Dept. of Physical Geography & Ecosystem Sciences

Coasts of SCANIA
EXCURSION No. 3
Part 2; Stops
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by

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EXCURSION no. 3 COASTS of Skåne. Part 2; the STOPS.

For a description of the stops along rocky shores, we are referring to the previous compendium no.1 to NW Skåne and Kullaberg, which we already have visited during the previous excursion.

We leave Lund and use highway E20 and E6 to follow the outer ring around Malmö. Just east of Malmö, we are passing through the westernmost parts of the dead ice hummocky landscape called “backlandskapet” which continue all the way down to Ystad in the SE. North of the highway between Ystad and Malmö, which forms a distinct topographic boundary, we have a powerful hilly landscape, dominated by flat top hills, separated by hollows and gullies. It is one of the most developed provinces in the country with dead ice topography. The depth of the loose sediments is very large, more than 120 metres. The development of the topography is unclear, but the landscape is of extremely great significance for scientific research regarding the interpretation of the deglaciation process. Various type of till are present and on the hills there are so-called plateau clays, which are deposited in the dammed ice Lakes between blocks of ice. In connection with the drainage of these, many ravines are created. The lingering ice blocks have also created many kettle landforms, which later were filled in by sediments and vegetation and transformed into mires and peatlands. Most of these small peat areas are now excavated and again waterlogged.

The area's soil types -boulder clays - are very fertile and the landscape is therefore predominantly cultivated. This implies that the distinctive and different terrain shapes are easily observed in the open landscape. The area is unique and the countryside is open and regarded as very appealing and without precedent in the country.

The bus drive to our first stop is 20 min.
5.1 STOP No 1. BUNKEFLOSTRAND (Tidal marsh and anthropogenic coast)
Coordinates; 55°33'47.48"N  12°54'6.86"E

The coastal meadows and the marsh just south of the bridge and further south to the Klagshamn peninsula is an area of national environmental interest. Figure 41. The area is the first nature reserve within the Malmö city administration borders. The coastal meadows have been used for grazing during several thousand years. The flora that has developed is extremely rich in species dependent upon grazing. The low area is by nature often flooded because of sea level changes (tide, wind, air pressure). Levels up to +1.5 m.a.s.l. are hence frequently flooded almost weekly. The shallow area off shore is extremely important ground for spawning and for young fish and other marine organisms. The depth of 3 m is reached as far as 3km from the shoreline cf. Figure 45 and 55.

5.1.2 Vegetation

The temporarily flooded areas lack higher vegetation – bushes and trees. However during the last decades when grazing has declined a bush encroachment has started at some places. It is basically willows (Salix sp.), birch (Betula sp.) and al (Alnus sp.) that are increasing and measures are ongoing to stop or control this process. A “new” and steadily increasing species is the Common sea-buckthorn (Hippophaë rhamnoides) (se. Havtorn, Havstörne) which grow on higher levels which are not flooded. (Figure 42)
Figure 42. The rapidly spreading Common sea-buckthorn (*Hippophaë rhamnoides*) (se. Havtorn, Havstörne) together with wild rose. (Photo J. Åkerman)

The marsh lands here show distinct patterns of vegetation zonation. Despite low salinity we may find Glasswort, *Salicornia europaea* (se. Glasört). In Skåne however, we more often find the Cordgrass (*Spartina alterniflora*) and Salt marsh hay (*Spartina patens*) (se. marskgräs) and Common saltmarsh-grass (*Puccinellia maritima*) (se. strandgröe) in the wettest zone. There is also a wide distribution of Sea clubrush (*Bolboschoenus maritimus*) (se. Havssäv), *Schoenoplectus lacustris* (se. säv), Softstem bulrush (*Schoenoplectus tabernaemontani*) (se. blåsäv) and Common reed (*Phragmites australis*) (se. bladvass, vass eller rörvass). These species all have different tolerances that make the different zones along the marsh best suited for each individual species. (Figure 48)

The grass covered small islands that are regularly flooded have English scurvy grass (*Cochlearia officinalis anglica*) (se. engelsk skörbjuggsört), Houndstongue (*Cynoglossum officinale*) (se. hundtunga) Figure 43, burr chervil (*Anthriscus caucalis*) (se. taggkörvel) and Blue iris (*Iris spuria* L) (se. Blå svärdslija) as characteristic species.

Common eelgrass or seawrack (*Zostera marina*) (se. Bandtång - äldre namn ålgräs) is the most common species and extremely wide spread below the low water level everywhere along shallow coastlines. During autumn the Common eelgrass shred its leaves which are blown ashore and form high accumulations of smelling walls along the high or mean water levels. Historically this dead grass was an important source for soil improvement on the nearby fields.

The uppermost zone of the beach which normally is not flooded by salt or brackish water has a soil water regime that is controlled by precipitation. Spray from the sea will however restrict this environment for sensitive species. One characteristic feature is more or less permanent walls of dead sea-weed and of
course all kind of washed ashore waste.
In or close to these walls dominate Couch grass (*Elytrigia repens*) (se. kvickroten). Other common species are Common Silverweed (*Potentilla anserine*) (se. gäsört) the Grassleaf orache (*Atriplex littoraiis*) (se. strandmålla), Spear- leaved Orache (*Atriplex prostrate*) (se. spjutmålla. and Creeping Thistle (*Cirsium arvense*) (se. äkertistel). Some perennial species that are common here are Sea mayweed (*Matricaria maritima*) (se. kustbaldersbrå var. maritima) and Corn Sow Thistle (*Sonchus arvensis*) (se. äkermolke).

![Figure 43. Houndstongue (*Cynoglossum officinale*) (se. hundtunga) (Photo J. Åkerman)](image)

![Figure 44. Water level changes along the coast of Skåne 1885- 2010. Line is 10-year moving average. (Source. Swedish National atlas)](image)
Figure 45. Google Earth imagery over the Bunkeflostrand tidal marsh area.

5.1.3. Water level changes along the coast of Skåne

Together with the temporal short time water level changes both the natural flora and fauna today have to “consider” the global climate change and the steadily and increasing higher water level. The human settlements, infrastructure and agriculture are also affected and the city of Malmö is a very low-lying city that already has experienced flooding’s the last decades. (Figure 46 & 47)

Together with the city of Kristianstad and the nearby districts of Vellinge and Lomma, Malmö is the city that has come a long way in making plans, for higher water levels and apply these new scenarios in the planning process. New drainage systems, wall etc. has already been build and a lot is in the pipeline.
Figure 46. Low lying parts of Skåne that will be (or already are) affected by flooding due to the rising sea levels.

