Nomination to
UNESCO´s World Heritage List

Kujataa

– a subarctic farming landscape in Greenland

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A nomination to UNESCO´s World Heritage List

January 2016

Kujalleq Municipality
in South Greenland

NAALAKKERSUISUT
GOVERNMENT OF GREENLAND

Nomination of Kujataa – a subarctic farming landscape

In 1996, the Nordic Council of Ministers published the report "Verdensarv i Norden" – World Heritage in the Nordic Countries (NORD 1996:30), proposing new Nordic properties, which the nation states were recommended to nominate to UNESCO. The report contained three proposals for Greenlandic World Heritage properties, one of which encompassed the Hvalsey church ruin (Qaqortukulooq), the episcopal seat of Gardar (Igaliku) and Brattahlid (Qassiarsuk), the Norse/Inuit Greenlandic cultural landscape located in the former Narsaq and Qaqortoq Municipalities in southern Greenland. In autumn 2002, Greenland called on the Danish Government to be party to nominating these three areas for inscription on UNESCO's Tentative List.

As part of the Danish and Greenlandic implementation of the UNESCO World Heritage Convention, the Government of Greenland decided in February 2003 to nominate Kujataa for inclusion in the World Heritage List as a cultural property.

Kujataa – a subarctic farming landscape in Greenland is located in the Kujalleq Municipality in southern Greenland. The nominated property is made up of five component parts, which together represent the demographic and administrative core of a farming community based on a combination of animal husbandry and marine mammal hunting established by Norse colonists in the 10th century AD and continued to this day by Inuit farmers.

Kujataa became an official candidate for the World Heritage List in February 2003. Since then, work has been ongoing to delimit, examine and describe the proposed World Heritage property, update legislation and rules, and plan the management of the property's unique qualities.

The Government of Greenland has in conjunction with Kujalleq Municipality, the local population and the Greenland National Museum and Archives, taken a number of initiatives aimed at preserving the property's universal values. Further measures are presently underway or planned for the coming years.

We therefore fully support the nomination of Kujataa for World Heritage status.

Nivi Olsen
Minister of Education, Culture, Research and Church
Greenland

Jørgen Wæver Johansen
Mayor of Kujalleq Municipality
Greenland

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The Greenlandic Ministry of Education, Culture, Research and Church

The Greenlandic Ministry of Industry, Labour and Trade

Kujalleq Municipality in South Greenland

Nunatta Katersugaasivia Allagaateqarfialu
Nunatta katersugaasivia Grønlands nationalmuseum Greenland National Museum

Greenland National Museum and Archives

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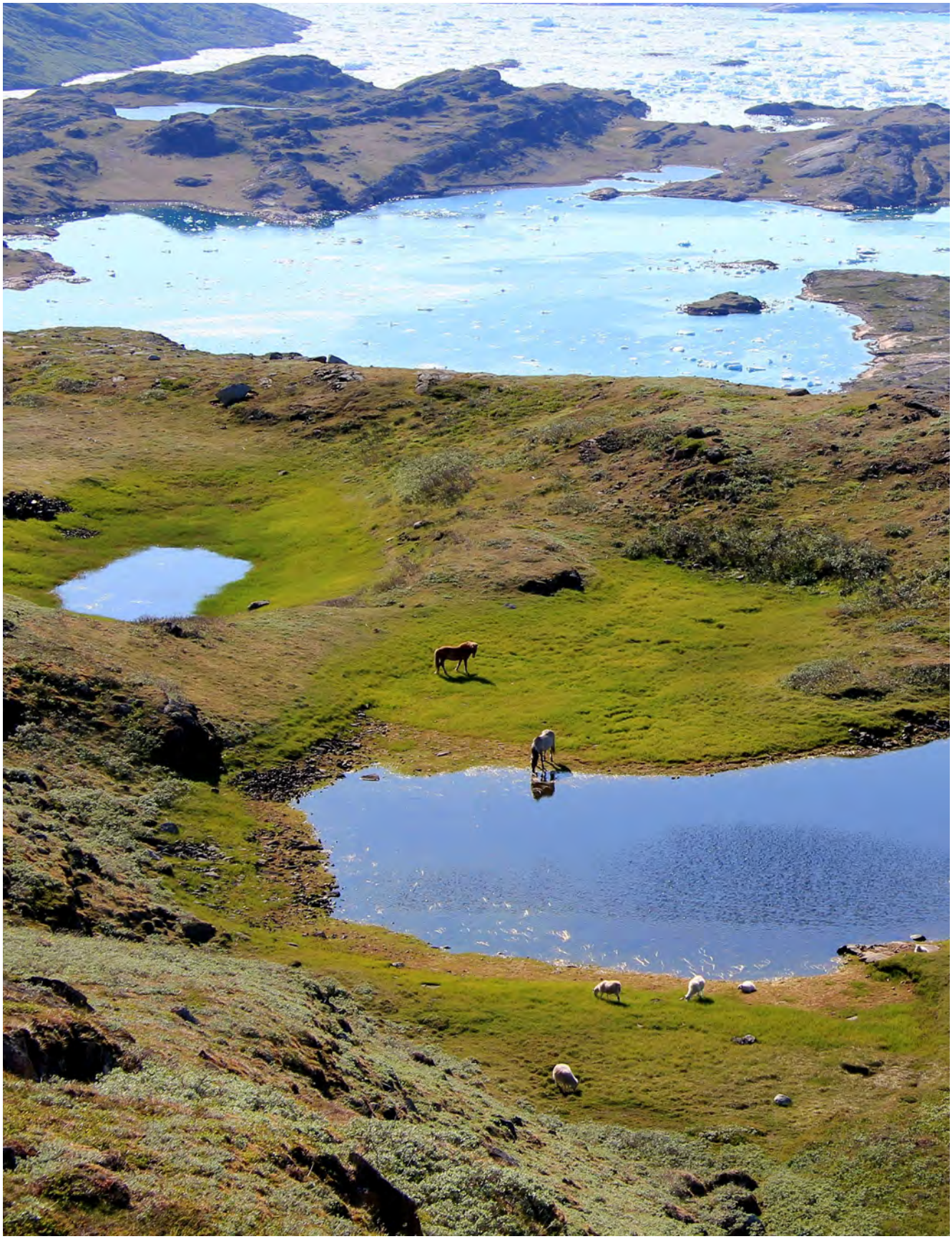

Fig. S.o: Horses and sheep grazing in a highland meadow near Tasiusaq. In the background the ice-filled Tasiusaq Fjord.

The bishop's crosier of Igaliku

We have selected the bishop's crosier (see page 131) as a symbol in this publication of both the Norse past and the "Good Shepard", being an agricultural reference to today's modern sheep farming traditions in South Greenland.

Executive summary

State party

Denmark

State, province or region

Greenland, Municipality of Kujalleq

Name of property

Kujataa – a subarctic farming landscape in Greenland

Geographical coordinates to the nearest second

Table S.1 – Geographical coordinates to the nearest second

Component part	Coordinates of the central point
(1) Qassiarsuk	N 61°09′52″ / W 45°35′53″
(2) Igaliku	N 61°00′06″ / W 45°22′29″
(3) Sissarluttoq	N 60°53′48″ / W 45°29′42″
(4) Tasikuluulik (Vatnahverfi)	N 60°50′52″ / W 45°23′24″
(5) Qaqortukulooq (Hvalsey)	N 60°47′33″ / W 45°50′04″

Textual description of the boundaries of the nominated property

Kujataa – a subarctic farming landscape in Greenland is located in the municipality of Kujalleq in South Greenland. The nominated property is made up of five component parts, which together encompass the core of Greenlandic farming settlement in southern Greenland. The components parts are concentrated in the central part of the Norse Greenlandic settlement of Eystribyggð, which is also the area most intensively farmed in modern times. They encompass all of the site types and landscape elements, providing the best representation of Greenlandic farming culture. The property comprises 348.92 km² of land and submerged land located in the inner parts of Tunulliarfik Fjord and Igalikup Kangerlua Fjord as well as the southern part of Qaqortup Imaa.

Component part 1, Qassiarsuk, covers 113.42 square kilometres extending across a peninsula 5.5-12 km wide. To the north, it is bordered by the Ulunnguarsuaq mountain massif (1,267 m), to the south by the highland area of Qaqqarsuatsiaq. To the east lies the fjord of Tunulliarfik, and to the west the large bay of Tasiusaq that opens onto Sermilik Fjord further west.

Component part 2, Igaliku, covers 82.87 square kilometres across the base of the Qaqortoq Peninsula. To the west it is bordered by the Tunulliarfik, to the east by the head of Igalikup Kangerlua Fjord. To the north it is delimited by the mountains Nalaqaa (1,450 m) and Tallorutit (1,660 m), to the south by the central range of the Qaqortoq Peninsula.

Component part 3, Sissarluttoq, covers 3.39 square kilometres in a valley on the south side of Qaqortoq Peninsula, draining into Igalikup Kangerlua Fjord.

Component part 4, Tasikuluulik (Vatnahverfi), covers 75.42 square kilometres along the southern coast of Igalikup Kangerlua; the area stretches from the plain of Igaliku Kujalleq in the northeast and continues in a 3.5-6 kilometre wide belt tracing the coastline southwest until about halfway into the fjord.

Component part 5, Qaqortukulooq (Hvalsey), covers 73.82 square kilometres in a 0.5-1.5 kilometre wide belt that traces the head and southern shore of Qaqortup Imaa, a fjord that branches from the outer part of Igalikup Kangerlua. It also includes the island of Arpatsivik.

Fig. S.1: During a warm summer, when the glaciers are very active, there are large numbers of icebergs in the fjords, creating dazzling displays that are a hazard for marine traffic.

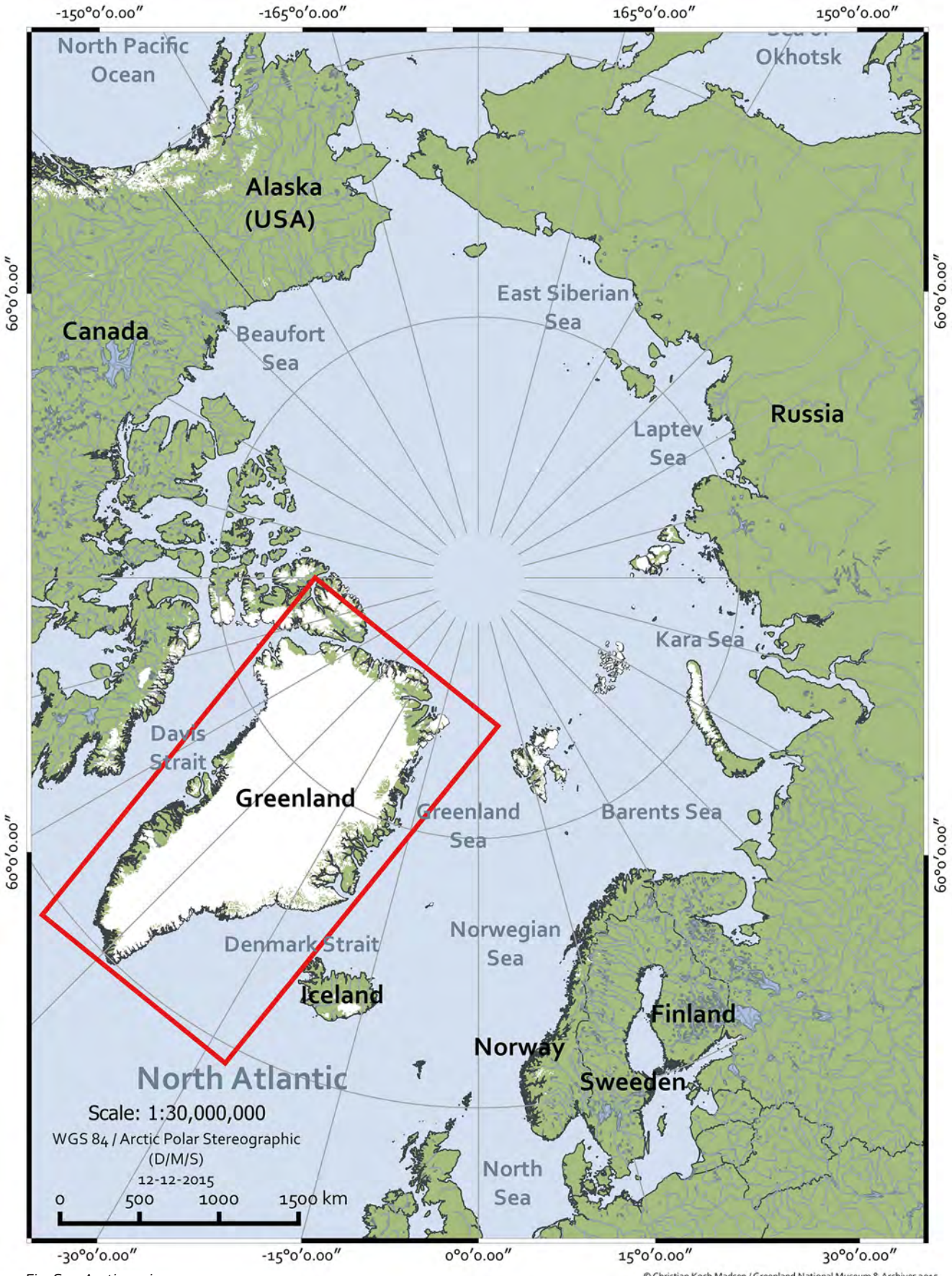

Fig. S.2: Arctic region.

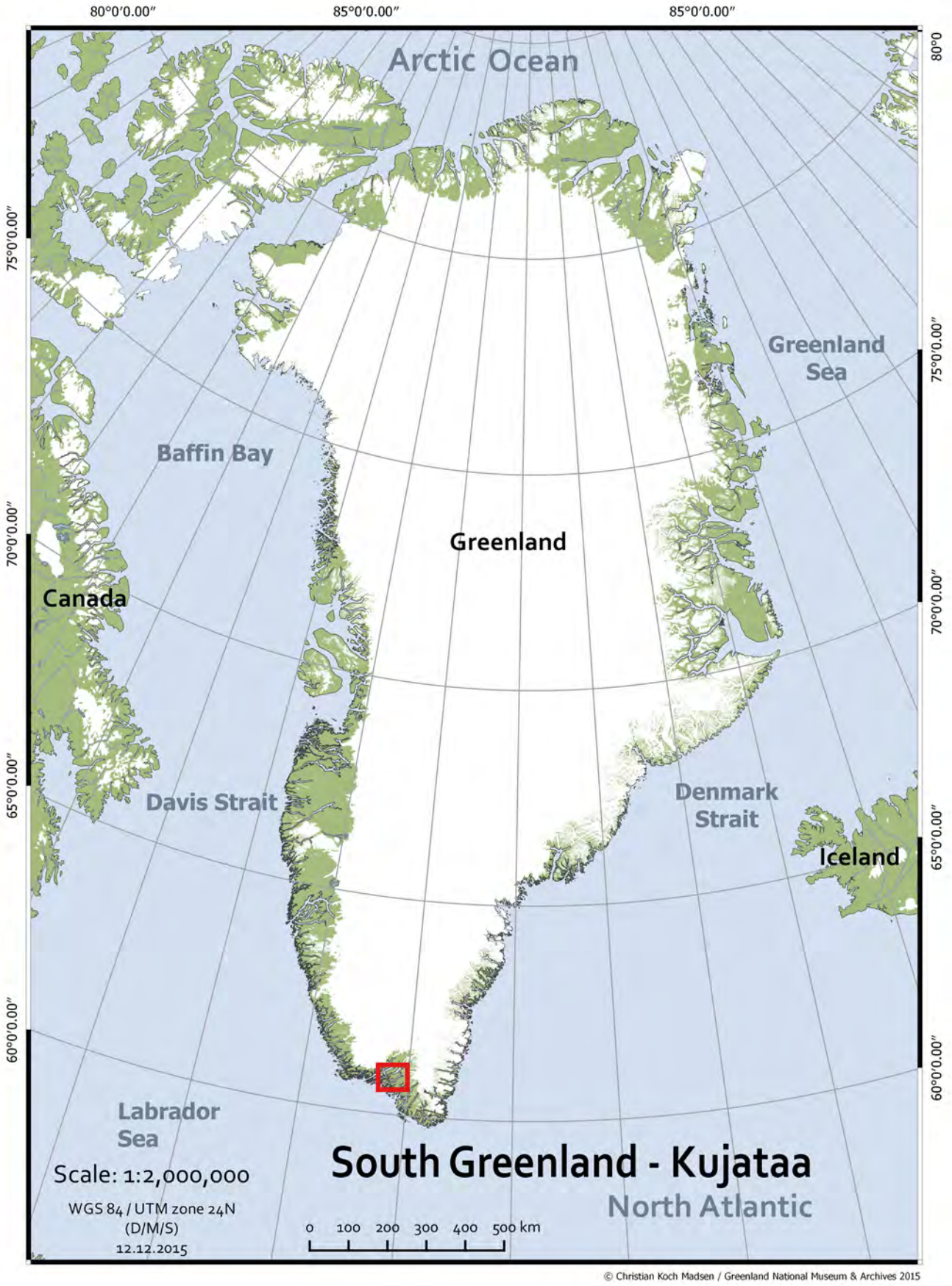

Fig. S.3: South Greenland – Kujataa.

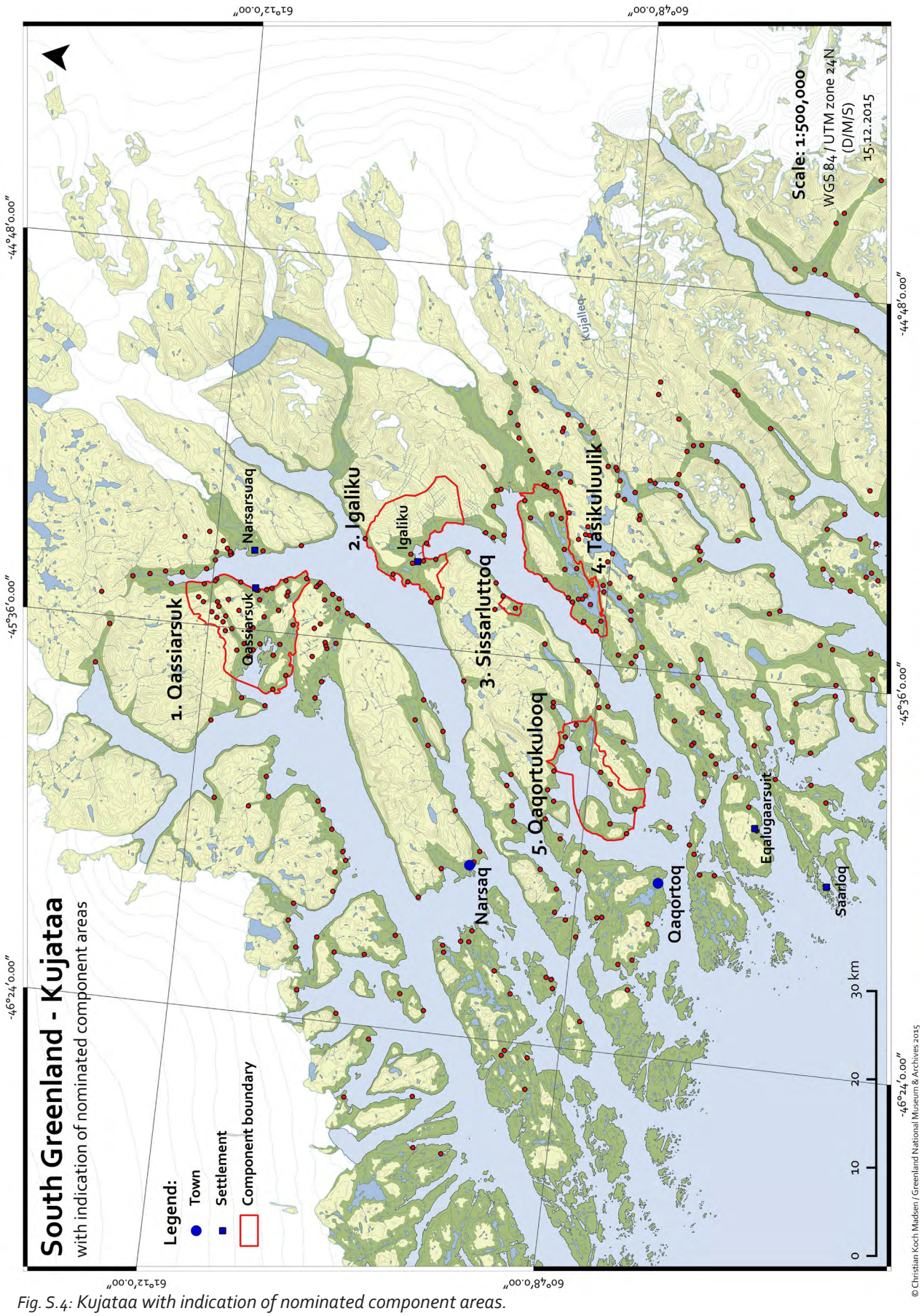

Fig. S.4: Kujataa with indication of nominated component areas.

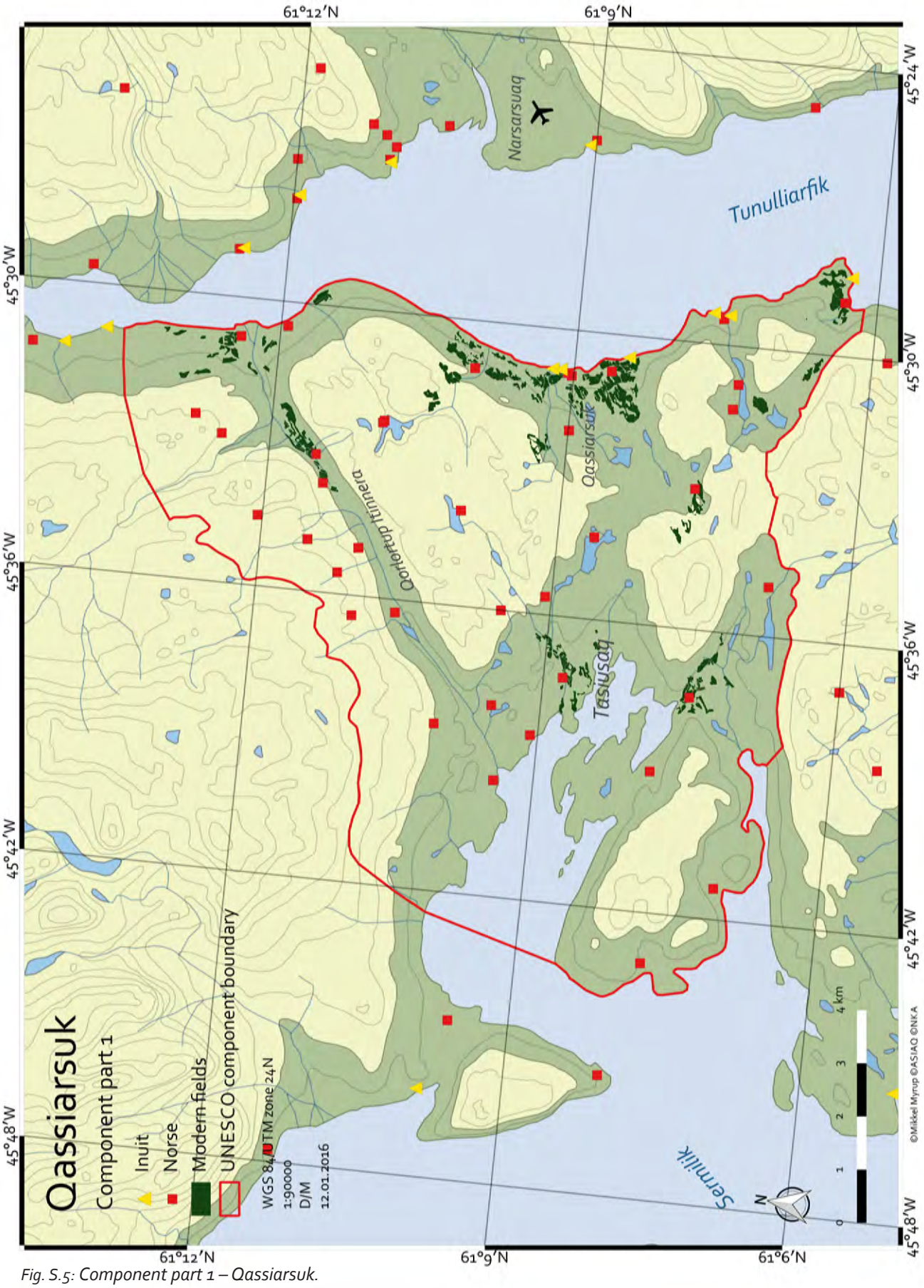

Fig. S.5: Component part 1 – Qassiarsuk.

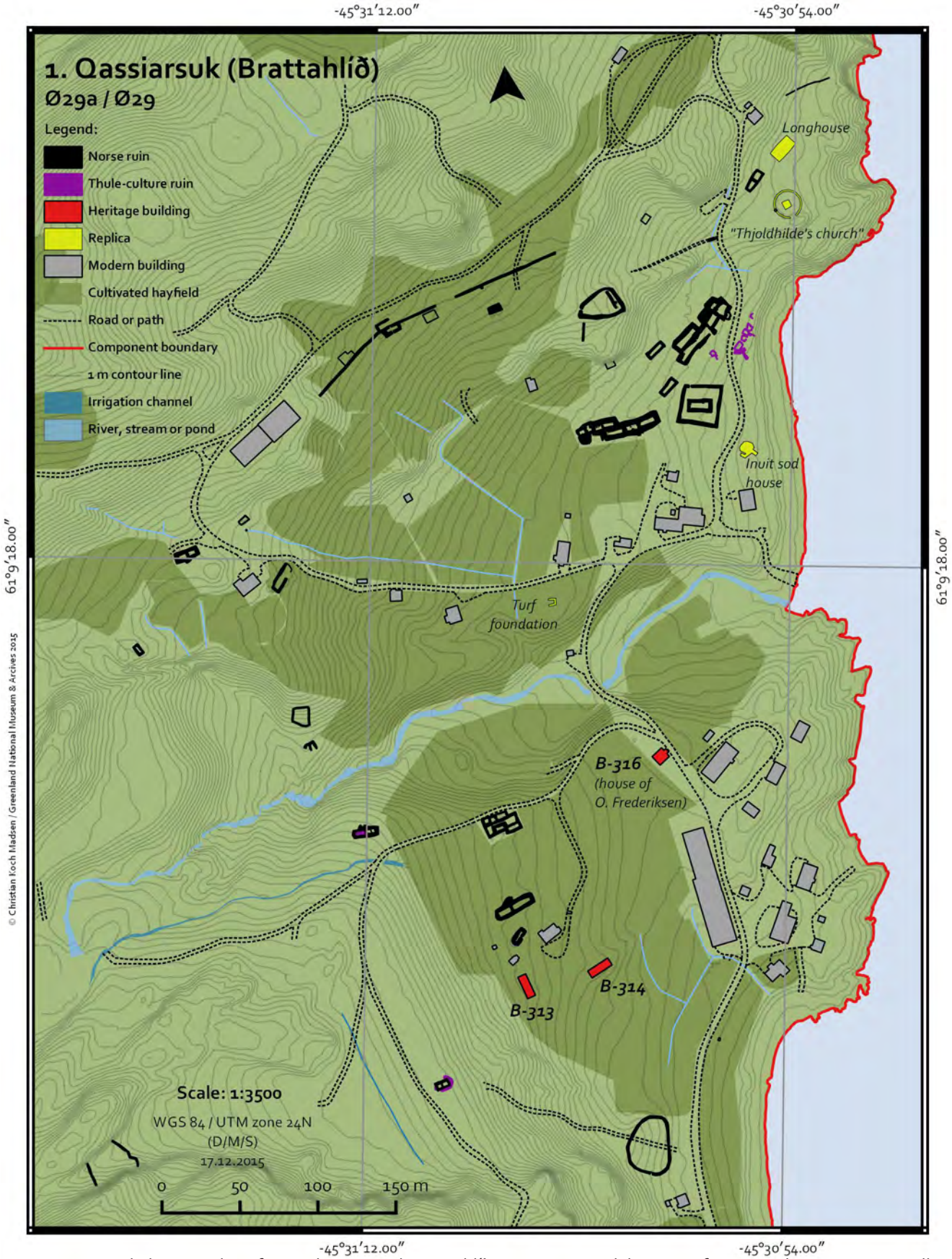

Fig. S.6: Detailed survey plan of central Qassiarsuk/Brattahlíð (Ø29a/Ø29) with location of Norse and Inuit ruins, as well as heritage and modern buildings.

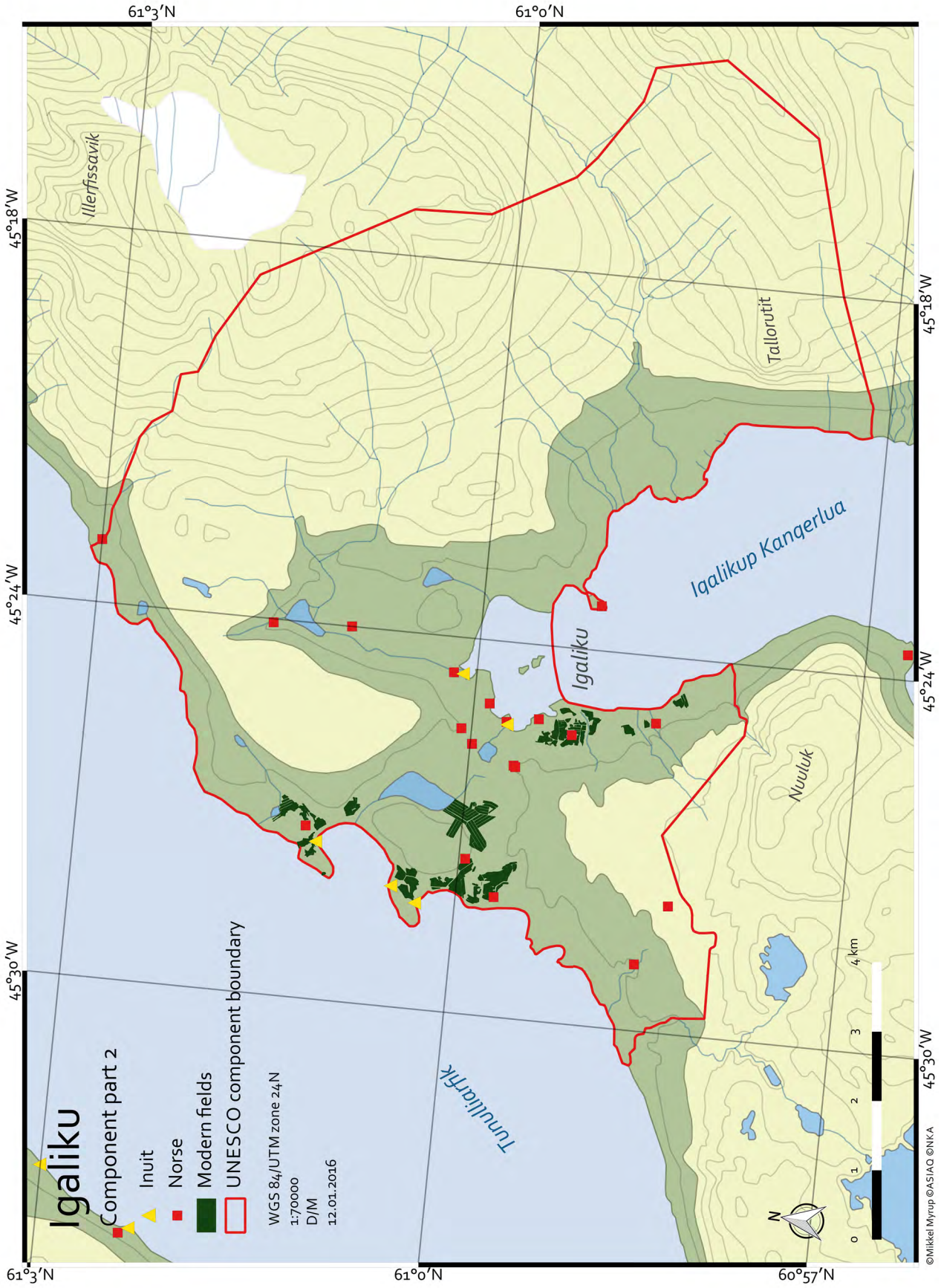

Fig. S.7: Component part 2 – Igaliku.

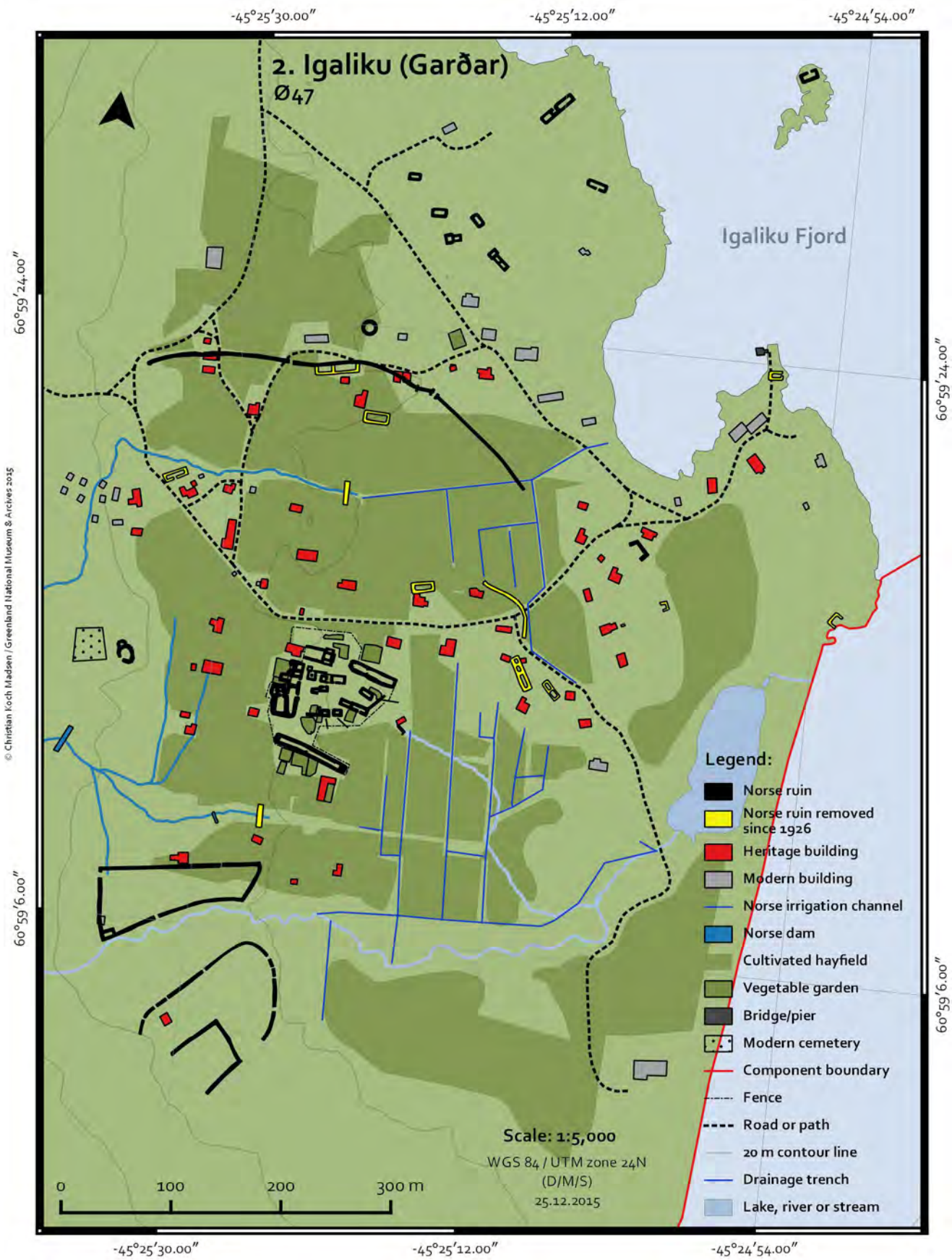

Fig. S.8 Detailed survey plan of Igaliku (Ø47) with location of Norse and Inuit ruins, as well as heritage and modern buildings.

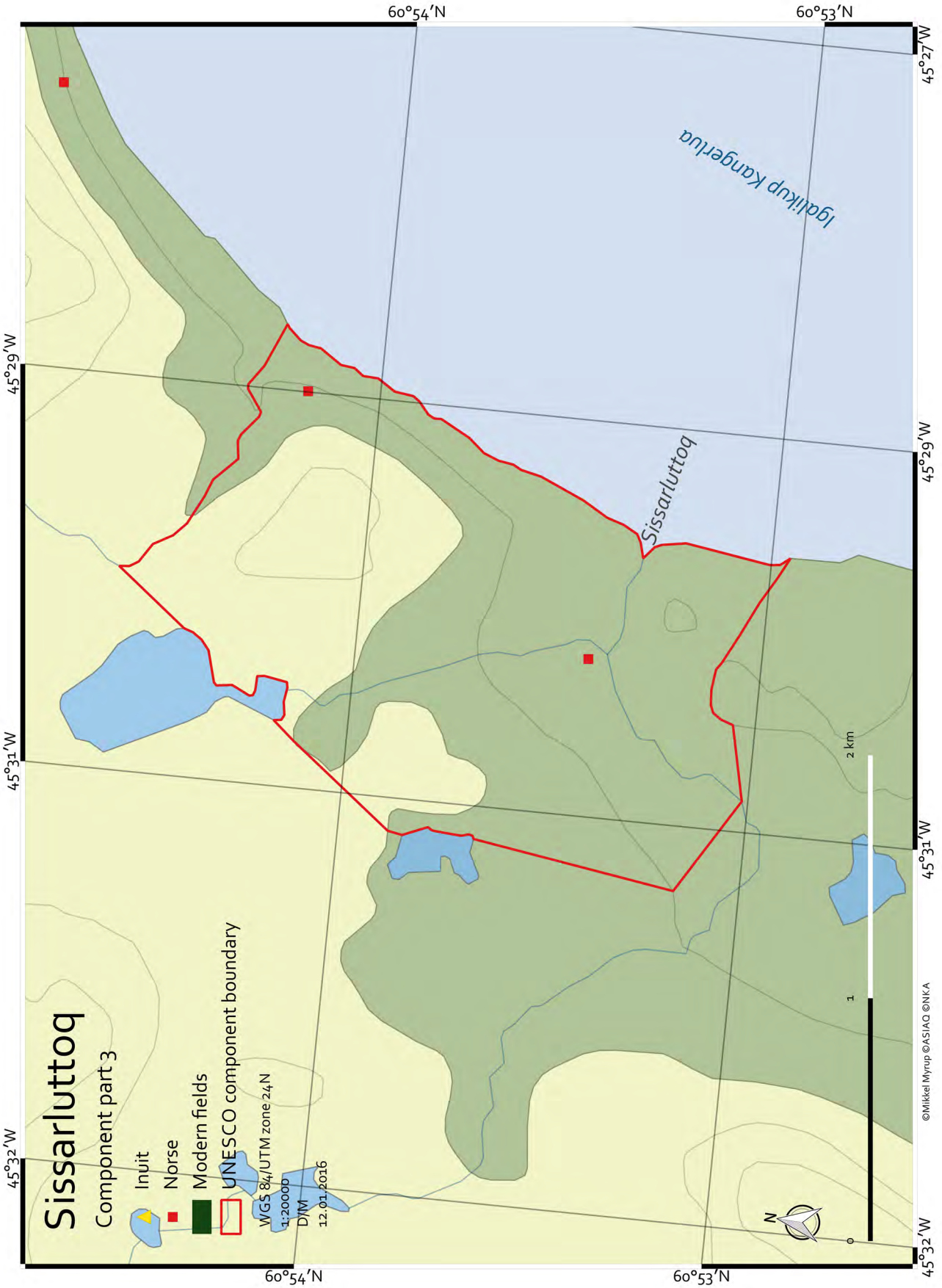

Fig. S.9: Component part 3 – Sissarluttoq.

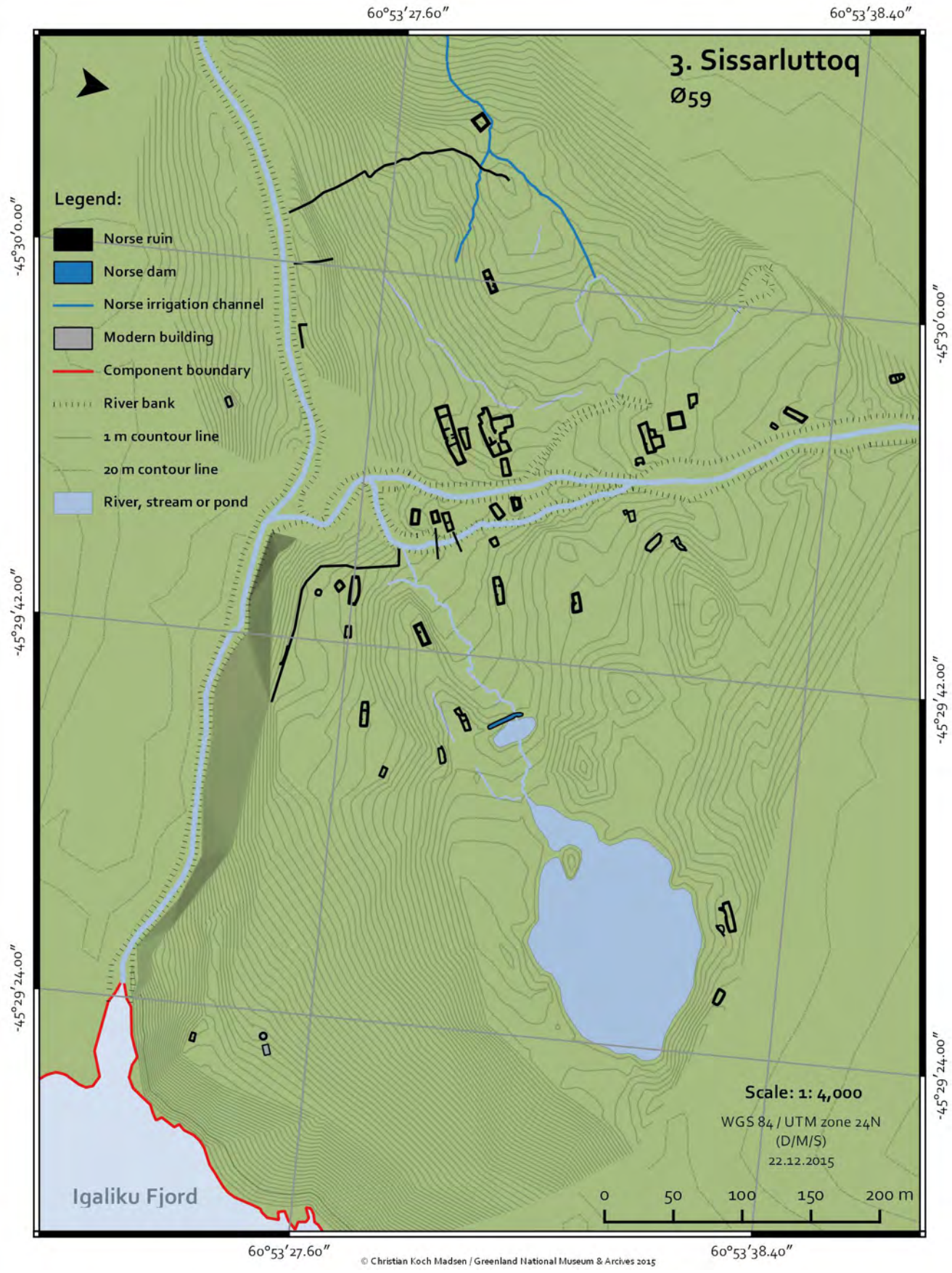

Fig. S.10: Detailed survey plan of Sissarluttoq (Ø59).

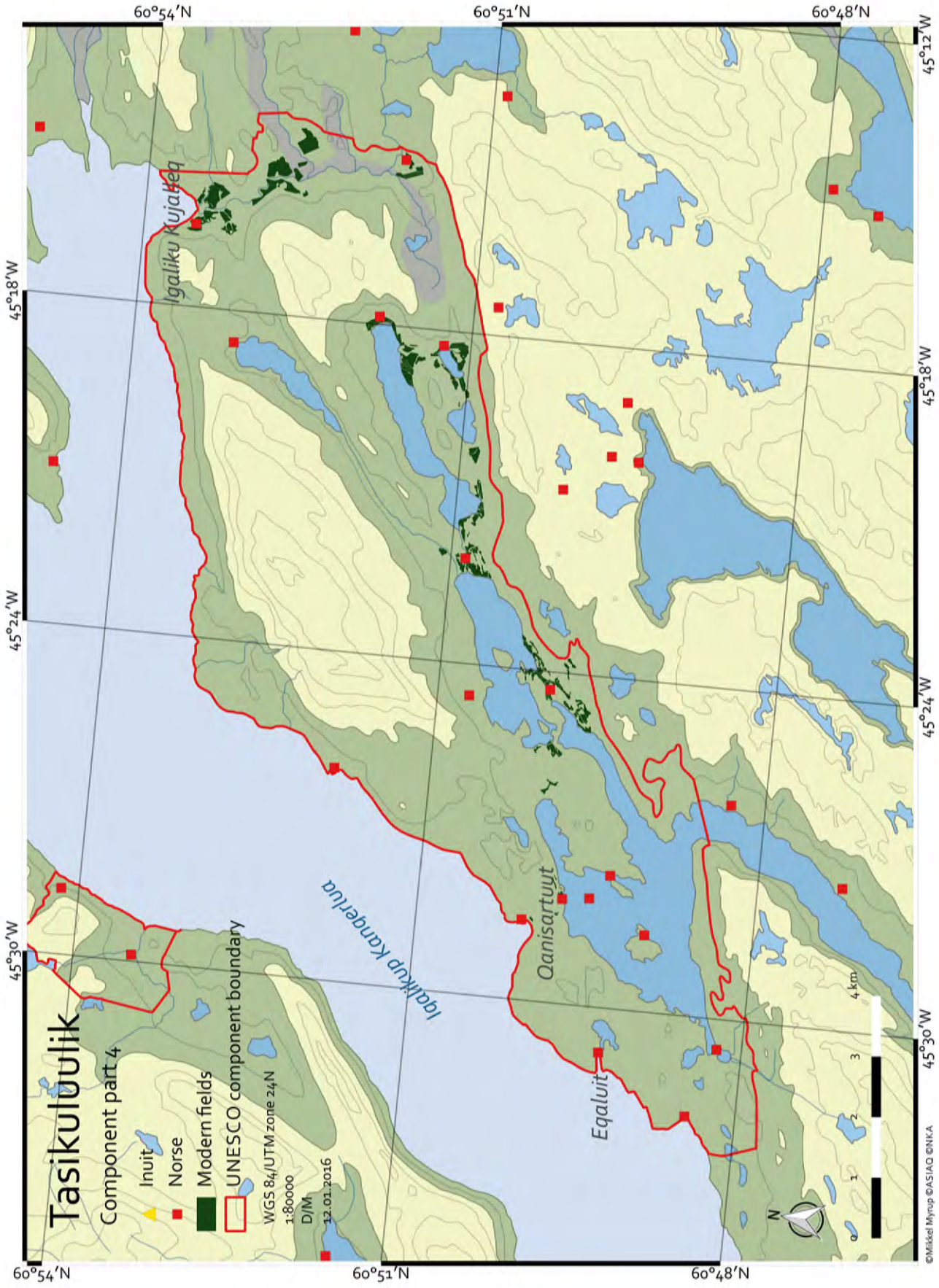

Fig. S.11: Component part 4 – Tasikuluulik (Vatnahverfi).

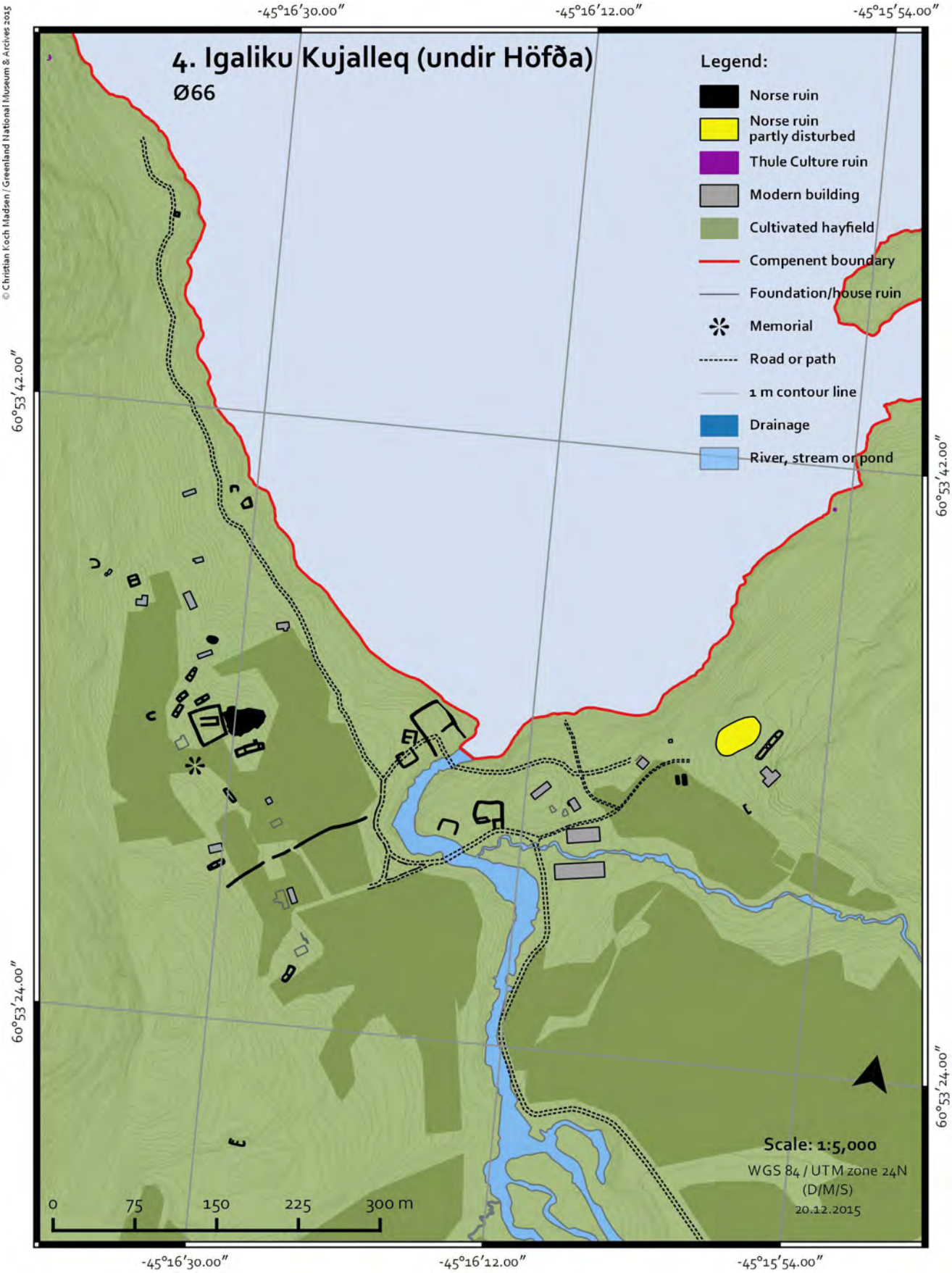

Fig. S.12: Detailed survey plan of Igaliku Kujalleq (Ø66).

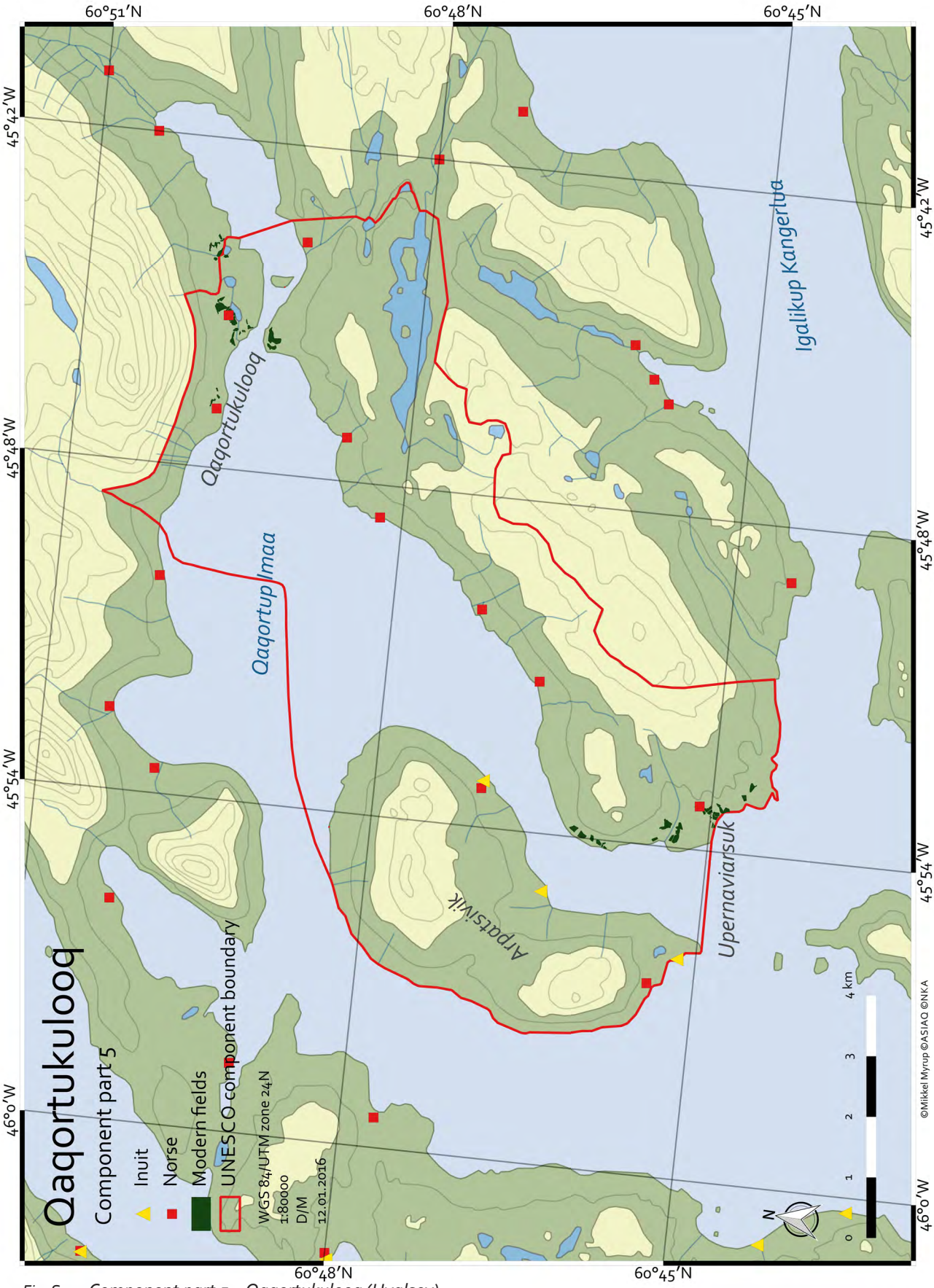

Fig. S.13: Component part 5 – Qaqortukulooq (Hvalsey).

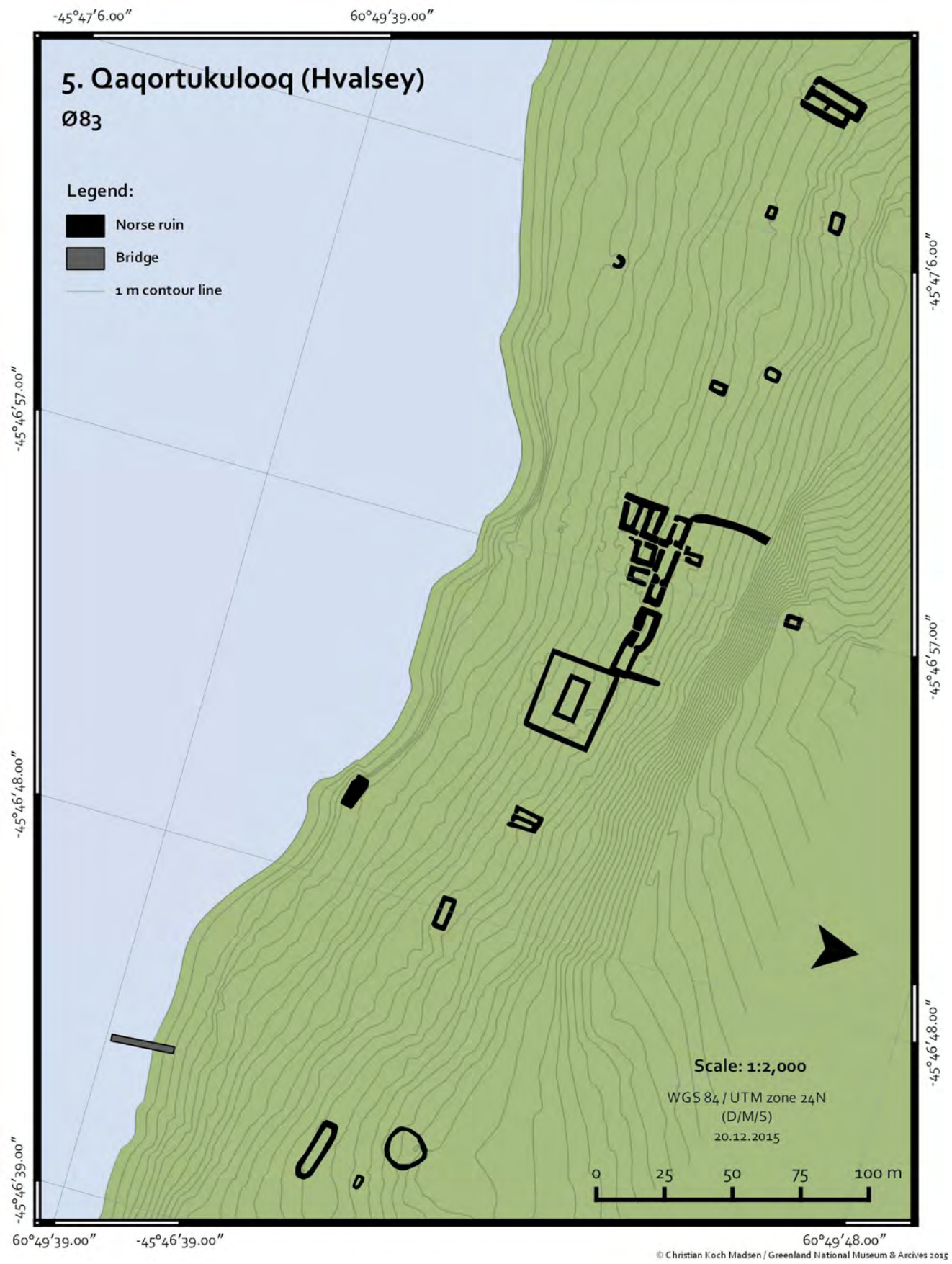

Fig. S.14: Detailed survey plan of Qaqortukulooq (Hvalsey) (Ø83).

Criteria under which property is nominated

The farming landscape of Kujataa is nominated under criterion (v) as "*an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change*."

Kujataa is an outstanding example of human settlement, where unique farming traditions have developed in a challenging environment. Situated between the cold desert of the Greenland Ice Cap and the cool outer coast of the Labrador Sea, Kujataa is an oasis with a relatively mild climate. Norse and Inuit subsistence practices based on a combination of animal husbandry and sea mammal hunting have resulted in a distinctive cultural landscape where cultivated fields and managed pastures contrast with the barren wastes of the Arctic. Kujataa is an extremely marginal landscape for farming, vulnerable to environmental change, illustrating the fragility as well as the resilience of past and present cultural traditions.

Draft statement of outstanding universal value

Brief synthesis

Kujataa – a subarctic farming landscape in Greenland is located in the municipality of Kujalleq in South Greenland. The nominated property is made up of five component parts, which together represent the demographic and administrative core of two farming cultures, a Norse Greenlandic one from the late 10th to the mid-15th century AD and an Inuit one from the 1780s to the present. Although these two cultures are distinct, they are both based on a combination of animal husbandry and marine mammal hunting.

The overall landscape of pastures, fields, ruins and present-day buildings is an outstanding example of a human settlement and land use in the Arctic, which is representative of a unique farming culture. Kujataa represents the first European settlement in the New World and the earliest introduction of farming to the Arctic. The resulting cultural landscape, shaped by grazing both in medieval and modern times, is composed of grassy slopes and willow copses and characterised by low settlement densities with isolated farmsteads surrounded by cultivated fields. The landscape of Kujataa represents an exceptionally comprehensive preservation of a medieval Northern European culture. The five component parts contain the full range of relics relating to Norse Greenlandic culture dating from the 10th to the 15th centuries AD, with complete examples of monumental architecture as well as key sites illustrative of the adaptation of the Inuit to a farming way of life from the 18th century onwards.

Fig. S.15: Silage bales on a sheep farm near Igaliku.

Justification of criterion

(v) Kujataa is an outstanding example of human settlement, where unique farming traditions have developed in a challenging environment. Situated between the cold desert of the Greenland Ice Cap and the cool outer coast of the Labrador Sea, Kujataa is an oasis with a relatively mild climate. Norse and Inuit subsistence practices based on a combination of animal husbandry and sea mammal hunting have resulted in a distinctive cultural landscape where cultivated fields and managed pastures contrast with the barren wastes of the Arctic. Kujataa is an extremely marginal landscape for farming, vulnerable to environmental change, illustrating the fragility as well as the resilience of past and present cultural traditions.

Statement of integrity

The boundaries of the nominated property are clearly defined and encompass all of the elements necessary to express its outstanding universal value. A comprehensive range of farming landscape is represented, including fields, meadows, and pastures with introduced and naturalised plants. All of the known elements relating to Norse Greenlandic culture—including farms, churches, cemeteries, and outfield structures—are represented in large numbers. The nominated property includes key sites relating to the reintroduction of farming in the 1780s and contains the core areas of contemporary farming, including all of the same attributes as those of the Norse Greenlandic culture.

Statement of authenticity

The nominated property has authenticity because the landscape retains the pastoral character introduced in the 10th century AD, where isolated farms surrounded by cultivated fields and interspersed by managed pastures are set against a background of vast and untouched wilderness. The archaeological remains of the Norse Greenlandic settlements in Kujataa have retained the highest degree of authenticity. The form, design and material composition of houses and other relics of this culture are unquestionably European and Norse. The characteristics and distinguishing features of Greenland Norse and Thule Inuit material culture are clear and well known. This has been established through large-scale excavations, extensive field surveys and intensive typological, art historical and environmental analyses stretching back into the 19th century. The historical view of the Norse Greenlandic settlements draws on contemporary written records from Iceland and Norway dating back to the 12th to 15th centuries AD.

Conservation of architectural monuments has primarily taken place in the last 20 years based on the principle of ensuring structural stability rather than rebuilding. The majority of the Norse Greenlandic sites have suffered no anthropogenic modification since their abandonment. Modern sheep farms, located mostly on or adjacent to Norse Greenlandic farm sites, typify the managed character of the contemporary landscape. Detailed historical documentation and protected historic buildings in the farming settlements bear witness to the farming culture of modern Inuit.

Fig. S.16: The church ruin of Hvalsey.

Requirements for protection and management

A combination of effective legislation and well-organised municipal planning strategies—together with an up-to-date management plan and a dedicated local community—contribute to the long-term protection and management of the nominated property and ensure the preservation of its outstanding universal value.

The site is governed and managed by a steering group with representatives from the Government of Greenland, the Greenland National Museum and Archives, Kujalleq Municipality, village councils, sheep farmers, the Danish Agency for Culture and the tourism industry. The day-to-day management will be carried out by a local secretariat headed by a site manager and a staff consisting of one or more park rangers working in close collaboration with the authorities represented in the steering group.

All ancient monuments in the property are protected by the Greenland Parliament Act on Cultural Heritage Protection and Conservation. This act ensures a protection zone of 20 metres around each ruin except for agricultural surface cultivation that may take place up to a distance of two metres from a monument. The ruin groups at Sissarluttoq (cp 3) and at the Hvalsey (Qaqortukulooq) site (cp 5) are further protected by their status as "cultural heritage areas", including a much wider protection zone around the monuments, where no agricultural activities can take place with the exception of pasture for sheep grazing during summer. The important ruin groups in Qassiarsuk (cp 1) and Igaliku (cp 2) also have an additional protection zone stipulated in the municipal planning. The listed buildings in the property are protected by the same legislative act as the ancient monuments, ensuring that demolition is prevented and that any alterations are carefully controlled. The Greenland National Museum

and Archives is the responsible authority and offers advice and information on the maintenance of listed buildings. Furthermore, listed buildings are protected under the municipal planning.

The Government of Greenland and Kujalleq Municipality are pursuing a pro-agricultural policy and investing development funds for the agricultural sector, with an observed focus on the nominated property, as it ranks among the most productive agricultural districts in contemporary Greenland. In recent decades, the Government of Greenland has developed agricultural legislation on the basis of the Agricultural Act of 1996, which has paved the way for the introduction of a number of regulations. Government support for the agricultural sector is expected to continue in the future.

This pro-agricultural policy ensures the ongoing livelihood of the agricultural sector, and there is a broad political consensus within the Parliament of Greenland for both preserving and developing the agricultural sector. The main incentive for this support is to provide Greenland with more domestically grown produce, thereby reducing the country's dependency on food imports. This political will and ambition is reflected in both legislation and the fiscal budgets of the Government of Greenland, with funds being provided for public loans and grants for development initiatives.

The Government of Greenland and Kujalleq Municipality provide further subsidies for the development of infrastructure, particularly renewable energy projects and roads between farms and settlements. As noted above, the government provides operating subsidies to agriculture that support the sector's continued existence. However, the government intends to make agriculture less dependent on subsidies and will increasingly focus on economies of scale in agriculture.

Name and contact information of official local institution/agency

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Website: www.kujalleq.gl

Glossary

Arctic Small Tool tradition: Earliest culture known in Greenland with traces in northern Greenland going back to 2500 BC or earlier. Independence I and Saqqaq are now seen as variants of this culture, the remains of which are found throughout Greenland and which lasted until c. 800 BC.

centralised farm: A *Norse Greenlandic* building complex where most or all functions of the farm have been amalgamated in one structure, as opposed to farms where stables and outhouses are scattered over the *homefield*.

Early Dorset: see *Greenlandic Dorset*.

Eystribyggð: Eastern Settlement. The area of Norse Greenlandic settlement in southern Greenland, from Cape Farewell to the mouth of Ikersuaq fjord. Equivalent to modern *Kujataa*. See also *Ø*.

feasting hall: A stone structure that was a component of *Norse Greenlandic* elite residences where feasts are thought to have been held.

Greenlandic Dorset: Distinct from the Canadian Dorset with which it is partly contemporaneous. Found throughout Greenland from ca. 800 BC to ca. 1 AD. Previously known as Independence II and Early Dorset.

homefield: The area of improved meadow/cultivated land around individual Norse Greenlandic farmsteads producing winter fodder for livestock, particularly dairy cows.

Independence I: See *Arctic Small Tool tradition*.

Independence II: See *Greenlandic Dorset*.

I***nuit***: Modern Greenlanders, refers to their culture in the post-contact (1721) period.

Kujataa: The modern Greenlandic name for the southernmost part of the west coast of Greenland, equivalent to *Eystribyggð* in medieval times.

Late Dorset: Found only in the far northwest of Greenland in ca. 700-1300 AD, part of the Canadian Late Dorset and not directly related to the earlier *Greenlandic Dorset*.

M: Abbreviation for the Danish term *Mellembygden* (Middle Settlement), used in site identification numbers, e.g. M7 for Eqaluit. There is no known Norse Greenlandic name for this region often regarded as an outlying component of *Eystribyggð*.

Norse: Culture of Scandinavian origin, used to describe the language, material culture, ideology and social structure of Viking Age Scandinavia as well as new communities in the North Atlantic, from the British Isles to the west coast of Greenland, during the Middle Ages.

Norse Greenlandic: The local manifestation of Norse culture in Greenland from the 10th to the 15th centuries.
outfield: Unimproved pastures and meadows outside the homefield of a *Norse Greenlandic* farm.

outstation: Any structure outside *Norse Greenlandic homefields* that is not a *shieling*. Typically a single fold or pen.

Palaeo-Eskimo: The cultures of Greenland and Arctic Canada that pre-date the European colonisation in the 10th century AD. These include the *Arctic Small Tool tradition* (Independence I and Saqqaq), *Greenlandic Dorset* (also known as Independence II and Early Dorset) and *Late Dorset* cultures.

Qeqertaasaq: An alternative Greenlandic place name for *Tasikuluulik* – component part 4, known in Norse as *Vatnahverfi*.

Saqqaq: Greenlandic variant of the A*rctic Small Tool tradition*.

shieling: *Norse Greenlandic* summer farm, characterised by a dwelling (seasonal) and a highland/peripheral location.

skemma: A stone structure found at many *Norse Greenlandic* sites, often set apart from other buildings in a prominent location. Thought to have had a storage function.

South Greenland: The southern part of Greenland, including both main settlement areas of the Norse Greenlanders, *Vestribyggð* and *Eystribyggð*

Subarctic: A climatic and vegetation zone equivalent to climate types Dfc, Dwc, Dfd, and Dwd in the Köppen climate classification scheme. "*Between the temperate coniferous zone … and the arctic climatic zone lies a narrow transitional region which is called the subarctic climatic zone. Here, average climatic temperatures during the warmest month lie slightly above 10°C and the growing season is just long enough to allow the development of a low scattered forest. In Greenland the subarctic zone is only found in the interior parts of the southern fjords.*"

Tasikuluulik: From 2014, the official place name for component part 4 – in Greenlandic also known as *Qeqertaasaq* and in Norse as *Vatnahverfi.*

Thule Inuit: The ancestral culture of modern Inuit, arrived in Greenland by the 13th century AD. Used in reference to the pre-contact (1721) period.

V: Abbreviation for the Danish term Vesterbygden (*Vestribyggð*, Western Settlement), used in site identification numbers, e.g. V51 for Kilersarfik (Sandnes).

Vatnahverfi: Norse term for Tasikuluulik – component part 4.

Vestribyggð: Western Settlement. The area of *Norse Greenlandic* settlement in the Nuuk / Ameralik-Ameralla fjord complex east of present day Nuuk. See also *V*.

Vikings: Pirates and seafarers of Scandinavian origin active in northern Europe and the North Atlantic in the period 800-1100 AD.

Winter house: In *Thule Inuit* culture a turf dwelling used in winter.

Ø: Abbreviation for the Danish term Østerbygden (*Eystribyggð*, Eastern Settlement, *Kujataa*), used in site identification numbers, e.g. Ø47 for Igaliku (Garðar).

Chapter 1 – Identification of property

1.1 Country (and State if different)

Denmark / Greenland

1.2 State, Province or region

Greenland, Municipality of Kujalleq

1.3 Name of Property

Kujataa – a subarctic farming landscape in Greenland

1.4 Geographical co-ordinates to the nearest second

Table 1.1 – Coordinates of the geographical centre of each component part of the nominated property

Component part	Coordinates of the central point
(1) Qassiarsuk	N 61°09′52″ / W 45°35′53″
(2) Igaliku	N 61°00′06″ / W 45°22′29″
(3) Sissarluttoq	N 60°53′48″ / W 45°29′42″
(4) Tasikuluulik (Vatnahverfi)	N 60°50′52″ / W 45°23′24″
(5) Qaqortukulooq (Hvalsey)	N 60°47′33″ / W 045°50′04″

Fig. 1.1: Norse church ruin in Qassiarsuk.

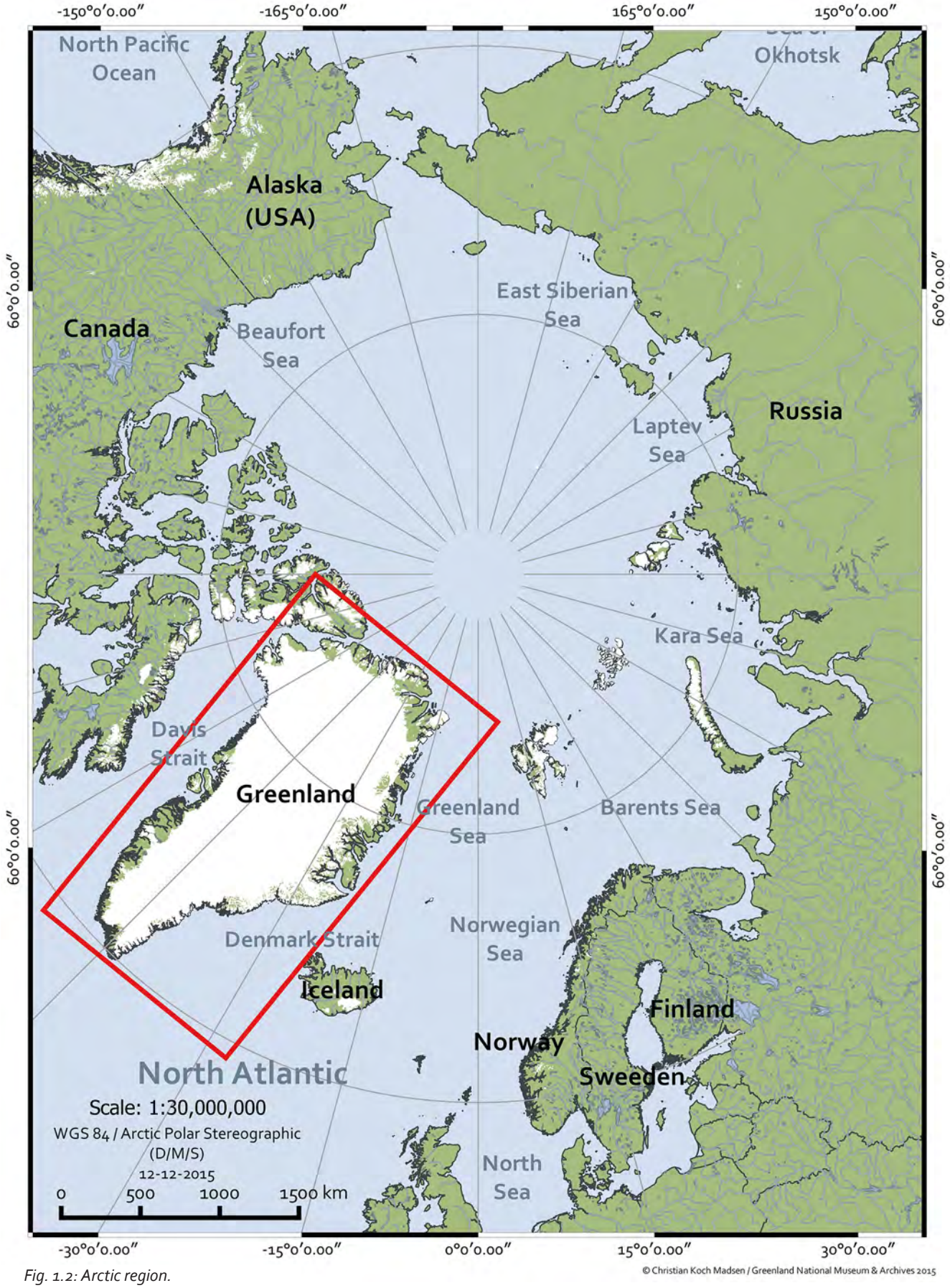


Fig. 1.2: Arctic region.

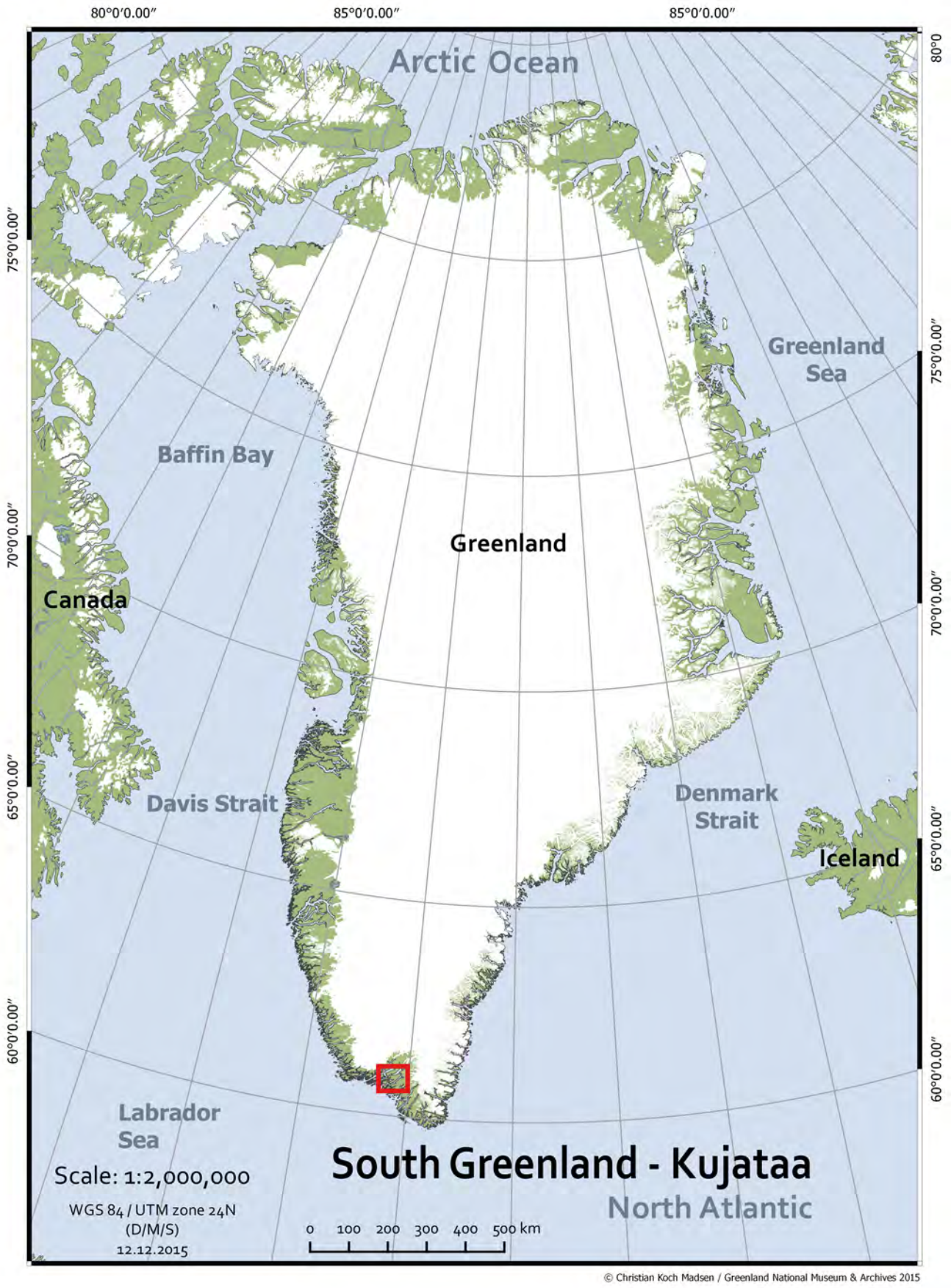


Fig. 1.3: Kujataa.

