

Report 2009:27

# General archaeological inquiry

## Tapuli

Inquiry step 1 without decision according  
to the Cultural Heritage Law

A supplementary archaeological study for the Tapuli  
mining project. Pajala parish and municipally Province  
of Västerbotten, County of Norrbotten



**Norrbottens museum**

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Dnr 166-2009



Norrbottens  
museum

## Technical Information

County Administrative Board's Register Number:	-
County Museum of Norrbotten's Register Number:	166-2009
Assigner/financier:	Northland Resources Inc.
Ancient remains number:	Newly registered: Raä 1274, Raä 1275, Raä 1276, Raä 1277, Raä 1278 Known remains: Raä 140:3
Type of ancient remains:	Settlements (4 separate settlements), Other cultural-historical remain (Wood for fences? Trap for small animals?)
Municipality:	Pajala
Parish:	Pajala
Province:	Västerbotten
County:	Norrbotten
Property:	Kaunisvaara 1:3, 1:11, 2:6, 16:5, 17:2, 17:5, 17:6, 25:1 among others. Kiäksiäisvaara 2:2, 2:4, Allmänningsskogen 1:1, Kolari 3:2, 3:7 Aareavaara: 3:3, 3:5, 3:6, 3:8, 4:10, 5:1, 6:1 among others.
Type of assignment:	Archaeological inquiry step 1 <u>without</u> decision according to the Cultural Heritage Law (general archaeological inquiry)
Dating:	Settlement Raä 1277 is C <sup>14</sup> -dated to 9384 ± 488 BP Settlement Raä 1276 is C <sup>14</sup> -dated to 10 291 ± 565 BP
Field days and duration:	14 days (17 August – 3 September 2009), (223 hours for 2 persons)
Time for writing report:	10,5 work days + 5 days for translation, (208 h including translation)
Managing of finds:	-
Project leader:	Olof Östlund
Responsible for report:	Olof Östlund
Writer of report:	Frida Palmbo and Olof Östlund (Translation: Nils Johansson)
Field personnel:	Olof Östlund (archaeologist & project leader), Frida Palmbo (archaeologist & assistant project leader)
Underconsultants:	-
Area of investigation:	Northland Resources' areas 1, 2 & 3 corresponds to approximately 10,3 km <sup>2</sup> . Out of these the County Museum of Norrbotten has focused on investigating about 5,3 km <sup>2</sup>
Height above sea level:	Area 1: 145-210 metres. Areas 2 and 3: 160-170.
Coordinates:	Area 1 lies within coordinates x 7489991-7495050 and y 1825286-1840916. Area 2 lies within coordinates x 7499529-7500804 and y 1824935-1826425 Area 3 lies within coordinates x 7503213-7504298 and y 1828486-1829793 (RT 90 2,5 gon V)
Economic map:	Area 1: 28M 8f, 28M 8g, 28M 8h and 28M 8i. Area 2: 28M 9f and 29M 0f. Area 3: 29M 0f, (economic map, the Swedish Surveying Office's digital mapping).
Documentation material:	All originals, in this case written notes and digital photos, are kept at the County Museum of Norrbotten's corresponding (acts-, picture-) archive. This applies to analogue as well as digital material. Photo Acc number 2009:92:01-44, (44 pictures) appendix 2
Digital documentation material:	The digital basic data for decision exists in shape format in RT90 2,5 gon V. It's stored at the museum's servers. Back-up-copies are created daily by the County Council's personnel on all material that is stored on server. In the meantime recommendations for long time storage of digital archaeological material are awaited from the Swedish National Heritage Board (SNHB).
Digital software:	Microsoft Office (XP), ArcPad 7.0.1, ArcGIS 9.2 - 9.3, Adobe PhotoShop Elements 4.0, FieldGIS.
Archaeological finds:	No finds were taken care of, with the exception of bone for C <sup>14</sup> -analysis.
Photo:	Digital, Acc number 2009:92:01-44, appendix 2
Drawings:	-

Photo on front page: *Frida Palmbo registers the settlement Raä 1276. In the background on the left is the wetland that lies south of the settlement. Photo from south southwest, acc number 2009:93:43, © County Museum of Norrbotten, Olof Östlund.*

# REPORT

General archaeological inquiry Tapuli (Inquiry step 1 without decision according to the Cultural Heritage Law)

Northwest side of Tapulivuoma, the area east of Aareavaara and the so called Honkavaara road between Kaunisvaara and Kolari.

Pajala parish and municipality  
Province of Västerbotten  
County of Norrbotten

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# Introduction

## Background

The County Museum of Norrbotten performed the field survey of a general archaeological inquiry during the period of the 17<sup>th</sup> of August to the 3<sup>rd</sup> of September 2009 assigned by Northland Resources Inc. The inquiry has been executed as a "inquiry step 1 without decision according to the Cultural Heritage Law", this means that Northland Resources Inc. themselves has contacted the County Museum of Norrbotten for this assignment, without a forcing decision of inquiry from the County Administrative Board in compliance with the Cultural Heritage Law.

The inquiry was compelled by the ongoing mining project in the area of current interest about 15 to 25 kilometres north of Pajala, the project was initiated by Northland Resources Inc. The County Museum of Norrbotten received a request for tenders by Northland Resources Inc to perform a complementary general archaeological inquiry in the three areas that could be affected by the possible mining activity at Tapuli. Area 1 is the so called Honkavaara road that stretches from the village of Kaunisvaara and east towards the Finnish border. Area 2 lies at the north western side of the wetland Tapulivuoma, north of Kaunisvaara. Area 3 lies east of the village of Aareavaara, at the shores of the river Muonio. At earlier inquiries (Jussila, Rostedt & Schulz 2007) all details concerning infrastructure and logistics wasn't known, that is why the current areas of interest wasn't reviewed at that time (appendix 2:1-2:4).

The archaeological work was performed by Olof Östlund and Frida Palmbo, County Museum of Norrbotten.

This inquiry shall not be mistaken for a special archaeological inquiry demanded by the County Administrative Board. Such an inquiry can be deemed necessary by the County Administrative Board after the reviewing of the final environmental impact assessment (EIA) according to 11§ 2 chapter in the Cultural Heritage Law (SFS 1988:950).

## Summary

The field work resulted in the registration of an other cultural-historical remain in area 1; Other cultural-historical remain (wood for fences? Trap for small animals?) (appendix 1:1 and appendix 3). Since earlier there was a registered foundation for a cabin (Raä 140:3) within the limits for area 1. The cabin's foundation is connected with two tar piles (swe: tjärdal) (Raä 140:1 and 140:2) but these lie outside the limits of area 1 (appendix 1:3-1:4).

In area 2 no remains were registered at all. Area 2 has rather poor prerequisites for the finding of ancient remains due to geographic conditions (appendix 1:4).

In area 3, four (4) ancient remains were registered; Raä 1274, Raä 1276, Raä 1277 and Raä 1288. They are all of stone age-character. Two of them probably date to the late Stone Age (Neolithic) and has an estimated age of 3800 to 6200 years. The last two were C<sup>14</sup>-dated and proved to be older than 11 000 years (appendix 1:2 and appendix 4).

## Aim

The aim of the inquiry was to find and register ancient remains and cultural-historical remains according to the procedures for a step 1 inquiry (i.e. investigation with only soil probe and eyesight) within the areas stated by Northland Resources Inc (appendix 1:1). These results will complement an EIA which Northland Resources, according to *Request for Tender*, has presented to Swedish authorities during the spring of 2009. The general archaeological inquiry will contribute with an increased knowledge of these areas which is important for any future decisions of the County Administrative Board.

## Direction

With starting point in the topography and the ancient remains registered in these areas it was considered likely to find ancient remains from the early Stone age all the way to modern times in areas 1 to 3. The types of remains expected after the desktop-study were these: settlements from Stone age, Bronze age and Iron age, trapping pits and various remains from reindeer husbandry and remains from forestry.

The goal with the field work was to methodically survey the three areas with focus on the areas where soil class, topography, vegetation and other natural conditions indicated the best chances of finding ancient remains and cultural remains. Descriptions of the newly registered remains and of the areas themselves will function as a part of the basis for future decision-making both for the County Administrative Board as well as for Northland Resources Inc.

## Prerequisites of the Area

### Topography and natural landscape

The general topography of the northern part of Pajala municipality is dominated by the rivers of Torne and Muonio and their valleys. The river Torne stretches from west to east through Junosuando and continues through Pajala and Kengis while the river of Muonio forms the national border towards Finland in the north and east. The area between the rivers consists of a flat, moraine-covered primary rock-plain. In this plains-landscape there are widespread wetlands, primarily on levels between 170 and 220 metres above sea level. The plain is broken by occasional heights, which in several cases reaches a height of about 300 metres above sea level (Algotsson & Sturk 1991:27).

In these two great river valleys there is sediment soils (sand and different kinds of silt) which has been left there by the sea at the end of the last ice age and after the retreat of the sea the rivers continued this process. Sediment soils are also represented at the two lesser watercourses; Kaunisjoki and at parts of Käymäjoki (appendix 1:4).

The vegetation in the north eastern part of Pajala municipality is affected by the topography with flat moraine ground, once covered by the sea. Large areas between the two large rivers consist of wetlands. The most common type of nature is moist coniferous forest with a rich ground vegetation of moss and herbs. The second most common type is wetlands. There are parts in this area of the municipality that is drier and has a lichen rich coniferous forest, there are also this kind of forest at a few places around Kaunisjoki, first and foremost where the watercourse runs east and west of the village of Kaunisvaara. A larger area with this drier, lichen rich coniferous forest exists in the area west of Aareavaara.

### Area 1

The limits of area 1 begin 2 kilometres east of the village of Kaunisvaara. The area is 16 kilometres long and between 240 and 980 metres wide and follows the stretch of the Honkavaara road east toward Kaunisjoensuu at the national border (appendix 1:1). The road winds through a flat landscape with exception for when it passes between the mountains of Honkavaara and Perävaara which is approximately half way along the stretch. Area 1 has its highest levels (about 240 metres above sea level) at the mountain Honkavaara. The lowest levels lie farthest to east close to the river Muonio and Kolari (about 145 metres above sea level). The majority of the stretch lies between 150 and 180 metres above sea level. Even if the terrain partly is very moist both the road and area 1 are found on the driest parts of this terrain. North and south of the Honkavaara road is widespread wetlands.