Figure 47. Land surface levels along coastal zone of Malmö city. Red is areas that will be flooded already at water levels 1m above mean sea water level. (From Malmö City information centre). Inserted is also the district Lomma just north of Malmö City.
Figure 48. Biotope classification of the Bunkeflostrand Nature reserve.
Figure 49. View of the Bunkeflostrand Nature reserve northernmost part at high water level. (Photo J. Åkerman)

Figure 50. The same to the south with the Klagshamn landfill in the background. Note the position of the coastline 1939 (red line) when the fort was built. (Photo J. Åkerman)
Figure 51. Google Earth imagery over the alternative Bunkeflostrand tidal marsh area. Access road “Södra vägen”.
Figure 52a. View at the alternative Bunkeflostrand tidal marsh area during the 2016 excursion. (Photo J. Åkerman)

Figure 52b. Sea level changes in cm at Skanör on the Swedish SW coast during October 2018. Red = observation, Green = short forecast, blue = long forecast. (source: https://www.smhi.se/vadret/hav-och-kust/vattenstand-och-vagor#. https://screenshots.firefox.com/ZVdAkDfPljwQxEku/www.smhi.se)
5. 2. Stop No 2. Foteviken & Hammarsnäs. (Optional stop)
Coordinates; 55°26'9.78"N 12°58'2.89"O

South of the Klagshamn landfill peninsula and south to Höllviken there is again a similar type of coastline like the one we just visited. Together these two areas are unique to Sweden.

The marshlands in Skåne are subject to weak tidal influences but still show distinct patterns of vegetation zonation. In low marsh areas with high salinity, we may find Glasswort, Salicornia europaea (se. Glasört). However, this species is mainly restricted to the true marshlands in Denmark. In Skåne we more often find the common eelgrass or sea wrack (Zostea marina) Cordgrass (Spartina alterniflora) and Salt marsh hay (Spartina patens) (se. marskgräs) and Common saltmarsh-grass (Puccinellia maritima) (se. strandgröe). There is also a wide distribution of Sea clubrush (Bolboschoenus maritimus) (se. Havssäv), (Schoenoplectus lacustris) (se. säv), Softstem bulrush (Schoenoplectus tabernaemontani) (se. blåsäv) and Common reed (Phragmites australis) (se. bladvass, vass eller rörvass). These species all have different tolerances that make the different zones along the marsh best suited for each individual species.

The soil in this section is sand covered by marine sediments and later with a type of peat – marsh-peat.
Foteviken has a long history of human settlements as the bay is protected from almost all wind directions. The inner parts of the bay are completely dominated by various reeds - Sea clubrush (*Bolboschoenus maritimus*) (se. Havssäv), (*Schoenoplectus lacustris*) (se. säv), Softstem bulrush (*Schoenoplectus tabernaemontani*) (se. blåsäv) and Common reed (*Phragmites australis*) (se. bladvass, vass eller rörvass) (Figure 54). The area is extremely flat, it is difficult to get a good view of it in the map or in the field, and hence Google Earth imagery is the best illustrations. (Figure 55)
Figure 54. Reed vegetation in the inner parts of Foteviken. (Photo J. Åkerman)

Figure 55. Google earth imagery of the Foteviken and the shallow area in north of it. Note the sand bars in the surf zone. Black lines indicate camera angle in figure 54.
Figure 55b. The inner parts of the Foteviken during high sea level +1.2 m above normal only. A typical winter situation. Most of the grazing fields are inundated. The field borders of blocks of seaweed and peat are holding the water well where they are intact. (photo Jonas Åkerman, feb. 2002)

Observe:
9. The extremely flat landscape of the old sea bottom
10. The abundant reed vegetation

5.3 Stop 3. Anthropogenic coastline in Höllviken
Coordinates; 55°25'7.05"N - 12°57'0.94"O

There is an extremely heavy use by commuters via Road 100 between the Falsterbo peninsula and Malmö and the old road that went through Höllviken (Figure 56) was for a long time a bottleneck. A new road was planned and constructed along the shoreline under heavy protests from the environmental NGO’s and the public. There were however no alternatives and by working hand in hand (road and environmental authorities) the new road was built and became a very good solution and a new completely naturally functioning beach. (Figure 57)
Figure 56. Stop No. 3. The old road in red and the new road by the blue arrow.

Figure 57. The new beach NW of the Höllviken village. Accumulations of common eelgrass (*Zostea marina*) indicating a healthy sea floor by the arrows. (Photo J. Åkerman)
5.4. Stop 4. Skanör ljung
55°24’0.50”N 12°51’52.22”O

Continuing along road 100 we pass an open area covered with Heather (*Calluna vulgaris*) (se. ljung). This is often regarded as a remnant of the “natural vegetation” of the area, which today is prone to bush encroachment by birch (*Betula sp.*) and willow (*Salix sp.*). Figure 58.

However, residents and seasonal merchants who cut down the original oak woods created the moor (“heater heath”) “Ljungheden” in the middle ages (12-13th century). The hard and valuable oak wood was used for sheds, boats, barrels, tools and fuel. After the disappearance of the oak an encroachment of heather and grasses occurred. Remaining areas of peat was used for fuel and construction of flood protection embankments. These may still be seen at many places. These activities left large areas of the ground open to wind erosion and sand transport creating dune fields that threatened or destroyed farmland. Hence, in the 19th century pine forests were planted both in the built-up areas and on the moor to bind the sand. He moor has a unique habitat type, a mosaic of dry-and moist moor with Cross-leaved heath (*Erica tetralix*) (se. klockljung) and plain heather (*Calluna vulgaris*) as the dominant plant species. The bush and tree encroachment is dominated by birch (*Betula sp.*) and is held back by manual methods and by the long-haired Scottish highland cattle.

The Falsterbo peninsula is otherwise dominated by coniferous plantations stabilizing the dunes and sand fields.
Figure 58. The vast moor or heather heath (Skanörs Ljung) on the central part of the Falsterbo peninsula with stop no. 4. *(Photo J. Åkerman)*

Figure 59. The vast moor or heather heath (Skanörs Ljung) on the central part of the Falsterbo peninsula with stop no. 4. Note the old “canal” from Wiking age times at the red arrows.
Figure 60. The Falsterbo peninsula with stop no. 4 and 5.
Figure 61. The vast heather heath (Skanörs Ljung) and the coastal meadows around and north of the Foteviken bay. (Vellinge kommun)

Figure 62. Proposed new or improved walls around Falsterbo, Skanör, Ljunghusen and Höllviken. (Vellinge kommun)
Figure 63. Water levels from present 0m to + 2.5 m above the present on the Falsterbo peninsula west of the canal. (Vellinge kommun)

Observe:
17. The low-lying landscape - topography.
18. New and old measures for protection against flooding
20. Natural and planted vegetation.
21. Hydrography?
22. Soils?
23. Wildlife?
5.5 Stop 5. The FALSTERBO LIGHTHOUSE and the MÅKLÄPPEN ISLAND
Coordinates 55°23'2.03"N - 12°48'56.02"O.