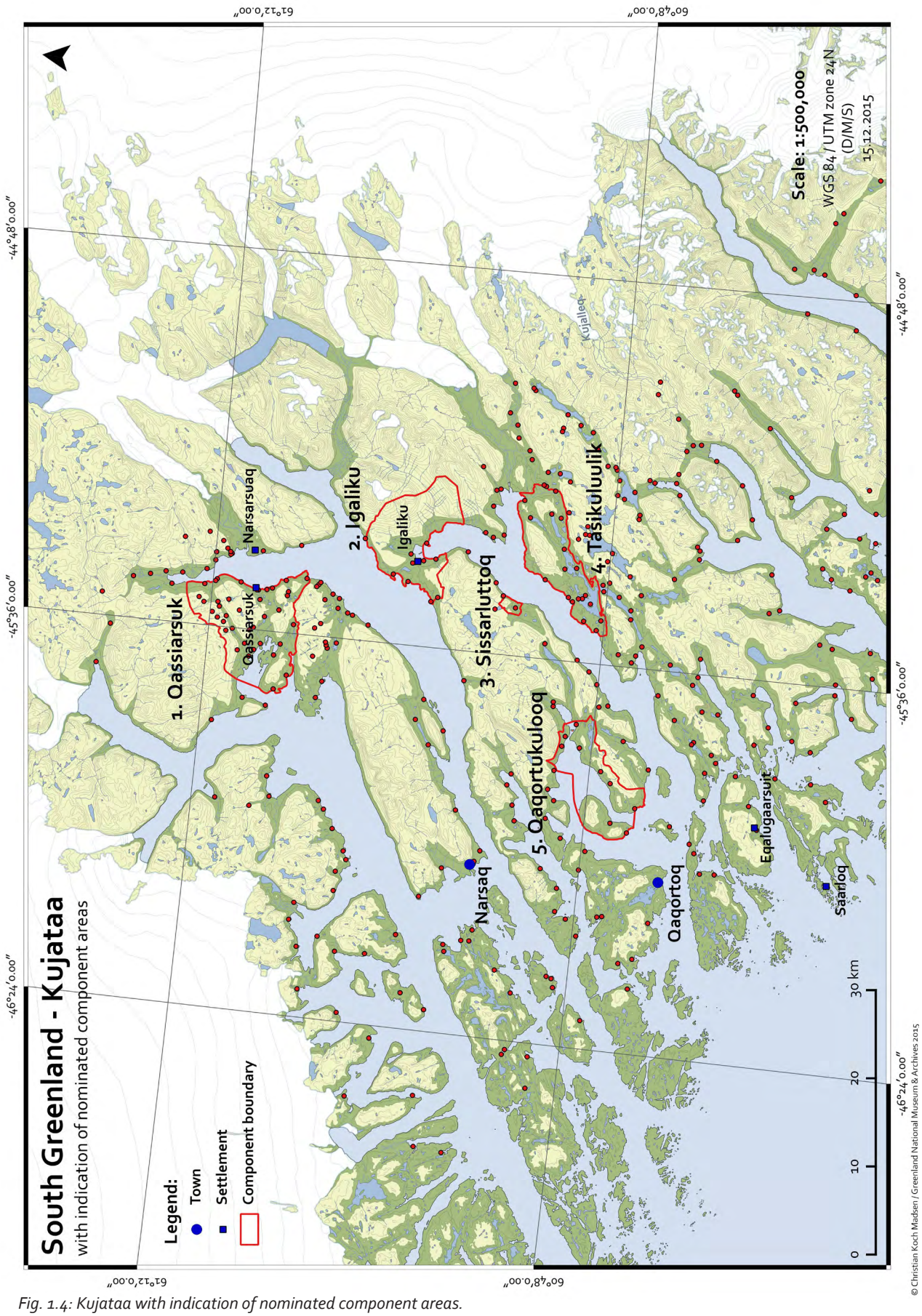


Fig. 1.4: Kujataa with indication of nominated component areas.

1.5 Maps showing the boundaries of the nominated property and buffer zone

1.5.1 Maps of the component parts

Component part 1 – Qassiarsuk

113.42 km² (11,342 ha)

Table 1.2 – Geographic coordinates for the borders of component part 1	
1	N 61°09'58" / W 45°42'27"
2	N 61°11'12" / W 45°37'17"
3	N 61°13'07" / W 45°34'17"
4	N 61°13'34" / W 45°30'55"
5	N 61°12'17" / W 45°30'30"
6	N 61°11'21" / W 45°29'23"
7	N 61°08'45" / W 45°30'45"
8	N 61°07'32" / W 45°29'21"
9	N 61°06'10" / W 45°29'01"
10	N 61°06'41" / W 45°38'40"
11	N 61°08'03" / W 45°43'49"

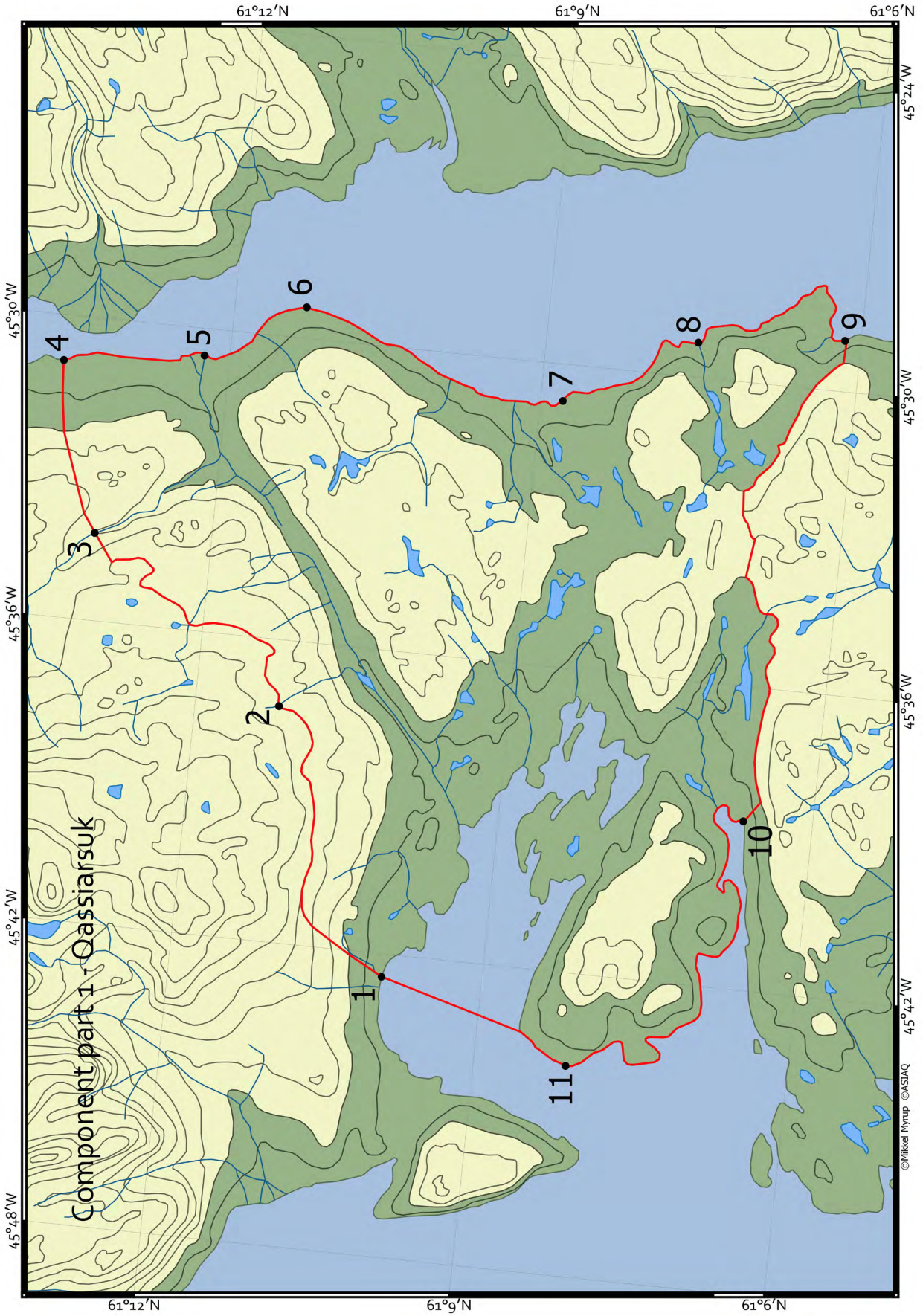


Fig. 1.5: Map showing the geographic coordinates for the borders of component part 1.

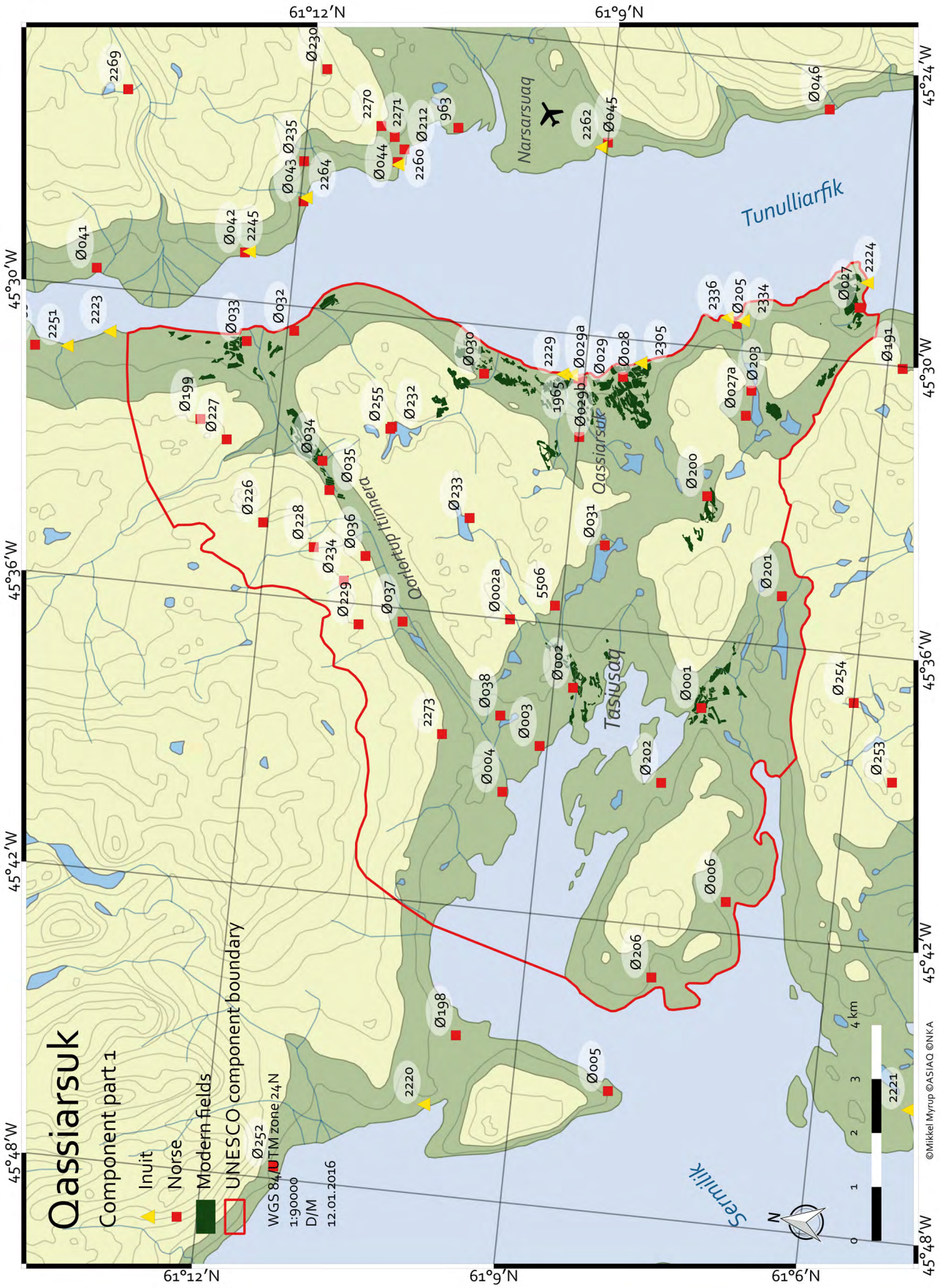


Fig. 1.6: Component part 1, Qassiarsuk.

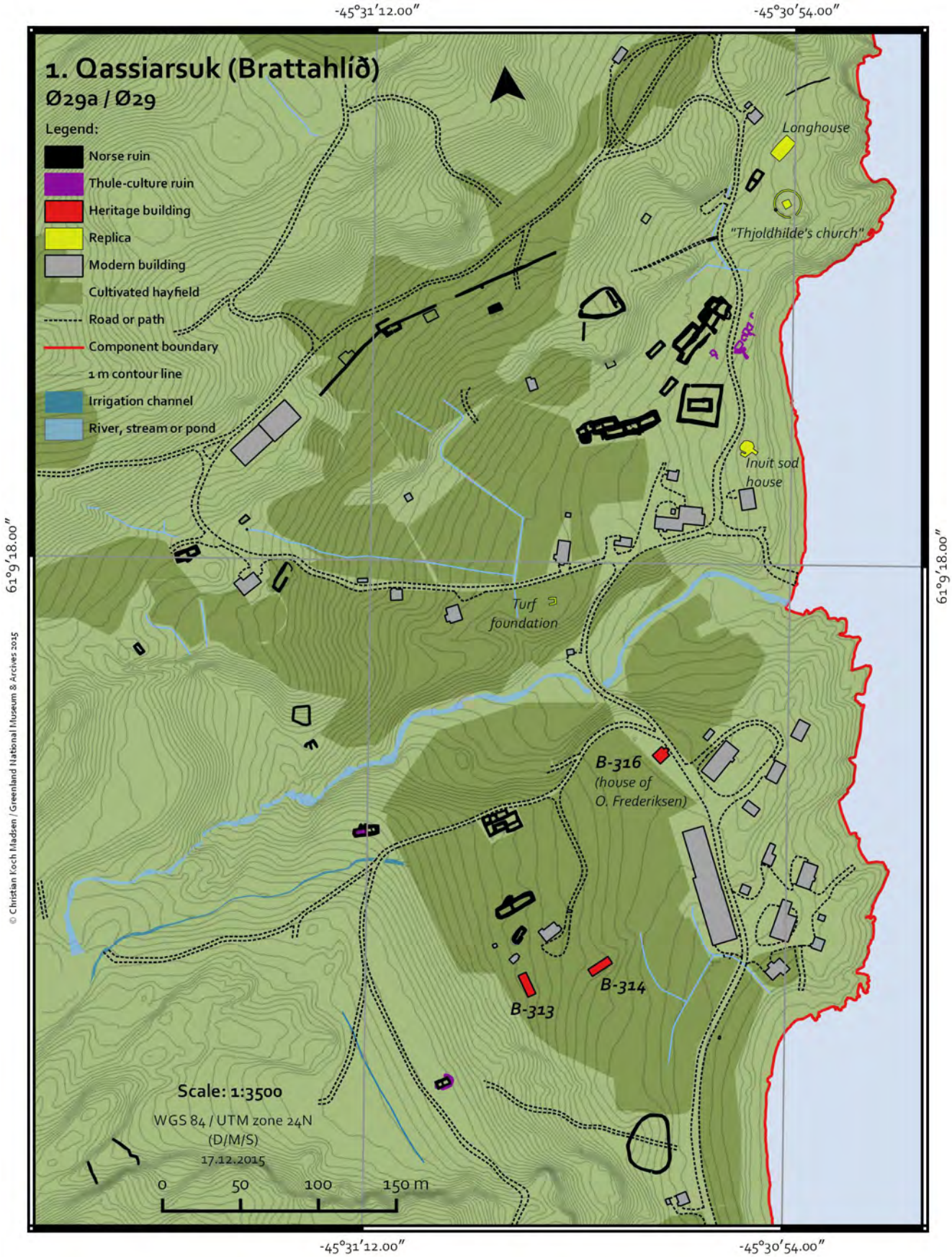


Fig. 1.7: Detailed survey plan of central Qassiarsuk/Brattahlíð (Ø29a/Ø29) with location of Norse and Inuit ruins, as well as heritage and modern buildings.

Component part 2 – Igaliku

82.87 km² (8,287 ha)

Table 1.3 – Geographic coordinates for the borders of component part 2	
1	N 61°03'05" / W 45°23'08"
2	N 61°01'59" / W 45°18'34"
3	N 60°59'32" / W 45°16'21"
4	N 60°58'31" / W 45°14'25"
5	N 60°57'07" / W 45°20'11"
6	N 60°58'35" / W 45°21'26"
7	N 60°59'18" / W 45°24'50"
8	N 60°58'03" / W 45°24'01"
9	N 60°58'27" / W 45°26'51"
10	N 60°58'32" / W 45°30'33"
11	N 60°59'20" / W 45°28'55"
12	N 61°00'58" / W 45°27'58"
13	N 61°02'03" / W 45°26'44"

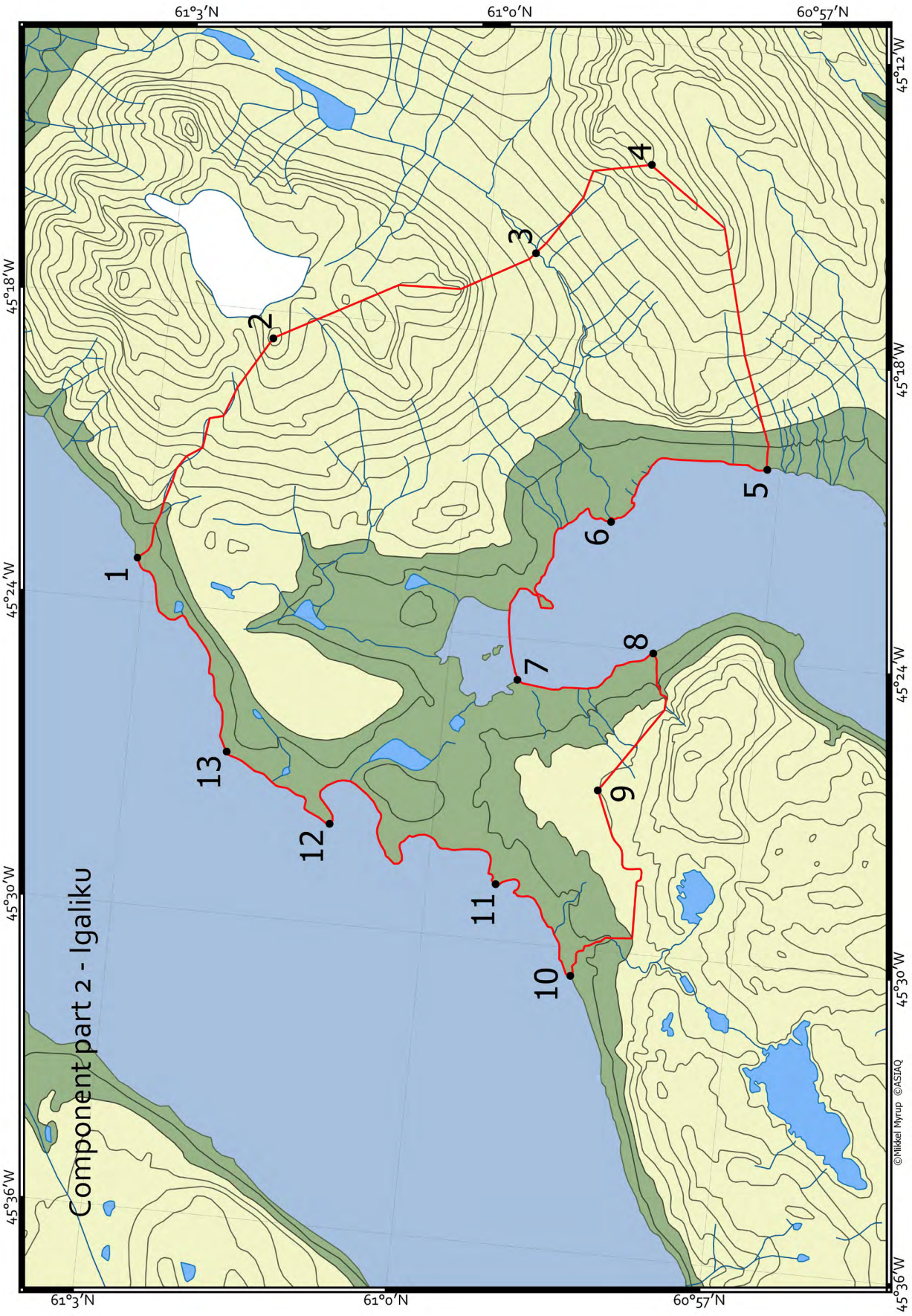


Fig. 1.8: Map showing the geographic coordinates for the borders of component part 2.

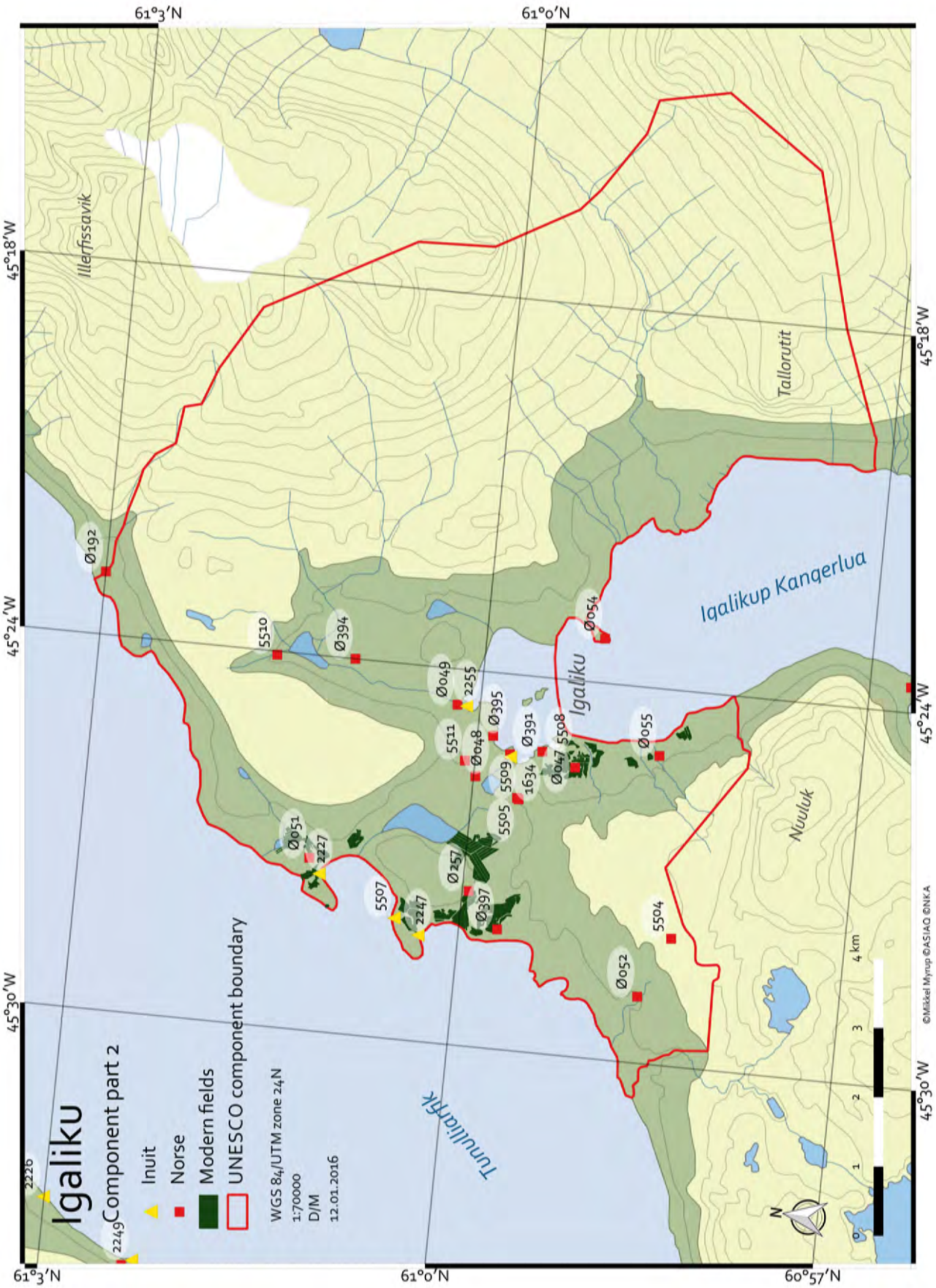


Fig. 1.9: Component part 2, Igaliku.

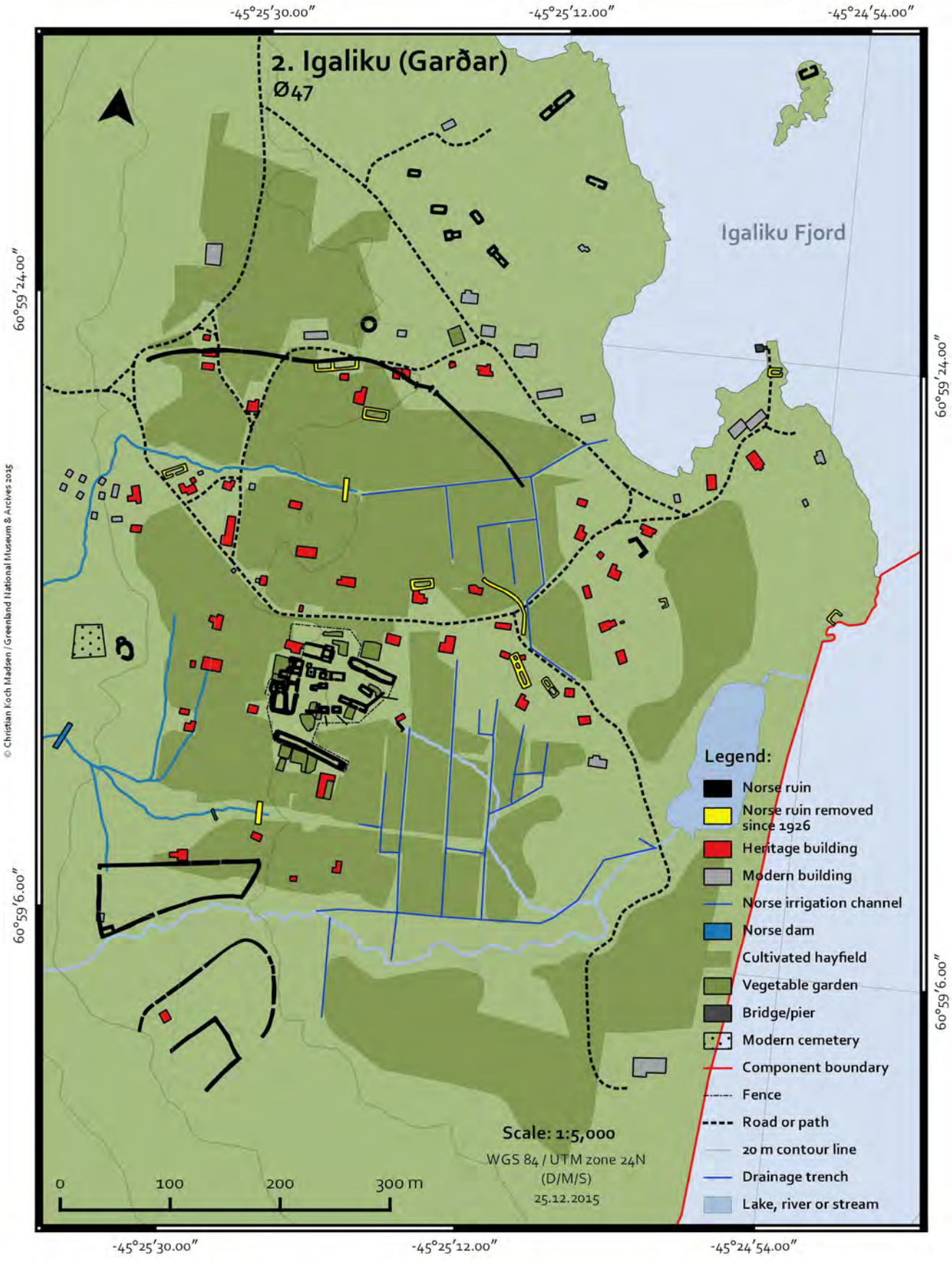


Fig. 1.10: Detailed survey plan of Igaliku (Ø47) with location of Norse and Inuit ruins, as well as heritage and modern buildings.

Component part 3 – Sissarluttoq

3.39 km² (339 ha)

Table 1.4 – Geographic coordinates for the borders of component part 3	
1	N 60°54'32" / W 45°29'40"
2	N 60°54'13" / W 45°28'30"
3	N 60°53'23" / W 45°29'24"
4	N 60°53'06" / W 45°29'23"
5	N 60°53'15" / W 45°30'54"
6	N 60°53'51" / W 45°30'46"

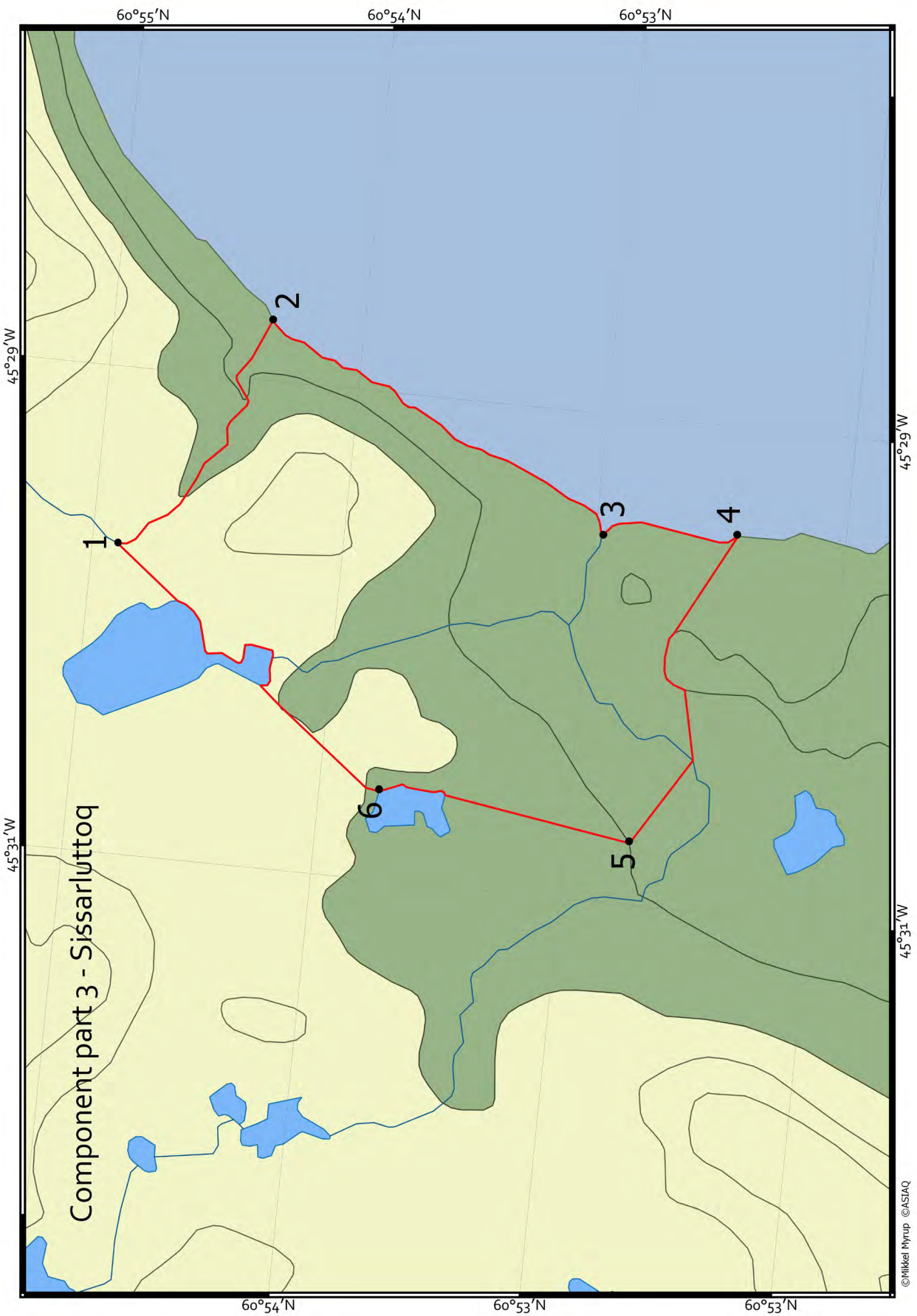


Fig. 1.11: Map showing the geographic coordinates for the borders of component part 3.

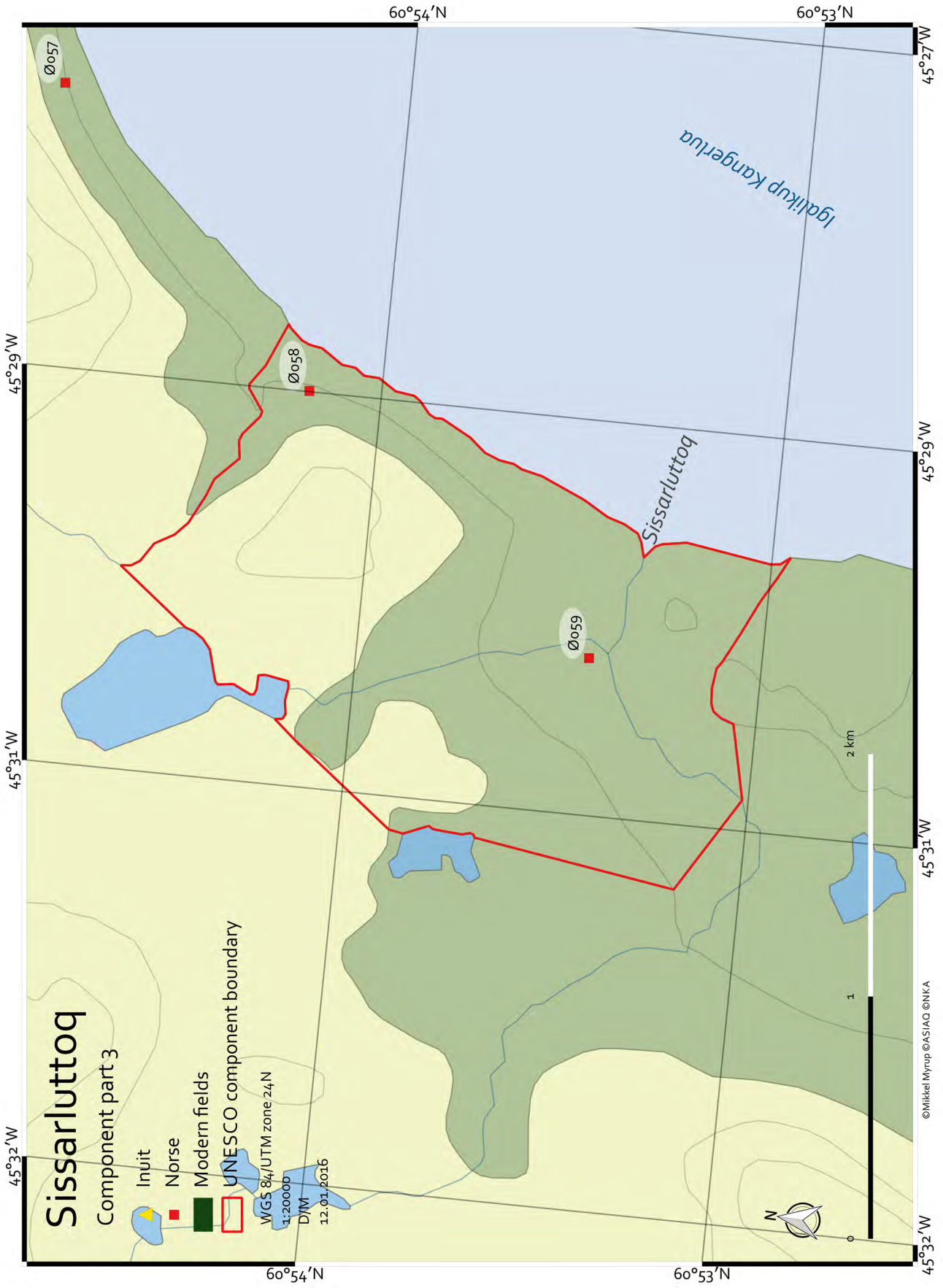


Fig. 1.12: Component part 3, Sissarluttoq.

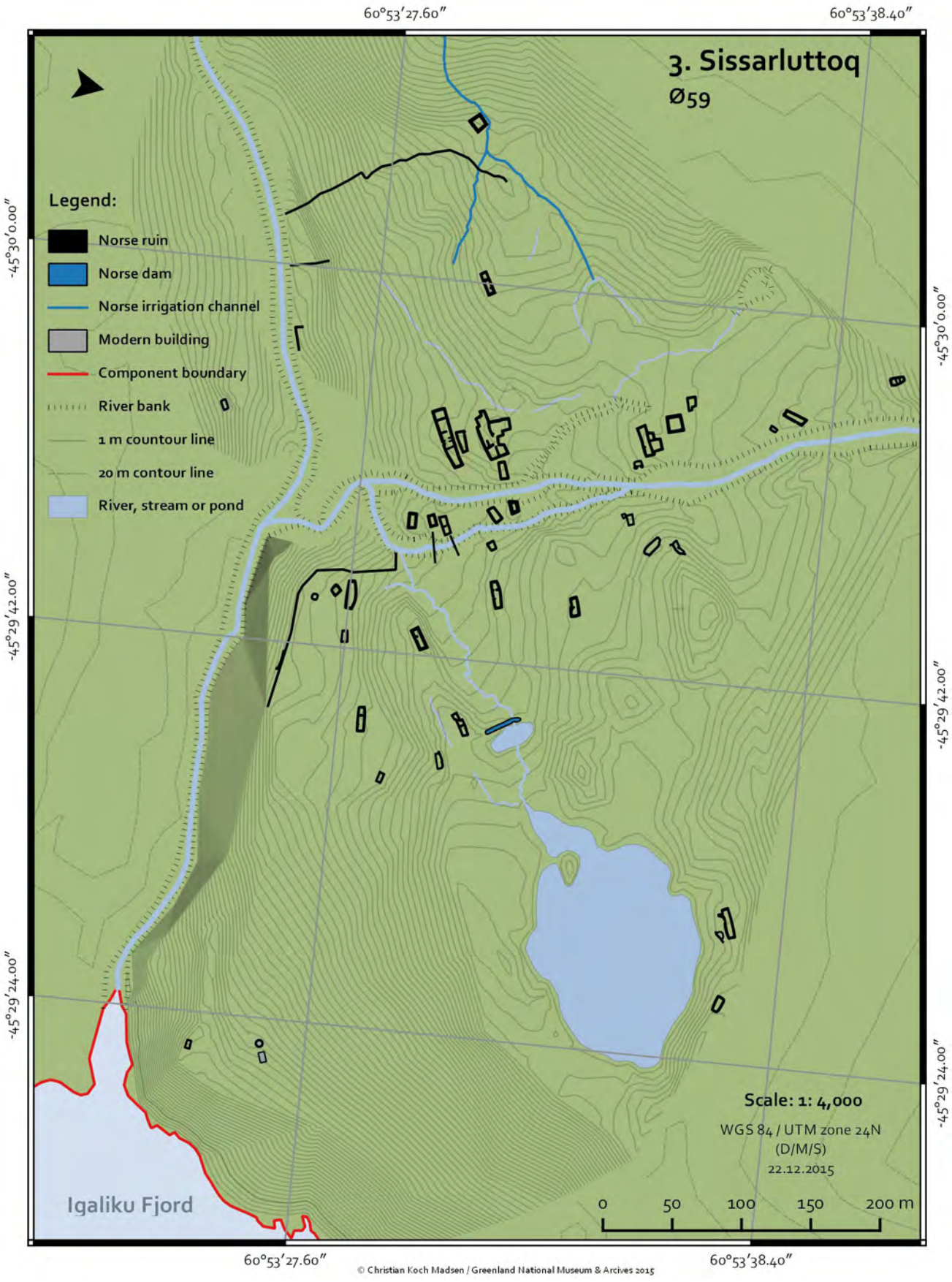


Fig. 1.13: Detailed survey plan of Sissarluttoq (Ø59).

Component part 4 – Tasikuluulik (Vatnahverfi)

75.42 km² (7,542 ha)

Table 1.5 – Geographic coordinates for the borders of component part 4	
1	N 60°53'32" / W 45°16'15"
2	N 60°53'04" / W 45°14'23"
3	N 60°51'28" / W 45°15'00"
4	N 60°50'51" / W 45°18'17"
5	N 60°49'49" / W 45°23'23"
6	N 60°48'36" / W 45°26'05"
7	N 60°48'28" / W 45°26'47"
8	N 60°47'47" / W 45°32'16"
9	N 60°48'12" / W 45°32'26"
10	N 60°49'57" / W 45°28'39"
11	N 60°53'10" / W 45°24'44"

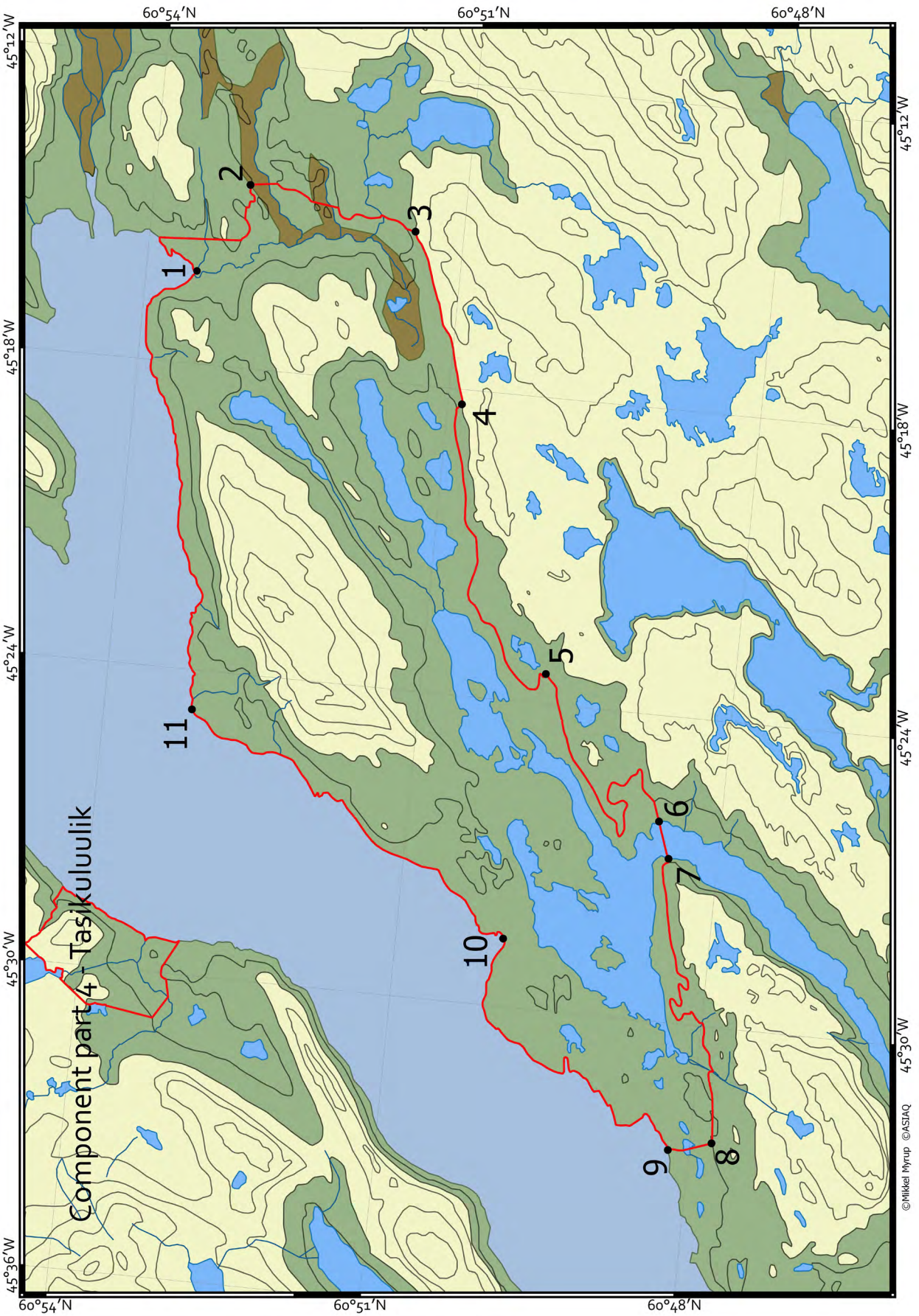


Fig. 1.14: Map showing the geographic coordinates for the borders of component part 4.

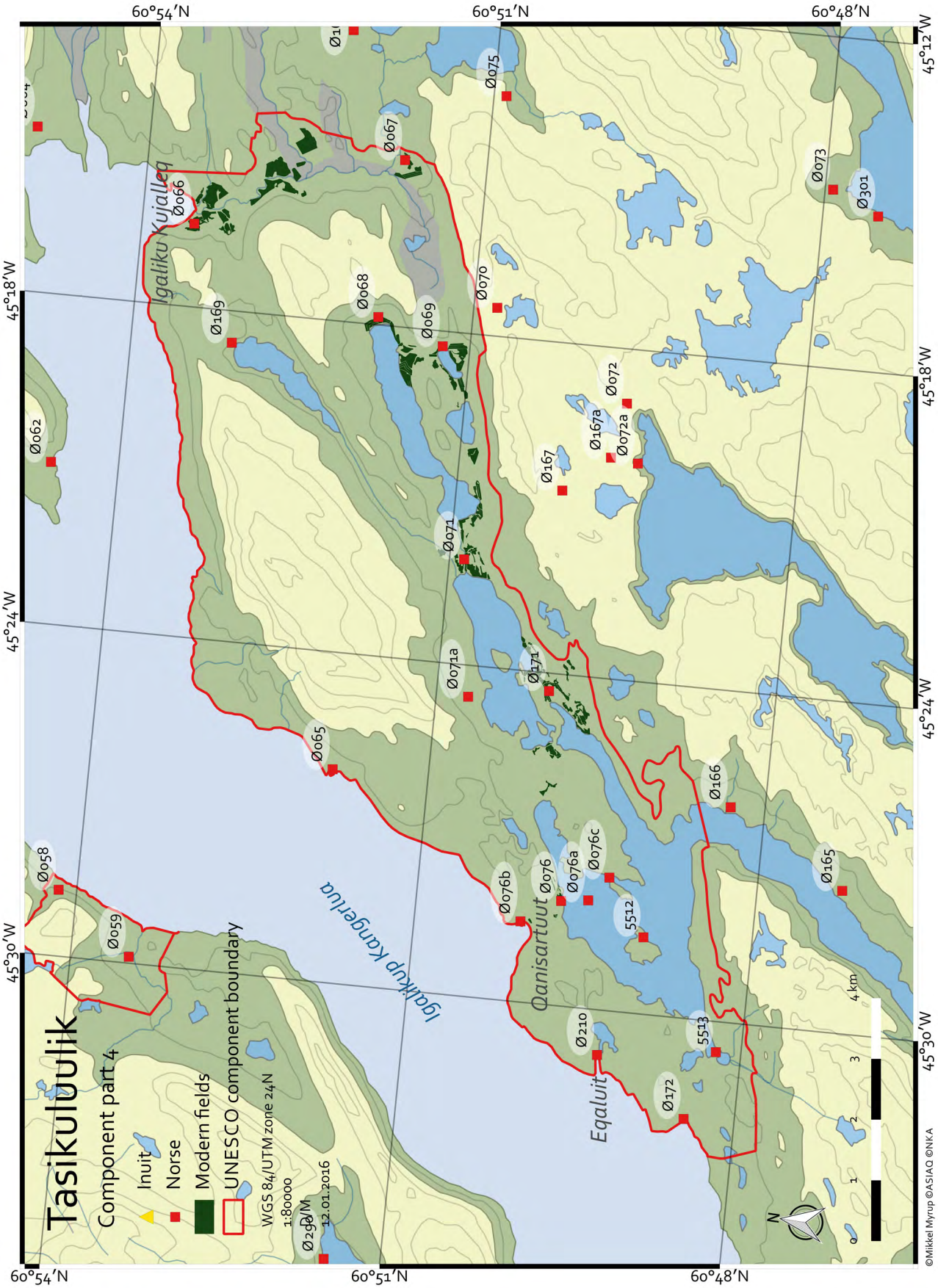


Fig. 1.15: Component part 4, Tasikuluulik (Vatnahverfi).

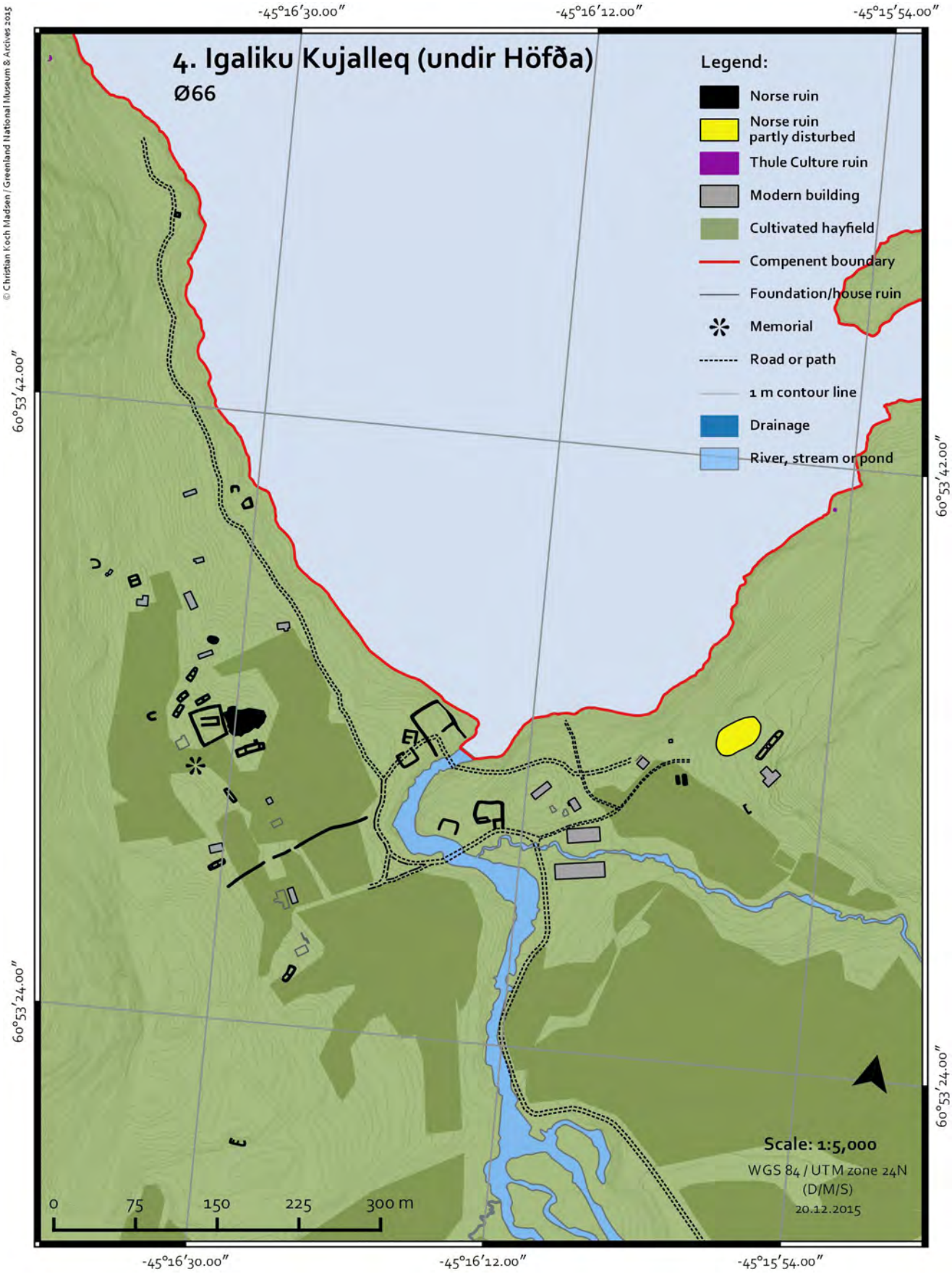


Fig. 1.16: Detailed survey plan of Igaliku Kujalleq (Ø66).

Component part 5 – Qaqortukulooq (Hvalsey)

73.82 km² (7,382 ha)

Table 1.6 – Geographic coordinates for the borders of component part 5	
1	N 60°50'41" / W 45°48'38"
2	N 60°50'08" / W 45°44'55"
3	N 60°49'42" / W 45°43'48"
4	N 60°49'14" / W 45°43'22"
5	N 60°48'16" / W 45°42'29"
6	N 60°47'51" / W 45°45'40"
7	N 60°47'06" / W 45°47'12"
8	N 60°46'09" / W 45°49'50"
9	N 60°44'34" / W 45°50'46"
10	N 60°44'26" / W 45°52'56"
11	N 60°44'58" / W 45°53'49"
12	N 60°44'58" / W 45°55'51"
13	N 60°45'33" / W 45°57'17"
14	N 60°47'02"/W 45°57'07"
15	N 60°48'18"/ W 45°55'14"
16	N 60°49'00"/ W 45°50'00"

1.5.2 Buffer Zone

There is no buffer zone defined around the nominated property. Each of the component parts has been delimited in such a way that it includes all elements of the cultural landscape. The borders are set 100 m or more away from any known archaeological site demarcating extensive tracts of land to create visual and culture historical wholes. The nominated property is complemented by culture heritage protection of historical areas that provide an added layer of protection to areas adjacent to the nominated property and to other areas of Norse Greenlandic settlement in southern Greenland.

1.5.3 Borders

Where the component parts border the sea, the demarcation follows a line extending 20 m from the coast at low tide. On land the borders follow rivers, lakes, other topographical markers and in some cases contour lines (100, 200, 300, 400 or 500 metres above sea-level).

Fig.1.17: Norse ruin of Qaqortukulooq (Hvalsey Church).

1.6. Area of nominated property

Table 1.7 – Area of nominated property				
Id. no.	**Component part**	**Coordinates of the central point**	**Area of the nominated component of the property (ha)**	**Area of buffer zone**
1	Qassiarsuk	N 61°09'52" / W 45°35'53"	11,342	0
2	Igaliku	N 61°00'06" / W 45°22'29"	8,287	0
3	Sissarluttoq	N 60°53'48" / W 45°29'42"	339	0
4	Tasikuluulik (Vatnahverfi)	N 60°50'52" / W 45°23'24"	7,542	0
5	Qaqortukulooq (Hvalsey)	N 60°47'33" / W 045°50'04"	7,382	0
	Total area in ha.		**34,892**	0

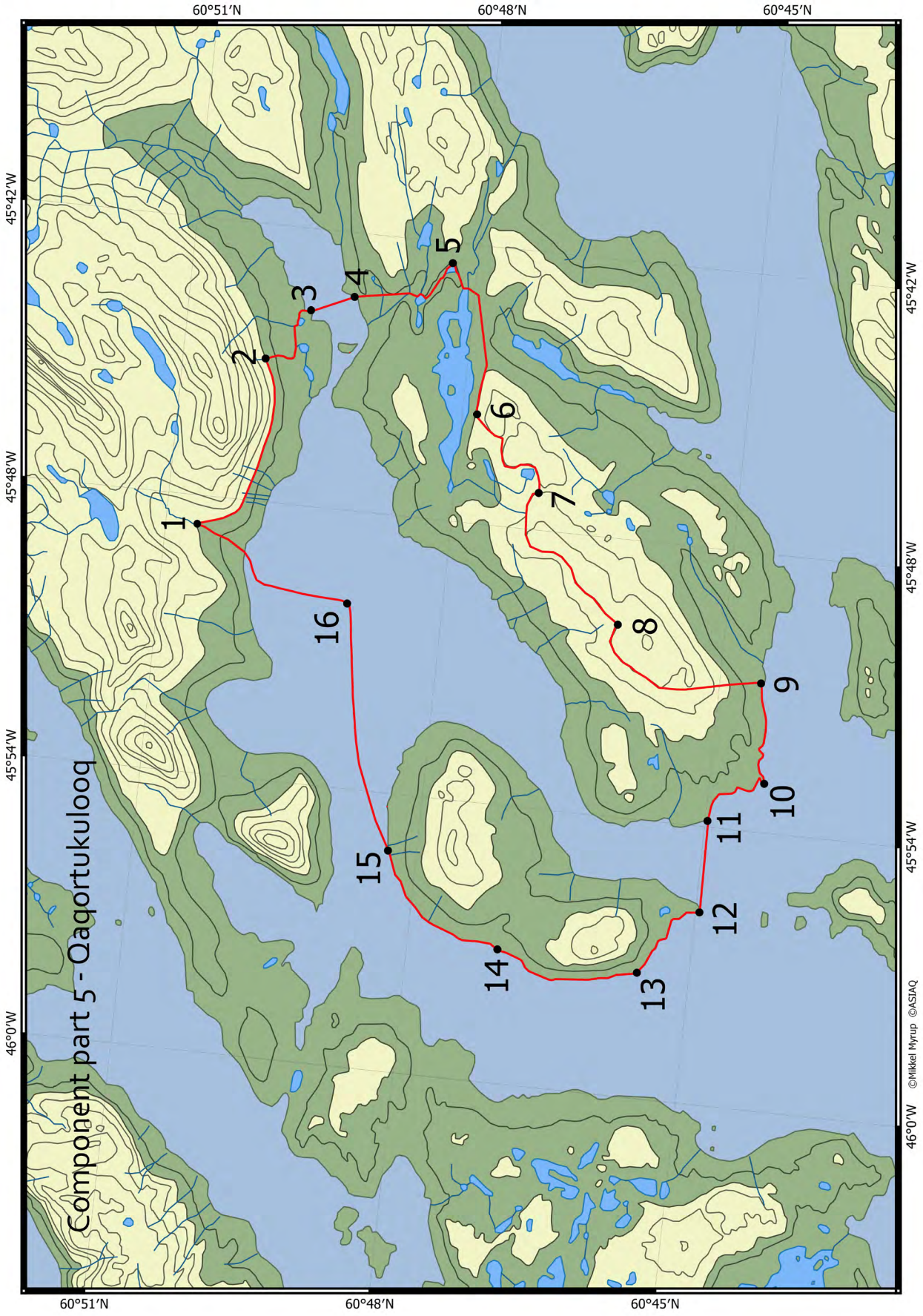


Fig. 1.18: Map showing the geographic coordinates for the borders of component part 5.

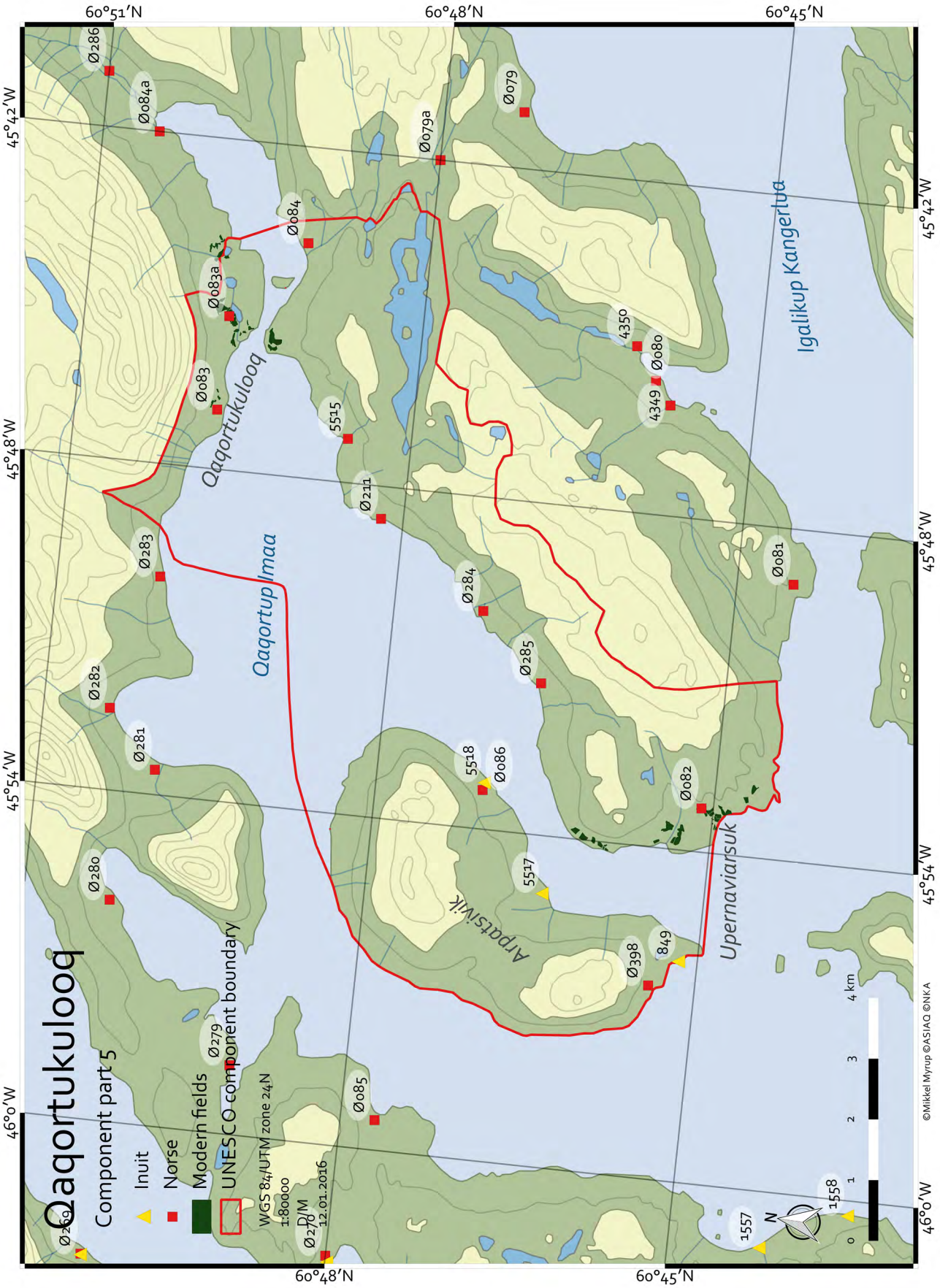


Fig. 1.19:Component part 5, Qaqortukulooq (Hvalsey).

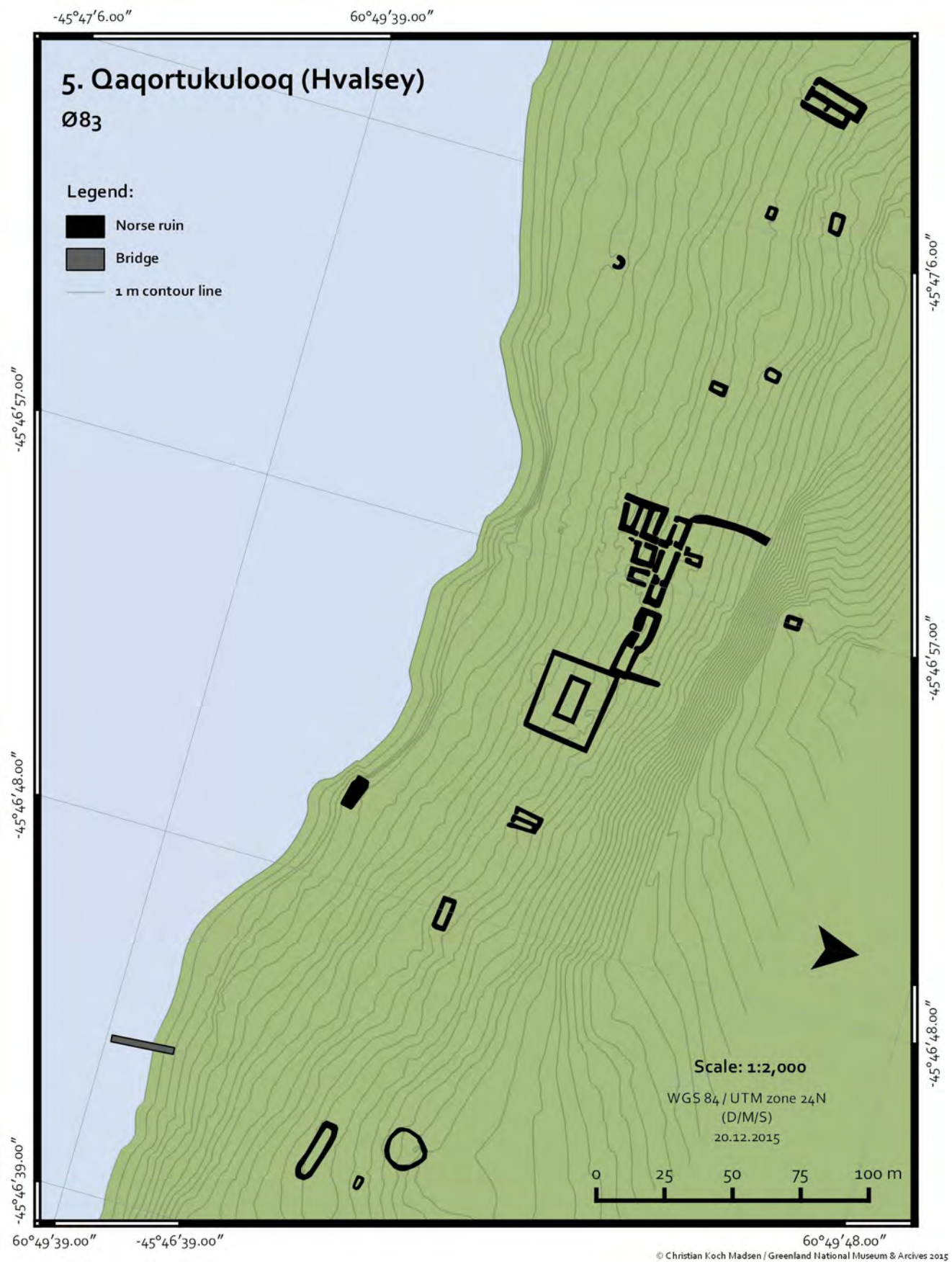


Fig. 1.20: Detailed survey plan of Qaqortukulooq (Hvalsey) (Ø83).

Chapter 2 – Description of property

2.1.1 Introduction

Kujataa is the modern Greenlandic name for the area known by the Norse as Eystribyggð, stretching from Nunap Isua (Cape Farewell, Hvarf in Norse) at the southern tip of Greenland to Nunarsuit Island 250 kilometres to the northwest. It corresponds to the west coast section of the modern municipality of Kujalleq and contains the modern towns of Qaqortoq, Narsaq and Nanortalik as well as the international airport at Narsarsuaq. Within a roughly triangular area between the coast on the western side and the ice cap on the eastern and northern sides, there are deep fjords cutting as much as 100 kilometres inland. These fjords are closer to the ice cap than the outer coast, and they shelter lowlands with a local climate that makes farming possible.

It is here that Norse colonists established their settlements in the late 10th century AD and where the remains of their 500-year occupation can still be seen at nearly 500 sites. In the same fjords, on or adjacent to some of the Norse Greenlandic sites, modern farms have been established. The modern farms illustrate the unique adaptation of a hunting society to the ways of farmers and also maintain grazing regimes that give the landscape its managed character.

While the landscape of Kujataa is dominated by large-scale natural features—the ice cap, high mountains, deep fjords and extensive stretches of wilderness where no man-made structures are to be seen for miles on end—a closer look also reveals a uniquely comprehensive preservation of the medieval cultural landscape. This landscape is made more accessible and visible by the modern farms, which have largely respected the earlier remains, yet utilise the same fields and graze the same pastures. This landscape preserves a comprehensive record of Norse Greenlandic society as well as evidence for earlier occupation by Palaeo-Eskimos, along with a fuller inventory of Thule Inuit archaeology from the 14th century AD onwards and the built heritage of Inuit farming introduced in the late 18th century AD. In addition to preserving a complete record of the vanished culture of the Norse Greenlanders and the contemporary culture of Inuit farmers, this cultural landscape bears testimony to several important themes in human history including global migration, cultural encounters and human adaptations to extreme environments.[2] The five component parts of the nominated area represent the core areas of medieval and modern farming in Greenland and they include key sites for the illustration of both traditions.

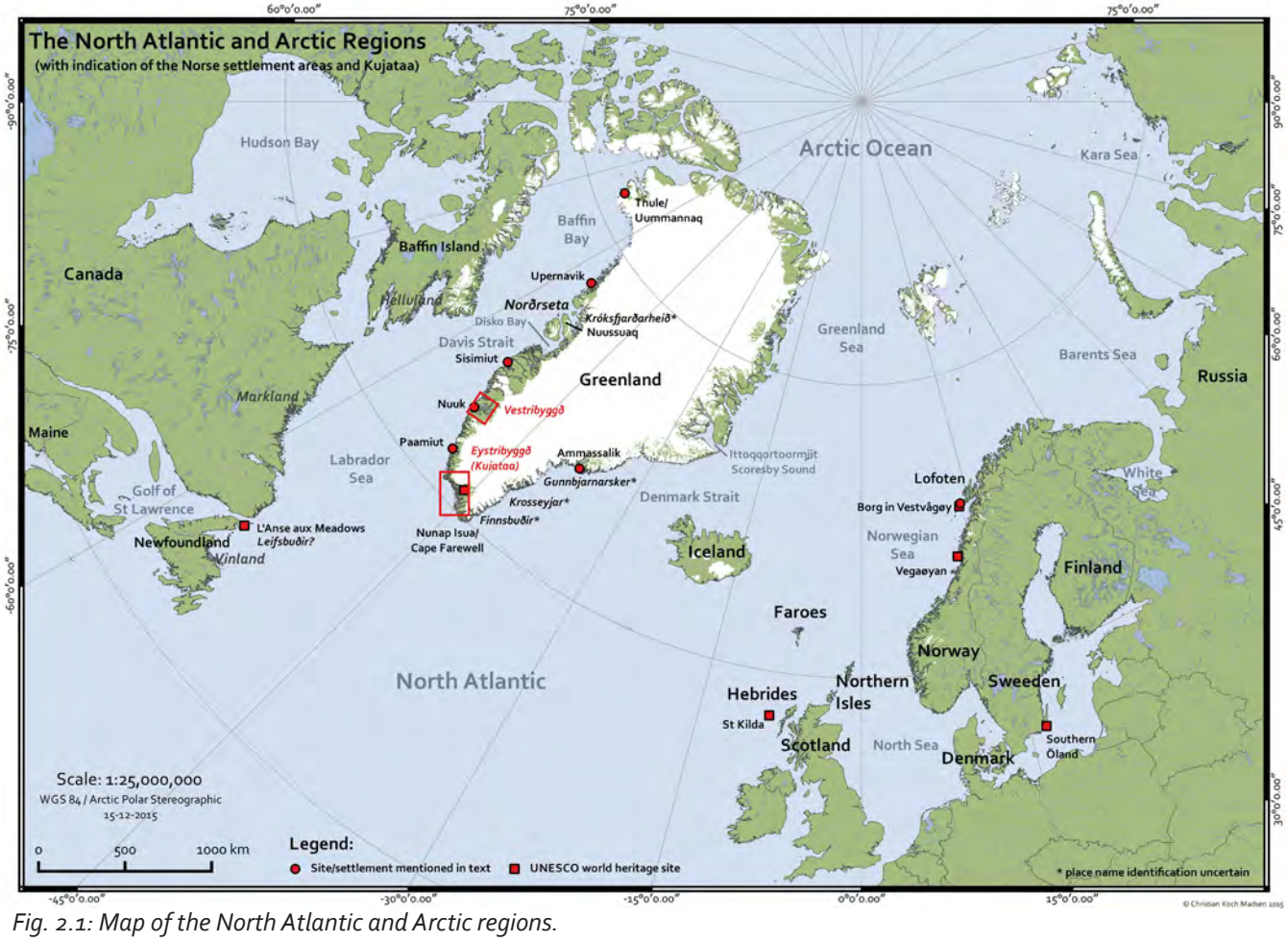


Fig. 2.1: Map of the North Atlantic and Arctic regions.

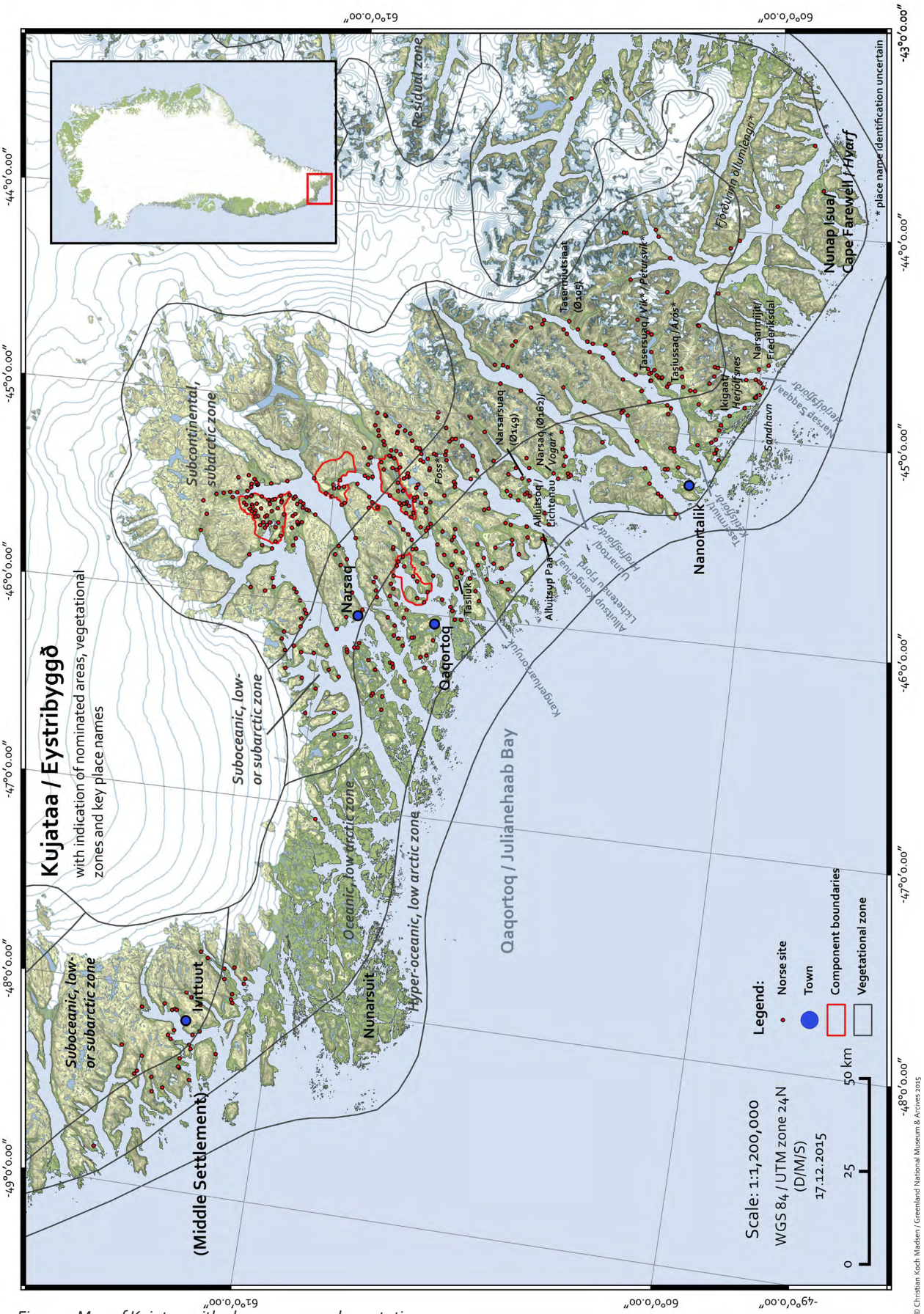


Fig. 2.2: Map of Kujataa with place names and vegetation zones.

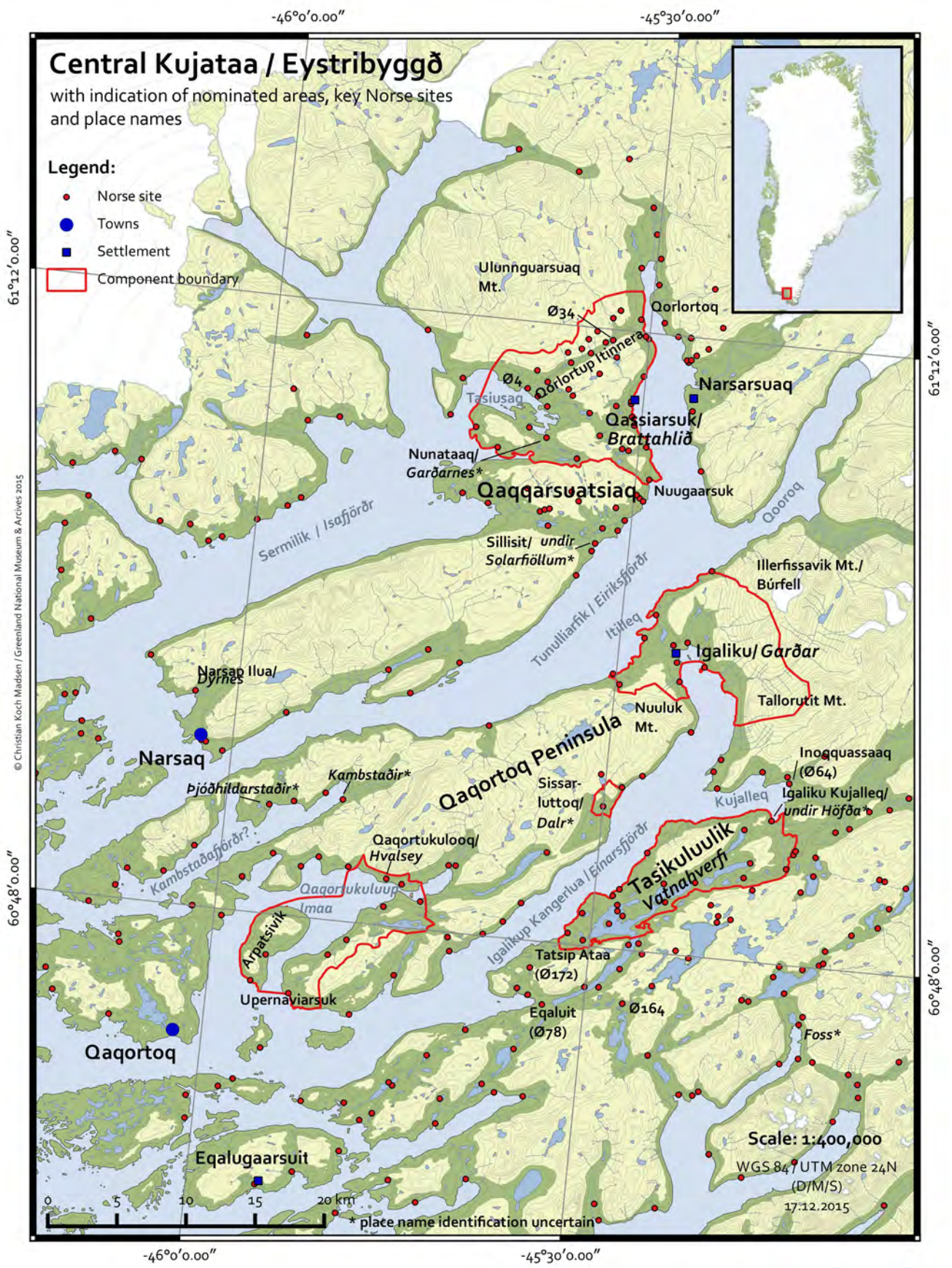


Fig. 2.3: Map of central Kujataa with place names.