The most western part of area 1, south of Sammakojänkkä and north of the Honkavaara road (subarea 1A, see appendix 1:1), consists of (in its western part) low, dry islets separated by stretches of wetland. The vegetation is lush. In the eastern part of subarea 1A the vegetation consists of sandy ground and dry, lichen rich pine forest.

Subarea 1B (appendix 1:1) consists of dry and sandy ground overgrown with pine and a ground vegetation almost exclusively of dry lichen. This is a heath land all the way to Kaunisjoki in the subarea's eastern limitation. The heath's name is Kenttäröva where the ending "-rova" means dry land between a running water and still water or wetland. There is a bog to the west of Kenttäröva, and there are also occasional smaller bogs on the heath. The shores towards the bogs are however dry and the bogs are clearly secluded from the heath.

Between subareas 1B and 1C the watercourse of Kaunisjoki stretches (appendix 1:1). The watercourse cuts through this sand landscape in meandering coils and continuously affects and changes it. Scree or talus and the creation of large sand banks (nipor) caused by the running water erodes the heath gradually, day by day. What once lay in the edge of the shore can with time be flushed away by the streaming water.



*Nbm acc nr 2009:93:20 © County Museum of Norrbotten. Kaunisjoki's sand banks and its meandering. Photo taken from the south. Photographer: Olof Östlund.*

Subarea 1C (appendix 1:1) lies on the eastern side of Kaunisjoki. Here the ground is sloping continuously towards the watercourse in the east and it consists of sandy moraine with elements of rock. The vegetation consists of pine with elements of deciduous forest and a rich ground vegetation of blueberry sprigs and different kinds of moss. The ground is considerably moister than at the Kenttäröva-heath.

Subarea 1D (appendix 1:1) consists of an uneven ridge landscape with rocky, partly boulder strewn ground. On occasional places there are sand areas. There is rich ground vegetation with moist demanding sprigs and a variety of moss. The larger vegetation consists of pine and spruce mixed with various deciduous trees.

Subarea 1E (appendix 1:1) lies on the north side of the mountain Honkavaara demarcated by a bog in the north. The ground here consists of a sandy slope with elements of rock but with ledges in the slope itself. Farthest to the north in this subarea is a very rocky and boulder strewn ridge with a steep edge towards a bog in the east. On its western side the slope is more flat than on its eastern side. The vegetation consists of pine with a ground vegetation of berry sprigs. We stopped here because of the ground's composition which looked fairly good even though the area hadn't been pointed out as an area of interest and priority during the desktop studies.

Subareas 1E and 1F (appendix 1:1) are separated by the stream Parkkijoki with connecting stretch of wetland. The stream also separates the mountains Honkavaara and Perävaara from each other.

Subarea 1F (appendix 1:1) lies on the southern side of the mountain Perävaara with a widespread valley in the south where Parkkijoki runs through surrounded by wetlands. The western half of this subarea has been deforested and harrowed, on several places there are very deep harrow tracks. The landscape slopes to the south with rocky offshoots or headlands pointing southwards down the slope at right angles to the direction of the valley. The offshoots or headlands could be end-moraines that have been showed together by the ice. The deforested area is very rocky and full with boulders in its most western part.



*Nbm acc nr 2009:93:40 © County Museum of Norrbotten. Part of the area of inquiry along the Honkavaara road (subarea 1F). The middle part of deforested area with a bog below in the south. Photo from north-northwest. Photographer: Olof Östlund.*

Subarea 1F becomes sandier the longer east you travel. The eastern half of the mentioned subarea is overgrown with a dense vegetation of young pines about 20-30 years of age. There are also signs of forest harrowing but moss and grass has grown so no sand is visible today. In the east part of the subarea there is a gravel pit, it is in the same area as the area with the dense forest of young pines.

Subarea 1G (appendix 1:1) is a sandy bog islet, a low, flat ridge that winds from north to south between two bogs. There are stretches of wetland even in the ridge which suggests that the ridge was created by the retreating sea and that it consists of sea sediment. The middle part of the ridge has dry vegetation in the form of pine and a ground vegetation of dry sprigs and lichen. Closer to the bogs in the east and west the vegetation is dominated by deciduous trees and the ground vegetation gets moister and lush.

Subarea 1H (appendix 1:1) is sandy, but this area has also been deforested for about 30-40 years ago and then harrowed. Here grows a dense forest of young pine together with rich amounts of deciduous bushes. The traces after the harrowing are beginning to vanish under a coat of grass and berry sprigs.

Subarea 1I (appendix 1:1) is not an area pointed out as prioritized during the planning stage. A gravel pit in the area gave however reason to think that the area could be of

interest. The ground consisted of gravel and rock and the vegetation of pine and berry sprigs.

Subarea 1J (appendix 1:1) is the area farthest to the east in area 1. Farthest to the east towards Kaunisjoensuu there is a drier sand ridge where the road north to south stretches along side the river Muonio. West of this ridge there are several bogs that also stretch from north to south in parallel with the river. These are most likely earlier river stretches either of Kaunisjoki or Muonio River. In some cases the shore's edges towards the stretches of bogs are clearly visible, but in most cases the transition between bog and firm ground happens gradually. The vegetation is that of a mixed forest where the majority of trees spruce and various deciduous trees. There is a ridge in the north that is called Hippapalo that is somewhat drier. On this ridge there is also a gravel pit. The ground around the gravel pit on Hippapalo consists of sand and gravel and the vegetation of mainly pine and berry sprigs. On the north side of the Honkavaara road there is an area on the Hippapalo which has been deforested and harrowed. The most western and southern parts of subarea 1J consist to large parts of wetlands or flat and moist forests with a lush ground vegetation of moss and sprigs.

### Area 2

Area 2 lies 4 kilometres north of the village of Kaunisvaara, at the most north western part of the bog Tapulivuoma (appendix 1:1). Area 2 is about 1,6 kilometres long from north west to south east and the width varies from 220 to 730 metres. The whole of area 2 lies within a height of 165 to 170 metres above sea level.

Area 2 consists of wet grounds. The northern part of mentioned area consists solely of wetlands (Tapulivuoma). The dry land that exists between the wetland-areas in the southern parts of area 2 is relatively flat and has rather low shores towards the bogs. This makes the ground wet and moist and the vegetation as a consequence is therefore very lush even on firm ground. The vegetation consists of a mixed forest with pine, spruce and deciduous trees as well moist-demanding herbs, grass, moss and sprigs. There are occasional small moraine heights in the area, consisting of sand and gravel. On these the vegetation is drier with pine, sprigs and lichen.

### Area 3

Area 3 lies south of the river Muonio and east of the village of Aareavaara (appendix 1:1 and 1:2). The area is about 1,2 kilometres long from west-south west to east-south east and the width varies from 430 to 750 metres. Area 3 lies on heights between 160 and 170 metres above sea level.

The river in the north has affected the area in several stages, once as a glacier-river during the last ice age, later on as a cove when it was a part of the sea (or more correctly part of the Ancylyus-lake, the predecessor of the Baltic Sea) and then again as a river. Sand has been deposited at the shores of the glacier-river that transported sediment from the big shelf of ice to the sea. When the sea level reached its highest coastline the waves from the great inland sea, the Ancylyus Lake, flushed in over the shores and left its mark. Since the land rose from the sea, after the ice melted away and the cove had vanished, the river Muonio has with its streaming water deposited and transported away sand from the shores yet again. Area 3 as a consequence of this process therefore consists of sediment that has been deposited and shaped by water.

The topography has two main features, the higher situated and drier sand area in the east and the lower situated and wetter area in the west. The western half lies closer to the village and is considerably moister and has also been ditched by the locals in attempts to channel away some of the water. The ground is low and flat in relation to the wetlands in the south. Large amounts of birch grow here as well as other deciduous trees and spruce. Ground vegetation consists of water demanding moss, herbs and grass.

The eastern half of mentioned area consists to large parts of dry and sandy heath land. The area is called Koskenkangas where the ending of the word means "heath". Area 3's eastern half is at its lowest farthest to the north at the river Muonio and then the height increases



southwards towards a smaller stretch of bogs. The small stretch of bogs or wetland is not to be seen in any of the attached maps but is very tangible in the terrain in reality. Three heights lie in a row in this higher part of the area. The first height, farthest to the east has a gravel pit in its north side but is not deforested as the rest of Koskenkangas. The two other heights are oval shaped and aligned from north-north west to south-south east and the southern edges of the heights ends at the small stretch of wetland. The small pine plants haven't had time to fully grow yet where it has been deforested; they are about 1-4 years of age. The ground vegetation consists of sprigs, moss and lichen. Where it has been deforested it has also been harrowed but in a relatively merciful way; on most areas the peat has only been turned up from the underlying sand. South of the small stretch of wetland there is also a drier sand area which edges towards a sand ridge, but the ridge lies outside area 3's south east corner.

### **Ancient remains and cultural landscape**

During 1992 the ancient remains inventory, a project funded by the state, reached the map sections 28M 8-9 e-f Kaunisvaara and 28M 8-9 g-h Kolari. These sections include whole of area 1 and the southern part of area 2. The northern part of area 2 and the whole of area 3 have however never been investigated earlier. During the surveys of 1992 there were registered several remains in the vicinity of the eastern part of area 1 in the form of 3 settlement pits, 3 tar piles, a settlement bank, a pit and finally a house foundation. A few kilometres from the area several other remains were registered such as settlement banks, trapping pits, cooking pits, a hearth, settlements and yet more tar piles (appendix 1:3). In the western part of area 1 (in subarea 1E, appendix 1:1) there is a house foundation (Raä 140:3). In the vicinity of the western part of area 1 there is several tar piles, a settlement bank, a number of trapping pits and an area with remains from forestry consisting of foundations for a cabin, cellar pits and remains of several charcoal stacks. About 3 kilometres south east of area 2 there are remains of trapping pits and settlement pits while a number of settlement pits are located about 3-4 kilometres north west of area 3. All these remains are located along the stretch of the river Muonio which also area 3 is (appendix 1:3).

An inventory has also been executed by Mikroliitti OY in 2007; this was performed as part of other preparations for mining activity in the areas around Huukki, Kaunisvaara and Sahavaara. During these surveys house foundations, tar piles, a trapping pit, a cairn and a stone fence among others were found in the immediate vicinity of the area of the recent inquiry (Jussila, Rostedt & Schulz 2007).