The west side of the Falsterbo peninsula is a true open horizon landscape. Here in the W and SW we find the old city of Falsterbo which was and extremely important and rich city in the Middle Ages. Its wealth was based on herring fishery and trade. We can still see old houses from this period of a medieval fishing city intermingled with modern permanent houses and summerhouses. Even though our visit is in October, we will see nature enthusiasts, ornithologists, swimmers and golfers enjoying a wealth of plants and animals. The site is an observation site for migratory birds of top world reputation.

5.5.1 The Falsterbo lighthouse
Falsterbo lighthouse is the oldest in Sweden (Denmark), dating back to the 1300’s. The lighthouse is no longer relevant for commercial shipping, but still useful for holiday boating. It is a historic building, which is owned and managed by the Vellinge municipality. The “modern” Falsterbo lighthouse started to operate on 20 September 1796th. The original medieval lighthouse was burnt with coal and the new one from 1796 used the same source of energy. Centrally in the tower was a shaft, in which the burning the coal was hoisted up to the top of the tower. Like a mighty torch blazed the open fire and spread light over land and sea up to the year 1843, when the tower was rebuilt. The upper 1.5 m of the tower was rebuilt with a new lantern and lens unit. The light source was three oil lamps, fired with rapeseed oil produced by pressing of seeds from locally grown rape.

In 1887 the oil lamps were replaced with brighter kerosene lamps that nine years later was changed to the more modern kerosene incandescent lamp. In 1927, a Dahléngasbrännare was installed and 1935 - the same year that the lighthouse was declared a monument - electricity was introduced. The lighthouse was automatized in 1972, and controlled from Trelleborg. In 1990, the lighthouse was shut down and three years later, it was taken over by the Vellinge municipality. The lighthouse was then lit again but only with a 40W "tourist light" to the delight of the population and tourists.

Figure 64. The Falsterbo lighthouse, Stevns klint in Denmark in the background. (Photo R. Larsson)
Figure 65. Oblique view of Måkläppen - 2010. (Photo Björn Hillarp)

Figure 66. The Falsterbo lighthouse, the golf course in the foreground. (Photo J. Åkerman)
Figure 67. Inundated areas at a 3 m higher mean water level on the Falsterbo peninsula. (data Wellinge kommun).

Figure 68. Google Earth Imagery of the Falsterbo peninsula.
5. 5. 2. Morphology

The Falsterbo peninsula and its coasts are built around moraine cores (former islands) (Figure 69) around which marine sand deposits have been deposited during 13 000 years. The moraine islands are probably mainly built up by material from the NE-till and with a thin cover of SW moraine. The sand building up the main part of today’s peninsula is transported from both north and from the east as a result of alternating currents in the outlet sound from the Baltic. To this is added the coastal drift from the wave action following the dominating SW- winds.

Far to the south is the Måkläppen, formerly an island but is now grown together with the mainland (1990). The development trends are shown in Figures 49-52. This half actuate sand bar extends far out into the sea and is constantly changing shape. The middle part of the peninsula is called Flommen and consists of for Sweden a unique lagoon landscape surrounded by meadows and marshes. Along the sandy beach there is a belt of dunes and south of Skanörs harbour there is a continuous accumulation of sandy beach material and build-up of sand bars that moved the coast line more than 50 meters westwards during the last 100 years.

Figure 69. The thickness of sand and the two moraine ridges. (after Blomgren 1999 & Davidsson 1963.

Figure 70. The development of the bar north of Skanör harbour. 1860-1994. (after Blomgren 1999)
5.5.3 Flora

The active open sandy beach is normal for most of the Falsterbo peninsula. The active dune areas have as the main vegetation the Blue Lyme Grass (*Leymus arenarius*) (se. strandråg), European beach grass (*Ammophila arenaria*), (se. sandrör), Baltic beach grass (*Ammophila baltica*) (se. östersjörör) and Sand Couch (*Elytrigia juncea* ssp.}

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**Figure 71.** The development of Måkläppen 1925-1956. (after Blomgren 1999 & Davidsson 1963.)

**Figure 72.** Aerial photos of Måkläppen 1959, 1985 och 1990. See aslo picture from 2009 in fig 54.
Boreoatlantica) (se. strandkvickrot).
On the dry, sandy soil behind the dunes grasses and heath vegetation are dominating including Heather (Calluna vulgaris) (Se. Ljung) and Grey Hair-grass (Corynephorus canescens) (se. borsttåtel).
In the southern part of the Falsterbo peninsula have Falsterbo and Flommens golf courses changed parts of the original vegetation.
As a protection against floods fences were built throughout history using seaweed and turf to build walls and ramparts.
The two cities Skanör and Falsterbo had their heyday in the middle Ages when the cities were the centres of the herring fishery in the Sound. From this time stems remains of the two castles in Falsterbo.
The area is particularly known for the impressive bird migration in autumn. Nabben in the extreme southwest of the peninsula is the place where the migrating birds are forced out over the sea and, as the birds prefer to move over land they are concentrated here. During a good day a stretch of 100's of sparrow hawks, 1000's of finches, sparrows, wagtails etc. may stretch out during a few morning hours.
On Måkläppen a large number of eiders, gull and gull birds are breeding. There is also a colony of seals. Private visits to Måkläppen are restricted during most part of the year but organized tips are offered especially during the winter.

**Figure 73.** Reeds and grass vegetation upon new sandbars and lagoons just west of Falsterbo lighthouse
(Photo J. Åkerman)

**Observe:**
24. The dune landscapes.
25. New and old land use. Conflicts?
27. The lagoons. Salt water, brackish or sweet water?
28. Natural and planted vegetation.
29. Hydrography?
30. Soils?
31. Migrating birds.
32. Other wildlife?
5.6 Stop No 6. Tombolo feature along a blocky moraine coast
Coordinates; 55°23’4.72”N 13° 1’18.54”O

We will stop at a bus stop and walk 20 meters down to the beach to get an overview of a small tombolo feature. (Figure 74 & 75) The coast here is a common type of washed moraine coast with large blocks in zone stretching about 100 m from the present beach. This zone is designed a bit like an abrasion platform breaking the waves at all “normal” wave situations and erosion along the beach is usually insignificant. A narrow strip of sandy or gravelly beach is common - often this is covered with seaweed walls.