Setting the scene

In the late 10th century AD, Norse explorers rounded the southern tip of Greenland to discover deep fjords with land suitable for farming, an event that quickly led to colonisation. The expeditions were mounted from Iceland, itself a recently established colony, but they were part of a general westward push of exploration and colonisation across the North Atlantic. This push had begun with Scandinavian settlement in the Northern Isles of Scotland in the 8th century AD, followed by the colonisation of the Faroes and Iceland in the 9th century.[3] The exploration of Greenland and the east coast of mainland North America represents the final and in many ways the most dramatic episode in this story.

> *The country called Greenland was discovered and settled from Iceland. A man from Breiðafjorðr called Eiríkr the Red went out there from here and took possession of land in a place that has since been called Eiríksfjorðr … And Eiríkr began to settle the country fourteen or fifteen years before Christianity came here to Iceland …*
>
> The Book of Icelanders, 1122-33 AD
> (Íslendingabók. Kristni Saga, 7)

The drama is underscored by ultimate failure: the expeditions to mainland America created an awareness of enormous possibilities, but as the explorers stood at the threshold of a New World, they also had to face their limitations: they would not be able to take advantage of the possibilities lying at their feet. They were too few, the distances too great and the costs too high for colonisation or systematic exploitation to be feasible. They had to be content with consolidating the settlements already established back in Greenland and Iceland, where generations of storytellers would recount the adventures of the explorers of Helluland, Markland and Vínland—the Norse names for Baffin Island, Labrador and Newfoundland/Gulf of St Lawrence area respectively—until they were put in writing in the 13th century.

At that time, the Norse Greenlandic settlements had matured and developed; they had their own bishop, an increasingly effective ecclesiastical and secular administration and a ready market abroad for their exotic and more or less unique export commodities—walrus tusks and hides, narwhal tusks marketed as unicorn horns, live polar bears and possibly gyrfalcons. The future looked bright for the Norse Greenlandic settlements in the 13th century AD, but some 200 years later they had disappeared. The reasons and circumstances of the demise of the Norse Greenlandic settlements are enigmatic, and the mystery has coloured subsequent perceptions of the Norse discovery of America. The sense of drama surrounding the initial explorers is enhanced by the hindsight knowledge that the colony they successfully established was destined to fail. Much of the popular and academic interest in Norse Greenland surrounds the extremes of its history, its beginning and its end. The in-between bit—ten to fifteen generations of farming and hunting, society building, adaptation and change, ordinary life in unusual circumstances, contact with different cultures—has made fewer headlines.

Yet it is the very mundaneness of Norse Greenlandic life, lived on the extreme edge, culturally as well as ecologically, of European civilisation, which makes it so intriguing. It is the fact that a society of a couple of thousand people became established in and adapted to a challenging environment unlike anything their ancestors had experienced; that they settled into a successful routine based on a unique mix of animal husbandry, seal hunting and extremely long-range walrus and polar bear hunts; that they maintained contacts with their lands of origins over thousands of kilometres of open sea, keeping abreast of fashion and ideology; that they were in contact with very different cultures of hunters—all this for about half a millennium—and that they left a legacy of their life that is nothing short of unique in its preservation and comprehensiveness; all this contributes to the outstanding universal value represented by the nominated property, Kujataa.

Fig. 2.4: Heroic bronze stature of Leif the Lucky—discoverer of the New World—overlooking the modern settlement of Qassiarsuk.

A less well known, yet all the more remarkable fact is that Greenlandic farming did not come to an end with the demise of the Norse Greenlanders. Little more than 300 years after the extinction of their settlement, farming in Greenland was revived by an Inuit woman and her Norwegian husband, Tuperna and Anders Olsen. The location they chose for their farm was the same as where the Norse Greenlandic bishops had had their residence and the community of their descendants that flourished in Igaliku in the 19th century represents a unique adaptation to farming by a hunting culture. Originally aimed at provisioning the trading post at Julianehaab (now Qaqortoq), the hamlet in Igaliku became a self-supporting farming community. The economy was based on sheep, goats, cattle and gardening subsidised by more traditional Inuit hunting strategies. The livestock and farming techniques were imported from Scandinavia, but the methods had to be adapted to the specific environmental conditions of Kujataa, just as the Norse Greenlandic forebears had to do.

Fig 2.5: View of houses and church at the settlement of Igaliku, where building stones from the Norse ruins have been incorporated into the Inuit farmers' houses.

Indeed, when official efforts to introduce specialised sheep farming to Kujataa started in the early 20th century, there was a pre-existing farming culture, a pool of individuals ready, able and willing to take up farming and a local market for farming produce, a taste for the meat of domestic animals, dairy products and vegetables. Today, most of the 50 odd farming families in Kujataa can trace their ancestry to Tuperna and Anders Olsen, many through Elisabeth and Otto Frederiksen, the pioneering sheep farmers who started farming in Qassiarsuk in 1924. The modern sheep farms produce 75% of the mutton consumed in Greenland and contribute significantly to the Government of Greenland's policy of increasing food security in a sustainable manner.[5] It represents an important support for modern Greenlandic society based on more than two centuries of native tradition.

Subarctic adaptations

The human colonisation of Greenland began in the third millennium BC with the Arctic Small Tool tradition. This tradition is known in two closely related variants, the short-lived Independence culture and the more enduring Saqqaq. The Arctic Small Tool tradition at first concentrated in the far north, but soon spread to most of the other habitable parts of Greenland, including Kujataa. Saqqaq culture is considered to have come to an end by c. 800 BC, and was succeeded by Greenlandic Dorset. This culture was to spread throughout Greenland as well and lasted until at least the end of the first millennium BC. There is then an apparent hiatus in human occupation of the island until the appearance of Late Dorset culture in the far northwest, around 700 AD. All these Palaeo-Eskimo cultures were initially adapted to hunting in the High Arctic, but they also showed remarkable adaptability to conditions much farther south and there are great numbers of their sites recorded and excavated in the Disko Bay area, around Sisimiut as far south as Nuuk on the west coast, and in the Scoresby Sound area on the east coast. Farther south, their presence is attested by numerous artefacts, but the lack of identification of dwelling sites is generally considered to be a result of coastal subsidence, greater soil cover and research bias. The lack of evidence is not evidence that their presence was actually more limited in the far South.

In Kujataa the focus of archaeologists has been on Norse Greenlanders, and to a lesser extent the later Thule Inuit, whose sites may in many cases obscure earlier Palaeo-Eskimo levels. It is possible that the more sophisticated transport technology of the Thule Inuit allowed them to tap the resources of Kujataa more effectively than the Palaeo-Eskimos, but this impression is generated mostly by the absence of systematic research into Palaeo-Eskimos in Kujataa. It may well be that the successful penetration of the Thule Inuit into these regions mirrors that of the less visible Palaeo-Eskimos.

In the meantime, Norse farmers had established farms in the fjords of South Greenland, necessitating a very different kind of adaptation. They were the first culture to enter Greenland not through the High Arctic but from overseas, and their adaptation may have been the most radical of all. South Greenland was too cold for the kind of agriculture which the parents and grandparents of the Norse colonists had practiced back in Northern Europe. The colonisation of Iceland a century or so earlier represented an adaptation to a colder climate, with less emphasis on cereal cultivation and more on hunting than was common in the homelands—although not categorically different from the kind of farming which had been practiced in northernmost Norway for centuries. The settlement of South Greenland on the other hand required an adaptation that was different by an order

of magnitude. Cereal cultivation may have been experimented with in Greenland,[6] but in the words of one 13th century source: *"... the great majority of that country do not know what bread is, having never seen it."*[7]

> *It has been stated as a fact that Greenland lies on the outermost edge of the earth toward the north; and I do not believe there is any land ... beyond Greenland, only the great ocean that runs around the earth.*
>
> The King's Mirror, c. 1250 AD (Speculum regale, 148)

But a more fundamental and profound difference was that the Norse Greenlanders—even if they lived on farms, surrounded themselves with livestock and maintained a sociopolitical structure grounded in the institutions of farming—derived half or more of their diet from hunting. Farming in South Greenland was made possible because the population had access to a stable and plentiful supply of wild mammals, seals in particular. Seal hunting was established from the outset as a mainstay of the economy and its importance increased as time went by. In the 14th century some households derived the majority of their meat from seal.[8] Unlike Iceland, where fishing was important from the outset and became an export industry in the late Middle Ages, the Norse Greenlanders made much less use of this resource—fish bones are hardly ever found in their middens—preferring to concentrate on the seal hunt. This choice may have boiled down to a matter of scheduling; the season available to set out to hunt and fish was short and limited to the summer months, and it may be that only one of these strategies could be combined with the demands of farming.[9]

The farming practices of the Norse Greenlanders were also distinctive. Unlike Iceland, where sheep became progressively more important as time passed, in Greenland goats made up a significant proportion of the livestock of each farm. It seems that while sheep were primarily kept for their wool, the goats point to an emphasis on dairy products, most likely because raising livestock for meat made little sense when meat-rich animals like seals could be hunted in abundance. Although it clearly conformed to a general Norse economic model focusing on cattle[10]—sticking to their cows through thick and thin—the specific features of the Norse Greenlandic farming economy are unique, and so is its continued adaptation throughout the history of the Norse Greenlandic settlements, especially as a cooling trend set in after 1200 AD. Not only did the hunting component increase in significance as time passed, but concerted efforts were made to maintain, and possibly increase, fodder

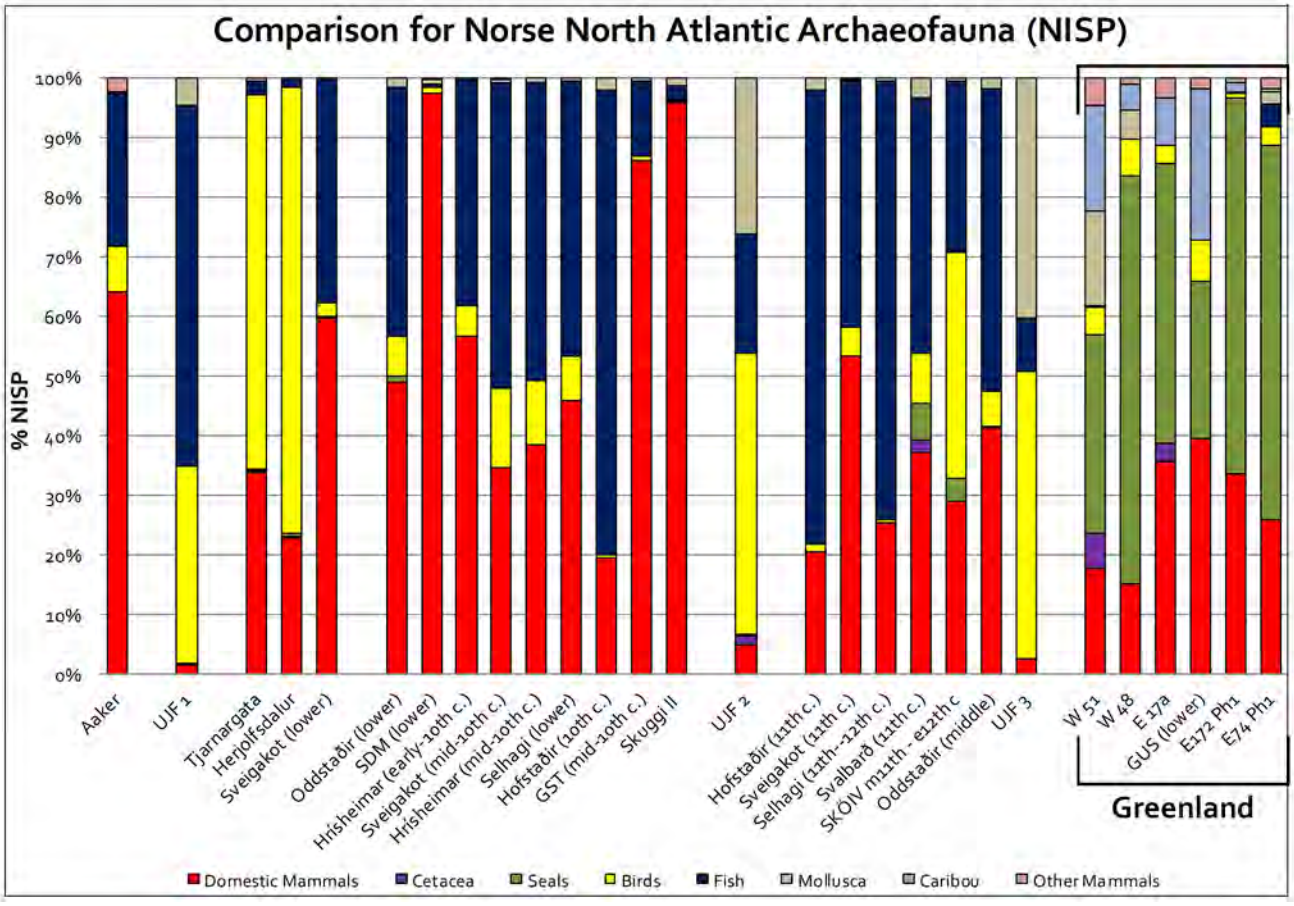


Fig 2.6: Bar graph showing the distribution of species found in Viking Age and Medieval North Atlantic archaeofaunal assemblages; on the right Greenland, which stands out with its great numbers of seals.

production capacity by developing irrigation systems at major sites like Igaliku (Ø47 – Garðar), Qassiarsuk (Ø29a – Brattahlíð) and Igaliku Kujalleq (Ø66 – undir Höfða), as well as smaller sites like Ø4 in component part 1 and at Sandhavn (Ø 221) near Ikigaat (Herjólfsnes).[11] These systems are still visible in whole or part and have been the subject of considerable scholarly attention as they are the only ones preserved from the Middle Ages in the North Atlantic.[11] In Tasikuluulik (Vatnahverfi) there is evidence for 13th century attempts to intensify fodder production at some farms while others were going out of use.[12]

The Thule Inuit had a technology which was admirably suited to the South Greenlandic environment and did not require any significant new adaptation even though it had developed at much higher latitudes. In particular the kayaks and umiaqs of the Thule Inuit made them highly mobile during the ice-free months of the year and allowed them to make the fullest use of both marine and terrestrial resources. In this sense, the Thule Inuit were the best pre-adapted of all the cultures to inhabit Kujataa in the last four millennia. Later, in more recent history, they also adapted to the particular opportunities offered by the Kujataa landscape by reintroducing farming into the area. This was a consequence of a cultural encounter, the establishment of Danish-Norwegian trading posts and missions on the west coast of Greenland from 1721 onwards. Trade with Europeans changed the Inuit economy, gearing it towards producing skins, blubber and oil for sale abroad and supplying the small trading posts. In Kujataa the first trading post was Julianehaab (now Qaqortoq), founded in 1775.

In 1783, Tuperna and Anders Olsen, an Inuit woman and her Norwegian husband, established a farm amongst the ruins of the medieval episcopal residence in Igaliku, where there has been a farming community ever since. For many years, this was the only farmstead, keeping livestock and growing vegetables, but since the first half of the 20th century specialised sheep farms have proliferated in the core area of the Norse settlements, building on foundations laid more than a thousand years ago and reanimating a uniquely subarctic farming landscape.

Human encounters

Over the past 100,000 years, anatomically modern humans originating in Africa have spread across the globe to occupy virtually every inhabitable spot on Earth. The dispersal of anatomically modern humans out of Africa had a general northward and eastward direction. They had colonised South Siberia and Australia more than 50,000 years ago and, following the end of the last Ice Age, they spread into the Americas and those parts of north-western Europe that previously had been covered by the ice sheet. Northernmost Norway had been colonised by 9500 BC, the Hebrides by 6000 BC and Shetland by 4000 BC. On the other side of the Atlantic, Palaeo-Eskimos first spread over the eastern High Arctic and into Greenland by 3500 BC. These Stone Age colonisations represent the final steps of the human occupation of the continents, but the two streams of humanity that had spread out of Africa—the northern one occupying Europe and the eastern one occupying Asia, Australia and the Americas—had yet to meet up. This meeting was not to take place until the Viking Age.

The Norse were the first Europeans to set foot in America and at their first ports of call, in East and South Greenland, they found a landscape empty of humans. According to traditions recorded more than a century later, they discovered remains suggesting that there had been earlier inhabitants in this land.[14] Modern archaeological

Fig. 2.7: Nikolaj Egede and his family harvesting hay in Igaliku, 1926.

research has confirmed this observation; the objects the Norse came upon may have been centuries old, but the landscape had been settled long before by Saqqaq and later by Greenlandic Dorset Palaeo-Eskimos. When the Norse arrived, South Greenland had not heard a human voice for half a millennium or more.

Fig. 2.8: Dorset Culture harpoon head of the type used in the 11th–12th century, found in Norse midden in the southern Vatnahverfi.

Fig. 2.9: Norse artefacts found in the Thule-District, Northwest Greenland.

As the Norse explored farther northwards beyond the Disko Bay area, they may have come into contact with Late Dorset people (and certainly did so later on), and as they began to follow the east coast of Baffin Island and Labrador as far south as Newfoundland, and possibly beyond, they also came into contact with Amerindian populations. These meetings are the first known encounters of Old and New World populations across the Atlantic and they are amply testified by European objects found in Indian and Palaeo-Eskimo contexts over a wide area stretching from the High Arctic south to Maine.[15] There is considerable debate about the scale and nature of these contacts, especially if there was economically and genetically significant exchanges between the populations, but as it stands the evidence suggests that, for the nearly 500 years the Norse maintained their settlements in Greenland, these contacts were mostly at an arm's length: The Norse, the Late Dorset people and Amerindians—and from the 13th century the Thule Inuit—all met each other on their respective long-range hunting and procurement expeditions. Such encounters will have been sporadic and it may well be that many of the Norse objects found in Late Dorset, Amerindian or Thule Inuit contexts were scavenged from shipwrecks and abandoned camp sites rather than obtained through face-to-face contact. The 13th century saga descriptions of encounters in Vínland have all the same elements as hundreds of first-contact scenes recorded by eyewitnesses in Modern times: Initial curiosity and an interest in trading giving way to fear and mutual distrust leading to misunderstanding and violence. The collective and clearly derogatory term the Norse had for all the non-Norse people they encountered in America was *Skrælingjar*, and the Sagas report both killings and kidnappings of such people by the Norse. Despite notes of cultural arrogance and prejudice familiar to students of later European encounters with indigenous people all around the globe, the story of European and American contacts in pre-Columbian Greenland is not one of annihilation, oppression or exploitation, but rather of coexistence. This may have been a precarious and mistrustful coexistence and was likely facilitated primarily by infrequent meetings, limited overlap of resource utilisation,

Fig. 2.10: Map showing distribution of Norse artifacts found in Thule Culture context.

and a lack of practical means to impact the other party in any significant way, but it nevertheless suggests that accommodation and forbearance was the strategy of choice by all concerned.

The migration of the Thule Inuit to Greenland in the 13th century resulted in much more frequent contacts between the Norse Greenlanders and American hunter-gatherers. The population of the Thule Inuit was much larger than the Late Dorset people whom the Norse had encountered occasionally on their long-range hunting and procurement expeditions, and the Thule Inuit also had a much greater range, exploring up and down the western and eastern coasts of Greenland, possibly hunting seal and whale at the mouths of the very fjords where the Norse Greenlanders had their farms a few kilometres landwards. The coincidence of the Thule Inuit arrival and the abandonment of the Norse settlements in Vestribyggð has led to speculation that these events are connected, but firm evidence is lacking for what actually happened.

A European outpost

The Norse exploration of Greenland—traditionally dated to the early 980s—was quickly followed by settlement in two main areas on the west coast. The smaller one, Vestribyggð, with fewer than 50 farms, was in the Nuup Kangerlua and Ameralik-Ameralla fjord complexes east of present-day Nuuk. Some 500 kilometres to the south was the much larger Eystribyggð—modern Kujataa—with 200–300 farms. This was always the political and socioeconomic centre of Norse Greenland, and even though the farms of Eystribyggð were spread over a very large area, some 160 kilometres of coastline (nearly 300 if the adjunct Middle Settlement of perhaps 10 farms is included), it contained a relatively densely settled core concentrated on Igalikup Kangerlua Fjord and Tunulliarfik Fjord (Eiríksfjörðr and Einarsfjörðr). This is where the five component parts of the nominated property are found. Population estimates vary but cautious assessments put the total Norse Greenlandic population at 2,000–3,000 at its peak and it may have been smaller.[16] The Norse Greenlandic settlements conformed to a pattern well-known from other Norse regions in the North Atlantic: individual, mostly single-household farmsteads, each with its own homefield for making hay to feed the livestock throughout winter; its own rough meadows and pastures; its own dwelling and buildings for storage and sheltering of animals. What set the Norse Greenlandic settlements apart was the large distances between farms, reflecting both low productive biomass per acreage and the cragginess of the landscape; where lowland is primarily found on narrow coastal strips each farmstead rarely has more neighbours than two. Another major difference is not so much apparent from the layout of the settlements but rather from the evidence for husbandry, diet and trade: Despite anchoring their existence in farmsteads in the few and isolated spots where sufficient grass can grow to support livestock, the Norse Greenlanders subsisted to a significant

Fig. 2.11: Map showing Norse settlement layout with lowland farms and upland shielings in Qorlortup Itinnera Valley.

But in Greenland it is this way, as you probably know, that whatever comes from other lands is high in price, for this land lies so distant from other countries that men seldom visit it. And everything that is needed to improve the land must be purchased abroad, both iron and all the timber used in building houses. In return for their wares the merchants bring back the following products: buckskin, or hides, sealskins, and rope of the kind that we talked about earlier which is called "leather rope" and is cut from the fish called walrus, and also the teeth of the walrus …

The King's Mirror, c. 1250 AD (Speculum regale, 142)

and even—especially as time went by–major degree on hunting of animals that were not found in the vicinity of their farms but rather tens or even hundreds of kilometres away. Chief among these were seals, hunted on the outer coasts. Access to the seal hunt was not limited to coastal farms. All farm middens, those of inland farms no less than the coastal ones, have a preponderance of seal bone. This suggests that the seal hunt may have been communally organised, unlike probably the reindeer, which is relatively rare in Kujataa farm middens and unevenly distributed, suggesting that some had access to this resource while others did not.

Fig. 2.12: Walrus resting on sea ice. The hunt for walrus ivory was likely a key factor driving the Norse settlement of Greenland.

Another animal represented at all sites, high and low, coastal and inland, is the walrus.[17] Single walruses can be encountered anywhere in Greenlandic waters but large colonies are primarily found in the Sisimiut area, close to the Arctic Circle, and farther north, in the Disko Bay area and in East Greenland. The Norse Greenlanders would have had to sail hundreds of kilometres to hunt these animals. Unlike the seals, the walrus were not hunted primarily for their meat, but rather for their hides, which were prized for making strong rope for ship rigging, and the tusks. Walrus ivory was the raw material for fine objects of art, valued by master craftsmen all over Europe for carving anything from chessmen (as in the famous set from Lewis) to altarpieces. As a high-value, low-bulk commodity, walrus ivory may have been the reason behind the initial exploration of the western North Atlantic. Such ivory was known from the White Sea area and there is evidence that Norse traders were purchasing or extorting walrus ivory from Sámi and other native peoples already in the late 9th century. Hunting walrus in uninhabited lands had clear advantages and it may be that the desire for a direct source of walrus ivory and hides gave the impetus for the exploration first of Iceland—where there may have been a few small walrus colonies, which were quickly depleted—and later of Greenland.[18] Assessments differ concerning the dependence of the Norse Greenlandic settlements on external trade, but it is possible that the walrus hunt was their *raison d'etre*. It may be that the farming settlements were essentially infrastructure to support the hunts, a way to keep the hunters fed, clothed and warm through winter, ready to depart to the hunting grounds in spring to make the most of their proximity. Effective exploitation of the Greenland walrus could not have been done in other ways because the seafaring technology of the time did not allow the North Atlantic to be crossed twice in the same year. Any hunters operating out of Iceland or Norway would always have had to overwinter in Greenland, requiring solutions for their accommodation and provisions. If the walrus colonies of Greenland were to be exploited effectively, there had to be a resident population in Greenland doing the exploitation. It is however uncertain how easily marketable the walrus products really were in Europe; the ivory in particular was a niche commodity which required well-placed contacts for its value to be realised. The market might not have been large or stable enough to justify such a complex operation. It is also not clear to what extent the Norse Greenlandic settlements relied on imports. Iron was the only essential raw material the Norse Greenlanders had no way of sourcing in their own environment, and while imports would have been needed to maintain adequate supplies, the scale of this is unclear. Much suggests that theirs was essentially a subsistence economy and that they did not rely on imports for their survival from one year to the next. Their absolute needs for imports could be satisfied through occasional rather than regular contacts with external markets. What is clear is that the walrus hunt was an important and integrated part of the Norse Greenlandic economy. Finds of chips from walrus skulls in practically every midden investigated, at small sites and large sites, inland sites and coastal sites, Eystribyggð as well as Vestribyggð sites, suggest that the hunting of the walrus and the processing of the ivory—requiring careful chipping of the skulls to extract the deep-rooted tusks—was a communal effort. Whether this signals that everyone shared in the fruits of this labour is another matter, and one of the issues awaiting resolution by

further research is how much of the profits from the walrus ivory trade flowed back to Greenland and how it was distributed there. It is likely that monumental architecture like the stone masonry churches and feasting halls at Qaqortukulooq (Hvalsey – Ø83, cp5), Igaliku (Garðar – Ø47, cp2) and Ikigaat (Herjólfsnes – Ø111) was in part at least funded from revenues generated by walrus ivory exports.

Fig. 2.13: Norse drill handle (length ca. 7.5 cm) made from walrus canine and with an incised walrus depiction. Excavated from the midden of a Norse farm in Vatnahverfi.

Fig. 2.14: Cross carved from walrus ivory for Princess Gunhild of Denmark (dated 1157 AD), an exceptional example of exquisite craftsmanship made from the Greenlandic exports once reaching Europe.

Other exotic goods exported from Greenland at the time include narwhal tusks (billed as unicorn horns), live polar bears and gyrfalcons. Hides and skins are also mentioned as export products, but unlike Iceland neither textiles nor fish were produced in Greenland for sale abroad. Whether it is seen primarily as a specialised resource extraction colony, or simply as a subsistence economy exploiting a limited market for exotic goods, Norse Greenland is exceptional among medieval European societies in that it was to a high degree organised around long-range hunting expeditions to procure a luxury product. Boats were vital to the Norse Greenlandic communities, not only for transport within the settlements, separated by deep fjords, but also to make the annual journeys to the seal hunting grounds on the outer coast and to the walrus hunting grounds in Norðrseta, the term used in contemporary sources to refer to the northern hunting grounds around Disko Bay and on the east coast. These longer expeditions would have required substantial boats, not as large as the ocean-going ships which crossed the North Atlantic, but larger than the rowing boats sufficient for transport within the fjord systems. To build the boats the Norse Greenlanders needed wood from more substantial trees than the birch that is the only native tree in Greenland. Wood could be procured in three ways: it could be imported, it could be collected as driftwood and it could be felled in the forests of Labrador. The last mentioned possibility is supported by the accidental landing in Iceland of a Greenlandic ship said to have lost its way coming from Markland (the Norse name for Labrador) in 1347.[19] It is quite possible the Norse Greenlanders went on regular expeditions to Labrador to procure timber for their boats and larger buildings. This capacity for long-range procurement expeditions in the Davis Strait contrasts sharply with the apparent isolation of Greenland from Europe. As far as is known, the Norse Greenlanders did not own ocean-going ships and relied entirely on foreigners for contact with Europe. Icelandic and Norwegian sources from the 12th to 14th centuries suggest that this contact was not

> *The next summer they voyaged to Greenland and put into Eiriksfjord. The wealthier passengers took lodging there, but the others sailed further on to the Western settlement. That's what Audun did and he found a place to stay there.*
>
> *A Greenlandic hunter named Eirik had caught a polar bear, exceptionally beautiful, with red cheeks. When Audun found out, he offered to buy the animal. The hunter told him it wasn't prudent for him to give everything he had for the bear. "I know that you've got exactly enough."*
>
> *Audun said he didn't care and bought the animal giving everything he had for it.*
>
> The Tale of Audun, 1220s AD, (Miller 2008, 7)

Fig. 2.15: Boat model excavated from Norse farm in the Western Settlement, probably representing the type of boats typically used by the Greenland Norse.

always regular and years could go by without any ships reaching Greenland or arriving from there. It is far from certain that the Greenland Norse depended on regular shipping for their material needs, but infrequent and unpredictable connections clearly set them apart as one of the most isolated communities of western Christendom.

Hunters become farmers

Long before any humans set foot in Greenland, people in the Middle East started cultivating plants, domesticating animals and living in permanent settlements. The transition from hunting and gathering to farming took thousands of years and understanding this process is one of the major issues in the history of mankind. Since the earliest beginnings in the Middle East, farming has been invented independently at several locations, but more commonly it has spread from farming cultures to neighbouring hunter-gatherers. The ways in which this can happen are manifold, but a distinction can be made between hunter-gatherer cultures that adopt some farming strategies as elements of their own culture and farming cultures that absorb or subsume those of neighbouring hunter-gatherers, so that the latter cease to exist altogether. As a rule, hunter-gatherers incorporate farming strategies into their own culture either because plant management and cultivation have become increasingly important components of the gathering aspect of their economy or because hunters in rich environments become sedentary. Although much remains obscure about the origins of pastoralism, it is possible in some cases that it involved hunter-gatherers

Fig. 2.16: One of the earliest—hand-coloured—photographs of Igaliku with Inuit houses and fences reusing Norse building stones; cows grazing on the left.

taking up animal husbandry. None of these scenarios however apply to the adoption of farming by Inuit in Kujataa in the 18th and 19th centuries AD.

The establishment of a farm in Igaliku in 1783 AD must be seen within its Danish-Norwegian colonial context. Thule Inuit had observed the Norse Greenlanders' way of life back in the 14th and 15th centuries and had clearly not been tempted to adopt any of their strategies. Although feral livestock is said to have roamed Vestribyggð after its abandonment in the mid-14th century AD, and the same may have been the case in Kujataa after the demise of the Norse Greenlandic settlements there in the mid-15th century, the Thule Inuit who likely came upon these animals found no use for them and they became extinct. After the reestablishment of contact in 1721, merchants and missionaries in the trading posts on the outer coast attempted to keep small numbers of livestock and to grow garden vegetables—with varying degrees of success, but invariably on a very small scale. The idea that farming could be revived among the ruins of the Norse Greenlanders was clearly entertained among the Europeans at the trading posts, and in the 1770s an expedition was mounted to the inner fjords of Kujataa with the express intention of assessing the possibilities of reintroducing farming where it had manifestly been practiced earlier. The thinking was that the trading posts could be supplied from such farms, increasing food security and providing fresh produce more palatable to the Europeans than their imported provisions or the fish and meat they could obtain from the Inuit. These are the overt reasons, but it was also significant that since 1721 many Inuit had converted to Christianity and settled in and around the trading posts. Some, like Tuperna the pioneering farmer in Igaliku, had married Europeans and many had been introduced to, and even developed a taste for, European foodways. The Inuit economy had also been profoundly affected by the European trading posts, becoming increasingly geared towards supplying them with trade goods and provisions and becoming more and more dependent on imported merchandise. Because Anders Olsen, Tuperna's husband, was Norwegian and had worked for the Greenland Trading Company for decades, their establishment of a farm—first at Upernaviarsuk in 1781 and, after it burned down, in Igaliku in 1783—can be seen as a European enterprise, both in the sense of its inspiration and the contacts needed to obtain the livestock (from Denmark). But Olsen died in 1786 and Tuperna in 1789 and it was their son Johannes Andersen and his Inuit wife who brought the farm to maturity and long-term viability. By 1857, when the settlement was led by Johannes's son Povl Egede, it had 19 inhabitants and was clearly seen by observers as an Inuit community. Povl was known as a fisherman and a hunter as well as a farmer, as was his grandson Amos Egede (d. 1958), who was the leader of the Igaliku community in the middle of the 20th century.

The community that took shape in Igaliku in the early 19th century was Inuit in outlook and self-definition, Christian in religion (at a time when many Inuit were still not converted), practicing a mix of hunting and farming, living in houses built partly with stones from the Norse Greenlandic ruins, first in Inuit tradition and later influenced by Danish/Norwegian-colonial architectural tastes. It represents receptivity to new ideas, values and ways of life, adapted and shaped to become a new kind of Inuit culture, a culture that retained, and was a seamless continuation of, old traditions. The rhythm of the farming way of life was completely different from that of Inuit hunters, but the culture and identity remained Inuit. Despite its very small scale, Igaliku farming was to have a major impact on the development of modern Greenlandic society. It created the conditions for the expansion of modern sheep farming in the 20th century. The success of the Igaliku community is measured, among other things, in the large number of children who reached maturity there. Many carried on the farming way of life at Igaliku, but others moved away, spreading a taste for farm produce and a preference for a sedentary lifestyle. It was against the background of these kinds of cultural developments that the expansion of sheep farming in the 20th century became possible. Building on the

Fig. 2.17: Amos Egede of Igaliku, 1956. Also known as "the King of Igaliku." Amos was an influential leader of the small community and one of the most important early Inuit sheep farmers.

pioneering efforts of pastor Jens Chemnitz—brother-in-law of Søren Egede (d. 1914), the 'king' of Igaliku and son of Povl mentioned above—a sheep-breeding station was set up in Julianehaab (Qaqortoq) in 1915. Otto Frederiksen, a former apprentice at the station and great-grandson of Johannes Andersen in Igaliku, set up the first new sheep farm in Qassiarsuk in 1924, and by 1935 there were 24 sheep farms in Kujataa. No less telling about the profound impact farming had on modern Inuit society is the fact that, apart from the specialised sheep farms, many fishermen and hunters in South Greenland owned sheep. By 1947, there were 240 registered sheep owners in Greenland. The Inuit had developed a taste for mutton and mastered the techniques of sheep rearing, combining this with more traditional ways of life. Although modernisation has brought many social problems to Greenland, it is arguable that the modern Greenlanders' own adoption of farming is reflective of a successful adaptation by a hunting society to modern industrialised and capitalistic modes of being. Modern Greenlanders are the only Inuit with their own government in their own affairs; indeed they are the only indigenous people of the Arctic to have rights in such an extended degree. The reasons for this are complex and manifold, but more than two centuries of farming in Kujataa are clearly part of the story.

The history of modern farming in Kujataa is partly a story of modernisation, but it is also a story of cultural adaptation, of how hunters can become farmers, with universal significance. The detailed historical and genealogical information about the Igaliku community and the expansion of sheep farming from the 1920s onwards provide unusually clear insights into the processes involved when hunters become farmers. Such processes have been underway in all parts of the world since the Neolithic, but rarely can they be observed in such detail as here.

Fig. 2.18: Woman milking cow in Igaliku in 1926. She is dressed in traditional Inuit clothes and has adopted the distinctive working posture used when cutting up seal.

2.1.2 Description of the component parts

The nominated property consists of five component parts, all located in the heart of the Norse Greenlandic settlement of Eystribyggð, which also represents the core of modern farming in Kujataa. The component parts include all elements of the cultural landscape and each part represents characteristic aspects of this landscape. Each component part is delineated in such a way that it includes all the area necessary to comprehend and appreciate the landscape context of the cultural properties, including both visual and socioeconomic aspects. The delineation of the nominated property is designed to include representative elements of Thule Inuit archaeology in addition to illustrating medieval and modern subarctic farming.

Component part 1 – Qassiarsuk

Component part 1, Qassiarsuk, covers 113.42 square kilometres across a peninsula 5.5–12 kilometres wide. To the north it is bordered by the Ulunnguarsuaq mountain massif (1,267 m) and to the south by the highland area of Qaqqarsuatsiaq. To the east lies the fjord of Tunulliarfik (Eiríksfjörður), to the west the large bay of Tasiusaq, which opens onto the Sermilik fjord (Ísafjörður) farther west.

The fjords and mountain ranges naturally define this component of the nominated property, but it also has a landscape character unique to Kujataa. While there are high mountains on either side of the component part, the neck of the peninsula where it is situated is nowhere higher than 500 m a.s.l. and a large proportion is below 200 m a.s.l. Extensive areas of low elevation like this are not found elsewhere in the inner fjords where the climate is also relatively mild. The combination of extensive lowlands in the area of highest summer temperatures makes this area one of the most favourable for farming in all of South Greenland. It is an area of low green foothills and undulating knolls, interspersed with withered reddish crags and outcrops around a myriad of small lakes and ponds. The shores of the fjords give way to gently sloping plains with extensive grass and meadowland covering this entire area. Scrub copses are very low and far between. The open rangeland vegetation is a result of modern sheep farming: Qassiarsuk was the second place in Kujataa (after Igaliku) where sheep farming was reintroduced in the first half of the 20th century. Since then, thousands of grazing sheep have cleared the scrub vegetation, leaving behind a distinct cultural landscape. Nowhere else in Greenland does one find such an extensive pastoral landscape.

Fig. 2.19: Farmhouse surrounded by lush green hay fields in Qassiarsuk.

Modern settlement

The Qassiarsuk settlement is the centre of population in component part 1, with five single family farms in outlying areas. It had 88 inhabitants on 1 July 2015.

Within the area of the component part, there are 11 sheep farms, five of which are based in the Qassiarsuk settlement, with a total of 6,455 sheep and 45 horses in 2014. The settlement has water and electricity works, garbage disposal, a primary school, a football pitch, a community hall, a grocery shop, a church and a cemetery. Qassiarsuk is only a 5-minute boat ride away from the international airport in Narsarsuaq, located directly across the fjord. As a result, Qassiarsuk is visited by large numbers of tourists. There is a hostel, a service house with showers and a laundrette, and cabin/farmhouse accommodation for rent in Qassiarsuk, Inneruulalik, Nunataq and Tasiusaq.

The Qassiarsuk settlement has three listed buildings, accorded special protection by Greenlandic law.[20] These buildings bear witness to the origins of modern sheep farming in Greenland. They are the three oldest surviving structures in Qassiarsuk and were all built by the first farmer, Otto Fredriksen:

- B-313 is a sheep stable built in ca. 1925 with a later extension.
- B-314 is a goat stable built in 1936.
- B-316 is the first sheep farmer's dwelling, built in 1924, but moved to different location in 1936.

In addition to its proximity to the international airport in Narsarsuaq, Qassiarsuk has its own helistop and gravel roads connect the settlement with outlying farms in Qorlortup Itinnera to the north, Nuugarsuk to the south as well as on the Sermilik side. There are approximately 37 kilometres of gravel roads in component part 1.

Component part 1 has 38 registered Norse Greenlandic sites, ranging from single structures to large complexes with more than 30 features. Twenty-four sites represent farms (in two cases double farms), and a further four may either be shielings or very small farms. Of the 28 farm sites, six are classified as large farms (more than 20 structures), 14 are medium sized (11–20 structures) and eight are small (fewer than 11 structures). Four farm sites have identified church ruins, all but one classified

Table 2.1 – Norse Greenlandic settlement					
NKAH no.	**Norse ID**	**Name**	**Number of identified ruins**	**Interpretation**	**Other**
2278	Ø227	Paratiisip Kuua	2	Shieling	
2279	Ø33	Qorlortoq	25	Large farm with church	Small excavations 1932, 2001. Modern sheep farm.
2280	Ø199	Qorlortoq Qaqqaa	6	Small farm or shieling	
2281	Ø32	Umiussat/ Qimarnguffik	21+15	2 farms, one large, one medium	Small excavation 1880
2282	Ø34	Qorlortup Itinnera	17	Medium farm	Midden excavations 1994–98, 2001 Modern sheep farm
2284	Ø232	Sammisoq Timaa	2	Shieling	
2285	Ø30	Qassiarsuk	2	Shieling or outstation	
2286	Ø35	Qorlortup Itinnera	13	Medium farm with church	Small excavations 1932, 2001
2287	Ø36	Qorlortup Itinnera	14	Medium farm	
2288	Ø37	Qorlortup Itinnera	20	Medium farm	
2289	Ø233	Sammisup Timaa	3	Outstation	
2290	Ø38	Qorlortup Itinnera	10	Small farm	Small excavation 1976
2291	Ø4	Isaroq	16	Medium farm	Small excavation 1976 Human remains may indicate church or Inuit graves
2292	Ø3	Tasiusaq	16	Medium farm	Small excavation 1910
2295	Ø2	Tingimiut	31	2 medium farms	Small excavation 1894 Modern sheep farm
2297	Ø2a	Sammisoq Timmaa	4	Shieling	
2298	Ø29b	Qassiarsuk	6	Small farm or shieling	
2230	Ø29a	Qassiarsuk / Brattahlíð	20	Large farm with churches	Excavations 1880, 1894, 1932, 1961–65, 2005–06 Historic buildings. Also Inuit winter houses Modern sheep farm
2231	Ø29	Qassiarsuk	11	Medium farm	Excavation 1932 Also Inuit winter houses Modern sheep farm
2300	Ø28	Qassiarsuk / Illunnguujuk	14	Medium farm	Small excavation 1932 Also Inuit winter houses Modern sheep farm
2300	Ø28a	Qassiarsuk	18	Assembly site?	Small excavation 1932, re-excavation in 2005–2006 Modern sheep farm
2306	Ø31	Tasersuaq	7	Small farm or shieling	Small excavation 1894

2307	Ø202	Nunakullak	28	Large farm	
2308	Ø206	Arfiarfik	11	Medium farm	
2312	Ø1	Nunataaq / Garðanes	21	Large farm with church	Small excavation 1971 Modern sheep farm
2313	Ø6	Tasiusaarsuk / Tuluartalik	28	Large farm	
2314	Ø200	Ammassiviup Qaqqaa	6	Small farm	
2317	Ø27a	Ammassivik	3	Small farm	
2319	Ø201	Tasiusaarsuk	14	Medium farm	
2333	Ø203	Ivisaassat	1	Outstation	
2335	Ø205	Ivisaassat	10	Small farm	
2225	Ø27	Nuugaarsuk / Inneruulalik	19	Medium farm	Modern sheep farm
2351	Ø226	Qorlortup Itinnera	3	Shieling	Small excavation 1997
2352	Ø228	Qorlortup Itinnera	3	Shieling	
2353	Ø229	Qorlortup Itinnera	6	Shieling	
2354	Ø234	Qorlortup Itinnera	8	Small farm or shieling	
2273	New	Qorlortup Itinnera Qaqqaa	5	Shieling	
5506	New	Sammisoq Timaa	1	Outstation	
Inuit					
2224		Nuugaarsuk		'Settlement'	Disappeared
2229		Qassiarsuk	5	Early Thule Inuit winter houses, graves	
2229				Palaeo-Eskimo presence	Small finds
1965		Qassiarsuk	8	8 Inuit winter houses	Destroyed
2305			1	Inuit winter houses (19th century)	Also a Norse site
2334			?	Inuit winter house	
2336			?		

as large farms. There are 12 potential shieling sites and three outstations. Characteristics of the settlement in this area include:

- A low proportion of small farms. More farms are medium sized or large in this area than anywhere else, and this is reflected by the highest ratio of churches to farms (1:7) in all of Norse Greenland
- A low proportion of outstations
- A high incidence of farms sharing the same or having adjoining homefields
- Relatively short distances between farms and unimpeded overland communications within a very large area of contiguous settlement

The Qassiarsuk area, component part 1, is thus characterised by high population density, intensive land use and relative prosperity in terms of both economic resources and access to communal activities. Favourable conditions for farming in general, and dairy-cattle farming in particular, are indicated by widespread indications of irrigation (dams and channels), homefield improvement, fencing and large folds and stables. Within the area there is a difference between the northern and southern parts. In the northern part, centring on the Qorlortup Itinnera Valley, medium-sized farms are laid out like pearls on a string, while individually associated shielings are located up the slope on each side of the valley. In the southern

part, there is a greater number of hill farms than shielings (although it is not always easy to tell the two functions apart and they likely overlap to a certain degree), indicating perhaps a tiered land-tenure system where affluent landowners on high-status farms on the coast rented out their hill-country lands to cottagers.

> *Erik the Red farmed at Brattahlid. There he was held in the highest esteem and everyone deferred to his authority.*
>
> The Saga of the Greenlanders, 13thc. AD (Complete Sagas I, 20)
>
> *There was a man named Sokki, who was the son of Thorir. He lived at Bratthlid in Greenland. He was highly respected man, and popular. His son was named Einar, and was a promising man. The father and son had a lot of power in Greenland, and were very much leaders.*
>
> The Tale of the Greenlanders, 13thc. AD (Complete Sagas V, 372)
>
> *There lies a large farm, which is called Brattahlíð where the lawman lives.*
>
> Ívar Bárðarson's Description of Greenland, 14thc. AD (Det gamle Grønlands beskrivelse, 28)

Inuit archaeology

There are a significant number of Thule Inuit and Inuit sites in the Qassiarsuk area, including the only confirmed presence of Palaeo-Eskimos within the nominated property, with some small finds found in Qassiarsuk itself. There are at least four sites with Inuit winter houses, one dated to the 19th century and the others also likely to be recent or at least to have been used recently. In contrast to Norse Greenlandic archaeology, no systematic efforts have been made to register Inuit and Palaeo-Eskimo sites in component part 1 (or, indeed, in any of the component parts) and most have been identified in the context of investigations into Norse Greenlandic archaeology. The number of Inuit sites in the Qassiarsuk area may therefore not reflect the actual incidence of such sites but rather the intensity of archaeological work conducted in the area, particularly in Qassiarsuk itself.

Research history

The site of Qassiarsuk (Ø29a) was frequently visited in the 18th and 19th centuries, resulting in descriptions of the ruins, but also some uncontrolled digging and retrieval of artefacts.[21] The first modern excavations were carried out in 1880 and 1894,[22] but the site was comprehensively investigated with major excavations in 1932.[23] These clarified the layout of the final phase of the dwelling and animal stable complexes and revealed two phases of the adjacent church. Excavations were also carried out at nearby Ø28a where a number of apparent open-air hearths and ephemeral structures were interpreted as the remains of an assembly site. In 1961–65 a third church, a small turf structure in a different part of the homefield, was excavated and a possible colonisation-period dwelling nearby was identified but not examined until 1974.[24]

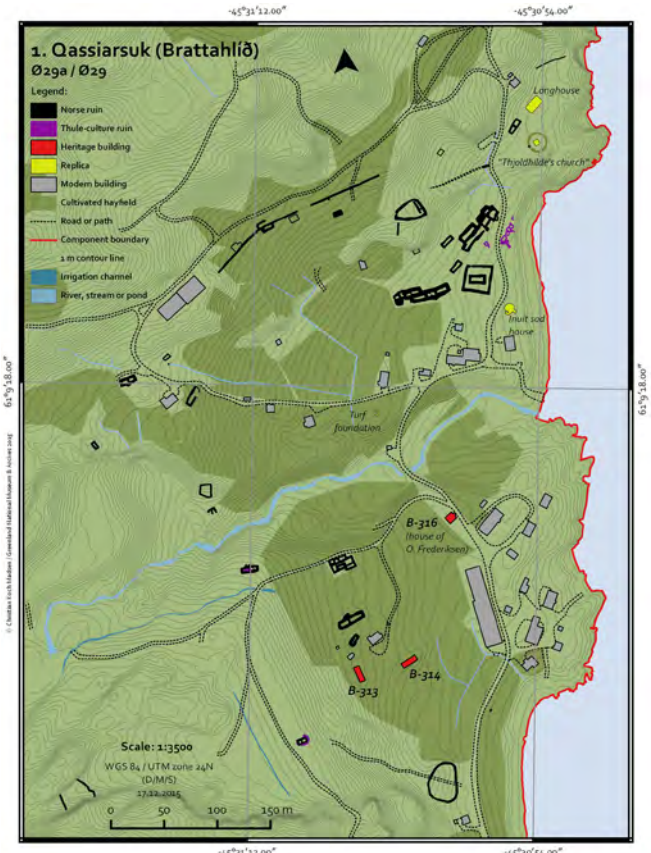


Fig. 2.20: Detailed survey plan of central Qassiarsuk/Brattahlíð (Ø29a/Ø29) with location of Norse and Inuit ruins, as well as heritage and modern buildings.

In 2005–06, midden layers and parts of buildings adjacent to the main dwelling at Ø29a were excavated. This produced a substantial animal bone assemblage and re-excavation was carried out in the enigmatic ruins at Ø28a, casting doubts on their earlier identification as an assembly site.[25] Few Norse Greenlandic sites have seen as much archaeological work as Qassiarsuk (Ø29a) and other excavations within the component part are relatively minor: in 1894, a dwelling was excavated in Ø2, in 1932, the team working in Qassiarsuk confirmed that ruins at Ø32 and Ø35 were those of small churches—the first such identifications in Greenland[26]—and in 1997–98 and 2001, a rich midden was excavated in Ø34.[27] This last mentioned investigation is significant because it is one of very few water-logged deposits in the whole of Kujataa, producing not only a substantial animal bone assemblage but also a large collection of artefacts consisting of organic materials. A number of other sites have been examined by digging small excavation trenches.

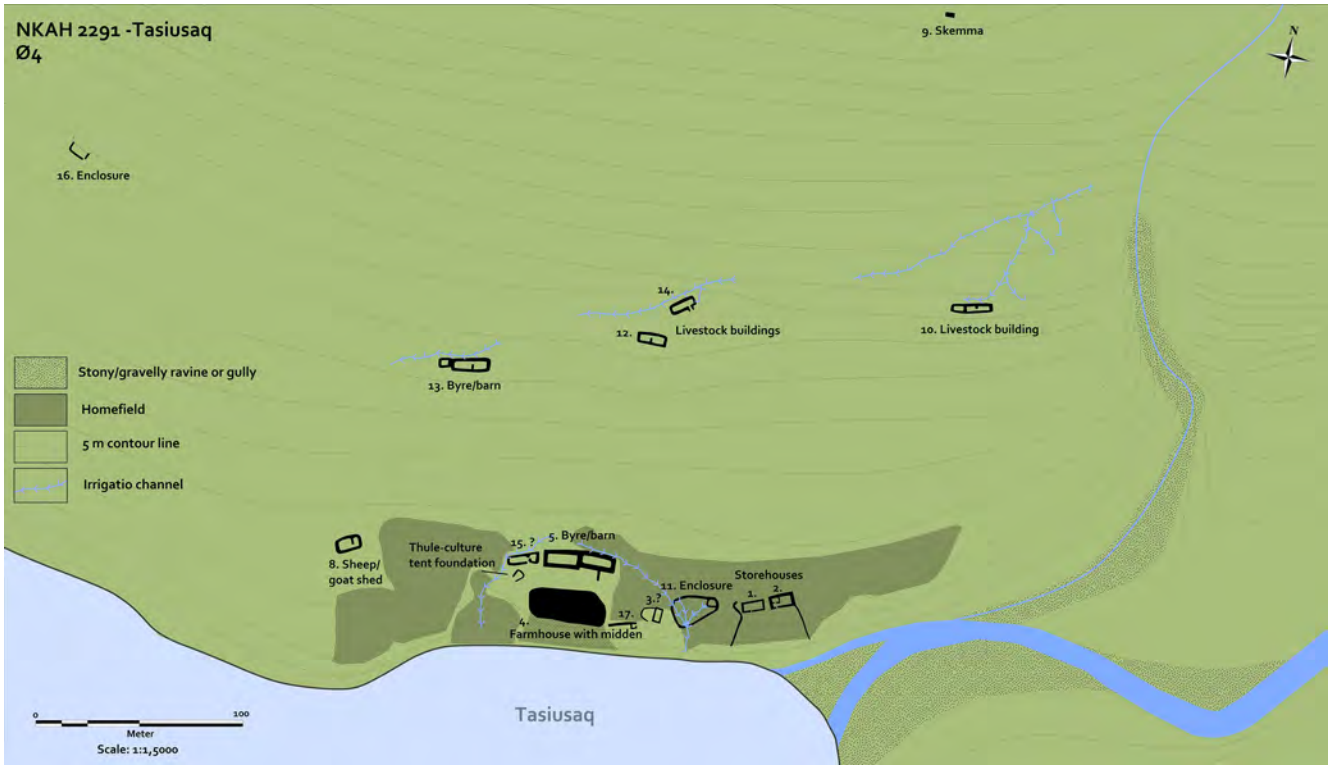


Fig. 2.21: Detailed survey plan of Ø4, where one can see all the characteristics of a virtually undisturbed medium sized Norse farm.

A comprehensive survey of archaeological sites in the Qassiarsuk area was carried out in 1998-2000, collating the results of earlier field surveys and producing systematic descriptions and maps of all of the sites.[28] A DGPS survey of the Qassiarsuk site (Ø29a and Ø29 - Brattahlíð) was made in 2013, providing a detailed and accurate map of this key site. Component part 1 is therefore not only the most intensively investigated but also the most thoroughly documented part of Norse Greenland, as revealed by the large number of publications on this specific area.

Fig. 2.22: Newly cultivated fields at Tasiusaq farm in the Qassiarsuk area.

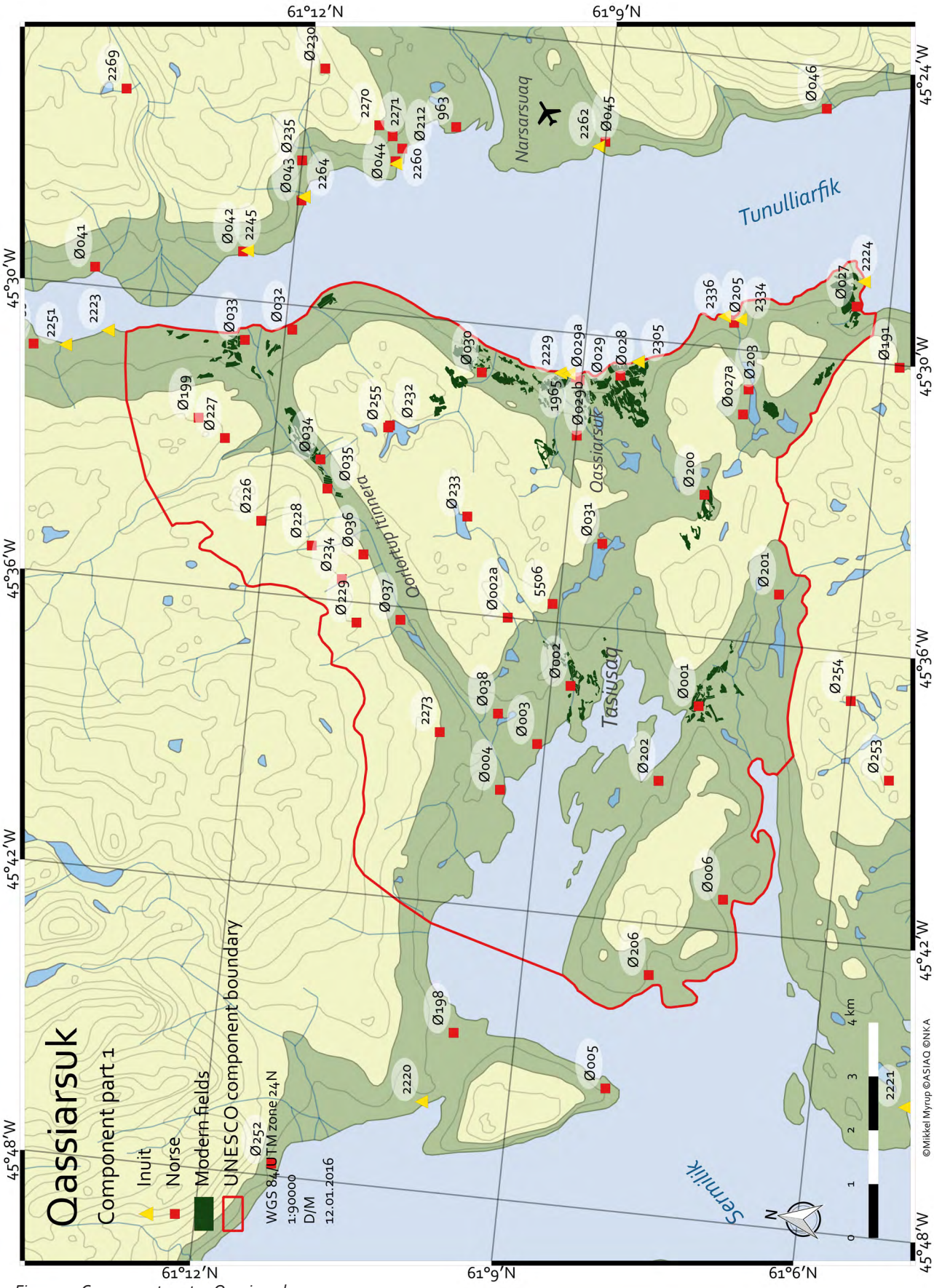


Fig. 2.23: Component part 1, Qassiarsuk.

Component part 2 – Igaliku

Component part 2, Igaliku covers 82.87 square kilometres across the neck of the Qaqortoq Peninsula where it is at its narrowest between Tunulliarfik (Eiríksfjörðr) on the western side and Igalikup Kangerlua (Einarsfjörðr) on the eastern side. To the north, it is naturally delimited by the majestic mountains of Illerfissalik (Búrfell) (1,450 m) and Tallorutit (1,660 m), and to the south by the central range of the Qaqortoq Peninsula, with Nuluk Mountain (823 m) overlooking the episcopal manor at the head of Igalikup Kangerlua. It is a compact and discrete area of considerable lowland bounded by high mountains, making overland access to other settlement areas impossible to the north and difficult to the south and east. The nearest settlement areas are component part 3, Sissarluttoq, some 13 kilometres to the south, and component part 4, Tasikuluulik (Vatnahverfi), some 20 kilometres to the south-east. This contrasts with the Qassiarsuk area: while conditions for farming at Igaliku are unparalleled in the whole of Kujataa, the immediate hinterland of the great manor/present hamlet is limited in size, supporting three modern farms and at most four small to medium-sized farms in the Middle Ages. Within the regional context, however, Igaliku is very centrally situated and ideally so in terms of ease of communication. Its location on the isthmus allows access to both fjords, Tunulliarfik (Eiríksfjörðr) and Igalikup Kangerlua (Einarsfjörðr), which together represent the core of the farming settlements in Kujataa. A 30-kilometre radius from Qassiarsuk includes component part 1, its immediately adjacent settlement areas as well as component part 2, whereas a 30-kilometre radius from Igaliku includes all the component parts, representing not only the majority of farming settlements in Kujataa but also the areas of most stable and affluent settlement. Igaliku was therefore a strategic location for the assembly of the Norse Greenlanders, as indicated by several sources, and it was the ideal place for the episcopal residence when this was established in the 12th century. The fertile Igaliku plain provided the resources necessary to support a very large manor and no other location in Kujataa matches this one in terms of centrality and communicative access to all areas of settlement. Igaliku could not have become a centre for either the Qassiarsuk (cp1) or Tasikuluulik (Vatnahverfi) (cp4) areas, but it was ideally placed to exercise higher level authority over both and other more distant areas of settlement. For the same reasons, Igaliku was the ideal place to start a farm in 1783.

The ruins of the episcopal manor are at the foot of a hillside overlooking a coastal plain some 0.7 kilometres wide at its widest and some 1.3 kilometres long. Situated at the head of Igalikup Kangerlua, it has a good harbour and sheltered anchorage and easy access on land over the 2.5-kilometre-wide isthmus to good harbours on the Tunulliarfik side. The isthmus itself has lakes and meadows among low hills and has three to four sites of small farms, one of them (Ø48) with a small church.

On the northern side, the isthmus and the site of the episcopal manor are dominated by the massive, naked, barren, wind-swept Illerfissalik Mountain, which the Norse called Búrfell. The contrast between the grey mountain and the green lowlands invites the visitor to contemplate the geological forces that have shaped this landscape and is a stark reminder of the limitations faced by the Norse Greenlandic and modern farmers alike. At present, the lowlands of Igaliku are a completely anthropogenic landscape. Farming was reintroduced here in 1783, making Igaliku modern Greenland's oldest farming community and among its largest.

Fig. 2.24: Aerial view of Igaliku/Garðar and its surroundings. In the background the Tunulliarfik Fjord can be seen.

Modern settlement

Igaliku is a small settlement with sheep farming as the main occupation. It had 33 inhabitants on 1 July 2015. At its peak in the mid-20th century, Igaliku was home to more than 200 people and a large number of houses remain from these more populous times, at present mainly used as summer houses. In and around Igaliku there are 5 sheep farms with 1,835 sheep, 8 horses and 18 heads of cattle in 2014. The hamlet has water and electricity works, garbage disposal, a primary school, a football pitch, a community hall, a grocery shop, a church and a cemetery. Within Igaliku there are facilities for tourists, and tourism is an occupation for local people as well as outside entrepreneurs. There is a hostel and a hotel operated in the summer, a service house with showers and a laundrette, huts and farmhouses can be rented, and the church contains a small exhibition about the hamlet and its archaeology.

Most houses are single-family dwellings. A few of these were built in the early part of the 20th century using local red stones, some of which were taken from the Norse Greenlandic ruins. The iconic red Igaliku sandstone is not only visually characteristic but has thermodynamic qualities which make it ideal for house construction. The stone absorbs and retains warmth giving the houses a greater degree of insulation than other types of stone. The modern stone-building tradition exhibits clear Danish architectural influences adapted to local conditions and materials.[29]

Fig. 2.25: Sheep grazing the plain of Igaliku.

The historic buildings give the Igaliku hamlet a unique character and make it one of Greenland's most distinctive sites. These buildings constructed by modern farmers from stone selected and dressed by their medieval predecessors evocatively reflect the connections and continuities between medieval and modern farming.

The Igaliku hamlet has 53 listed buildings, accorded special protection by Greenlandic law:[30]

- B-66 is the shop, built in 1932
- B-72 is the shopkeeper's dwelling, built in the 1920s
- B-76 is the church, built in 1926
- B-346 is a sheep stable, uncertain date
- B-353 was formerly a chicken coop, now a lavatory adjacent to B-355, uncertain date
- B-355 is a dwelling ("Walsøes hus"), uncertain date
- B-359 is an animal stall, adjacent to B-360, uncertain date
- B-360 is a dwelling, uncertain date
- B-361 is a dwelling ("Drusillas hus"), built in 1926
- B-366 is the foundations of an animal stall built in 1947
- B-367 is an outhouse ("Qalipaasivik"), now serving as a fire station, uncertain date
- B-369 is a dwelling ("Abrahams hus") built shortly after 1920
- B-371 is a dwelling ("Andalas hus") built in 1920–26, extension in 1930s
- B-381 was originally a garage ("Qalipaasivik"), now used for storage, uncertain date
- B-383 was originally a garage, now a dwelling, uncertain date
- B-384 was originally a byre, now a dwelling, uncertain date
- B-385 is a dwelling ("Sofies hus") built 1930–35 using earlier construction
- B-386 was originally a dwelling, now community hall, uncertain date
- B-387 is a dwelling ("Anes hus") built 1937
- B-388 is a dwelling, built in the 1940s
- B-390 was built as a goat stable, now a hostel, uncertain date
- B-391 was built as the school's dormitory, now a dwelling, built 1961
- B-392 was built as the teacher's dwelling in 1961
- B-394 was built as a sheep stable, now a dwelling, uncertain date
- B-397 was built as a shed for dwelling B-419, uncertain date
- B-398 was built as a stall, now a chicken coop, uncertain date
- B-400 is a dwelling ("Suuluts hus") built in the 1920s
- B-403 was built as a barn, now a dwelling, uncertain date
- B-405 is a dwelling built shortly after 1920
- B-406 is the foundations of a barn, adjacent to B-407, uncertain date
- B-407 is a dwelling ("Moortraqs hus" / "Emmas hus") built 1922-24
- B-419 is a dwelling ("Enooraqs hus") built in 1964
- B-532 is a dwelling built in 1953

- B-533 is a dwelling built in 1953
- B-534 is a dwelling built in 1953
- B-538 is a dwelling ("Taperas hus") built in 1953
- B-559 is a dwelling built in 1953
- B-567 is a workshop ("Sannavik"), uncertain date
- B-583 is a dwelling, at one time of the local midwife, built in 1967
- B-971 is a hotel, built in 1964
- B-993 is a dwelling, built in 1975
- B-1102 is a stall, built in 1980
- B-1142 is a dwelling from an 1984
- B-1163 is a dwelling ("Amooraqs hus"), built in 1985
- B-1178 is a home for the elderly, built in 1986
- B-1179 is a home for the elderly, built in 1986
- B-1312 is a pump house, uncertain date
- B-1313 is a standpipe hut, uncertain date
- B-1344 is a chapel, uncertain date
- B-1381 is a dwelling, uncertain date
- B-1399 is a dwelling, uncertain date
- B-1424 is a dwelling, uncertain date
- B-1452 is a dwelling, extension of B-407, uncertain date

In addition to a fully equipped harbour in Igaliku, there are jetties in Itilleq and Itillip allanngua, with a road across the isthmus connecting this infrastructure to the hamlet, along with branches to the three outlying farms and their fields as well as extensions leading northwards and southwards into the highlands on either side of the isthmus. There are approximately 23 kilometres of gravel roads in component part 2. Igaliku also has a helistop.

Norse Greenlandic settlement

Component part 2 has 17 registered Norse Greenlandic sites, ranging from single structures to the enormous episcopal manor with more than 50 features. At least four other sites represent farms, and a further site (Ø395) may be a single-phase settlement from the colonisation period. All of the farms apart from Garðar itself are classified as small or medium, with 11 structures or fewer. The most substantial of these is Ø48, which has a small church ruin. There are three or four potential shieling sites and seven outstations. Characteristics of the settlement in this area include:

- The contrast between the enormously large and complex episcopal manor and the modest size of the neighbouring farms
- A high proportion of outstations
- Relatively short distances between farms and unimpeded overland communications within a compact and discrete settlement area

The archaeology of the Igaliku area, component part 2, is completely dominated by the episcopal manor, the single largest settlement of Norse Greenland. Rivalled in size and complexity only by Qassiarsuk (Ø29a – Brattahlíð) it is distinctive both in the way it has shaped the surrounding landscape and in its monumental architecture. The foundations of the cathedral show it to have been by far the largest church in Norse Greenland and the two enormous byres and cyclopean storage buildings in several locations reflect economic wealth on a scale unparalleled elsewhere in South Greenland. Not only do the ruins of Igaliku represent the apogee of Norse Greenlandic society, they are the only medieval episcopal manor in the North Atlantic to be comprehensively preserved. The modest size of the adjacent farms is no doubt an effect of the economic centrality of the manor, which likely controlled the whole isthmus and organised the exploitation of its resources directly for its own benefit. It is possible that most or all of the small farms were abandoned or at least not operated as separate farms in the 13th and 14th centuries. The relatively high number of outstations is also a likely reflection of this. Some of these (e.g. Ø55 and Ø257) have very substantial structures suggesting that they may have been operated from the manor.

Fig. 2.26: Dry-stone masonry building (ruin no.5) interpreted as the Norse bishop's tithe barn in Igaliku

Fig. 2.27: Norse ruin on the top of mount Illerfissavik/Burfjeld rising 1,727 m above the settlement of Igaliku.

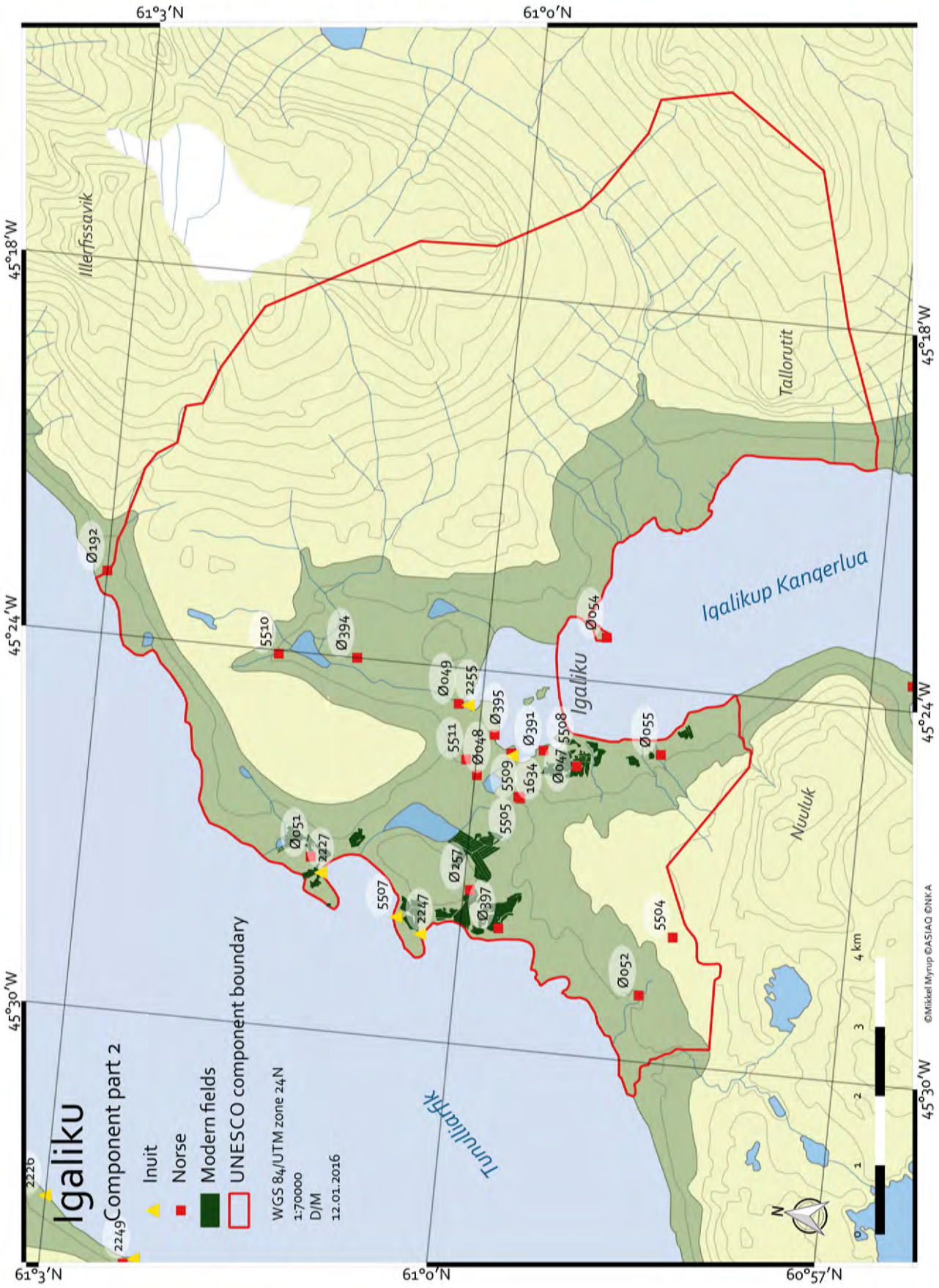


Fig. 2.28: Component part 2, Igaliku.

Table 2.2 – Norse Greenlandic settlement					
NKAH No.	**Norse ID**	**Name**	**Number of identified ruins**	**Interpretation**	**Other**
	Ø54	Usuk	1	Outstation	
4326	Ø48	Ilijerfeeqqaq saava	11	Medium farm with church	Small excavations 1968 and 2001
4328	Ø47	Igaliku / Garðar	52+	Large farm with cathedral	Excavations 1926, 2012-13 Modern farm
4335	Ø55	Kalluut	1	Outstation	
4336	Ø52	Innaarsussuan-nguaq	11	Medium farm	
4405	Ø391		2	Outstation	Also Inuit site
4426	Ø49	Qingugut	7	Small farm	Small excavation 2011
2252	Ø257		5	Small farm or shieling	
2248	Ø51	Attarnaatip ilua	10	Small farm	Modern farm Also Inuit site
2228	Ø192	Narsaarsiip kuua	1	Shieling	
2253	Ø397		1	Outstation	
2356	Ø395		8	Small farm	Small excavation 2000
5509	Ø390		1	Outstation	
5510	Ø393	Tatsip qinngivata qoorua	5	Shieling	
5511	Ø396		2	Outstation	
5504	New		1	Shieling	
Inuit					
2227		Illunnguaq	2 long-houses 3 small houses		Modern farm Also Norse site
2247		Itilleq	Winter houses and a grave		
2255			Dwelling Early Thule		Also Norse site
1634			Summer camp 19th c.		Also Norse site
5505			11 graves		
5507		Itilleq	2 graves		
5508		Igaliku	Summer camp		Also Norse site
	Ø47 no. 38		8 graves		Re-use of a Norse structure

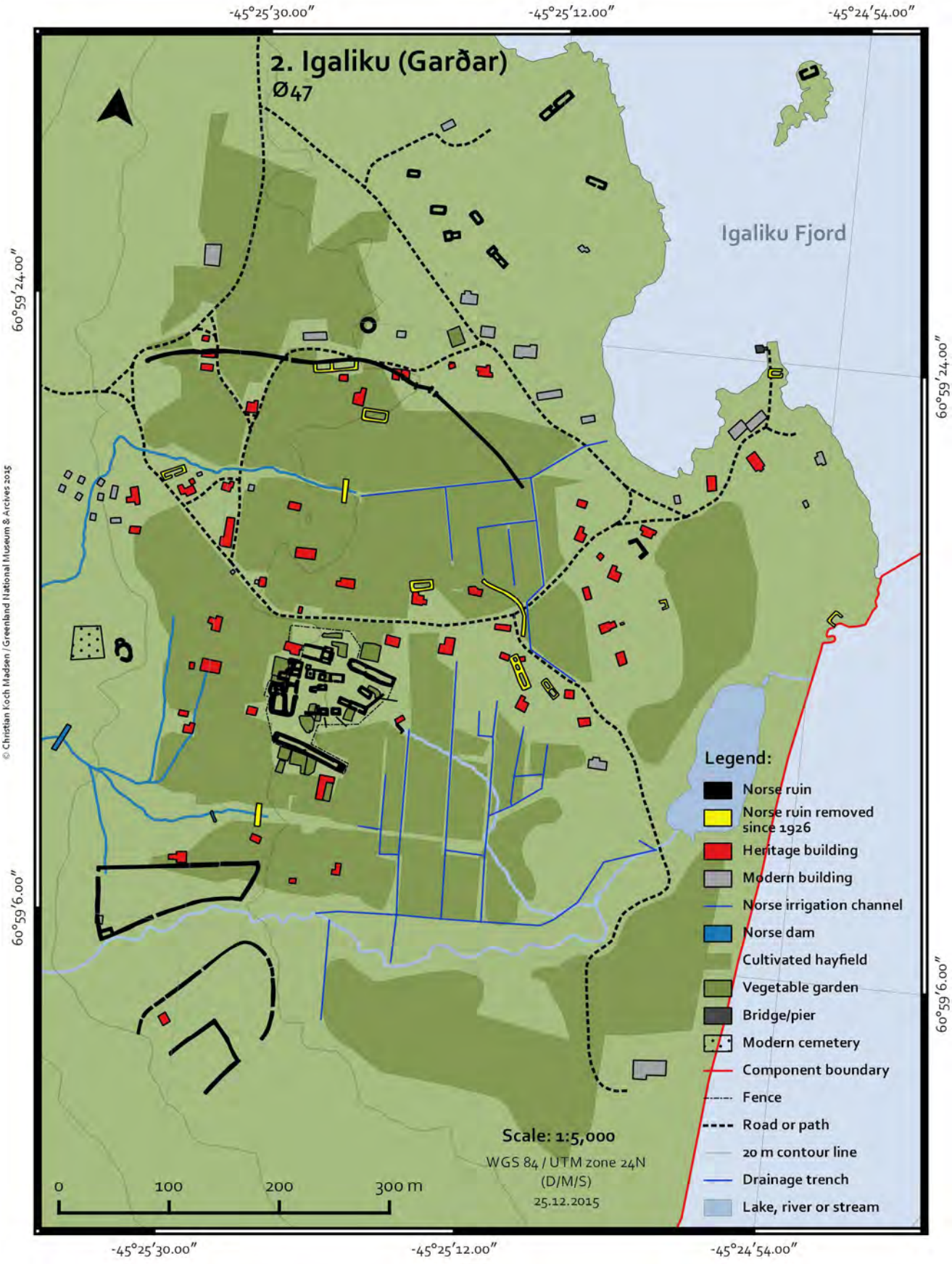


Fig. 2.29: Detailed survey plan of Igaliku (Ø47) with location of Norse and Inuit ruins, as well as modern features.

