used to cook the cereals and acorns into a thick

porridge or mush. Besides cooking in this kind of thin-walled ware, ceramic plates were also used for food preparation. Charred residue on one ceramic plate fragment indicate that it was heated and used as a kind of griddle. The mixed residue points to the heating of mixed food, consisting of proteins, polysaccharides and lipids of both animal and plant origin. Zeewijk is the first Dutch prehistoric site where the use of ceramic plates for baking has been demonstrated.

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## 12.7 Production and use of ceramics

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The probably locally produced pottery of Zeewijk is characterised by the many different tempering materials added to the clay. Pieces of quartz, granite, shells and pottery were crushed using stone implements to create tempering material.

About half of the ceramics at Zeewijk are thin-walled ware, decorated with spatula and cord. The clay of these beakers is always tempered with grog and sand. The medium thick-walled and thick-walled ware is decorated with fingertip imprints, and has stone grit temper. Spindle whorls, baking plates and a ceramic disc used as a lid or loom weight were also found at Zeewijk. The question is whether sheep's wool was used for yarn production, as the presence of spindle whorls and one possible loom weight might suggest. Another suggestion is that these ceramic artefacts were used for processing flax into linen.

The beakers are related to many different types in the classification devised by Van der Waals and Glasbergen: 1b, 1c, 1d, 1e, zigzag, type 211b and the half-decorated type 1a and 211d.<sup>452</sup> Smaller undecorated beakers and medium-large and large undecorated vessels have also been found. The percentages of undecorated sherds vary from 74% (Zeewijk-West south) to 82% (Zeewijk-West north) and 90% (Zeewijk-East).

Different vessels were used for cooking and maybe storage. The residue analysis of the food crusts showed that thin-walled and medium thick-walled vessels, including the majority of the cord-decorated beakers, were most frequently used for the preparation of meals. This preference for beakers for cooking purposes is remarkable, as beakers are generally seen as

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<sup>452</sup> Van der Waals & Glasbergen 1955.

drinking vessels.<sup>453</sup> These meals consisted of cereals and/or acorns cooked into a thick porridge or soup or, more generally, to a fine mush. The ceramic plates were used to heat mixed food as on a griddle. The ceramic artefacts, spindle whorls and ceramic disc that probably served as a loom weight were used for spinning and weaving.

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## 12.8 Production and use of flint, hard stone, amber and jet

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The variety of raw materials used at Zeewijk is not as great as at Mienakker, but notwithstanding this uniformity a few pieces of southern flint are present (specifically Valkenburg, Light Grey Belgian and Rullen flint). This suggests the existence of long-distance exchange networks. Most flint has a northern origin and like stone and amber was gathered locally, on the beach and at the Pleistocene glacial outcrops, some 10–12 km away. These local materials were important for the production of implements and beads. The northern flint and hard stone implements were produced locally. The few pieces of southern flint may have been brought to the site as finished products.

Flint knapping was focused on flake production, using an ad hoc technique. The settlers of Zeewijk used a combination of bipolar technology with other types of approaches, as uni- and bidirectional flaking. Flakes were retouched on the spot and used as ‘ad hoc’ tools in the execution of domestic activities. Stone types were chosen selectively: volcanic and sedimentary rocks as grinding and quern stones and sandstone pebbles for use as hammerstones. They could be used for cracking acorns and hazelnuts, making tempering material, and crushing tuber roots. The majority of the stones were not modified, but used in a way that took advantage of their natural shape. Some querns and grinding tools were flaked and reshaped before use. Use wear indicates that the querns and grinding stones were used to process plant materials, especially cereals, but one *mano* was used for woodworking. Also, animal hide was cleaned or worked with stone implements.

Unmodified flakes are the most frequent tool type. Retouched flint artefacts are low in

number. Retouched flakes, blades, scrapers and borers constitute the majority of the implements. The scraping of hides is the most frequently represented activity, mostly performed with scrapers and retouched implements. Tools used for scraping scales and fish skin were also identified. Fishing was one of the main subsistence activities of SGC groups, but use-wear traces on flint was never found, until now. Zeewijk is the first Dutch SGC site to yield use-wear traces related to fish processing.

Amber was most likely gathered from the relatively nearby coastal area, as natural pieces are transported along the North Sea.<sup>454</sup> Jet is far less common. The provenance area is situated in the Pas de Calais region. Jet may have been gathered on the beach as fragments transported north by the tidal effect of the Channel and the North Sea.<sup>455</sup> Another, more plausible, option is that the settlers of Zeewijk obtained the jet by exchange.

The production of amber ornaments occurred locally, at the settlement (as at Mienakker). This conclusion is based on the abundant evidence of production waste and the use wear on one flint borer. The beads and pendants were well crafted, in comparison with beads known from other sites.