Figure 74. The excursion route between Höllviken and Trelleborg with stop no 6.
Figure 75. The Tombolo at stop No. 6. Theoretic picture inserted. (Photo J. Åkerman)

Figure 76. Google Earth Imagery of a tombolo W of Trelleborg.

Figure 77. A view of a tombolo on the west coast of the island of Jersey. (Photo J. Åkerman)
After this stop we will follow the coast E-wards, passing through the city of TRELLEBORG.

5.7. Stop No 7. The SMYGEHAMN fishing village.
Coordinates; 55°20′14.13″N 13°21′35.94″O

A traditional large fishing village with a several century background as a harbour for both full time and part time fishermen. Today the main activities are tourism and a majority of the houses are owned by city people. Several commuters also live here, as the distance to TRELLEBORG, YSTAD and even MALMÖ is not too long. (Figure 78.)

Figure 78. The coastline next to the southernmost tip of Sweden.

Smygehuk, Sweden's southernmost tip is surrounded by diverse shore types and contains culturally interesting buildings and monuments. Sweden's southernmost coastline is characterized by an open landscape, narrow shores of sandy beaches or moraine beaches and with grassland up to the coastal road and then a 100% large scale
agricultural land use inland. The actual beach is quite blocky as the stone-rich moraines have been washed out and the sand transported to the bays as far as to the Falsterbo peninsula in the West and the Sandhammaren in the East. Flint is a characteristic feature of the beach environment and has been an important resource for the early settlers of the area. The flint stone comes from the soft limestone that here is exposed in a low cliff along some hundreds of meters. This is the only site and example of a beach cliff in limestone in Skåne.

Between the harbour and Smygehemmet there is a wetland called Smygärr. This is an old gravel pit where it has formed a rich wetland environment. Calcareous groundwater seeps up and creating a surface flow saturating the surface and give a suitable environment for species such as Marsh orchid (*Dactylorhiza majalis*) (Majnycklar) and the Dune wintergreen (*Pyrola rotundifolia*) (se. vitpyrola). In the shallow water ponds the common frog, moor frog, common toad, large and small newt are regularly seen.

On the beach moor at Smygehuk there is a large population of the Common European adder (*Vipera berus*) (huggorm) that has been the subject of intense scientific studies. Although they are common, it is rare that someone see them as they quickly hide if someone comes close. Even the rare European green toad (*Bufo virdis*) can be seen in the area and may be heard during warm April evenings “playing” with its characteristic trill. (Figure 79.)

In spring and autumn Smygehuk is a good place to observe migrating birds. During northern winds, the number of migrating birds may be great in the autumn and the small areas with trees is then often full of birds waiting for an opportunity to set off south over the sea.
At Smygehuk, there are also old lime kilns, fish smoking huts, handicrafts and other tourist attractions.
Figure 80. Google Earth imagery of the southernmost tip of Sweden-Smygehuk.

Figure 81. Beach cobbles and small blocks below a low erosion cliff in limestone just east of Smygehuk. The only site and example of a beach cliff in limestone in Skåne. (Photo J. Åkerman)
After this stop (no 7) we will continue eastwards along the coast to Hörte and stop no. 8. Figures. 82 & 83.

Figure 82. The route along the south coast east of Smygehamn. Stop No. 8. is indicated.
Figure 83. The route along the south coast east of Abbekås.

5.8. Stop No 8. The Hörte small fishing village and harbour.

Coordinates; 55°23'11"N - 13°32'51.64"O

Most villages and individual framers on the plain north of the coastline were highly dependent on the fishing as a complement to farming. All along the coast there are small harbours used for this type of small-scale fishing. The HÖRTE village and harbour is a typical example of this. The village as such is not big as the farmers/fishermen lived on their farms further inland. Figure 83. The main fishes caught here was, and still is, cod, herring, salmon, eel, flounder, and others.

Figure 84. The small estuary of the Dybäcks ån river transformed into a harbour. (Photo J. Åkerman)
Observe:
45. The estuary of the Dybäcks ån river.
46. Water quality.
47. The combined moraine/sand coast and its material.
48. The water mill.
49. Wildlife?
50. Anthropogenic features.
51. Why a village and harbour here?

5.8. Stop No 8B. Alternative stop. Example of “Backlandskap” - Dead Ice landscape with kames and kettle holes.

The area east of Ystad is a good example of a Dead Ice landscape with kames and kettle holes. We passed the westernmost part of this area just east of Malmö city along the main ring road E6/E20. Now here when we are meeting road 110 from Malmö we again meet this landscape. You have an example of the formation of dead ice landscapes with kames and kettle holes in your textbook “Hess”. That figure is presented below. During deglaciation blocks of ice or large units of inland or glacier ice may be melting down in situ without glacier movement. They are then often embedded in outwash or in the material in the ice that are melting out and cover the ice. Figure 84b

Figure 84b. The principle of the formation of small scale kettle holes and kames. The kettle holes may be water filled or dry. From Hess. Ed. No 11.
**Figure 84c.** The principle of the formation of large scale kettle holes and kames. Example from Skåne. Vertical scale in m. *From Åkerman 2016*

**Figure 84d.** Dead ice landscape west of Ystad. A large kame complex and kame terraces dominate the picture. *(Photo J. Åkerman)*
Figure 84e. Dead ice landscape west of Ystad. *Google Earth Imagery.* Kettle holes by red arrow. Kame hills by blue arrow. For position and contour lines see Figure 85

Figure 85. The excursion route just west of YSTAD. The Google Earth imagery in Figure 84e is indicated.
The City of Ystad is a good example of well-preserved medieval Swedish cities. The street layout is genuine and still very old and so are a lot of the buildings. In Ystad, one is met by a mix of old and new, as the oldest parts of the city dates from the 13th century. Some of the oldest parts are still intact, even though the city has experienced great fires and plundering during the wars with the Danes during the 17th century. The oldest building in Ystad is the Maria church, built around 1200. Here we also find the second oldest monastery, Gråbrödrakloster, inaugurated in 1267. The city museum is situated in the Franciscan monastery, and here we can see an exhibition about the history of the Franciscan Order, the monastery and Ystad in general. Ystad Theatre is unique in its kind, as it - along with Drottningholm Theatre in Stockholm - is the only theatre in Sweden that is still operated with an 19th century machinery.

If you are interested in Dag Hammarskjöld, we will, time permitting, visit Backåkra, where his art, furniture and other belongings are exhibited.