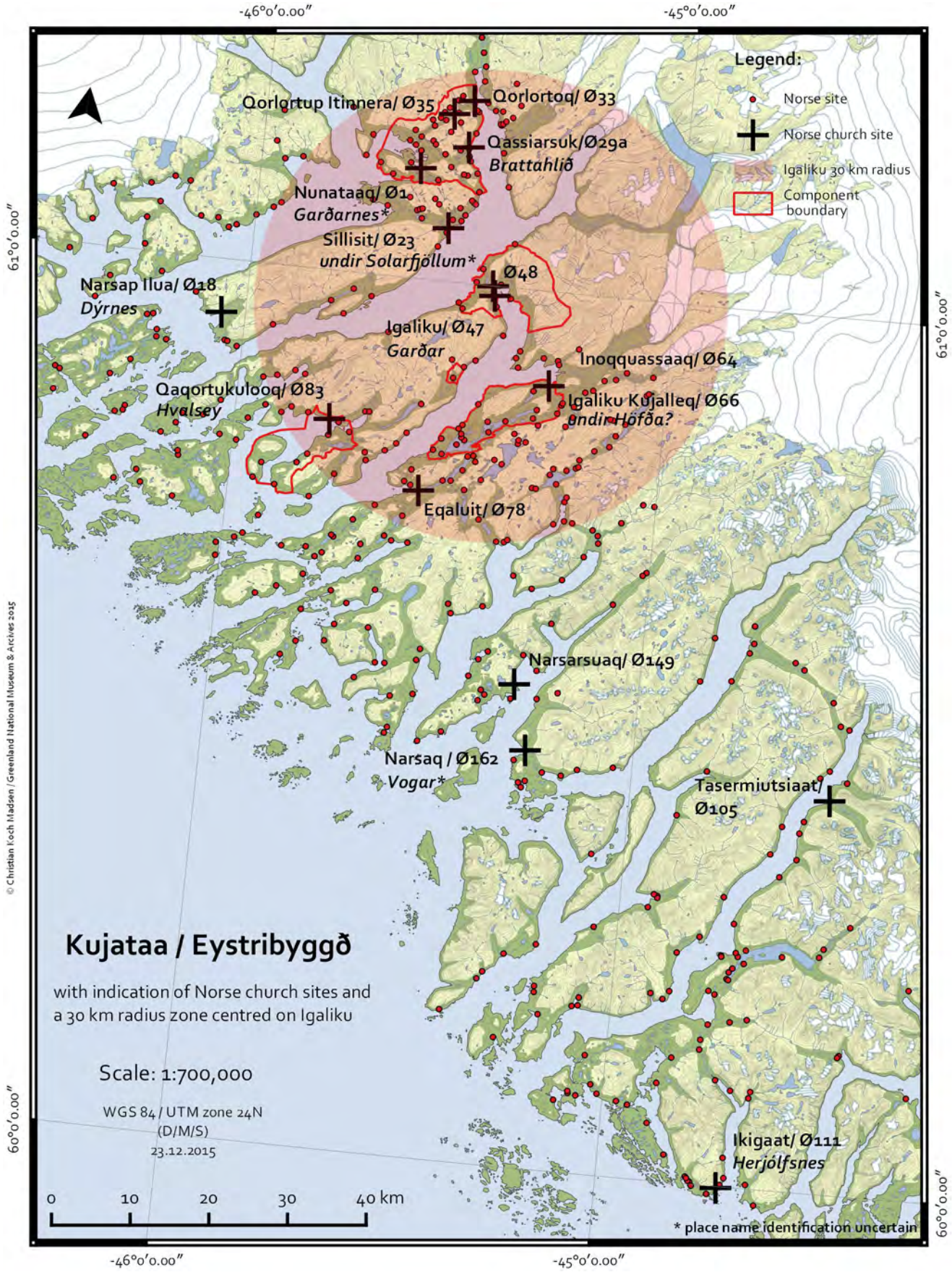


Fig. 2.30: Norse churches in Kujataa.

Inuit archaeology

The slightly higher proportion of Inuit sites in component part 2 reflects more recent survey methods that record all features encountered. Nevertheless, a focused search for Inuit and Palaeo-Eskimo remains has not taken place and the number of sites may still increase. Four Inuit dwelling sites are registered, including substantial winter houses in two places and two substantial summer camps in addition to smaller camping sites. The two winter house settlements, both on the Tunulliarfik side of the isthmus, likely date to the 18th and early 19th centuries based on house typology and written records. Three Inuit burial sites are recorded and one of them, at Igaliku itself, is a reutilisation of a Norse Greenlandic building, illustrating how the Inuit took notice of the earlier cultural landscape and incorporated its features into their own. Igaliku also has a distinctive early Christian Inuit cemetery as well as the remains of late 18th and 19th century Inuit farming culture, mostly unexplored.

Research history

Like Qassiarsuk and Qaqortukulooq (Hvalsey), Igaliku was a major focus of antiquarian attentions in the 18th and 19th centuries.

Several small-scale and unsystematic excavations, mostly within the cathedral ruins, produced a number of artefacts, including runic inscriptions, which were sent to the National Museum in Copenhagen in the 19th century. Major excavations took place in 1926, clarifying the layout of the cathedral and manorial complex and producing a large artefact collection.[31] In recent years, the irrigation system at Igaliku has been the focus of targeted fieldwork[32] and excavations in the meadow downhill from the manorial complex in 2012–13 produced a substantial animal bone and artefact collection, including a large assemblage of wooden artefacts preserved in the waterlogged deposits.[33] Targeted excavations in Ø48, Ø48a and Ø49 have produced 11th and 12th century dates for these sites and suggested that they may have developed into substantial farms (small church at Ø48 and evidence for barley consumption/cultivation at Ø49) before they were eclipsed by the episcopal manor.[34] A DGPS survey of the episcopal manor was carried out in 2012, providing a detailed and accurate map of the central part of this exceptional site. Furthermore, the whole of component part 2 was the subject of a systematic archaeological survey in 2015.[35]

Fig. 2.31: Detailed survey plan of Igaliku (Ø48).

Component part 3 – Sissarluttoq

Component part 3, Sissarluttoq covers 3.39 square kilometres in a small valley on the western coast of Igalikup Kangerlua. The valley holds a single Greenlandic Norse farmstead but an exceptionally large and well preserved one. The shoreline on the eastern side of the Qaqortoq Peninsula generally appears very forbidding; steep—in some places vertical—slopes drop several hundred metres into Igalikup Kangerlua and only the hardiest plants cling to the sheer mountainside. However, some 10 kilometres before reaching the head of the fjord and the fertile plain at Igaliku (cp 2), the otherwise unbroken mountain wall is interrupted by an indentation where a river spills into the fjord through a deep gorge. The bay is littered with large boulders and makes for a rough landing; in fact, that is exactly what the modern Greenlandic place name Sissarluttoq signifies: "the poor landing site".

From the forbidding landing site, the slope rises abruptly for over 50 m, but behind it there is an isolated valley, nestled between the mountain ranges. The valley floor is watered by several streams trickling from the mountains to join the small river that runs through the valley to spill into the bay. Aided by irrigation, this setting provided exceptional hay-making potential in the Norse Greenlandic context. While the coastal access of this farm is poor, not only because of the difficult landing but also because of the all-but impassable coastlines on either side, it is relatively easily reached via overland routes from both Igaliku (cp 2) to the north and Hvalsey (cp 5) to the south. The distances are great however, even in Norse Greenlandic terms, with 12–13 kilometres to the nearest settlements on either side. Sissarluttoq has been identified with the large farm Dalr, mentioned in Ívar Bárðarson's description as belonging to the cathedral in Garðar. The location fits and the place name is apt for Sissarluttoq. The implication is that this site represented a major component in the economic organisation of the Norse Greenlandic bishops.

Modern settlement

There is no modern settlement in Sissarluttoq and the site is more or less completely untouched by any post-medieval development. Only at the landing site are there two huts built in the 1970s and impermanent wire-fences for sheep round-ups have been built in the valley where the ruins are.

Norse Greenlandic settlement

Sissarluttoq is among the best preserved Norse farmsteads in Greenland, indeed in the whole North Atlantic. At least 44 features have been identified at the site making it among the largest and most complex—and by far the largest farm in Norse Greenland without a church. It is possible that this farm was made up of two or even

Fig. 2.32: View of the plain with the Norse ruins of Sissarluttoq, to the right a well preserved animal pen.

three households, but it may equally have been a single, exceptionally large operation. Some of the features—irrigation channels, small animal pens, and completely collapsed turf houses—only reveal themselves to the trained and keen eye, but many of the ruins stand exceptionally well preserved, offering a matchless glimpse into Norse dry stone architecture; clearly visible are metre-thick walls built from snugly fitted natural stones, a narrow doorway with the lintel still in place, ventilation channels, niches, rooms etc. In addition to this single enormous site, there is one outstation on the coast.

Characteristics of the settlement in component part 3 include:

- The size and complexity of the single farm
- The preservation of the dry stone architecture
- The isolation of such a large settlement within the heart of the Norse Greenlandic settlement in Kujataa

Inuit archaeology

There are no registered Inuit sites in Sissarluttoq but graves/caches have been reported and the area remains unexplored in this regard.

Research history

Sissarluttoq was visited and described by 19th century antiquarians and, apart from a small trench dug by Gustav Holm in 1880,[36] it has seen no systematic archaeological research. A GDPS survey has been carried out providing a detailed and accurate map of the area and its archaeological features. Palaeo-ecological analyses have examined the impacts on the landscape that are associated with this farmstead.[37]

Table 2.3 – Norse Greenlandic settlement

NKAH no.	Norse ID	Name	Number of identified ruins	Interpretation	Other
4339	Ø58	Naajat	1	Outstation	
4340	Ø59	Sissarluttoq / Dalr	44	Large farm	Small excavation in 1880
4340					
				Graves ? / caches	

Fig. 2.33: The doorway with lintel of the extremely well preserved ruin no.3 – a byre or barn at Sissarluttoq.

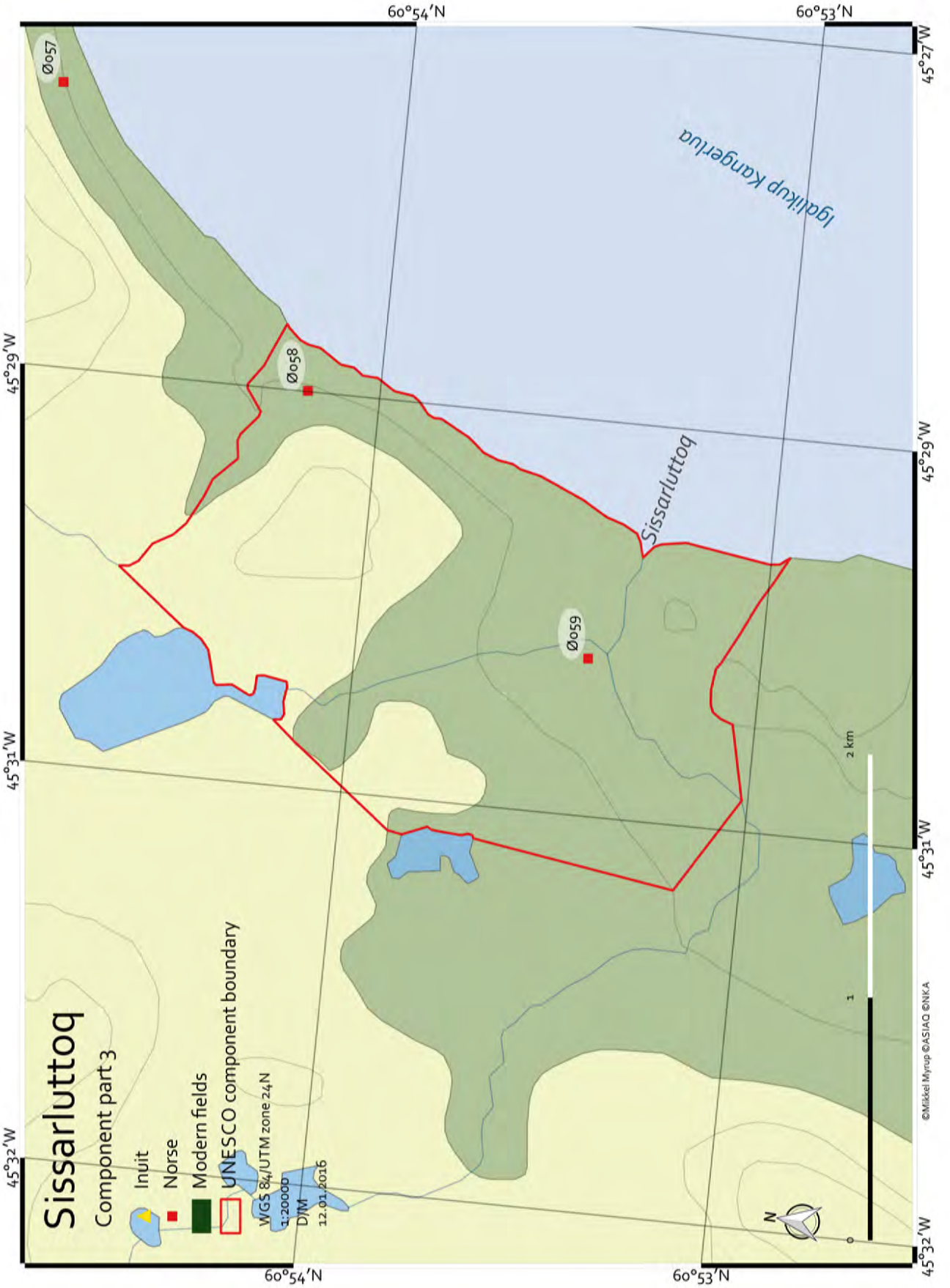


Fig. 2.34: Component part 3, Sissarluttoq.

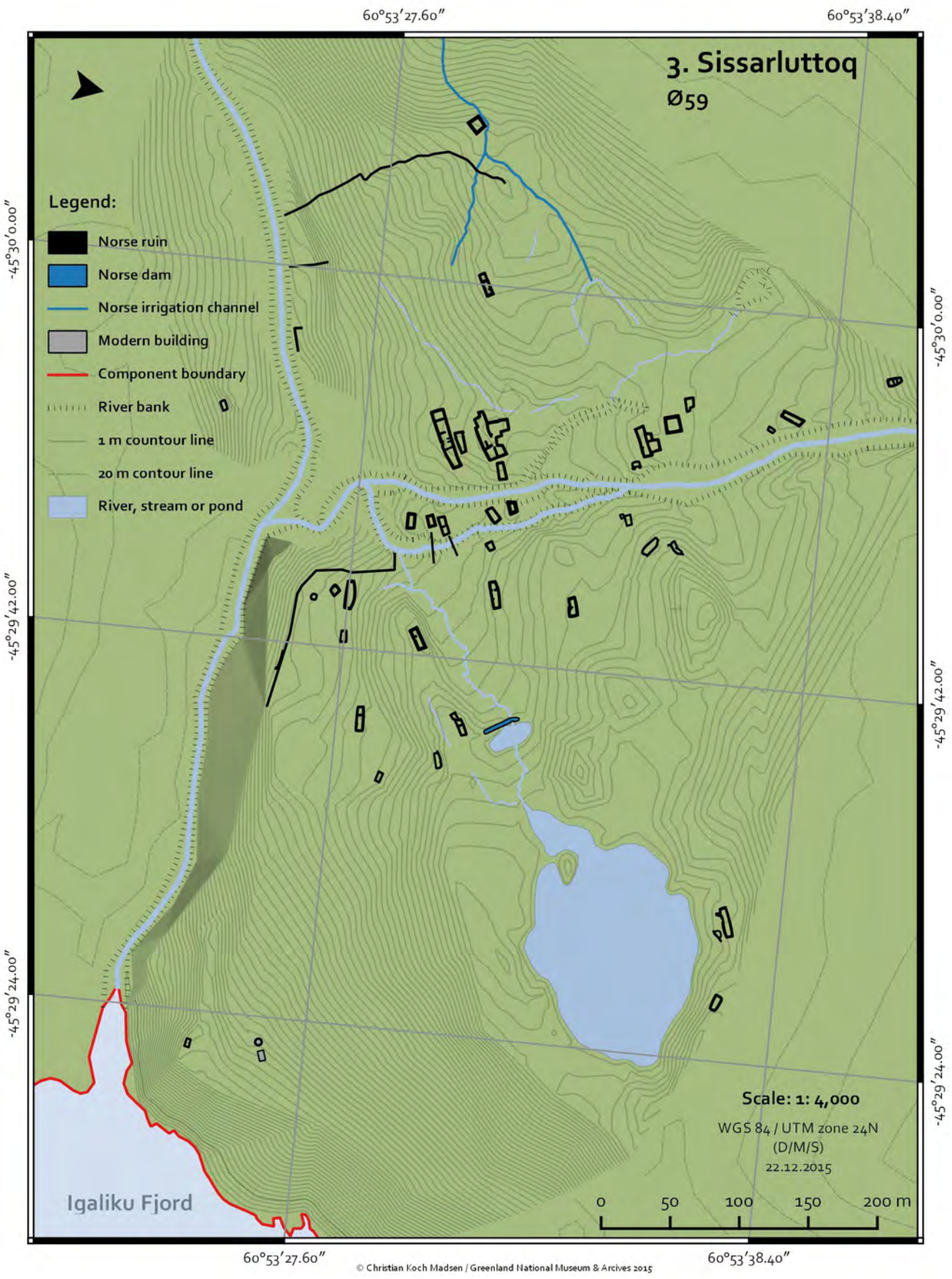


Fig. 2.35: Detailed survey plan of Sissarluttoq (Ø59) with location of Norse ruins and modern buildings.

Component part 4 – Tasikuluulik (Vatnahverfi)

Component part 4, Tasikuluulik (Vatnahverfi) covers 75.42 square kilometres along the southern coast of the fjord Igalikup Kangerlua. The area stretches from the plain of Igaliku Kujalleq in the north-east and continues in a belt 3.5–6 kilometres wide tracing the coastline south-west until about halfway into the fjord. This area encompasses most of Tasikuluulik, its Norse place-name, Vatnahverfi, meaning the 'lake district'.

On the eastern side, component part 4 begins at the head of the Igaliku Kujalleq Fjord where there is a small plain with the major church farm Ø66, identified with the Greenlandic Norse place name undir Höfða. Inland from this site, towards the Inland Ice, several large glaciers fan out onto vast outwash plains. Katabatic or föhn winds come howling from the ice and are channelled south-westward over the sandy plain and onwards through Tasikuluulik (Vatnahverfi). Besides creating the barren landscape in the northeast corner of component part 4, the winds have also carried with them tonnes of sediment—silt and grains of fine sand—that are gradually deposited along the way. This is the Sandur of Tasikuluulik (Vatnahverfi). It provides a rare and remarkable opportunity to study the dynamics of settlement in an area of rapidly changing geomorphology. Hidden between the sand dunes are fertile patches of meadow where the Norse Greenlanders built shielings and farmsteads. However, such landscapes of sand are very dynamic; in some places the sites are being engulfed by sand dunes, in other places they emerge from them. Thus, the Sandur of north-east Tasikuluulik (Vatnahverfi) may well hide more Norse Greenlandic ruins. In fact, investigations in 2015 revealed that what had previously been thought to be a single outlying ruin is probably an entire farm, emerging from under a dune.

West of the Sandur and Igaliku Kujalleq, a valley filled with lakes stretches westwards, parallel to the fjord but divided from it by low mountains (greatest height 646 m a.s.l.) and hills. At Qanisartuut the valley merges with a coastal plain with only a 600 m wide isthmus between Lake Tasersuaq and the fjord. Although the largest medieval sites are on the coast on either end of the valley, all but one of the small and medium-sized farm sites are located in the valley. Unlike component parts 1 and 2, it is not prime pastureland that dominates, but exceedingly dense and thick scrub woodland. Even today, after more than half a century of intensive sheep farming, the landscape is largely covered in scrub willow and birch copses, in some places standing several metres high. The scrub is not, however, continuous; the winds from the glacier have resulted in the gradual filling of the countless lakes and ponds with aeolian soils, creating meadows on their shallow banks.

Fig. 2.36: Aerial view of Qanisartuut in Tasikuluulik (Vatnahverfi).

Table 2.4 – Norse Greenlandic settlement					
NKAH no.	**Norse ID**	**Name**	**Number of identified ruins**	**Interpretation**	**Other**
3899	Ø67	Qorlortukasik	7	Small farm	Modern farm
5500			8	Small farm	Excavation 2015
4272	Ø172	Tatsip Ataa Killeq	21	Large farm	Modern farm (abandoned) Excavation 2007, 2009–2010
5513			1	Outstation	
4273	Ø210	Tatsip Ataa Kangilleq	7	Shieling	
4274	Ø76C	Qeqertarooq	3	Outstation	
4275	Ø76a	Tasersuaq	5	Outstation	
4276	Ø76	Qanisartuut	21	Large farm	Modern farm
4277	Ø76b	Qanisartuut	2	Outstation	
5512			1	Outstation	
4278	Ø65	Atikerleq	12	Medium farm	Modern farm (abandoned)
4279	Ø71a	Saqqataa Tasia	9	Small farm	
4282	Ø171	Tasilikulooq	15	Medium farm	Modern farm
4297	Ø71N	Saqqaata Tasia	15	Medium farm	Modern farm Excavation 1949
4297	Ø71S	Saqqaata Tasia	7	Small farm	Modern farm
4310	Ø69	Timerliit	12	Medium farm	Modern farm
4311	Ø68	Timerliit	11	Medium farm	Modern farm Excavation 2008
4313	Ø169	Amikitap Tasia	4	Shieling	
4318	Ø66	Igaliku kujalleq / undir Höfða	31	Large farm with church	Modern farm Excavations 1880, 1894, 1910, 1926, 1935, 2008
Inuit					
5514		Tatsip Ataa Killeq		Burial, fox trap, tent ring	

Modern settlement

Andreas Egede from Igaliku was the first to settle in Igaliku Kujalleq in 1934. By 1965, six families were practicing sheep farming at this locality and the population had grown to 38 inhabitants. Farms were also started along Igalikup Kangerlua in the late 1940s (Qanisartuut and Eqaluit, the latter outside cp 4), and common use was made of the large fertile hinterland for grazing. It was not until the 1980s that the internal part of Tasikuluulik (Vatnahverfi) colonised by new farms, when an EU-funded gravel road was established between Igaliku Kujalleq and Qanisartuut in the 1980s. Today, six sheep farms are located within component part 4.

On 1 July 2015, there were 19 inhabitants within component 4, resident on six farms with 3,265 sheep, 45 horses and 27 heads of cattle in 2014. Unlike the settlements in Qassiarsuk and Igaliku, there is limited infrastructure in Tasikuluulik (Vatnahverfi), although tourists can rent farmhouse accommodation in Igaliku Kujalleq.

Tasikuluulik (Vatnahverfi) has one listed building, accorded special protection by Greenlandic law: [38]

- B-345 which is a dwelling in Qanisartuut, built in 1946

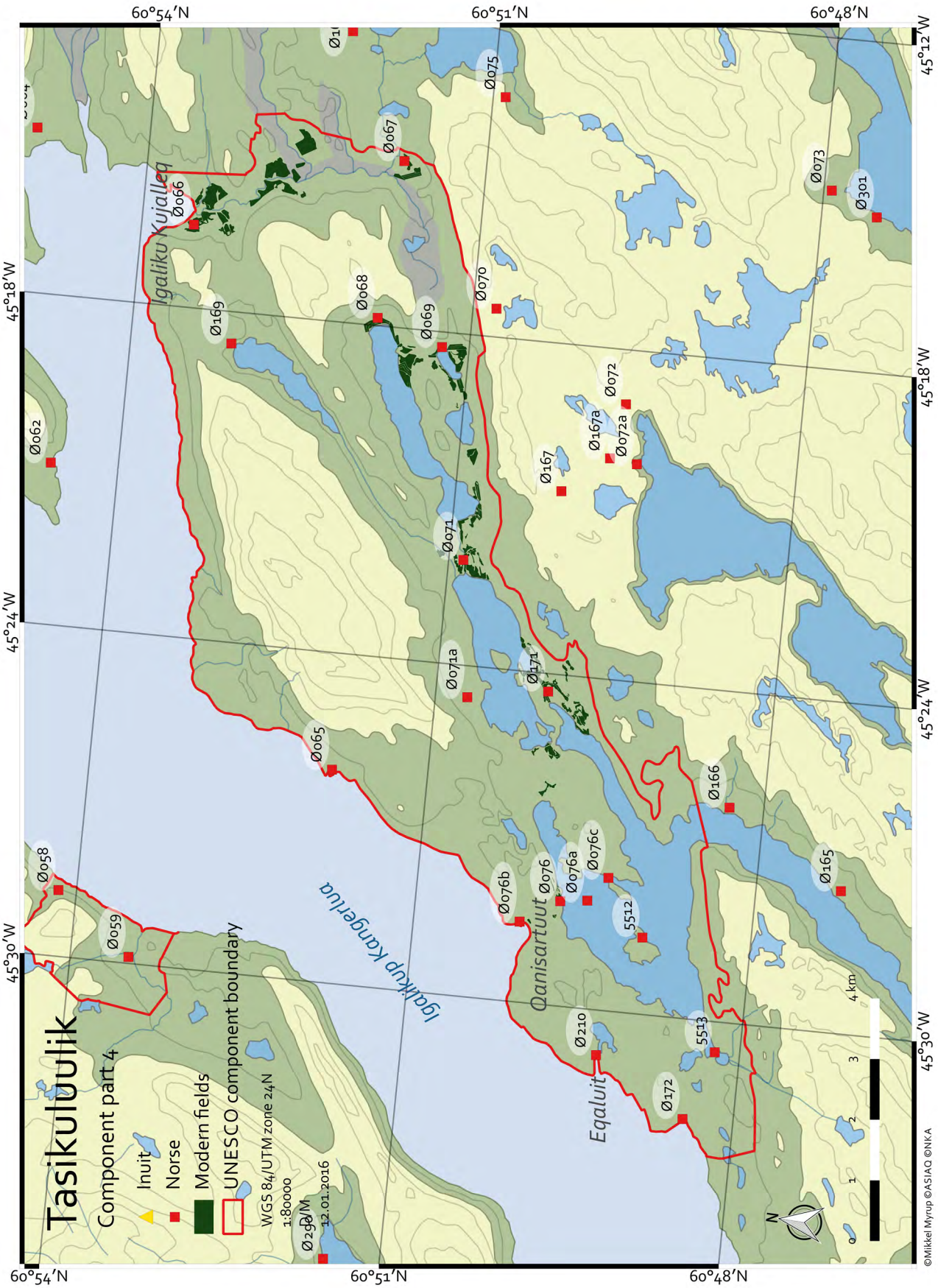


Fig. 2.37: Component part 4, Tasikuluulik (Vatnahverfi).

There is a substantial jetty in Qanisartuut and a smaller one in Igaliku Kujalleq. A gravel road leads south-westwards from Igaliku Kujalleq along the lakes to Qanisartutt and beyond, connecting all the farms within the component part. There are approximately 27 kilometres of gravel roads within component part 4.

Norse Greenlandic settlement

Component part 4 has 19 registered Norse Greenlandic sites, ranging from single structures to the regional centre in Igaliku Kujalleq (Ø66 – undir Höfða) with more than 30 features. There are two other large farms, both on the coastal plain where the valley opens onto the coast (Ø172 and Ø76) and four small and five medium-sized farms, all but Ø65 at inland locations. As in component parts 1 and 2, some of the small farms may have been used as shielings, but there are two sites classified as shielings and five outstations, most with only one structure. It is possible that some of the shieling and outstation sites on higher ground outside the borders of the component part were subsidiary to the farms inside the borders. Characteristics of the settlement in this area include:

- A high proportion of small and medium sized farms
- The inland focus of much of the settlement
- High settlement density rivalled only by component part 1

Inuit archaeology

There are no registered Inuit sites in Tasikuluulik (Vatnahverfi), but Inuit features have been reported at Tatsip Ataa Killeq and the area remains unexplored in this regard. The low frequency of Inuit archaeology in this area is no doubt a factor of the inland focus of much of the Norse Greenlandic settlement, and therefore of archaeological attentions, but a survey of the coastline would likely reveal Inuit archaeology on a par with that found in component parts 1 and 2.

Research history

Igaliku Kujalleq (Ø66 – undir Höfða) was one of the sites frequently visited by antiquarians in the 19th century and it saw some early unsystematic excavation and artefact retrieval. It was also the site of some of the earliest systematic excavations and detailed surveys by Gustav

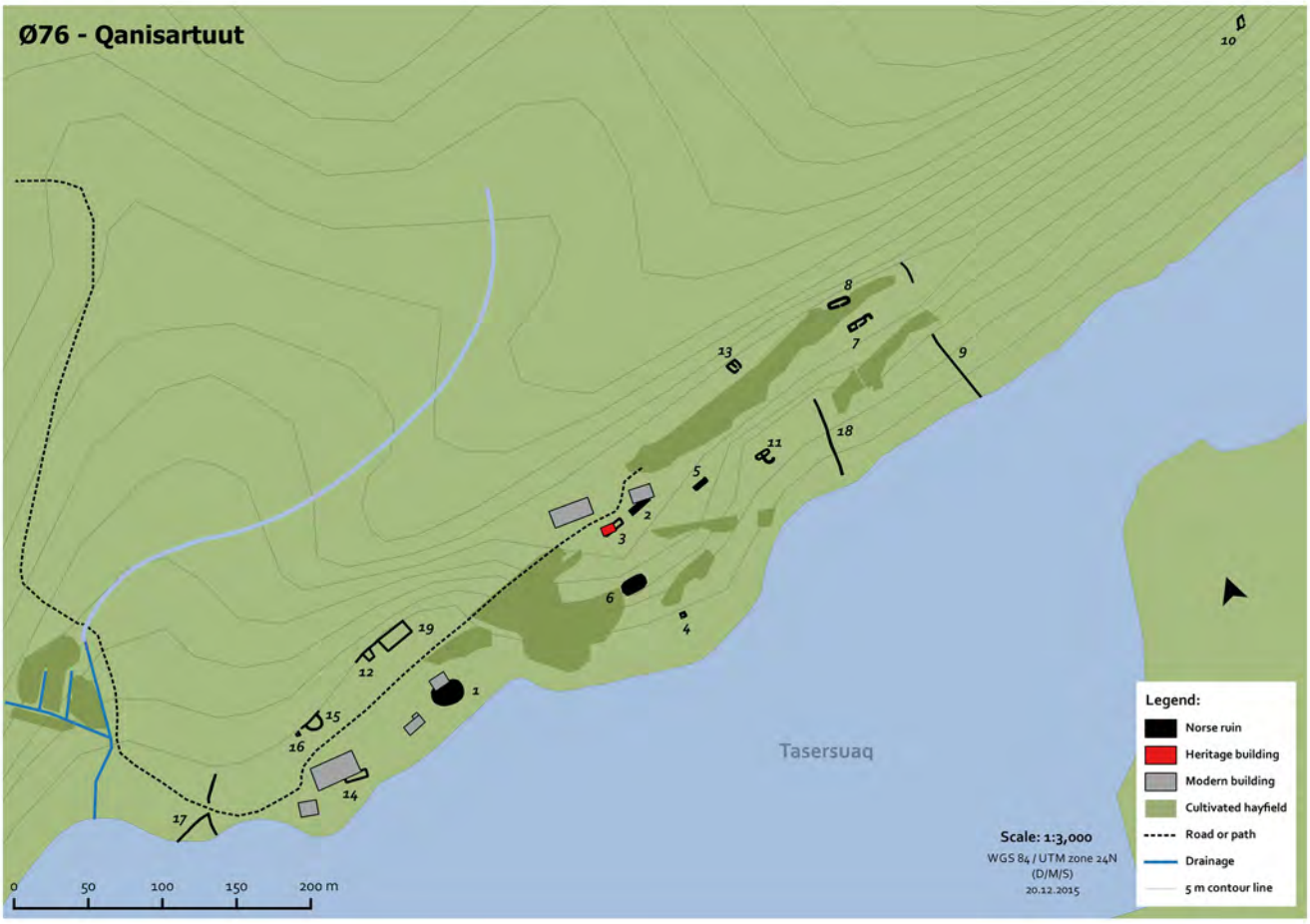


Fig. 2.38: Detailed survey plan of Qanisartuut (NKAH 4276) with location of Norse ruins, heritage and modern buildings.

Holm in 1880 and Daniel Bruun in 1894.[39] In 1935,Aage Roussell excavated in the church and cemetery at this site,[40] and this was followed by several excavations of Tasikuluulik (Vatnahverfi) sites by Christian Vebæk.[41] His efforts commenced in 1939 and were continued in 1948–51. Most of these are outside the borders of component part 4, but inside it is Ø71, which he excavated in 1949. Vebæk's investigations ensured that site distribution in Tasikuluulik (Vatnahverfi) became better known by the mid-20th century than any other part of Kujataa, laying the foundations for a second Vatnahverfi project.[42] Starting in 2006, this project has resulted in a comprehensive survey of the whole area (not only component part 4 but also extensive tracts to the south and west), with DGPS surveys available of all the sites, recently published in a PhD monograph by Christian Koch Madsen.[43] The Vatnahverfi project has also involved coring of several sites, small-scale excavations at Igaliku Kujalleq (Ø66 – undir Höfða) and Ø68, and more substantial midden excavations at Ø172, resulting in large faunal and artefactual assemblages. Associated with the survey and excavations are several palaeo-environmental studies, including a comprehensive palynological (pollen) investigation of the region.[44] No part of Norse Greenland rivals Tasikuluulik (Vatnahverfi) in the range and volume of modern archaeological research.

Fig. 2.40: Harvesting of Bering Hairgrass.

Fig. 2.39: Qorlortukasik farmstead, harvesting with modern round baler.

Fig. 2.41: Fields at Timerliit farm in autumn.

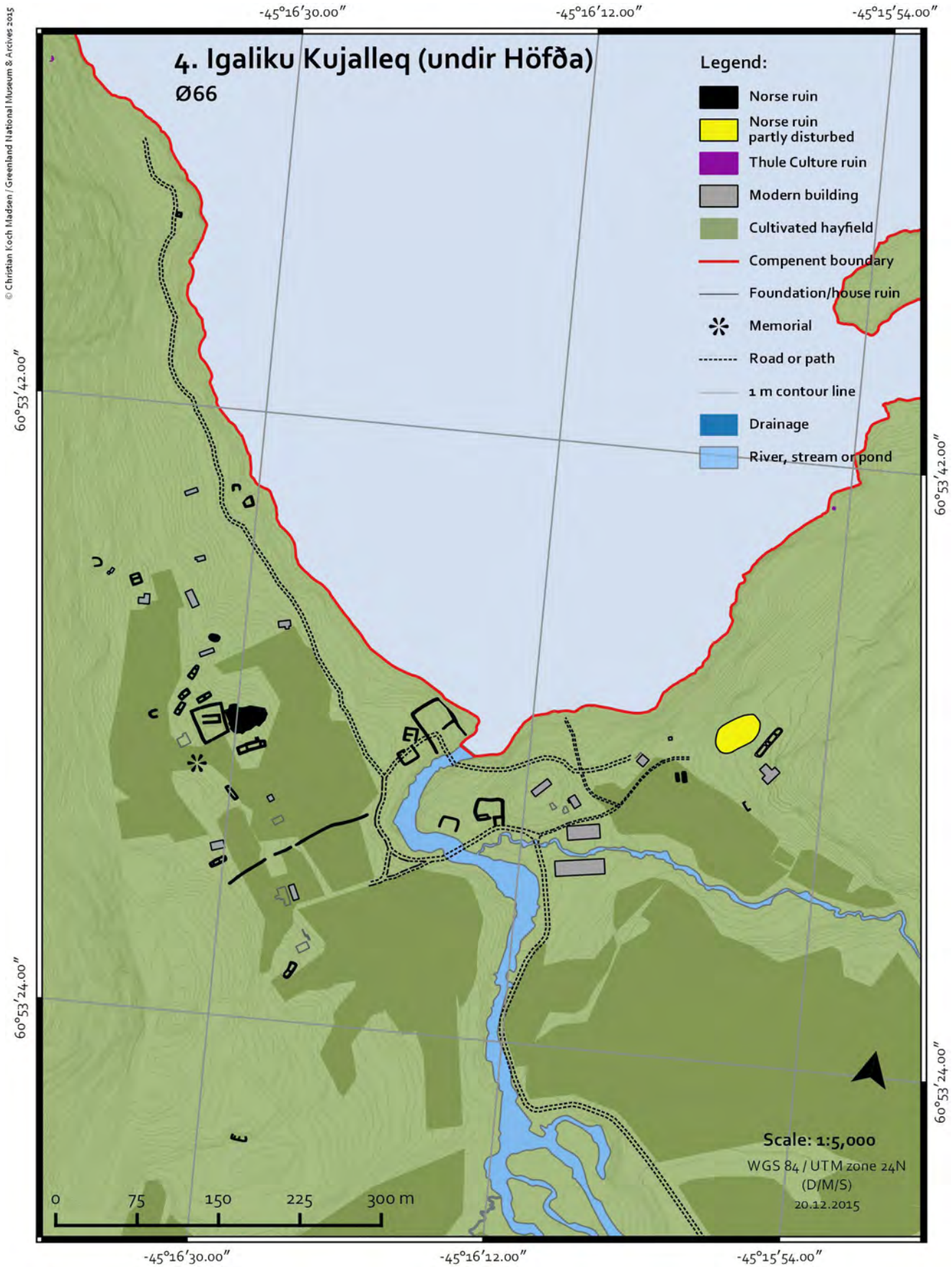


Fig. 2.42: Detailed survey plan of Igaliku Kujalleq/undir Höfða (Ø66) with location of Norse ruins, Inuit ruins, and modern buildings.

Component part 5 – Qaqortukulooq (Hvalsey)

Component part 5 covers 73.82 square kilometres in a 0.5–1.5 kilometre wide belt that traces the head and southern shore of Qaqortup Imaa, Hvalseyjarfjörður, a fjord that branches from the outer part of Igalikup Kangerlua and includes the island Arpatsivik, the Hvalsey ("whale island") from which the fjord and the manor at its head derived their Norse Greenlandic names. Component part 5 is the outermost part of the nominated property and is located in the transition zone between the inner fjord and outer fjord environments. The mountains are more than 1,000 m high at the head of the fjord, but the terrain becomes lower and slopes more gradually towards its opening. There is considerable lowland and good grazing in the hills, but conditions for haymaking are significantly poorer than in the inner fjord areas of component parts 1-4. This is reflected in the smaller size of the farm sites in this area. Even the manor of Hvalsey, with its monumental architecture signifying major wealth accumulation, only has 16 registered structures and may have been propped up by a neighbouring farm, Ø83a, to provide it with all the resources needed for a high status household. In contradistinction to the other component parts, especially 1 and 4, this one is very decidedly a fjord environment with all the sites located within 400 m of the coastline.

Modern settlement

On 1 July 2015, there were 13 inhabitants in component part 5, including five students of the agricultural college. All of them live in Upernaviarsuk where there is an agricultural research station with a number of buildings, including greenhouses, gardens and fields where crops and vegetables are grown on an experimental basis. It is the Greenlandic government's research and training centre for the farming sector. The station has four employees and a boarding school for sheep farming students. The station had 392 sheep in 2014. It has its own source of electricity, water works and a jetty. Upernaviarsuk is not only a centre for modern Greenlandic farming, it is also connected with the re-introduction of farming to Greenland in the late 18th century. Tuperna and her Norwegian husband, Anders Olsen, are thought to have started farming here with a few cattle and goats in 1780. The unverified story tells that their houses burnt down in 1782, and in 1783 they relocated and started cattle farming in Igaliku. The son of Tuperna and Arnes, Johannes Andersen, is also said to have farmed at Upernaviarsuk for a few years in the 1780s before taking over his parents' farm in Igaliku.[45]

There is one other sheep farm in the component part, Qaqortukulooq at the head of the fjord close to Hvalsey farm (with no residents in July 2015), and a recently abandoned settlement on the southwest coast of the island Arpatsivik. At the central site of Hvalsey (Ø83), there is no modern development apart from a jetty which allows easy access to the site by boat. A power line which crosses the northernmost part of the area is concealed below ground in the vicinity of the Hvalsey site so as not to detract from the integrity of the medieval cultural landscape. An old farmhouse is rented out in summer in Qaqortukulooq.

Fig. 2.43: One of the greenhouses in Upernaviarsuk.

Table 2.5 – Norse Greenlandic settlement					
NKAH no.	**Norse ID**	**Name**	**Number of identified ruins**	**Interpretation**	**Other**
4354	Ø82	Upernaviarsuk	9	Small farm	Modern farm
4359	Ø86	Arpatsivik	4	Shieling	
4427	Ø83	Qaqortukulooq / Hvalsey	16+	Large farm with church	Excavations 1880, 1935, 1999, 2015
4372	Ø83a	Qaqortukulooq	8	Small farm	Modern farm Small excavation 2004
4365	Ø84	Marraat	9	Small farm	
5516	Ø84b	Tasiusaq	1	Outstation	
5515	Ø211a		2	Outstation	
4362	Ø211		2	Shieling	
4361	Ø284		4	Small farm or shieling	
4360	Ø285		2	Outstation	
2050	Ø398	Nuuk	2	Outstation	
Inuit					
?	Near Ø211			Inuit graves	
848		Upernaviarsuk	6	Inuit houses incl. foundations of Tuperna and Anders Olsen's 1780s house	Modern farm
849		Arpatsivik, Nuuk		Several houses, incl. a communal house	Modern farm
5517		Arpatsivik		Inuit graves	
5518	Near Ø86	Arpatsivik		Summer camp	

There are gravel roads at each of the two farms, extending approximately 4.5 kilometres in Upernaviarsuk and 1.5 kilometres in Qaqortukulooq.

Component part 5 has 11 registered Norse Greenlandic sites, ranging from single structures to the regional centre of Hvalsey (Ø83) with 16 structures and a neighbouring small farm, which is often seen as a component of the manorial operation. There are two other permanent farms, both classified as small, although the one at Upernaviarsuk (Ø82) may have been larger. A third site may have been a small farm or shieling and the island Arpatsivik holds a very large shieling with an unusually large fold that was likely operated from the Hvalsey manor across the fjord. In some aspects the settlement structure in component part 5 is similar to component part 2. There is a single centre which dominates the area while the adjacent farms are all small, and there are a high proportion of outstations. Characteristics of the settlement in component part 5 include:

- The contrast between the large and complex church manor and the modest size of the neighbouring farms
- A high proportion of outstations
- The marine orientation of the settlement

Unlike the other centres at Qassiarsuk (Ø29a – Brattahlíð), Igaliku (Ø47 – Garðar) and Igaliku Kujalleq (Ø66 – undir Höfða), the manor of Hvalsey is not located on prime farmland. It is at the foot of the imposing mountain Qaqortukuluup Qaqqaa, on a narrow strip of land with drained gravels, which make for a mostly dry meadow that is not especially suited for homefield cultivation. This contrasts with the location of the adjacent farm (Ø83a), where there is lush wet meadow surrounding a series of small lakes, providing excellent conditions—

by far the best in the whole fjord—for haymaking. This contrast has led to speculation that Ø83a may have provided the economic foundation for the manor, while the location of the church and high status dwelling may have been influenced by other considerations. The church and farm site is indeed located in such a way that the structures would have become visible as soon as ships entered the mouth of the fjord eight kilometres to the southwest, especially so if the church's masonry walls were whitewashed as the Greenlandic name for the place, Qaqortoq, meaning 'white', may imply. The location of the church is definitely imposing and certain to draw the attention of anyone entering the fjord. There are sizeable stalls and animal shelters in the Hvalsey homefield, suggesting that it was a fully operational farming unit and excavations at the adjacent farm Ø83a have suggested that it was short-lived.[46] Perhaps it was the more original of the two, the more secluded location only becoming a disadvantage when it came to building a church, which was then erected in the more prominent place. Whatever the case, it is likely that Ø83a was subsidiary to the manor, either as a "dairy farm" (as it was called by Aage Roussell who proposed this hypothesis), as a tenant's farm, or it ceased to be a separate farm and the fields were utilised directly from Hvalsey, only 1.5 kilometres away.

Inuit archaeology

Although there are only two registered Thule Inuit sites in component part 5, it is substantially different in this regard from the other parts of the nominated property. Reports are available of at least three other sites and the island of Arpatsivik has a particularly dense and representative selection of Inuit archaeology, especially on its southern tip, where there are remains of numerous dwellings. There is an 18th century or older Inuit settlement in Upernaviarsuk, and among these ruins are also the houses of Tuperna and Anders Olsen and their son Johannes from the 1780s.

Fig. 2.44: Aerial view of Qaqortukulooq/Hvalsey (Ø83).

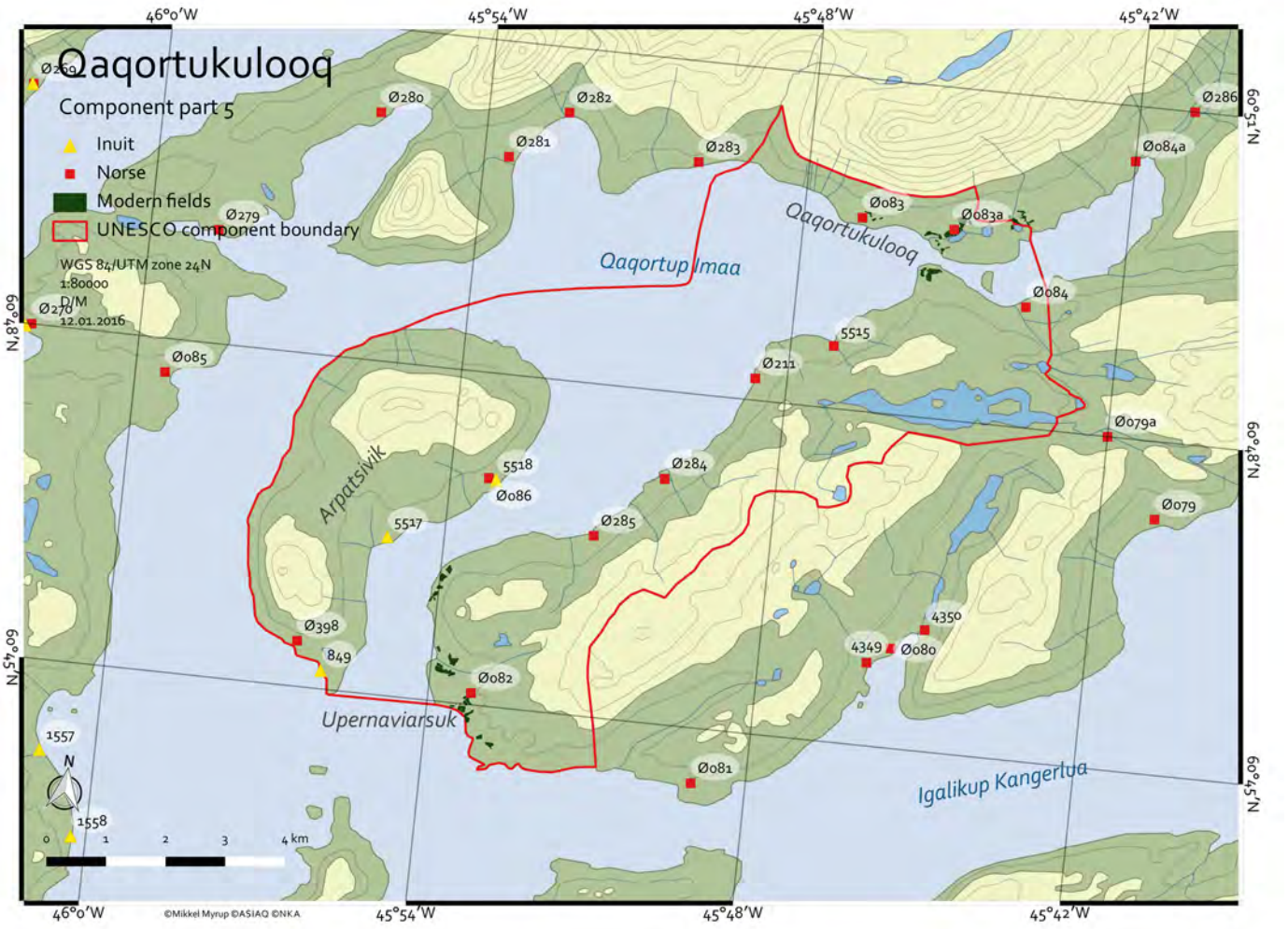


Fig. 2.45: Component part 5, Qaqortukulooq (Hvalsey).

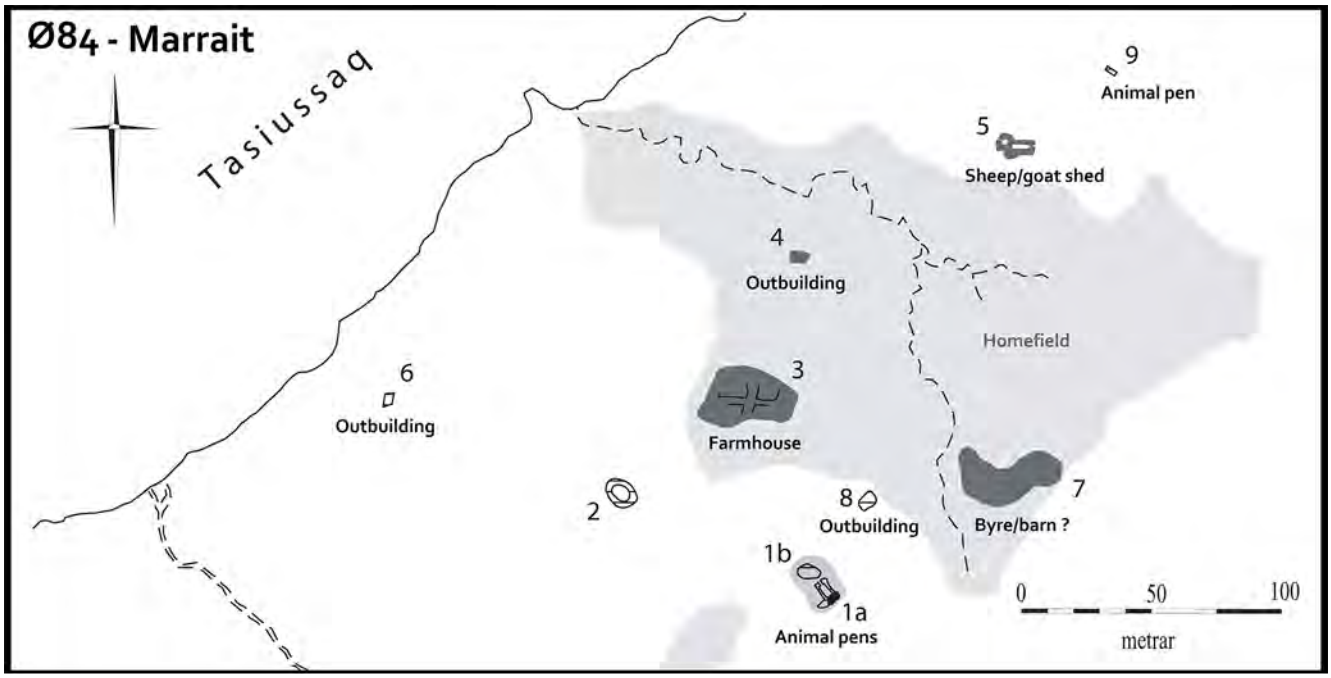


Fig. 2.46: Survey plan of the small Norse farm Ø84 in the Qaqortukulooq area.

Research history

Hans Egede conducted the first archaeological excavation in Greenland at the church at Hvalsey in 1723, and the site was visited many times during the course of the 18th and 19th centuries, with some superficial diggings taking place on occasion. The Hvalsey church was the subject of increasingly accurate illustrations from the 1830s onwards, with accurate, stone-by-stone measurements of the whole structure made in 1876 and 1910.[48] The entire site was excavated in 193y Aage Roussell, who concentrated on the dwelling and produced an accurate map of the whole site.

An excavation in 1999 carried out in conjunction with a repair of the southern wall of the church revealed graves below the wall, demonstrating that the church (typologically dated to ca. 1300) cannot be the first at the site and must have had at least one precursor.[49] Another small excavation took place at the adjacent site of Ø83a in 2004 to throw light on the "dairy farm" hypothesis,[50] and in 2015 an investigation was conducted of the presumed *skemma* on the coast down from the church. Field surveys in 2005[51] and 2014 have resulted in a full inventory of Norse Greenlandic sites in the component part with DGPS maps available of all of the sites apart from Upernaviarsuk (Ø82) where most of the ruins are no longer visible.

Fig. 2.48: Vegetable garden at Upernaviarsuk.

Fig. 2.47: Hvalsey Church, the largest and best preserved Norse ruin in Greenland.

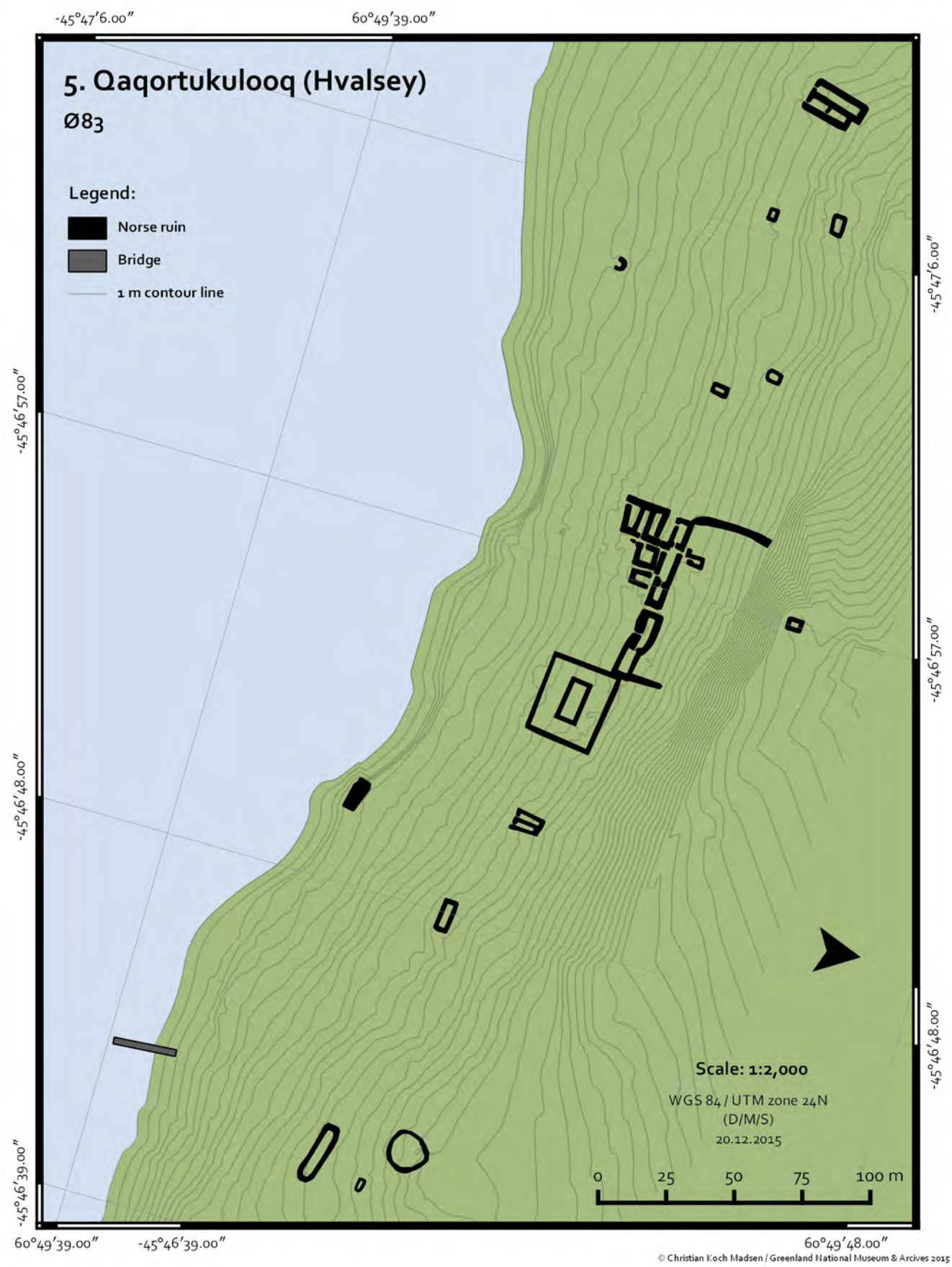


Fig. 2.49: Detailed survey plan of Qaqortukulooq/Hvalsey (Ø83) with location of Norse ruins.

2.2 History and development

2.2.1 Historical, archaeological and architectural resources

Historical records

The existence of Greenland is mentioned first in a papal letter from 1052 AD showing that information about its discovery and settlement by the Norse had reached as far as Rome before mid-century.[52] Writing in the 1070s, Adam of Bremen mentions both Greenland and Vínland, the earliest record of the latter,[53] but the earliest source to put some meat on the bones is Ari *fróði's Íslendingabók*, The Book of Icelanders, written in the 1120s. Ari relates that Greenland was discovered and settled from Iceland and mentiones Eiríkr rauði (Erik the Red), who settled in Eiríksfjörðr in ca. 985. According to Ari, Eiríkr had called the country Greenland saying that "people would be more eager to make the journey there if the land had an attractive name." Ari had his information from his uncle who had met a man in Greenland who had himself sailed with Eiríkr, and this is the basis for the dating. Ari furthermore mentions that the explorers had found remains of human dwellings on both the east coast and the west coast and that they surmised that these had been left by the same kind of people as had been encountered in Vínland, the *Skrælingjar*.[54]

> *There was a man called Thorkel Farserk, a cousin of Erik the Red, who went to Greenland with Erik. He took possession of Hvalseyjarfjord and of the region between Eiriksfjord and Einarsfjord, and lived at Hvalseyjarfjord. The men of Hvalseyjarfjord are descended from him. He was a man of unusual powers. Once when he wanted to welcome his cousin Erik, but had no seaworthy boat at home, he swam out to Hvals Isle for an old sheep, and carried it on his back to the mainland, a distance of well over a mile. Thorkel was buried in the enclosure of Hvalseyjarfjord, and has been there, round about the house, ever since.*
>
> The Book of Settlements, 13th c. AD
> (Book of Settlements, 50)

A more detailed account of the exploration and colonisation of Greenland is given in *Landnámabók* (The Book of Settlements) and Eiríks saga rauða. The surviving versions of *Landnámabók* date from the 1280s and 1300s, but they derive from a common source with an early 13th century date, which in turn was based on information collected by Ari fróði in the early 12th century. Whether the information regarding Greenland was introduced into the text at that early stage is not known, but it was almost certainly included in the early 13th century version. *Landnámabók* inserts a brief description of the colonisation of Greenland after describing Eiríkr rauði's attempts at settling in Iceland and how he set out to explore Greenland after having been sentenced to outlawry for killings in Iceland. Eiríkr had heard of a land sighted to the west of Iceland called Gunnbjarnarsker ('Gunnbjörn's skerries'), named after the ship's captain who had made the discovery.

Fig. 2.50: View of the coastal plain with Qassiarsuk/Brattahlíð (Ø29a/Ø29).

Eiríkr sailed to the east coast of Greenland and followed the coast southwards until he rounded Hvarf (Cape Farewell) and sailed all the way up the western coast to the Nuuk area, where he overwintered. The following summer, he chose a place for his own future settlement in Eiríksfjörðr and continued exploring both to the far north of the west coast and around the southern tip of Greenland. After three winters in Greenland, he returned to Iceland and agitated for settlement in the new country. Twenty-five ships are said to have left for Greenland, but only fourteen made it there, the rest either shipwrecked or turned back. The text then provides names for the leaders of settlements in each of the large fjords in Eystribyggð, but only says that "some went to Vestribyggð". *Landnámabók* displays basic knowledge of the geography of the Norse settlements in Greenland, but its compilers' access to information about the colonisation seems to have been limited and anecdotal. Most of the leaders are eponymous with the fjords they are said to have settled (e.g. "Einarr settled Einarsfjörðr"); they do not have patronymics and they do not figure in any other texts, suggesting that their names are surmised rather than meaningful traditions. The exceptions are anecdotes about Herjólfr the settler of Herjólfsnes and Þorkell farserkr, the settler of Hvalseyjarfjörðr, the latter with echoes of what may have been local, Norse Greenlandic traditions. In accordance with Ari's account, *Landnámabók* states that Eiríkr's fleet sailed in 985 AD.[55] *Eiríks saga rauða* copies the same information as *Landnámabók* about Eiríkr's early career in Iceland (also found in *Eyrbyggja saga*[56]) and about his three-year exploration of Greenland, but does not describe the settlement

and shifts the focus to Icelanders who became involved in the voyages of exploration to the east coast of mainland America.[57] Descriptions of these voyages are the principal subject matter of both *Eiríks saga rauða* and *Grænlendinga saga*,[58] which are both thought to have been written at a similar time, sometime in the early 13th century.[59] Although the two texts obviously stem from a common pool of knowledge about these events, they differ significantly, both in the order and character of events and the roles ascribed to the principal personages. In both sagas the Norse settlements in Greenland only served as a backdrop to the voyaging narratives. The two texts agree in depicting Eiríkr as the chief of the colony and his children as its up-and-coming leaders.

> *There was now much talk of looking for new lands. … Leif, the son of Eirik the Red of Brattahlid, sought out Bjarni and purchased his ship. He hired himself a crew numbering thirty-five men altogether.*
>
> *… It seemed to them the land was so good, that livestock would need no fodder during the winter.*
>
> *… Leif named the country after its natural features and called it Vinland (Wineland). They headed out to sea and had favourable winds, until they came in sight of Greenland and the mountains under its glaciers*
>
> *The Saga of the Greenlanders, 13th c. AD (Complete Sagas I, 21-23)*

Both sagas show Leifr as Eiríkr's heir and successor as chief in Brattahlíð,[60] while Freydís Eiríksdóttir is said to have lived in Garðar and Þorsteinn Eiríksson had a farm in Vestribyggð, giving the impression of a family with both intensive and extensive control over the new colony. Both sagas agree that Þorsteinn died before he could lead an expedition to Vínland and that his widow Guðríðr Þorbjarnardóttir married the Icelander Þorfinnr karlsefni who subsequently led a major expedition where natives are encountered. Both sagas conclude with Þorfinnr and Guðríðr settling in Iceland and it is clear that the traditions recorded in Iceland derive from their accounts of their adventures. *Grænlendinga saga* attributes the discovery of Vínland to an Icelandic mariner, Bjarni Herjólfsson, but has Leifr lead the first planned expedition and portrays him as a sort of a patron of three subsequent expeditions, which all made use of the camp he had erected, Leifsbúðir. *Eiríks saga* on the other hand has Leifr make the initial discovery on his way from Norway, where he had promised King Ólafr Tryggvason (d. 999) to convert the Norse Greenlanders to Christianity. It then combines the several voyages of *Grænlendinga saga* into one very large one led by Þorfinnr karlsefni. Leifr's role as an agent of conversion is also reported in the *Heimskringla* version of *Ólafs saga Tryggvasonar*[61] (and subsequent versions as well as other texts citing it), but it is not mentioned in earlier versions of the missionary king's biographies[62] nor *Grænlendinga saga*. This has led to the suggestion that King Ólafr's, and by extension Leifr's, role in the conversion of the Norse Greenlanders is an early 13th century scholarly invention—earlier biographers are not likely to have kept quiet about such an accomplishment if it had been an established fact.[63] Both sagas agree, however, that the Norse settlements in Greenland were originally pagan and that Christianity had been recently introduced when the westward expeditions were carried out. *Eiríks saga* reports that while Eiríkr rauði shunned Christianity his wife Þjóðhildr embraced it, having a church erected "a considerable distance from the dwelling"—a description which fits well the location of a small church excavated in Qassiarsuk in the early 1960s[64] and popularly associated with the Þjóðhildarkirkja (Thjodhilde's Church) mentioned in the saga.

Eiríks saga dwells on the imperfections of Christianity in early Norse Greenland, describing in detail a ritual performed by a seeress and the inadequate solutions that the Norse Greenlanders had for the burial of their dead in the absence of Christian cemeteries and priests. This theme is taken up in some other sagas of Icelanders that

Fig. 2.51: View of the coastal plain with Igaliku/ Garðar (Ø47).

have episodes taking place in Greenland. In sagas such as *Flóamanna saga*[65], *Króka-Refs saga*[66] and *Bárðar saga Snæfellsáss*[67], Greenland is a place of isolation, wilderness and lawlessness, a fantastic setting which allows plucky Icelanders to perform fantastic deeds. Isolation is also a theme in *Fóstbræðra saga*[68], which mentions a fair number of place names in Eystribyggð although its geography is clearly garbled. It is also the only source for a third generation of Eiríkr rauði's dynasty in Brattahlíð, where a Þorkell, son of Leifr Eiríksson, was chieftain in the early 11th century, according to the saga. The saga author has another chieftain in Einarsfjörðr, but it is uncertain whether this reflects accurate information about the Norse Greenlandic political landscape.

> *The following spring, Ingimund joined a ship called Stangarfoli that was preparing to sail to Iceland. In this ship was Bergþór, the son of Þórð Ívarsson, and many other distinguished Icelanders and Norwegians. Their ship was lost on the deserted shores of Greenland and they all perished. This came to light fourteen years later when their ship was found and the remains of seven men in a cave. Ingimund the priest was one of them: his corpse was intact and undecayed, as were his clothes, and the skeletons of the other six were by his side. They also found a wax tablet close to him with runes that told the story of their death.*
>
> The Saga of Guðmund Arason the priest, Sturlunga Saga, early 13th c.
> (Sturlunga Saga 2, 118)

In general, the saga descriptions of Greenland are generic and uninformative. They suggest that Greenland was not a familiar place to 13th century Icelandic writers or their audiences; it was distant and strange.[69] But there was clearly also interest and accounts were written down based on actual visits. The most detailed of these is *Grænlendingaþáttr* (also known as Einars saga Sokkasonar)[70] which details a conflict between Greenlandic chiefs and Norwegian merchants in the 1130s. This short text mentions as an eyewitness to these events an Icelander, Hermundr Koðránsson, although he had no apparent role other than bystander. Hermundr later became a chieftain in Iceland (d. 1197) and it is reasonably deduced that he was a source of the information preserved in the piece.[71] It describes how the chieftain Sokki Þórisson in Brattahlíð gathered support for the establishment of a separate bishopric for Greenland and how his son Einarr went to Norway and successfully had a bishop, Arnaldr, appointed and took him to Greenland where he was established in Garðar. Icelandic annals date the consecration of Arnaldr to 1124[72] and this fits with *Grænlendingaþáttr*'s chronology. At the same time as Einarr and Arnaldr sailed from Norway, a Norwegian merchant set off for Greenland too, but unlike them he did not make it to Eystribyggð. His two ships were later found in the wilderness of southeast Greenland with the whole crew dead in their winter camp. A Norse Greenlandic hunter, who was hunting on the east coast one autumn, discovered the Norwegian camp and brought the one undamaged ship and a great fortune in merchandise back to the settlement. He also brought the corpses of the Norwegian crew to be buried at Garðar and gave the ship to the bishop as a donation for their souls. "The other valuables they divided between them in accordance with Greenlandic law." News of this soon reached Norway where a nephew of the Norwegian merchant decided to go to Greenland to retrieve what he considered to be his inheritance. At the time he arrived, two other foreign ships are said to have been in Vestribyggð, one of them captained by the above-mentioned Hermundr. The nephew appealed to the bishop and tried to take his case to the Greenlandic assembly held in Garðar, but was rebuffed in both places. At the assembly, Einarr Sokkason used force to wreck the proceedings of the Norwegians, claiming that "We will have those laws which are in force here"—effectively claiming that the Norwegian merchants could not judge in Greenlandic matters using Norwegian laws. Piqued by all this, the nephew sabotaged the ship, leading to killings and counter killings until both he, Einarr and nine others were dead. In the end, arbitration by a wise client of Sokki, the farmer of undir Sólarfjöllum, settled the matter in such a way that the Greenlanders got no compensation for their dead but the Norwegians got none of the contested merchandise, either.

Several important pieces of information are contained in this text:

- The Greenlanders had their own laws, a judicial system with an assembly at Garðar and a sense of separate jurisdiction from Norway
- The episcopal see was in Garðar in the 12th century. This is mentioned in no other early source
- The secular leadership was associated with Brattahlíð in the 12th century as it had been in the 10th, in Eiríkr and Leifr's times, and in the 14th when Ívarr Bárðarson's description says it is the seat of the lawman (from the Norse lögmaðr, i.e. the head of the Norse Greenlandic settlements)

Fig. 2.52: Polar bear with cubs.

- Several ocean-going vessels could be present in Greenland at the same time
- The Norse Greenlanders themselves only had smaller ships
- Norse Greenlandic hunters went on sizeable ships (a crew of 15 men is mentioned) on long-range expeditions to the east coast in autumn
- Ocean-going ships could be hindered by sea ice from leaving Greenland
- Norse Greenland exported live polar bears, walrus tusks and hides

While the basic social structure described in *Grænlendingaþáttr* will have been familiar to its Icelandic audience, with political actors consisting of patrons and clients, with a close relationship between secular and ecclesiastical leaders and with politics being made at meetings, both at judicial assembles and church festivals, there is a clear sense of different proportions in comparison to Iceland. The Norse Greenlanders appear as a solid block under the leadership of Sokki and Einarr in their alliance with Bishop Arnaldr against the Norwegian merchants. In Iceland, Norwegian merchants often are found in the role of specialist military advisers and mercenaries, but they rarely acted independently of the Icelandic chieftains who hosted them.[73] The difference seems to be that in the larger Icelandic society there were always competing local chieftains with whom foreign merchants could align themselves. In Greenland, it seems that the Norwegian merchants felt militarily powerful enough to engage in brawls and killings without having the backing of any local allies. This may suggest something about the small size of the Greenlandic communities—that the Norse Greenlanders were simply so few that visitors felt fairly safe in using violence against them—but also that the Norse Greenlanders were so dependent on foreign connections that visitors felt they could risk violent confrontations without fear of annihilation. The drama of this episode then derives from how close to a complete breakdown in relations the two sides came in the early 1130s.

The theme of shipwrecks on the east coast of Greenland, with scope for fantastic tales of privation, horror, superhuman bravery and supernatural phenomena, is taken up in *Flóamanna saga*,[74] but was clearly also fuelled by actual events—as the shipwreck in *Grænlendingaþáttr*'s narrative may well have been. Around 1190, Icelandic annals report the return of the merchant Ásmundr kastanrazi from Finnsbúðir and Krosseyjar on the east coast of Greenland, on a ship held together by wooden nails and sinews.[75] The implication is that the original ship had been wrecked and that the survivors had fashioned a rescue vessel out of the materials at hand. At a similar time, an Iceland merchant was wrecked on the east coast of Greenland with the remains of the crew found dead in a cave 14 years later.[76] Hair-raising adventures of this type were also reported in the 1380s.[77]

Such reports blend fact and fiction and can be seen as the equivalent of today's sensationalist news reporting, but they demonstrate an abiding fascination with Greenland as an outpost in the wilderness. Finnsbúðir and Krosseyjar are also mentioned in Ívarr Bárðarson's late 14th century description of Greenland, the former place associated with a tale of castaways dying and of stone crosses having been erected there in their memory.[78]

Fig. 2.53: View from Ikerasassuaq (Prins Christians Sund), the type of dramatic and forbidding landscape one encounters after rounding the southern tip of Greenland at Nunap Isua/Cape Farewell.

By the late 13th century, sources of information on Greenland become more factual, although they remain limited in volume. The earliest Icelandic annals date to this period. They record information from the 12th and early 13th centuries, much of it from a common source, but from the late 13th century several annalists were at work in Iceland, occasionally recording information relating to Greenland from then on until the beginning of the 15th century. The annals record essentially two types of information pertaining to Greenland: the consecrations, comings, goings and deaths of the Greenlandic bishops and incidental information about maritime connections: shipwrecks in Greenland or of Greenland-bound ships, ships blown of course coming to or from Greenland and news of Icelanders who had been to Greenland. News in the last category become more frequent in the final decades of the 14th century and may reflect temporarily increased connections between the two countries but also, perhaps more likely, a growing curiosity about a neighbouring land with which connections were no longer as regular as before.

A source of major importance from the late 13th century is *Speculum regale* (Konungsskuggsjá – the King's mirror). This is a Norwegian handbook for a young courtier who asks questions of his master and gets detailed advice on, amongst other things, navigation, trade and the geography of the North Atlantic. The text deals extensively with the geography of Greenland, discussing the lay of the land in relation to the rest of the known world, and its natural wonders: the sea ice, polar bears, gyrfalcons, seals, whales and northern lights as well as sea monsters and other fantastic aspects. It then goes on

to describe Norse Greenlandic society and economy in a few key paragraphs which are worth quoting in full:

> *But in Greenland it is this way, as you probably know, that whatever comes from other lands is high in price, for this land lies so distant from other countries that men seldom visit it. And everything that is needed to improve the land must be purchased abroad, both iron and all the timber used in building houses. In return for their wares the merchants bring back the following products: buckskin, or hides, sealskins, and rope of the kind that we talked about earlier which is called leather rope and is cut from the fish called walrus, and also the teeth of the walrus.*
>
> *As to whether any sort of grain can grow there, my belief is that the country draws but little profit from that source. And yet there are men among those who are counted the wealthiest and most prominent who have tried to sow grain as an experiment; but the great majority in that country do not know what bread is, having never seen it.*
>
> *...*
>
> *The people in that country are few, for only a small part is sufficiently free from ice to be habitable; but the people are all Christians and have churches and priests. If the land lay near to some other country, it might be reckoned a third of a bishopric; but the Greenlanders now have their own bishop, as no other arrangement is possible on account of the great distance from other people. You ask what the inhabitants live on in that country since they sow no grain; but men can live on other food than bread. It is reported that the pasturage is good and that there are large and fine farms in Greenland. The farmers raise cattle and sheep in large numbers and make butter and cheese in great quantities. The people subsist chiefly on these foods and on beef; but they also eat the flesh of various kinds of game, such as reindeer, whales, seals and bears. That is what men live on in that country.*[79]

The author of *Speculum regale* was clearly well-informed, albeit at second hand, and much of the information provided is consistent with other sources, both historical and archaeological. It is significant that while the *Speculum* dwells at length on the natural wonders of Iceland it has nothing to say about its economy or society. The implication is that Icelandic society was familiar enough and therefore unremarkable, while the aspiring courtier needed instruction about the much more obscure Greenlandic society.

Other late 13th century sources include a short section in the biography of King Hákon Hákonarson, which explains that in 1261 mariners returned from a two-year trip to Greenland with reports that the Norse Greenlanders has accepted the jurisdiction of the Norwegian king and promised to pay him taxes. It is explained that the king's jurisdiction covered the killings both of Norwegians and Norse Greenlanders, whether they were killed in the settlements or in Norðrseta, the hunting grounds in the Disko Bay region, and "even though they camped as far north as the [North] star." The implications of this for the geographical reach of the Norwegian king's dominion, and as a result for his glory, were not lost on contemporaries. The poet and chronicler Sturla Þórðarson celebrated this in a poem where he claimed that "no other king has held power so far north under the lodestar."[80] Despite this political milestone, there is practically no information preserved in Norway about the administration of this new part of the realm. Icelandic compendia contain lists of Norse Greenlandic bishops, lists of fjords and churches (all from around 1300),[81] but the only information surviving about royal control of Norse Greenland relates to trade and revenue.

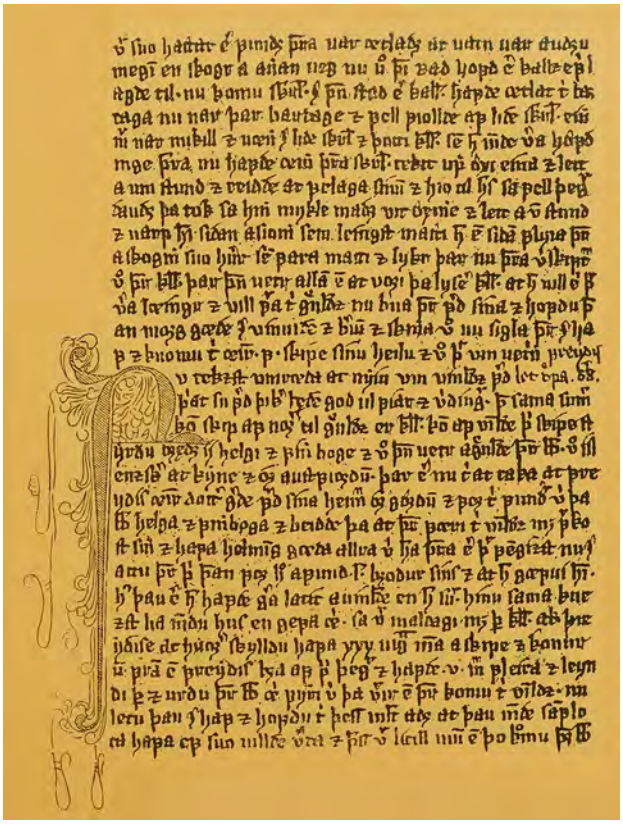


Fig. 2.54: Page from the Flateyjarbók, one of the Icelandic medieval manuscripts containing, among other sagas, Grœnlendinga saga telling of the Norse Vínland journeys.