About 10 500 years ago the sea stood at its maximum level in Norrbotten's coastal zone (Lindén 2006). Lindén's data originates from measurements of sea sediment at the communities of Älvsbyn and Gunnarsbyn. Gunnarsbyn lies 180 kilometres south-south east of Kaunisvaara. The highest coast line in the areas around Kaunisvaara lies on a height of about 165 metres above the modern day sea level (appendix 1:3). The lake of Kaunisjärvi was during this time a part of a shallow and 2-5 kilometres wide sea cove that connected to the sea through a narrow strait in the north east where today the stream Kaunisjoki stretches east towards the river Muonio. This means that the most parts of area 1 and the south east part of area 2 were under water. There were good settlement locations in the smaller coves where there are fine sand grounds. Due to the fast elevation of land (8 metres per century) more and more of these excellent settlement locations became available (Östlund 2009). There are excellent settlement locations for example about 5 kilometres west of Kaunisvaara, at Kaunisjoki's outlet in what was the sea at that time. In this area there are also known remains in the form of settlements and settlement pits in locations with glacier river-deposits (see A, appendix 1:4). At the existing watercourse of Aareajoki (appendix 1:1), about 6 kilometres north-north east of Kaunisvaara and more than 2 kilometres north of area 2, was a fine sea cove for about 10 500 years ago. Here are excellent sand grounds with deposits from glacier rivers which make an ideal environment for settlement (see B, appendix 1:4). Further examples of good settlement locations are the fine sand grounds (glacier river-deposits) that appears at the river Muonio, west of the village of Aareavaara (see C, appendix 1:4). These sandy areas were connected to the sea at the time of the

maximum sea level for about 10 500 years ago. The sandy areas were then a promontory surrounded by the sea in the north (the modern stretch of the river Muonio) and south. The sand areas (glacier river-deposits as well as sea, river and lake sediment) along the river Muonio has therefore been excellent settlement locations through the ages into modern days, but today beside the streaming water of the river and not the sea (see D, appendix 1:4). When the sea retreated after the melting of the ice, with a speed of almost 8 metres per century (Lindén 2006:12) the shallow sea cove east of Kaunisvaara soon vanished and the fine sand areas (glacier river-deposits as well as sea, river and lake sediment) around Kaunisjoki appeared and was well suited for settlement. In this area there are also several settlements registered since earlier (see E, appendix 1:4).

In Pajala municipality's cultural environment plan from 1991 (Algotsson & Sturk) several villages in the municipality are mentioned as interesting from a cultural environment perspective. It is stated in this text that Aareavaara has a beautiful cultural landscape and that Huuki needs a total building inventory because of its very valuable cultural environment which should have a strong protection. There are also valuable cultural-historical surplus grounds (Algotsson & Sturk 1991:106). The village of Kolari was founded in the year 1586 when a farmer of the name Per Kolari is registered as payer of taxes for the first time. It is likely that he was the first settler in the village which was named after him. His farm has probably lain at Kolarinsaari. In the year of 1640 there were five farms in the village: Airivaara, Nuottaniemi, Mella and Kaunisjoensuu. In the cultural environment plan it is stated that a total building inventory is necessary in Airivaara and Kolari (Algotsson & Sturk 1991:107). The mountains Kaunisvaara and Sahavaara are regarded as possible sources for the raw material needed to produce the green stone-tools (magmatic mineral with green color) found in the valley of Torneå river. Along the stretch of Kaunisjoki and its tributaries there are remains from several, old settlements, hay-making grounds, cabins, tar piles and charcoal stacks and a location of a mill. South of the village of Kaunisvaara there is valuable hay-making grounds, spread around the village are also several storage houses (ajtte), barn houses and cowsheds for summer usage. There are also several surplus buildings in the village of Sahavaara which are of cultural-historical value. In the cultural environment plan it is stated that a total building inventory is needed in both Kaunisvaara and Sahavaara and that the whole area along Kaunisjoki should be surveyed (Algotsson & Sturk 1991:108).

In the vicinity of Saarikoskenvaara is Pyöärenoja, it is a hay-making mire that is still used for hay-making (appendix 1:1). Even to this day hay is made with scythe and then used for feeding reindeers in the winter. On the mire is five barns and several hay-drying racks and there is still dam constructions in the ditches. The mire is dammed up in order to fertilize it and receive a larger yield. Hay-making on mires was a technique that was used extensively during the 1800's because of the increased amount of live stock to feed which was needed due to the increase of human population from the 1700's and onwards. Meadows around villages and existing hay-making grounds along rivers and streams wasn't enough anymore. In Norrbotten the hay-making mires are a very important forage type due to that the hay receives a high forage value. The hay-making took part mainly in the shift between June and July due to the fact that you could get a relatively large volume of hay and of good quality at this time. The hay was made with scythe and hanged on hay-drying racks and when it had dried it was stored in the barns on the mire. Hay-making mires could often lie far from the villages that utilized them. Pyöärenoja belonged for example to the village of Huuki but is located about 5 kilometres south of the village. In *Norrbottens synliga historia* (1998) it is stated that the hay-making mire is to be used in the future with traditional methods and that restoration and continuous maintenance of the barns and the dam constructions is necessary (Burman 1998:620f).

The variation of ancient remains and cultural-historical remains in this area, which includes all areas of the inquiry, has been used for a long period of time, from the Stone Age to historical times. Shortly after the ice had melted away attractive areas for settlement appeared and the landscape has with great certainty been used for a long period of time. Saami cots, hearths and camp grounds bare witness of reindeer husbandry while tar piles

and the remains of charcoal stacks tell us of forestry. The area north of Pajala has a long continuity and several cultural-historically valuable places that have been mentioned here.

## Research history

The Swedish National Heritage Board (SNHB) has performed an ancient remains inventory, a state funded survey for ancient remains, during 1992 in the map sections where area 1 and the southern part of area 2 are located. During these surveys several ancient remains were registered, among others settlements, settlement pits, settlement banks, trapping pits and hearths. Cultural-historical remains were also registered during the inventory 1992, remains such as house foundations, tar piles and other remains of forestry (appendix 1:3).

During 2006 the County Museum of Norrbotten performed a directed inventory in the areas around Kaunisvaara, Pajala and Täreändö, the inventory was directed to search for the oldest settlements in Norrbotten and was a part of the project called "Between ice and sea". No settlements were found in the immediate vicinity of the area of inquiry now in question; however one settlement were found and registered about 4 kilometres north of subarea 1E at Kaunisjoki (appendix 1:1). The main aim wasn't however to search for new settlements but to visit already known ones and gather burnt bone in order to perform carbon-14 dating, the settlements chosen for dating were those believed to be up to 10 000 years old. None of the three settlements dated at Kaunisjoki (Raä 452, Raä 1267 and Raä 456:1) were however of that high age. Raä 452 was dated to be about 3000 years old, Raä 1267 was closer to 5000 years of age and Raä 456 was merely 1300 years old (Östlund 2006).

## Starting points of the inquiry

The work was performed in accordance to work plan drawn up by the County Museum of Norrbotten (Nbm dnr 166-2009, drawn up 2009-05-18).

## Method and execution

The study of the area's archaeological values began as an archival and literature study in the County Museum's archive, map material, historical sources and other archive material concerning the area were surveyed. The ancient remains register were also surveyed in existing databases at the County Administrative Board and Swedish National Heritage Board (SNHB). We also took part of the report compiled by Mikrolitti OY regarding cultural environment and archaeology ordered by Northland Resources Inc.

A field inventory was performed during the summer within the areas stated by Northland Resources Inc. as areas 1, 2 and 3 (appendix 1:1).

Even before the start of the field work assessments were made of which subareas within areas 1, 2 and 3 should be prioritized; these priorities were done by assessing soil class maps, vegetation maps and topographical maps. The types of ancient remains known from the northern part of Pajala municipality and its vicinity were also an important factor in the process of deciding priority. Well in the field two more subareas were added in area 1 (1E and 1I) when reality proved better conditions for finding ancient remains than what the maps had shown.

The field inventory was directed at finding and/or visiting types of terrain that we by experience know to hold archaeological remains. This was done with a starting point in an assessment of the topography of the landscape and geographical location in relation to the natural resources that historically has been important. Only soil probe were used during the field inventory to decide whether or not remains originated from human activity. No excavations were performed.

When we came across two settlements and suspected that they could be exceptionally old we contacted the County Administrative Board in order to get an approval to remove burnt bone from existing ground damage. These bones were later dated by the County Museum's own funding, outside the budget for this assignment.

Actions and observations in the field were documented in words as well as in pictures. All new remains were registered (described and then marked out on the economic map), their position were taken with handheld computer/GPS and marked in the field with blue and yellow ancient remains ribbons made of paper for ancient remains and red paper ribbons for cultural remains. Photography was done with a digital camera. The new remains were registered on the Swedish National Heritage Board's (SNHB) form for registration in the ancient remains register (FMIS) and in accordance with the guidelines stated by the SNHB. The course of action used for describing ancient remains follows the criteria that SNHB has established and uses at ancient remains inventory, these criteria can be found in this written document: *Informationssystemet för fornminnen – lista med lämningstyper och antikvarisk praxis*.

Information on the positions of the registered remains is to be delivered in ArcGIS- format to both Northland Resources Inc. and to the County Administrative Board of Norrbotten. The County Administrative Board have been informed and at one occasion consulted. The County Administrative Board has also been given information about the remains found during the field work. Any final decisions regarding the future fates of ancient remains and cultural remains falls upon the responsibilities of the County Administrative Board of Norrbotten, the County Museum of Norrbotten has no responsibility or possibility to make such a decision.

All original documents, in this case written notes and digital photographs, are kept and stored in the County Museum of Norrbotten's archive and picture archive.

Gantt charts of this assignment's respective phase and execution has been delivered to Northland Resources Inc. on a weekly basis during the weeks that work has been planned in other words; during preparations, field work and writing of the report.

## Results

An ocular survey with the aid of soil probe has been effected in the whole of area 2 and 3 together with chosen parts of area 1 (appendix 1:1). With starting point in map studies the County Museum chose to prioritize areas from topography and soil classes in order to produce the areas most probable to hold ancient remains along the stretch of the Honkavaara road, this were done with the known ancient remains north of Pajala in mind. Topography and soil class has significance due to the fact that certain remains are found under certain conditions. Dry grounds that drain rain good, often flat, near a watercourse or some other source of fresh water are examples of known prerequisites that increase the possibility of finding ancient remains on a site.

During the inquiry a total of four fixed ancient remains were found, they were all settlements (Raä 1274, Raä 1276, Raä 1277 and Raä 1278), and one other cultural-historical remain consisting of something that could be remains of wood intended for fences or possibly material for a trap for small animals, for example marten (Raä 1275).