![Figure 86. Ystad in the year 1812 map. The reddish area is the area that today is developed with buildings and industries](image)

After passing Ystad, we will continue eastwards along the coast. We will pass through the “Ystad Sandskogen” summerhouse settlements. These are, or rather were “upper class” summerhouses to the city people of YSTAD. Today many of them have become permanent residential houses. Further east we find smaller summer houses and camping sites for both permanent and short time camping.

The coastal pine forest known as Ystad Sandskog was planted in the first half of the 19th century to protect the town from sand storms; it is now a favourite spot of Ystad residents. Today the forest is dotted with summer
cottages, cafés and eateries as well as a traditional hotel and other forms of accommodation. The beach with its jetties and offshore rafts is enjoyed by many, as are the new beach ball, volleyball and boule courts and the children’s playground. Ystad is one of the few towns in Sweden that can claim a beach in the centre of town.

5. 9. Ystad Sandskog (optional stop).

Ystad Sandskog is a set of ten old beach ridges from a warmer time and an area with vegetation covered dunes. Ystad Sandskog is an about 5 km long coastal area east of the Ystad City, (Figure 87 & 88). The dunes and the old beach ridges are situated one kilometre north of the present coastline. The old beach ridges are from postglacial warm period and the area is today completely covered with vegetation and exploited for summerhouses.

![Figure 87. The route east of YSTAD](image)

The soils are fine sand and occasionally with parts dominated by gravel. Especially in the eastern part of Sandskogen the sand ridges lie parallel to the coast as traditional coastal parallel dunes. Some of the dunes are up to 10m while the old beach ridges rise only 1-2 m. The beach ridges were formed by the sea when the water was 3-5 meters higher than now. Currents along the coast transported sand and deposited it in sandbanks and elongated beach spurs. The material came probably from both Revnabben near Ystad city and from Kåseberga the east. The beach ridges and the beach spurs developed in succession with the rising land surface and created the complex system we see today. The beach ridges were formed 4000-7000 years ago, when the water level was 3-5 meters higher than now and when Earth's climate was much warmer than at present – the postglacial warm period. This period is called the Littorina period after a little salt-water snail, which was a key species in the sea at that time.
Beachridges from the Littorina period are found in many places along Skåne coasts, such as Järavallen, and all along the road from Höllviken–Trelleborg-Ystad, which we have travelled along today.

In general, there are only one Littorina beach ridge along the coast of Skåne, but in the shallow bay east of the Ystad ten distinct levels can be seen. This indicates that sea level varied during the Littorina time several times with ±1-2 m. The beach ridges are often covered with dune sand. The reason for the sand drift in the area is that the natural vegetation and forest was cut for timber, fuel, the seaweed was collected to be used as fertilizer, and the pasture grass areas were often overgrazed causing wind erosion scars. The Herrestads bog inside the beach ridge system was deliberately drained in 1888 and after that followed an extensive peat extraction period with a production of over 1500 tonnes of peat a year. The Herrestads bog is today more or less completely empty of peat and the wetland is covered with various reeds.

**Figure 88.** The set of beach ridges in Ystad sandskog just east of YSTAD.

**Figure 89.** The route north of the “KÅSEBERGA hills” and our lunch stop at KÅSEBEREGA harbour. Stops 9, 10, 11 & 12. are also included. Blue lines are walking routes.
**Hammars Backar and Kåseberga åsen**

Having left the pine forest planted upon the dues of the Ystad Sandskog and passed the Kabusa River we enter an open landscape, which is called the Kabusa meadows. These open grasslands here and in the east part of Skåne around the Ravlunda fields are ecologically true east European sand steppe. Both Kabusa and Ravlunda are still today military exercise fields that are kept open by the military activities and by grazing. The flat open steppe is soon merging into a long coast parallel ridge or set of hills almost 15km long. This is the Kåseberga ridge, which has its highest part in the western part – Hammmars backar where the highest top is 40 m high above m.s.l. The ridge has basically a sand steppe vegetation throughout but most of the area is under controlled grazing. The sea side of the ridge form classical “backafall” beach bluffs (Figure. 90 & 91). The north facing slopes are generally more gentle and in many places sets of small terraces are formed. These are cattle steps but have a natural slope process as the main background. Secondarily long trampling by cattle trampling has emphasized the form.

*Figure 90. Kåseberga and the Kåseberga ridge in the year 1812 map.*
5. 10. Stop No 10 & 11. KÅSEBERGA fishing village and ALE STENAR.

Coordinates;  P-lot  55°23’0.88”N - 14° 3’48.61”E
            “Ale stenar”  55°22’56. 85”N - 14° 3’16.73”E

After YSTAD we will make our first stop at the small fishing village of KÅSEBERGA. After we again have reached the coast east of Ystad at Kabusa the view of the sea will soon disappear behind a ridge, which is the Kåseberga backar or Kåseberga åsen. The ridge between the road and the coast is a huge hump of gravel and sand left by the inland ice. Fortunately, there is a small gap in the ridge and we can cross down to the coast and reach the Kåseberga village. Here we find a small harbour with toilet facilities, kiosks, hamburger kiosks, and tourist shops together with fish shops and small restaurants. Here we will have our lunch and also take a walk up to the mysterious site “ALE STENAR”. The lunch break will be 30 min. and the walk up to Ales stenar and back will take another 30 min.

ALESTENAR (Ales Stones) is Sweden's largest preserved "ship setting" - stones set in the layout of a ship. We do not know what function the stones have had through the ages, or what the ship setting symbolised for the people who created it.

Figure 91. The Backafall shores just east of Kåseberga harbour. (Photo J. Åkerman)

5.9.1 The Ship settings

67 meters long and 19 meters wide, Ales stenar is one of the largest ship settings in the Nordic region. It comprises 59 carefully selected stones weighing between 500 and 1800 kilos.

Ship settings date from two periods - the late Bronze Age (ca. 3,000 - 2,500 years ago) and the early Iron Age (ca. 1,600 - 1,000 years ago). Archaeological tests can be used to determine the age of Ales stenar. The Carbon-14 dating system for organic remains provides seven results at the site. One dates the material at around 5,500 years old, whereas the remaining six indicate a date around 1,400 years ago, probably the most likely time that Ale stenar was created.
Ales stenar has fascinated for hundreds of years. There are numerous theories as to the function and significance of the ship, but very few indisputable truths. One sure fact, however, is that the site has never been such a visitor attraction as it is today.

Ship settings are generally regarded as burial monuments, and many of the settings found in Scandinavia do contain one or more graves. Yet no grave has ever been positively identified in the limited area that has been subject to archaeological research at Ales stenar.

If the site is not a grave, what function can the monument have had? One theory is that the ship setting was constructed to honour the crew of a ship who perished at sea. Another theory is that the ship was built to determine various times of the year. The alignment of the stones in relation to the sun is such that the sun sets over the North West tip of the monument at midsummer, and rises at the opposite tip at midwinter.