It seems that following the submission of Norse Greenland to Norway in 1261 the crown established a monopoly on the Greenland trade—unlike Iceland, where the crown was obliged to secure minimum shipping but did not claim exclusive rights—and in the 1340s through to 1369 a Greenland *knörr* is mentioned, apparently a royal ship making regular crossings between Norway and Greenland.[82] This ship was wrecked in 1369 and does not seem to have been replaced, but the crown nevertheless

maintained its claim to an exclusive right to trade with Greenland, resulting in legal proceedings, with concomitant production of documents, against merchants who claimed they had been accidentally blown off course to Greenland in the final decades of the 14th century.[83] It is possible that gyrfalcons, which the Norwegian kings used as diplomatic presents (sometimes along with walrus ivory[84]), originally came from Greenland, but this is nowhere stated explicitly in historical sources.[85] More significant documentation relates to the ecclesiastical administration of Norse Greenland in the 14th century. In 1327, an extraordinary papal tax was paid by the Norse Greenlanders, entirely in the form of walrus ivory it seems, a cargo of which was sold in Norway and the proceeds sent to Rome.[86] Norwegian bishops also used walrus ivory and polar bear pelts as diplomatic presents.[87] But the most comprehensive and important document is a description of Greenland attributed to the cleric Ívarr Bárðarson, who was a caretaker of the episcopal see at Garðar in the 1340s and 1350s.[88] Ívarr is called a Greenlander in the description but a pass issued to him in 1341 shows that he was sent to Greenland by the bishop of Bergen,[89] and from this it has been deduced that he was Norwegian. The description survives in late 16th–17th century translations into Danish, but seems to have been written in Norway after Ívarr returned there, probably around 1360, perhaps indicating some stirrings of interest in the Norwegian ecclesiastical establishment about this most distant corner of the archbishopric. The description begins with sailing instructions, mentioning how the old sea route from Iceland to the east coast of Greenland was now blocked by sea ice. It then provides an overview of Greenlandic geography, beginning on the east coast and listing major proprietorial interests of the bishopric of Garðar as well as the locations and interests of the parish churches and the two religious houses. It mentions resources (hunting, woodland, steatite mines) and gives assessments of settlement density in some places. Two royal farms are named and the lawman's residence at Brattahlíð. While the description of Eystribyggð—Kujataa—is detailed and more or less reconstructible, reflecting first-hand knowledge of the lay of the land, particularly in the core areas around Einarsfjörðr and Eiríksfjörðr, the area of the nominated property, it gives a more sketchy but nevertheless vital account of Vestribyggð, the western settlement. It explains that there are twelve leagues of sea with an uninhabited coast between the two settlements, but that the western one was now completely depopulated. Ívarr had himself taken part in an expedition

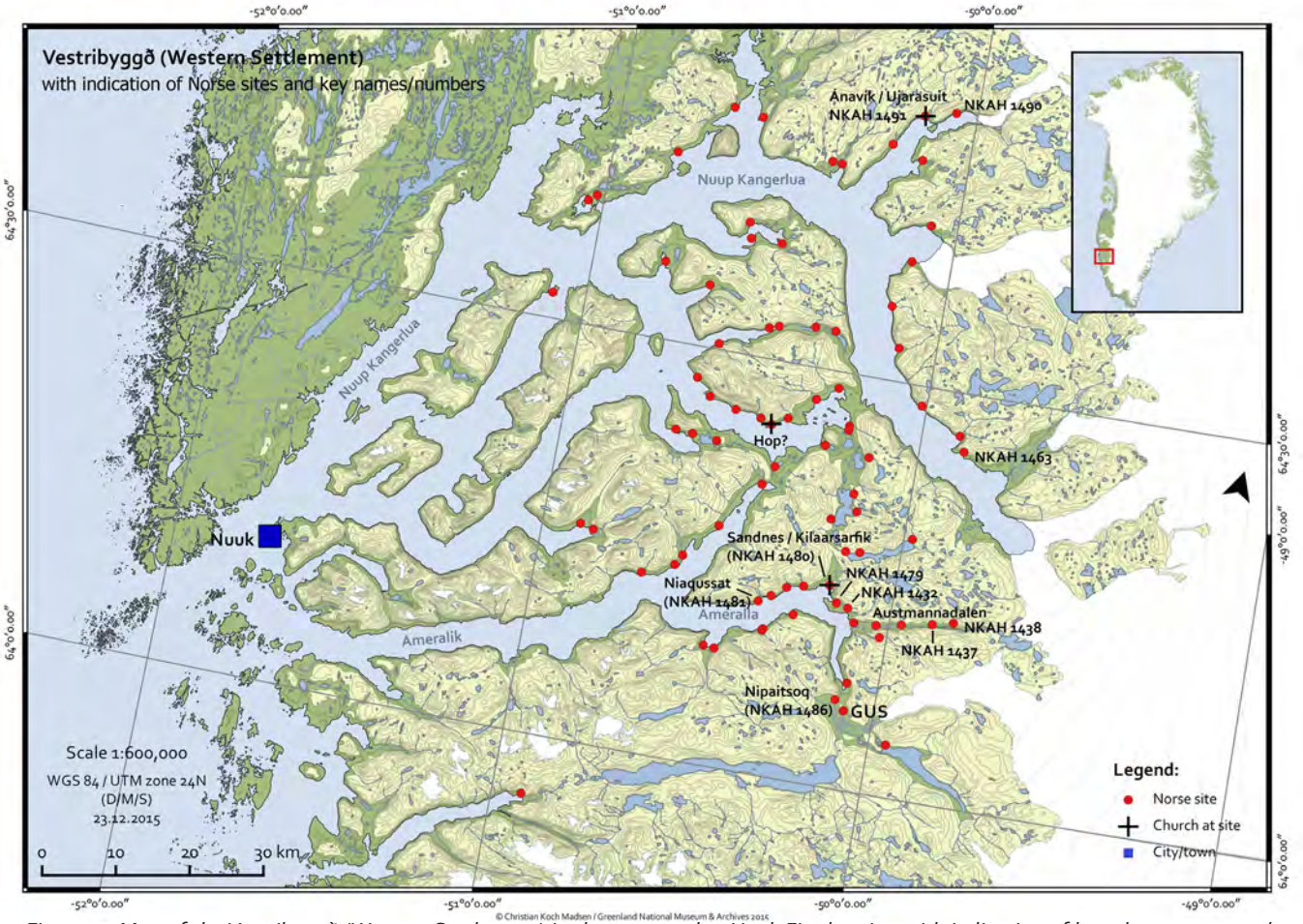


Fig. 2.55: Map of the Vestribyggð (Western Settlement) in the present-day Nuuk Fjord region with indication of key place names and site numbers.

organised by the lawman in Brattahlíð in order to drive out the *skrælingjar* from Vestribyggð, but when they came there they found no people "neither Christian nor heathen" but large numbers of feral livestock, some of which they took back to Eystribyggð. It is clear from the text that Ívarr and his contemporaries blamed the depopulation of Vestribyggð on the Thule Inuit but it is also clear that they did not know what had actually happened.

Fig. 2.56: One of the many Inuit stories about violent encounters between Norsemen and Thule Culture hunters, here visualized by Aron of Kangeq (1869). A Norseman returns from the seal hunt to find his farm set aflame by a band of vengeful Inuit hunters.

The *skrælingjar* described in the sagas had been encountered on the east coast of America. There is a clear sense that their numbers increased the farther south the explorers went and it is likely that most of the people the Norse met on the Vínland expeditions were Amerindians. The exception may be the two *skrælingjar* captured in Markland according to E*iríks saga rauða*.[90] If Markland is the same as Labrador, then these can conceivably have been Late Dorset people depending on how far north the encounter happened. An isolated account reflecting some real ethnographic knowledge is preserved in the Latin text *Historia Norwegiae*, which reports that:

> *Beyond the Greenlanders some manikins have been found by hunters, who call them Skrælings. Weapon-wounds inflicted on them from which they will survive grow white without bleeding, but if they are mortal the blood hardly ceases flowing. But they lack iron completely: they use whales' teeth for missiles, sharp stones for knives.*[91]

This text, which is definitely earlier than 1260 and most commonly dated to 1170-1220 AD, is probably too early to stem from meetings of Norse Greenlanders and Thule Inuit, but it is unique among the earlier references in reporting encounters made by hunters rather than explorers. The earliest possible reference to *skrælingjar* who may be Thule Inuit comes from a summary of a letter sent by a priest in Greenland to his colleague who had taken up a position at the Norwegian court. The letter describes how in the summer of 1266 worked pieces of wood composite with tooth and bone had been found floating in the sea and how in the same year hunters who had been in Norðrseta reported finding evidence of the presence of *skrælingjar* in Króksfjarðarheiði, normally associated with Nuussuaq peninsula on the north side of Disko Bay, although it could be farther north. Following this event, an expedition was organised "by the priests". The expedition sailed far north of Króksfjarðarheiði, much farther north than hunters went at that time, and observed plenty of seals, walrus and polar bears, but only ancient remains of humans. On their way back south however, on some islands one day's sailing north of Króksfjarðarheiði, they again found what appears to have been evidence of recent human presence.[92] Although the geographical descriptions in this account are hard to reconstruct in detail, it gives a vivid sense of a community sensing that change was in the air on its northern flank.

> *Since, as We have heard, the Church of Gardar is situated at the extremity of the earth in the country of Greenland, whose inhabitants are accustomed to use dried fish and milk because of the want of bread, wine and oil, wherefore and also on account of the rare shipping to said country due to the intense freezing of the sea no vessel is believed to have put to land there for eighty years back, or if it happened that such voyages were made, surely, it is thought, they could not have been accomplished save in the month of August, when the ice was dissolved ; and since it is likewise said that for eighty years, or thereabouts, absolutely no bishop or priest governed that Church in personal residence, which fact, together with the absence of Catholic priests, brought it to pass that very many of the diocese unhappily repudiated their sacred baptismal vows ...*
>
> *Letter of Pope Alexander VI, 1492-1503 AD (Anderson ed. 1906, 176)*

We can only guess when face-to-face contacts were first made, but by Ívarr's time, nearly a hundred years later, the Norse Greenlanders clearly perceived the Thule Inuit as a menace. That the encounters were definitely sometimes hostile is borne out by an Icelandic annal entry from 1379, which reports that *skrælingjar* had attacked the Norse Greenlanders and killed 18 of them and taken two captive.[93] But tensions also existed within the Norse settlements and as in the 1130s we know primarily about those which arose between the Norse Greenlanders and visiting merchants. One of the last pieces of news to come out of Norse Greenland was the burning at the stake in 1407 of a Norse Greenlander who had committed adultery with an Icelandic gentlewoman, the wife of an Icelandic merchant who had arrived in

Greenland the previous year. The Greenlander was accused, and convicted, ofhaving used black magic to seduce the woman, who is said to have never recovered and died soon afterwards.[94]

A more cheerful event associated with the same group of Icelanders was the marriage of Sigríður Björnsdóttir and Þorsteinn Ólafsson in the church at Hvalsey on September 14th the following year. A letter dated April 9th 1409 and written in Garðar attests to this marriage and this is the last word to come out of Norse Greenland.[95] The Icelanders came back to Norway in 1410 and after that nothing more was heard of the Norse Greenlanders in written sources.

During the 16th and 17th centuries, there was periodic interest in re-establishing contact with the Norse Greenlanders. Expeditions were mounted[96] and information collected in intermittent bouts of interest. The Danish translation and transcriptions of Ívarr Bárðarson's description stem from this period, as do a number of Icelandic texts from the decades around 1600. The scholars Björn Jónsson frá Skarðsá[97], Arngrímur lærði Jónsson, Jón lærði Guðmundsson[98], Bishop Þórður Þorlákssson[99] and Þormóður Torfason[100] all collected information relating to Greenland and Arngrímur authored the first book-length treatise on Norse Greenland, *Gronlandia* published in Icelandic in 1688.[101] The compendia of these scholars show that there had been more information on Norse Greenland available in medieval Iceland than is now preserved, including a lost saga called *Skáld-Helga saga*, which was set in 11th century Greenland (a 14th century versification survives[102]), but on the whole there are few indications that substantially different or more extensive knowledge has been lost.

Although medieval Icelanders, and to a lesser extent, Norwegians, were interested in Norse Greenland and recorded much invaluable information about it, this information reflects the views and interests of outsiders. From the written sources we learn practically nothing about the specifics of Norse Greenlandic politics, the internal workings of its social structure or the details of its culture or way of life. Current ideas about these aspects are primarily based on inference from conditions in Iceland and Norway and to a large, and growing, extent on the large body of archaeological evidence now available.

Runes

There are more than 100 known runic inscriptions—nearly 200 if every marking is counted—found mostly on grave markers and other objects of wood and stone. The inscriptions tend to be short and fragmentary and rarely convey information which can be historically contextualised. Famous exceptions include the Kingittorsuaq stone with the names of three explorers found north of Upernavik, and one of the crosses from the cemetery in Ikigaat (Ø111 – Herjólfsnes), which was put in a grave to commemorate a woman who had died at sea. The most common content (apart from single letters and names) is prayers, mostly conventional ones like the Ave Maria. As a whole, the Norse Greenlandic runic inscriptions suggest active and widespread literacy in a conventionally Christian, high to late medieval society. The use of runes in everyday life was similar to the practice in Iceland and Norway, suggesting that despite their isolation the Norse Greenlanders continued to belong to the larger Norse cultural domain. There are indications however that by 1300, as in other parts of that Norse cultural region, a regional dialect had begun to develop.[103]

Fig. 2.57: Runestone left by Greenland Norse hunters in a cairn on the island Kingittorsuaq close to Upernavik north of the Disko Bay in the 13th century.

Folklore

In addition to the record left in runes, folktales preserved and recounted by modern Inuit are evidence with a bearing on the history of Norse Greenland. In the 1720s, Hans Egede questioned his Inuit sources about what had happened to the Norse Greenlanders and was told stories that seem fantastic in his retelling, but clearly indicate that the 18th century Inuit thought that their ancestors had caused the demise of the previous inhabitants of the country.[104] A greater volume of stories to the same effect were recorded later in the 18th and 19th centuries. Among them are stories that portray the Norse Greenlanders as under attack from pirates, and stories of Norse Greenlandic women and children taken by Inuit, leading to intermarriage between the groups, but the principal theme is battles between the two groups, invariably ending with victory for the Inuit and the annihilation of the Norse Greenlanders. Before the mid-19th century, such stories were recorded by Europeans and retold in edited and interpreted versions influenced by their outlook and interests. Inuit folktales written by the storytellers themselves or published verbatim from the telling of named storytellers first appeared in print in 1859–63.[105] By this time, several generations of Inuit storytellers had been questioned closely by Europeans

interested in identifying traditions that could throw light on the fate of the Norse Greenlanders and it is difficult to allay suspicions that this interest may have influenced the shape and content of the stories. In many cases, the identity of the enemies of the Inuit is vague and comparative analyses of folktales from other parts of the Inuit world have shown that the same stories were being told outside Greenland with the roles of the enemies filled by other ethnic groups. It is not possible to identify historical facts from this corpus of evidence with any degree of confidence. Instead, the significance of the ethnographic evidence is that it contains a record of how one culture preserved knowledge of a pre-existing one, making sense of ruins and place names and integrating such explanations into a narrative that was meaningful to the storytellers' audience.[106]

Norse Greenlandic place names

A small but significant collection of place names is preserved in medieval records relating to Norse Greenland. For the most part, these relate to major geographical features like fjords, mountains and islands with a small collection of farm names. A list of fjords had been drawn up in Iceland by 1300 AD and is preserved in a couple of versions making fjord names the only place name category more or less comprehensively preserved from Norse Greenland. The place name inventory reflects the interests and preoccupations of Icelanders as well as mariners who sailed to Greenland. There are a relatively high number of names relating to the east coast and hunting grounds outside the settled areas and within those areas only major landmarks are known. Some of the names relating to hunting grounds and other uninhabited areas may not be Norse Greenlandic at all but rather coined by sailors or just over-imaginative authors back in Iceland. Among these are unwieldy but fascinating names like Fjörðurinn öllumlengri ('The fjord longer-than-any') while the farm name Sólarfjöll ('Sun mountains') may owe its popularity in saga texts to its poetic qualities. Norse Greenlandic place names have the same basic characteristics as place names in Iceland and the Faroes and many have exact parallels in these and other Norse areas. Farm names, particularly of central places like the church farms, tend to derive from geographical features, and are often simple (Vogar, Vík, Hóp) but there are indications that smaller holdings followed the same naming conventions as in Iceland, with composite names ending in –staðir being common (as in Þjóðhildarstaðir, Kambstaðir), but very few names of lower status farms have survived. On the other hand, there is among the Kujataa fjord names a high proportion of personal names as qualifiers (Einars-, Eiríks-, Ketils-, Herjólfs- etc.), especially among the most densely settled fjords. This is in contrast to both Iceland and the Faroes (and in fact Vestribyggð), where such names are relatively uncommon and mostly associated with minor geographical features. This may indicate something about the colonisation process in Eystribyggð, i.e. that these fjords were from the outset strongly associated with the individuals who claimed the land and may have organised its settlement. This was certainly the interpretation of 12th and 13th century scholars in Iceland.

Associating the place names preserved in medieval records with the actual landscape and particular sites has proven to be difficult, and in many cases impossible. For a long time after contact with Europe was established in 1721 there was confusion about even where the settlement names Eystribyggð and Vestribyggð should belong, and even after it had become generally accepted that Eystribyggð was in Kujataa, there remained differences in opinion about fundamental issues like whether Eiríksfjörðr and Einarsfjörðr corresponded to Tunuliarfik and Igaliku fjord respectively or the other way around. At the heart of this problem lay the name of Brattahlíð which in many ways seems a misnomer for the site of Qassiarsuk. Brattahlíð means 'Steep slope' but Qassiarsuk is in one of the most gently sloping parts of a country which is otherwise full of very steep, and often vertical, slopes. Indeed, many in the 19th century believed that Brattahlíð should rather be associated with Igaliku and other sites have been suggested, too. A comprehensive study of this issue was carried out by Finnur Jónsson and the present consensus (evident e.g. on official maps) rests largely on this work, although it is still occasionally challenged today. The consensus includes recognition that many of the place names cannot be located at all, or only placed within a general region, and some contradictions in the sources are too intractable ever to be solved. This leaves a significant number of names that can be located with confidence and this is important as it allows the anchoring of the medieval descriptions in the landscape of the present.

Andersen 1982, Jónsson 1898

Fig. 2.58: Dense shrub woodland in a sheltered area just south of Tasikuluulik (Vatnahverfi).

Sources on modern farming

The outlines of the history of the farming hamlet of Igaliku, from its beginnings in the 1780s to the transition to sheep farming in the 1920s, are well known from contemporary records,[107] but an in-depth study remains to be carried out. Many references are made to this farming community in the debate about the possibilities of extending farming activity in Greenland, which rapidly grew in the 1900s,[108] and the precedent clearly had an impact on decisions to establish a sheep breeding programme in Qaqortoq in 1915. The sheep breeding station, first in Qaqortoq and from 1956 in Upernaviarsuk, has preserved an extensive archive (now curated in the National Archives in Nuuk[109]) that not only documents the running of the station, its research, training and finances, but also includes detailed information on the establishment and running of the sheep farms in Kujataa, including year-on-year data on livestock numbers, weights and loans granted to the farmers. The early history of sheep farming in Greenland is recorded in a number of contemporary studies and descriptions.[110]

Fig. 2.59: Greenlandic sheep in a shed during winter.

Greenlandic sheep farmers have themselves written about their way of life, describing the farming methods as well as the culture and history of the Kujataa farming community.[111] Contemporary farming has also been the subject of extensive research, both of an environmental[112] and anthropological nature.[113]

Archaeological evidence

When Hans Egede sailed up the west coast of Greenland in 1721 he was expecting to find a Norse Greenlandic population. The Inuit he met instead were able to tell him about ruins from an earlier culture and his reconnaissance to Kujataa two years later confirmed that there were indeed large abandoned settlements with definite European traits there.[114] Egede was convinced that the abandoned settlements on the west coast were from the smaller Vestribyggð and that Eystribyggð, perhaps still with descendants of the Norse Greenlanders, would yet be found in the east coast. This belief was not fully dispelled until the 1830s, when the southern part of the east coast was finally investigated in detail. This coincided with the scholarly publication in 1837 of medieval texts relating to the exploration of America[115] and a full compendium of all available evidence relating to Norse Greenland in 1838-1845.[116] The latter work, still a major reference, contained not only the medieval texts and contemporary folklore, but also observations and descriptions of ruins in Greenland, and reports of artefacts that had been found[117] and were increasingly being obtained and preserved by the National Museum in Copenhagen. These included objects with runic inscriptions, among them grave markers from Igaliku, Qassiarsuk and Ikigaat, and the small stone found in 1824 in Kingittorsuaq north of Upernavik, which shows that Norse explorers came at least as far north as 73° N, more than 1,000 kilometres north of Vestribyggð. Following the establishment of a trading post in Julianehaab (modern Qaqortoq) in 1775, a mission in Lichtenau (modern Alluitsoq) the year before and another trading post in Nanortalik in 1797, visits by Europeans to the Norse Greenlandic sites in Kujataa became more frequent, resulting in some minor and usually inconsequential digging, the finding of artefacts and a gradual accumulation of site descriptions.

The publication projects of the 1830s and 1840s demonstrated the wealth of material and helped to focus the minds of amateur antiquarians (as a rule factors from the trading stations, missionaries and naval officers) who began to record information more purposefully, producing e.g. illustrations of ruins, and more routinely donating artefacts to the National Museum of Denmark and reporting their findings through learned societies in Copenhagen. It was however only after 1880 that systematic archaeological investigations can be said to have commenced. Gustav Holm produced a systematic inventory of sites in Kujataa in 1883, where he described, and in many cases accurately mapped, some 40 sites, bringing the total of known sites in the region up to around 100.[118] He also carried out excavations in Qassiarsuk (Ø29a –Brattahlíð, in cp1), Igaliku Kujalleq (Ø66 – undir Höfða, in cp4), Sissarluttoq (Ø59 – Dalr, in cp3) and Qaqortukulooq (Ø83 – Hvalsey, in cp5), producing a list of artefacts from these and several other sites.

Holm's work was followed up more intensively and comprehensively by Daniel Bruun who surveyed sites in Kujataa in 1894 and in Vestribyggð and the so-called Middle Settlement in 1903, publishing in 1917 an inventory of all Norse Greenlandic sites known at that time. The grand total was 226, of which 124 were in Kujataa. Bruun also carried out excavations at Qassiarsuk (Ø29a) and Igaliku Kujalleq (Ø66), but like Holm's excavations these were superficial, aimed mostly at clarifying the layout of buildings visible on the surface and to retrieve

artefacts.[119] In 1910 Mogens Clemmensen carried out minor excavations in Igaliku Kujalleq and Qaqortukulooq (Hvalsey) and made detailed measurements of the Hvalsey Church ruin.[120]

Fig. 2.60: 1837 water colour of the Hvalsey Church.

Daniel Bruun introduced the numbering system of Norse Greenlandic sites—Ø for Østerbygden (Danish for Eystribyggð, the Eastern Settlement); V for Vesterbygden (Danish for Vestribyggð, the Western Settlement) and M for Mellembygden, (Danish for the Middle Settlement), each followed by an ordinal number—and published widely on his findings. The Daniel Bruun numbering system was abandoned in 1981 and replaced by q new numbering system. All sites registered after 1981 have a NKAH number (NKAH: *Nunatta Katersugaasivia Allagaateqarfialu Heritage*).

Bruun's comprehensive work—his accurate and detailed maps and drawings, his systematic descriptions and considered interpretations—allowed a much fuller understanding of the Norse Greenlandic cultural landscape and paved the way for the major projects that were to follow in the 1920s and 1930s, the Golden Age of Norse Greenlandic Archaeology.

In 1921, Paul Nørlund carried out an excavation focusing on the church and cemetery in Ikigaat (Ø111 – Herjólfsnes). He retrieved a large number of skeletons, some runic inscriptions and a remarkable collection of textiles, some 70 pieces in all, including dresses, stockings and what came to be known as Burgundian hats. Nørlund's typological dating of these hats suggested to him that the Norse Greenlanders were following European fashions as late as the 16th century and this interpretation, along with the phenomenal preservation of the organic remains, made the results sensational (AMS datings now suggest the most recent pieces may be from the 1430s).[121] The 23 sets of clothes for men, women and children[122] provided an intimate connection to the extinct Norse Greenlanders and the dating results heightened, and helped popularise, the mystery of their demise.[123] Nørlund returned to Kujataa in 1926 to carry out a large-scale excavation of Igaliku (Ø47 – Garðar), where he excavated the cathedral and large parts of the episcopal residence.[124] In 1932, he teamed up with Mårten Stenberger to excavate Qassiarsuk (Ø29a – Brattahlíð) in a similarly comprehensive way.[125] Nørlund's disciple Aage Roussell took over the baton of Norse Greenlandic archaeology in the 1930s and carried out major excavations of the remaining key sites, Kilaarsarfik (V51 – Sandnes) in 1930, Ujarassuit (V7 – Ánavík) in 1932[126] and Qaqortukulooq (Ø83 –Hvalsey) and Igaliku Kujalleq (Ø66 – undir Höfða) in 1935, as well as investigating for the first time lower and middle status farms. Roussell produced in 1941 a work of major synthesis, *Farms and Churches of the Medieval Norse Settlements of Greenland*, in which he published the findings of his own fieldwork but also provided an overview of all of the sites recorded thus far, as well as systematic analyses of both building and artefact typology.[127] By this time, there were 268 known Norse Greenlandic sites, of which 180 were in Kujataa. Although the focus during the 1920s and 1930s was very much on large-scale excavations of key sites, a number of important discoveries were also made of new sites, including several with church ruins.

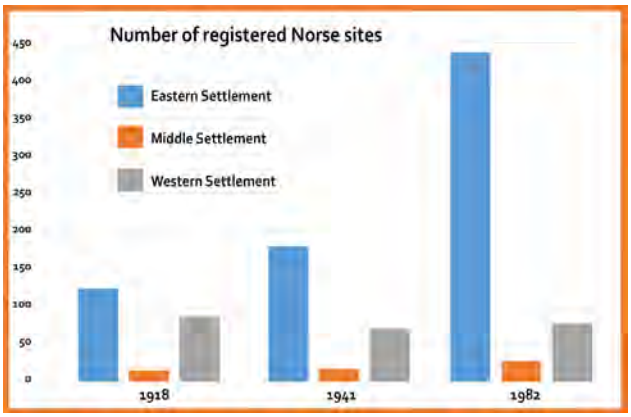


Fig. 2.61: Bar graph showing the number of Norse sites registered in the three main settlement areas in the period 1918-1982.

Roussell's *Farms and Churches* is a milestone in Norse Greenlandic archaeology, presenting a comprehensive treatment of the evidence as it stood at that time. The excavations of the 1920s and 1930s can be characterised as meticulous examinations of the structural remains visible on the surface. The diggers normally traced the walls of the structures and the aim was to clarify the layout of the final phase building at each site. Artefacts were systematically (if not comprehensively) retrieved and animal-bone assemblages were analysed. As a rule, earlier phases were not examined and, as a result, the great majority of the evidence collected in this period relates to the final phase of the Norse Greenlandic settlement. This was partly a result of the researchers being primarily interested in the demise of the

settlements. One important outcome that had become apparent by the early 1940s was that the abandonment seemed to have been orderly: there were no skeletons of starving last survivors, no obvious signs of violence or strife. In some cases, it was apparent that the last occupants had dismantled their buildings before leaving, the implication being that they had not gone very far.

Although the excavation projects of the 1920s and 1930s focused very much on material culture, like buildings and artefacts, the foundations were also laid for the strong tradition in Greenlandic archaeology of studying the landscape and the environment through multidisciplinary approaches. In connection with Roussell's excavations in Ánavík, Johannes Iversen carried out the first palynological investigation in Greenland, drawing parallels with the European Neolithic to throw light on the demise of the Norse Greenlandic settlements.[129]

Roussell, who was an architect by training, had an abiding interest in house typology and its development. His excavations of lower status sites in Austmannadalur in the Western settlement reflect his interest in fully comprehending the range of farm-house types in Norse Greenland, which he saw as a key to understanding its cultural development and place in the wider Norse world. Although they were not accorded the same significance as the structures, the artefacts also told an important story recognised by Roussell and Nørlund. The assemblage as a whole contained nothing that could suggest a later date than the 15th century, and it gave an impression of a material culture almost entirely reliant on local materials, with only small—but all the more significant—amounts of imports. Important dating conclusions were also reached about the churches, stylistic analyses suggesting that the more monumental ones, such as Qaqortukulooq (Ø83 –Hvalsey), Qassiarsuk (Ø 29a – Brattahlíð) and Igaliku (Ø47 – Garðar), were built in the 13th or 14th centuries.[128]

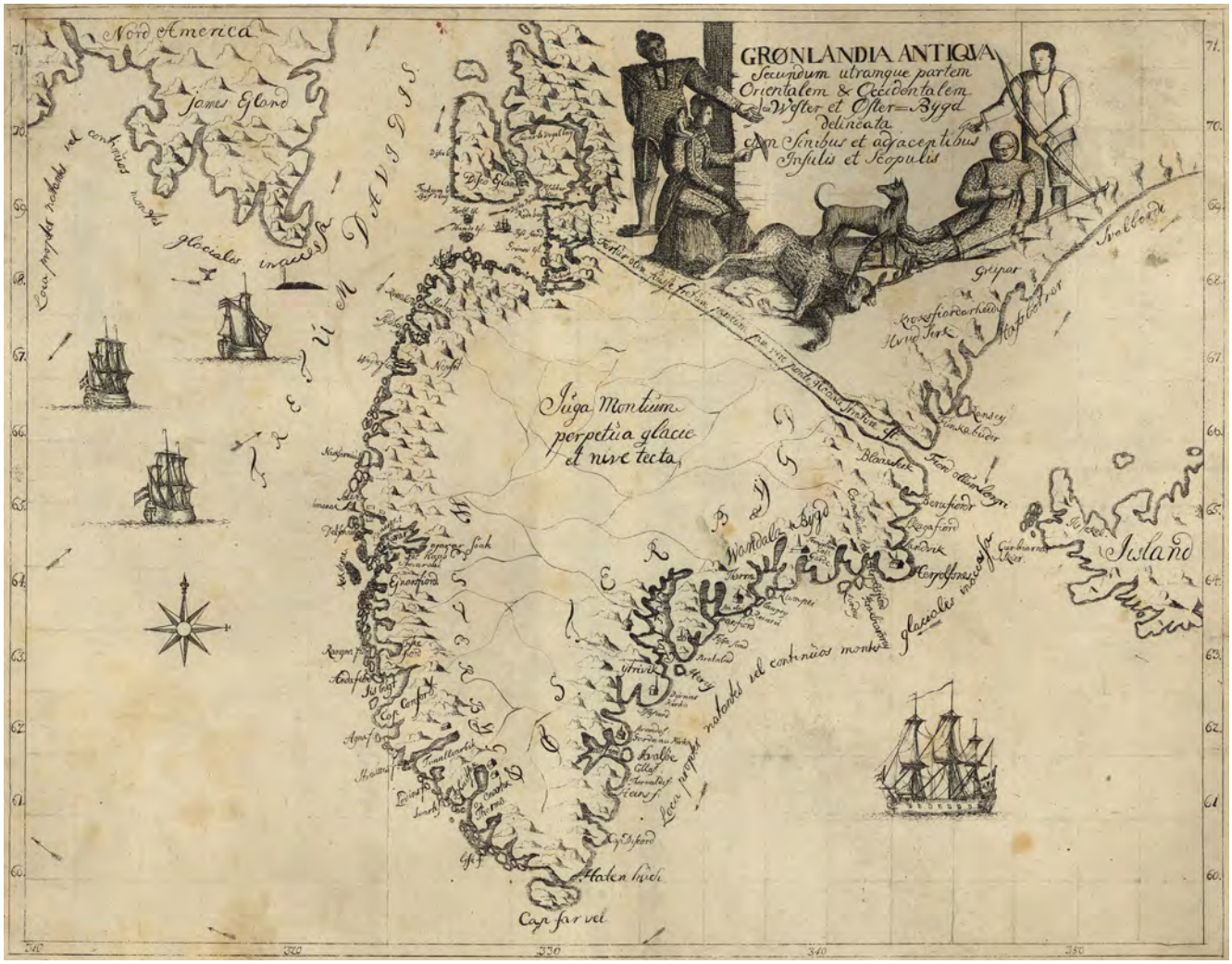


Fig. 2.62: 1741 map of Greenland in Hans Egede's celebrated first monograph on Greenland. In this map, Norse churches and place names are located on Greenland's East Coast.

Christian Vebæk continued Roussell's and Nørlund's archaeological fieldwork in a similar vein, beginning with excavations of low status sites in Tasikuluulik (Vatnahverfi) in 1939, which he followed up on after the war[130], also carrying out excavations of the possible nunnery in Narsarsuaq in Uunartoq Fjord (Ø149) in 1945–48[131] and an early farm ruin at Narsaq (Ø17a) in 1954–62.[132] Based on the foundations laid by his predecessors, Vebæk was able to extend the lines of inquiry to include the development and organisation of Norse Greenlandic society. He recognised that there was a pattern in the church architecture with larger churches, some of them stone-built, corresponding to the locations of parish churches mentioned in medieval documents while smaller, turf-built churches were found at less central sites. He also carried out the first deliberate excavation aimed at throwing light on the colonisation period of Norse Greenland. The farmhouse ruin he exposed in Narsaq (Ø17a) was for long the only (and is still one of very few) potential pioneering phase structures investigated in Norse Greenland.

The baton of Norse Greenlandic archaeology was taken over in the 1960s by Knud Krogh who excavated a cemetery and small church in Qassiarsuk (Ø 29a – Brattahlíð).[133] This structure is in a different part of the homefield than the farmstead and church excavated by Stenberger and Nørlund in 1932 and the location, dating and characteristics are consistent with the information given in *Eiríks saga rauða* about a church built by Eiríkr rauði's wife, Þjóðhildr around or shortly after 1000 AD.

In the late 1960s and early 1970s, a reconnaissance programme by Ove Bak resulted in the addition of as many as 200 new Norse Greenlandic sites in Kujataa.[134] When Knud Krogh published the second edition of his overview of Norse Greenlandic culture in 1982, the site tally stood at 542, of which 437 were in Kujataa.[135]

Fig. 2.63: C. L. Vebæk during his 1948 "Mounted Expedition" in the Tasikuluulik/Vatnahverfi area.

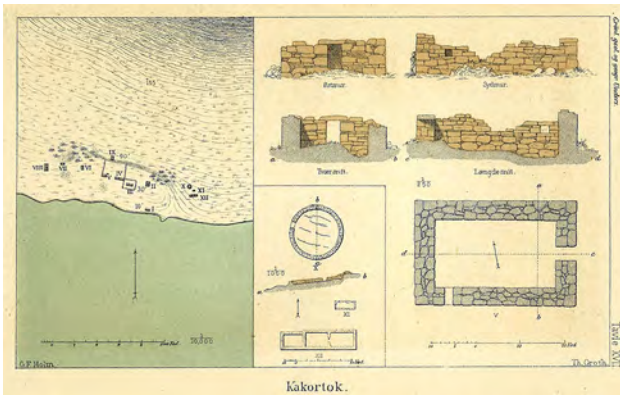


Fig. 2.64: G. F. Holm's 1883 archaeological survey plan of the Hvalsey feasting hall, showing his different types of visualization.

The 1960s saw the beginnings of active archaeological heritage management in Greenland. The National Museum in Copenhagen gradually stepped up its efforts in registering and monitoring sites, which were at the same time facing increased pressures from farming and tourism, and these were aided by the establishment and growing involvement in archaeological research of local museums in Qaqortoq (established in 1972), Narsaq, Nanortalik and Paamiut. Following the establishment of the Greenland Home Rule government in 1979, responsibility for Norse Greenlandic archaeology shifted to the Greenlandic National Museum in Nuuk, although Denmark's National Museum in Copenhagen remains an important repository of Norse Greenlandic archaeological archives and has retained an active research interest in Norse Greenlandic archaeology.

Although there was a long hiatus in excavation projects in Kujataa after the excavation of Thjodhilde's Church in Qassiarsuk was completed in 1965, the subsequent two decades nevertheless saw important developments in archaeological research relating to Norse Greenland. Ove Bak's massive survey effort around 1970 demonstrated not only that there might still be significant numbers of undiscovered sites but also that there were patterns in site distribution that were worth investigating. A joint Nordic research project focusing on the Qorlortup Itinnera valley north of Qassiarsuk (within cp1) in 1976–77 represented an important step towards characterising a Norse Greenlandic cultural landscape, leading to research on the Norse Greenlandic shieling system as an element in land use and resource utilisation patterns.[136] An Inuit-Norse project, another international collaboration with a focus on the Western settlement, with significant excavations at Niaquusat (V48) and Nipaitsoq (V54) taking place in 1976-77, sought to throw light on Norse Greenlandic and Inuit relations through the examination of their respective resource utilisation patterns.[137]

These projects of the late 1970s set the stage for patterns in archaeological inquiry that are still in evidence. With the exception of the GUS project, a comprehensive excavation of a Western settlement farm mound threatened by a river in 1991-96,[138] excavations have as a rule been small scale and tactical in nature. Middens have been the primary target of numerous excavations, where the aim has been to retrieve animal-bone assemblages, the analyses of which have provided fodder for economic and environmental reconstructions. Zooarchaeological analyses are producing an increasingly nuanced understanding of Norse Greenlandic society and continue to suggest new lines of inquiry. Comprehensive examination of older collections augmented by new excavations have shown for instance that chips from walrus maxilla are found at practically every farm in both settlements, indicating community-wide participation in the processing of walrus ivory.[139] The animal-bone assemblages also demonstrate an increasing reliance on seals for food as time went by, but with significant status-related differences: at higher status sites people were more likely to enjoy the produce of domesticated animals. There were also significant differences between the two main settlement areas, with more walrus chips in the Western Settlement, no doubt reflecting its greater proximity to the main hunting grounds, and different proportions of seal species reflecting different environmental conditions. The increase in seal bones in the late 13th century has been related to increased sea ice, also suggested by other palaeo-environmental indicators.[140] In Kujataa, midden excavations producing significant animal bone assemblages have taken place at Qorlortup Ininnera (Ø34)[141], Qassiarsuk (Ø29a – Brattahlíð)[142], Igaliku (Ø47 – Garðar)[143] and Tatsip Ataa (Ø172)[144], all of which are within the nominated property.

Fig. 2.65: 2011 onset of test excavation at Norse farm Ø3 by Tasiusaq.

Since the 1980s, palaeo-ecological analyses have become a routine part of archaeological excavations of Norse Greenlandic sites, but there has also been a significant increase in palaeo-ecological projects retrieving samples independently of excavations. Analyses of pollen[145], seeds[146], insect remains[147], soils and soil chemistry[148] have contributed significantly to our understanding of the Norse Greenlandic environment and husbandry practices, in the process also providing data points and datings for many more locations than it would be possible to excavate archaeologically.[149]

A significant aspect of the work of the past three decades is a growing interest in and emphasis on field survey. Detailed field surveys, producing accurate maps of sites and identifying new ones have been carried out in the Qassiarsuk area[150], Tasikuluulik (Vatnahverfi)[151] and Qaqortukulooq (Hvalsey)[152], covering the major part of the nominated property. These surveys have identified a small number of previously unknown sites, mostly minor ones, but each visit to a site tends to result in the identification of more structures than had been previously recorded, contributing to an increasingly detailed archaeological record. The use of EDM and GPS stations has also ensured that the record is becoming increasingly accurate and internally consistent.

Another characteristic of the archaeological work of the last three decades is a growing number of theses and monographs. Major works of synthesis have been produced on material culture[153], landscape and settlement patterns[154], human bones[155], iron[156] and textiles[157], as well as detailed studies of individual sites and specific

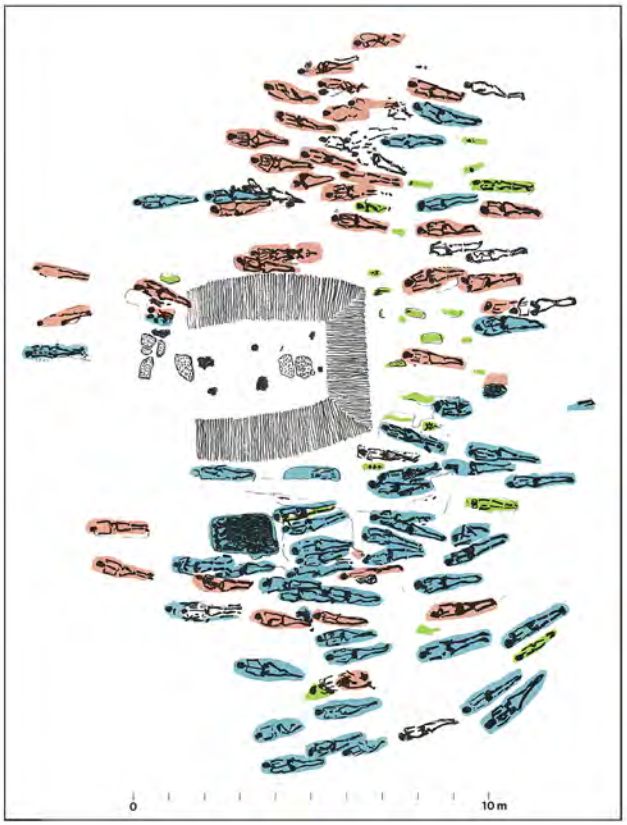


Fig. 2.66: Survey plan from the excavation of Þjóðhildarkirkja (Thjodhilde's Church) in Qassiarsuk, where burials in red indicate women, blue indicate men and green indicate children.

questions. For instance, Lynnerup's comprehensive assessment of the Norse Greenlandic skeletal material has sparked a major line of inquiry, with ongoing research making use of isotopic analyses to reconstruct dietary patterns.[158] Partly in relation to this interest, tactical excavations have been carried out at a number of sites with small churches producing not only isotopic samples but also dates suggesting that these small churches were going out of use in the 12th and 13th centuries.[159] The isotopic evidence provides important evidence to compare with animal-bone assemblages, supporting the conclusion that the Norse Greenlanders relied increasingly in marine resources as time passed and that there were significant status-related differences in their diet.

Palaeo-Eskimo and Thule Inuit archaeology

In contrast to Norse Greenlandic archaeology, there was little interest in, or even awareness of, Eskimo or Inuit prehistory in the 19th century. There was a widespread view at the time that the Inuit were recent arrivals and that, in so far as their history merited any attention, it was best studied with ethnographic methods. Artefacts suggesting a Stone Age phase of history in Greenland were collected and sent to the National Museum in Copenhagen, but they generated little interest and no systematic analysis until the early 20th century. Important data was collected in northernmost Greenland during the course of Knud Rasmussen's Thule expeditions (1912-33), including the fifth expedition (1921-24) aimed explicitly at investigating the origins of the Inuit and mapping their cultural affinities with the Canadian Arctic and Alaska. These were followed by ground-breaking archaeological work by Therkel Matthiassen in the 1920s and 1930s, including the only comprehensive study of Thule Inuit archaeology in Kujataa to date,[160] and

Fig. 2.67: Photo from the 1934 excavation of a Thule Culture winter house at the site of Tuttutuup Isua in South Greenland.

investigations in northern Greenland by Erik Holtved and Eigil Knuth from the 1940s onwards that demonstrated the existence of a long and complex development of Palaeo-Eskimo cultures long before the arrival of the Norse Greenlanders. Palaeo-Eskimo archaeology has become a vibrant field of research with a focus on northern Greenland, with its large sites and outstanding preservation. The potential for Palaeo-Eskimo research in Kujataa remains unexplored, although there are certainly enough indications of Palaeo-Eskimo presence all the way down to Cape Farewell to suggest that this potential is great. In recent decades, the focus of Thule Inuit and historical archaeological research has been on the Nuuk region,[161] but the great number of Thule Inuit sites and historically known high population levels of Inuit in Kujataa show that there is also enormous potential for more research in that region.

For instance, unanswered questions remain concerning early Thule Inuit settlement in Kujataa and the nature and volume of contacts between Thule Inuit and Norse Greenlanders. The potential for historical archaeology in Kujataa is also great, with sites related to early farming in Upernaviarsuk (cp 5) and Igaliku (cp 2) waiting to be explored to shed light on the early history of Inuit farming.

Greenlandic archaeology is at present a vibrant field with a number of established scholars and graduate students engaged in a variety of projects, producing new data every year and maintaining vigorous debate in academic journals and books.

The built heritage

The pre-1950 history of Greenland is dominated by five principal types of structures. The least substantial but with the longest historical record were tents, which were the principal accommodation for the first three millennia and only went out of use as seasonal dwellings in the early 20th century. Turf houses characterised the Norse Greenlandic and Thule Inuit periods and were likewise only phased out in the early 20th century. A few stone masonry buildings were erected by the Norse Greenlanders and stone masonry building also had a brief flowering in the 19th to early 20th centuries, providing the Igaliku hamlet with its unique character. Two types of wooden construction, log houses and post-and-beam houses characterised the European missions and trading posts in the 18th and 19th centuries. Each of these types has a number of variants, and in many cases two or more are combined in the same building.

The prehistory of Greenlandic architecture

The Palaeo-Eskimos of the Arctic Small Tool tradition, who were the first humans to set foot in Greenland in

the third millennium BC, lived in tents year round. The more solid of these were slightly sunken and had low supporting walls of turf and stone but the superstructure was made of skins stretched over a wooden frame. Oval or subcircular in plan, these dwellings were often characterised by a rectangular stone setting dividing the interior space into two equally large parts. The central stone setting is frequently divided into compartments, one of which contained a hearth. The areas on either side of the central stone setting were raised and this is where people slept and worked. This basic layout governed Palaeo-Eskimo architecture for more than three millennia.[162] There were variations on the basic theme over this long period, but even the most radical development, the megalithic longhouses of the Late Dorset people in North-East Greenland, retained the principle of a three-fold division created by a central stone setting.

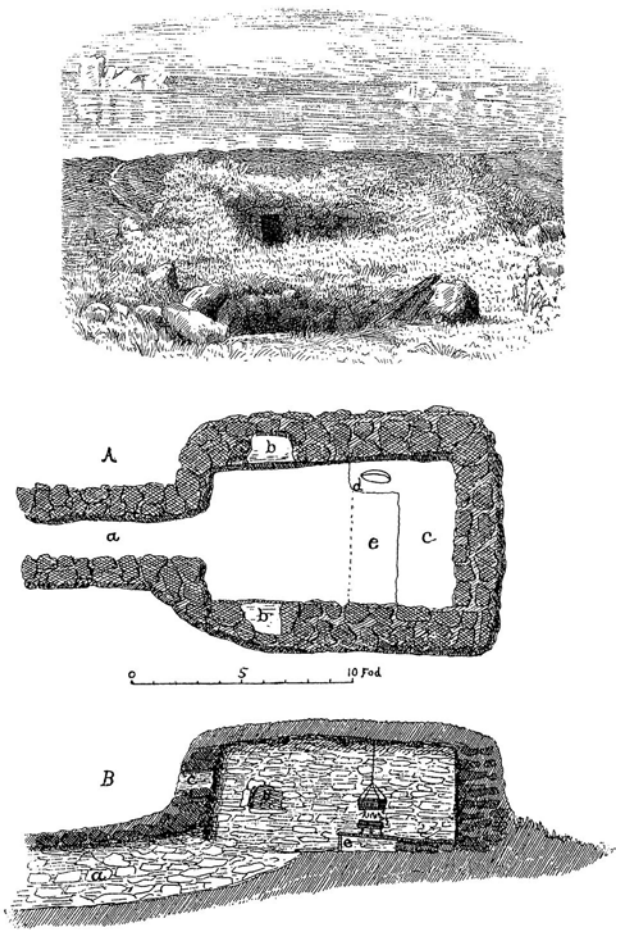


Fig. 2.68: 1891-92 depiction of a Thule Culture house in Scoresby Sound, East Greenland.

At the end of the 10th century, the Norse Greenlanders brought with them architectural traditions based on wooden constructions. Three-, two- and single-aisled houses had sturdy wooden frames supporting turf roofs, but the outer walls were made of turf and/or stone. The earliest dwellings were halls with a central hearth and benches along the sides, but over time cells with different functions—each with their own wooden frame connected by corridors—were added to the halls. Animal stalls and barns were often parts of these complexes, but the Greenlandic Norse farmstead is characterised by a multiplicity of buildings spread over and around the homefield. As the buildings tended to be rebuilt at the same location, these sites are characterised by low ruin mounds made from turf and stone debris from earlier buildings. In addition to timber-framed buildings, there were dry stone structures, with or without corbelled roofs, and in the 13th and 14th centuries stone masonry churches and feasting halls were built at a few central sites, importing contemporary European architectural styles. It is these monumental buildings as well as sturdy dry stone structures like the *skemmur*—often constructed in prominent locations—and the ruin mounds created by the accumulation of building material over five centuries, which make the greatest visual impact for later onlookers.

The architecture of the Thule Inuit represents a clear break with the Palaeo-Eskimo tradition. They constructed sturdy winter houses of turf and stone with a turf roof supported by wood or whale bone posts. The entrance to these buildings is a sunken corridor protruding from the main building, typically facing the sea. In spring the roofs of these structures were taken down and during summer tents would be used. The more permanent tent bases are often slightly sunken, with a trapezoid ground plan and low turf walls. Very large winter houses, so-called communal houses with two or more hearths and room for up to 40 people, began to appear in the late 17th century and are associated with long-distance barter voyages primarily influenced by contact with European whalers, and later missionaries and merchants. Examples of remains of all these types of buildings—winter houses, communal houses and different types of summer camps—are found within the nominated property in component parts 1, 2 and 5.

With the establishment of a mission close to Nuuk in 1721, European buildings began to be imported and detailed descriptions, and depictions, of Inuit architecture become available.

Colonial and Inuit architecture

The missions and trading stations that proliferated along Greenland's west coast from the 1720s onwards initially had two principal kinds of buildings: European timber buildings and Inuit winter houses of turf and stone. The Europeans imported log houses, constructed in Norway, disassembled, and shipped to Greenland, where they were rebuilt, log by log. These solid wooden buildings provided good insulation and were used both

as dwellings and churches. About 50 log houses were imported to Greenland in the period 1734-1847, some of which stand to this day. Less massive were post-and-beam houses, i.e. timber-framed buildings clad with wooden boards. In the 18th century, they were primarily used for storage and as workshops, but with improved insulation (double or treble cladding or brick) this construction technique came to replace the log houses as the favoured form of dwelling in the late 19th century. In the early 19th century, stone masonry buildings were built at several Greenlandic trading posts. Although quite different in construction technique, these three types of European houses had common characteristics that set them apart from the Inuit houses. The European houses had different dimensions—the most striking being the pitched (often quite steep) roofs—and windows of glass.

Fig. 2.69: Wooden church in Nanortalik, South Greenland, an example of the type of wooden architecture introduced to Greenland through Danish colonial rule.

Inuit winter houses in the 18th century were built of turf and stone, with the rear of the structure often built against or dug into a slope. The roof was nearly flat and supported by a wooden beam along the longitudinal axis. Over the joists an old umiaq (women's boat) skin would be placed under the topmost layer of turf and stone. These were single-roomed structures with a bench or platform along the back of the building. The front side had a sunken entrance and small windows covered with translucent skin. During the course of the 19th century, these buildings developed under the influence of European styles and materials. The small windows with skin were replaced with larger ones with glass set in a wooden frame, and the sunken entrance corridor was replaced by a vestibule with wooden doors. The interior surfaces of the walls became more solid and built to last, made either of stone or wood panelling. This change reflects in particular the growing permanence of these buildings, which would be left standing even if the inhabitants went on summer hunting trips. The final and visually most radical change was the addition of a pitched roof. Inuit houses with a pitched roof are called 'Danish-Greenlandic'. In the first half of the 20th century, turf and stone were gradually phased out as the principal building material of Greenlandic dwellings and replaced primarily by true timber constructions (on stone or concrete foundations), which, despite deriving more from European than traditional Inuit building techniques, nevertheless retained a distinctive Greenlandic style.[163]

The built heritage in Igaliku

The hamlet of Igaliku has a special place in the architectural history of Greenland. Little is known about the houses built by Tuperna and Anders Olsen in the 1780s although the foundations of their house (the one re-built by their son Johannes) in Upernaviarsuk are known and show that the building was made of turf and stone. Photographs of Igaliku houses from the late 19th and early 20th century show buildings predominantly built of stone, with influences both from traditional Inuit winter houses and colonial architecture. It is the older stone houses in Igaliku—most of which were built in the 1920s and 1930s, some likely modified or rebuilt from earlier phases—that give the hamlet its unique character, representing a distinct aspect of modern Greenlandic architectural and cultural history. The Igaliku tradition is only partly in line with stone building traditions elsewhere in Greenland, but apart from the distinctive character of the tradition, it is the comprehensive preservation of the early stone buildings in Igaliku that gives the hamlet exceptional cultural and historical value. The buildings are made of the local and very characteristic red sandstone that also was used for the Norse Greenlandic buildings at the site. In many of the houses there are clear signs that the stones have been reused from earlier structures. The Igaliku stone houses have a number of common characteristics, the principal one being that they all have massive outer walls of stone sourced in the local area. The red Igaliku sandstone has insulating and warmth-retaining properties that make it an ideal building material, and it is soft enough that the stones can be shaped during construction.

There are two types of massive outer wall construction. The earlier type is made from undressed, but hand-picked local stone. Without a doubt many of the stones were taken from the Norse Greenlandic ruins, which remained a convenient source of building material for the 18th to early 20th century buildings, presumably involving the continued re-use of the same stones from one building phase to the next. In the earlier type of outer wall construction, an even side of a stone was selected to make up the outer face while the inner face was quite uneven, with a variation of thickness between individual stones of 30 to 70 centimetres. In dwellings this uneven inner face was screened off with wooden panelling and

the intervening space filled with insulating materials like moss, hay or seaweed collected locally. The stones in the massive outer wall were originally bonded with clay, which can be found in several places around Igaliku, but in the preserved buildings this has been replaced—at least close to the surface of the walls— with cement-based mortar. In several houses wooden planks are embedded in the stone construction to serve as anchors for tying the wooden roof to the stone walls.

The more recent type of massive outer wall construction has a cement coating, which may either be painted or have vertically placed stone slabs embedded for decoration. The cement coating creates an even surface both on the inside and outside of these buildings, but dwellings built with this technique nevertheless also have wooden panelling on the inside. The cement-coated buildings are usually built on a stone foundation, creating a cavity under the floor boards which increases ventilation and provides some insulation.

Several buildings display both types of construction. In some cases, elements of earlier, sometimes quite derelict, buildings have been incorporated into newer constructions, while in others the cement-coated wing is merely an extension of the original structure.

The earlier type of construction was still used in the 1920s, but the more recent type took over from the 1930s. Irrespective of this change in construction techniques, the two types have a number of characteristics in common. Typically the heated part of the house is a rectangular space incorporating both a kitchen and a living room. Abutting this rectangle are unheated spaces, typically a vestibule, a barn and a byre. The addition of a pitched roof allowed for more efficient use of the warmth from the downstairs heat source, creating space for one or two rooms, typically used for sleeping. The building of chimneys from bricks goes hand in hand with this change. The unheated rooms, requiring neither the same warmth nor roof height as the dwelling part of the house, remained single-storied. Before the 1920s, when pitched roofs were introduced in Igaliku, the dwelling and the byre/barn had been built as a single, two-part structure, with a continuous flat roof of turf over both parts. From the 1920s onwards, the dwelling and the byre/barn continued to be built as one building, even though only the dwelling had a pitched roof.

The Igaliku houses of the 1920s and 1930s were built by their owners, without plans, regulations or outside guidance. They represent the last stages of a local building tradition which had evolved since the 1780s, representing a unique mix of Inuit tradition, European influences and local inventiveness and adaptability. Although the oldest houses are ascribed building dates from the 1920s, it is likely that in many cases this represents major refurbishment associated with the addition of a pitched roof, rather than new construction from scratch. These houses continued to be modified as new influences, new materials and new demands (e.g. for running water and electricity) were introduced, but they have retained their distinctive character and their comprehensive preservation makes the built environment of Igaliku unique.[164]

Fig. 2.70: A house in Igaliku showcasing the unique, local architectural style that reused Norse building stones.

Fig. 2.71: The church in Igaliku is built with red Igaliku sandstone.

2.2.2 Geographical and environmental setting

Geological setting

The solid geology of Kujataa can be divided into two groups: the older Ketilidian and, geographically restricted, younger group referred to as the Gardar province. The etymology of both names is Norse. Ketilidian derives from Ketilsfjörðr (modern day Tasermiut fjord) and the Gardar Province from the Norse Greenlandic episcopal seat of Garðar (modern day Igaliku). The Ketilidian group formed in connection with mountain building processes ca. 2,000–1,800 million years ago and is dominated by igneous rocks such as granites. The Gardar province formed ca. 1,300 million years ago in association with intense volcanism. Red (Igaliku) sandstone dating from this period was used by the Norse Greenlanders for tool making (e.g. whetstones) and construction and can be found dressed and carved in both Norse Greenlandic and modern Inuit buildings.

Rocks from the Gardar Province are visible in a number of areas within the nominated property. The region between Igalikup Kangerlua and Sermilik is noteworthy for 3,400 m of alternating sedimentary and volcanic rocks named the Eriksfjord Formation after Eiríksfjörðr (modern day Tunulliarfik). A boat trip from Narsarsuaq to Narsaq also provides a magnificent view of a section that extends right through the heart of the Gardar Province and showcases Ketilidian granites, the overlying sandstones and lavas of the early Gardar, a number of dykes, the Qassiarsuk carbonatite and three of the more recent cross-cutting intrusions, the Igaliko, Ilimaussaq and Dyrnes-Narsaq complexes.[165]

Physical geography

The northern and eastern boundaries of the nominated property are delimited by margins of the Greenland ice sheet, which is all that remains of the extensive ice sheets that once covered large parts of the Northern Hemis-phere during the most recent ice age. Indeed, the waxing and waning of this ice sheet is responsible for much of the physical geography of Kujataa. Glacial outlets from the ice excavated the deep network of fjords that characterise the region and tidewater glaciers (those that terminate at the sea) are observable at the head of

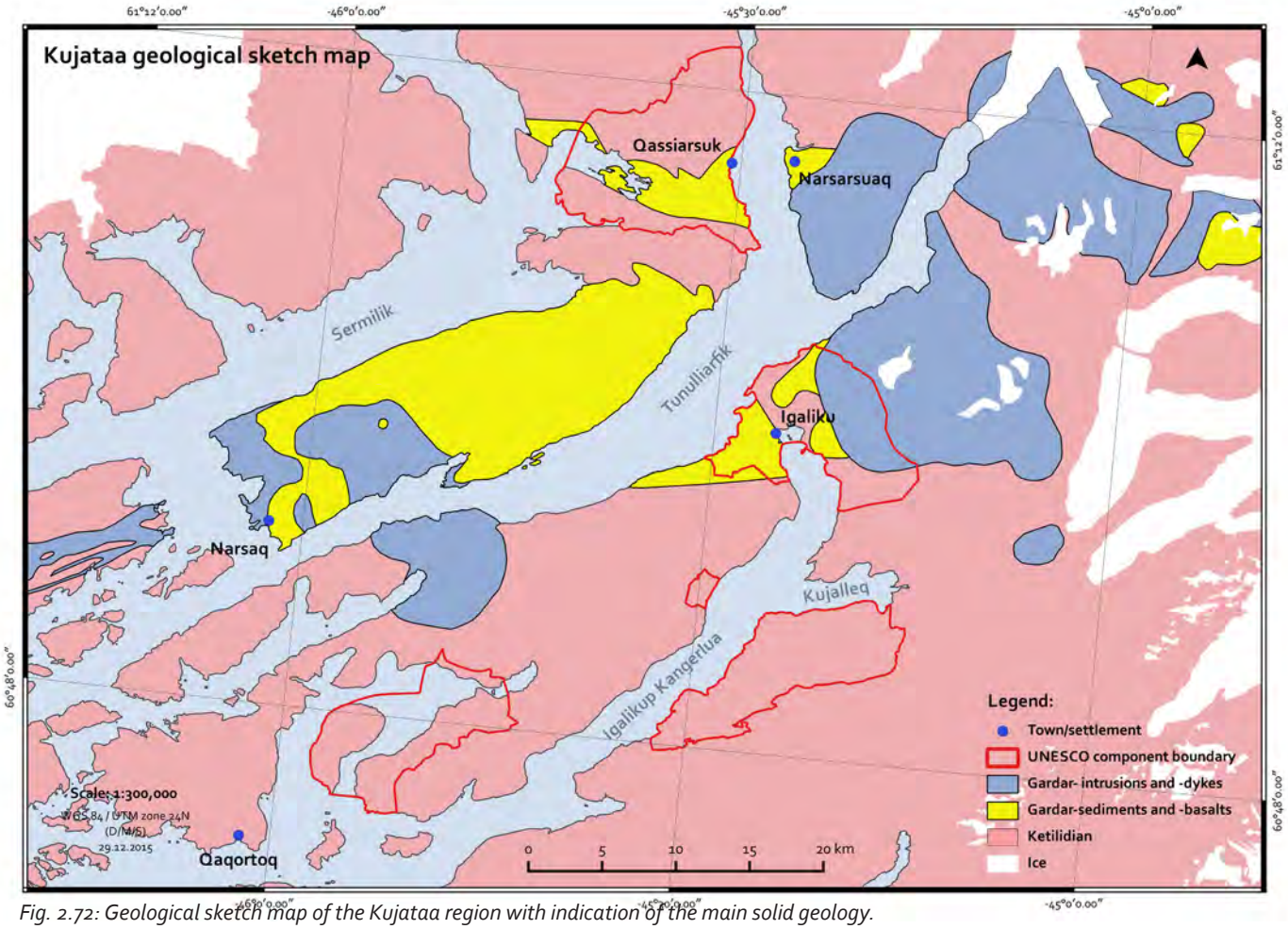


Fig. 2.72: Geological sketch map of the Kujataa region with indication of the main solid geology.

Sermilik and Tunulliarfik. The Qooroq Icefjord in Tunulliarfik is a particularly spectacular example. Running from the ice cap to the open ocean, the fjords form natural routes of communication around the region, much as they did in the Middle Ages. Rounded and flattened mountains reaching a maximum elevation of about 600 m a.s.l. near the coast but up to 1,500 m a.s.l. farther inland are characteristic of the glacially abraded fjord landscape. Although the landscape is generally mountainous, and difficult to navigate, there are also glacially-carved river valleys that cross-cut the mountains (e.g. Qorlortup Valley), or penetrate into the interior (e.g. Tasikuluulik (Vatnahverfi) and Qingua Valley at the head of Tunuliarfik). These more interior locations provided extensive opportunities for farming in the medieval period, much as they do today.

You asked whether the sun shines in Greenland and whether there ever happens to be fair weather there as in other countries; and you shall know of a truth that the land has beautiful sunshine and is said to have a rather pleasant climate. The sun's course varies greatly, however; when winter is on, the night is almost continuous; but when it is summer, there is almost constant day. When the sun rises highest, it has abundant power to shine and give light, but very little to give warmth and heat; still, it has sufficient strength, where the ground is free from ice, to warm the soil so that the earth yields good and fragrant grass.

King's Mirror, 13thc. AD
(Speculum regale, 149)

Other geomorphological forms such as onshore moraines (e.g. Narsarsuaq), marginal moraines and fluvial plains are also present near the head of Tunulliarfik where modern settlements tend to cluster (e.g. Igaliku and Qassiarsuk). Towards the coast, the landscape is mainly characterised by ice-eroded bedrock or, in lower-lying areas, raised marine beaches and deltas.[166]

Sea level change

Since the Last Glacial Maximum (LGM), the ice sheets of the world have either disappeared or shrunk in size, and the release of meltwater has led to a global sea level rise of ca. 135 m. Coastal rebound has taken place in formerly glaciated regions where the land has been freed from the weight of the ice. This rebound exceeds in general the global sea level rise in West Greenland, and marine deposits can therefore be seen above the present sea level in many places, testifying to the uplift. Raised beaches are found e.g. in component part 2, Igaliku.

The Early Holocene regressive phase of the relative lowering of the sea level reversed during the Middle Holocene as a result of a glacio-isostatic response induced by Neoglacial re-advance of the Greenland ice cap. This resulted in a Neoglacial submergence that transgressed and drowned Early Middle Holocene coastlines. The major transition from emergence to submergence took place between 8,000 and 2,000 years ago depending on the location. The sea level reached its lowest level around 10 m below highest tide in southern Greenland between 8,000 and 6,000 cal. BP. The Late Holocene re-advance of the Greenland ice sheet caused this subsidence. A subsequent relative sea-level rise on the order of 1 m/1,000 years since AD 1200 has been documented in West Greenland with a peak rate of sea level transgression around AD 1400–1600.[167] Submergence of fertile coastal grassland caused by the Late Holocene sea level may be one of several natural factors that affected the Greenland Norse settlements.

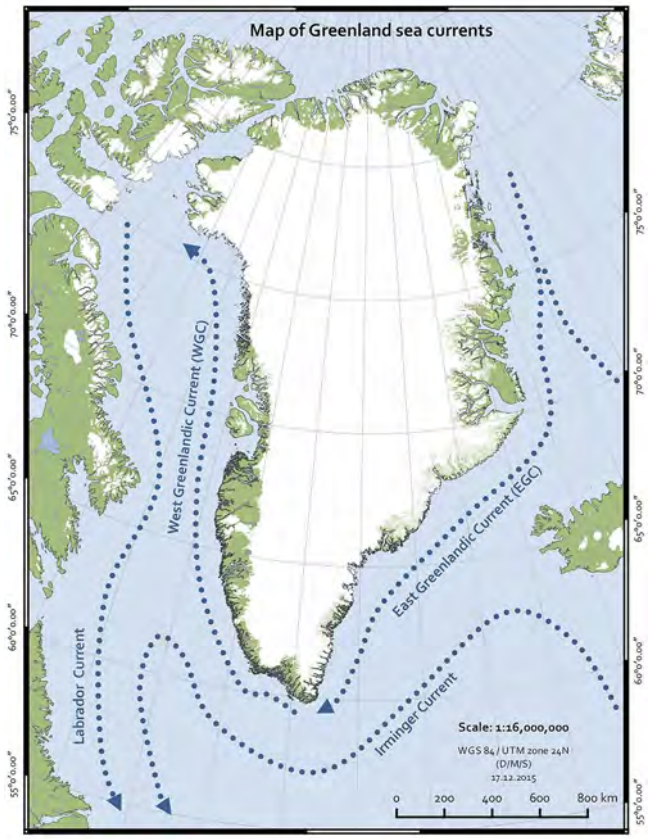


Fig. 2.73: Map of Greenland and the main sea currents influencing local and regional climatic conditions.

Climate

The geographical position of the nominated property, abutting into the North Atlantic at ca. 60°N, has a profound influence on the region's climate that makes pastoral agriculture a viable prospect. As is the case elsewhere in the North Atlantic the climate of Kujataa is very much influenced by the warm (ca. 8° C) North Atlantic

Current (NAC). The NAC, which originates in the Gulf of Mexico, flows into the North Atlantic region, warming it relative to geographical regions at similar latitudes.[168] South of Iceland a branch of the NAC, the Irminger Current (IC), diverges from the main flow and carries warm waters westwards towards Greenland.[169] Along the east coast of Greenland the IC meets the East Greenland Current (EGC), a cold, iceberg- laden mass of water from the Arctic.[170] These currents then converge as they flow northwards around Cape Farewell to become the relatively cold West Greenland Current (WGC).[171] The WGC then continues northwards along the coast and is responsible for keeping south-western Greenland warmer than areas at similar latitudes such as Hudson Bay in Canada.

Due to this geographical and oceanographic setting, the climatic zone of Kujataa is defined as subcontinental and subarctic, manifested by a strong temperature and precipitation gradient between the outer coast and the ice cap margin. The coasts and the outer reaches of the fjords are predominately oceanic/maritime in character, while towards the fjord heads and ice cap the climate becomes more continental.[172] The mean annual temperature (for the period 1961–1990) at the coastal weather station of Qaqortoq was 0.6° C, ranging from -5.5° C (January) to 7.2° C (July). Sea ice, transported from the Arctic on the EGC, is also responsible for suppressing temperatures in the coastal zone during the summer months, often leading to foggy conditions. Farther inland, at Narsarsuaq, the mean annual temperature was 0.9° C, ranging from -6.8° C (January) to 10.3° C (July). It is this 17.1°C difference between the mean temperatures of the warmest and coldest months that demonstrates the effect of continentality on the fjord heads.[173]

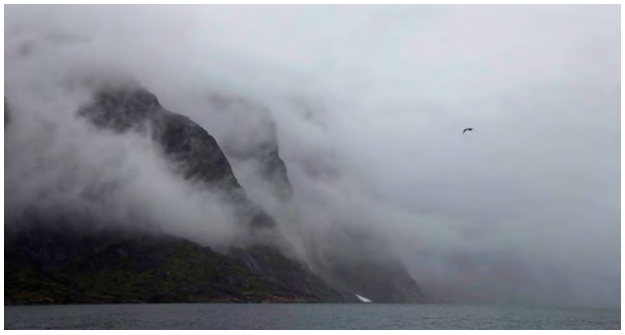


Fig. 2.74: Dense fog swirls along the steep sides of a fjord near Cape Farewell.

Relative to other regions in the North Atlantic, precipitation is low and drought years are not uncommon. There is a marked difference between mean annual precipitation at coastal and fjord head locations. Towards the coast, rainfall tends to be higher with mean annual precipitation at Qaqortoq recorded at 857 mm/annum for 1961–1990 and only 651 mm/annum at Narsarsuaq, the bulk of which falls in the summer months.[174] Strong föhn (katabatic) winds, which blow from the ice cap, compound this problem drying both the soils and vegetation, and can be extremely destructive. Sustained wind speeds of 40 m/s over a 60-hour period, with gusts of up to 60 m/s have been documented as causing evaporation of up to 0.67 mm/h; equivalent to a reduction of 6% in the mean annual rainfall.[175] Indeed, drought may have been experienced in 11–16% of the years during the Norse settlement period[176] and there is growing evidence for the use of irrigation systems to buffer Norse Greenlandic farming systems against drought conditions.[177] Modern farmers experience the same problems with drought and in Igaliku a dam was built in the 1960s in the same location as a previous Norse Greenlandic one, designed to distribute water to the fields.

Fig. 2.75: Fishing for cod on the frozen fjord near Narsaq.

Historical climatic variability

Norse settlement in Greenland coincided with an era of climatic stability in the North Atlantic region known as the Medieval Warm Period (MWP). This phase, in which annual temperatures were similar to the 1961–1990 mean,[178] was characterised by generally stable atmospheric circulation in the northern hemisphere[179] and reduced storminess in the North Atlantic.[180] Indeed, the MWP has classically been cited as a factor that drove the Viking expansion across the North Atlantic to Greenland , perhaps providing the impetus for Norse settlers to begin pastoral farming in the subarctic landscape of southern Greenland. The duration of the MWP is far from certain. Nevertheless, climatic deterioration from the beginning of the 14th century is well documented in historical sources,[182] oceanographic records[183] and the Greenlandic ice cores.[184] This subsequent period, known as the Little Ice Age (LIA), continued into the 19th century and was characterised by increased climatic instability variously manifested by decreasing temperatures and increased storminess and winter ice.[185] Historically the LIA has been invoked as the causal factor for the abandonment of the Norse settlements in Greenland.[186] Although the LIA was undoubtedly detrimental to Norse Greenlandic lifeways, with increasing instability and variability of weather patterns, recent research suggests they were able to adapt their subsistence strategies to the deteriorating climatic conditions.[187]

Holocene vegetation evolution

The Holocene vegetation of the nominated property following deglaciation is well documented in palynological (pollen) studies of organic sediments from lakes and peat bogs in the region. The earliest records come from the coast in the Cape Farewell area and date from ca. 11,500–10,500 cal. BP and document the appearance of fellfield pioneer vegetation. Plants such as *Thalictrum alpinum* (alpine meadow rue), *Oxyria digyna* (mountain sorrel), *Poaceae* (grasses) and *Cyperaceae* (sedges)[188] quickly colonised the barren surfaces exposed by the retreating Greenlandic ice sheet. The recession of the ice masses to their modern day positions was swift and the arrival of pioneering species in the Qassiarsuk and Igaliku area is documented from ca. 9,500–8,000 cal. BP.[189] The first appearance of woody plants—common to the modern mosaic of vegetation—such as *Salix sp.* (willows) are noted from ca. 9,500 cal. BP with *Betula sp.* (birch) not arriving until ca. 7,500 cal. BP.[190] From ca. 5,000–4,000 cal. BP *Betula* and *Salix* became dominant in the inland reaches of Kujataa while *Betula* and *Ericaceous* (heather family) shrubs came to characterise the coastal reaches. *Betula-Salix* scrub and *Betula pubescens* woodland then came to represent the climax community of the interior and low *Empetrum nigrum-Betula glandulosa* heath along the coasts. With the exception of where sheep farming has been re-established, these communities are dominant in southern Greenland today, a situation that would have been similar in the Norse period.

The modern vegetation of Kujataa

The first comprehensive documentation of the Greenlandic flora was published in 1968,[191] and Kujataa was also extensively mapped in the 1980s.[192] Both of these surveys aimed to establish the various natural communities of vegetation present within the Greenlandic landscape, but they made no direct mention of cultural communities associated with modern sheep farming and settlement. Generally speaking, the vegetation communities of southern Greenland are influenced by the degree of continentality of a given location. Three main vegetation zones are defined:

1. the oceanic subarctic
2. the suboceanic subarctic and
3. the subcontinental subarctic.

In coastal areas, the oceanic subarctic vegetation belt is dominated by mossy heaths and dwarf-shrub heath in which *Empetrum nigrum* (crowberry) and *Vaccinium uliginosum* (bilberry), which bear edible fruit, are widespread. Moving inland, to the suboceanic zone, luxuriant herb slopes develop in which herbs, that are widely utilised in traditional Inuit subsistence, such as *Angelica archangelica* (angelica) and *Epilobium angustifolium* (rosebay willowherb/fireweed) are common. Towards the fjord heads, *Betula glandulosa* (downy birch) and *Salix glauca* (grey willow) heath and scrub vegetation become dominant. Elements of this community may approach 3 m in height. In sheltered locations, open *Betula pubescens* woodland may develop and in exceptional circumstances has been observed to reach 10 m in height (e.g. in Qingua valley). There is also a greater diversity of vegetation communities in the inland suboceanic and subcontinental regions. Grassland slopes dominated by *Anthoxanthum odoratum* (buffalo grass) and *Deschampsia flexuosa* (wavy-hair grass) are frequent in the inner reaches of the fjords, and mires or fens frequently develop around freshwater lakes.

History of the environment – from medieval to modern farming landscapes

Palaeo-ecological research in Kujataa was initiated by Bent Fredskild in the 1970s and continued in a series of influential papers through the 1980s and 1990s. These seminal works set the tone for understanding the environmental impact of pastoral farming arising from Norse settlers, and to some extent modern farmers. Nevertheless, these works were often focused on 'deeper' time and the evolution of the flora of southern Greenland since deglaciation. The introduction of pastoral farming was often considered as a short transitory event occurring within millennia of landscape-scale processes. More recently, in the last ten years, a growing body of high-resolution palaeo-environmental research has reconsidered the impacts of farming in the subarctic landscape of Kujataa. In focusing on both the macro- and micro-scale impacts of Norse settlement, these studies have nuanced our understanding of the environmental impacts of both Norse and modern farming.

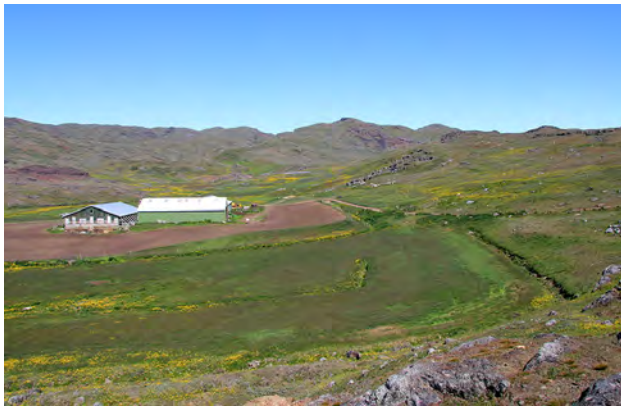


Fig. 2.76: The landscape around farm Ø2 by Tasiusaq displays notable traces of heavy and prolonged sheep grazing.

Impact on the vegetation

Not surprisingly, there are a number of similarities between the environmental impacts of medieval and modern farming. The foremost impact of the introduction of farming in the medieval era is a reduction in the area covered by scrub and woodland.[193] As is the case with the modern farms, Norse settlers cleared areas of the dwarf birch and willow scrub to create fields for growing hay.[194] The extent to which scrub and woodland was cleared beyond the farm's homefield and the manner in which this occurred is subject to much debate. Early research from the Western Settlement implied the widespread use of fire to clear vast tracts of land and stimulate the development of pastures,[196] as was the case in the European Neolithic. However, recent studies point to vegetation clearance having been less severe with scrub and woodland retained and perhaps managed in a number of areas.[197] Indeed there is growing evidence that widespread burning of the scrub and dwarf-shrub heath was not a method employed by the first settlers.[198] In addition to a decrease in scrub and dwarf-shrub heath, there were concurrent expansions of grassland in the form of managed hayfields and grazed grassy heaths.[199] These same anthropogenic vegetation communities, associated with modern farming, can be observed across the nominated property today at locations such as Igaliku, Qassiarsuk, Tasikuluulik (Vatnahverfi) and Qorlortoq Valley.

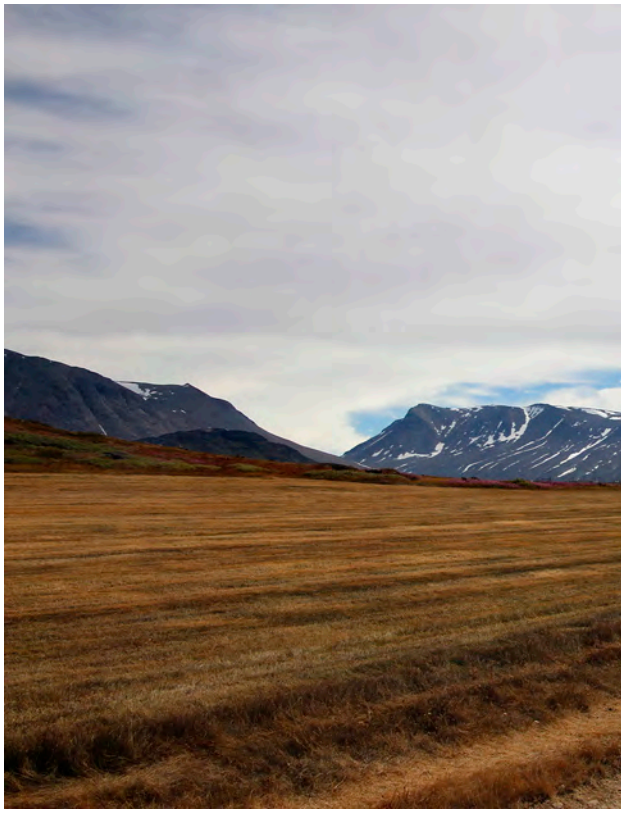


Fig. 2.77: A harvested hayfield between Itilleq and Igaliku.

Introductions to the flora

Aside from altering the natural climax vegetation communities of Kujataa, Norse settlement also resulted in the introduction of a number of alien plant species from Europe.[200] In total six plants, representing 2.3% of the flora of Kujataa, are certain introductions, while a further two are suspected to be. The most common introduction, and a palynological indicator of Norse settlement, is *Rumex acetosella*[201] (sheep's sorrel) which is frequently observed as striking red fields growing around modern habitations and farms.

Fig. 2.78: A field filled with Rumex acetosella near Igaliku.