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## 12.9 Spatial distribution of finds and features

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### Identification of activity areas

Due to the sampling strategy during the excavation campaigns, the selection process during our project and some missing find categories, the spatial analysis of the finds was very limited. In Zeewijk-West the studied area comprises 368 m<sup>2</sup>. In this area many features were recorded. Although no clear structures were identified, the presence of one or more structures can be expected. In general, the majority of the finds was found on the higher ground. The distribution of the animal remains showed a concentration in the western zone of this area, in a banded pattern. This may be the result of habitation events or related to natural slope processes. No clear pattern can be seen in the flint distribution, but stone showed a large concentration of small pieces of granite. The modified stone artefacts have a more dispersed

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<sup>453</sup> Sheratt 1987.

<sup>454</sup> Waterbolk & Waterbolk 1991.

<sup>455</sup> Van Gijn 2006a, 2008.

pattern. In the amber distribution a significant clustering was visible in the northeastern part of the site. This could indicate an amber working area. The ceramics, generally speaking, showed no clear patterns, but at the level of individual vessels, clustering is apparent in the case of six of the twenty selected vessels, possibly pointing to a later phase of habitation.

In Zeewijk-East, the missing data hampered the spatial analysis. There is no clear association between these remains and the large structure.

### Features and dwellings

The features at Zeewijk consist of many postholes, a few pits, a large number of cattle hoof marks and ploughmarks, a couple of small and one large former gullies separating West and East. Following the initial interpretations no new or different structures could be reconstructed on the basis of the finds and features. In Zeewijk-West, two main areas are distinct: the dense area of postholes on the higher ground, juxtaposed with the cow hoof marks on lower ground. This cattle behaviour signifies the presence of a built environment. At least one and probably more structures (buildings/house plans) are hidden in the concentration of postholes. The large number of postholes prompted the possibility that the people of Zeewijk may have built dwellings with elevated floors. This idea, inspired by present-day West-African houses and Neolithic lake settlements on the shores of Lake Constance<sup>456</sup>, is also attractive in terms of a better understanding of deposition processes and the formation processes of middens. Many questions remain about the formation of the cultural layer, containing a lot of domestic refuse, mussel shells and huge amounts of charred reed.

The large structure in Zeewijk-East, already described in detail and published widely, is impressive and enigmatic.<sup>457</sup> Its monumentality, the absence of domestic refuse and associated hearths or pits points to a ceremonial or ritual function.

No direct evidence of human presence as a feature, like the burial at Mienakker, was found in the area studied, but human footprints, size 42–45 (EU), were recognised. In the central area of Zeewijk-East six of these prints reveal movement of people. Other indirect evidence includes some stray teeth, including a canine

from a ten-year-old.<sup>458</sup>

Ploughmarks, orientated in criss-cross patterns, are ubiquitous, especially in Zeewijk-East, which indicate repeated ploughing activities covering an area of a hectare or more.

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## 12.10 Seasonality and duration of habitation

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Evidence from the archaeozoological and archaeobotanical studies point to human activities in specific seasons. The large numbers of ducks were probably caught in the moulting period, in late summer (July–August), when they are unable to fly. Some birds, such as brent and barnacle geese, guillemot and swan, can be seen as indicators of winter time, as can fishing for haddock. The presence of thin-lipped mullet and the preponderance of flatfish are indicative of summer and autumn activities.

With regards to consumed plants as evidence for seasonality at Zeewijk, it is clear that different activities were carried out in different seasons of the year and in varied places in the wider landscape. Crops like cereals and flax were most likely sown in spring and harvested in late summer. The small cultivated fields were probably watched and weeded through the growing season. It is remarkable that there is no evidence of storage in pits at Zeewijk. Pits are very rare in general, numbering only four in total. No large grain concentrations like those at Mienakker, indicating the storage of crop yields, have been found at Zeewijk. In addition to crop plants, crab apples, orache seeds, hazelnuts, acorns, and possible tubers of sea club-rush were collected for food. The best season to collect crab apples and orache seeds would have been early through late summer. Soon after that, in early through late autumn, hazelnuts and acorns would have been available. Although many roots and tubers (also tubers of sea club-rush) are available throughout most of the year, their highest concentration of starch content coincides with the period between autumn and early spring. Combining season-specific information (Fig. 12.2) we would conclude that Zeewijk was inhabited throughout the year. Indications of the duration of habitation are limited. The <sup>14</sup>C dates give only a rough outline: a first phase somewhere between 3000 and 2500 BC and a

<sup>456</sup> Suter & Schlichtherle 2009; Pétrequin 1984.

<sup>457</sup> Hogestijn 1997, 34–42; Hogestijn 1998, 102; Hogestijn 2005, 431; Van Ginkel & Hogestijn 1997, 113; Hogestijn & Drenth 2000, 138; Hogestijn & Drenth 2000/2001, 62.

<sup>458</sup> De Vries 2001, 300.