### Area 1

#### Raä 1275

Raä 1275, other cultural-historical remain (wood for fences?, trap for small animals?) was found within area 1 (appendix 1:1).

Raä 1275 consist of a number of sharpened sticks, about 1 metre in length and about 5 centimetres in diameter and found leaning against a tree. Two of the sticks had been driven in between two branches of a spruce. Due to the lichen that had grown on the sticks the assessment was made that the sticks had been standing there for about 30-40 years.

Research regarding the remains has been done and one of the suggestions that have been made is that it's material for a trap for small animals (marten?). In that case it would be some sort of set trap, a so called squirrel log or marten log where a higher placed stick (or log) falls down on a lower placed stick/log when the prey climbs up to snatch the bait. The

sticks could then have been a part of the suspension of the trap in the tree. Something that speaks against this interpretation is that you usually used the lowest branches of the tree to fasten the trap with, not loose sticks that you first had to fasten into the tree. Besides this the sticks are sharpened in one end which suggests that they were intended to be driven into the ground. For example they could have been used for some form of fence. However, the short length of the sticks speaks against this thesis also.



*Nbm acc nr 2009:93:30 © County Museum of Norrbotten. Small animal trap/Marten-trap? Raä 1275. With folding rule extended to 1 metre. Photo from the south east. Photographer: Frida Palmbo.*

Besides this find no other remains were found within area 1 other than the earlier known house foundation (house foundation, historical times Raä 140:3). Outside the boundary of area 1 in the immediate vicinity of Raä 140:3 there are two tar piles (Raä 140:1 and Raä 140:2). No other cultural-historical remains or ancient remains were found within area 1.

Area 1 is very varied in soil classes, nature and topography. The variation means that two extremities for prerequisites of archaeological finds exists within the area; first; flat sand heath up to a watercourse and second; sloping, rocky moraine grounds up to mires. The area with the greatest prerequisites for finding ancient remains is the sand heath Kenttärova in subarea 1B (appendix 1:1) at Kaunisjoki. The area has been surveyed earlier by the ancient remains inventory in 1992 and now the County Museum so the risk that some remain has been missed is minimal.

Subarea 1F was interesting due to its location was close to the highest coast line, but large parts of the area is very rocky and lies in an even slope with few terraces. Subarea 1F's most eastern parts are rich in sand and have therefore better prerequisites for settlements but no remains have been found.

In general the dry, even sand grounds with closeness to water are few and small to their size. During the survey on these few sites no remains were found either.

## Area 2

Within area 2 no ancient remains, cultural-historical remains or probable settlement locations were found. The area consists of wetlands and in between these, low lying, moist grounds. On the occasional dry heights within the area no remains were found.

## Area 3

The four settlements registered (Raä 1274, Raä 1276, Raä 1277, Raä 1278) were found during the ocular survey of area 3. All remains are situated within the eastern part of area 3 (appendix 1:2). The eastern part of mentioned area consists of glacier river-deposits and therefore is an excellent settlement location. Most of the eastern part also lies higher than the highest coast line – 165 metres above sea level – which opens the possibility for a relatively quick settlement after the ice had melted away (appendix 1:3-1:4)

### Raä 1276 and Raä 1277

Two of the settlements (Raä 1276 and Raä 1277) are situated on the south side of the road between Aareavaara and Huukki (appendix 1:2). These settlements are located on small heights, each separated by a distance of about 50-55 metres from each other. The settlements lie approximately 300 metres from the river Muonio on the south side of the small heights. The heights or hills lie up to a bog in the south, yet another hill is directly east of the area of inquiry and is also a probable settlement location.



*Nbm acc nr 2009:93:19 © The County Museum of Norrbotten. View over the most northerly area of inquiry. On the hill closest to the camera is the settlement Raä 1277 situated and on hill farthest away is the settlement Raä 1276 located. Photo from the north east. Photographer: Olof Östlund.*

The settlements of Raä 1276 and Raä 1277 were discovered through the finds of quarts and burnt bone in open damages to the ground caused by harrowing. Burnt bone was collected in order to date the settlements after receiving a permit from the County Administrative Board of Norrbotten. The bone from Raä 1276 was retrieved by collecting it from the surface from an area of 1 x 1 metres in a harrowing track, (GPS coordinate x 7503792 / y

1829639 RT 90 2,5 gon W). The bone from Raä 1277 was gathered through collecting it from the surface from an area of 1,5 x 1 m, this was also taken from a harrowing track (GPS koordinat x7503858 / y1829636 RT 90 2,5 gon W).

Raä 1277 has carbon-14 dated to  $9384 \pm 488$  BP (Before Present uncalibrated. "Present" is always from the year 1950), which means that the settlement is somewhere between 7400 to 10400 years older than the birth of Christ (B.C) in calendar years, calculated with a probability of 95,4 %. Raä 1276 has been carbon-14 dated to  $10\,291 \pm 565$  BP, which means that it dates to 8400 to 11300 B.C. The dated material is burnt animal bone which is leftovers from cooking. The bones are therefore with certainty affected by humans. The osteologist's (expert on bones) analysis says that the bones come from land living mammals. Sadly there wasn't any bone that wasn't too fragmented by the fire, so no species could therefore be determined in the samples that were collected (appendix 5). The relatively large standard deviation on the dating is  $\pm 488$  respectively  $\pm 565$  years, which is due to the fact the weight of the collected bone was just enough to perform a carbon-14 dating according to the laboratory that carried out the dating.

By reasoning about the settlements and by looking closer on the two settlements' dating it goes however to come a little bit closer and get a more exact conclusion about the age of respective settlement. The wetland that lie south of the two settlement hills has during the time of immediate interest been a sea cove and it should soon have vanished due to the fast elevation of the land when the ice melted. The sea cove couldn't be used for a longer period of time as a cove with open water, which seems to have been crucial in the location of the settlements. Due to the similarity in the two sites locations on one hill each, on the same locations on the hills, up to the wetland and the short distance between them (only about 50 metres) makes it likely that they are contemporary.

If you put the two settlements' carbon-14 diagrams on top of each other and then compares the results, the highest values coincides in time around the interval 9400-9300 B.C (calibrated values). If you add the number of years after the birth of Christ we have today (2009 years) you'll see that the settlements should be around 11 300 – 11 400 years old counted from today and in calendar years. These are up to this date the oldest dated human settlement in Norrbotten (appendix 4).

At contact with Ulf Strucke at SNHB the County Museum of Norrbotten got the opportunity to try to calibrate the two dated samples with each other. Strucke stated that the dates for the two settlements coincided to 80% which makes it very possible that they are contemporary. Calibrated with two sigma the combined calibrated date for the two settlements is between 10380 and 8450 B.C. According to Strucke it is not unreasonable to argue that the settlements are 11000 years old (Strucke, oral account).

### **Raä 1274 and Raä 1278**

The other two settlements (Raä 1274 and Raä 1278) are situated on the north side of the road between Aareavaara and Huuki. Both settlements are located close to the river Muonio in the north. Raä 1278 was located in a machine-dug trench where all vegetation had been removed. In the open damage to the ground we found one worked stone in green stone-mineral, a quartz fragment and a ground stone in green stone-mineral (could be a part of a chisel). The ground green stone-object suggests that this settlement most likely dates from the late Stone Age 4200-1800 B.C. However the settlement is not carbon-14 dated and the assessment of its age can not be deemed as certain without such a dating, perhaps in the connection with a future archaeological excavation. The rivers importance as a waterway and as a resource in the form of fish and fresh water has clearly played an important role in the location of the settlement.



*Nbm acc nr 2009:93:03 © County Museum of Norrbotten. Settlement 1278 was found in an area cleared from peat and vegetation. Photo from the south. Photographer: Olof Östlund.*



*Nbm acc nr 2009:93:05 © County Museum of Norrbotten. Material from settlement Raä 1278. Part of chisel? Ground stone in green stone-mineral. With folding rule. Photo from above. Photographer: Frida Palmbo.*

Raä 1274 was also registered from settlement material in quartz and green stone found in existing damages to the ground. This settlement had a similar location up to the existing river Muonio.



## Cultural-historical interpretation

In the County Administrative Board's summary of the archaeological situation in the late 1990's *Arkeologi i Norrbotten* (1998) an oversight is asked for of the coastal areas' ancient remains from early Stone Age and how settlements from that time are situated topographically (1998:29). With that ambition in mind the areas around Pajala are very exciting due to the fact that the highest coast line stretches through the area contemporary with the settlements Raä 1276 and Raä 1277. The highest coast line doesn't occur at the same time all around the Baltic (at that time Ancylus Lake). In the area north of Pajala it coincides at the same time the ice melts away. The elevation of the land is enormously fast due the massive weight it is freed from when ice starts to melt, the melting of the ice isn't rapid enough either to fill up the level of the Ancylus Lake to hinder the land to rise from the sea. The highest coast line therefore is contemporary with the disappearance of the ice and the dates from the settlements tell us that this happened at the latest for about 11 000 years ago.

The wetland south of the two carbon-14 dated settlements in area 3 is most likely the remnants of an earlier strait in a larger cove connected to the Ancylus Lake/Baltic Sea. The glacier river-deposits at the river Muonio suggests that there are more settlements in the vicinity that could be as old (appendix 1:4). The glacier river and the rich animal life around it must have been what first tempted humans to visit the area.

The oldest dates in northern Finland, Norway and Sweden lies to the north at the Norwegian coast of the Arctic Sea. In those cases it is similar or older dates we're time wise talking about. The oldest dates in Finland are up to this date all about 1000 years younger, except in the farthest north up to the Norwegian border and to the farthest south in Karelen. In Sweden all known dated settlements from southern Norrbotten and down to at least the middle part of Sweden younger than those now registered at Aareavaara. In the south, across Västerbotten and southern Norrbotten there were still ice masses left all the way out into the Gulf of Bothnia while the ice already had melted away from the Norwegian coast and southwards.

The early, ice free Norwegian coast has long been known within the field of archaeology. There are two main points of view that are recurrent in archaeological literature during the later part of the 1900's regarding the arrival of humans to the coast of the Arctic Sea in Norway, the so called Komsa-culture. The first theory is that the first humans came there from the continent and south west Sweden and then continued north up along the Norwegian coast. The other possibility that is suggested is that the first settlers came to this area from what today is Finland and Russia (Rankama & Kankaanpää 2008).