The mechanism behind the introduction of these plants is uncertain, but it is likely that they were spread accidently in fodder, or other organic materials transported with the original settlers.[202] Debate also surrounds whether the Norse introduced and managed to grow cereal crops to Greenland. Although there is clear macrofossil evidence from secure archaeological contexts for the presence of *Hordeum* (Barley), it is uncertain if it was grown in Greenland.[203] Palynological evidence is equivocal, although *Hordeum*-type pollen has been identified in peat from a number of sites within the nominated property.[204] In fact modern farmers in Kujataa frequently sow Barley seed for animal fodder, but it will seldom ripen.[205]

Other impacts on the landscape

A further prominent environmental impact arising from medieval farming, and one often implicated in the failure of Norse Greenland, is an increase in soil erosion.[206]

The causes of this were twofold:

1. the stripping of turves for house construction, and
2. animal grazing, both of which would have exposed, or increased the susceptibility of soils to erosion.[207]

Although an undoubted consequence of Norse farming practises in Kujataa, soil erosion was far from the levels recorded in contemporary Iceland. Research in the Igaliku area indicates that medieval land management resulted in modest erosion that was only twice that of the natural background rate.[208] By contrast, modern farming practises have resulted in a period of soil erosion five times the background rate.[209]

In Tasikuluulik (Vatnahverfi), desertified areas can be observed immediately south of Igaliku Kujalleq, although there is vigorous debate surrounding the degree to which farming is exacerbating natural processes that have been underway since before the arrival of the Norse Greenlanders.[210] Recent research has also suggested that modern farming practises are resulting in substantial shifts within the biota of a large lake near Igaliku, whilst Norse farming produced vaguely perceptible impacts.[211]

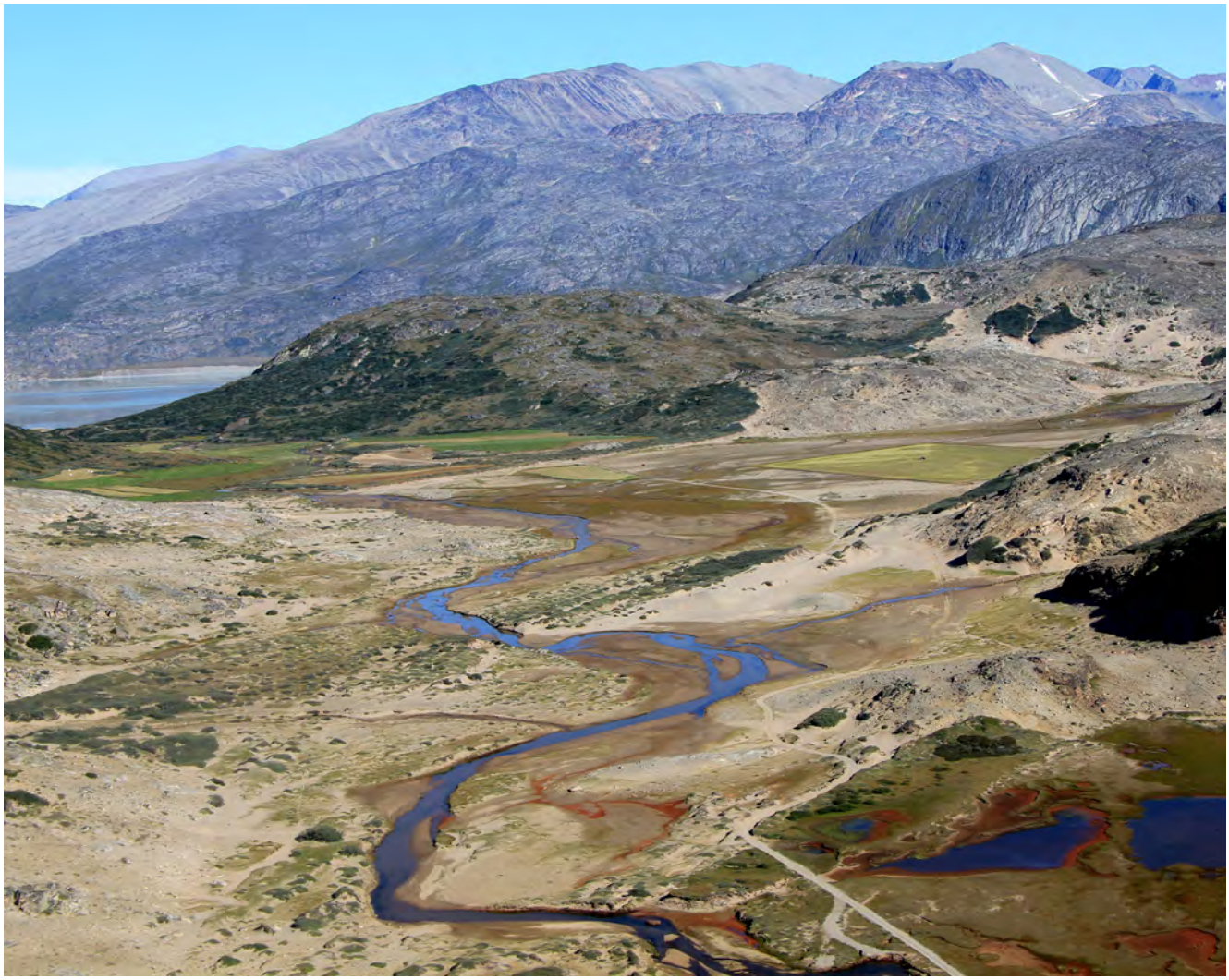


Fig. 2.79: A sandur (glacial outwash plain) in the northeast Tasikuluulik/Vatnahverfi is a dynamic landscape of erosion and new soil deposits.

2.2.3 Culture history

Palaeo-Eskimos in Kujataa

The earliest traces of human presence in Greenland, the Arctic Small Tool tradition from the third millennium BC, are concentrated in the far north of the island. By the second millennium, the Saqqaq variant of this tradition had spread all around the island including Kujataa.[212] All large Saqqaq and the later Greenlandic Dorset culture sites that have been investigated by excavation are located farther north than Kujataa and the presence of Saqqaq and Greenland Dorset people in the southernmost part of the island is confirmed only by artefacts, some from test pits into Greenlandic Norse contexts, but often stray finds from insecure contexts. One such spot is in component part 1, suggesting that Palaeo-Eskimos visited and utilised the inner fjord environments as well as the outer fjords. It is not thought that low archaeological visibility of Palaeo-Eskimos in Kujataa reflects actual site density in the region. Conditions for site discovery are categorically different in Kujataa from farther north on account of much greater soil accumulation and thicker vegetation. High site density from later periods, both Norse Greenlandic and Inuit, also likely obscures earlier traces. Combined with coastal subsidence, this has meant that the attentions of archaeologists working on Palaeo-Eskimo cultures have been directed farther north where Palaeo-Eskimo sites are more easily identified on the surface.

Fig. 2.8o: Examples of stone Arctic Small Tools from the Independence I Culture. Top: three knife blades. Below, left: two scrapers. Below right: two burins.

For this reason there is however little specific that can be said about the Palaeo-Eskimo presence in Kujataa except that they were there in the second and first millennium BC and as far as can be deduced had the same lifeways as elsewhere in Greenland. Greenland Dorset culture disappeared around the end of the first millennium BC and as far as is known no humans lived in South Greenland until the Norse arrived in the 10th century. When they came,

> they found signs of human habitation there both in the east and west of the country, fragments of skin-boats and stone implements, from which it may be deduced that the same kind of people had passed through there as had settled Vínland and the Greenlanders call Skrælingar.[213]

The long hiatus in human settlement in South Greenland meant that the Norse entered an environment unaffected by human predation and utilisation. Whatever impacts Palaeo-Eskimo hunting had had on the fauna of South Greenland, the ecosystem had long since recovered and developed under its own momentum.

Norse Greenland

Colonisation

The earliest radiocarbon dates associated with Norse Greenlandic archaeology are from the late 10th century AD.[214] 12th century accounts recorded in Iceland date the settlement of Greenland to 985 AD[215] and associate it with the colourful character of Eiríkr rauði. The earliest narrative, Ari fróði's *Íslendingabók*, written in the 1120s, only says that

> the country called Greenland was discovered and settled from Iceland. A man from Breiðafjörðr called Eiríkr the Red went out there from here, and took possession of land in a place that has since been called Eiríksfjörðr. He gave a name to the country and called it Greenland, and said that it would encourage people to go there that the country had a good name.[216]

Later sources, *Landnámabók* in late 13th century versions and *Eiríks saga rauða*, provide more detail, the veracity of which is impossible to determine.[217] They describe Eiríkr as a Norwegian who had recently immigrated to Iceland. He picked fights with neighbours wherever he settled and was finally sentenced to outlawry for homicide. Instead of limping back to Norway, Eiríkr decided to explore a land which had been sighted to the west of Iceland, the islands called Gunnbjarnarsker, named from the mariner who found them. According to these accounts, Eiríkr spent the three years of his outlawry sentence exploring South Greenland, first the east coast and then the inner fjord areas later known as Eystribyggð and Vestribyggð on the west coast, identifying places to settle. Back in Iceland, after the three-year period of banishment had ended, he advocated the

colonisation of Greenland, and the enticing name that he had chosen for the new country was clearly a major element in his marketing strategy. He then led a fleet of 25 ships to Greenland, only 14 of which made it all the way. The Book of Settlements gives the names of ten settlers in different parts of Kujataa, only three of whom have patronymics or nicknames which might suggest that they were actual historical characters. All of the texts describing Greenland in the 11th century agree in placing Eiríkr's settlement in Brattahlíð and making him the undisputed leader of the new colony. His son Leifr is also consistently described as his successor and an influential leader, to whom both the discovery of Vínland and the conversion of the Greenlanders to Christianity were attributed. The hegemony of Eiríkr and his family over the colony is widely implied in the sources, but this may be based on surmise as much as actual knowledge. Icelandic scholars of the 12th and 13th centuries clearly did not have an intimate knowledge of Greenlandic geography or history and their portrayals of Greenland are characterised by making good use of the few facts and factoids available.

One important clue to dating the colonisation is the fact that no unequivocal pagan burials have been found in Greenland. Pagan burial was practiced in Iceland until the end of the 10th century and would therefore be expected in Greenland, too, if the colonisation had started many decades before the conversion, which the sources associate with missionary king Ólafr Tryggvason's reign ending in 1000 AD. Christian influences on burial practices in Iceland are evident already in the second half of the 10th century, and some of the earliest radiocarbon datings from Norse Greenland are on human remains from Christian cemeteries.[218] Isotopic analyses show that some of these early Christian Greenlanders were born in Iceland.[219] It is possible that the late 10th century colonists of Greenland were not a cross-section of Icelandic society at the time, but primarily those who had already converted to Christianity (and there are suggestions that early Christian influence was particularly prevalent in the west of Iceland, where most of the Greenlandic colonists are said to have come from) and were perhaps still a minority in the old country. If this is the case, then the saga's characterisation of Eiríkr rauði as an intractable pagan may not be accurate.

Analyses of strontium isotopes suggest that both humans and domestic animals came from Iceland to Greenland in the late 10th century AD.[220] Early Norse Greenlandic material culture is also consistent with Icelandic origins, but this type of evidence is not precise

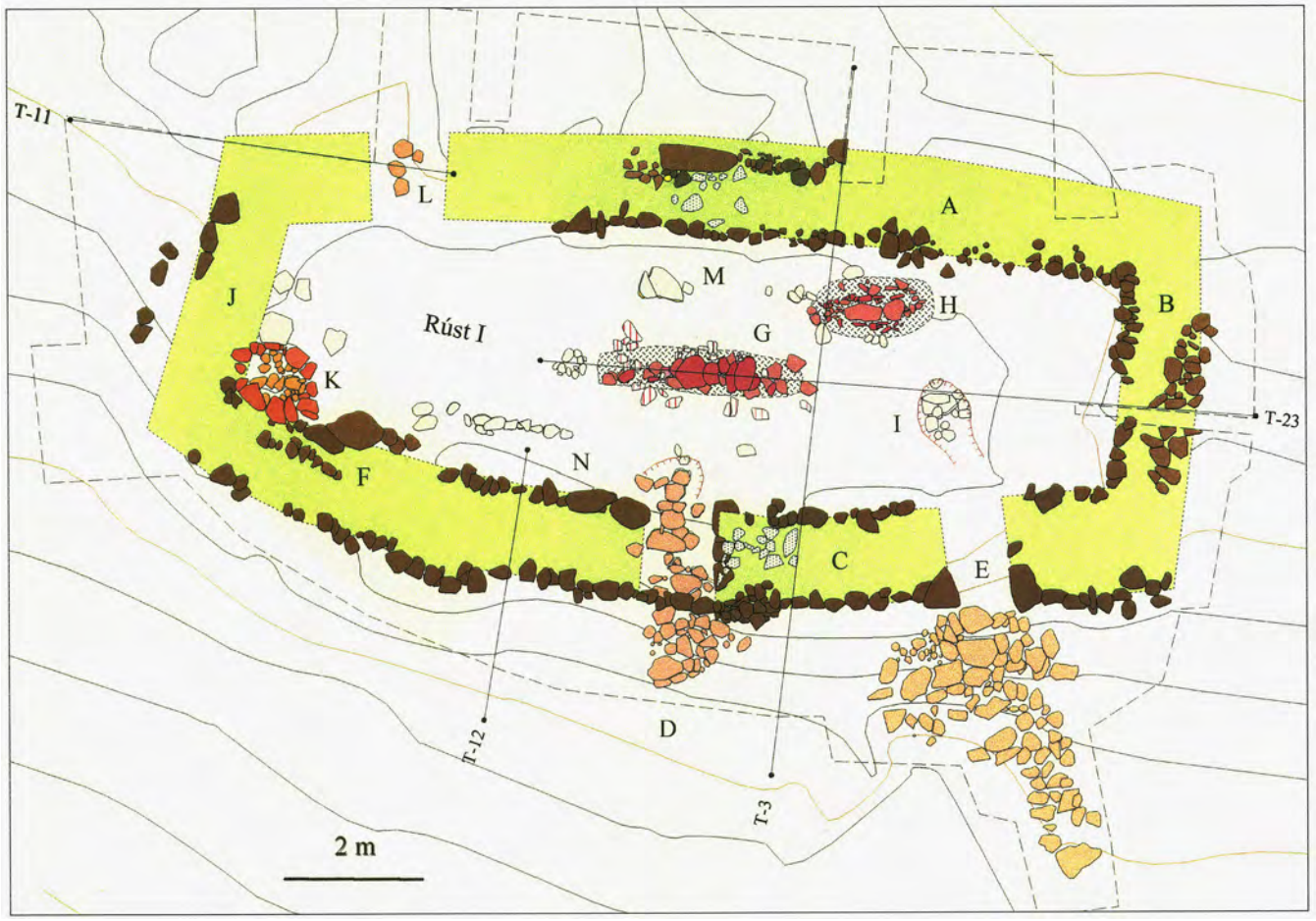


Fig. 2.81: Archaeological plan of Eiríksstaðir in West Iceland, associated with Eiríkr rauði's stay in Iceland before he colonised Greenland.

enough to preclude the possibility that some of the settlers may have been drawn from wider afield within the Norse world.

Fig. 2.82: Excavation of a Norse mass grave just north of Igaliku Kujalleq with at least 15 individuals. Strontium analyses and a DNA analyses showed that several had grown up in Iceland.

Archaeological research on Norse Greenland has predominantly focused on the final phase of occupation and only a handful of sites from the 11th century have been investigated in detail. Among these are several small halls, showing that the colonists initially built houses very comparable to those they had occupied in Iceland,[221] but also that they immediately adapted their subsistence strategies to the different Greenlandic conditions. Unlike Iceland, where marine fish is a significant component in all faunal assemblages from the beginning of settlement in the 9th century, in Greenland fish is rarely found, but the collections are instead dominated by seal bones.[222] Many scholars suspect that this comes down to a scheduling conflict. There is plenty of fish in Greenlandic waters—and enough has been found in zooarchaeological contexts to show that this is not simply a taphonomic issue—but it may be that the time of year when fishing could have been most fruitfully done coincided with the best time for hunting seal – from spring into mid-summer. Unlike Iceland, the seal populations in Greenland are very large and their seasonal behaviour easily predictable. Seals were an accessible and plentiful resource that afforded greater energy value for effort expended than fishing would have done. It is likely that plans to colonise Greenland were based on pre-existing knowledge of this resource. Knowing that there were virtually inexhaustible supplies of marine mammal meat will have made decisions to emigrate easier to take. Establishing productive farming regimes based on domestic animals will have taken several years and in that crucial start-up period having access to a dependable wild food supply will have been essential. A circumstantial case has been made that the exploration of Greenland in the 10th century was driven by walrus hunters. [223]Small populations of walrus which may have existed in Iceland were quickly exterminated and inevitable sightings of the east coast of Greenland (only 300 kilometres NW of the NW corner of Iceland and visible in good conditions from its fishing grounds) can easily have prompted its exploration. Low bulk, high value commodities like walrus ivory and hides may have been just the kind of lure to entice adventurers to take the risks necessary to explore the long coasts of Greenland. Given the enormous distances involved, the short travelling season (even at the height of the Medieval Warm Period in the 10th century) and the absence of any helpful locals, it is likely that the exploration of Greenland, and the landscape learning necessary for permanent settlement to become established, took decades rather than the short and swift voyage ascribed to Eiríkr rauði in the texts. Walrus may well have been hunted for a long time in Greenland before attempts to colonise it permanently began, and experiences of colonisation of new countries elsewhere suggest that there may have been a number of false starts before settlement took root. All of this is hypothetical, but given how little research has been done into the earliest phase of Norse Greenlandic history, it is likely that future investigations will result in a better supported and more nuanced picture.

Once the colonisation of South Greenland by Norse farmers was underway, it seems to have progressed rapidly.[224] One of the earliest radiocarbon dates from a Norse Greenlandic archaeological deposit comes from the base of a midden at a small and marginal farm site, Niaquusat (V48), in the smaller and more marginal Vestribyggð. If such an unassuming place was already occupied at the end of the 10th century, then practically

Fig. 2.83: Harbour seal, a seal species found in the fjords of many parts of Greenland, where it was hunted by Palaeo-Eskimo, Norse and Inuit.

all other inhabitable places must have been settled by that time, too. Estimates of the founding population range from several hundred to as many as a thousand, and larger numbers are needed if it turns out that Niaquusat (V48) was not exceptional, if all the small and dismal places were settled more or less from the outset.

What can explain the colonisation of Greenland in the late 10th century? It can, of course, be seen as a logical progression of the settlement of Iceland, and it is clear that climatic conditions were favourable at this time, both for exploration and colonisation. A hypothetical walrus hunting prequel would help explain how the country was explored and how the necessary knowledge of the lay of the land and its resources was established. There are indications of mid- to late 10th century settlement expansion within Iceland and it may be that interest in moving to Greenland was kindled among a new generation of Icelanders coming of age and not finding the same opportunities available to them as their parents and grandparents.[225] Finally, ideological motivations may have been involved. The absence of pagan burials suggests that, unlike contemporary Icelanders, late 10th century Greenlanders were uniformly Christian and it may be that they had ideas of building a more perfect society of the kind well known among early modern emigrants.

Economy

Zooarchaeological analyses show that the Norse Greenlanders established particular subsistence strategies from the outset.[226] Seal hunting was preferred over fishing and was from the beginning a mainstay of the economy, with seal bones making up between 25% and 70% of animal bones in early assemblages. The heavy reliance on seal is particularly apparent at lower status sites, and is more pronounced in Vestribyggð than Kujataa. It is likely that dependable access to seal meat was a precondition for successful colonisation, and it seems to have provided the Norse Greenlanders with the basic food security that saw them through nearly half a millennium of deteriorating climatic conditions. Increasing sea ice from the mid-13th century onwards, while undoubtedly making farming more challenging, may have brought more seal to the outer coasts of Kujataa. It has been argued that increases in harp seal numbers in the Norse Greenlandic middens are linked with increased summer drift ice, indicating that the cooling may have had the counter-intuitive effect of improving food security.[227] It is however clear that reliance on the seal hunt came at a cost to Norse Greenlandic society. It seems to have precluded the utilisation of other resources, marine fishing in particular, and will have required investment in boats and likely considerable cooperation and coordination between settlements. Investigating these dynamics is one of many pressing tasks that await resolution by archaeologists studying Norse Greenland.

Estimates of seal populations and accessibility would allow assessments of the extent to which the Norse Greenlanders could easily meet their calorific needs through the seal hunt. It is possible that famine was never a serious threat in the Middle Ages and that the Norse Greenlanders could always stock up on enough seal meat to see them through even the most severe winters. But although the seal may have been an inexhaustible resource it, could not be utilised easily, at least not in the quantities necessary to provide full security, without organisation and cooperation. Effective large-scale seal hunting had to take place in the outer fjords, 20–60 kilometres from most Norse Greenlandic farms. This required boats, the building and maintenance of which was costly. Timber for boat building is not to be had in the inner fjords. Driftwood may have been utilised—assessments of its quality vary—and timber could have been imported from Europe, and perhaps also from Labrador. The appearance of a Marklandsfar ship in Iceland in 1347[228] suggests that the Norse Greenlanders may have made regular trips to Labrador, and the most likely reason they had to go there was to obtain lumber.

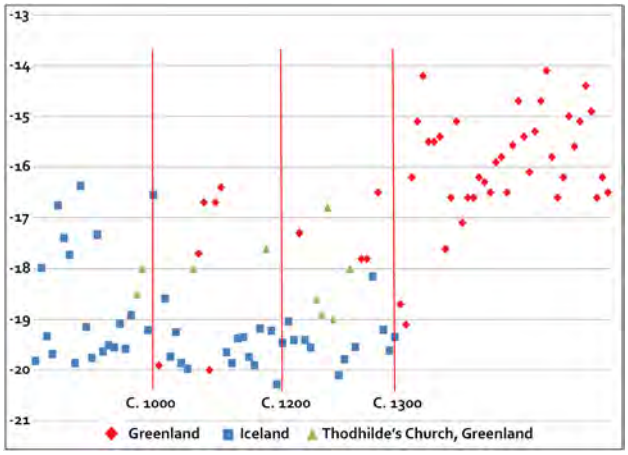


Fig. 2.84: Graph showing δ13C isotopic values of medieval Greenland Norse (red and green) and Icelandic (blue) skeletal samples, showing the distinct presence of marine mammals in the diet.

However the boat building material was obtained, it will have required resources and connections, and this is likely to have been one source of inequality in Norse Greenlandic society. Lower status households relied heavily on the seal hunt for their subsistence, but for this they needed access to boats. It is unlikely that households, whether individually or communally, were self-sufficient in obtaining materials for boat repairs and replacement (not to speak of boat building expertise). At the very least, there must have been community-wide efforts to obtain timber and very likely this provided opportunities for leaders to show leadership and patrons to patronise. While the seal hunt may have provided the Norse Greenlanders with basic food security, it may also have been one of the factors that contributed to, and maintained, clearly evident patterns of inequality.

Although seal was vital for the Norse Greenlandic economy as a whole, it is clearly associated with lower status. Seal meat was the fall-back item on the menu when other food was not to be had. Its possible abundance may have ensured that even the poorest Norse Greenlanders never suffered seriously from famine, but it probably also ensured that they were stuck in a perennial poverty trap. It seems that everyone had access to seal meat, and the poor even had more than the better off. Access to seal meat may have created dependencies, but it did not constitute the basis for social or economic differentiation. Such differentiation was exhibited in other domains. In Vestribyggð, where reindeer are found in large numbers, such bones are found in comparable measures at all sites. In Kujataa on the other hand, where reindeer has not roamed naturally since ca. 1800, and where in medieval times herds were small and isolated compared to farther north, reindeer is clearly associated with higher status sites in the inner fjord areas. But it was not the wild resources but rather farming that was the primary determinant of socioeconomic status in Norse Greenland. There is a very clear relationship between the conditions for farming and status in Norse Greenland. Settlement is densest in the inner fjord areas where soil and microclimate combine to create the most favourable conditions for farming. Within this area the locations suitable for homefield cultivation are few and small, and there is a direct relationship between such spots and site status.

In Norse Greenland possession of one of these few favourable spots was a precondition for prosperity and respectability. Opportunities to enhance the productivity of fields and pastures were small and circumscribed. In fact, such opportunities were more or less restricted to the most favourable locations, meaning that only the lucky few in possession of such places were able to improve on their conditions, while the majority was unable to significantly increase the productive capacity of their farming operations once woodland had been cleared to enhance grazing and homefields had been improved to produce winter fodder. A shieling system, under which a part or all of a farm's livestock was kept at summer farms where small patches of meadow could in some cases also be exploited, created a degree of flexibility. But this seems also to have been correlated with status: the larger and more productive the homefield and nearby pastures, the more likely the farm was also to possess a rich shieling site (or sites). In some areas what has been termed 'exclusion zones' have been described around the very largest farms. This is where large farms or manors sit in the middle of high quality land which would have been sufficient to support more units. At sites like Igaliku (Ø47 – Garðar) and Qaqortukulooq (Ø83 –Hvalsey), it seems that the manors came to dominate their neighbourhoods and small adjacent farms were either subsumed under the manorial organisation or closed down so that their resources could be utilised directly from the central farmstead.

Farming in Norse Greenland was subsistence oriented and its goal seems to have been to produce the greatest variety of food to supplement the plentiful, but monotonous and apparently low status, seal meat. Higher status was associated with greater variety of farm products, dairy and meat. At the apogee of Norse Greenlandic society, one of its bishops, whose skeleton was excavated from the cathedral at Igaliku (Ø47 – Garðar), has isotopic values indicating that there was practically no marine component to his diet while the average person subsisted to a major degree on marine foods, the animal bones suggesting that this was primarily seal meat.[229] All the farms had cattle, sheep and goats, as well as small numbers of horses, while pigs are found in more modest numbers and not at every site.[230] A characteristic of the Norse Greenlandic farming economy is a relatively high proportion of cattle relative to sheep and goats and the fact that this ratio did not change as markedly as it did in neighbouring Iceland, where there was a decided shift towards sheep from the 12th century

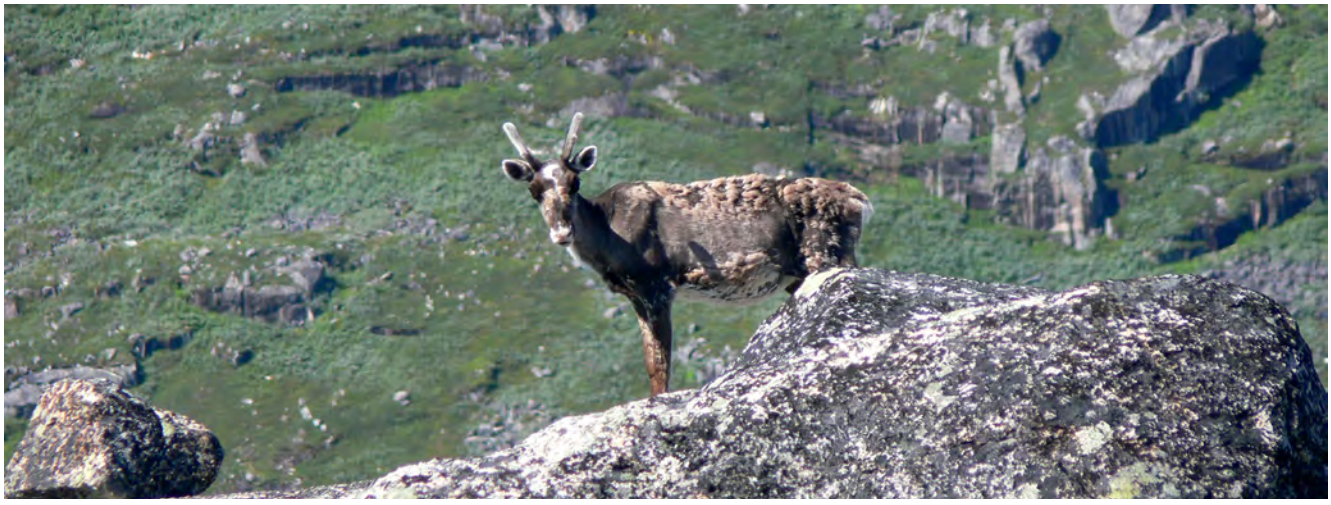


Fig. 2.85: Caribou was an important food source for both Norse and Inuit.

onwards. Another characteristic and a difference compared to Iceland is a high proportion of goats compared to sheep.[231] Goats became rare in Iceland after the 11th century, but in Greenland they constituted a significant proportion of the livestock throughout. To some degree, these patterns may relate to exchange: in the mid-13th century *Speculum regale* buckskins and cowhides are mentioned as the main export items of Norse Greenland along with walrus hides and ivory.[232] It is possible that the Norse Greenlanders had cornered a niche market in specific types of—or specifically processed—skins, similar to what has been argued for Icelandic textiles, but it would be difficult to argue that Norse Greenland could have produced such quantities of goat and cattle skins that they could compete with North European producers. More likely these export items are mentioned because they are all the Norse Greenlanders had in addition to the more exotic commodities derived from the hunting of wild animals. The relatively small numbers of sheep mean that the Norse Greenlandic economy will only just have been able to produce enough wool to clothe the whole population, and no doubt the sheep were primarily kept for this purpose, while goats and cattle were raised for milk and hides. Although farming may have produced less than half of the food needed, especially at lower status farms, it seems to have occupied a proportionately greater part of people's time and energy. Caring for the farm animals required shepherding, fodder production and storage, the building of shelters and feeding and watering throughout the winter months. The greater part of the visible archaeological remains of Norse Greenland relate to this activity: byres and stables of different types and sizes, barns to keep hay, pens and folds of a variety of types for milking, weaning and other management of the flocks, and the construction of irrigation dams and channels to enhance grass growth.[233]

A significant difference between Norse Greenland and Iceland is that in Greenland homefields were as a rule not protected by walls of turf or stone. Such boundaries are found in a number of places, but they are not ubiquitous, as in Iceland, and this suggests a different approach to farming. It may reflect the fact that despite all the efforts the Norse Greenlanders put into their farming activities, it was not vital to their survival to the same degree as in Iceland. Fenced homefields were labour intensive—constant repairs were needed if they were to be functional—and it may be that it was simply not worth the effort to maintain them. It may also be a labour issue. If significant proportions of the male population were away hunting seal in the spring and early summer, and smaller but still significant numbers went on the long hunting trips to Norðrseta and other hunting grounds in summer and autumn, then there may simply not have been enough manpower to build more than the most essential structures.

Fig. 2.86: Bishop's burial and skeleton unearthed inside a side chapel in the Norse Garðar Cathedral. The skeleton is14C-dated to the second half of the 13th century AD, and could be the remains of either of the historically known Greenland Norse bishop's Olaf, Thord, Arne or Alf. Isotopic analysis of the skeleton displayed a very terrestrial diet, reaffirming the high status of the buried person.

Much suggests that population and manpower was a key limiting factor in Norse Greenland. The population was small—estimates range from 2,000 to 5,000—with most modern researchers opting for the lower end of that range.[234] At its height, Norse Greenland may have had some 350 separate farm units and likely the number was always considerably smaller.[235] This population needed to support at least two groups of specialists: priests and shipwrights, and a substantial part of the workforce was engaged in seasonal long-range resource procurement activities. There must have been a tension between the labour requirements of the farming and the hunting aspects of the Norse Greenlandic economy. The hunting produced the staple food, but also the commodities that could most profitably be exchanged abroad in return for basic necessities like wood and iron, and for materials and prestige goods that underpinned socioeconomic differentiation. Farming, on the other hand, clearly reflected and supported the ideology and social order of this community. If asked, the Norse Greenlanders would undoubtedly have identified themselves as farmers; their

world view was derived from northern European farming communities and they steadfastly clung to the farming way of life even if their actual circumstances made them rely on hunting. The degree to which Norse Greenlandic society should be seen primarily as a resource extraction operation serving European markets has been much discussed.[236] It is clear that Norse Greenlandic society was geared towards the procurement of exotic, high-value goods to a remarkable degree. The ubiquity of walrus maxilla fragments in Norse Greenlandic contexts shows that walrus ivory was not only an important export item but also that the entire society—small farms and large farms alike—was involved in the processing of this commodity.[237] Because of Greenland's isolation and its lack of basic resources like wood and iron, it has seemed to many that marketing exotic goods was not only a necessity but the whole reason for Norse Greenland's existence. Scholarly positions on this can be divided into three main categories:

- One sees Norse Greenland as a resource extraction colony, which was established and maintained in order to procure rare commodities of high value. The farming in this scenario is then seen as a prop for the hunting. The distances were too great for the hunting to be organised from Norway or Iceland and the hunters therefore had to be stationed permanently in Greenland, where small-scale and low intensity farming was necessary to support their existence. This scenario draws attention to the organisers of this activity: who benefited and where did the profits go?
- Another view holds that the aims of the settlers of Norse Greenland were no different from those of Iceland and the Faroes, to establish self-sufficient communities offering the possibility of a decent quality of life, but that because of their isolation, the small size of their settlement and the limitations of the environment, the Norse Greenlanders were completely dependent upon foreign trade. This dependence then forced them to spend much time and great effort on procuring commodities that would draw foreign merchants to their shores.
- The third view sees the foreign trade as less vital, more as an opportunity that the Norse Greenlanders could exploit, providing them with occasional windfalls, but without making them dependent on it for their survival. This scenario would see the resupply of iron as a minor issue, downplaying both replacement rates and cost.

Assessments of these different scenarios are affected by two essential issues. One is the demand for Greenlandic products on European markets.[238] There is good evidence that walrus ivory was highly valued, but this value was likely underpinned by its rarity. Like the live polar bears known to have been exported from Greenland, the single walrus tusk may have been effectively priceless, but if there was a steady supply of tusks coming from Greenland, then this would have affected their value, lowering it in the long run. The news of a whole shipload of walrus ivory paid by the Norse Greenlanders in papal dues in 1327 suggests that there was a plentiful supply, but that the market had not been flooded because the shipment fetched a handsome price by all accounts.[239]

> *The farmers raise cattle and sheep in large numbers and make butter and cheese in great quantities. The people subsist chiefly on these foods and on beef; but they also eat the flesh of various kinds of game, such as reindeer, whales, seals, and bears. That is what men live on in that country …*
>
> *The King's Mirror, c. 1250 AD*
> *(Speculum regale, 145)*

The other issue is the costs of procuring the exotic commodities within Greenland. There are sufficient references and archaeological traces to suggest that the Norse Greenlanders embarked on very long-range hunting expeditions as far north as Upernavik, 1,000 kilometres north of Vestribyggð and 1,500 kilometres north of Kujataa. However, we do not know how regular these trips were, or how large the expeditions were. It is possible that the expeditions were mounted annually, involving many ships and significant numbers of men, but it is also possible that they were more occasional and opportunistic, involving perhaps only a single boatload of men who could slaughter enough walrus in one season to meet the fiscal and commercial demands for the products for many years. As merchants often stayed in Greenland for two or three years or more, it is possible that the long-range hunting expeditions were only sent off when there was a buyer in place who was sure to take the merchandise off the Greenlanders' hands. Given present understandings of the nature of medieval trade it is possible that the hunts were carried out to fulfil specific orders, so to speak—that expeditions only set off when a merchant had arrived offering goods that were deemed necessary to buy and when the price had already been negotiated. Such dynamics were liable to change once the Norse Greenlanders started paying tax to the Norwegian crown, which coincided in time with growing demands for extraordinary contributions to the Catholic Church. After the 1260s, there would have been reason for the Norse Greenlanders to stock up on merchandise that could be handed over to tax collectors when they came by, and it is traditional to view the distinctive *skemmur*, dry stone structures interpreted as storage houses, as custom-made responses to such long-term storage needs.[240] Depending on which scenario is closest to the truth, the *skemmur* could also have been a feature of Norse Greenlandic economic practice since the inception of the settlements.

Communications

Communications are a central issue for Norse Greenlandic history. They are vital for understanding both the internal and the external dynamics of this society. Communications with the outside world were affected by the sheer distances involved—with more than 1,200 kilometres to Iceland, 2,100 kilometres to Scotland and 2,600 kilometres to Norway—and by conditions underway and the ships and navigational technology available. Although nothing characterises the Viking Age so much as seafaring, there is little firm knowledge of the ships and navigational technology involved in the ocean-going ventures of these times. The effects of these voyages provide the most revealing indications: the fact that Norse mariners were able to sail across the Atlantic and establish colonies as far from the European mainland as Greenland tells us that they had ships large enough to transport living animals and large volumes of equipment and numbers of people, and that they had navigational technology sophisticated enough to do this repeatedly and regularly enough for the settlements to flourish.

> *Þórarinn answers: "I have not been to Greenland."*
>
> *The king says: "For a mariner such as you it must then be high time to go to Greenland, if you have not been there before."*
>
> Ólafs saga Helga, Heimskringla, 1230s AD
> (Íslenzk fornrit 27, 126)

It is known that the ocean-going ships were of a particular type, the *knörr* (p. *knerrir*), but how large they were is not known, nor is there a clear sense of their operational limits. The closest thing to an ocean-going ship preserved from the Viking Age is Skuldelev I, thought to be a small *knörr*. It is 16 m long and 4.8 m wide and will have carried a cargo of some 25 tonnes.[241] It is little larger than the largest fishing boats known from later times in the North Atlantic (*tólfæringar* in Iceland, *sexæringar* in the Faroes) and arguments have been made that it was ships in this size category that made up Eiríkr rauði's colonisation fleet in the 980s.[242] The drawbacks of such relatively small ships were limited cargo capacity and vulnerability to storms, but the pros included greater manoeuvrability and less need for harbour installations. Such ships could be dragged ashore and if wrecked they represented smaller losses than larger ships with bigger cargo and larger crews. It may be that in the relatively favourable conditions of the 10th century, when the climate was not only considerably milder than later on but weather patterns more stable and predictable, it was such versatility and manoeuvrability that made the exploration of Greenland and mainland America possible.[243] What is clear is that as time went on the climatic conditions deteriorated and ocean-going ships got larger and their operation became a more specialised undertaking.

After 1200, a decided cooling trend set in throughout the North Atlantic ,and much suggests that the second half of the 13th century represented a threshold in this respect. A colder climate meant that sea ice became prevalent farther south and this is explicitly referred to in the sources. In Ívarr Bárðarson's description it is said that the old navigational route lay from Norway to Iceland, and that from western Iceland there were four days of sailing to islands off the east coast of Greenland, and another four days from there to the settlements in Kujataa. It adds that there is now ice from the north-east so close to the off-shore islands that no one sails this old route without danger to their lives.[244] This implies that it had been traditional to stop in Iceland on the way to Greenland and there are several instances of this mentioned in 13th and 14th century sources, although most involve bishops going to and from Greenland, who may have had specific reasons to want to stop over on their infrequent trips. It is clear, however, that sailing directly between Norway and Greenland was regular practice at least by the late 13th century and this is how the route is described as well in *Landnámabók*.[245] In the 14th century, when there was more regular reporting on this shipping route than in previous centuries, it seems that most trips were made non-stop between Norway and Greenland. This may be an effect both of larger ships and more prevalent sea ice along Greenland's east coast. Larger ships, such as the Bryggen ship, built in 1188 or shortly after, which was more than 30 m long and 9 m wide with a cargo capacity of at least 120 tonnes,[246] or the Bremen cog from ca. 1380, at 24 m long and 7.6 m wide with a cargo capacity of ca. 100 tonnes,[247] could have stayed at sea much longer than the Viking Age *knerrir* and could therefore have been expected to have sailed more easily the longer route south of Iceland, which had the benefit of being less likely to be choked with sea ice than the traditional route along Greenland's east coast.

Fig. 2.87: Summer pack ice in the fjord near Uunartoq. In some periods, the pack ice blocks the South Greenlandic sounds, fjords and inlets for months on end.

Larger ships were more unwieldy than the smaller ones and a major limitation in the late medieval North

Atlantic context was that without harbour installations they were difficult to bring to land. Out at sea they were safer, but close to shore they required calm conditions to avoid the risk of shipwreck. This is why there may have been a reason to avoid Iceland altogether on the Norway to Greenland run; stopping over was not as necessary as on smaller ships and it invited unnecessary danger. But larger ships also represented greater investment, both in terms of the ship itself, the larger crew and the larger cargo. Unless there was a drastic increase in the volume of trade, larger ships would have meant fewer trips. It would have meant a smaller number of mariners with first-hand knowledge and experience of the long and treacherous route and it would have meant that each trip represented a greater risk from the operators' point of view. If four times as few ships were needed to service Norse Greenland in the 14th century as in the 11th (a figure extrapolated from the difference in estimated tonnage), and if the absolute number had only been 12 ships regularly involved in the Greenland trade, then a reduction to three would have had serious consequences. There would have been a very small pool of experienced mariners and such a small fleet would have been very vulnerable to mishaps. It may indeed be that the loss of the 'Greenland knörr' in 1369[248] represented irrecoverable damage to the regular Greenland trade. From an insurance perspective, each journey of the larger late medieval ships was much more risky than the smaller craft of earlier times, and this would have affected what were the age's equivalent of premiums, as well as the willingness of operators to risk their ships on such trips. It is not known that the ships involved were so few, but the Icelanders' insistence on six ships annually in their 1262 treaty with the Norwegian king[249] would indicate that the more than 10 times smaller settlement in Norse Greenland would not have required more than one ship per annum for its commercial needs. If each ship took 2–3 years to make the round trip, this would have meant that a minimum of three ships was needed to maintain dependable communications. Much suggests that the regularity of shipping was compromised after the middle of the 14th century. Most news of late 14th century shipping to Greenland involves Icelandic seafarers—claiming misadventure in violating the royal monopoly on the Norse Greenland trade, and perhaps exploiting a vacuum created by the diminishing fleet of regular Norse Greenlandic traders. Much is uncertain in this field, but it is clear that the mechanics of external communications are an important piece in the puzzle of the dynamics of Norse Greenland and the demise of its settlements.

All of this is, of course, contingent on the assumption that the Norse Greenlanders were not able to build or operate ocean-going vessels themselves. The assumption that they were not is supported primarily by the absence of evidence for such involvement and by analogy with the larger society of Iceland, which by and large relied on foreign merchants to keep up communications with other countries. It is reasonable to assume that if the Icelanders did not have their own ocean going ships, then the Norse Greenlanders would have been even less likely to have such ships. Although they were always in a minority, Icelanders did own such ships, however, and in particular both episcopal sees operated vessels that regularly sailed between Iceland and Norway. In 1381, the vessel of the bishops of Skálholt, *Þorlákssúðin*, was shipwrecked in Greenland[250] and although there is no mention of it anywhere, it is possible that there was a comparable ship, perhaps called *Nikulásarsúðin* after the cathedral's patron saint, operated by their peers in Garðar.

Fig. 2.88: Depiction of a Knörr-type Viking ship on a 13th century seal from Bergen. This was probably the type of ship commonly used in the medieval voyages to the settlements in Greenland.

The sources however consistently portray Norse Greenlandic shipping as smaller and not ocean-going. The authors of *Eiríks saga rauða* and *Grænlendinga saga* are careful to highlight that the ships involved in the Vínland expeditions had been brought to Greenland from Iceland and in the 12th century *Grænlendingaþáttr* there is an explicit statement about how much smaller the local boats were than the merchants' ships from Iceland and Norway.[251] In 1347, a Norse Greenlandic ship "smaller than small Iceland-merchants" came to Iceland with a crew of 17 or 18. It had been on its way to Markland – Labrador – when it was blown of course.[252] The crew size indicates that this ship may have been in the size category of *Skuldelev I* and the wording of the comparison with Icelandic merchants probably means that this ship was larger than the largest Icelandic fishing boats, of ten or twelve oars. Such ships may have been considered ocean-going in the 11th century and this certainly demonstrates that in the mid-14th century the Norse Greenlanders had the capacity to send expeditions

to mainland America, a similar distance as to Iceland if they went straight across the Davis Strait, and a similar distance as to Norway if they crossed the Strait at its narrowest, as is normally assumed. The Davis Strait is no tranquil pond. Fogginess, sea ice and icebergs more than make up for its storms being perhaps slightly less severe than in the North Atlantic. Indeed, it may be that smaller vessels like the Marklandsfar were more easily able to manoeuvre those treacherous waters than the large ocean-going cogs of northern Europe. The existence of the Marklandsfar suggests that the Norse Greenlanders not only were able to mount some fairly impressive long-range expeditions around the Davis Strait and into Baffin Bay, but also that they would have had the means to get themselves to Iceland or mainland Europe, if needed. That the appearance of the Norse Greenlandic ship in Iceland in 1347 was considered newsworthy suggests on the other hand that such voyages were not being regularly made at that time, whatever may have happened later.

> *... there are frozen headlands which send headlong into the sea immense icebergs, which are increased in bulk by the water spewed on them by the flooding waves and solidified by the frost of winter. Traders making for Greenland often and unwillingly must set their course among them and so run the risk of shipwreck.*
>
> Historia Norwegiae, 13thc. AD
> (Historia Norvegiae, 4)

The evidence for Norse Greenlandic boats is extremely thin on the ground. Texts like *Grænlendingaþáttr* mention them as everyday equipment, not requiring any particular comment, fragments of boat timbers have been recovered from archaeological excavations[253] and in some places structures lying directly on the coast have been interpreted as boat houses.[254] It is, however, impossible to imagine how Norse Greenlandic society could have functioned without boats—a great many boats. Norse Greenlandic settlement structure is overwhelmingly coastal, with inland farms frequent only in the centre of Kujataa (in particular component parts 1 and 4), and the ruggedness of the landscape is such that even neighbouring coastal farms were in many cases not able to communicate with each other except by sea.[255] A reconstruction of the parish of Hvalsey suggests that only six out of its probably more than 20 farms could have attended church services by travelling overland, and even for these going by sea would have been easier. Boats would have been required not only for ritual and social needs, but in many cases also for the transport of livestock and produce within farm properties, which could extend across fjords and sounds and frequently included sections of coast that were inaccessible on land. Most importantly, however, Norse Greenlandic households required boats to get to seal hunting grounds located on the outer coasts of the settlements. For these expeditions it is not necessary to imagine that every farm had its own boat, although this is conceivable. It is possible that the seal hunts, as well as the longer range walrus hunts, were organised communally and that a smaller number of larger boats were required for these needs. How this was organised is a major issue for understanding the dynamics of Norse Greenlandic society. How expensive it was for each household to acquire and operate a boat affects assessments of how robust or vulnerable the Norse Greenlandic economy was, and if some households relied on others to obtain access to long-range hunting, then this raises issues of social relations and possible inequities. If boats which could be used for the annual seal hunt were communally owned and operated, this would mean that depopulation could very quickly have a cascading effect. If, for instance, five households shared a boat and one was abandoned, the remaining households would need to increase their labour contribution significantly to make up the shortfall. If, on the other hand, boats for long-range hunting were owned and operated by landowners, churches or other agents in positions of power, this would imply centralised control over the long-range hunts, resulting in a society characterised by a fundamental divide between those in control of the means of production and those who relied on them for their subsistence.

Fig. 2.89: Likely Norse cairn built in a pass approximately halfway between two farms (Ø100 located by the inlet in the background).

Communications are a central issue for understanding Norse Greenland because of the immense distances involved, on all scales of analysis: the distances between Norse Greenland and other countries, the distances between the Norse Greenlandic settlements and their hunting grounds, and the distances between individual farms. On all of these scales Norse Greenland is exceptional in the European context. No other medieval European society faced comparable challenges in maintaining the connections necessary to keep itself running.

Church and state

No unequivocal pagan burials have been found in Norse Greenland and for all intents and purposes Norse Greenlandic society can be considered to have been Christian from the outset. 13th century sources credited Leifr Eiríksson with bringing Christianity to the country on the orders of the missionary king Ólafr Tryggvason (who ruled 995–1000). The earliest texts about King Ólafr and his missionary exploits in Norway and Iceland do not mention this, and this has led to the suggestion that the story about Leifr is a late invention.[256] There is at any rate no archaeological evidence to support an initial pagan phase and some of the earliest radiocarbon dates from Norse Greenlandic contexts come from late 10th century Christian cemeteries, including the graves of immigrants from Iceland, suggesting that many of the colonists may already have been Christian when they arrived in Greenland.[257]

The earliest churches were small structures, typically surrounded by a circular enclosure. This is the same type of structure as the earliest generation of churches in Iceland. These were likely buildings where prayers could be said and itinerant priests could sing masses, but they were probably not parochial centres. Such small early churches are typically found on moderately large farms, while the largest farms are associated with larger churches, some of them monumental, with 13th–14th century dates. An exception is Qassiarsuk (Ø29a – Brattahlíð), which has two church sites, a small early turf church with dates on burials going back to the late 10th century and extending into the middle of the 13th, and two phases of a much larger stone church. The earlier of these is Romanesque in style inside a circular enclosure, while the later one is Gothic inside a rectangular churchyard. There are no absolute dates for the later churches, but typologically the Romanesque church could be from the 12th–13th centuries and the Gothic one from the 13th–14th. It is possible that the small turf church was used concurrently with the Romanesque church for a century or more, in which case it may have functioned as a private chapel and cemetery for the lawman's household while the larger church was the parish church, receiving burial from the surrounding farms. Where the small churches have end-dates, these suggest that they were no longer used by the middle of the 13th century. Most of these dates are on burials so they suggest, at minimum, that the small churches ceased to be used for burial in the 12th and 13th centuries, a pattern also observed in Iceland. This implies a growing centralisation of the parochial system, with the development of parish churches that monopolised burial in their districts. It is currently not possible to date this process more closely than to say that it had long been underway by the mid-13th century and had probably started much earlier. Important institutional developments took place in the 1120s when the Norse Greenlanders got their first bishop. *Grænlendinga þáttr*, thought to be written around 1200, describes how the secular leader of the Norse Greenlandic settlements went to Norway to petition for a bishop, how he was successful and a bishop called Arnaldr was consecrated.[258] Icelandic annals date his concentration to 1124,[259] but they also mention an earlier bishop, Eiríkr ufsi, who is reported to have set off to search for Vínland in 1121 (two annals place this in 1112 or 1113).[260] This is normally not given much credence, although it could be reconciled with Grænlendingaþáttr's account (which makes no mention of any earlier bishops) if Eiríkr was a missionary bishop with a status similar to several bishops who are known to have been to Iceland in the 11th century, but did not have the same status or role as the bishops formally consecrated to the Icelandic episcopacy (from 1056).[261]

> *... Sokki had an assembly summoned, and announced to everyone that he wished that the land should not remain any longer without a bishop, and he wanted all his countrymen to contribute to the founding of an episcopal see ...*
>
> *Sokki asked his son Einar to make a journey to Norway to this end ... Einar said he would go as he wished. Einar took a lot of ivory and walrus-hide ropes with him, in order to advance his case among the notables.*
>
> *They arrived in Norway. ... Einar came to meet the king and smoothed his way by means of his gifts, and then he broached his business and his mission, and asked the king for his help so that he could obtain what he asked for, for the need of the country. The king said that would certainly improve things for them in Greenland.*
>
> The Tale of the Greenlanders, 13thc. AD
> (Complete Sagas V, 372-73)

There is hardly any information about the Norse Greenlandic church before the 12th century. Adam of Bremen indicates in his account from the 1070s that the Icelandic bishops had pastoral responsibility for the Norse Greenlandic settlements.[262] This may simply have been his surmise, and even if they had such responsibilities they would not have been in a position to have much influence, especially taking into consideration the rudimentary nature of the Icelandic church's organisation before the end of the 11th century. Later Icelandic sources depict early Norse Greenlandic Christianity as primitive and imperfect, Eiríks saga giving this description of the problems the Norse Greenlanders had in burying their dead in consecrated ground:

It had been common practice in Greenland, since Christianity had been adopted, to bury people in

> unconsecrated ground on the farms where they died. A pole was set up on the breast of each corpse until a priest came, then the pole was pulled out and consecrated water poured into the hole and a burial service performed, even this was only done much later.[263]

The number and high age of the small churches with associated cemeteries suggests that this reflects assumptions based on knowledge about settlement dispersal and difficult communication rather than sound information about the level and quality of pastoral care in early 11th century Greenland. The small churches on the other hand do suggest that there were no fundamental differences in church organisation between Norse Greenland and Iceland, at least not until the Icelandic church establishment began to consolidate during the course of the 12th century. From Arnaldr onwards, there is an unbroken succession of Norse Greenlandic bishops ending with Álfr who died in 1378. The deaths and consecrations of these bishops are routinely reported by the Icelandic annals and a list is also given in the late 14th century manuscript *Flateyjarbók*.[264] From Bishop Jón smyrill (1188-1209), the coming and goings of the Norse Greenlandic bishops is reported in some detail in the annals, which often state when they went to Greenland and if they stopped over in Iceland. This has led to the suggestion that the men named as bishops of Greenland before Jón smyrill never actually went to Greenland,[265] but this may also be an effect of the annals being composed in the 13th century and therefore reporting in more detail about contemporary events while they relied on historical documents and oral traditions about 12th century and earlier events. Their reporting on the comings and goings of the Icelandic bishops in the 12th century is also quite incomplete. *Grænlendingaþáttr* clearly places the first bishop, Arnaldr, at Garðar in Greenland in the years around 1130 and there is little reason to discount this. The annals also mention his stopover in Iceland in 1126.[266] Very little is known about the men who served Garðar; most are not mentioned in any other sources and most are known only by their given names. They are normally assumed to have been Norwegians (unlike most Icelandic bishops before 1237, who were all natives) but there are no clear indications about this and some of them may well have been Norse Greenlanders.

Grænlendinga þáttr explains that Bishop Arnaldr established his episcopal see at Garðar and implies that the father-son team of secular leaders in Brattahlíð, Sokki and Einarr, were instrumental in arranging this. The earlier history of Garðar is obscure: it is mentioned in the *Grænlendinga saga* as the farm of Eiríkr's daughter Freydís,[267] and this might imply an early proprietorial connection between Brattahlíð and Garðar, but like so much else which is reasonable enough in the sources, it may merely have been surmised by the authors. Archaeological evidence confirms that Igaliku (Ø47 – Garðar) was occupied already in the 11th century, and a hazelnut dated to 994–1154 from a midden deposit suggests that Garðar early became a centre for the elite consumption of imported goods.[268] Garðar is one of the most, if not by far the most, favourable spot in Kujataa for farming. It is therefore to be expected that it was occupied in the first wave of settlement and the only thing about its becoming an episcopal seat that might need explaining is how it could have been so conveniently vacant when the first bishop arrived. It is the kind of place where chieftains competing with the Brattahlíð clan would have been likely to set up shop. That there is no trace of this suggests that secular authority in Norse Greenland may always have been unified, with little or no room for competing factions.

Fig. 2.90: Bishop's crozier and ring found in burial inside the Norse Garðar Cathedral at present-day Igaliku along with skeleton 14C-dated to the second half of the 13th century AD.

The narrative of *Grænlendinga þáttr* hinges on the Norse Greenlanders having their own laws and a separate jurisdiction from Norway. The text indicates that there were local rules about how to handle proceeds from salvaged shipwrecks, which may indeed have been the sort of issue that was particular to Norse Greenland and will have required local legislation. The text mentions a judicial assembly in Garðar and from these scanty descriptions, as well as analogy with Iceland and Norway, it is traditionally assumed that the constitutional order of Norse Greenland will have been similar to other Norse societies. Norse Greenland was a separate jurisdiction, but to what extent it had separate laws and judicial institutions is unknown. All of the medieval that which describe political conflict in Norse Greenland involve foreigners and are not considered reliable guides to its internal politics or judicial system.

In 1261, a ship came to Norway that had been in Greenland for two years and bore the news that the Greenlanders had sworn allegiance to the Norwegian king.[269] The biography of King Hákon Hákonarson (ruled 1217–63) mentions that this involved the paying of tax and the acceptance of liability to the crown in manslaughter cases, irrespective of whether Norse Greenlanders or Norwegians had been killed, and irrespective of whether they were killed within the settlements or in the Norðrseta hunting grounds "and even if they are found as far north as the North Star." It was not lost on contemporaries that this extended the jurisdiction of the Norwegian crown enormously, but apart from the same text's claim that Bishop Ólafr was sent to Greenland in 1247 tasked with bringing the country under Norwegian control,[270] there is no further detail available on how this came about or whether it was the same arrangement as the Icelanders accepted in 1262–64. It cannot be a coincidence that the two North Atlantic societies swore allegiance to the Norwegian king at the same time and it is normally assumed that the prelude must have been comparable in the two countries, with local and Norwegian agents of the king advancing his case and receiving help to overcome opposition. The deal struck between the Norse Greenlanders and King Hákon will have been essentially similar to the one he struck with his new Icelandic subjects, but there are indications that there were also significant differences. By the middle of the 14th century, a royal monopoly had been established over trade with Norse Greenland, and it is likely that this harks back to the agreement made in 1261.

This may indicate that the exotic commodities that the Norse Greenlanders could offer were of greater interest and value to the king than the more mundane merchandise available in Iceland, and it may also suggest that the Norse Greenlanders were concerned about the regularity of external contacts and sought to bind the king to guarantee regular shipping in turn for a monopoly on their trade. Another difference is that the administration of the trade and all contacts with the Norse Greenlandic settlements seems to have been delegated to the bishops of Bergen. Bergen had become the centre of North Atlantic trade in the 13*th* century, partly as a result of royal policy, and so this was a practical measure aimed at both bolstering Bergen as a market town and to make sure that Norse Greenland received the administrative support that it needed. But these were clearly extraordinary measures necessitated by the small size and isolation of the Norse Greenlandic settlements. The king also had a more direct hand in local Norse Greenlandic affairs than for instance in Iceland. Ívarr's description mentions two royal farms, one called Foss in Tasikululik (Vatnahverfi) and the other called Þjóðhildarstaðir in Kambstaðafjörðr, a small fjord next to Hvalsey.[271] The description says of Foss that the king grants it in fief, implying that he was in the position to give rewards independently of the local power structure. It is however probably symptomatic that both these properties are marginal to the main concentrations of settlement in the inner fjord areas of Kujataa, suggesting that local interests dominated the core of the settlements and its largest farms. Ívarr Bárðarson, himself a Bergen man, appointed by the Bishop of Bergen to oversee the bishopric of Garðar while its seat was vacant, gives the impression in his description that most land in Kujataa was owned by the churches. He details the lands and rights owned by the cathedral at Garðar and says of the parish churches that they "owned" continuous tracts of lands. It is possible that the original meaning was that these areas belonged to the parishes of these churches, but taken at face value this means that practically all farmable land in Kujataa, apart from the two royal farms, was owned outright by the churches. This is not inconceivable, but would indicate a radically different system of land ownership from any other known in contemporary Europe.

Fig. 2.91: View through the doorway of the massive Norse byre/barn in Igaliku/Garðar, the largest byre ever found in Greenland.

The Icelandic church establishment was busy accumulating landed wealth in the late Middle Ages and owned about a half of all land in the country by the middle of the 16th century.[272] If the Norse Greenlandic churches actually owned practically all land in Kujataa by the 1360s,

this might indicate that depopulation was already underway and that people who were leaving had given or sold their farms to the churches. The chequered transmission of the text means, however, that this can only be considered a possibility. There is much to suggest that the Norse Greenlandic churches were rich landowners and that the economic role of the Norse Greenlandic church was greater than in other Norse societies. One clue is the evidence for two religious houses, one an Augustinian house of canons in Ketilsfjörðr (associated with Ø105 – Tasermiutsiaat) and the other a Benedictine nunnery in Hrafnsfjörðr (more equivocally associated with Ø149 – Narsarsuaq). These religious houses had been established by the end of the 13th century and compared to the seven houses operational in Iceland at that time (one for every 600 farms as against one for every 200 farms in Norse Greenland) they represent a remarkable infrastructure investment for such a small society.

As it was the *raison d'être* of religious houses to support economically non-productive individuals, these institutions clearly testify to surplus production. Another indicator of surplus production, and possible royal support, is the monumental churches in places like Qassiarsuk (Ø29a – Brattahlíð) and Qaqortukulooq (Ø83 – Hvalsey). Stone masonry churches were a symbol of wealth and status in medieval Norway, although there were significantly fewer of them than in neighbouring Denmark or Sweden. They were not built in Iceland (not to completion at least) and finding several examples in Norse Greenland is therefore counterintuitive. These monumental buildings—along with the feasting halls associated with some of the same sites—represent wealth accumulation on a significant scale. They imply centralised control over this wealth, but it is not known whether all of the profits generated by the Norse Greenlandic economy flowed into erecting such structures or whether it was only a fraction. In other words: do the monumental buildings of Norse Greenland represent the proverbial tip of the iceberg of a very affluent society or are they the result of what could be squeezed out of a society blessed with valuable resources, the revenue from which benefited only the rich and powerful? Either way, these extraordinary buildings imply international connections and patronage. Building them was not only expensive it required specialist knowledge and likely craftsmen from

Fig. 2.92: View of the dramatic landscape in Tasermiut Fjord/ Ketilsfjörðr, where the Norse monastery was situated.

abroad. The Norwegian kings actively patronised church building in Norway and it is possible that their greater involvement in Norse Greenland than the larger society of Iceland, with its own crop of local patrons, meant that they channelled some of the wealth generated in this distant corner of their kingdom back to the local elite to ensure that the revenue would continue flowing. The typological dating of most of the monumental architecture to around 1300 would support this scenario; it is the period when the relationship between the crown and its Norse Greenlandic subjects was closest and mutually beneficial to both. Only a few decades later, things had changed, however, and soon afterwards the Norse Greenlandic settlements were no more.

Fig. 2.93: Detail from Aron of Kangeq's wood engraving of the last scene in a story in which the Inuit Qasapi after a long fight finally beats the Norse Uunngortoq and cuts of his arm.

Explaining the demise of Norse Greenland

Although a long time passed from the re-establishment of European settlement in Greenland in 1721 until it was generally accepted that the Norse Greenlandic settlements had gone extinct, it was clear to Hans Egede already in 1723 when he explored the ruins of the Norse Greenlanders in Kujataa that something had gone terribly wrong. His Inuit informers told Egede stories that indicated their ancestors had destroyed the Norse Greenlandic settlements. This was for long the favoured explanation, although 18th and 19th century scholars speculated freely about other possible causes, including famine, epidemics and enslavement, even rescue by European seafarers in the Age of Discovery, and possibly cultural assimilation with the Inuit. Much of this debate was hampered by uncertainty over when the Norse Greenlandic settlements had actually become deserted.

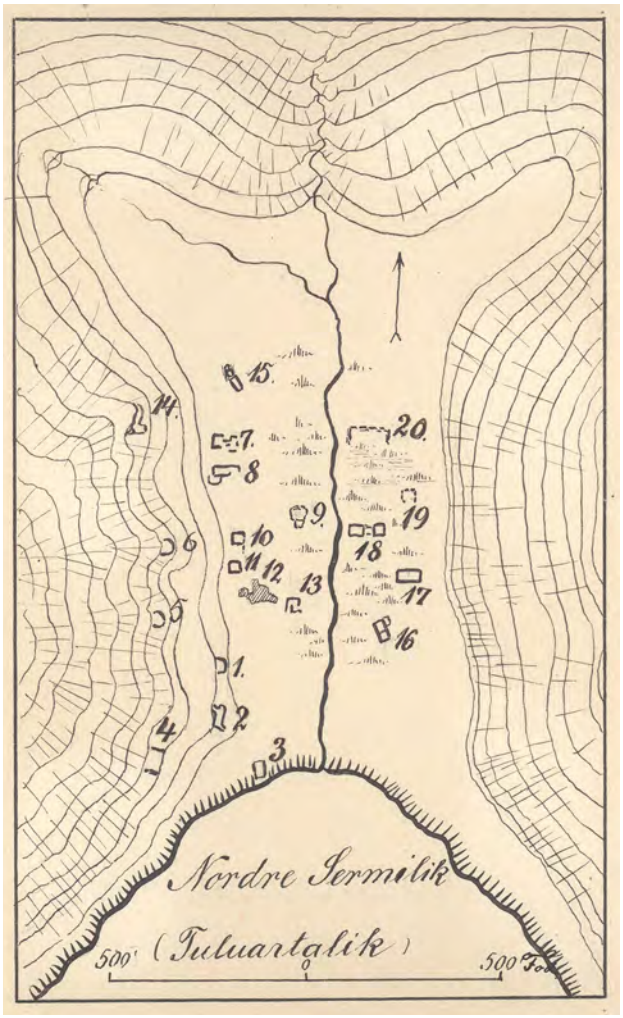


Fig. 2.94: D. Bruun's 1996 archaeological survey plan of Norse farm Ø6 in the nominated component part 1.

A variety of evidence, some made up and other misunderstood, seemed to indicate the presence of Europeans in Greenland at different times between the 15th and 17th centuries, and it was only through the critical efforts of the two generations of scholars working on Norse Greenlandic issues in the final years of the 19th century and the first half of the 20th—Daniel Bruun, Finnur Jónsson, Poul Nørlund and Aage Roussell—that it became firmly established that the last reliable record of contact is from 1408 and that archaeological evidence does not support any Norse Greenlandic presence much beyond 1500. Subsequent research has modified this conclusion only slightly; a number of radiocarbon dates on terminal phase burials and occupation layers suggest that Norse Greenlandic culture did not survive beyond the middle of the 15th century.

Fig. 2.95: The statue of Hans Egede overlooking the harbor in Nuuk.

The causes for the demise of Norse Greenland remain enigmatic and hotly debated. Poul Nørlund was the first modern scholar to argue that Norse Greenland failed because of changing trade patterns.[273] In his view, Norse Greenland was entirely dependent on foreign exchange and when comparable products to what it had to offer (elephant ivory from Africa and furs from Russia) flooded the European markets in the 14th century, the days of Norse Greenland were automatically numbered. Since the 1926 publication of Nørlund's influential book, which did much to popularise the issue, scholars have identified a number of possible causes and honed arguments for and against each one. During the course of the last hundred years, some explanations that were seriously considered in the 19th century have been discounted.

To all men who see this letter or hear it Brandur Halldórsson, Þórður Jörundsson, Þorbjörn Barðason and Jón Jónsson send their and God's greetings, making it known that when one thousand four hundred and eight years had passed from the birth of our Lord Jesus Christ we were present and saw and heard in Hvalsey in Greenland on the Sunday following the Feast of the Holy Cross in the autumn that Sigríður Björnsdóttir married Þorsteinn Ólafsson with the consent and counsel of her kinsman Sæmundur Oddsson.

Testimony taken in Iceland on 11 May 1414 (Diplomatarium islandicum 3, 756)

One idea was that the Norse Greenlanders had been assimilated into Thule Inuit society and there were apocryphal stories about blond Eskimos circulating at the beginning of the 20th century. Increasing contact and systematic ethnographic work among the Inuit, including archaeological work on early Thule Inuit sites, has failed to find any support for this idea, however, and recent DNA studies support the conclusion that there was no significant admixture of Inuit and Norse gene pools.[274] Another idea, which was also seriously explored in the 19th century and continues to get aired on the outer margins of serious scholarship, is that the Norse Greenlanders were enslaved or evacuated by some of the explorers who sailed into Greenlandic waters from the late 15th century onwards. This is a field characterised by misinformation and speculation, as the earliest explorers rarely left records of their journeys.[275] Many operated in secrecy providing a wide playing field for conjecture and fantasy. Suffice it to say that no reliable historical evidence and no archaeological evidence whatsoever exists to support such explanations. The explanations that do have factual and argumentative support can be grouped in four main categories, some of which include a number of different factors and lines of argument.

Conflict with the Thule Inuit

Since the Inuit had replaced the Norse Greenlanders in the Greenlandic landscape, it has always seemed that there must have been a causal link between the disappearance of one group and the introduction of the other. The Inuit themselves told stories in which their ancestors attacked and destroyed the Norse Greenlandic settlements. The factual basis of such folklore has been questioned primarily on the grounds that the Inuit had no tradition of practicing warfare. Against this it has been pointed out that while modern Inuit may be unusually peaceful people, it does not necessarily follow that their ancestors were just as nonviolent. Evidence has been found which suggests that the Thule Inuit forebears did wage war on occasion[276] and it does stand to reason that warfare becomes more likely when groups with widely different cultures encounter each other than when a group is alone on the scene, as the Inuit were after the Norse disappeared. A more devastating argument against this hypothesis comes from the fact that no evidence has been found of hostility or violent destruction in final phase Norse Greenlandic contexts. Looking for such evidence was one of the reasons behind the extensive excavations of the first half of the 20th century, and the fact is that no indications of this nature were found. There are no burned farmhouses, no mangled human remains in the ruins or suspicious trauma on those who were buried in the cemeteries. Nor is there evidence of looting in Thule Inuit contexts, which could be associ-

ated with violent conflict. Norse artefacts are found in Thule Inuit contexts, but they are few and mostly much later than the disappearance of the Norse Greenlanders, more suggestive of scavenging and treasure hunting of long-abandoned sites than pillaging of active settlements.[277]

The strongest support for this notion comes from Ívar Bárðarson's description which describes how Ívarr was "one of those appointed by the lawman to go to Vestribyggð against the *skrælingjar* to drive them out of Vestribyggð. And when they came there they found no people, neither Christian nor heathen, only multitudes of feral cattle and sheep, and they gathered as much of this cattle and sheep as their ships could hold and sailed home with them."[278] This expedition must have taken place in the 1340s or 1350s and it clearly suggests that contemporary Norse Greenlanders in Kujataa thought that their northern neighbours in Vestribyggð were being harassed by native Americans. But the account leaves room for doubt about the actual reasons for the abandonment of Vestribyggð and it is clear that Ívarr and his contemporaries did not know what had really happened.

Fig. 2.96: In one of Aron of Kangeq's water colour depictions of violent Norse-Inuit encounters, a single Icelander manages to escape a raid by fleeing on a ship, while the Norse farm burns in the background. Note how the ship is of 19th century European look, the type of ship Aron was familiar with.

Deepening the mystery is a handful of radiocarbon dates from terminal layers in Vestribyggð which suggest that Norse Greenlanders may have been living there several decades after the expedition.[279] Only further research can solve the issue of when Vestribyggð was actually abandoned and it may well be that it will never be possible to make full sense of Ívar's description. What is clear is the sense of menace it reveals; at this time the people still living in the Eastern Settlement saw the Thule Inuit as an existential threat. In 1379, an Icelandic annal reports a battle between the Greenland Norse and *skrælingjar*, wherein 18 Norse were killed and two taken captive,[280] and from these scraps of information it is possible to infer that the Thule Inuit at the very least represented a complication for Norse Greenlandic society in the 14th century.

Recent advances in Thule Inuit prehistory have demonstrated that their migration across the Canadian High Arctic was later and much more rapid than previously thought.[281] It now looks as if they arrived in northern Greenland only in the mid to late 13th century and it may be that the report from the 1260s of a Norse Greenlandic expedition to go and look for signs of new people north of the Norðrseta hunting grounds marks the beginnings of contact between these two cultures. Much is still unclear about the speed of the Thule Inuit as they spread southwards along the west coast of Greenland, or when they started to live permanently in South Greenland. That the Thule Inuit and Norse Greenlanders interacted is clear, but the nature and scale of this interaction is not well understood. The two societies were not in direct competition for natural resources, and on those grounds it could be argued that they had no reason for conflict and likely the opportunities for contact, and instances of conflict, were few.

As it stands, the available evidence does not suggest that the Thule Inuit were instrumental in bringing about the demise of the Norse Greenlandic settlements. That the Norse Greenlanders were alarmed by this new presence is evident, but it is not possible to assess to what extent this may have contributed to any loss of faith in the settlements' viability.

Resource failure

Norse Greenland was extremely marginal, both in the sense that the environment barely supported the type of farming Norse culture was based on—and then only for a very small population—and in the sense that it was very far away from other countries, requiring costly communications. It has therefore always seemed that this society must have been very vulnerable to any changes upsetting the precarious balance of its existence. Few avenues of research have proven as fruitful as this one, and it has generated vast amounts of new data over the past 3–4 decades, in particular resulting in a greatly improved understanding, both of the challenges faced by Norse Greenlandic society and of its ability to cope with them.

Deteriorating climatic conditions have long been considered a crucial factor in the Norse Greenlandic demise. Already during the 14th century, it was observed how increased sea ice along Greenland's east coast was making sailing difficult along traditional routes,[282] and climate research in the 20th century suggested that this could be placed in the context of a general cooling trend that began after the end of the Viking Age and culminated in the Little Ice Age of the 16th to 19th centuries. The earliest climatic reconstructions showed a gradual

cooling after 1200,[283] and it then seemed straightforward to suggest how this would have made life more difficult for the Norse Greenlanders. The increasing number and detail of past climate reconstructions relevant to Greenland, including analyses of cores drilled into the Greenland ice cap, has resulted in a more nuanced but also a more confusing picture.[284] It is clear that the local effects of the general trends were not the same everywhere and that changes were manifested in different ways. Cooling is one thing, but it does not always correlate neatly with other changes like precipitation, storminess or sea ice distribution. There is, however, an emerging consensus that the mid-13th century represents a climatic threshold for Norse Greenland.

After 1250, conditions were not only generally cooler, they were also generally more unstable and there was definitely more sea ice along the coast. The chronology of the climatic changes shows that this was not a case of a sharp downturn in temperature, which made farming impossible so that everyone died. Traditional farming continued for as much as 200 years after the cooling had set irrevocable environmental changes in motion, suggesting that the Norse Greenlanders adapted their substance strategies to the changing conditions. Convincing evidence for this is provided by changing isotope ratios, which suggest that the Norse Greenlanders relied increasingly on marine foods as time went by. It seems that as the conditions for farming worsened, the Norse Greenlanders responded by hunting more seal. This was not a drastic change; the Norse Greenlanders had relied heavily on seal from the beginning and the increase in the marine diet component seems to have been gradual, but persistent. An increased proportion of harp seal bones in zooarchaeological assemblages in Kujataa from the late 13th century onwards have been linked to increasing sea ice, which may in that sense have been a blessing if it brought greater numbers of this seal species to Greenland's shores.[285] Much hinges on assessments on how dependent the Norse Greenlanders were on their farm produce. If they relied on wild animals for the majority of their caloric intake, then it is possible that farming was pursued, and prioritised, primarily for its symbolic, sociocultural, value.

The resource failure hypothesis is not supported by any positive evidence, e.g. for malnutrition[286] (which would show up in the human bone assemblages if it had been an endemic problem), nor has any substantive support been found for the proposition that the Norse Greenlanders degraded their environment or overexploited their hunting resources to the point that their subsistence was compromised, despite no want of argumentation along these lines.[287] The lack of positive evidence does not mean that these could not have been real problems, but it does make it difficult to propose resource failure as the principal cause for the demise. Nevertheless, worsening climatic conditions undoubtedly had an impact. The deterioration obviously limited the options of the Norse Greenlanders, made them more reliant on hunting and likely contributed to the gradual contraction of their settlements in Kujataa from the 13th century onwards. Radiocarbon dates on terminal phases of farms in Tasikuluulik (Vatnahverfi) suggest that the farms closest to the outer coast were abandoned already in the 14th century while only the farms in the balmiest parts of the inner fjords likely have 15th century end dates.[288] These changes probably relate to climate in complex ways and may represent reorganisation and adaptability as much as simple retreat, but however this is characterised, it is clear that climatic changes meant that the choices of the Norse Greenlanders were getting fewer and less palatable.

One environmental factor independent of climatic changes is soil fertility. Ongoing research suggests that the natural fertility of Greenlandic soils—never outstanding to begin with—started to decline as soon as the colonists began cutting grass for fodder and that despite efforts at manuring and irrigation, it deteriorated slowly but surely over the subsequent centuries.[289] The natural capital was simply not up to sustaining in the long run the kind of exploitation of the land that Norse Greenlandic farming relied upon. This chimes well with indications about growing reliance on hunting as time went by, and it may be that by the beginning of the 14th century a threshold had been reached and that the homefields were no longer yielding enough to support the minimum of livestock required to maintain the social order of the Norse Greenlanders.

External contacts

The idea that Norse Greenland was effectively done for when its export commodities ceased to be competitive on the European markets hinges on two factors. One is that this society was directly dependent on the revenues from its exports and the other is that these commodities really were outcompeted at the right time to explain the demise. The latter factor is uncertain. There are differing assessments as to when elephant ivory began to reach Europe in appreciable quantities, but it does seem clear that walrus ivory ceased to be a marketable commodity after the 15th century. This may in fact relate to changes in artistic tastes as much as to the supply of the raw material, but, whichever the case, it is difficult to date.[290] It may be that products like walrus hides, prized in the 12th and 13th centuries for making ropes for ship rigging, were being marginalised by a more specialised and large-scale rope-making industry associated with the expanding shipping business. For hides there will have been a market at all times, but it is unlikely that Norse Greenland could produce quantities that were anything more than a drop in the ocean and they would have had difficulties in keeping up the regularity and volume of supply that

would have been needed to keep a window open into this market. The only possible export commodity of Norse Greenland that was definitely valuable throughout its history and beyond was live gyrfalcons. Considering the lengths Danish kings went to in their efforts to secure a steady supply of these animals from Iceland in the 17th century, it seems that this alone should have ensured that the Norwegian kings of the 14th century wanted to maintain regular contact with Norse Greenland. There are, however, no unequivocal sources about the export of gyrfalcons from Greenland, and it may be that the sea voyage was too long for reliable transport of these birds across the Atlantic.

Fig. 2.97: A pectoral cross–reused as a book ornament–carved from walrus ivory, ca.1000 AD (origin unknown). It was shipped from Greenland as raw material. In Europe walrus ivory was fashioned into highly valuable prestigious and religious artefacts.

It is often pointed out that a fundamental difference between Iceland and Norse Greenland in the high and late middle ages was that the former exported woollens and, increasingly from the late 13th century, fish, while the Norse Greenlanders only had low bulk exotic goods to trade. It is unclear how economically significant Iceland's exports were before 1400, but after that time fish exports exploded and English fishermen and merchants were drawn to Icelandic waters in large numbers. That a great increase in trade and fishing was taking place in the North Atlantic at the very same time Norse Greenlandic society was drawing its last breaths seems incongruous and draws attention to the different paths that these two neighbouring societies had taken. With their reliance on the seal hunt, the Norse Greenlanders had eschewed marine fishing and climatic changes had probably made them even more locked into this choice. Irrespective of the marketability of Norse Greenlandic commodities, it may be that developments in international commerce made the Greenland trade an unprofitable relic from an earlier age. Larger ships and greater demands for efficiency and financial profit made it more difficult to justify dangerous journeys to distant settlements that had little to offer that could not be obtained more cheaply elsewhere.

Exacerbating the effects of the changes in international trade were political changes in Norway. Norse Greenland joined the Norwegian kingdom when it was in a vibrant, expansionist phase, and in the following decades Norse Greenland no doubt enjoyed the benefits of being a part of a dynamic polity that had the resources and ambition to maintain a far-flung empire. The westwards focus of Norway's 13th century kings was not retained by their 14th century successors, who became increasingly involved in Swedish politics reflecting a generally more southerly focus. This shifted focus is represented also by the growing importance of Oslo as the political centre of Norway at the expense of increasingly marginalised Trondheim and Bergen. Although Norwegian merchants seem to have retained control over the North Atlantic trade with Iceland and Greenland until the end of the 14th century, they were increasingly outcompeted by German merchants of the Hanseatic League, who set up an office in Bergen in the middle of the 14th century and afterwards dominated Norway's external trade. The Hanseatic merchants specialised in supplying the growing cities of the Baltic and North Sea areas but did not venture their own ships into the North Atlantic until the mid to late 15th century. The decline in Norwegian international shipping, exacerbated no doubt by the Black Death of the 1340s and pirate attacks on Bergen in 1393 and 1429, which destroyed many ships, led to an almost complete breakdown in communications with the North Atlantic parts of the kingdom. For several decades after 1410, most of Iceland's external contacts were made possible by English ships fortuitously drawn to the Icelandic fishing grounds at this time. It is possible that English mariners also visited Norse Greenland in this period, but if they did they clearly concluded that sufficient profits could not be made there. If Norse Greenland was served by only a few small ships, however, it is difficult to ascribe the breakdown in contact to these structural changes in international commerce. Such a small operation will at no time have been beyond the means of a government like the Norwegian if it really had an interest in maintaining the contacts. That there was a shift in policy from an emphasis on the North Atlantic towards a focus on the North Sea and the Baltic is beyond doubt, but this did not meant that taxes did not continue to be collected from the peripheries of the kingdom, like Finmark and Iceland. That the Norwegian kings seem to have made no efforts to collect their taxes in Norse Greenland after the

1380s suggests that this revenue was not significant to them, neither politically or financially. It may reflect that the settlements were already in sharp decline, possibly so dramatically that the crown waived its taxes as the only practical means of support, or that the commodities the Norse Greenlanders could offer in payment had decreased in value. At the same time, the crown seems to have kept insisting on its monopoly over the Greenland trade—even when it was no longer making any effort to keep up that trade itself—and this can really only be characterised as bad government, no doubt made possible by indifference to the matter at the highest levels of authority.