For long periods, the ship setting was covered by loose sand. In 1916, when the monument was first restored, only 16 of the 59 stones were standing upright. Sand was removed and the fallen stones were re-erected. In 1956 the area was restored for the second time, but unfortunately, no simultaneous archaeological investigations were carried out. Instead, the soil around the stones, which may have contained any number of finds, was transported away.

One sure fact, however, is that the site has never been such a visitor attraction as it is today. The mystery surrounding the purpose of the ship setting, the stunning location and wide-open views attract more than 300 000 visitors per year.

**Figure 92.** Google Earth imagery of Ale Stenar, the Backafall bluffs just west of Kåseberga harbour.

Observe:
- 52. This is our lunch stop. Special instructions!
- 53. The “backa fall” coastal bluffs.
- 54. The material and its detail forms.
- 55. The vegetation.
After Käseberga, we will continue east and through another gap in the ridge we will reach the summer beach resort of LÖDERUP. Here the coastline is severely affected by coastal erosion and we shall take a short walk and see how it has affected the coastline and the property owners and how the problems can be tackled.
5.12. Stop No 12. The BEACH EROSION at LÖDERUP
Coordinates; 55°23'0.48"N - 14° 6'34.61"O

We will meet an area with severe beach erosion that has caused loss of beaches, summerhouses and other properties. The problem is old but accelerated in the 1970-ies and onwards. Early private protection actions were not successful and only a full-scale restoration programme performed by both local and national authorities have gained results. The erosion is a natural phenomenon but as increased through the construction of the Ystad harbour and other human activities along the shores. The city council of YSTAD and its dep. of environment are locally in charge of the protection work that is going on. Together with LUND UNIVERSITY, there is a monitoring and research program going on, our Dep. is participating in expert groups, and act as supervisors for works done – including several Masters and Bachelor’s thesis. We will leave the bus at the Löderup camping and walk about 2 km into the Hagestad nature reserve further to the east.

Figure 94. Google Earth imagery of the Löderup beach.

Figure 95. The Shoreline changes 1818 to 1990 at LÖDERUP. (Davidsson 1990)
Figure 96 & 97. The Shore line changes at LÖDERUP a) Löderup 1974, b) Löderup 2008. (Photo J. Åkerman)

Figure 98. Coastal erosion in sand dunes and sand sheets with several layers and generations of soil horizons east of LÖDERUP. Note the three layers of sand and the thin O-horizons in between. An O-horizon is the top layer of a soil profile with very high organic (humus) content. (Photo J. Åkerman)
Figure 99. Coastal erosion in sand dunes with collapsing pines east of LÖDERUP. (Photo J. Åkerman)

Figure 100. Measures to stop the coastal erosion east of LÖDERUP. (Photo J. Åkerman)
Figure 101. Coastal erosion January 18\textsuperscript{th} 2007. (Photo J. Åkerman)

Figure 102. Severely damaged beach repaired with infill of sand dredged from the sea bottom south of the Löderup coast. 2007. (Photo J. Åkerman)
Det kan löna sig på många sätt att läsa naturgeografi

Klockarestigen 2, Löderups
Strandbad, Ystad
Ditt livs tillfälle att förvärva en stuga
på ett ypperligt läge med fri
havsutsikt och med havet som
närmsta grannen! Njut av utsikten
mot Käseberga och Hambars Backar
och fram till Skillinge och föl
årstidernas skiftningar i havet. Detta
kommer verkligen att bli Din egen
lilla oas och rekreasionsplats i den
stressede verden!

Basfakta
Adress: Klockarestigen 2, Löderups Strandbad, Ystad
Pris: 1 795 000 kr = 191 800 EUR utgångspris
Typ: Fritidshus, friköpt tomt
Rum: 2 rum varav 1 sovrum
Boarea/Biarea: 45/0 kvm Tomtarea: 1 518 kvm Byggår: 1954
5.13 Stop No 13. The HAGESTAD Natural Reserve
Coordinates; 55°22'49"N - 14° 8'17.97"O

Hagastad nature reserve has been created partly to safe guard the unique ecosystem and partly to open up the valuable and sensitive stretch of coast line for outdoor life and recreation. No buildings are allowed and the area is open to everybody. Compare the right of admission that we discussed earlier. For more information use (www.allemansratten.se).

The reserve is characterized by its wide expanse of sand dunes, formed over the years by the effect of wind and waves. We have now just entered an area where the sand is accumulated, not eroded, along the shore. The transition between the erosion coast and the accumulation coast is just east of the small brook Tyge å (Figure The accumulation is at its maximum further east where sand has accumulated since the end of glaciation and the coastline is today several km further south. The speed of the accumulation can easily be seen at the next stop where the lighthouse and some military installations today is far from the coast line where they originally were built. Sand erosion and wind transport was so extensive that large areas were planted with pine in order to bind the sand. Planted pine today comprises a large part of the areas vegetation. Natural oak, mixed birch and other broad life trees are the dominant vegetation. Small openings with heath lands are common and the common heather is common in the area.

Observe:
58. Erosion features
59. Deposition features.
60. Measures against erosion. Physical structures – sand filling.
61. Groins
62. Wave breaks and peers
63. Wave pattern and types.
64. Landuse
65. New and old houses.
66. The Camping site.
67. The forest.
68. Different soil layers.
69. Wind erosion and deposition features.
70. Amber!!!
Figure 104. The summer resort Löderup and the coastal erosion sites we are visiting. Our walk path in red.

Figure 105. The Shore line in the western part of the Hagestad nature reserve. (Photo J. Åkerman)
Figure 106. Outlet of the small brook the eastern part of the Hagestad nature reserve 2010. Just here, you turn left to find the bus. How does it look today? (Photo J. Åkerman)

Figure 107. Outlet of the small brook the eastern part of the Hagestad nature reserve 2016. Just here, you turn left to find the bus. How does it look today? (Photo J. Åkerman)

Secretary General of the United Nations 1953-1961, is one of the most admired and respected international leaders of the 20th century. His courage, integrity and sureness of touch communicated themselves to others in a way that made a profound impression on people all over the world. He personified the ideal of the United Nations Charter in action. Hammarskjöld had his summerhouse just outside Ystad at a place called Backåkra. This was his retreat during his few days of holidays during his active diplomatic career. Today the house is a cultural centre used for seminars courses and official functions during state visits etc. The area around the house is a natural reserve with nice scenery and an unique sand steppe flora and fauna.
Figure 108. The area around stop no. 15. “The SANDHAMMAREN BEACH”.