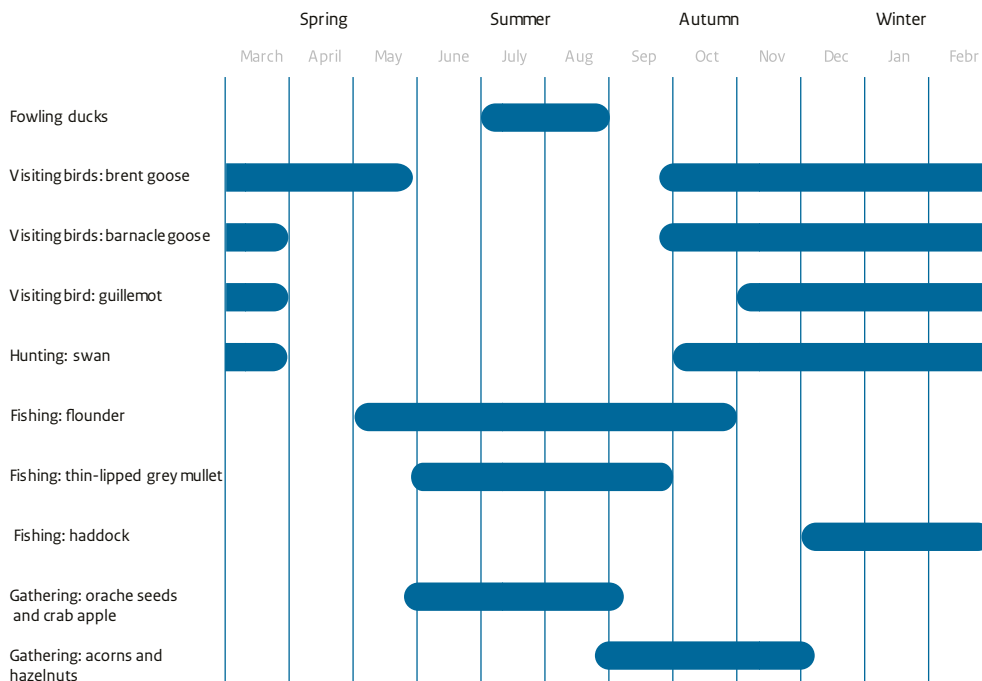


Figure 12.2 Overview of the season-specific information at Zeewijk.

final phase between c. 2500 and 2200 BC. These dates leave us with a very long timespan with multiple habitation phases spanning eight centuries. The analysis of the ceramics points to at least three phases. It is impossible to discern these as successive or with long/short intervals. The phasing and use of the settlement can only be assessed in relative terms.

All human activities seem to be arranged in a kind of mosaic: habitation, growing crops on small arable fields, collecting wild plant foods, raising cattle occurred simultaneously and successively, and shifted spatially. Charcoal evidence points to long-lasting habitation. The large variety of taxa in the wood spectrum of Zeewijk is one reason, the other is the greater degree of fragmentation in the charcoal, caused by frequent trampling by animals and humans.

## 12.11 Concluding Zeewijk

Even though our conclusions are based on a relatively small sample of the site, it is possible to characterise Zeewijk. We can conclude that Zeewijk was a large domestic settlement, occupied all year round. In our view Zeewijk must be seen as a location where recurrent

habitation took place, intensively, alternated with subsistence activities. It is a permanent mosaic of different assemblages: relocated dwellings, cultivated plots and the building and partial demolition of a remarkable ritual structure. This variety in life history was restricted to the higher parts of the levees and may have been divided by the large gully, or perhaps connected by a crossing. The levees were the stable landforms in the dynamic tidal landscape, an environment well known to the settlers of Zeewijk.

The inhabitants of Zeewijk carried out a broad spectrum of activities related to subsistence: mixed intensive farming (including small-scale crop cultivation, crop processing and consumption, and animal herding and consumption), foraging, fishing, fowling and hunting all took place there. Their meals were rich and varied, containing cereals, cattle, wild boar/pig, sheep/goat, birds, fish, wild mammals and diversity of wild plants. From all the evidence presented in Zeewijk study, it is clear that the subsistence economy and diet at Zeewijk is comparable with Mienakker. At Zeewijk, however, the focus on mammals is much greater, while much less fish was consumed here than in Mienakker. The preference for decorated beakers as cooking

vessels at Zeewijk can be regarded as an eye-opener. The demonstrated use of the baking plate is another new result.

There is ample evidence of craftsmanship. Labour-intensive activities were performed at the site. Flint implements were made and used for scraping hides and processing fish. Wood was worked by flint and stone and large oak posts were lopped with a stone axe. The production of amber and bone beads, spinning and weaving were all local crafts practised at the settlement.

This variety of local crafts, the construction

and use of the large ceremonial building in Zeewijk-East and the large variation in ceramics are seen as indications that different groups of Corded Ware people settled at Zeewijk. These groups were probably household groups, a community of several families, related by kinship both genetic and affinal. The question of how many household social units lived at Zeewijk simultaneously or – in the longer term – in subsequent generations is essential, but remains unanswered. In many ways, Zeewijk still holds a lot of questions for future archaeologists to explore.