Demography and scale

The Black Death came to Norway in 1349, killing an estimated half of the population and crippling the economy. Iceland was spared at this time, but was visited by plague in 1402 which also resulted in enormous mortality. It is not known if Norse Greenland ever suffered from plague—the journey may have been too long for any ship with an infected crew to make it all the way—but if it did, and if the epidemic could spread the same way as it did in Iceland, where no district seems to have been spared, however thinly populated, then it would undoubtedly have been catastrophic and would be sufficient to account for its demise. This unprovable possibility brings the attention to the issue of scale: reasonable estimates of the Norse Greenlandic population put it at 2,000–3,000 at its peak. Small size is vulnerability in of itself, but there is reason to think this was a particular problem in Norse Greenland, more so than in e.g. the Faroes, which had a comparable population but survived 50% mortality in the Black Death of the mid-14th century. The difference is that the Faroese population was concentrated in about 100 locations in an area of about 1,400 km^2, and the majority of those people lived in hamlets with several households,[291] whereas in Kujataa the Norse Greenlandic population was scattered over an area of some 15,000 km^2 and divided into some 190–260 farm sites, the vast majority of which were isolated

single household operations.[292] In effect, there were significantly fewer people in Norse Greenland behind each unit of infrastructure, be it byre or boat, and this meant that a reduction in population would always have significantly greater repercussions than in regions which supported greater population densities. Even when these factors are not considered, it is easy to calculate that a small reduction in the Norse Greenlandic population could have dramatic consequences. If there was, for instance, a loss of faith among the younger generation resulting in small numbers of people of marriageable age leaving in the space of a few years, then the population would very quickly cease to be able to sustain itself through natural growth.[293]

Conclusions

There is growing realisation that it is not possible to ascribe the demise of Norse Greenland to a single cause and that in many ways this society was remarkably robust.[294] It did survive for as much as 500 years in what were probably always challenging and extreme conditions compared to other European societies. It showed remarkable adaptability in the face of change, but some of those choices also set it on paths that resulted in more limited options down the road. By the mid-14th century, it seems that Norse Greenland had the odds stacked against it. Reconstructing how it all came apart remains a lively field of research and new evidence and lines of argument are always appearing. The enigma of the disappearance of the Norse Greenlanders invites students and visitors to contemplate fundamental issues about human societies, about the environment and about historical trajectories. The human drama which was undoubtedly involved makes this one of those evocative episodes of human history which leaves no one unaffected.

Thule Inuit culture

Sometime before 1300 AD, a new culture appeared in northern Greenland. The dating of the arrival of these new people, referred to in the literature as Neo-Eskimos or Thule Inuit, has long been debated and estimates range from around 1100 AD to the end of the 13th century AD. Recent scholarship has tended to favour the later part of this period, but whenever they did first cross over to Greenland, it seems clear that their culture did not start to spread from the Thule (Uummannaq) district to other parts of Greenland until around or after 1300. This coincides in time with the final dates for distinct Dorset culture remains in the same area. What is not debated is that the Thule culture originated in Alaska and it is becoming increasingly clear that the migration across the Canadian Arctic was affected over a very short span of time, easily within a single lifetime. Objects found in basal Thule Inuit layers in northern Greenland had been brought directly from Alaska and the whole cultural assemblage, from buildings to objects, art and technology, has distinctly Alaskan characteristics. The Thule Inuit package included the use of dog sledges, kayaks and umiaqs (large, skin-covered boats for transport), and they also used bows and arrows, which are absent from the Dorset culture. Like their Dorset forebears, the Thule Inuit made use of meteoric iron which is found in the Cape York region of northwest Greenland, and also telluric iron found in Disko Bay as well as iron exchanged or scavenged from the Norse Greenlanders. A significant difference between the Thule Inuit and the earlier Palaeo-Eskimo cultures was that the former buried their

dead in graves, often with grave goods and in exceptional cases the remains have become mummified providing tantalising glimpses into their culture. Thule Inuit subsistence strategies were heavily oriented towards the sea, relying on seal hunting as well as the hunting of whales. They hunted small species like beluga whales and narwhals, but also the much larger bowhead whales. These strategies were well suited to the Greenlandic ecosystem and the Thule Inuit population quickly expanded, within a short time dwarfing and eventually replacing the pre-existing Dorset culture. While Dorset came to an end as a distinct material culture about the time of the Thule Inuit arrival, Dorset traits have been identified in later Thule Inuit artwork and technology, suggesting that the very small indigenous population did not become extinct but rather took up the ways of the newcomers.

From the Thule district the Thule Inuit spread eastward across the top of the island and southward along the east coast as far as Scoresby Sound. This branch of Thule Inuit culture developed its own characteristics and eventually disappeared. A much larger population spread southwards along the west coast, and summer camps in the vicinity of Ikigaat (Herjólfsnes) were already established by the 14th century. Cape Farewell was quickly rounded and settlements established along the east coast, as far north as Ammassalik. At the southern side of Disko Bay, large herds of reindeer roamed the relatively extensive inland tracts, providing the Thule Inuit who settled in that region with an important supplement to their diet.

On their southwards migration the Thule Inuit came into contact with Norse Greenlanders, both in Vestribyggð and in Kujataa. In both regions Thule Inuit artefacts have been found in Norse Greenlandic contexts providing direct evidence for the contemporaneity of and likely contact between these two cultures. Norse Greenlandic artefacts are found at most Thule Inuit sites from the 14th and 15th centuries (and frequently, although in diminishing quantities, for a long time thereafter), but it is usually not possible to determine whether the objects were items of exchange or whether they had been scavenged from derelict sites. It is usually assumed that the majority of Norse Greenlandic objects in Thule Inuit contexts were obtained from abandoned settlements and this seems certain for specific categories of objects, like bell metal, which is found in many Thule Inuit sites.

Although it is not unthinkable that the Norse Greenlanders traded their broken church bells, it is more likely that these pieces were obtained once the church sites had been abandoned. A desire to obtain iron—through exchange or scavenging—may have contributed to the swift southward spread of the Thule Inuit, but the relatively dense settlement they established in the regions previously inhabited by the Norse Greenlanders, and the onwards push into the iron-free east coast, suggests that a quest for iron can, at most, have been a partial influence behind these migrations.

Fig. 2.98: In 1654, four Inuit were captured in present-day Nuuk Fjord. They were first brought to Bergen, where an artist painted them in their traditional outfits. The painting is now a valuable source of ethnographic information.

High mobility remained a characteristic of Thule Inuit society. Not only did individual groups move long distances between winter dwellings and one or more summer and autumn camps, but smaller groups went on long-range exchange expeditions, which could cover thousands of kilometres and last for a couple of years. A particular type of dwelling, the communal house, is associated with these trips, constructed by travellers for the winter months, usually in settlements of permanent residents. People from Kujataa would bring skins and wood up to the Nuuk area and as far north as Disko Bay to exchange for baleen, essential for making fishing lines, and steatite (soap stone). In the 17th century, European trade items like glass beads also entered this exchange system. European whalers began frequenting the Davis Strait and bartering with the Thule Inuit. As a result, European goods began to appear in Thule Inuit assemblages up and down the coast. The impact of these early contacts on Thule Inuit society and economy was superficial, but the establishment of a mission at the mouth of the fjord Nuup Kangerlua in 1721, followed by several

other mission and trading stations in the following decades, had a profound influence. Access to European goods and a market for hunting produce meant that the long-range exchange expeditions ceased and Inuit settlement began to concentrate in the vicinities of the European posts. This contributed to the growing isolation of communities farther away from the European posts, especially on the east coast, which had little or no contact with the rest of Greenland in the 19th century until an expedition to Ammassalik established contact in 1884. After getting off to a slow start, the missions began to affect a change in religion among the Inuit and the last conversions, of East Greenlanders, took place in the beginning of the 20th century. Long before, the spread of Christianity had contributed to increased settlement density around the European posts on the west coast, with their churches and priests, leading to increased literacy and significant changes in their culture and worldview. From 1774 to 1908, Greenland was administered by the Royal Greenlandic Trading Company, which had a policy of preserving the traditional way of life of the Inuit, principally to ensure that the products of the hunt kept flowing to the trading posts. A steady increase in the Greenlandic population, from 5,122 at the first count in 1779 to over 12,000 in 1900, put a strain on the traditional economy and the first decades of the

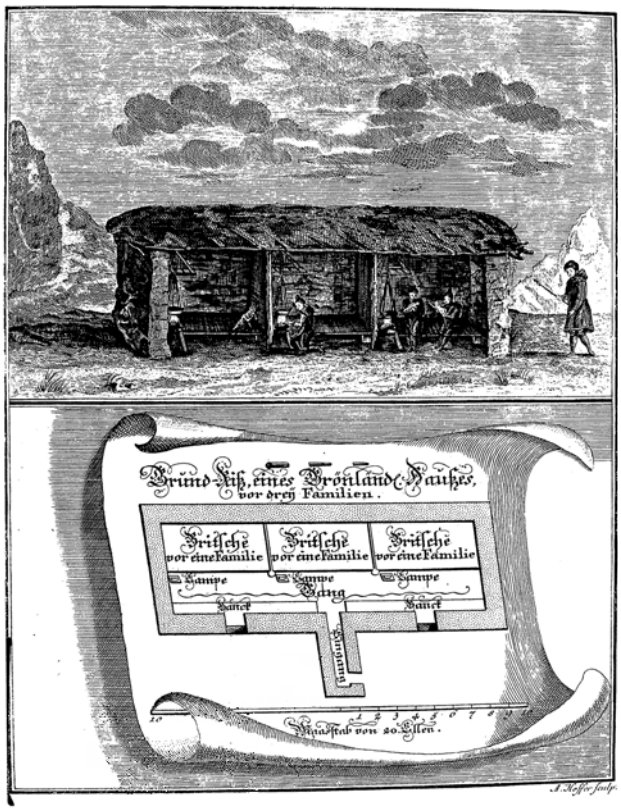


Fig. 2.99: 1770 contemporary etching depicting the Inuit communal house, a wood/stone/turf building housing multiple families in separated sections. This house type was likely associated with intense trading and travelling activities in the 18th century.

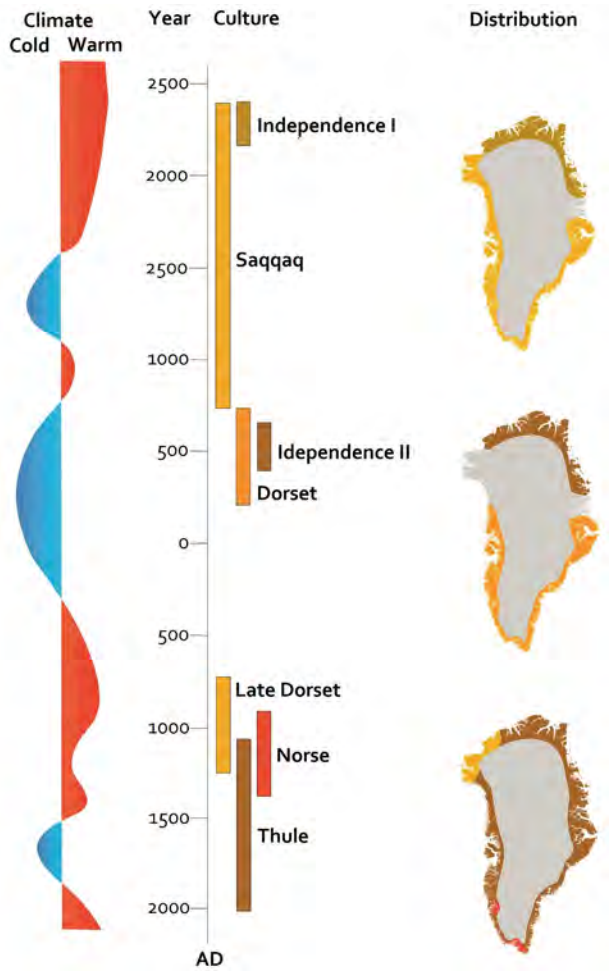


Fig. 2.100: Graph and map of Greenland aligning chronological development of climate with distribution of archaeological and historical cultures in Greenland.

20th century witnessed a fundamental shift from kayak—and umiaq—supported hunting of seal to fishing from motorboats as the mainstay of the Greenlandic economy. It was in this period that efforts to diversify the Greenlandic economy led, among other things, to the establishment of a sheep breeding station in Julianehaab (Qaqortoq) with the aim of establishing extensive sheep farming in Kujataa.[295]

The foundations for Thule Inuit culture history in Kujataa were laid by Therkel Mathiassen in 1934 when he excavated and surveyed a large number of Inuit sites in the region. Mathiassen distinguished three cultural periods on the basis of house forms and artefact assemblages. In the earliest period, which he dated to the 14th–16th centuries, settlements were few and large and found mainly in an intermediate zone, neither in the inner fjords nor on the extreme outer coast. The houses were round in shape and the artefacts included a relatively high number of Norse objects, which he attributed mainly to scavenging after the Norse sites had been

abandoned. The next phase, dated to the 17th and 18th centuries, is characterised by an explosion in settlement with small sites predominating but distributed widely,

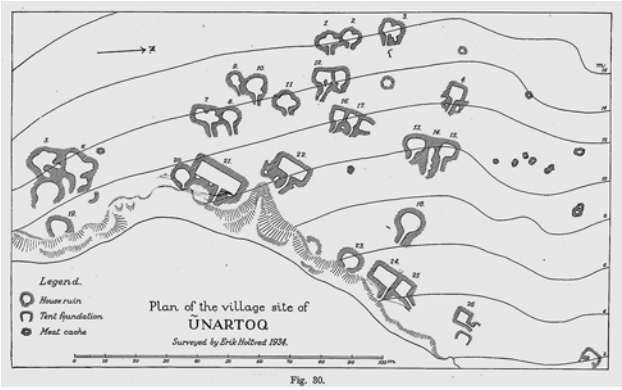


Fig. 2.101: Archaeological survey plan of large Thule Culture winter and summer site on the island of Uunartoq.

from the inner fjords to the outer coasts. The houses in this period are rectangular and at a right angle to the passage. In this period, occasional objects traced to European whalers, which the Inuit were coming into contact with in the 17th century, are found in the assemblages, but the full impact of contact was not felt until the final phase, in the 19th century. In this phase, the passage tends to be a continuation of the lengthwise axis of the houses and the collections include large numbers of trade goods, gun flint, pottery and iron. The settlements get fewer and larger with concentrations in the neighbourhoods of the trading stations, which in Kujataa were being set up from the 1770s onwards. The hunting equipment and animal bones found suggested particular reliance on the seal hunt throughout the three periods, but also the utilisation of a large number of other animals, including whale, reindeer, marine fish and birds.[296] Subsequent research has not changed Mathiassen's conclusions in any major way. His house typology is still referred to, but it is also clear that it is based on a small dataset and more research is needed to throw light on the details of Thule Inuit history in Kujataa.

Farming in Kujataa 1781–2015

As soon as European settlement was established in Greenland in 1721, livestock and garden crops were reintroduced to Greenland. To begin with, farming on a miniscule scale was limited to the Danish trading stations, but in 1780, Tuperna and Anders Olsen, an Inuit woman from the Nuuk area and her North-Norwegian husband, moved from Julianehaab (Qaqortoq), where Olsen had worked for the trading company, to Upernaviarsuk (Ø82 in cp5) to start a farm with a small number of goats and cattle. In 1783, they moved their farm to Igaliku (Ø47 in cp2), which has seen an unbroken history of farming to this day. Tuperna and Olsen's children continued the farming, which concentrated on dairy products and small-scale gardening. In 1834, the farming community in Igaliku had 16 heads of cattle and 40 sheep

Although some of the produce was sold to the trading station in Julianehaab (Qaqortoq), this was largely a subsistence operation. It represents a new cultural development whereby Inuit created new lifeways out of a mix of farming and hunting. Tuperna and Olsen's descendants spread over different parts of South Greenland, bringing with them the taste for farm produce and a sense of the rhythm of the farming way of life. A second cattle farm was established in Narsaq, close to the Norse Greenlandic farm at Narsap Ilua (Ø18 – Dýrnes) in the 1880s. One of Tuperna and Anders Olsen's descendants was reverend Jens Chemnitz, who in 1905 travelled to the Faroe Islands to learn practical sheep farming. When he came back to Greenland in 1906, he brought with him nine Faroese ewes and two rams from the village of Velbastaður to experiment with sheep breeding in Frederiksdal / Narsarmijit[297] (Narsaq Kujalleq – Ø223).

Fig. 2.102: Qassiarsuk /Brattahlíð was the first place outside Igaliku to be resettled by farmers, when Otto Frederiksen settled there in 1924. The photo shows the settlement in 1929.

In 1908, Chemnitz imported a further eight sheep from the Faroe Islands. Reverend Chemnitz kept the sheep in Narsarmijit as a part-time occupation, beside his work as priest. Following this first initiative, sheep began to spread among the local population in South Greenland, and sheep were finally reintroduced to Igaliku in 1914 when cattle farmer Amos Egede received sheep from Chemnitz.

The results of this private initiative were promising, and in 1915 the Danish colonial administration launched an experiment with the import of some 170 sheep, 2 Icelandic horses and 3 sheepdogs from Iceland,[298] and joined them with Chemnitz's flock of 60 to lay the foundations for a sheep breeding station in Julianehaab (Qaqortoq). The present sheep population in Greenland descends from these imports, making the Greenland sheep today a Nordic short tail sheep of Icelandic and Faroese descent. It is today considered to be a sub-race among the North Atlantic sheep breeds.

Initially the sheep bred at the station were given only to the already established farms in Igaliku and Narsaq, but in 1924 a specialised sheep farm was established in Qassiarsuk (Ø29a – Brattahlíð) by Otto Frederiksen. The next two decades saw a rapid increase in the number of sheep farms, almost all of them established on or near Norse Greenlandic farm sites, and the majority within the nominated property. By the 1940s, the sheep numbers had reached 20,000, which is the level they have maintained despite fluctuations, especially in the 1950s and 60s. At the same time as sheep numbers increased, goat numbers, never much more than a 100, decreased and from the 1960s there have been no goats in Greenland.

Sheep farming was until the 1970s mainly based on free grazing on the mountain pastures year round, with only limited amounts of fodder stored for the winter. The need to cultivate hayfields had been argued for since the 1930s, and some efforts were made in this direction, but large-scale cultivation was still far in the future. The period between the 1920s and the 1960s was characterised by mild winters with little snow, allowing grazing during most of the year. This production strategy required minimum investments, and in years with plenty of summer rain and little snow the economic results were good. Initially the sheep were therefore given little fodder support and limited shelter in winter, but following a number of catastrophic winters, 1948–49, 1956–57, 1966–67 and finally 1975–76, when large parts of the flocks perished, the period between the late 1970s to the 1990s saw the start of large-scale cultivation of hayfields, imports of concentrates and the building of stalls to keep the sheep during the winter. The 1970s also saw the implementation of the first regulations for animal welfare, making demands of minimum amounts of fodder and shelter. These regulations have been further developed and strengthened since then.

Farming in Igaliku 1894

The Greenlandic settlement of Igaliko (= abandoned hearths) is situated on the coastal strip below the mountains, a few hundred ells from the beach, in the same place as the large ruins of the Norse.

The population, consisting of about thirty-five souls, owns fourteen kayaks and four umiaks and lives in eight houses with barns and byres for their 29 heads of cattle (15 cows, 7 bulls and 7 heads of young). They go hunting and fishing in the Igaliku and Tunulliarfik fjords as well as Sermilik. Their byres are built in the same fashion as those in Narsaq. The barns are about twice as large as the accompanying byres.

The hay is collected exclusively within the Igaliku fjord, partly around Igaliku itself and partly along the coast on the west side of the fjord far south, beyond Sissarluttoq (Kaglut, Nuuluk, Najaat et c.), and on the east side (from the foot of Iganek and the bay around to the mouth of the fjord's eastern arm) as well as in the fjord's eastern arm (Iterlak, Inugkuagsak and Kagsiarsuk). In nearly all of these places there are Norse ruins, some farms and some folds. In total the annual hay volume fills fifty umiaks.

As a rule the cattle graze outside from April to October, in the pastures around Igaliku. During winter they are stalled although it happens that they are let out now and then, when the strong wind, which is a regular occurrence in Igaliku, has blown the snow away. In hard winters, when hay is scarce, the Greenlanders have fed their cattle on dried fish (cod and trout), and in later years they have also used swedes which are cultivated in enclosed gardens. The cows are milked three times daily and are driven to their stalls for this purpose. Their milk is abundant and the Greenlanders know how to make excellent cheese and butter, which is sold to the Europeans, in addition to their own consumption of a large part.

Fuel is not to be found in Igaliku itself, and it is therefore gathered in other places in the fjord, particularly at the foot of Iganek across the bay, but also in many other locations, like the coast from Sissarluttoq to Nuuluk.

When the people of Igaliku hunt and fish a great deal in Tunulliarfik and Sermilik, they keep their kayaks on the other side of the isthmus by the Tunulliarfik fjord. On the rare occasion they need to use an umiak on that fjord they carry it over the isthmus. This takes a good hour.

It is evident that Greenlanders have lived earlier on the Tunulliarfik side because there are still old Greenlander-houses at the foot of Iliortafik and close to the beach. – In the salmon season great quantities of this fish are caught, primarily in the Igaliku fjord by the large rivers (Tessingertasak, Iganek, Iterlak, Inoqquassaap Kuua, Kagsiarsuk and Sissarluttoq, all of which are places where there are also Norse farms nearby) but also in Tunulliarfik (Kingua for instance).

Daniel Bruun 1895, 322–23.

These efforts have resulted in more stable supplies of animals for slaughter, and therefore a more stable income for the farmers. But expenses have increased as it has become necessary to invest in imported concentrates, fertilisers, buildings and agricultural machinery. These developments represent a major investment in the farming sector and have gone hand in hand with increasing mechanisation of the farming, with all farms now owning tractors and other farm machinery necessary for cultivation and hay production.

The number of sheep farms in Kujataa has remained at about 50 since the early 1990s and many of the farms are now operated by second or third generation farmers. The sheep breeding station in Julianehaab (Qaqortoq) was moved to Upernaviarsuk (Ø82) in 1956, where it remains the centre of agricultural research and education in Greenland. A slaughterhouse was established in Qaqortoq in 1929, but was moved to Narsaq in 1949. The Narsaq facitility is the only one of its kind in Greenland, aside from the private reindeer slaughterhouse at Isortoq Reindeer Station close to the settlement of Qassimiut. The slaughterhouse Neqi A/S is a company owned by the Government of Greenland.[299]

The sheep population in Greenland 1906–present

Sheep farming - the extensive period, 1906–76

The modern history of sheep farming in Greenland can be divided into an early period characterised by extensive forms of farming and a later one characterised by more intensive methods from 1976 onwards. Despite new initiatives in the late 1970s, the change was not abrupt and is more a matter of gradual development towards more intensive approaches, with respect to feeding, animal welfare, care and systematic breeding.

Although sheep were first introduced by pastor Jens Chemnitz back in 1906, it was not until 1925 that the first reliable records of the sheep population in Greenland become available.

By 1925, the number of sheep had reached 1,678 animals, which gradually rose during the 1930s and 1940s to 21,120 animals in 1948, an increase which was primarily driven by new farms that were established throughout the inner fjord systems of Kujataa. This sheep farming was based on grazing in the hills and mountains for most of the year, with only a very limited amount of fodder collected for storage in winter. Such a strategy made the sector extremely vulnerable to hard winters, with large losses of sheep and lambs occurring at times, but it was still possible to increase the population

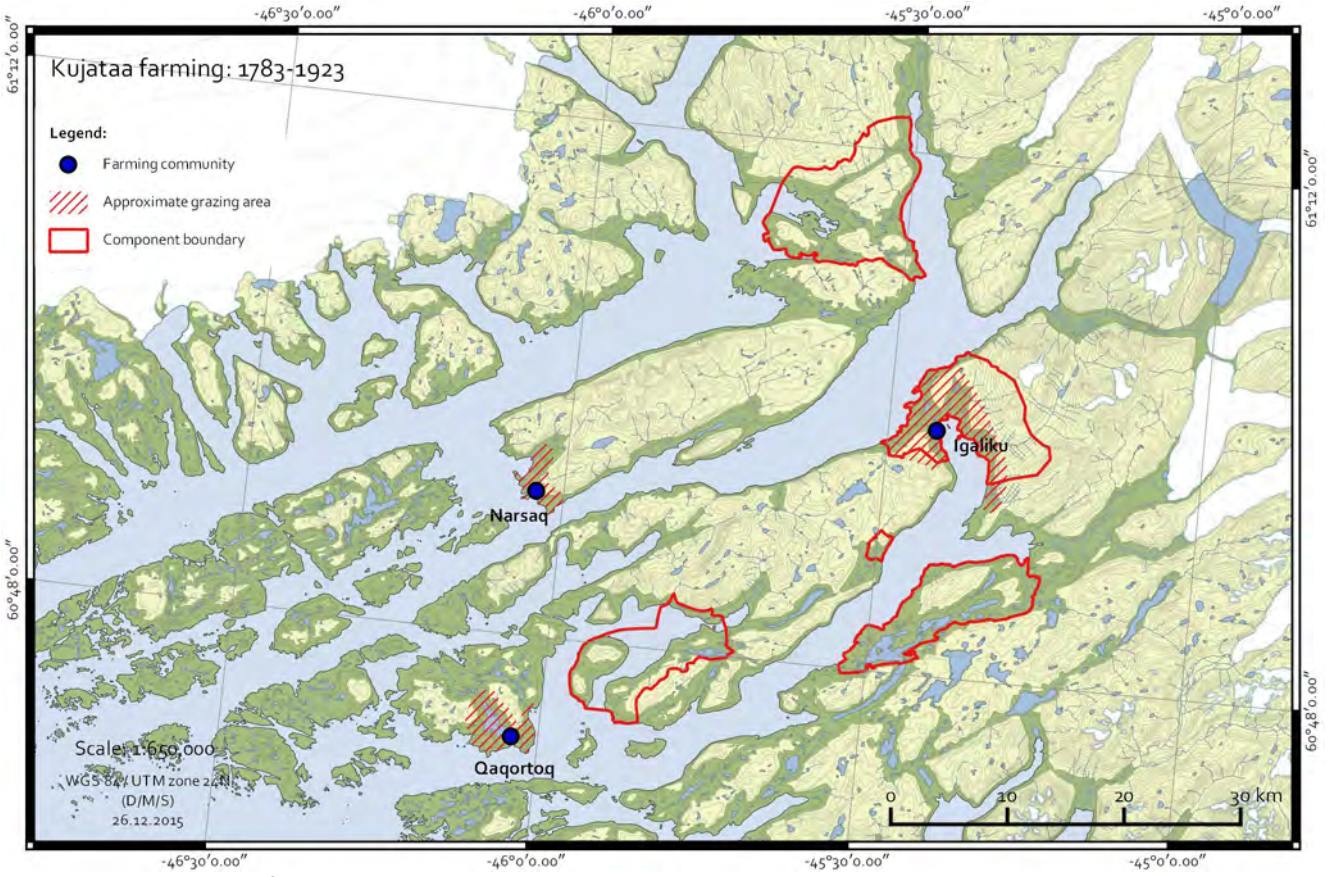


Fig. 2.103: Map showing farming settlements and approximate grazing areas, 1783-1923.

Fig. 2.104: In the early years of sheep farming, hay production was limited and mainly reserved for the cattles' winter fodder, whereas the sheep had to graze freely throughout the year. Here, Nikolaj Egede in Igaliku/Garðar, 1926.

considerably during extended periods of mild winter weather. However, such a system of sheep farming produced low yields per animal, due to the large loss feeding. This was compensated for by large flocks, roughly analogous to the situation in many sheep farming countries in the southern hemisphere.

After the harsh winter of 1948–49, the population was reduced to only 10,453 winter animals or roughly half as many sheep as the year before. During the following years, the population gradually increased to reach 22,654 animals in 1956, but fell again to 17,575 animals in 1957, again resulting from a long, hard and snow-heavy winter—without föhn winds to melt the snow cover. This was followed by a significant increase in the number of domesticated animals in the late 1950s to 1966, primarily thanks to a sequence of good summers and mild winters, with relatively little snow and good winter grazing. The population peaked in 1966 with 48,000 sheep, which is the largest number registered so far. But this population should be seen in light of the production yields at the slaughterhouse, which, during this record year, were only on par with what has become the norm in the past years since 2000, with a much smaller number of productive animals. Thus, the pioneers in the industry relied on a particularly extensive form of farming, with highly limited yields per animal, even during good years.

The following fateful winter of 1966–67 resulted in record losses, with only 19,070 sheep surviving until the autumn of 1967. More than 60% of the population had died of hunger and exhaustion during the spring, when

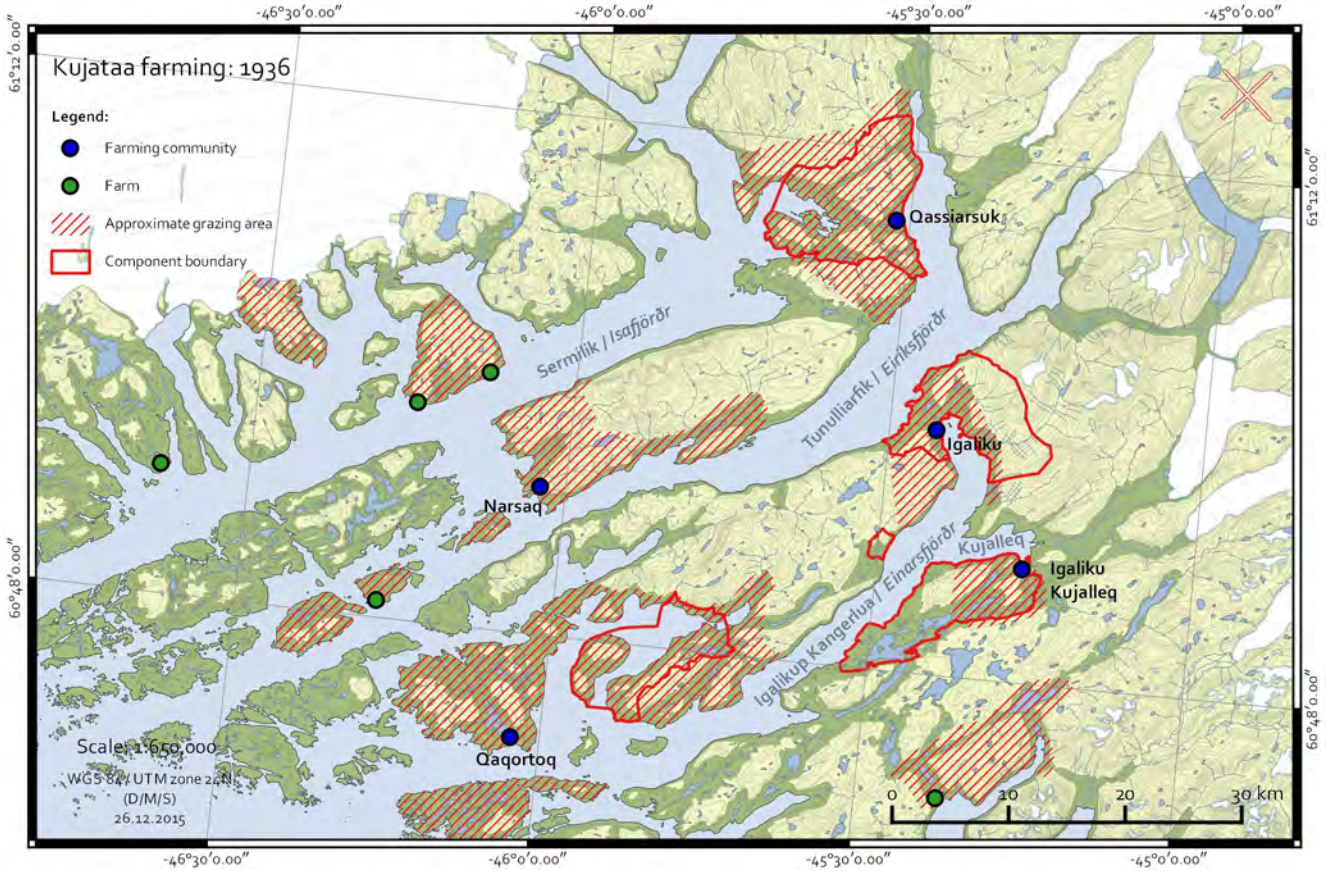


Fig. 2.105: Map showing farming settlements and approximate grazing areas, 1936.

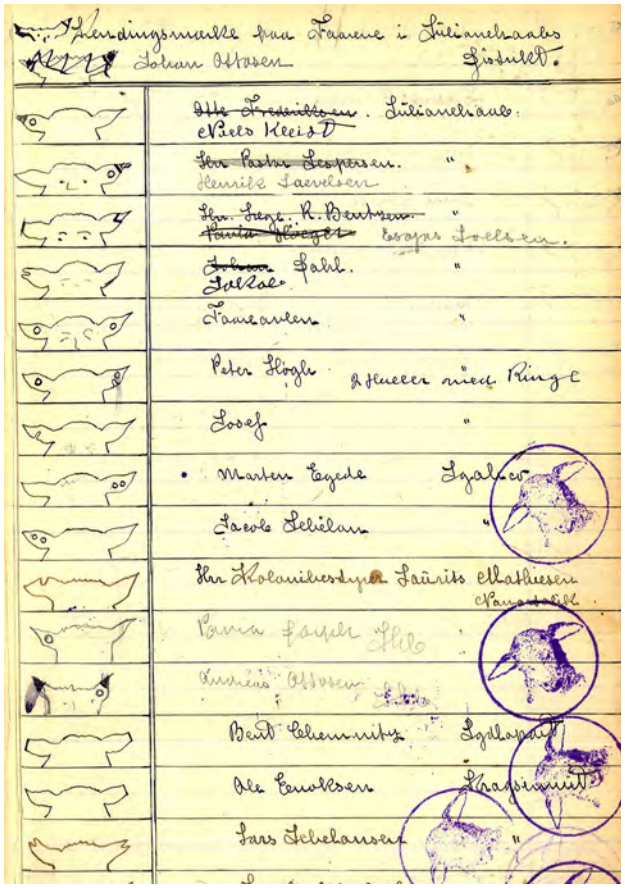


Fig. 2.106: Photo of an early document from the sheep breeding station, which was located in Qaqortoq at the time. During the years of extensive sheep farming, it was decided to earmark the animals to make it easier to differentiate the flocks of various farms. In this document, diverse earmarks are shown, Otto Frederiksen's being the one on the top. This earmark was later taken over by Niels Kleist.

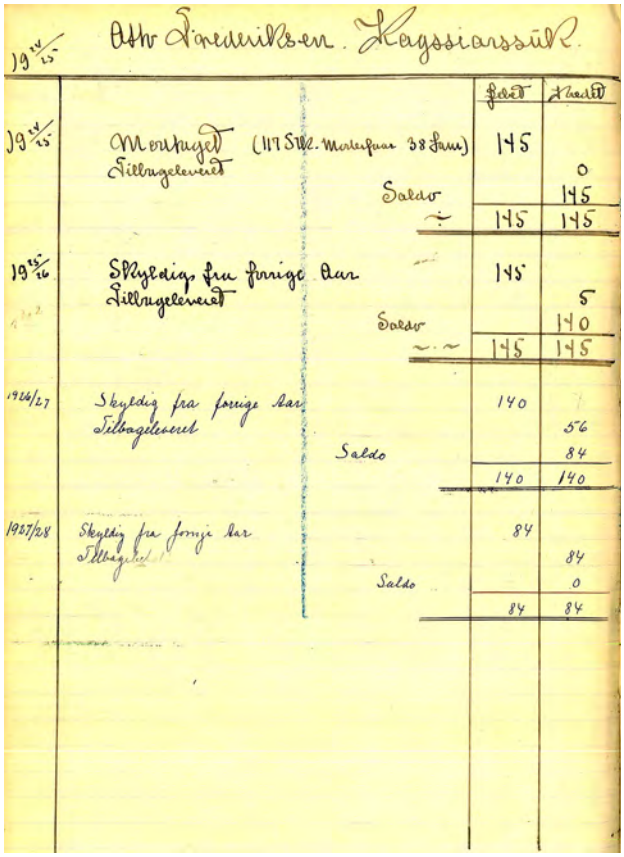


Fig. 2.107: Photo of a 1928 ledger from the sheep breeding station, which was located in Qaqortoq at the time. In the ledger one can follow the development of Otto Frederiksen's farm the initial sheep stock of 117 ewes and 38 lambs. The ledger shows his success as a farmer: in 1925/26 he returned 5 lambs to the sheep breeding station, in 1927/28 another 56, and in 1928/29 the remaining 84, which made him debt free!

snow and ice still covered the countryside during the lambing period. The number of animals slaughtered in 1967 was only 3% of that in 1966. Many sheep farmers quit during the following years due to the difficult economic situation and the loss of their production basis.

During subsequent years, there were a series of bad seasons with a generally colder climate and more snowy winters, and disasters occurred in the winters of 1971–72 and 1975–76. The sector underwent therefore an existential crisis during these years.

Intensive farming from 1976 and onwards

The extensive form of farming persisted until the disastrous winter of 1975–76. This was followed by a gradual shift towards more intensive forms of farming, with larger purchases of fodder and adjustments of the size of the herds in proportion to the amount of feed available. The population size was also stabilised, allowing farmers to avoid the considerable annual fluctuations of previous years. This stabilisation translated into larger operational expenses in the sector, but also produced far more stable incomes and enhanced opportunities for planning. During the 1980s and 1990s, mainly driven by the SAP (Savaateqarnerup annertusarneqarnerani pilersaarut / Development plan for sheep farming) development project[300], with more feeding and a larger domestic production of fodder on Greenlandic fields.

There is a marked tendency towards greater effectiveness after the last truly disastrous winter, 1975–76, through to the present. Since the turn of the millennium, production of sheep and lambs has reached a level of 20,000 to 24,000 animals slaughtered annually in Narsaq, although these figures currently tend to decrease due to an economic crisis and layoffs within the industry. The number of sheep has remained stable over the past decades, with a winter population of approx. 20–21,000. The last 10 years of production have thus been the most stable in the history of sheep farming and, as a result, the first decade of the 21st century has seen the largest

average production in the history of the sector, with an increase of 22% in comparison to the 1990s.

The slaughterhouse operated by Neqi in Narsaq is a modern facility, rebuilt in 2013 according to EU regulations, with the capacity to slaughter 34,000 lambs and sheep, plus cattle, horses and reindeer every autumn. The meat is packed for the local market and sold through the Greenlandic supermarket chains of KNB (coop), KNI and Pilersuisoq.

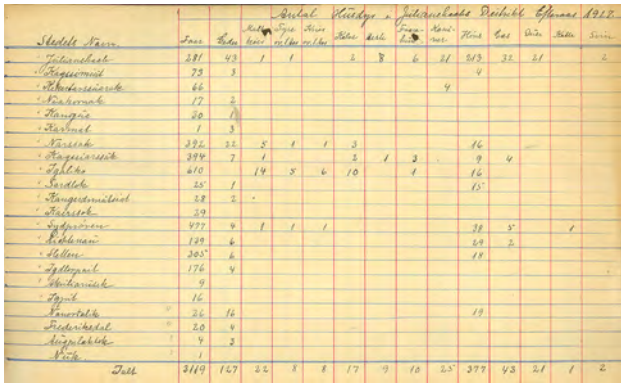


Fig. 2.108: The early years of farming in Greenland were keenly monitored by the sheep breeding station. In the ledger pictured here, all kinds of livestock in the district is meticulously listed, including rabbits, chickens, geese and pidgins

Domestic reindeer, 1974–present

Domestic reindeer were introduced to areas close to the property during the 1970s, when the son of a sheep farmer set up a reindeer station close to the settlement of Qassimiut. By the end of 2015, there were two reindeer stations with a total of around 2,000 winter animals in the Isortoq/Nunarsuit area and on the island of Tuttutooq close to Narsaq.

Reintroduction of cattle in Greenland, 1998–present

As with the goats, cattle numbers decreased as sheep farming became more widespread and specialised, and between 1975 and 1998 there were no cattle in Greenland. The first reintroduction of cattle was to the farm of Timerliit, where two Icelandic dairy cows were imported in 1998. Other farms have since then held small numbers of dairy cattle, but only the Timerliit farm has maintained a small herd of dairy cattle. Semen of Jersey cattle was imported in 2003 resulting in the present dairy cattle population being a mix between Icelandic and Jersey cattle. The main objective for the introduction of dairy cattle has been to establish a local supply of fresh milk on the farms, including the traditional Icelandic *skyr*.

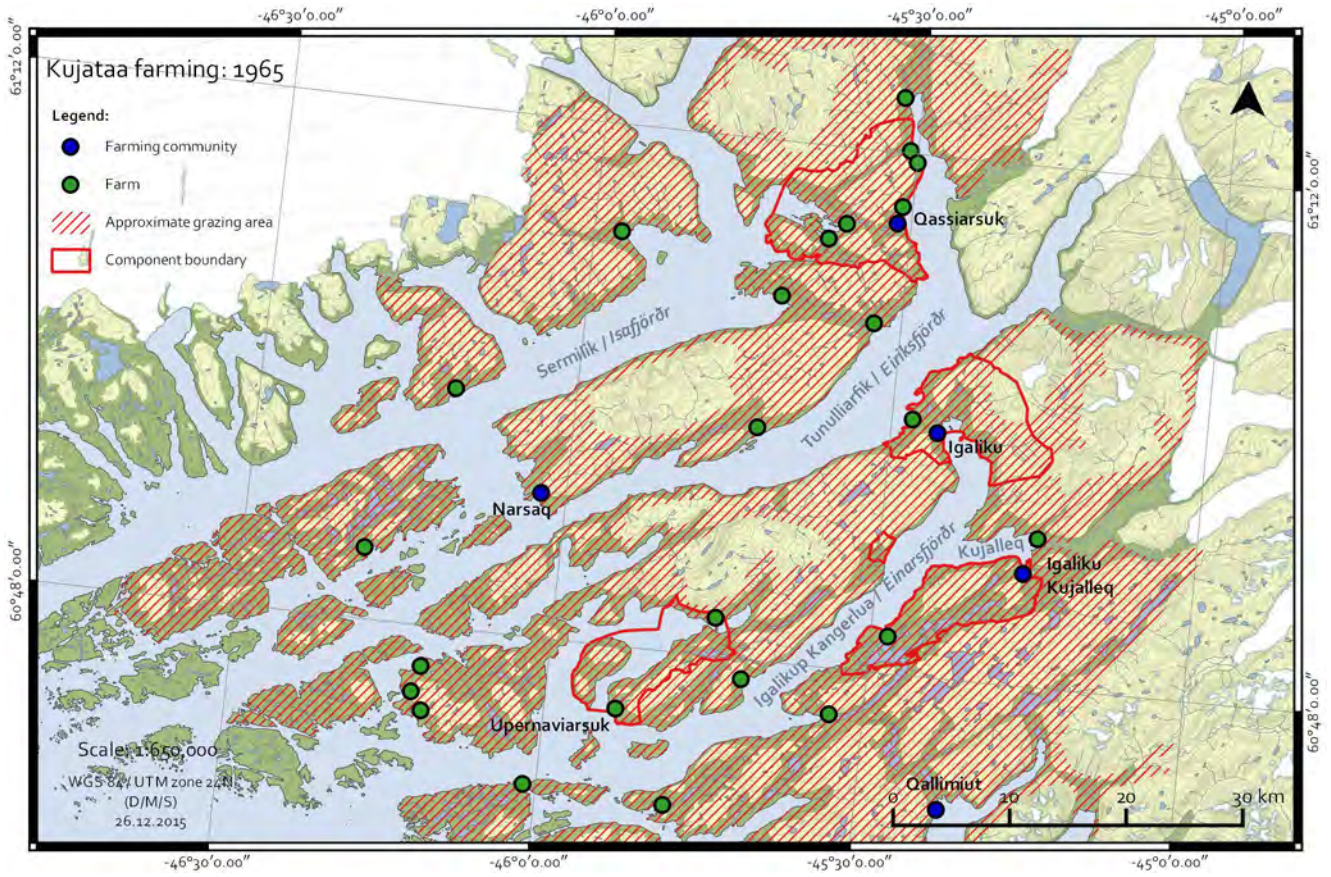


Fig. 2.109: Map showing farming settlements and approximate grazing areas, 1965.

But the recent reintroduction of cattle is also aimed at establishing beef production, with the introduction of the Irish Dexter breed in 2003. Since then, Scottish Galloway cattle has been introduced as well. In 2015, there were three farms involved in the commercial production of beef cattle, two based on the Dexter breed and one on the Galloway breed. Two of the beef cattle herds and the Timerliit dairy herd are situated within the nominated property, with the total head of cattle being 45 (2014).

Essentially the mid-20th century decline in goat and cattle numbers reflects the transition from the older model of dairy-based Inuit farming, established in the late 18th century, to a more modern farming regime concentrating on commercial sheep rearing. There are, however, plans for a development project into commercial milk production, based on a micro-dairy concept for the local market.

The economy of contemporary farming families

Modern farming in Greenland has developed from subsistence-based farms, generating a variety of products for the consumption of the family but with limited amounts to sell, towards modern farms specialising in selling most or all of the meat and wool produced. Today, sales of lamb and sheep meat represent around 80% of the total income of the farms. Some farms receive substantial incomes from other sectors, such as potato and vegetable production as well as fishing and hunting, the latter being the traditional side income.

Tourism

Tourism is being developed in South Greenland, but is dominated by local operators from outside the farming community and foreign companies. The income of the farming community from tourism is still limited, and the numbers of tourists in the farming district are small. A group of farmers is working on further developing farm-based tourism, incl. a cooperation with the website and online booking system of the Icelandic farm holiday organisation "Icelandic Farm Holidays".[301] Tourism is a supplementary source of income for the farming community, as it is in a position to appeal to the modern tourist seeking both adventure and tranquillity.

Handicrafts

Some handicrafts are made on the farms, using wool for knitting and felt-making to produce souvenirs and gift items. At one farm there is a cottage production of felt slippers, a product popular among locals as well as tourists. In the past, some farmers have been renowned

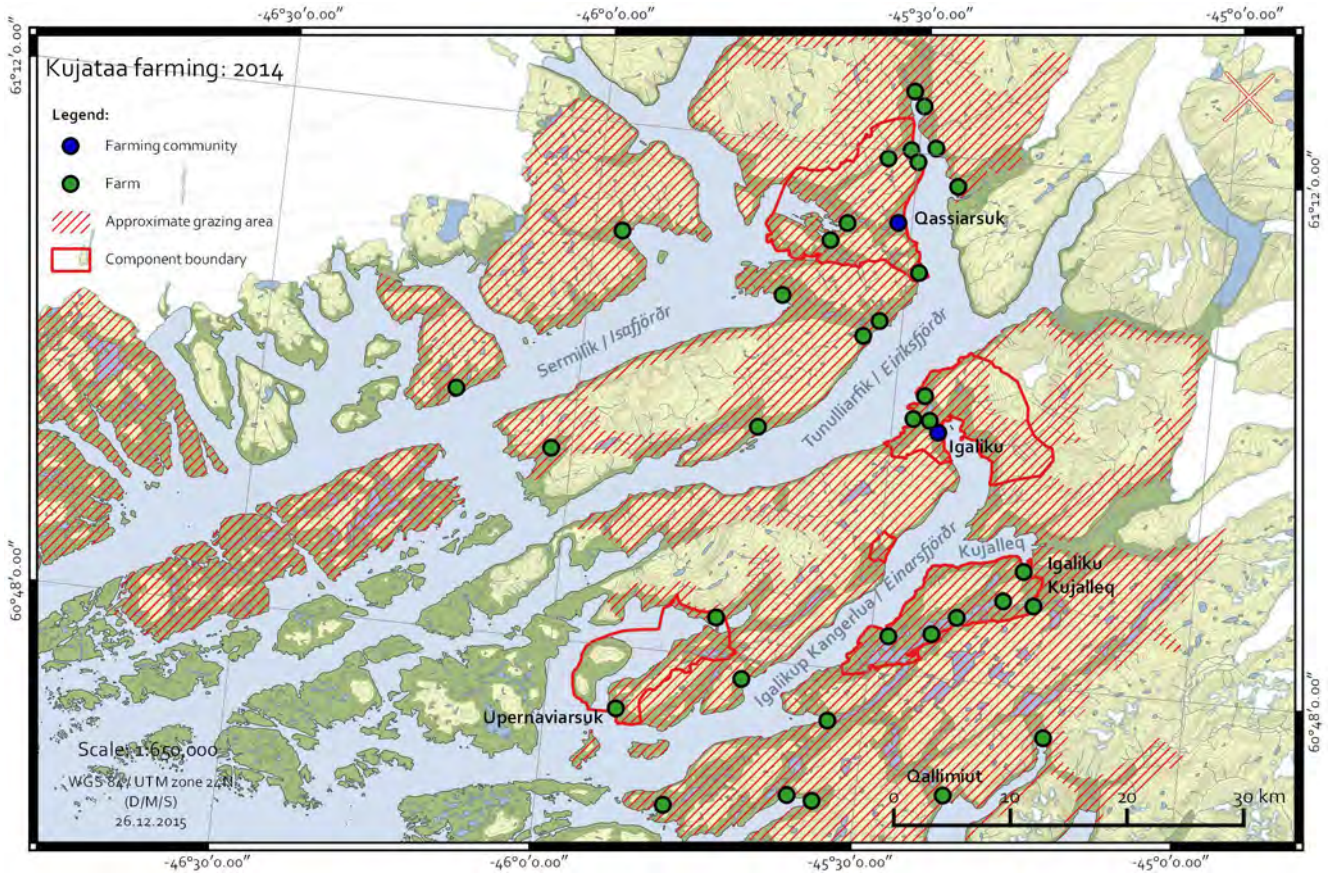


Fig. 2.110: Map showing farming settlements and approximate grazing areas, 2014.

artists creating Inuit art, especially wood carvings from local mountain birch and juniper.

Hunting and gardening

The farmers grow vegetables for their own consumption, and gather berries and herbs for teas. They also hunt ptarmigan and arctic hares around their farms, and fish for arctic char and cod. Seal hunting is not uncommon among the farmers, especially those living close to the coast. Many of the farmers are polar bear hunters as well, more from necessity than ambition as they have been forced to kill bears coming too close to the farms, threatening humans and animals alike.

In the past, the farmers have received considerable income from trapping arctic fox, but this is no longer a viable business as the price of the wild skins has plummeted, due to competition from farmed fox skins.

Fig. 2.111: On her way to help her father gather the sheep in the mountains around the sheep farm of Qorlortoq, near Qassiarsuk.

Grazing districts					
Grazing district	**District no.**	**Component part**	**Vegetated area (hectares)**	**Available fodder units (FEs)**	**Summer grazing capacity (reduced), nos. of ewes**
Qinnguata Nunaa (Kangia)	1	1	10,911	1,409,170	2,740
Qassiarsuup Nunaa	3	1	7,880	1,449,189	2818
Naajat Nunaa (Kitaa)	4	1	13,695	2,367,932	4,604
Inoqquassaat	9	2/3	3,853	614,043	1,194
Sissarluttup Nunaa	10	2/3	11,066	1,802,993	3,506
Upernaviarsuup Nunaa	13	5	4,231	464,872	904
Qanisartuup Nunaa	22	4	4,315	666,544	1,296
Kujalliup Nunaa	23	4	9,699	1,539,429	2,993

Land and grazing management

Resource mapping and monitoring

The management of the grazing resources is based on mapping of the vegetation in South Greenland carried out in 1977–82.[302] This project was jointly conducted by the Icelandic Agricultural Research Institute in Reykjavík and Upernaviarsuk research station. The borders of the grazing areas were established in close consultation with the local farmers, producing reality-based estimates of the grazing potential of each district. In each grazing district the different plant communities were mapped, and the available plant production was estimated through in-situ harvesting.

The nominated property includes grazing districts nos. 1, 3 and 4 in component part 1 (Qassiarsuk), nos. 9 and 10 in component parts 2 and 3 (Igaliku and Sissarluttoq); no. 13 around Upernaviarsuk in component part 5 and nos. 22 and 23 in component part 4 (Tasikuluulik/Vatnahverfi), with the following mapped properties: [303]

Since the 1980s, the mapping project has been the main planning tool for estimating grazing pressure and for the planning of new farms.

A monitoring programme has been ongoing since the late 1980s, with a system of botanical reference areas, some fenced off from grazing, allowing systematic studies and reducing the threat of degradation and erosion.[304]

Rangeland grazing and feeding of animals in Greenland is regulated through two by-laws.[305] They require the farmers to store a certain amount of fodder for their animals and to obtain a grazing concession. Furthermore, the by-law can regulate the grazing pressure and the length of the periods in which grazing is permitted.

Round-ups: Practical farm-level rangeland management

The local sheep farmers collectively organise the autumn round-ups, requiring them to coordinate their work schedules in September–November. The autumn round-ups are done both on foot, by boat, on horseback and with ATVs. Each grazing area is systematically searched, involving careful planning and synchronisation of movements, and the sheep and lambs are driven to the home pastures. Each area may need to be searched more than once and the final round-up takes place just before winter, at the end of October or early November.

The slaughterhouse gives the farmers dates for when the pick-up of slaughter animals is scheduled during the months of September and October. Landing craft, former US or UK military vessels, are used for transporting the animals to the slaughterhouse in Narsaq.

Further supplementary round-ups take place during winter, aimed at finding the remaining stragglers—usually few in number—in the mountains and more remote areas. The winter round-ups are normally conducted with snowmobiles.

The development of a cultural landscape

The landscape is naturally influenced by grazing. On the grassy slopes around the old farms in Qassiarsuk and Igaliku the landscape is not static. Rather it is a dynamic process continually changing due to both cultural, biotic and abiotic factors. Transformations in vegetation are influenced by both the type of grazing—in terms of different grazing animals, the level of grazing pressure, the length of the grazing period and the time of year for grazing—and by changes in climate and species composition.

Originally birch and willow bushes had a more widespread distribution in Kujataa, but due primarily to the heavy winter grazing in the decades around the middle of the 20th century, these species are now heavily reduced around the farms, especially the older ones, in Qassiarsuk and Igaliku. In recent decades, when winter grazing and the cutting of firewood has all but ceased, the bush and tree species are slowly remerging in the farming landscape of Kujataa

Modern cultivation.

Cultivated grass fields for fodder production

Contemporary sheep farming is based on the growing of winter fodder on cultivated fields, harvested mainly in silage bales and to a lesser extent as dry hay. The total cultivated land is around 1,200 hectares, with only a limited part being improved natural grass fields or old Norse fields. The majority of the fields are worked with heavy machinery, cultivated and seeded with imported grass cultivars from other subarctic areas, mainly northern Norway.

Fig. 2.112: Lime application on experimental plots in Upernaviarsuk.

Before cultivating available land, the farmers must apply for a free lease, a right of use (in Danish *brugsret*), which is essentially a non-transferable right to cultivate the land. As all land is Greenland is publicly owned, the application is a public and open process involving a number of local and national stakeholders, and no cultivation can be initiated before a formal permission is obtained from the local Municipality.

The areas selected for cultivation are typically flat and well-drained, normally with natural vegetation consisting of willow and birch thickets, as well as heath and natural grasslands. More or less stony moraines, sandy soils and drained mires are the soil types utilised for cultivation. Originally only horses were used for cultivation, limiting the possibilities in the stony Greenlandic soils. But in 1952 the first tractors for cultivation were introduced in South Greenland, significantly increasing the possibilities for cultivation. Today, all the farms have one tractor or more, normally tractors with 70–150 horsepower. Contemporary cultivation is done with tractors, backhoe loaders and diggers, using heavy-duty disc

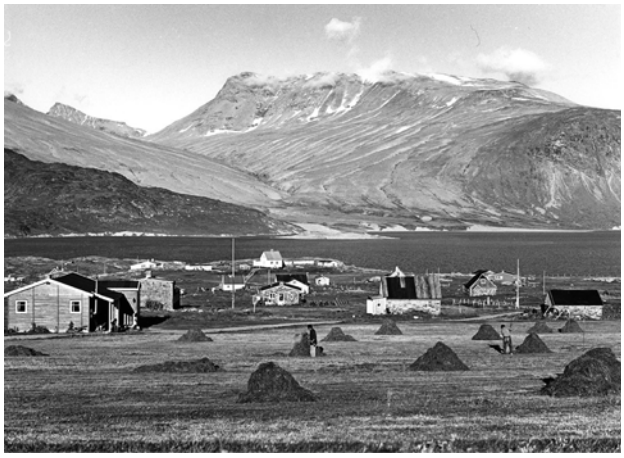


Fig. 2.113: Hay stacking on the fields in Igaliku in 1980.

harrows, ordinary harrows, rotary tillers, seeders and fertiliser spreaders. Ploughs are only used to a limited extent, due to the thin soil.

The soils are often low in pH, requiring lime to optimise plant growth. Both chemical fertilisers and anima manure are used in contemporary Greenlandic agriculture. The chemical fertiliser is mostly spread in spring while the animal manure is often spread during the autumn, as it is still frozen in spring. The compound fertilisers used are often high in both potassium and phosphorus.

The fields are largely made up of perennial grasses, mainly cultivated grass species originating in Norway. The cultivated areas in Greenland are very small, which is why seed production based on local plant material would not be economically feasible. The perennials grasses and legumes seeded in Greenland are:

- Timothy-grass (*Phleum pratense*), cultivar: "Noreng", "Engmo"
- Blue grass (*Poa pratensis*), cultivar: "Knut", "Lavang"
- Red fescue (*Festuca rubra*), cultivar: "Leik"
- Common bent/Brown top (*Agrostis cappilaris*), cultivar: "Leikvin"
- Tufted hairgrass (*Deschampsia caespitose*), origin: Gunnarsholt, Iceland
- White clover (*Trifolium repens*), cultivar: "Norstar"

Except for the tufted hairgrass, all of the above cultivars originate in Northern Norway or the mountain areas of Southern Norway. Aside from the perennial grasses, annual green fodder is also used, including spring rye, oats, triticale, barley and annual ryegrass.

Harvesting of grass

In so far as hay was collected for storage at all, down to the 1950s the farmers used the old Norse fields and natural meadows and thickets in the mountains and along the fjords. Hand tools like scythes and sickles were uses to harvest the grasses and sedges. The modern farms depend entirely on improved and cultivated fields, which can be worked with tractors and machines. To some extent scythes are still being used for more inaccessible fields and edges, but generally modern harvesting techniques are used.

The modern harvesting methods for grass and green fodder are tractor driven, where the grass is cut by disc or drum movers, after which the grass is worked with tractor-mounted rakes and tedders. Finally, the grass is packed by balers and wrapped in plastic, for producing the end product as silage bales. In some cases, harvesting machinery is shared by neighbouring farms. The bales are most often stored inside the hay barns. Most of the grass harvest is in silage bales, and only very small quantities are dried in the traditional way. The dry matter yields (DM) from grass is normally between 3–7 tonnes, though the yields can vary significantly from year to year, mainly due to droughts. During warm summers, the farmers are able mow the fields twice. This increases the dry matter yield only a little but produces a better quality of forage.

Fig. 2.114: A garden in Igaliku. Gardening has always been an important part of the household economy on the Greenland sheep farms.

Potato and vegetable production

Commercial vegetable and potato production is conducted on a number of farms, as a supplement to sheep production. Small-scale garden production of vegetables and potatoes has been conducted within the farming community in Kujataa since its inception in the 1780s, originally—and for a long time—only for consumption on the farms. At the research station in Upernaviarsuk experiments with systematic vegetable and potato production have been underway since the 1950s, and Kujataa farmers have been selling the popular turnips for many decades to consumers in the coastal towns.

Commercial production of potatoes and vegetables has increased since 2000, due both to a more favourable climate and improved techniques. The introduction of more productive potato varieties, proper machinery, better fertilisers and a protective non-woven fabric which protects the crop during light night frosts has contributed to this development. Around 10 hectares of fields are used annually for potato and vegetable production, producing a total of 50–150 tonnes of potatoes per season.

The main crops are the early varieties of potatoes in addition to turnips, lettuce, cabbage, rhubarb and radishes. The production is sold directly to the supermarket chains, as well as on the traditional open-air markets in the towns of South Greenland.

Plantations

As Kujataa has a subarctic climate with boreal forest plant species, but without tall growing commercial trees,

Fig. 2.115: "The Children's Forest 2004" - a small plantation with conifers at Itilleq.

experimental tree planting with exotic conifers has been conducted since the 1950s. A number of species have been successful, primarily larch (*Larix sibirica var. sukaczewii*), spruce (*Picea engelmannii, Picea glauca, Picea glauca x sitchensis*), pine (*Pinus contorta*) and poplars (*Populus balsamifera ssp. trichocarpa*).

Within the nominated property there are four small plantations (0.5–7 hectares) with introduced conifers. They are at Itilleq (est. 2004), east of Igaliku (est. 2004) in component part 1); Timerliit farm (est. 2002) and Tatsip Ataa (est. 1995 onwards) in component part 4 and the Upernaviarsuk research station (est. 1956 onwards) in component part 5. In addition, solitary trees have been planted close to houses for shelter and ornamentation.

Government support for contemporary farming

The Greenlandic government provides different types of subsidies for farming, both in the form of direct subsidies as well as loans. Furthermore, the government provides consultancy and development funds and initiatives.

Most of the loans for investments in agriculture are from funds from the Government of Greenland, and subsidies go the construction of houses, sheds, stables and barns. Direct subsidies also support both the slaughterhouse as well as the farmers, and are granted for each head of sheep sent to the slaughterhouse.

Fig. 2.116: Grass field for forage production in Upernaviarsuk, dominated by timothy and blue grass

Special government initiatives include incentives and subsidies for cultivating more land, in order to avoid the negative consequences of bad harvests and to limit expensive imports of fodder. What's more, the government is prioritising irrigation schemes to be established on all farms, with investment subsidies to stabilise the local fodder production also in years with limited precipitation. Finally, the government is prioritising the establishment of green energy projects on the farms, meaning small-scale hydropower, wind and solar power, thereby minimising the need for fossil fuels for the generators on the farms.

Government initiatives on agriculture are regulated by a law for agriculture.[306] Further government policies are being developed, and a parliamentary report on agriculture was completed in 2014. There is the political will to further develop the agricultural sector in Greenland, mainly for the sake of greater food security, but there is also a political wish for a more sustainable industry, which is less dependent on government subsidies.

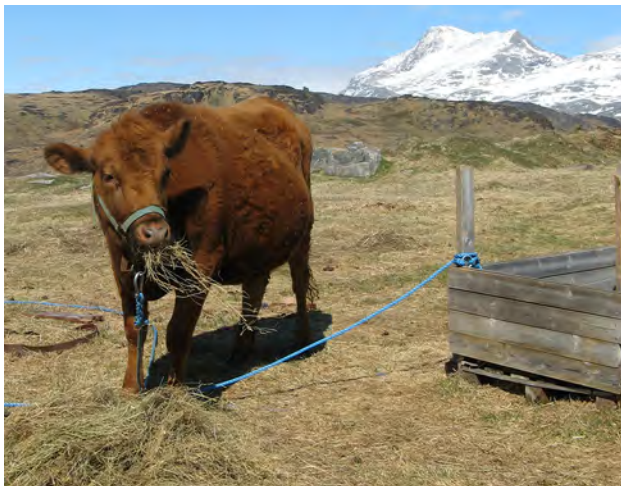


Fig. 2.117: Cattle on Uummannartiivaaraq farm, near Igaliku.

The agricultural consultancy service

The objective of the consulting service is to support Greenland's agricultural development and is provided by three specialised consultants, including accounting and technical experts. Typically, farmers contact the consultants and request assistance with regard to a certain task. At the farmers' request, consultants will visit farms to provide advice, with professional consulting provided free of charge, except for accounting services. The consultancy service is situated in Qaqortoq, and is funded from the government's fiscal budget.

Upernaviarsuk experimental farm

The Upernaviarsuk experimental farm is the Greenlandic government's research and training centre for the agricultural sector. The farm is located within the nominated property (cp 5), approximately 7 kilometres east of Qaqortoq, and all transport to and from the facility is by boat. Upernaviarsuk is situated in an outer fjord region of Kujataa, which is free of ice during the winter months, but often blocked by large quantities of pack ice during the spring.

The operation at Upernaviarsuk provides agricultural research and training in a a sub to low arctic region. A wide range of topics is covered within the area of animal husbandry, with a focus on the economically important area of sheep farming. In this connection, a flock of 350 winter ewes is kept in Upernaviarsuk, and around 15 hectares of grass fields are harvested. Upernaviarsuk and the consultancy service are developing systematic sheep farming methods. In addition, smaller herds of cattle and horses are raised at the facility, mostly for training purposes. Planned research with dairy cows and a micro-dairy have been postponed indefinitely due to a lack of funding.

Within the area of plant cultivation, research is conducted on various perennial types of grasses for the production of hay and silage, including experiments with annual feed crops such as grains—primarily rye, barley and oats—as well as ryegrass and varieties of the cabbage family. In addition, research is conducted in the area of general vegetable cultivation and horticulture at the farm's nursery, including the production of flowering perennials, ornamental bushes and trees for private and public gardens. Furthermore, there is a small grove (0.2 ha) of planted conifers, with up to 5 metre high spruce trees.

There is a small agricultural school at Upernaviarsuk, with 10 students enrolled (autumn 2015), with some students at the station while others are away on internships on farms in Greenland, Iceland and/or Norway. The research station and school at Upernaviarsuk has a staff of four, including an agricultural teacher, a head of operations, a cook and a gardener.

Fig. 2.118: The new greenhouse at Upernaviarsuk, a heated plastic tunnel structure, with strawberries within the greenhouse and lettuce in the foreground.

The nursery and gardens at Upernaviarsuk dates back to the initial tentative attempts to introduce horticulture and forestry research to Greenland back in 1953, when the first hotbeds were built. The nursery and gardens at Upernaviarsuk continue to be a mixed agricultural operation consisting of outdoor areas, hotbeds and a greenhouse with a surface area of 144 m^2. The outdoor areas are divided into a number of smaller units that are primarily used for vegetable production and growing potatoes. With the right amount of calcium and fertiliser, the soil, which is slightly acidic and relatively rich in humus, has proven well suited to the current production. The hotbeds are from the 1950s and 1960s, and are used for the production of summer flowers and herbaceous perennials. They also serve as "exhibit areas" for these products. In addition, the hotbeds are used to harden vegetable plants before they are transplanted to the outdoors. The greenhouse is divided into two units, one with electric heating from 1987 and a "cold house" unit, without heating, from 2005. The greenhouse is used during the first half of the season for the production of small plants, and later for growing vegetables. A new greenhouse of 125 m^2 was built in the summer of 2009. This is a heated plastic tunnel structure, which is able to withstand strong winds, probably the most solid construction of its kind on the market. This experiment has shown that such relatively inexpensive greenhouses are suitable for use in Greenland. The nursery at Upernaviarsuk is an important destination for excursions for tourists and visitors alike.

SPS (Savaatillit Peqatigiiffiit Suleqatigiissut) – The Sheep Farmers' Association

SPS is the main Greenlandic agricultural organisation representing farmers' interests. SPS has an administrative office in Qaqortoq, with a full-time administrative position. The administrator assists the association's members and works with advocacy tasks, in cooperation with the chairman and the board of directors. Important

tasks include annual price negotiations with the slaughterhouse, communicating with the public authorities concerning political initiatives, and the annual general meeting/assembly, along with the joint animal feed purchases. Originally, sheep farmers were organised in smaller associations that were in charge of the joint task of rounding up the sheep. The Sheep Farmers' Association (SPS) was founded in 1951 at a meeting in the village of Alluitsup Paa, and since then SPS has served as the leading representative and professional body in Greenlandic agriculture. SPS handles all areas of Greenlandic agriculture, although sheep farming is the most important area of operation. Most of the Greenlandic farmers are members of SPS.

The SPS members and their families meet every summer, around the last week of June or first week of July, for an annual general assembly, every second year in either Narsaq or Qaqortoq. Beside the normal rituals of an annual assembly, formal discussions are held on important topics, as well as lectures presented by the consultancy service and invited lecturers. The annual assembly is also an important social event in the towns and the culture of Kujataa, with sport competitions, horse races and a party with several hundred people. The SPS has a youth wing with its own annual assembly, including discussions on relevant issues.

The farming community in contemporary Greenland – challenges and prospects

Traditionally the farming families have been successful and influential, and are often involved in politics and have good educational records. The farming community has been very influential in the cultural arena, including choir singing, music and poetry, especially in the village of Igaliku.

Although farm production has increased in the last decades; the farming community is getting smaller in terms of the number of people, with fewer people in the villages and fewer children in the families. Accordingly, the community could lose some of their present-day network and influence. The main challenges will therefore be to maintain an ongoing development of both farming and agro-tourism, through for instance high levels of education, and to maintain good communications with the outer world, a challenge shared with other sections of Greenlandic society.

Fig. 2.119: Two sheep overlooking the settlement of Qassiarsuk.

Importance of education

The farming community in Kujataa is maintained by a readiness to adapt to new technologies and knowledge, an adaptation that is very much connected to good education. The parents on the outlying farms home-school their children up to the age of 10–11, after which the children attend boarding schools, two of which are found within the nominated property, in Qassiarsuk (cp1) and Igaliku (cp2). The educational levels of the teachers at these small schools are among the highest in the country.

Importance of good telecommunications. In the not-so distant past, only 20 years ago, the farming families depended exclusively on VHF radios, with no telephones or fax machines. Today, they are connected to outside world with satellite TV, telephones and internet. Although improving steadily, telecommunications in the farming districts are still rather undeveloped, but are set to become an important issue in the teaching of children on the outlying farms. The farms have slow internet connections, which makes many aspects of communications challenging in a modern society. The development of proper internet connections for the outlying farms and settlements will therefore be one of the bigger challenges in the years to come.

Assimilation of farming products into the Inuit cuisine

Mutton is today an integrated part of the local diet in Greenland, being a very popular type of meat, both roasted and boiled. An important dish is the local lamb stew, prepared in a similar way to the traditional seal soup. Boiled mutton served with rice and a curry sauce is also a very popular dish in Kujataa.

The Inuit tradition of producing fermented and dried meat products, traditionally from seal, whale and fish, has been adapted to the farming produce, as the more or less dried lamb or sheep meat has become very popular as a variety of lightly fermented meat. The meat is hung up outside during late September/October, and will be left outside for at least a few weeks. This results in a tender and tasty product. The lightly fermented meat is normally boiled as a meat soup, often served together with rice and a curry sauce.

Turnips are an important part of the traditional cuisine in Kujataa, and seem to have been so since the 19th century. It is popular to eat the turnip together with traditional Inuit foods, such as dried seal and whale meat, as well as fermented seal blubber and dried fish.

Greenlandic farming and climatic change

Greenlandic farming dates back to the Norse period, with a climate probably not very different from today. During the Middle Ages, irrigation systems were established on some farms suggesting that droughts were a challenge then as they are today. Climatic changes contributed to the demise of the Norse Greenlanders in the 15th century and improving climate, especially from the early 20th century onwards, coincided with a resurgence in Greenlandic farming. Today, there are 50 farms with sheep farming as their primary source of income, with roughly 50,000 animals, sheep and lambs, grazing during the summer. In addition, there are small numbers of horses and cattle, and a few thousand tame reindeer. Winter fodder is grown on 1,200 hectares, and potatoes and vegetables on approximately 10 hectares. Sheep farming with year-round grazing in the mountains flourished during the mild climatic period from the early 1920s to the mid-1960s, but the sector underwent a crisis from the late 1960s to the late 1970s. This was due to a colder climate with harsher winters and heavy, extended snow cover.

Fig. 2.120: A snowmobile track over the frozen fjord heads towards Hvalsey.

In an area like Southwest Greenland, a warmer climate with a longer growing season means increased agricultural production because the temperature and length of the summer period are the primary limiting factors for plant growth in the subarctic. Thus a warmer climate, sparked by global warming, will translate into greater grazing capacity as well as larger yields of silage and hay, vegetables and potatoes. Climatic warming since the mid-1990s has helped establish the commercial production of potatoes and vegetables, which have become particularly widespread among Greenlandic farmers since the year 2000. Furthermore, current lamb production is at an extremely high level, making the first decade of the new millennium the most productive in the history of Greenlandic sheep farming.

An improvement is observed in the small experimental groves of foreign trees, especially conifers, around Kujataa. However, also increasing damage to trees from more continental regions has been noted, indicating difficulties in adapting to increasingly mild winters. This can be observed by the fact that trees from coastal areas, with unstable winters, do better than related tree varieties from farther inland.

However, a more unstable winter climate, with many mild weather periods with wind and rain, where the earth is covered with a sheet of ice, could lead to worse grazing, especially in the autumn months and the winter grazing period, with serious consequences for the reindeer in particular. Winter grazing is only of limited importance to today's sheep farming industry.

More frequent periods of summer drought, with higher temperatures and no rain, will pose a problem in a warmer climate regime. For instance, droughts in the summer of 2015 were extremely damaging to the farming, especially with regard to the growing of grass for hay and silage, and for grazing in particularly hard-hit areas, including the area around the settlement of Qassiarsuk. A number of new irrigation facilities are expected to be established in the years to come to help make the silage and hay production more stable.

All in all, it can be concluded that a warmer climate would be advantageous for agriculture in Greenland. By contrast, a colder climate would make conditions significantly more difficult. Greenlandic agriculture continues to thrive on the doorstep of the cold Arctic desert, as it has been agriculture's northernmost outpost since the time of the Norse.

The future will show if this outpost will shift farther north.

Fig. 2.121: Horses on spring pasture, near Qassiarsuk.

2.3 Development of modern sheep sheds, 1970s to present day

The sheep sheds have undergone an immense development in recent decades, from being basic shelters for the animals in the early 1970s, built by recycling materials from US army barracks, up to the present-day structures made from modern steel constructions and equipped with cutting-edge automated technology, including automated watering systems and systems for handling manure.

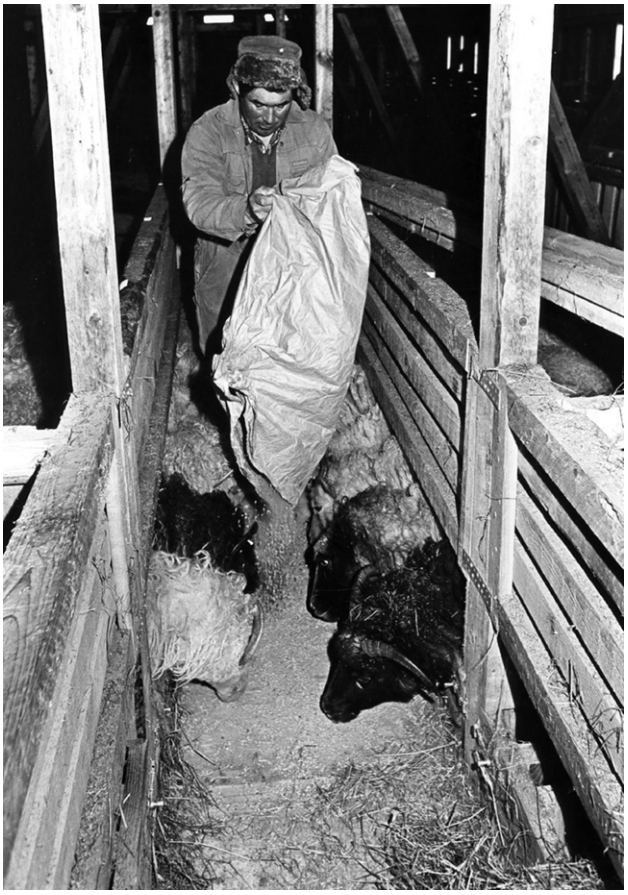


Fig. 2.122: Feeding hay and concentrates in a sheep shed from the 1980s.

Fig. 2.123: A sheep shed in Tasiusaq, 2008.

Fig. 2.124: Modern sheep shed at the Tatsip Kitaa farm, close to Igaliku, component part 2.

Fig. 2.125: The inside of the sheep shed at the Qorlortup Itinnera farm, component part 1.

Fig. 2.126: Wooden shed from the late 1980s and a steel barn from the 1990s at the Tasilikulooq farm.

Fig. 2.127: Fields at the Tasilikulooq farm, component part 4.

Chapter 3 – Justification for inscription

Introduction

Dominated by the world's second largest ice cap, Greenland, situated between 60 and 83 degrees north, is a land of long winters and cold and short summers. While its marine ecosystem is comparatively rich, Greenland's vegetation is sparse and species-poor, supporting only a small number of land animals. Human occupation of this hostile environment stretches back to the third millennium BC, with Palaeo-Eskimo hunting cultures basing their economies on fishing and the hunting of sea mammals, musk ox and reindeer. A completely different approach to survival in this environment was introduced by Norse colonists in the late 10th century AD. In two restricted areas in South Greenland they found a local climate that allowed them to establish a version of a Northern European farming settlement based on a unique combination of animal husbandry and sea mammal hunting. The Norse Greenlandic farmers brought with them a suite of domestic animals; cattle, sheep, goats, pigs, horses and dogs in addition to cultivars like barley, and pests like mice, lice and weeds.[307]

The introduced organisms were a part of a package, an economic strategy underpinning a social order, which had to be adapted to environmental conditions radically different from the regions where the package originated. The Norse Greenlandic farmers countered low fertility and low biomass production by spacing their settlements widely; by adapting their farming practices to the subarctic conditions—evidenced among other things by a characteristic reliance on goats—and by heavily supplementing their farming by hunting wild mammals, particularly seal and to a lesser extent reindeer. Seal hunting was a subsistence activity of marginal importance in the regions the Norse settlers came from, but in Greenland it became a mainstay of the economy. The adaptation of the Norse Greenlanders to their environment is unique, and uniquely well documented, and so is their subsequent adaptation to changing climatic and environmental conditions. The dietary mix of dairy products and seal meat is emblematic for this extraordinary adaptation.

> *He (Erik the Red) gave a name to the country and called it Greenland, and said that it would encourage people to go there that the country had a good name.*
>
> *The Book of Icelanders, 1122-33 AD (Íslendingabók. Kristni Saga, 7)*

The history of the Norse Greenlandic settlements contains stories of remarkable persistence—especially their high-cost loyalty to animal husbandry and continuing attempts at barley cultivation—as well as of innovation (e.g. irrigation), adaptability and dynamic responses to environmental change. Despite their inner-fjord settlements, the Norse Greenlanders relied intensively on seal caught on the outer coast, where the hunting-grounds

Fig. 3.1: View of the plain at Igaliku Kujalleq (Ø66), where Norse ruins and modern buildings lie side by side, occupying the same infield and suggesting the overlap of farming traditions.

were between 30 and 100 kilometres from their farms. For nearly five centuries, the Norse Greenlandic farmers overcame local unavailability of basic resources like iron and timber, maintaining extraordinarily extensive procurement and trading networks—stretching from Labrador and the head of Baffin Bay to mainland Europe—designed to offset the inherent limitations of the environment in which their farms were located.