5.15. STOP 15. The SANDHAMMAREN BEACH.

Coordinates; 55°23'8.03"N- 14°11'46.30"O

The beach at Sandhammaren is allegedly the finest in Sweden and often stated that the fine white sand has no equal. The endless beach, sand dunes and inland pine forests can be enjoyed in any season. The highest sand dunes are between 10 and 15 m high. Sandhammaren is one of the most southerly points of Sweden and a corner where traffic pass close on the way from the Baltic sea towards the open ocean in the west. Throughout history but especially during the 1600 to 1800’s it has been a notorious ships graveyard.

Lighthouse and lifeboat station
The lighthouse at Sandhammaren was brought into service in 1862; it was designed and built by the famous lighthouse builder Nils Gustaf von Heidenstam. In the middle of the 19th century, one of Sweden’s first lifeboat stations was established here. The lifeboat station remained in service until 1945 when it moved to Käseberga; however, the old lifeboat may still be seen in the old boathouse. Note that the lifeboat station is today situated some 500m from the present shoreline – an obvious sign and measure of the rate of sand accumulation. (Figure 109)
Figure 109. Google Earth Imagery of the Sandhammaren beach and stop No. 15. The position of the coast line when the lighthouse at Sandhammaren was brought into service in 1862 is indicated with a red line. The Lighthouse at red and boathouse with blue arrow.
Along the Sandhammaren shores sea transported sand is since deglaciation continuously transported onto the shore. During some postglacial short periods, however, a negative regime has prevailed and removal of sand has dominated. The sand deposits in the bars and dunes are mixed with organic material and therefore rich in mineral nutrients. A more or less constant supply of sand from the sea is a prerequisite for the development of the dune system and its growth. Over a period of years, the mass balance must be positive or what has been built up over
decades may otherwise be washed away in a few hours during a heavy storm. The dune formation is essentially a physical process, but also greatly affected by the colonizing vegetation. The vegetation stabilizes the dunes and prevents erosion from waves and wind. The vegetation also traps wind transported sand and help in building the dunes higher. The first plants to colonize the sand washed ashore act as sand traps and a first primary “dune” is formed (Figure 112). If not destroyed by high water levels the primary dune may be colonized by the higher and more resistant higher grasses and thus form a more durable unit or for stable dunes to form (Figure 113).

The most common plant acting as a stabilizer is the Lyme grass (*Elymus arenarius* L.) (se. Strandråg) which is a psammophylic (sand-loving) species of grass in the Poaceae family, native to Atlantic, Central and Northern Europe and the coldest shores of North America.

In Europe, the plant's stems are used also for roof thatching and can be woven into a coarse fabric. Seeds have provided food in the past. Beginning as early as the 18th century, the plant's extensive network of roots was used in stabilizing sands on northern coastal beaches.

The large grasses are a prerequisite for the formation of a stable row and continued growth of stable dunes. The grasses all have very large root system with long spurs and a quick sprouting. They are thus very well suited to grow rapidly. This ability is essential for them to be able to survive in the dune, and thereby a prerequisite for the growth of the dune.

In order not to have to be over-sanded completely and suffocated, the grasses must grow at the same rate, or quicker, than the sand accumulation. Another problem faced by the grasses is water shortages in the dunes, which is associated with the sands poor water holding capacity. The dune grasses have different adaptations for an efficient water management. For example, they can roll up the leaves in order to reduce stomata exposure and transpiration. The dew forms a very important part of water budget in a dune environment in all climates.
Gradually the stabilized “white” impeded dune is aging. New primary dunes are formed outside them, and as these are trapping sand there is a reduction in the sand supply to the inner dunes. The dunes are then increasingly being leached and the nutrient content and the pH decreases. The dune grasses may start losing ground and other, more low-growing species, especially mosses and lichens, and vascular plants like Sand sedge *Carex arenaria*, Borsttåtel *Corynephorus canescens* and Gulmåra *Galium verum*, takes over. The lichens and mosses are increasing the humus content and change the colour of the dune sand to a greyish colour. The grey dune is further leached and the vegetation composition undergoes further change. The Heather (*Calluna vulgaris*) and the crowberry (*Empetrum nigrum*) are species that will increase and eventually take over. Eventually trees and shrubs, mainly oak (*Quercus sp.*), Birch (*Betula sp.*), Willows (*Salix sp.*) may invade and the dunes are forested. Pine trees, which have been planted on Sandhammaren, often also appear during this stage.

This described vegetation succession from Sandhammaren may take place at several other places along the sandy shores of Skåne, albeit on a smaller scale. Bathing, camping, and other human development and settlement activities often disturb or even prevent this. If the dunes and the vegetation are disturbed wind-erosion is activated especially during winter when the grasses are vulnerable. The erosion exposes new surfaces of fresh sand. These erosion scars may be recolonized but it means that the dunes are kept more or less in the stage of dune grass cover. As a result, simple vegetation wear and disturbances by human beach activities may be more harmful than commonly understood. A common result is that we contribute to that many sandy beaches suffer from an impoverishment of the flora and fauna.
Vegetation development outside the coastal dune area.

The succession of the large-scale vegetation pattern within the Sandhammaren area is well known from early investigations and maps.

A. Up to the late 1700th the original vegetation outside the active dune area was basically dominated by Heather (*Calluna vulgaris*) and oak bushes on the dryer sites. In wetter, former lagoon areas, the Birch (*Betula*) and Willow (*Salix sp.*) dominates the higher vegetation (Figure 114). The area was not used very much by man except for some grazing and wood collection.

B. In the late 1700s and early 1800s when the coastal processes resulted in wider and wider areas with sandy beaches and dune formation the direct threat from wind-blown sand increased to inland agriculture and settlement. Extensive programs and projects were started all along the coasts of Skåne to control the sandy soils along the coasts (and also elsewhere inland). It therefore pine was planted to bind the sand. In addition to our native species of pine *Pinus sylvestris*, a number of non-native species, such as the tall black pine *Pinus nigra* and the shrub-like mountain pine *Pinus mugo*, both exotics from Central Europe Mountains.

In the late 1700s and early 1800s resulted in larger areas with sandy dune formation is often a direct threat to inset chips. It therefore pine planted to bind the sand. In addition to our native species of pine *Pinus sylvestris*, a number of non-native species, such as the tall black pine *Pinus nigra* and the shrub-like mountain pine *Pinus mugo*, both residents of Central Europe Mountains.