According to Tuija Rankama, Helsinki University, the finds of chipped quarts could be an indication of a colonisation from east-north east. On the contemporary settlements in Norway the main mineral found is "chert", a type of dense, fine grained sand stone which reminds of flint when it is worked. Chert occurs only in Norway and not in northern Sweden or Finland. According to Rankama it takes time to learn to work with quarts when no better material is available, maybe generations. The time to learn the material would seem natural if the humans had passed through Finland before arriving in Aareavaara. Finland has the same type of bedrock with quarts material as Sweden. A further observation that is part of Rankama's line of argument concerning the eastern approach is that the settlements in Norway belong to a coastal culture in which there is no major reason to change living patterns. Is there then any propelling force to wander south towards Norrbotten if you prefer a life by the sea? None could have known by then that there was water on the other side of the land mass. According to Rankama's line of arguments the settlements in Finland represent an inland culture that, in contradiction to the Norwegian culture, didn't have to change their way of living when migrating over the land mass and they eventually ended up in Aareavaara (Rankama, correspondence by e-mail).

The obvious problem with this argumentation is that the dates in northern Finland is younger than those we have in Aareavaara, besides one settlement (Sujala settlement) that has been discovered farthest to north in Utsjoki that could be from the same time. The mineral material on Sujola settlement consists not of quarts but of chert, which excludes it

as a Finnish quartz settlement. According to Jan Ingolf Kleppe on Tromsø University there is however equally old settlements in Norway that also have quartz material (Kleppe, correspondence by e-mail).

It is best to leave the question of the first migration routes open for discussion. The settlements at Aareavaara haven't been investigated yet in any form of archaeological excavation. The differing thoughts about migration routes should be at mind during future investigations at Aareavaara and also during future surveys in the areas along the river Muonio and northwards and also to the north east into Finland.

The Other cultural-historical remain that was found in area 1 is hard to define. It is definitely a remain that should be registered. It has not been used for 30 years or more according the growth of lichen on it. But our research efforts amongst fellow archaeologists, skilful hunters and locals haven't yielded any clear answers to what it is. It is some form of saved wood, that much we know, but if it belongs to a trap or a fence is still unclear.

Area 2 has rather poor prerequisites for finding any ancient remains due to the fact that the area for the most part consists of wetland. The ground beside the bogs is very moist and has lush ground vegetation. This makes it hard to see anything that possibly could be under the coat of vegetation. The area today isn't inviting you to settle in. Due to that the area is so flat there has probably formed a wetland here shortly after the ice melted, and therefore the area shouldn't have interesting for settlement in older times either. There are several other and better areas than this to settle in. In area 2 there are occasional hunting towers used during the moose hunt which shows that area is used for hunting today but no older traces for hunting has been spotted, for example no trapping pits were found.

With starting point in the ancient remains in the adjacent areas there were prerequisites to find similar remains from various time periods within the three areas of inquiry (appendix 1:1). Earlier registered ancient remains and cultural-historical remains shows that the area has been used from prehistoric times into historic times. The closeness to the highest coast line has contributed to that its fine grounds were available for settlement soon after the ice had melted (appendix 1:4). It is very clear to us that ancient remains are concentrated to areas with glacier river-deposits as well as sea, river and lake sediment which make fine sandy grounds, excellent for settlement into this day. In these sand areas around i.e. Kaunisjoki and the Muonio River (appendix 1:4) there are for example settlement pits, settlement banks, settlements and trapping pits. Reindeer enclosures, camp grounds, saami cots and hearths bare witness of reindeer husbandry. All three areas of inquiry are also situated within the saami village of Muonio which brought about the possibility of finding further remains from reindeer husbandry. Aside from this there are tar piles, remains of charcoal stacks and foundations for cabins that tell us of forestry. Pyöärenöja, a hay-making mire in the vicinity of Saarikoskenvaara, lies a couple of kilometres north of area 1's eastern half and tell us of the need of extra forage for the cattle that arose during the 1800's due to increasing population. Existing meadows and hay-making grounds around the villages wasn't enough anymore and people also started to use mires for hay-making (appendix 1:1, 1:3-1:4).

There are also two rectangular shaped cooking pits about 3,3 kilometres respectively 5,5 kilometres north of the eastern part of area 1, along the river of Muonio. Rectangular cooking pits are frequent within the whole of the County of Norrbotten, from coast to inland, on levels that vary from 10 metres above sea level to 520 metres above the sea. All excavated rectangular cooking pits in both Norrbotten and Västerbotten has been dated to the Iron Age (Bennerhag script 2009, Palmbo 2009). Rectangular cooking pits could be a good indicator on where to find the prehistoric activity during the Iron Age (Melander 1986, Norberg 1996). The two rectangular cooking pits located along side the river Muonio could therefore be seen as an indication that humans resided in the area during the Iron Age.

## Conclusions/Further investigations

The County Museum of Norrbotten considers that:

The foundation for the cabin in area 1 (Raä 140:3) and the tar piles (Raä 140:1-2) most likely are connected and contemporary and should be treated as a whole in the event of exploitation. In order to preserve the cultural value of the foundation and the tar piles it is important to treat the area as a whole, this means that the remains should not be separated from each other (appendix 1:3). The foundation is a registered cultural-historical remain. They are fully described in the ancient remains register (FMIS) and documented in picture during this inquiry. The northern limitation for area 1 needs only a minor modification in order to avoid the house foundation, this is recommended.

The County Museum of Norrbotten considers that:

The other cultural-historical remain (Wood for fences? Trap for small animals?) found in area 1 are fully documented in text and in pictures for the future, if the County Administrative Board would give permission to remove it.

The County Museum of Norrbotten considers that:

The four Stone Age-settlements in area 3, at the river Muonio, are fixed ancient remains and therefore must be archaeologically examined i.e. they must be excavated by archaeologists before the places where they are located can be allowed to be exploited. Such excavations will by law be funded by the entrepreneur, in this case Northland Resources Inc. Fixed ancient remains are protected by the Cultural Heritage Law and permission for removal of them can only be granted by the County Administrative Board.

If Northland Resources Inc. instead chooses to move the eastern limitation for area 3 in order to eliminate any risk of damaging the settlements in area 3 by Northland Resources Inc's planned enterprise then there is a possibility of avoiding archaeological excavations before an eventual exploitation. Through these simple measures the settlements can be preserved for future generations. A consultation is necessary if such a solution is to be considered between Northland Resources Inc. and the County Administrative Board of Norrbotten. The final assessment of the area falls on responsibilities of the County Administrative Board of Norrbotten. It falls also on the responsibilities of the County Administrative Board to decide how large a protection area should be around fixed ancient remains.

Luleå 2009-11-20

Olof Östlund and Frida Palmbo

Archaeologists at the County Museum of Norrbotten

Translation done by archaeologist and translator Nils Johansson

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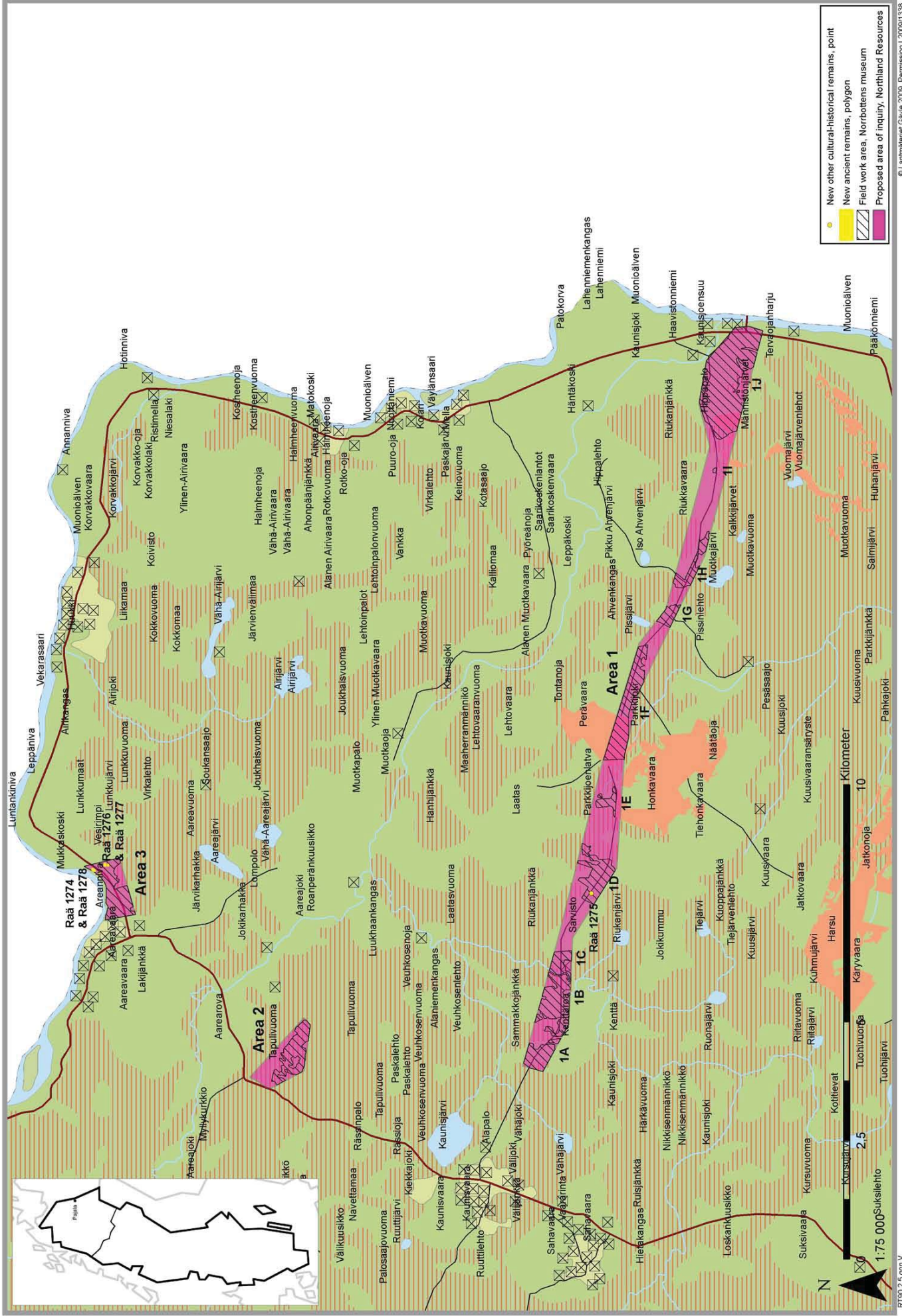
### Other sources

- Jan Ingolf Kleppe, Tromsø universitet. E-mail correspondence
- Tuija Rankama, Helsingfors Universitet. E-mail correspondence
- Ulf Strucke, Riksantikvarieämbetet. (Swedish National Heritage Board; SNHB) Verbal information by telephone.

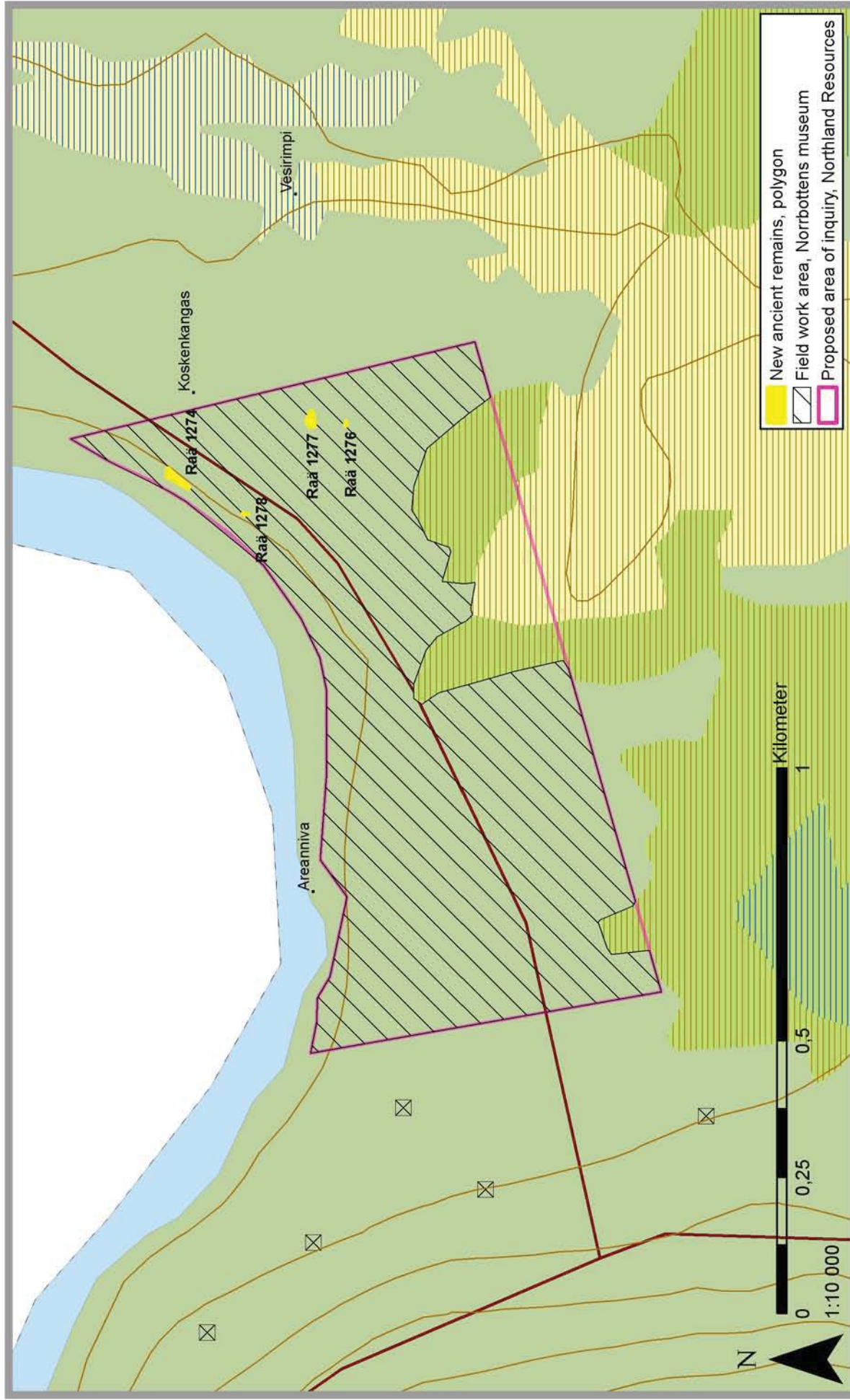
## Appendixes

1. Maps
  - 1:1 Current area of inquiry and results
  - 1:2 Results from area 3
  - 1:3 Ancient remains with the highest coast line
  - 1:4 Soil type map with possible settlement locations
2. Photo list
3. List of remains
4. Dating
5. Osteological analysis

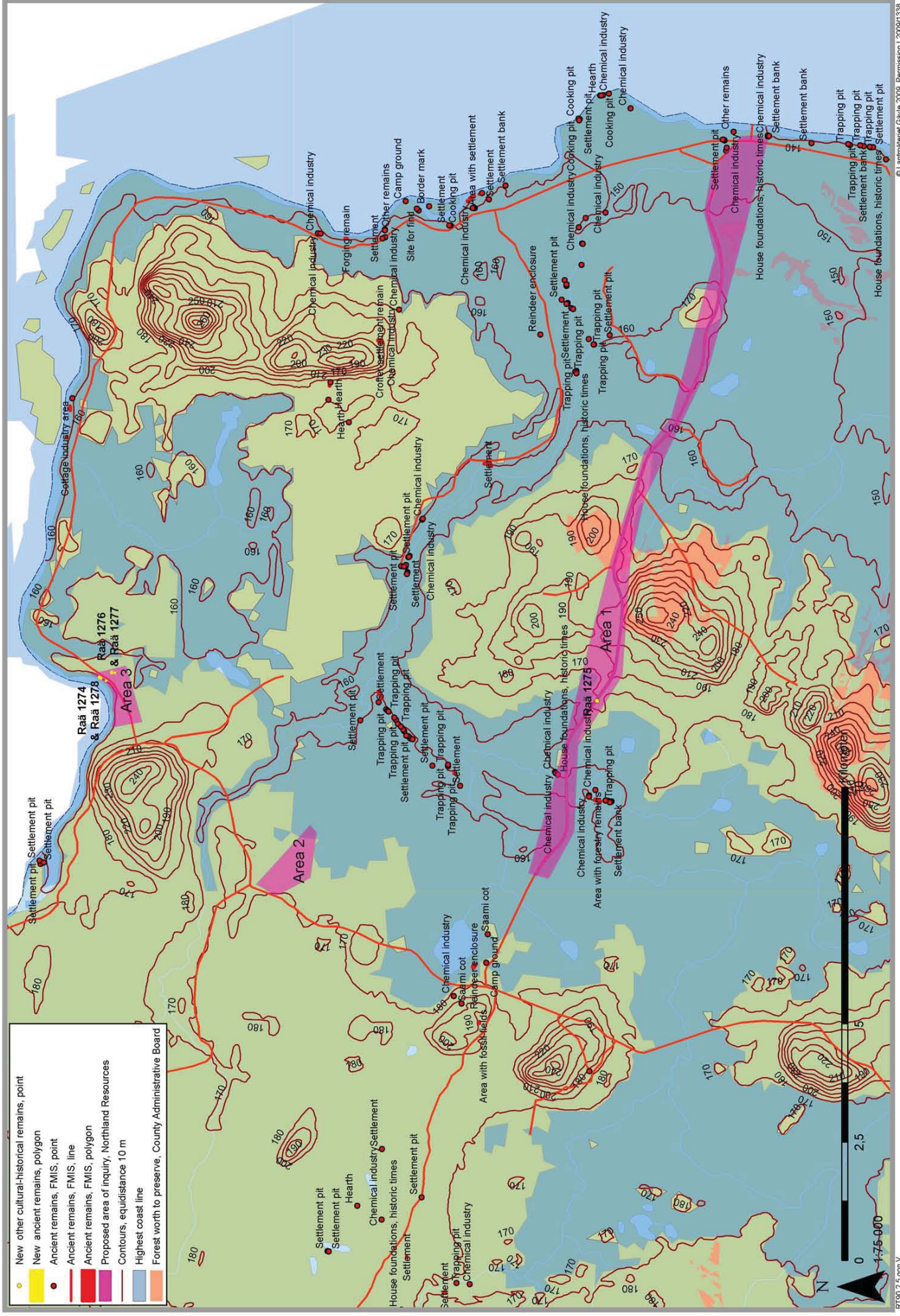
# Current area of inquiry and results



# Results from area 3



# Ancient remains with the highest coast line







## Photo list Tapuli

Acc nr: 2009:93:01-44

Photografers: Olof Östlund (OÖ) och Frida Palmbo (FP)

**Bold text in the list indicates which pictures that are in the report**

Acc nr	Motif	Direction from	Photo-graphers
2009:93:01	Findings related to the settlement Raä 1278. Polished stone (part of a chisel?) and a stone flake of green stone / slate. A compass is in the picture.	Vertical photo	FP
2009:93:02	Frida Palmbo at the finding place of polished stone (part of a chisel?) and quartz flakes, settlement Raä 1278	W	OÖ
<b>2009:93:03</b>	<b>Settlement Raä 1278 was found in an area freed from vegetation.</b>	S	<b>OÖ</b>
2009:93:04	Finding place for flake of greenstone, belonging to settlement Raä 1278. A folding rule is in the picture..	SSW	OÖ
<b>2009:93:05</b>	<b>Find from Raä 1278. Part of chisel? Polished greenstone. A folding rule is in the picture.</b>	<b>Vertical photo</b>	<b>FP</b>
2009:93:06	Finds from Raä 1278. Part of chisel? Polished greenstone. A folding rule is in the picture.	Vertical photo	FP
2009:93:07	Finds from Raä 1278. Part of chisel? Polished greenstone. A folding rule is in the picture.	Vertical photo	FP
2009:93:08	Finds from Raä 1278. Part of chisel? Polished greenstone. A folding rule is in the picture.	Vertical photo	FP
2009:93:09	Finds from Raä 1278. Close-up on a small quartz flake. A compass is in the picture.	Vertical photo	FP
2009:93:10	Close-up on a quartz flake from settlement Raä 1277. A compass is in the picture.	Vertical photo	FP
2009:93:11	Close-up on a quartz flake from Raä 1277. A folding rule is in the picture.	Vertical photo	FP
2009:93:12	Close-up on a quartz flake from Raä 1277. A folding rule is in the picture.	Vertical photo	FP
2009:93:13	Area for settlement Raä 1277. Frida Palmbo is looking for burned bones and quartz.	WSW	OÖ
2009:93:14	Quartz material from the settlement Raä 1277 was found in open ground damages like this one.	S	OÖ
2009:93:15	Settlement Raä 1277. In the background on the left-hand side is the settlement Raä 1276.	ENE	FP
2009:93:16	Settlement Raä 1277. In the background is the easternmost hill or height, outside the border for Area 3.	SW	FP
2009:93:17	Some of the quartz flakes belonging to settlement Raä 1277. A folding rule is in the picture.	Vertical photo	FP
2009:93:18	Burned bones belonging to settlement 1277. A folding rule is in the picture.	Vertical photo	FP
<b>2009:93:19</b>	View over the most northern study area. On the hill closest to the camera is settlement Raa 1277 and located at the farthest hill is the settlement Raa 1276 localized. The photograph was taken from the easternmost hill outside the border of area 3.	<b>NE</b>	<b>OÖ</b>
<b>2009:93:20</b>	<b>Kaunisjokis sandbanks and its meandering.</b>	<b>S</b>	<b>OÖ</b>
2009:93:21	Raä 140:3, Foundation for cabin. Frida Palmbo is standing in the centre of it.	S	OÖ
2009:93:22	Raä 140:2, Tar pile. Olof Östlund is standing in the centre of it. The tar piles' gully is clearly visible in the front part of the picture.	W	FP
2009:93:23	Raä 140:2, Tar pile. Olof Östlund is standing at the bottom of the pile.	NW	FP