![Figure 114a. The development of the higher vegetation on the Sandhammaren beach area. (After Olsson 1972)](image_url)
Figure 114b. The development of the higher vegetation on the Sandhammaren beach area. (After Olsson 1972)

Figure 115. Rip currents – something that you all must know about!!!
Rip currents.
Currents in the nearshore zone: (A) feeder longshore currents, rip currents and mass transport returning water to the surf zone; (B) relationship between edge waves and rip currents; (C) position of rip currents with edge waves and incoming waves, which are 180° out of phase; (D) longshore currents associated with an oblique wave approach. Figure 115. (Based on J. L. Davies (1980) Geographical Variation in Coastal Development (2nd edn) Longman, London Fig. 76, p. 103 and P. D. Kornar and D. L. Inman (1970) Journal of Geophysical Research 75, Fig. 9, p. 5926)

Figure 116. Wind ripples on the Sandhammaren beach. (Photo J. Åkerman)

Observe:
77. The position of the old beach lines.
78. The dune field and the dunes.
79. Vegetation in the area from the P-lot to the beach.
80. Wind erosion and deposition features.
81. White and grey dunes.
82. Bush and tree encroachment.
83. Waves – types of breakers and patterns.
84. With of the beach
85. Sand bars
86. Dune development
87. Wind and wave ripples.
Figure 117. The Sandhammaren area with the stop no 15 and the rout eastwards. Note that all land south and east of the road (in red) is postglacial sand aggradation.

From Sandhammaren we continue along the coast until we reach the fishing village of Skillinge. This is one of the main fishing harbours on the south coast but it has gradually been transformed into a summer resort for tourists. Time permitting, we will make a short stop here.
5.16. Stop. No 16. Simris strandängar (Optional)
Coordinates; 55°31'59.69"N - 14°21'12.33"O

The coast south of Simrishamn is terraced into a series of old beach ridges formed during the deglaciation. At many places, the soil cover is very thin, or absent, as the bedrock – quarzitic sandstone has been washed bare by the storm waves from the east. Along the coast, especially further north of Simrishamn also black shales (alunskiffer) of the Silurian age are frequently found and form low rocky shores (Figure 118).

Figure 119. Soil map of the Simrishamn area. The legend is the same as in the previous soil maps. (Map by SGU)
Figure 120. The area around Simrishamn.

5. 17. Stop. 17. Rock carvings at Simrislund.
Coordinates; 55°32'20.86"N - 14°21'21.48"O

In the area north and south of Simrishamn the quarzitic sandstone from the Cambrian period is the characteristic and dominating bedrock elements both along the beaches and in the higher terrain. Several quarries show that the quartzite had a great value during the 1800-1900s. Today, most of the quarries are closed down.
West of the old narrow coastal road Brantevik - Simrishamn, we find the Simrislund rock area. It is an area where the sandstone lies open in the terrain with several rock outcrops forming roches moutonne’s. The old wave ripples from the Cambrian sea waves may also be seen.

The carvings are found on many different rock surfaces of the area. The largest and most easily accessible are those next to one of the abandoned quarries. The rock carvings are from the Early Bronze Age and probably symbolize or represent the ceremonies and religious cult acts. Ship, sun-wheels, human figures, axes and animals dominate the rock carving scenes.

**Figure 121.** Rock carving at Simrislund. *(photo J. Åkerman)*

**Figure 122.** Glacial striation and crescentic closed cracks (se. parabelriss), at Simrislund. *(photo J. Åkerman)*
5.18 Stop. 18a & b Tobisvik and Vårhallarna –
Coordinates;  Tobisvik: 55°34'2.36"N - 14°20'24.76"O
Vårhallarna 55°34'43.24"N - 14°20'5.24"O

18a. Tobisvik.

Tobisviken is situated immediately north of the city of Simrishamn. It is a popular recreation area with a camping site. Tobisviken has a sandy beach that is different from most other beaches in Skåne as its sand grains are larger. The average size is 1.6 mm, whereas common beach sand in the region has a size of about 0.9 mm or less. The sand grains are well rounded and 90% is pure quartz. The sand at the bottom of the sea off Tobisviken is relatively finer than ashore and it is therefore clear that the coarse sands are sorted by the waves along the shore. Both to the south and to the north of Tobisviken the bedrock is white Cambrian quarzitic sandstone. In general, this bedrock is well cemented so that all pore spaces are filled with silica. Therefore, rock does not break down along the crystal boundaries of the original sand grains but break irregularly transversely through them. Thereby, it is possible to recognize the grains of the sand and it shown that they represent less than 5% of the local sands. Thus, the local sandstone is not the origin of the coarse sand along the Tobisviken beach.

Figure 123. The north part of the Tobisvik sandy beach just in the transition between the sandy Tobisvik Bay and the low rocky coast. (photo J. Åkerman)
Figure 124. Sea-kale (*Crambe maritime*) (se. Strandkål) at Vårhallarna just in the transition between the sandy Tobisvik Bay and the low rocky coast. (*photo J. Åkerman*)

The structure and composition of the coarse sand suggest that the material is preglacial but washed by the postglacial costal processes. It further indicates that it originally must have come from granitic rocks, as these often have large quartz grains. Therefore, there is evidence that the rounded quartz grains derive from deep weathered granite, where only quartz grains remain relatively unaffected when everything else was transformed into kaolinite. Accordingly, we here have a connection to what we have seen up in the NE part of Skåne! It is not impossible that the seabed somewhere in Hanöbukten is remnants of such weathered bedrock.

The sand is very clean and contains a rich micro fauna and has for more than 100 years been used for water treatment. Moreover, it has been used as filter sand for drilled wells, for various laboratory purposes etc. Most of the production is exported. One of the developers, AB Quartz sand, claims that currents and waves constantly brought new material ashore but over the years, it is shown that the beach shifted some 20-30m and beach erosion is still ongoing.

18b. Vårhallarna

North of the camping site the area is a very attractive landscape with a nice beach of unique characters, interesting rock outcrops and the special natural conditions have created conditions for a very rich flora and fauna. Tobisviken, which is lined with its coarse sandy beach material, reach a low rocky sandstone coastline here at Vårhallarna. Here at Vårhallarna, it is again the Cambrian sandstone that is the outcrop and in its surface, we can see the fossil
wave ripples. In the lose sediments there are numerous fragments of the alun-schists that are very common in the area – especially to the north.

Figure 125. The Vårhallarna low rocky coast just north of the Tobisvik Bay. The bedrock is very hard quartzite sandstone with a distinct, preserved surface of old (Cambrian age) wave and ripple pattern on the old sea bottom. (Photo J. Åkerman)
MAP 2. The soil map of SKÅNE.

- **Orange** is sandy soils from below the highest coastline.
- **Violet** is calcareous tills from the SW ice.
- **Light blue** is sandy block till from the NE ice.
- **Green** is glacifluvial sediments