2009:93:24	Raä 140:1, Tar pile. Olof Östlund is standing at the bottom of the pile.	NNW	FP
2009:93:25	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. In the picture: Frida Palmbo.	NW	FP
2009:93:26	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. In the picture: Frida Palmbo.	NW	FP
2009:93:27	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Detail: Wedged sticks nailed into spruce	SE	FP
2009:93:28	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Folding ruler is here 1 m long.	E	FP
2009:93:29	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Folding ruler is here 1 m long.	SE	FP
<b>2009:93:30</b>	<b>Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Folding ruler is here 1 m long.</b>	<b>SE</b>	<b>FP</b>
2009:93:31	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Detail: Sharpened ends of sticks wedged into spruce.	SSW	FP
2009:93:32	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Detail: Sharpened ends of sticks wedged into spruce. Folding ruler is here 20 cm long.	SSW	FP
2009:93:33	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Detail: Sticks wedged into spruce.	ESE	FP
2009:93:34	Other cultural-historical remain (Trap for small animals /small game/marten rap or material for fence) Raä 1275. Detail: Sticks wedged into spruce.	NE	FP
2009:93:35	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Detail: Sticks leaning towards the trunk of the spruce.	E	FP
2009:93:36	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275.	NE	FP
2009:93:37	Other cultural-historical remain (Trap for small animals /small game/marten trap or material for fence) Raä 1275. Olof Östlund registers the findings.	N	FP
2009:93:38	Part of the area of inquiry along the Honkavaara road (subarea 1F) Eastern part of the deforested area.	E	OÖ
2009:93:39	Part of the area of inquiry along the Honkavaara road (subarea 1F) Western part of the deforested area.	E	OÖ
<b>2009:93:40</b>	<b>Part of the area of inquiry along the Honkavaara road (subarea 1 F) The middle part of the deforested area with a bog below in the south.</b>	<b>NNW</b>	<b>OÖ</b>
2009:93:41	Settlement Raä 1276. Frida Palmbo registers the ancient remain.	NNE	OÖ
2009:93:42	Settlement Raä 1276. Frida Palmbo registers the ancient remain.	NE	OÖ
<b>2009:93:43</b>	<b>Settlement Raä 1276. Frida Palmbo registers the ancient remain. In the background the hill/height is seen where settlement Raä 1277 is situated.</b>	<b>SSW</b>	<b>OÖ</b>
2009:93:44	Settlement Raä 1276 The photograph is taken from the hill/height where settlement Raä 1277 is situated. The ribbon in the foreground marks the southernmost part of the area where settlement Raä 1277 is situated.	NNE	OÖ

## List of remains.

General archaeological inquiry (Inquiry step 1 without decision according to Cultural Heritage Law) prior to mining activities near Tapulivuoma, Pajala parish and municipally, Province of Västerbotten, County of Norrbotten.

Assigner: Northland Resources Inc.

Nr	Type of remain	Description	Coordinates RT90 2,5 gon W	Antiq. assessm	Action proposals
Raä 1277 (temporarily id -1_1)	Settlement (Stone Age characteristics)	Settlement approximately 30 x 17 m (E-W). Within Inom stated area were found in open damages to the ground some 20 pieces (stone chips) of quartz, 5 some chips of greenstone, and 2 finds of burned bones. Bones corresponding to about 1 gram was collected for dating purposes ((Oral permission to do so was given by Ann-Cristin Burman at the Cultural Administrations Board) Overgrown with saplings, berry sprigs and herbs.  GPS-coordinates of the bone sample: x7503858 / y1829636	Settlement is within the coordinates x 7503848-7503866 / y 1829634-1829666	Fixed ancient remain	Preservation
Raä 1275 (temporarily id -2)	Öther remains	Trap for small game Smådjursfälla/Trap for marten? 2 sawn sticks are wedged about 1,5 m above ground level between branches at the E side of a spruce. The sticks are about 1 m long and about 0,05 m in diam. The wedged ends are sharpened. 10 sawn sticks are leaning against the E side of the trunk of the spruce. The visible parts of the sticks are 0,65-0,95 m long and about 0,05 m diam. The sticks lower parts are overgrown with moss. 1 stick has fallen and are almost completely covered with moss. Could be material for small game traps (martens for exempel) or for fences.	x 7493607 / y 1829053	Other cultural- historical remain	-
Raä 1276 (temporarily id -3)	Settlement (Stone Age characteristics)	Settlement, approximately 9 x 3 m (E-W). Within the defined area were found in open ground damage some 10 pieces (stone chips) of quartz and some fragments of burned bones. Bones corresponding to about 1 gram was collected for dating purposes. (Oral permission to do so was given by Ann-Cristin Burman at the County Administrative Board) Overgrown with moss and twigs and herbs.  GPS coordinates of the bone sample: x 7503792 / 1829639	Settlement is within the coordinates x 7503791-7503795 / y 1829637-1829647	Fixed ancient remain	Preservation
Raä 1278 (temporarily id -1_2)	Settlement (Stone Age characteristics)	Settlement, approximately 10 x 4 m (N-S). Within the defined area were found in open ground damage 1 piece of quartz (stone chip), 1 greenstone (stone chip) and 1 part of a sharpened (i.e. grinded) tip of a greenstone Overgrown with berry sprigs, moss and grass.	Settlement is within the coordinates x 7503970-7503982 / y 1829473-1829479	Fixed ancient remain	Preservation
Raä 1274 (temporarily id -7)	Settlement (Stone Age characteristics)	Settlement, 54 x 14 m (NO-SV). Within the defined area were found in open ground damage 2 pieces of quartz (stone chips), 1 greenstone (stone chip) and few fire cracked stones. Overgrown with saplings, berry sprigs, mosses and grass.	Settlement is within the coordinates x7504081-7504123 / y 1829520-1829561	Fixed ancient remain	Preservation
Raä 140:1	Chemical industry	Descriptions retrieved from the ancient remains register (FMIS):  Tar pile, oval, 26x17 m (NS), consisting of a pit, 11 m diameter and 1.8 m deep, surrounded by a bank, 2 m wide and 0.8 m high. Opening in the N, 0.5-2 m wide. Drain gutter in N, 13 m long, 0.5 m wide and 2 m deep. In the E there is a pit, 1 m diameter and 0.15 m deep. Overgrown with birch seedlings, willow and pine trees.	x7494485 / y1827546	Other cultural- historical remain	Bevaras genom flyttning av gräns.

Raä 140:2	Chemical industry	<p>Descriptions retrieved from the ancient remains register (FMIS):</p> <p>...1m SW of 140:1 is:  Tar pile, 10 m diameter, consisting of a bank, 3 m wide and 0.3-1 m high, with an opening to the NW and in front of the opening a pit. The tar piles bottom is level with the outside ground surface. Overgrown with eleven young pines, a number of birch plants and a few low willows.</p>	x7494474 / y1827523	Other cultural-historical remain	Preservation (for example by adjusting the boarder of Area 3)
Raä 140:3	Building foundations, historical time.	<p>Descriptions retrieved from the ancient remains register (FMIS):</p> <p>...38 m SW of 140:1 is:  Foundation of a cabin, square, 3,5 x 3, 5 m (NE-SW) and 0.4 m deep. In the NE side is a rest of a stove, extending beyond the limitation of the foundation. It is 1.5 m diameter and 0.7 m high. Overgrown with twelve young pines, five birch plants and a few low willows.</p>	x7494433 / y 1827493	Other cultural-historical remain g	Preservation (by adjusting the boarder of Area 1)

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Uppsala 2009-11-12

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Goran.Possnert@Angstrom.uu.se**Resultat av <sup>14</sup>C datering av brända ben från Norrbotten.**

Förbehandling av brända ben:

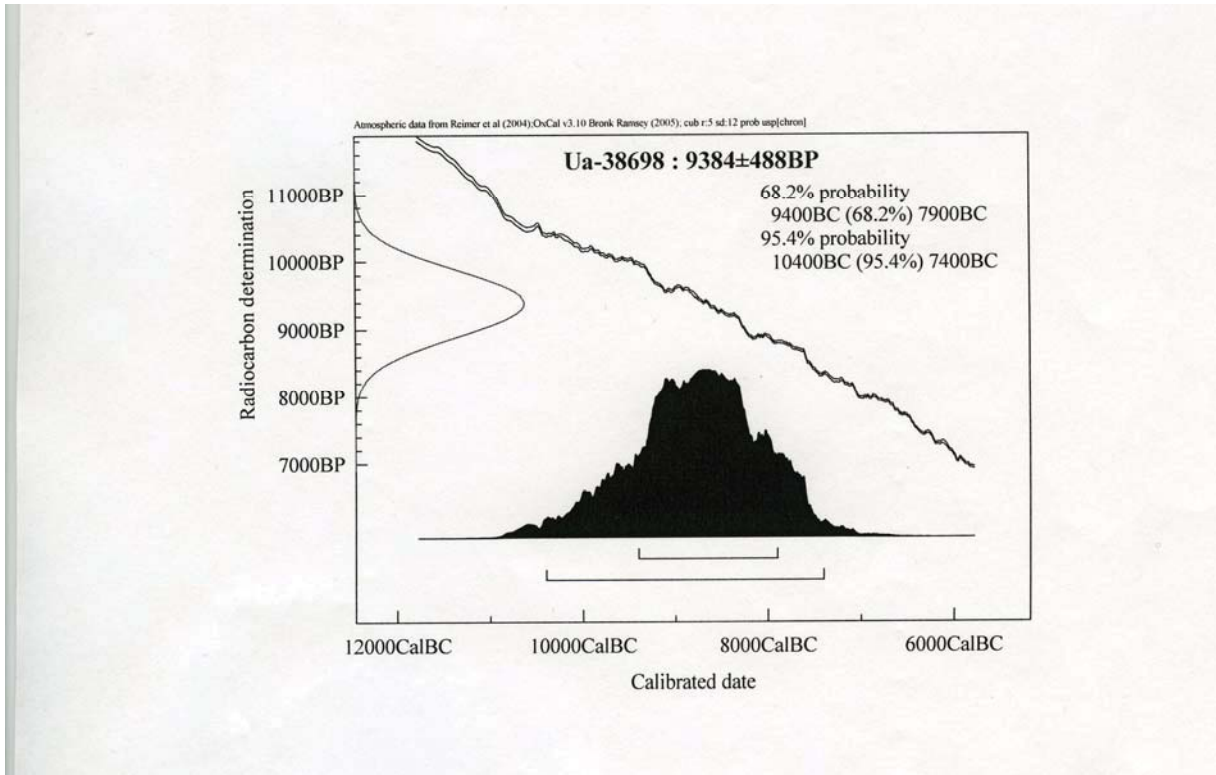
1. 1,5 % NaOCl tillsatt till det rengjorda och krossade benprovet och blandningen fick stå i rumstemperatur i 48 timmar.
2. Provet tvättat till neutral i avjoniserat vatten.
3. 1M HAC tillsatt till provet och blandningen i rumstemperatur i 24 timmar.
4. Provet tvättat till neutral i avjoniserat vatten och intorkat.
5. Lakning med 6 M HCl och den erhållna CO<sub>2</sub>-gasen grafteras därefter Fe-katalytiskt före acceleratormätningen av <sup>14</sup>C-innehållet.

**RESULTAT**

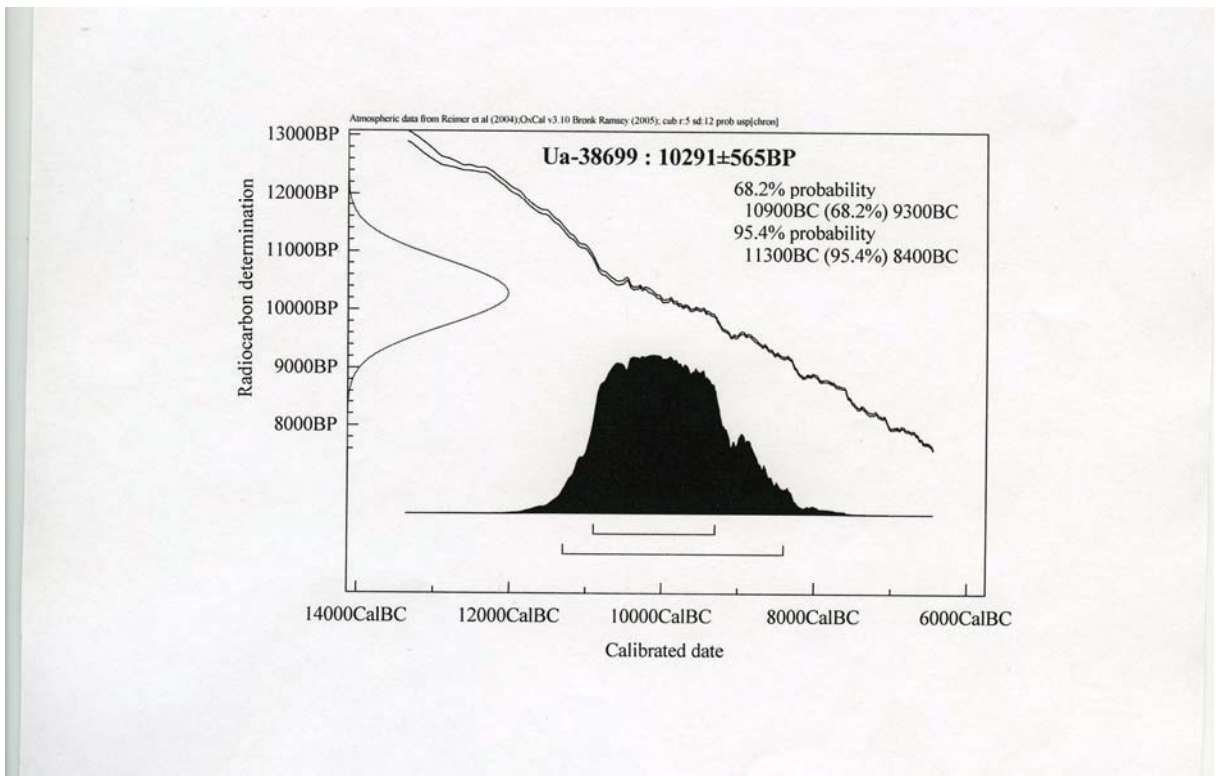
Labnummer	Prov	δ <sup>13</sup> C ‰ PDB	<sup>14</sup> C ålder BP
Ua-38698	Koskenkangas, Kulle 2 (x7503858/y1829636)	-24,3	9 384 ± 488
Ua-38699	Koskenkangas, Kulle 3 (x7503792/y1829639)	-27,7	10 291 ± 565

Med vänlig hälsning

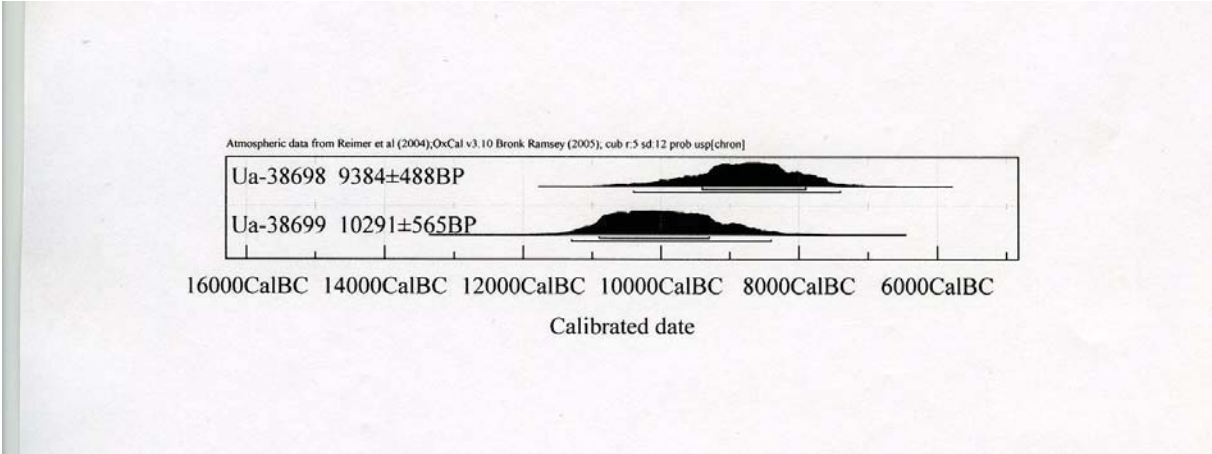
Göran Possnert/Maud Söderman



Site/settlement Raä 1277 (At the time for collection of the sample called "kulle 2" (hill nr 2) )



Site/Settlement Raä 1274 (At the time for collection of the sample called "kulle 3"(hill nr 3) )



Both sites curves for the dating.



(Olof Östlunds translation of Leif Jonssons report)

Osteological Report 2009-09-16  
Leif Jonsson  
LJ-Osteology

### **Burned bones from two settlements in Koskenkangas in Pajala Municipality, Norrbotten County**

The tested materials were found in the investigation of planned mining operations north of Pajala (Inquiry/investigation Tapuli 2009). The bones were picked directly from the ground (no excavation or weeding). Possibly the settlements can be of early postglacial age. The bones will be used for dating. Responsible for the investigation was Olof Ostlund at Norrbotten Museum.

#### Method

At the osteological analysis, each fragment is examined under the stereo microscope (5-60 x magnification) to assess internal and external characters. External characters are anatomical features that may determine what kind of animal group, skeletal elements, types of skeletal elements, or specific portion thereof (eg joints surfaces, "diafysvägg" (Swedish) or similar). The internal characters are microscopic bone structure. Here I have attempted to determine whether they are so called Haversian bone, i.e. bone is made up of "Osteon" with Haversian canals (typical of mammals in which the bones rearranged during bone development, while such fish bone is built up of acellular bone in layer upon layer). Also deer animal horns, mammalian dentin and tooth enamel have typical features. Bird bone has very compact structure with barely visible cells.

#### Results

Only the bones of mammals have been found. Size-wise, the bones are from medium to slightly larger animals (from about the size of beavers to the size of reindeers). Based on the size of Haversian canals and the appearance of the fungus formed bone from the interior of the various bones, there are no indications seals are represented in the material. My assessment is that the bones originated from terrestrial mammals.

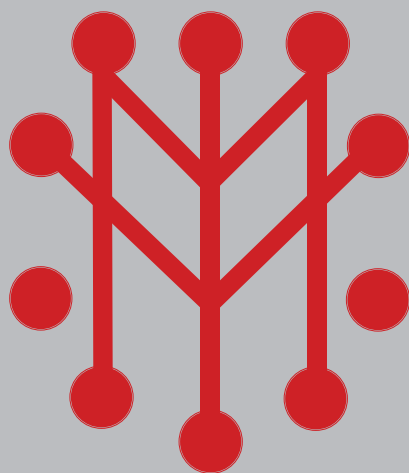
#### Catalog of finds

Koskenkangas, Hill nr 2 (now registered as Raä 1277)  
x 7503858 / 1829636 y  
Bones, burned white, 2-14 mm in size.  
Mammals: 3 parts of joints (0.1 g); 43 Other fragments (1.0 g).

Koskenkangas, Hill nr 3 (now registered as Raä 1276)  
x 7503792 / 1829639 y  
Bones burned white, 5-16 mm in size.  
Mammals: 3 fragment of diafys (2.4, 2.9; 3,4 mm thick diafys wall) of which the thickest/largest have diagonal reinforcement beams on the inside, similar to those found in the distal part of the humerus (possibly large enough to be reindeer) (1 , 0g); 13 Other fragments (1.4 g).

Gothenburg September 16, 2009

/ Leif Jonsson



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