Fig. 3.2: A typical Igaliku house.

The success of Norse Greenlandic society is evidenced for instance by the establishment of a separate Greenlandic diocese in the 12th century, separate laws and local administrative and ecclesiastical hierarchies. Monumental building projects were under way around 1300 AD, but signs of increased isolation are apparent from the late 14th century AD and it is believed that the Greenlandic Norse communities had ceased to exist by 1450. In Europe it was thought that the community lived on and confirmation of its disappearance only came after contact was re-established in 1721. The end of the Norse Greenlandic settlements remains a mystery; there is no shortage of hypotheses about what happened, but there is no consensus and the issue remains hotly contested among academics and the public alike.

No sooner had Danish-Norwegian merchants and missionaries established posts on Greenland's west coast in the early 18th century, than their thoughts turned to farming. Historical records and extensive ruins told of a medieval farming society and it seemed both feasible and profitable to re-establish this. Young men from northern Norway were brought in because their experience in farming at high latitudes had provided them with the skills necessary to reintroduce farming to Greenland. Nothing came of these plans in the 1740s, but after decades of service as a Greenland merchant, one of these Norwegians, together with his Inuit wife, established a farm in Igaliku, the site of the former Norse Greenlandic episcopal see. From 1783, the Igaliku farm grew and developed into an Inuit community, mixing imported and re-invented farming methods with traditional hunting practices. As in the Middle Ages this economy was based on a combination of animal husbandry and seal hunting—although this time it was hunters who learnt to farm rather than the other way around. The Igaliku community thrived throughout the 19th century and provided the cultural and economic springboard for the expansion of sheep farming in Kujataa in the 20th century. The adoption of farming by Inuit hunters involved a fundamental change in subsistence and lifeways, representing an alternative pathway to the more common transition from seasonal hunting to urban living. Inuit farming represents a rare example of a cultural adaptation which that has assumed a unique character because of the connections with its Norse Greenlandic forebears. The cultural history of modern farming in Greenland bears witness to the importance, both symbolic and practical, of the Norse Greenlandic precedent. Having a farming landscape in place, with ruins indicating the best places to farm, old homefields still retaining distinct vegetation communities and outfield structures suggesting where the best grazing was to be found meant that the Inuit farmers inherited a template that aided them in the landscape learning necessary to successfully establish a farm-based economy. The modern farming landscape retains the same basic structure as its medieval antecedent, with farmsteads and hayfields located in the same places and extensive summer grazing coupled with stalling and local grazing in winter, but it also has its own distinct characteristics, embodied most prominently by drainage ditches, wire fencing and farm machinery. Modern farming has impacted Norse Greenlandic archaeology, albeit only a fraction of the total number of sites, but it also brings the farming landscape to life. The same kind of livestock (sheep of Icelandic and Faroese origin) provides livelihoods and contributes—through grazing—to the maintenance of comparable vegetation regimes as in the Middle Ages. The landscape of Kujataa bears outstanding testimony to a farming culture flowering across chronological and ethnic divides. Modern sheep farming in Kujataa faces the same basic limitations as its medieval forerunner, but also has to contend with unprecedented climatic warming, resulting in instability and unpredictability. Kujataa therefore remains an outstanding example of human interaction with the environment, both past and present.

The preservation of the Norse cultural landscape in Greenland is unique. Owing to the very limited imprint of subsequent human activity, and the sensitivity of modern farmers, more or less the entirety of the material relics of this culture remains preserved and visible in the landscape. There are 440 Norse Greenlandic sites on

record in Kujataa, half of which may have been farms. The nominated property is in the core of the larger and longer-lived of the two main settlement areas in Greenland, and the five component parts encompass the entire range of site types and continuous landscapes that remarkably attest to this vanished culture. The modern farms follow the same distribution and are also concentrated in the area of the component parts, which include farms with a building heritage going back to the early 20th century that reflects this unique adaptation. The stone buildings in Igaliku are iconic of this modern culture. They represent more than a century's worth of architectural development in Igaliku, where traditional Inuit architecture made use of Norse Greenlandic building materials. Without the Norse Greenlandic ruins, this modern architectural tradition would have been very different.

3.1.1 Brief synthesis

Kujataa – a subarctic farming landscape in Greenland is located in the municipality of Kujalleq in South Greenland. The nominated property is made up of five component parts which together represent the demographic and administrative core of two farming cultures, a Norse Greenlandic one from the late 10th to the mid-15th century AD and an Inuit one from the 1780s to the present. Although these two cultures are distinct, both are based on a combination of animal husbandry and marine mammal hunting.

The overall landscape of pastures, fields, ruins and present-day buildings is an outstanding example of a human settlement and land use in the Arctic, which is representative of a unique farming culture. Kujataa represents the first European settlement in the New World and the earliest introduction of farming to the Arctic. The resulting cultural landscape, shaped by grazing both in medieval and modern times, is composed of grassy slopes and willow copses and characterised by low settlement densities with isolated farmsteads surrounded by cultivated fields. The landscape of Kujataa represents an exceptionally comprehensive preservation of a medieval North European culture. The five component parts contain the full range of relics relating to Norse Greenlandic culture dating from the 10th to the 15th centuries AD, with complete examples of monumental architecture as well as key sites illustrative of the adaptation of the Inuit to a farming way of life from the 18th century onwards.

3.1.2 Criterion under which inscription is proposed

The farming landscape of Kujataa is nominated under criterion (v) as "*an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.*"

Criterion (v) Kujataa is an outstanding example of human settlement, where unique farming traditions have developed in a challenging environment. Situated between the cold desert of the Greenland Ice Cap and the cool outer coast of the Labrador Sea, Kujataa is an oasis with a relatively mild climate. Norse and Inuit subsistence practices based on a combination of animal husbandry and sea mammal hunting have resulted in a distinctive cultural landscape where cultivated fields and managed pastures contrast with the barren wastes of the Arctic. Kujataa is an extremely marginal landscape for farming, vulnerable to environmental change, illustrating the fragility as well as the resilience of past and present cultural traditions.

3.1.3 Statement of integrity

Integrity is a measure of the wholeness and intactness of a nominated property and its attributes. The conditions of integrity set out in the operational Guidelines are met by the nominated property in Kujataa. The property includes all of the elements necessary to express its outstanding universal value, it is of adequate size to ensure the complete representation of the features that convey its significance, and it does not suffer from the adverse effects of development or neglect.

All of the elements necessary to express the outstanding universal value are included.

The nominated property in Kujataa is an outstanding example of a farming landscape where a unique economic regime, based on a combination of animal husbandry and sea mammal huunting, persisted for centuries in a challenging environment and is still practiced to this day. The nominated property includes the full range of site types representative of a medieval farming culture and a complete modern farming landscape. The nominated property includes the range of landscape types characteristic of Norse Greenlandic culture, from densely settled inland valleys and fertile coastal plains to steep-sided fjords with high site dispersal. It includes marine-oriented sites, farms ranging from small cottages to pinnacle sites like the residences of the bishop and the lawman, as well as outfield stations and mountain shielings. The nominated property includes the full range of modern farms, large and small, coastal and inland, as well as sites demonstrating the historical development of modern farming. The nominated property illustrates the use of the land and the sea by Greenland Norse and modern Inuit farmers. It includes hayfields, pastures and woodland, sparsely vegetated lowlands and denuded

mountains—the ecological setting for medieval Norse Greenlandic and modern Inuit farming. It includes ice-filled and ice-free fjords, mountain passes, long stretches of lowland suitable to transport by horse as well as impassable mountains and steep-sided fjords—all of which set the stage for the communication and transport challenges that shaped this culture and gave it its unique character. The nominated property includes the full range of ecological zones and landscape types found in subarctic Kujataa, demonstrating the environmental context of subarctic farming.

In addition to the landscape itself and the monuments still visible, archaeological research in Kujataa has revealed a collection of artefacts—including tools, domestic articles and objects with runic inscriptions and symbolic expression—that represent the daily life, economic activities and trade contacts of the Greenland Norse. Listed buildings bear witness to the history of modern Inuit farming and the modern farms—with tilled fields and grazed pastures—preserve the farming character of the landscape.

Adequate size to ensure complete representation

The nominated property consists of five component parts extending over a total area of 348.92 km^2. Each part includes unique sites and monuments as well as landscape types representing the full range of both Norse Greenlandic and modern Inuit settlement patterns. Kujataa farming represents an extreme case of an extensive adaptation, with great distances between settlements and installations. The spaces in between, the pastures and unproductive areas as well as the sea, are an integral part of this cultural landscape, and the nominated property is designed to encompass this totality. Full appreciation of the adaptation of Kujataa farmers to this subarctic landscape can only be gained by taking into account the extreme dispersal of natural resources and the challenges involved in accessing those resources while at the same time maintaining an integrated sedentary society, with regular meetings (for feasting, church service and judicial assembly in the Middle Ages, and also for education and administration in modern times) and exchanges of goods and services. The boundaries of the nominated property are drawn to fully represent Norse Greenlandic farming culture during the Middle Ages as well as modern Inuit farming.

Absence of adverse effects of development and/or neglect

When the Norse Greenlandic settlements became depopulated in the 15th century, they were left in an orderly fashion, valuables were removed but the buildings left to collapse and decay. A few buildings were re-used by Thule Inuit over the subsequent centuries,

Fig. 3.3: At Sissarluttoq (Ø59) several ruins have been built with thick stone walls of neatly fitted, even worked, stones resulting in excellent preservation.

but on the whole the remains of the Norse Greenlandic settlements have not been modified or built over since their abandonment. From the 15th to the 20th century, this landscape was untouched by human development—with the single exception of the small farming hamlet of Igaliku established in 1783. Sheep farming was introduced in the beginning of the 20th century, first at Qassiarsuk and by mid-century across the area with 22 farms now operational within the nominated property. The modern farms are associated with less than half of the Greenlandic Norse farm sites within the nominated property and an even smaller proportion of shielings and other sites. Practically all the modern farms are located adjacent to earlier Greenland Norse farms, making use of the same hayfields and pastures. Legal protection and effective monitoring and conservation efforts were in place by the middle of the 20th century, and recent field surveys show that, with few exceptions, there has been great success in preserving the Greenland Norse ruins side-by-side with the modern farming operations. In most cases, individual ruins have been left intact or, in a few cases, buried under soil. Fields have been levelled and drained but recent excavations in Igaliku demonstrate that this has only affected the top soil, leaving archaeological deposits

undisturbed below. The modern farming has a considerable visual impact, but its negative impact on the preservation of archaeological remains is limited. The visual impact is represented by modern buildings, roads, improved fields, fences and equipment. Despite great distances between farms, this is an active farming landscape where it is possible to appreciate both the medieval and modern phases—and to understand the connections between them. The modern farms facilitate access to the sites; what transport infrastructure there is within the nominated property has been created to support the farming operations, and it is on the back of this network that the region is accessible to visitors at all.

Although mechanised, the modern farming is built on the same ecological foundations and husbandry principles as the medieval farming. It is based on extensive summer grazing and the production of fodder to feed the animals through the winter months. Grazing has returned the landscape of the nominated property to a comparable condition as it was in during the Middle Ages, and hunting of terrestrial fauna (arctic fox and hare) as well as fishing of freshwater fish has had a comparable effect. Unlike the terrestrial one, the marine ecosystem has not seen any hiatus in exploitation since the Middle Ages. Although the Thule Inuit and the Inuit farmers hunted and fished different species, in different quantities and at different times of the year from their Norse Greenlandic forebears, the marine ecosystem of Kujataa has seen unbroken exploitation by man for over a millennium. Although muted in its visual impact, the anthropogenic marine ecosystem is nevertheless a vital component of the farming landscape of Kujataa.

Many of the key sites were excavated in the 1920s and 1930s, exposing structures and making them more visible. The ruins are monitored and standing masonry has been repaired.

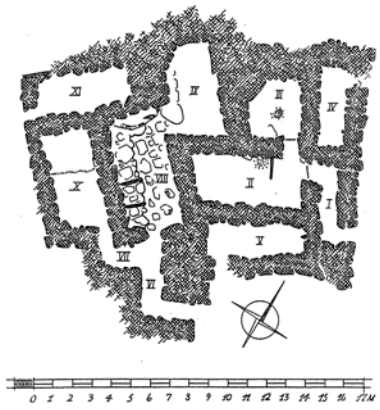
In summary, despite modern development, and partly because of it, the medieval farming landscape can still be appreciated to a remarkable degree. The modern farms are a reliable guide to the centres of medieval settlement and while the modern buildings, fields and fences strike the eye at first glance, the visitor can, with a minimum of orientation, begin to appreciate the medieval farming landscape. Large sections of the nominated property, especially in component parts 3 and 5, have seen no development whatsoever and scores of sites remain in a pristine condition, while modern grazing ensures that the vegetation is comparable to what it was in the Middle Ages. Where modern farming has been introduced, it has not damaged the Greenlandic Norse archaeological remains to any significant degree. It is subject to the same ecological restrictions as the medieval farming and reflects the same distribution of resources, thus providing a vivid link between past and present.

The nominated property does not suffer the effects of neglect. Existing legislation and the monitoring and management supervised by the Greenland National Museum in Nuuk ensure that the property is well cared for. The impact of both natural factors, such as erosion, and man-made ones, such as proposed developments, are carefully monitored to ensure that they have little or no impact on archaeological sites and that the landscape retains its integrity.

3.1.4 Statement of authenticity

A nominated property meets the conditions of authenticity if its cultural values are truthfully and credibly expressed through a variety of attributes. The authenticity of Kujataa is demonstrated by attributes that include the form and design of various components, the materials used in construction, the traditions and techniques associated with animal husbandry and hunting, the location and setting of the property, the intangible heritage represented by literary texts and historical descriptions relating to Norse Greenlandic and Inuit farming, and the spirit and feeling evoked by the dramatic landscape and the ongoing practices of animal husbandry and hunting.

The authenticity of the nominated property is further demonstrated by substantial archival records and large artefact and ecofact assemblages.



West Settlement No. 16. Plan of farm-houses 1:300. I—III dwelling rooms, IV and V store-houses, VI—XI, livestock rooms and barns.

Fig. 3.4: Excavation plan (1941) of the small centralized farm V16 in the Western Settlement.

Form and design

The Norse settlers brought with them distinct architectural traditions derived from their Scandinavian homeland. These traditions had already seen development and adaptation to conditions in the North Atlantic but are readily identifiable in the earliest structures known from Norse Greenland. The dwellings were three-aisled

Fig. 3.5: One of the best preserved stone skemmas in Eystribyggð, close to Upernaviarsuk.

longhouses with a central hearth, concave long walls and an entrance towards one end of one of the long walls, typically the one facing the sea. Very few such buildings are known from Norse Greenland, but one of them has been investigated in Qassiarsuk (Ø29a – Brattahlíð) and the basic form can be discerned at the core of many of the farmhouse complexes known within the nominated property. As in Iceland, the Norse Greenlandic house evolved to contain additional rooms, each with its own timber frame and connected with others through corridors of various lengths. In some cases, animal stables were made a part of the central farmhouse complex, creating what look like warrens of many small interconnected rooms. In its extreme form, the Norse Greenlandic centralised farm is a unique architectural form, although it has clear parallels both in Iceland and Finnmark in Norway.

As in Iceland, byres were either separate buildings or separate rooms within the farmhouse complex; they did not, as was common in Scandinavia, constitute one end of the longhouse.

Fig. 3.6: The well-defined stone built Norse storehouse (Ø47) on a tiny island just off the Igaliku harbour.

Also in common with other Norse communities in the North Atlantic, the Norse Greenlandic farm was made up of a number of buildings scattered within and just outside a homefield. A tendency towards centralisation, the bringing together of all the buildings into one mighty central complex, has been suggested as a key architectural characteristic of Norse Greenland, and the nominated property includes several examples of such a development (e.g. at Ø167 and Ø72, cp4). Most farms have several discrete outhouses, usually interpreted as animal stables, in addition to the dwelling, often on top of a small farm mound. Most also have stone pens, typically just outside the homefield. Outhouses, animal stables and pens are the least well investigated category of Norse Greenlandic structures, but their forms and locational characteristics are nevertheless well known and comparable to other Norse communities in the North Atlantic.

Norse Greenlandic farms have several types of structures which are distinct. These include the so-called *skemmur* (sing. *skemma*), dry-stone built storehouses, often set apart from the other farmhouses in a location selected for prominence rather than ease of access. The *skemmur* are a unique Greenlandic feature associated with the processing and storage of marine resources, including seal meat and walrus hides. Another distinctly Norse Greenlandic type of structure is the large (10–20 m in diameter) stone fold, sometimes called horse pens, often built of very large stones.

In addition to domestic architecture, the nominated property includes several churches exhibiting different architectural styles and traditions. These range from small turf churches, such as the excavated Þjóðhildarkirkja in Qassiarsuk (Ø29a –Brattahlíð, cp1, a distinctively North Atlantic style often associated with a circular graveyard enclosure), to Romanesque churches—typically bicameral with an open western gable indicating a timber construction—and Gothic stone churches such as the well-preserved example in Qaqortukulooq (Ø83 – Hvalsey). The latter two types vividly demonstrate the enduring connections of the Norse Greenlandic community with European culture. Such influence can also be seen in the uniquely well preserved feasting hall in Qaqortukulooq (Ø83 – Hvalsey), another stone and mortar construction.

Distinctively European forms and designs are also exhibited in the artefactual evidence, sometimes rendered in locally available materials.

Thule Inuit culture is represented by distinctive forms of stone graves, both cairns (e.g. in Igaliku) and slab-lined cists with slab coverings (e.g. in Arpatsivik) as well as Christian Inuit cemeteries (e.g. in Igaliku) bearing witness to a second meeting of cultures, that of Thule Inuit with 18th and 19th century European culture. Thule Inuit culture is also represented by summer camps—

Fig. 3.7: Early Christian cemetery in Igaliku (19th – 20th century).

hearths and tent-rings—as well as winter houses (e.g. in Arpatsivik and Itilleq).

A unique architectural form is represented by the stone houses in the village of Igaliku. These houses were built by modern Greenlanders from stone quarried from the Norse Greenlandic ruins to Scandinavian design templates in the late 19th and early 20th centuries. Still standing stables and photographic evidence illustrates how the Inuit farmers of the Igaliku hamlet took medieval masonry materials, imported window frames and fixtures and blended them with traditional Inuit winter house architecture. Listed buildings in Qassiarsuk illustrate the architectural traditions adopted by Inuit farmers in the first half of the 20th century, traditions which remain influential to this day.

Materials and substance

Norse Greenlandic domestic buildings were made from a timber frame with walls of stone or turf or, commonly, a combination of turf and stone. Roofs are thought to have been made from turf laid on the timber frame, sometimes with an inner covering of thin stone slabs, sometimes with twigs. This use of materials is well known throughout the North Atlantic, but the Norse Greenlandic buildings are made distinctive by their generally greater reliance on stone as the primary construction material. This may have to do with a ready supply of good building stone, but the impression may also be a product of the fact that many dry-stone buildings are remarkably well preserved, with many courses of stone standing in a large number of quite mundane buildings. A distinctively Norse Greenlandic dry-stone architectural tradition is represented by the *skemmur* mentioned above. Some, like the ones in Igaliku / Garðar are almost megalithic in their dimensions.

Buildings of stone and mortar are represented by the church and feasting hall in Qaqortukulooq (Ø83 – Hvalsey). On the other hand, little is known about possible buildings made of timber.

The material culture of the Norse Greenlanders shows their Iron Age European roots and continued contacts with Europe. Iron and copper-alloy tools and implements are the most prominent imports, but there are also objects of other metals, schist, glass and ceramic. Imported materials are however relatively rare and the artefact assemblages are dominated by local materials, primarily organics (wood, bone, wool, leather), steatite and other Greenlandic stone types (e.g. Igaliku sandstone used both as a building material and as whetstones).

Fig. 3.8: Different building techniques were used according to the quality, accessibility, and functionally of the turf. Here small pieces of turf were used.

Thule Inuit architecture also made use of turf and stone, with turf the more prominent material in winter houses and nothing comparable to the dry-stone building tradition of the Norse Greenlanders. Early domestic architecture in the farming hamlet of Igaliku combined turf and stone to a remarkable degree and several stone masonry buildings survive, but outside Igaliku modern architecture is dominated by timber buildings.

Use, function, traditions, techniques and management systems

The farming landscape of Kujataa represents an adaptation of a sedentary society that was structured around animal husbandry, but relied on the hunting of marine mammals as a major and even principal food source. The structural remains and the organisation of the cultural landscape correlates overwhelmingly with the animal husbandry aspect of the equation. Dwellings are associated with those patches of land where winter fodder could be collected and evidence of irrigation at Igaliku and Qassiarsuk demonstrates the lengths to which the Norse Greenlanders went to improve the productivity of their fields. A substantial proportion of the built environment relates to the sheltering and management of livestock, as does the settlement pattern itself, the spacing

and configuration of farms, shielings and outfield installations. An essential and fundamental component of this system is the natural environment, the vegetation and the obstacles to transport which affected how the land was utilised and where structures were built.

Fig. 3.9: Excavated, but still well-preserved circular enclosure at Qaqortukulooq / Hvalsey.

The *skemmur* are the most visible and iconic evidence illustrating the importance of sea mammal hunting both for subsistence and trade.

The churches and feasting halls represent sociability, hierarchy and ideology in Norse Greenlandic culture.

Subsistence strategies and management systems are revealed by investigations of artefactual and zooarchaeological assemblages. Several large assemblages are available from within the nominated property, e.g. Qassiarsuk, Igaliku, Ø34 and Ø172. These demonstrate the long-range expeditions to obtain walrus (the ivory and hides were primary export commodities) far outside Kujataa and the shorter, but still quite long journeys, required to hunt large quantities of seal on the outer coast.

Long-range strategies also characterised the Thule Inuit adaptation with winter houses typically found closer to the outer coast while summer camps relating primarily to fishing are found in the inner fjords.

Modern farming represents a functioning management system that relies heavily on boat transport, where sheep are driven to pastures in spring and rounded up in autumn on foot or horseback, and where fishing and seal hunting still supplements the income and diet of the farmers. Rich historical and ethnographic evidence documents how this system has developed since its beginnings in Igaliku.

Location and setting

Anyone with a sense of how farming was practiced in Northern Europe in the Middle Ages is bound to react strongly to the incongruity of farming in the landscape of Kujataa. The setting of the farms, huddled on narrow strips of land at the roots of high mountains, separated by deep fjords filled with icebergs and isolated by barren highlands, is both dramatic and evocative. Even the respectably large church at Qaqortukulooq (Ø83 – Hvalsey)—the most well preserved structure in Norse Greenland—is totally dwarfed by the mountain behind it, rendering it a seemingly insignificant speck on a much greater canvass and demonstrating geological processes on a scale that bears no relation to the human experience. These enormous contrasts are an essential part of the farming landscape of Kujataa.

Intangible heritage

The language of the Norse Greenlanders can be heard no more but a few of their words are preserved in runic inscriptions carved on pieces of wood, bone and stone and recovered from archaeological excavations. These demonstrate piety, humour, learning, playfulness and the concerns of everyday life in a medieval community. Their very ordinariness makes what we know of the remoteness and isolation of this society particularly poignant.

Stories about Norse Greenlanders, preserved in a few Icelandic manuscripts from the 13th century and later, provide glimpses into daily life, memorable events and leading personages, helping to anchor and contextualise the material remains of the cultural landscape. Oral traditions of modern Inuit, recorded in the 18th and 19th centuries, describe interactions between Thule Inuit and the Norse Greenlanders, demonstrating direct links with the past and providing insights into the Inuit perception of this encounter.

Fig. 3.10: Well-preserved Norse storehouse or barn at farm Ø4 at Tasiusaq.

Historical and ethnographic evidence, including photographs, documents the Inuit adaptation to a farming way of life since the late 18th century, and contemporary

farmers—the majority of them direct descendants of the early farming families of Igaliku and Qassiarsuk—preserve knowledge of the development and gradual transformation of Inuit farming, from traditional, practically Iron Age technology, to a modernised mechanical industry.

Spirit and feeling

Kujataa is a landscape of incongruity. Compared to other parts of Greenland it is a busy place, full of farms, animals and people, but compared to common notions of what a farming landscape should look like, the area has an overwhelmingly natural feel to it. However, a closer look reveals that it is a managed landscape and a landscape with a history of management reaching back more than a thousand years. The modern farms, located in the same places as many of the largest Norse Greenlandic farms, help the visitor to comprehend and visualise what the medieval farming landscape could have looked like and how it functioned. Without the tangible demonstration that farming is possible in these hostile conditions, the medieval landscape would be all the more incomprehensible. The livestock, of Icelandic and Faroese origin, are of the same breeds as grazed these mountainsides in the Middle Ages and have within a few decades changed the vegetation so that it is now, in terms of height, density and species composition, much closer to the medieval conditions than before the reintroduction of farming in the 20th century.

3.1.5 Protection and management requirements

Overall management framework and site management plans

Within the management framework, all parts commit themselves to the aim of protecting, preserving, monitoring and promoting the outstanding universal value of the nominated property. The management framework builds on cooperation between the involved partners.

The management framework provides a forum for active collaboration among all component parts. Management principles for the entire nominated area are defined in the management framework, such as establishing common principles and guidelines for good management, building capacity for common management, promoting the property, involving the stakeholders and monitoring management.

The central body of the management framework is the Steering Group, which embodies the joint responsibility for the nominated property. It ensures the coordination of the management of the individual component parts by making decisions regarding the structure, goals and procedures of the management system and by implementing the management principles.

The group consists of a local and a national level. It is headed and represented by a chair from the Municipality of Kujalleq and supported by a secretariat. Its activities are defined by the management principles and the

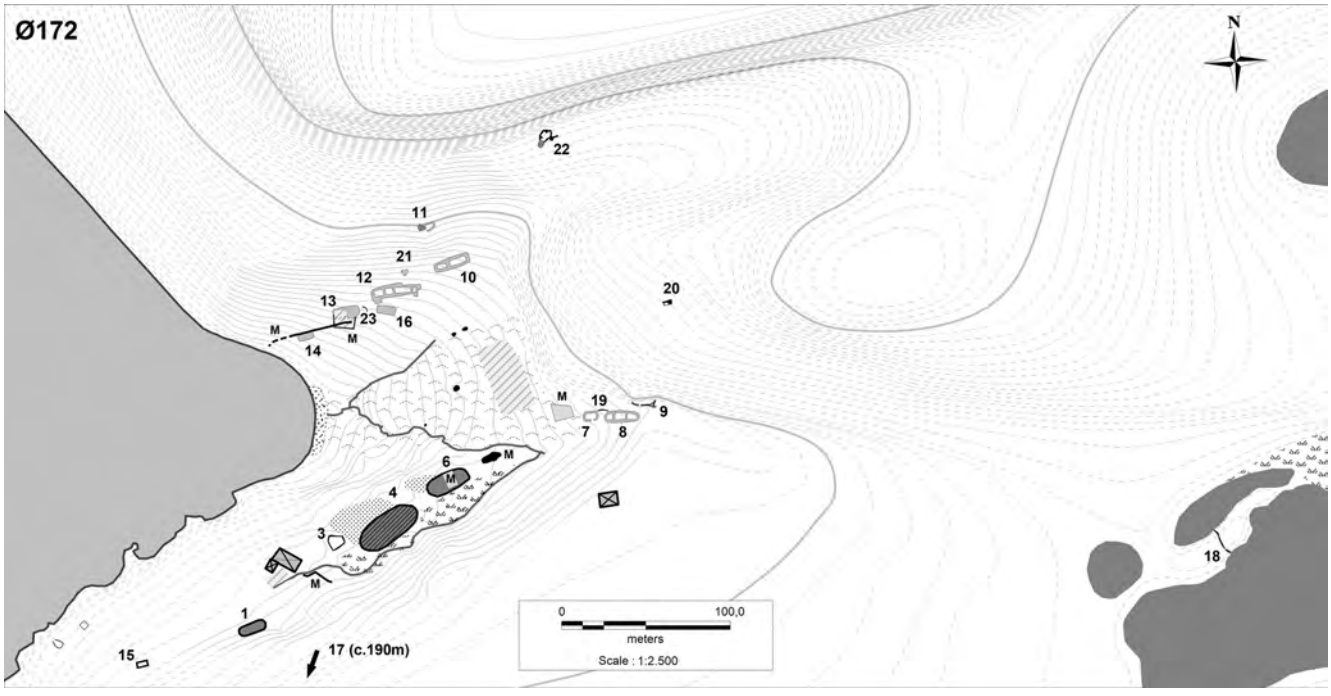


Fig. 3.11: Archaeological survey plan of site Ø172 in Tasikuluulik/ Vatnahverfi, an example of a large farm. Norse ruins are numbered.

primary aim of the management framework. In order to implement the goals and principles of the management framework, site management plans or systems are being implemented for each area.

Aside from existing national acts protecting heritage sites and farming, various management systems are in place such as:

- The 2016–2020 management plan
- The action plan for ruin preservation
- The action plan for listed buildings

The funding is provided collectively by Kujalleq Municipality, the Government of Greenland, the Greenland National Museum and Archives and other stakeholders.

Sources of expertise and training for the management of the nominated property, over and above the experts directly involved, are mainly national and local museums and farming authorities and other institutions. Staff will be hired for the secretariat to implement site management plans. Initiatives will be launched to provide the required training and education of employees to care for and maintain the nominated property in a competent and professional way.

Long-term expectations

The management framework and the site management plans are the forum for and means to a coordinated approach to long-term issues for the entire property.

In the future, the plan is to involve local society in interest groups and a support network among the local stakeholders.

Expanding the infrastructure in the region surrounding the nominated property is an ongoing issue that has to be addressed. Another ongoing task will be to secure financial support to improve the maintenance and presentation of the sites.

Visitor pressure could be a threat to all areas, but possible changes to historical buildings could present a challenge, plant growth could jeopardise the ruins, and climate change could render it more difficult to practice agriculture. These are examples of threats that need to be tackled in a collaborative way and are mentioned in the management plan.

3.2 Comparative analysis

The conditions for farming in Kujataa are not without parallel. There are places on earth with comparable mean temperatures, length of growing season, precipitation, soil conditions and vegetation patterns. Before the industrial period, however, no such place supported a farming society. *Kujataa – a subarctic farming landscape in Greenland* derives its outstanding universal value from this as well as from the specific adaptations that made a farming culture possible in these conditions, exemplified by the unique combination of animal husbandry and

Fig. 3.12: Aerial photo of the main dwelling at Qaqortukulooq/Hvalsey (Ø83), where the well preserved room in the foreground is thought to have been a feasting hall.

sea mammal hunting. The external comparative analysis demonstrates the truthfulness of these assertions by comparing Kujataa to other subarctic and environmentally marginal farming cultures around the globe, and by reviewing marine mammal exploitation by farmers worldwide and showing that no other farming culture came near to Kujataa in their dependency on the seal hunt. The external comparison follows an internal comparative analysis comparing the five component parts of the nominated property to other parts of Kujataa as well as to the two other areas of Norse settlement in North America, Vestribyggð and the World Heritage site L'Anse aux Meadows. Although not a part of Kujataa, these two areas belong to the same cultural tradition and they have so much in common with Kujataa that they are more reasonably considered as a part of the internal context than the external one. The internal comparison demonstrates how these two areas contain only some of the qualities that provide Kujataa with its outstanding universal value, but the emphasis is on showing how the nominated property represents the essence and full range of qualities that make up Kujataa's outstanding universal value.

3.2.1 Internal comparison

The nominated property is made up of five components parts. Although they are geographically separate units and each has its own characteristics (described in ch. 2), the definition and demarcation of each of the component parts is executed so as to present the greatest coherence and continuity of the elements that provide the nominated property with its outstanding universal value. What looks on the map like fragmentation reflects the nature of the Greenlandic landscape and the conditions past populations had to contend with. This is a landscape broken up by steep mountainsides and deep fjords, a landscape where effective communications were carried out by sea. From that perspective, it can be appreciated that what looks on the map like disparate tracts of land are in fact a continuous landscape.

The total area of Kujataa is more than 10,000 km² with 440 registered Norse Greenlandic sites, but the nominated property covers an area of 348.92 km² with 87 Norse Greenlandic sites. The nominated property therefore represents some 3% of the total area, yet nearly 20% of registered Norse Greenlandic sites in Kujataa. By comparison, Vestribyggð covers some 6,000 km² but only has

Fig. 3.13: Map of the North Atlantic and Arctic regions with place names and UNESCO world heritage sites mentioned in the text.

95 registered sites. The nominated property includes 22 of 44 modern sheep farms; both locations of pioneering farming in the 18th century; the one major site of farming in the 19th century and 47 out of 49 listed buildings associated with modern farming in Greenland. The nominated property comprises those areas in Kujataa where the nature and complexity of the medieval and modern farming landscape can be appreciated most easily and comprehensively.

Fig. 3.14: The dwelling at Igaliku/Garðar (Ø27), where room no. IX is interpreted as a feasting hall, signifying the great importance of the place.

Site types

All known Norse Greenlandic site types are amply represented within the nominated property. The nominated property stands out in its representation of central sites, large estates with churches and other monumental architecture. It includes eight of ca. 20 known church sites (actual ruins are identified at 16 sites, medieval documents and stray finds suggest that there must have been at least five more). The nominated property includes the three church ruins in Norse Greenland that are the most monumental, largest and best known.

These are:

The cathedral at Igaliku (Ø47 - Garðar, in cp2). This was by far the largest church in Norse Greenland and among the largest in the North Atlantic. The foundations of this massive building are still visible.

The Hvalsey church (Ø83 - Qaqortukulooq, in cp5). The walls of this fine example of a Gothic church from around 1300 AD are still standing. This structure is iconic not only on account of its phenomenal preservation but because it was the setting of the last recorded event to take place in Norse Greenland, the Hvalsey wedding of 1408.

The churches in Qassiarsuk (Ø29a - Brattahlíð, in cp1). In Qassiarsuk excavations have revealed a small church dating from the inception of Norse Greenlandic colonization around 1000 AD, one of the oldest churches in the North Atlantic—and in the New World—as well as two phases of a later, much larger, church representing the pinnacle status of this site as the residence of the lawman (from the Norse *lögmaðr*), the secular leader of Norse Greenland.

The other five churches within the nominated property represent the full breadth of Norse Greenlandic architecture, ranging from a large parish church at Igaliku Kujalleq (undir Höfða, cp 4), to a small parish church in Nunataaq (Ø1, Garðanes, cp1), to private, household churches at Qorlortoq (Ø33) and Qorlortup Itinnera (Ø35) in component part 1 and Igaliku (Ø48) in component part 2.

Outside the nominated property large churches on a par with Qassiarsuk and Igaliku Kujalleq are found at Ikigaat (Ø111 - Herjólfsnes), and possibly at Narsap Ilua (Ø18 – Dýrnes) and Kilersarfik (V51 – Sandnes), although the dimensions of both are uncertain. Smaller churches are found at Sillisit (Ø23 – undir Sólarfjöllum), Tasermiutsiaat (Ø105), Narsarsuaq (Ø149) in Uunartoq Fjord and Ujaragsuit (V7 – Ánavík). Three further household churches are known (in Inorqquassat (Ø64), Eqaluit (Ø78) and Narsaq (Ø162) in Uunartoq Fjord). In terms of church sites, which were the social and economic centres of Norse Greenland, the nominated property therefore represents the full range of types, including all of the largest and best preserved structures, as well as a high proportion of all known church sites.

Another type of monumental structure associated with high status is the feasting hall. A very large feasting hall was excavated in the episcopal residence at Igaliku (Ø47 - Garðar, cp2), by far the largest such structure known in the North Atlantic, and a smaller but exceptionally well built and well preserved hall is found in Qaqortukulooq (Ø83 – Hvalsey, cp5). The third feasting hall—

larger than Hvalsey but not as well preserved and probably representing an earlier form—is at Qassiarsuk (Ø29a – Brattahlíð, cp1). The only other feasting hall known in Kujataa is at Ikigaat (Ø111 – Herjólfsnes). There are no feasting halls known from Vestribyggð. Feasting halls are a rarer type of structure than churches, but they reflect the same pattern, i.e. there is a greater concentration of these kinds of sites within the nominated property, which includes the majority of central sites.

Historical records mention two monastic houses in Norse Greenland, a house of canons at Tasermiutsiaat (Ø105) in Tasermiut and a nunnery, traditionally associated with Narsarsuaq (Ø149) in Uunartoq Fjord, both outside the nominated property. Despite excavations at the latter site,[308] no structures have been identified at these sites that relate specifically to monastic functions. Apart from confirming their existence around 1300 AD, the historical sources provide no insight into the nature and scale of these monastic institutions. They may have been short-lived and their location, peripheral to the main centres of population, remains enigmatic.

The presence of a church is a status indicator. A farm with a church can with confidence be regarded as a high status site, and a feasting hall suggests the highest status within that group. The nominated property includes those sites that occupy the apex of Kujataa society as well as a large selection of those on the next levels below, which can be regarded as residences of the local gentry and higher clergy.

Very large farms do exist where no churches have been found. These are sites where the number and size of buildings, the size of possible hayfields and the land quality combine to suggest economic if not social importance. A particularly fine example of this kind of farm is Sissarluttoq (Ø59), which constitutes component part 3. This site, sometimes identified with the Norse place name Dalr, is an outstanding example of a very large farm without a church. It has 44 recorded features, whereas farms are considered large if they have 20 features. Comparable sites are all smaller and, unlike Sissarluttoq which is definitely a single farm, frequently represent the remains of two or even three farms (e.g. Ø39 with 34 features).

The Qassiarsuk area has by far the greatest number of large farms (with more than 20 features) without churches. They are seven in total, four of which are within the limits of component part 1 (Ø6, Ø32, Ø38, Ø202).[309] Outside the Qassiarsuk area (cp1), such farms are rare and found only as isolates. Examples include Ø172 in Tasikuluulik (Vatnahverfi), in component part 4, Ø79 (on the coast between component parts 3 and 5), Ø164 (in Tasikuluulik (Vatnahverfi) just outside component part 4) and Ø93 in Alluitsup Kangerlua. Farther south, as well as in Vestribyggð, such sites are even more uncommon, although survey data is insufficiently detailed to allow a full listing.

Small to middle-sized farms, the largest categories of Norse Greenlandic sites in Kujataa, are abundantly represented in the nominated property. Component parts 1 and 2 include the full range, from the smallest cottages to the largest manors, whereas component part 4 represents a less top-heavy social structure, with small to middling farms predominating. In other parts of Kujataa and in Vestribyggð the variation is much more limited within areas of comparable size.

In Norse Greenlandic archaeology distinctions are made between sites that are definitely farms, sites that may or may not have been farms, and sites that are definitely not farms. Sites in the in-between category may have been very small farms or shielings, with occupation occasionally oscillating between seasonal and perennial. Such sites are represented in component parts 1, 2 and 4, most prominently in component part 4. Again the variation within areas of comparable size is much less in Vestribyggð and other parts of Kujataa.

Fig. 3.15: Otto Fredriksen's house in Qassiarsuk is today a little museum.

Sites that were definitely not farms may have been shielings or outstations. Outstations can be folds—large and small—and boundaries; they may have been camps and stores related to hunting and marine exploitation, and some cairns have unmistakably Norse characteristics. Such sites are found all over Kujataa, but their recognition has progressed fastest in the region of the nominated property, which has been the focus of detailed field surveys in the last two decades. There is considerable variation in the number and types of these outfield stations between the component parts, whereas both their numbers and variety are smaller in other parts of Kujataa as well as in Vestribyggð.

When considering types of individual features, the same picture emerges: the full variety is represented

within the nominated property with a greater proportion of those types of features that are particularly associated with high status sites (e.g. churches and feasting halls as outlined above, but also so-called skemmur, dry stone structures often built in prominent places thought to have been used for storage, and irrigation systems). Again, because the nominated property has been the focus of more intensive fieldwork than other areas of Kujataa, this variation is especially well understood there, particularly in component parts 1 and 4.

The history and range of modern farming is fully represented within the nominated property. The sites where Tuperna and Anders Olsen initiated farming in Upernaviarsuk (cp5) and Igaliku (cp2) in the 1780s are localised and the 19th century farming landscape of Igaliku is reflected in the distinctive layout of the extant buildings, vegetable plots and fields. Apart from Narsaq (where a farm was started in the 1880s) and Narsaq Kujalleq (where Jens Chemnitz started his sheep breeding experiment in 1906), all sites relating to the early history and development of modern farming in Greenland are found within the nominated property. In addition to the historic centre of Igaliku, these groundbreaking sites include Qassiarsuk (cp1), with listed buildings from the time of the pioneering farmer Otto Fredriksen, and Igaliku Kujalleq (cp4), where the first modern farm of Tasikululik (Vatnahverfi) was established in 1934.

Not only was Upernaviarsuk (cp5) in the 1780s the site of the precursor to the modern Igaliku farming community, but this farmstead has also been the site of an agricultural research and training station since 1956. Indeed, the nominated area is located right in the heart of modern farming in Greenland. Half of the operational farms in the country are within the nominated property and the majority of the remainder are in areas directly adjacent to the component parts. The farms within the nominated property represent the full range of farm sizes, from the fewest number of ewes (in component part 5) to the greatest (in component part 1). Schools and churches are located in both Qassiarsuk (cp1) and Igaliku (cp2), the only such institutions within the nominated property of Kujataa and the present-day farming communities of Greenland, identifying these areas as the core of the modern farming community. Although attempts were made in the 20th century, there is no modern farming in Vestribyggð.

Settlement density

The nominated property represents the areas of densest Norse Greenlandic settlement within Kujataa. Settlement density can be measured by counting the number of sites, but as each site represents a range of values, in terms e.g. of wealth and population, those figures need to be balanced by considering the distribution of monuments indicating centres of population and wealth accumulation. The most conspicuous and well documented of such indicators for the Norse Greenlandic period are the churches and feasting halls.

Fig. 3.16: A dirt road connecting two sheep farms near Qassiarsuk. On the other side of the fjord is the international airport of Narsarsuaq.

Component parts 1, 4 and 5 fall within, and represent significant portions of the two largest areas of highest density settlement in the region.

The only other areas within Kujataa with such high density settlement are a small concentration near Tasiluk on Kangerluarsorujuk fjord and a slightly larger concentration by Taserssuaq and Tasiussaq on Tasermiut Fjord (Ketilsfjörður). The Tasiluk area has a few farm sites and outstations, but no church nor much variation in farm status. The Taserssuaq and Tasiussaq area has a greater number and range of sites and is associated with the church farms referred to as Árós and Pétursvík in medieval sources. However, unlike the churches in the nominated property, neither of these possible central sites has been identified.

Eight out of 16 identified church sites in Kujataa are found within the nominated property, indicating that it represents the demographic and economic core of the region.

In terms of settlement density, no meaningful comparison can be made with L'Anse aux Meadows as this is a single site—an explorers' camp rather than a farm. Comparison with Vestribyggð reveals that in Kujataa's northern neighbour, settlement densities are on a par with the outer fjord areas of Kujataa, more than three times more dispersed than the average density in Kujataa and up to twenty times more than in the nominated property. The mean distance between farms in the most densely settled part of Vestribyggð, Austmannadalur, is double that of Qorlortup Itinnera in Kujataa.

In Kujataa the density of modern farms follows the same pattern, with an even greater concentration in the region of the nominated property. In the two fjords of Igalikup Kangerlua and Tunuliarfik, 37 out of 44 functioning farms in Kujataa are found, 22 of them within component parts 1, 2, 4 and 5. In terms of livestock numbers, the nominated property contains approximately 61% of all sheep in Greenland, and 31% of all cattle and 77% of all horses.[310]

Landscape types

Norse Greenlandic settlement in Kujataa is overwhelmingly coastal. Farms and outstations are typically widely spaced, with sheer mountainsides frequently blocking travel on land. Such coastal landscapes are amply represented in all parts of the nominated property, but it also includes a greater variety than found in most other parts of Kujataa, most particularly coastal plains (as opposed to the predominating coastal strips) and inland valleys (especially in cps 1, 2 and 4). A distinction can be made between the inner fjord areas where these three landscape types are found (coastal strip, coastal plain and inland) and the outer fjord areas where all settlements are on the coastal strip, even if the elevation of the immediate hinterlands is much lower than in the inner fjords.

The coastal plains of Qassiarsuk (cp1) and Igaliku (cp2) are unique in Kujataa for their size and fertility. Both areas support exceptionally large farms with easy overland access to several other farms and adjacent fjords.

The runners-up with regard to comparability are also found within the nominated property: Nunataaq (Ø1 – Garðanes) (cp1) and Igaliku Kujalleq (Ø66 – undir Höfða) (cp4). Again the only meaningful comparison that can be made outside the nominated property is with Taserssuaq and Tasiussaq, where, however, the church farms mentioned in historical sources have not been identified on the ground.

Inland farms from the Norse Greenlandic period are rare in Kujataa and in most parts they are absent altogether or are found in ones or twos where narrow valleys provide some lowland grazing. There are only two significant concentrations of inland settlement in Kujataa and component parts 1 and 4 include substantial sections of both. In the Qassiarsuk area there are 18 inland farms, 10 of which are within the borders of component part 1. These include a string of farms in the valley Qorlortup Itinnera, seven of them (many substantial and two with small churches) lining the valley floor, each associated with a shieling in the hills above. The regularity and density of settlement in this valley is unique in Kujataa, providing an exceptionally clear view of the organising principles behind Greenlandic Norse settlement patterns and land use. A further four farms are found in the hills behind the densely settled plain of Qassiarsuk itself. In contrast to Qorlortup Itinnera, these are all small farms, indicative of a lower status backcountry. The other main area of Norse Greenlandic inland settlement in Kujataa is Tasikuluulik (Vatnahverfi), the core of which is represented by component part 4. Tasikuluulik (Vatnahverfi) is approximately 150 km^2 and has a settlement pattern focused on a string of lakes in a valley that lies parallel to the coast. In this area there are at least 14 inland farms, eight of which lie within the borders of component part 4. Although there are some large farm sites in Tasikuluulik (Vatnahverfi), the status of the farms there is predominantly characterised as small or medium, indicating a generally less affluent district than in component part 1. These inland areas have no parallels in other parts of Kujataa, and the variation they exhibit in terms of site types and farm status is key to understanding the socioeconomic structure of Norse Greenland.

Unlike Kujataa, Vestribyggð is not associated with any outer coast settlement. In fact, the Vestribyggð region is entirely confined within the pincer-shaped system of fjords behind modern Nuuk. The settlement pattern is primarily coastal strips and there are no coastal plains comparable to Kujataa's, but inland settlement is found in three valleys at the head of the Ameralla Fjord with 3–5 farm sites each. This area represents the nucleus of the Vestribyggð region and is centred on the church site

of Kilersarfik (Sandnes). In this sense, it bears comparison with the Qassiarsuk region (cp1), but the settlement density is much lower as is the variety of site types.

In Kujataa modern farming follows the same basic pattern as in Norse Greenlandic times, although it tends less towards dispersal and more towards concentration, with multiple farms operating in the two main centres of medieval and modern farming, Qassiarsuk (cp1) and Igaliku (cp2), while in Tasikuluulik (Vatnahverfi) (cp4) the modern farms are slightly fewer than their Greenland Norse forebears. These three areas represent the fully developed modern sheep farming landscape, with managed pastures and farmsteads surrounded by cultivated fields interconnected by gravel roads. There is no modern farming settlement in Vestribyggð.

Fig. 3.17: Thule Culture graves in Igaliku in a Norse animal enclosure, where the Inuit reused the building stones.

The only landscape type not included in the nominated property is the extreme outer coast, where Norse Greenlandic sites are as a rule small, few and far between and very often modified or obscured by later Thule Inuit occupation. Modern farming follows the same pattern, with a greater number of short-lived and abandoned farms than the inner fjords. However, the component parts line up to represent a cross-section of Kujataa landscape types and settlement patterns. A 40 km long NW-SE axis from component part 1, through 2 to the eastern end of component part 4 represents the variety of inner fjord settlement patterns, with coastal and inland farms, highland settlements, wide plains and narrow coastal strips, and relatively high to relatively low fertility. Another axis lies from the eastern end of component 4 westwards in the direction of the outer coast, where the south end of Arpatsivik Island represents an outer coast environment, with a small Norse Greenlandic outfield site dwarfed by a much greater Thule and modern Inuit presence. This 40 km gradient demonstrates the rapid drop-off in farmland quality from the inner fjords to the outer coast. At its eastern inland end, at Igaliku Kujalleq, the mean July temperature is 10.2° C (the same as in Qassiarsuk 40 km to the north) whereas at Qaqortoq, 7 km west of Arpatsivik it it 7.1° C.

Preservation and visibility

Although Norse Greenlandic archaeology is generally very well preserved in the sense that there has been limited or no impact on the sites since the demise of the Norse settlement in Greenland, their preservation is nevertheless variable due to a number of natural and human factors.

Organic preservation

There is no permafrost in Kujataa and as a result organic preservation is variable. There are pockets of waterlogging, including three sites—Ø47 Igaliku in component part 2, Ø34 Qorlortup Itinnera in component part 1 and Ø172 Tatsip Ataa in component part 4—where excavations have uncovered substantial assemblages of animal bone and wooden artefacts.[311] Based on presently available evidence, it seems that in the area of the nominated property there is an east-west gradient of good organic preservation increasing eastwards and inwards along the fjords, being greatest in component parts 1, 2 and 4.

Organic preservation has been observed outside the nominated property, notably at Ikigaat (Ø111 - Herjólfsnes), Narsaq (Ø162) and Narsarsuaq (Ø149) in Uunartoq Fjord, and its incidence is likely evenly spread

Fig. 3.18: The preservation conditions are astounding, resulting in the conserving of such fragile artefacts as textiles, here one of the famous Herjólfsnes gowns.

throughout Kujataa.[312] Unlike Kujataa, there is permafrost in Vestribyggð, which has resulted in spectacular preservation of organic materials at sites such as GUS.

Fig. 3.19: The excellent preservation conditions often found in the Greenland Norse settlement areas have provided a wealth of wooden artefacts.

Subsidence

It is generally believed that because of geological subsidence (the settling or sinking of a body of rock or sediment), coastal areas have become submerged since the Middle Ages in both Kujataa and Vestribyggð. Estimates of the scale of the subsidence vary, and there is no systematic research that allows detailed assessments of how this has impacted the cultural landscape, or, for instance, if it may have impacted different parts of Kujataa to different degrees. What can be asserted is that subsidence has affected the cultural landscape of the nominated property to a smaller degree than elsewhere in the region because a much larger proportion (esp. in cps 1, 2 and 4) is made up of inland settlements.[313]

Thule Inuit reuse

Thule Inuit settlement (13th–18th centuries AD) was concentrated on the outer coast where there are much fewer Norse Greenlandic sites than in the inner fjords. On the outer coast a very high proportion of Norse Greenlandic sites have evidence of Thule Inuit visits or occupation (e.g. up to 50% in the Torsukattak/Qussassat Tunua area surveyed in 2009[314]), but the incidence of such reuse drops off sharply in the inner fjords. In component part 1 there are six registered Thule Inuit sites, but only one of those (Ø28) represents reuse of Norse Greenlandic ruins.[315] The Norse Greenlandic cultural landscape in the nominated property is therefore largely untouched by Thule Inuit reuse, and significantly less so than the outer coast areas of Kujataa, but comparable to Vestribyggð.

Modern farming

Modern farming has had a much greater impact on the landscape and archaeology of the component parts than the traditional land use of the Thule Inuit. Within the nominated property there are 22 functioning farms and only component part 3 has never seen any modern farming activity apart from grazing. In component parts 2 and 4, about 1/3 of the Norse Greenlandic sites are impacted by modern farming, and about ¼ in component parts 1 and 5. The nominated property is in the core area of modern farming in Kujataa, with the highest concentration of large, long-lived sheep farms. The modern farms are in most cases located adjacent to Norse Greenlandic farm sites, making use of the same hayfields and meadows, but as a rule the Norse Greenlandic ruins have not been removed or damaged. The modern hayfields are sown with imported grass species and fertilised with artificial fertilizer. The contrast between the managed fields and the arctic vegetation of the surrounding heathlands is stark and gives this landscape a unique character.

Modern farming also has a broader impact brought on by the grazing of livestock. The grazing of sheep in the hinterlands of the farms affects the vegetation, holding in check the growth of those plants sheep find especially palatable. This includes species of shrub (willow and birch) that can—especially in the sheltered and fertile spots favoured by the Norse Greenlanders—grow to considerable height and density. The result is a significant difference between those parts of the inner fjords where sheep graze and those where they do not. In the latter areas, Norse Greenlandic sites are frequently completely overgrown and obscured by dense vegetation, making their identification and appreciation challenging. In the grazed areas, the vegetation is markedly less dense and the sites are, as a result, more visible and comprehensible.

Fig. 3.20: Wooden toy horse found in Norse midden layers at the farm Ø34 in Qorlortup Itinnera.

Although the effect is subtle, the general appearance and feel of the grazed landscape is—due to selective browsing and improved conditions for grazing-tolerant species—that of a managed, farming landscape.

Historical records

Surviving texts describing people, places and events in Norse Greenland focus, in so far as they can be localised at all, heavily in the two fjords dividing the nominated property, Tunulliarfik (Eiríksfjörður) and Igalikup Kangerlua (Einarsfjörður). The places most frequently mentioned—those which most historical personages can be associated with and where most recorded events took place—are Brattahlíð (Ø29a - Qassiarsuk, cp1) and Garðar (Ø47 - Igaliku, cp2). Hvalsey (Ø83 - Qaqortukulooq, c5) has a special place in the historical record as the location of the last known recorded event from Norse Greenland, the Hvalsey wedding of 1408 AD. The only place which can rival these three for historical significance is Herjólfsnes (Ø111 - Ikigaat), which functioned as a first place of call for ships arriving from Europe.[316] Vestribyggð is barely mentioned in the historical records and, apart from a list of fjord names and churches, these sources provide little information about it. The sagas describe a number of camps erected by Norse Greenlandic explorers in Vínland and L'Anse aux Meadows clearly represents such a place, but identifying which one it represents is fraught with controversy. In so far as the medieval sources throw light on the Norse Greenlandic farming landscape at all, they are primarily revealing about the area of the nominated property.

> *Betweeen the Eastern Settlement and the Western Settlement there are twelve leagues, all unpopulated. In the Western Settlement there is a large church called Steinsnes church. For a time it served as a cathedral and Episcopal see. Now the Skraelings have devastated the whole of the Western Settlement. It is full of horses, goats, cattle and sheep, all wild, but no people, neither Christian nor heathen.*
>
> Ívar Bárðarson's Description of Greenland, 14th c.
> (Det gamle Grønlands beskrivelse, 29)

Research activity

In the 18th and 19th centuries, investigations of Norse Greenlandic remains focused primarily on the monumental sites found within component parts 1, 2, 4 and 5, with early excavations taking place in the churches of both Igaliku (Ø47 - Garðar, cp2[317]), Igaliku Kujalleq (Ø66 - undir Höfða, cp4) and Qaqortukulooq (Ø83 - Hvalsey, cp5[318]). A general survey of archaeological sites in Kujataa had been accomplished by the beginning of the 20th century[319] and the 1920s and 1930s saw major

Fig. 3.21: Archaeological excavations in Igaliku, 2012.

excavation projects focusing on the largest and most prestigious sites: Qassiarsuk (Brattahlíð, cp1[320]), Igaliku (Garðar, cp2[321]) and Qaqortukulooq (Hvalsey, cp5[322]). The only major excavation project of this period outside the nominated property was at Ikigaat (Herjólfsnes[323]). Smaller-scale excavations took place in Tasikuluulik (Vatnahverfi) (cp4) already back in the 1890s, with a renewed campaign of farm excavations in the 1940s[324] and an ongoing project since the late 1990s, which has ensured that Tasikuluulik (Vatnahverfi) is the most comprehensively researched landscape, both in terms of excavation and survey, in the whole of Kujataa, as well as in Vestribyggð.[325] Modern field surveys, producing detailed maps of the sites, invariably leading to the discovery of new sites and new features at known sites, have been carried out throughout the nominated property and its immediate vicinity, but not in other parts of Kujataa or Vestribyggð. The nominated property therefore represents the by far best documented and most heavily investigated part of Kujataa. Proportionately both Vestribyggð and L'anse aux Meadows have seen much more archaeological excavation than any part of Kujataa, including the nominated property. The single site of L'anse aux Meadows was comprehensively excavated in the 1960s and 1970s,[326] and in Vestribyggð both known church sites have been excavated[327] along with eleven farm sites, mostly small to middle sized.[328] Among them is GUS, the only comprehensive excavation of a Norse Greenlandic farm mound to date.[329]

The research station at Upernaviarsuk (cp5) is the centre of agricultural research in Greenland. The records kept by the station—going back to 1915 when it was established in Qaqortoq, and curated at the Greenland National Museum and Archives in Nuuk—preserve the history of sheep farming in Kujataa.

Access and infrastructure

Greenland is an extremely sparsely populated country with 0.14 inhabitants per ice-free km². Distances between modern settlements are great and, in the absence

of a road system, all transport is by sea or air. Component parts 1, 2 and 5 are effectively along Kujataa's main route travelled by tourists (primarily by boat and, for some stretches, on foot), between the international airport at Narsarsuaq and Kujataa's largest town, Qaqortoq. Although within reach, component parts 3 and 4 are much less visited, but are nevertheless far more accessible than most other parts of Kujataa, or Vestribyggð, for that matter, which has no land or air transport, despite its proximity to Greenland's capital Nuuk.

Conclusion

This internal comparison has highlighted the following features of the nominated property:

- It represents the full range of attributes associated with farming culture in Kujataa within a relatively compact and coherent area, which was the administrative and economic centre of Norse Greenland and is the core area of modern sheep farming
- It stands out in terms of the diversity and completeness of the archaeological record; no other parts of Kujataa have the same degree of variation and no other parts have this number of highest status sites, nor this degree of site integrity

No other sites or single areas within Kujataa combine this fullness and range. Norse Greenlandic sites like Ikigaat (Ø111 - Herjólfsnes) and landscapes like Tasersuaq on Tasermiut (Árós / Pétursvík) have individual attributes that are comparable to sites and landscapes within the nominated property, but they are also lacking in significant aspects, especially as relates to diversity, distinctiveness and documentation, including archaeological excavation.

The same holds true for the two other areas of medieval Norse settlement in America. Of these the World Heritage sites at L'anse aux Meadows in Newfoundland is not a farm but a base camp, a staging post for explorations farther south. No evidence for cultivation or animal

Table 3.1 – Summary table for internal comparison

	cp 1 Qassiarsuk	cp 2 Igaliku	cp 3 Sissarluttoq	cp 4 Tasikuluulik	cp 5 Qaqortukulooq	Nominated property total	Kujataa outside nominated property	Kujataa total	Vestribyggð	L'Anse aux Meadows
No. of Norse Greenlandic sites	38	17	2	19	11	87	353	440	95	1
No. of church sites[1]	4	2	0	1	1	8	8	16	3	0
No. of feasting halls	1	1	0	0	1	3	1	4	0	0
No. of large farms[2]	4	0	1	1	0	6	7	13	0	0
Settlement density[3]	2,7	4,8	(1,7)	3,9	4,3	3,6	ca. 27	ca. 22	ca. 85	
Landscape types[4]	cp, inl, cs	cp, inl, cs	inl	cp, inl	cs, oc	all	cs, cp, oc	all	cs, inl	cs
Historical sources	full	full	some	some	full		some		some	(full)[5]
No. of modern farms	11	5	0	6	2	24	20	44		0
No. of listed historic buildings[6]	3	49	0	1	0	53	0		0	0

1) Sites with identified church ruins.
2) Sites with more than 20 features but no church.
3) Square kilometres per archaeological site
4) cp: coastal plain; cs: coastal strip; inl: inland; oc: outer coast.
5) Detailed descriptions but uncertain if they refer to this site.
6) Excluding urban contexts.

husbandry has been found at the site and it most likely was in use only for a very short time, a matter of years at most. L'anse aux Meadows represents exploration rather than a complete society, a single site rather than a landscape. Vestribyggð, in many ways comparable to Norse Greenlandic Kujataa and in some ways identical, is different in that it has a shorter history—abandoned up to a century before Kujataa—and has much fewer sites, not the same range of high status sites, and while it has been well served by archaeological excavations of farm sites, it remains incompletely surveyed. Unlike Kujataa, there is no modern farming in Vestribyggð. Because of permafrost, there are instances of excellent preservation of organics in Vestribyggð, and the absence of modern settlement means that the landscape is as pristine as can be. But this also results in Vestribyggð being much less accessible to visitors, with neither roads nor airports or indeed any modern settlement or infrastructure. The absence of grazing also means that the landscape has reverted to 'wild' to a greater degree than in Kujataa.

3.2.2 External comparison

The subarctic biome of Kujataa represents one of the most marginal places on Earth for farming. A sedentary farming society based on animal husbandry was only possible in these conditions because the farmers also hunted sea mammals, which made up half or more of their diet and provided them with trade goods that allowed them to obtain necessities from abroad.

There is no cultural landscape fully comparable to Kujataa and no sites on the World Heritage List or the tentative lists combine the qualities that make up Kujataa's outstanding universal value.

The external comparison aims to demonstrate how exceptional and extreme Kujataa is compared to other marginal farming landscapes on earth. Marginality is inherently relative and there are of course innumerable landscapes that can be perceived as more marginal than their neighbour. This is however nearly always a matter of degree. In the Old World, the lower the yields from cultivation, the greater the reliance on livestock tends to be. Beyond the limits of cultivation, livestock can form the basis of the economy under a system of nomadic pastoralism. Pastoralism can make use of environments that are not suited to cultivation but can support

Fig. 3.22: Blue ice from deep down under the Greenlandic ice cap.

grazing animals if they are moved seasonally between pastures. Although their land use was extensive and their mobility great, the farmers of Kujataa were not nomadic. They lived on permanent farms where they maintained improved fields to produce hay to support their livestock through the winter months. This strategy is unusual but not unique and can be found in other parts of the North Atlantic and many highland zones across Eurasia. What is unique is the Norse Greenlandic farming landscape, which is characterised by extreme dispersal of settlement while still maintaining social, religious and economic structures developed in village societies back in the European homeland. This would not have been possible without another unique feature, namely the extent to which the farming was supplemented by the hunting of marine mammals. Hunting and fishing are components in many farming strategies around the world, but in most cases either as minor supplements,[330] often with more symbolic than dietary significance, or as localised practices, where individual communities make use of favourable conditions for hunting or fishing without shaping the farming economy as a whole. Cultivation can supplement what are essentially hunting or fishing economies, but where animal husbandry and hunting/fishing provide the mainstays of the economy it is usually under a system of nomadic pastoralism. While the seal hunt was essential to the subsistence of the Norse Greenlanders, they also hunted walrus on long-range expeditions hundreds if not thousands of kilometres from their settlements. Walrus tusks and hides were valuable commodities that the Norse Greenlanders could trade for imported necessities and to pay tithes and taxes. An economy based to an equal degree on farming and sea mammal hunting is unique to Kujataa. This is true both of the Norse Greenlandic farmers and the Inuit farmers of Igaliku in the late 18th and 19th centuries. Modern farmers still hunt and fish, and such activities remain economically and symbolically significant.

The following comparison approaches this issue from two directions. First, a survey is presented of farming in the subarctic, including the neighbouring Arctic and humid continental zones, to demonstrate how exceptional the introduction of farming to Greenland in the 10th century AD was. This survey also reveals the distinctive nature of modern farming in Kujataa. Second, it is followed by an overview of sea mammal hunting to show that the economic strategy pursued by Kujataa farmers is indeed unique.

Farming landscapes in the subarctic

Agriculture originates in earth's temperate, Mediterranean, semi-arid and tropical zones and, since its beginnings in the early Holocene, the farming way of life—sedentism based on animal husbandry and/or cultivation—has been restricted to these zones, with most cases of marginal farming occurring on the borders of the semi-arid and arid (e.g. in the Sahara) and in mountainous areas within the zones of mild climate.[331] Within the coolest of these zones, known as the temperate, farming tended to be restricted to its southern regions until the 19th century, when industrialisation and concomitant population growth led to the colonisation of hitherto sparsely inhabited regions in Canada, Alaska, Siberia and Russia. The only major exception to the pattern of pre-modern farming being limited to the temperate latitudes, typically well below 50° N, is northern Europe. This is on account of the Gulf Stream, which warms the whole western seaboard of the continent (and far inland in its southern parts) making farming possible since the Neolithic as far north as the Arctic Circle in the coastal parts of northern Norway. Because of the warm waters of the Atlantic, the coastal strip of northern Norway is temperate and the same goes for southern and coastal Iceland, while the interiors of these countries are subarctic/boreal as befits their high latitudes. These environmental conditions help explain the early spread of farming northwards along the coast of Norway and the colonisation of the Faroes and Iceland in the 9th–10th centuries AD by farmers from Scandinavia and the British Isles, who found in the new countries a climate not radically different from what they were used to in their homelands. By contrast, the Icelandic farmers who migrated to Greenland in the late 10th century moved into a climatic zone that had considerably colder and longer winters and correspondingly short growing seasons, with low average temperatures despite daily highs. Furthermore, such conditions were severely restricted to pockets in inner fjord areas, surrounded by even less balmy low arctic climatic conditions. Making subarctic Greenland even less inviting to farmers is the fact that conditions for soil formation are poor and restricted to small patches, limiting possibilities for harvesting fodder for livestock.

The adaptation of the Greenland Norse farmers to these conditions is unique in pre-modern world history. Nowhere else was farming attempted in such a hostile environment until the 19th century. It is no fluke that the Norse farmers arrived in Greenland at the height of the Medieval Warm Period, when the climate in South Greenland was as mild as, or even slightly milder than, in 1990–2010,[332] but even so the difference compared to Iceland was marked and drastic. This is most clearly demonstrated by evidence for barley cultivation, which was ubiquitous in Iceland in the Viking Age, but only sporadic in Greenland and never a significant component in the economy. At about the same time, farming also spread northwards in the western Pacific (see on Okhotsk culture below), but there it only reached as far north as 50° N (a full 10 degrees of latitude farther south than Kujataa) in a humid continental climatic zone. The humid continental zone, with warmer and longer summers than the subarctic, saw the greatest northward expansion of farming away from its centres of origins,

especially in Eurasia in the last two millennia. Even so, enormous tracts of land within this zone were still not yet farmed by the 19th century. It was during this century that the modern agricultural expansion in Siberia, Manchuria, Canada and the United States mostly took place.

Looking at each region in turn before considering a few specific examples and beginning in Europe, the unusual case of coastal northern Norway has already been pointed out with its temperate climate at very high latitudes. Here a temperate coastal climate borders on the subarctic, often only a few kilometres inland. Since the Iron Age, farming was restricted to coastal areas south of Lyngen fjord, at 69°N, but in the period 1200–1400 Norwegian settlement expanded far west of this old border. Partly driven by the interests of the Norwegian state, this new subarctic settlement was however primarily based on fishing. The new settlements were fishing villages, which also served as centres for trade for the Sámi. Pigs may have been kept at these sites in small numbers, but evidence for farming has not been found.[333]

In eastern Scandinavia, around the Baltic, the northern border of farming lay much farther south than in northern coastal Norway. In Sweden, Finland and northwest Russia agriculture spread northwards since its introduction to these regions in the Neolithic (mostly after 2500 BC), but it remained—and remains to this day—firmly within the boreal zone.[334] Farther east agriculture was introduced later and generally at more southerly latitudes,[335] while in the steppes and east of the Ural Mountains agriculture was introduced as a minor component of a pastoral nomadic economic model, which predominated in Central Asia and southern Siberia until modern times. Pockets of agriculture were found in the southern Urals[336] and southern Siberia (particularly in the valleys of the Altai Mountain region where the Minusinsk basin has the earliest evidence for farming – see below) from the third millennium BC.[337] A major transition towards farming took place east of the Urals only after the conquest of Siberia by Russians in the late 16th century AD. Most of that expansion took place in the 19th and early 20th centuries, well within the humid continental zone.[338] Similarly Manchuria was heavily colonised by Chinese from the late 17th century onwards, although its northern regions mainly began to experience farming settlement in the early 20th century.[339] Unlike Siberia, which prior to modern colonisation had been dominated by pastoralist economies, small-scale agriculture had a long history in Manchuria, particularly in the southern part.[340] In coastal and island northeast Asia there was a gradient from densely settled agricultural areas in northern China, Korea and Japan to the hunter-gatherer societies of eastern Siberia, with an in-between region where cultivation played a gradually smaller role the farther north one goes. In Japan and Primorye, the coastal region east of the Amur, pottery making started in the Palaeolithic in the context of hunting and foraging communities, which were partly or fully sedentary and practiced some horticulture – increasingly so as time went by (Jomon and Boisman cultures respectively).[341] Agriculture was introduced in Japan in the first millennium BC, first in the South and spreading to northern Honshu during the course of the first millennium AD. While rice was cultivated in the south, only dry farming was possible in the north with millet, wheat and barley. It was only in the period associated with the Satsumon culture (700–1200 AD) that agriculture was established in Hokkaido.[342] The Okhotsk culture in the Kuril Islands and Sakhalin is the only example of a culture with a farming component developing in the northern border of the humid continental zone—and it will be considered in more detail below.

In North America there is a comparable gradient with a centre of agriculture in Mexico and farming spreading slowly northwards into what is now the south-western United States, where fully sedentary societies developed only in the second half of the first millennium AD in an arid climatic zone. The difference is that unlike e.g. Japan agriculture did not spread along the seaboard and in the whole area from California to British Columbia and southern Alaska agriculture was not practiced before the arrival of European settlers.[343] In this region—where conditions are very favourable for agriculture—sedentism developed early on, as in NE Asia, but hunting and gathering, with some horticulture, remained the foundation for the economy.

In eastern North America woodland farming of maize was developing and spreading in the first and second millennia AD.[344] The Huron of southern Ontario represent some of the most northerly farming societies in the region. Woodland hunter-gatherer groups used pottery and grew maize; indicating degrees of sedentism, but in the more northerly parts of the region this only complemented what remained a basically hunting and gathering economy.[345]

In the southern hemisphere the only major landmass that touches the subantarctic climatic zone is the southern tip of South America. As in the NW and NE Pacific, there is a gradient from fully agricultural societies in the far north to the hunter-gatherer societies of Tierra del Fuego.[346] The Subantarctic also touches Tasmania, where farming was introduced only with European settlers in the 19th century, and the South Island of New Zealand and the Chatham Islands. Although these regions have a significantly more moderate climate than Kujataa, they were also the settings of introduced cultures with economic regimes that had developed under much more favourable conditions. In that sense, they are interesting to compare with the case of Kujataa and will be considered separately below.

Sea mammal hunting

Opportunities to hunt sea mammals are not evenly distributed around the globe. True seals are found only north of the Tropic of Cancer and mostly well south of the Tropic of Capricorn, while eared seals (sea lions and fur seals) are only found in the Pacific in the northern hemisphere, but live further north in the southern hemisphere, particularly along the coasts of South America, where they are found in the tropical zone. Sea otters live only in the northern Pacific and Walrus live only in the Arctic while dugong are only found along the shores of the Indian Ocean and in Southeast Asia and marine manatees are restricted to the Caribbean. Whales are found in all of the oceans, but many species of whale are too large and too mobile to have been easily hunted before commercial whaling took off in the 16th century, and evidence of low level utilisation is usually associated with scavenging rather than active hunting. Systematic hunting of small whales, dolphins and porpoises is a feature of many coastal cultures, the earliest dating back more than 5,000 years,[347] but is usually seen to represent quite particular adaptations, as in the well known case of Thule Inuit bowhead whaling.[348] Practically all well documented whale hunting cultures before the Middle Ages developed in the Pacific.[349]

Fig. 3.23: A seal resting on a piece of ice.

Sea mammals have been hunted by humans since the Palaeolithic,[350] but intensive exploitation of marine resources first became a widespread strategy in the Mesolithic and is a feature of many hunting societies around the world. Sedentary hunters—in the European Mesolithic, the Jomon period in Japan and, until modern times, on the Pacific coast of the contemporary United States and Canada—developed subsistence strategies based on fishing, mollusc gathering and seal, sea lion or sea otter hunting.[351] The sea mammal component in these economies varies, and can differ from site to site depending on local circumstances, but it is rarely seen to be the mainstay of the economies in the same way it was among Palaeo-Eskimo and other arctic hunting cultures.

Sea mammal hunting in combination with farming is rare for the main reason that sea mammals are not found in the coastal regions of many of the main centres of agriculture in the world. In Europe the process of Neolithisation is associated with a shift away from marine resources towards a fully land-based economy, where most of the population lived away from the coastal regions.[352] There is lively debate about the nature and speed of this transition, particularly in the Baltic, where evidence suggests that many Neolithic coastal communities continued to rely heavily on marine resources, among them seal, long after elements of the farming package had been adopted.[353] Towards the end of the Neolithic, such communities had become an exception as farming economies became increasingly homogenous. From the Bronze Age onwards, marine resource exploitation in Europe was a negligible component of the economy, even in coastal areas, and seal hunting was not a significant activity in any society.[354] The issue of overhunting of sea mammals by farmers has been raised in several regions around the world, including New Zealand in a prehistoric context and the Caribbean in an early modern one, but in all such cases there are uncertainties both concerning the population sizes of the sea mammals and the degree to which their human predators were dependent on the hunt for their survival.[355]

In general coastal farmers around the world have tended to utilise the marine resources available to them. In some cases such utilisation had symbolic as well as, or instead of, economic value.[356] Fishing was by far more universal and more economically significant than marine mammal hunting, but in non-urban economies it is rare to find remains of marine animals far from the coastal zone. Marine resources could be locally significant, but apart from Norse Greenland there are no farming societies that relied on sea mammals for their very survival. The contrast is revealed in comparison with Iceland, a neighbouring and culturally related society to Norse Greenland. Zooarchaeological analyses of Viking Age and Medieval middens show that marine fish is everywhere a significant component of Icelandic bone assemblages, typically between 5% and 20%, and while seal and whale bones are found in most large middens, their numbers are in most cases very small, suggesting incidental rather than regular provisioning. Three coastal sites in northern Iceland have a significant seal bone component, in contrast to both inland sites in the North and coastal and inland sites in the South. This pattern suggests that while marine fish was distributed evenly and in significant quantities throughout Icelandic society, to inland as well as coastal sites, seal and whale was

rare apart from the northern coast, where there are seal colonies and where drift ice regularly brought large numbers of seals to within reach of Icelandic hunters.

Iceland, therefore, represents the more typical pattern of a coastal farming culture where sea mammals were utilised. This utilisation was opportunistic in the sense that it was limited to farms which had direct access to seal colonies and to the exceptional times when winter sea ice brought large flocks of seals within reach of the coast. The latter could represent a veritable bonanza, especially as the sea ice was otherwise detrimental to farming, reducing and delaying spring growth, often with disastrous consequences, but neither kind of utilisation was significant for the economy as a whole. Instead the Icelandic economy relied on fishing as the principal supplement to farming, and in this it was similar to most other coastal farming economies around the world. The reliance of Kujataa farmers on seal hunting for subsistence and walrus hunting for trade is therefore unique.

Fig. 3.24: Grass fields for silage on Qorlortoq farm, near Qassiarsuk.

Farming landscapes

The following presents a number of farming landscapes, including from the World Heritage List and tentative lists, which are either marginal in some significant way or where farmers relied on marine resources to a considerable degree—or both. The list is not exhaustive, but the wide selection demonstrates how exceptional Kujataa is in regard to these two aspects.

Agricultural Landscape of Southern Öland[357]

Öland is a Baltic island off the coast of mainland Sweden, and the whole southern part of it is on the World Heritage List. This is a landscape that has seen continuous human occupation since the Mesolithic. The present settlement patterns preserve a system of land division that has been in place since medieval times, with a residual Iron Age landscape showing through, particularly in a series of well known and distinctive hill forts. This landscape is characterised by linear villages and land use patterns shaped by the underlying geology, which has contributed to the preservation of land use practices that make the surviving culture unique. The settlement pattern took shape from the 11th century onwards and is crowned by several imposing stone churches from the 12th century. Maritime connections were important in Öland, including both the herring fishery as well as participation in Baltic trade networks. It was a densely settled, heavily modified landscape, dependent on cereal cultivation and animal husbandry as well as trade.

The landscape of Öland also contains evidence for earlier and different economic regimes. Marine resources were particularly important during the Mesolithic and towards the end of the Neolithic, and the transition from a marine to terrestrial economy, as well as intra-island economic diversity, is well recorded.[358]

Vegaøyan -- The Vega Archipelago[359]

Another World Heritage List Scandinavian cultural landscape that can be compared to Kujataa is Vegaøyan – The Vega Archipelago in Norway. Human occupation stretches back to the Mesolithic, but permanent settlements on these outer coast islands only began in the Late Iron Age with small-scale farming and fishing, often seasonal, supplemented to a considerable degree by the harvesting of eider down. Living traditions of eider down processing and boat building can be traced back to the Viking Age. Vegaøyan preserves the cultural relics of marginal, low status communities exploiting niche products in the context of larger economic enterprises, mainland estates and later international trade through Bergen. It is a fragment of the larger Norwegian society, in some ways most comparable to the Greenlandic Western settlement in that it lacks its own superstructure and is primarily focused on resource extraction.

Lofoten Islands

The Lofoten Islands are on Norway's tentative list of sites to be nominated for World Heritage status. Lofoten is a string of islands that stretches into the North Atlantic and forms the political and economic centre of the northernmost region of farming settlement in Norway. At 68–69° N, it is well beyond the Arctic Circle and much farther north than any other farming settlements in the North Atlantic, including Kujataa. Despite its high latitude, the climate in Lofoten is relatively mild, on account of the Gulf Stream, underpinning an economy based among other things on cereal cultivation. Farming in Lofoten goes back to the Neolithic, but the area's economic significance was enhanced significantly by the

commericalisation of the cod fisheries from the 12th century onwards. Lofoten was, and still is, the centre of those fisheries and it is this that provides the area with its unique character. The fishing village of Vågan is the earliest in Norway, and the monumental site of Borg in Vestvågøy attests to Late Iron Age and Viking Age chieftainly power centred on this region.

St Kilda[360]

St Kilda is a World Heritage site, a small island group considered a part of the Outer Hebrides, but 64 kilometres from the nearest big island in the archipelago. Settled from the Neolithic, these isolated islands have extensive evidence of both prehistoric and historic buildings, but evidence of a Norse presence is limited to place names and reports of artefact finds. In modern times, the islands had a population of some 180, all living in a single village. The islands were evacuated in 1930 and remain uninhabited apart from a military base.

Minusinsk basin

The Minusinsk basin in southern Siberia is a steppe basin along the Middle Yenisei with steep mountains on both sides. It was sparsely populated until the Bronze Age, but then saw a marked intensification of occupation, which is thought to relate to rich copper sources in the area. Archaeological evidence for this region comes predominantly from graves, which increased markedly in number during the Bronze Age, indicating a hierarchical pastoralist society with wide cultural connections. Isotopic analyses of human bones indicate a substantial shift towards millet agriculture in the later Bronze Age (from 1500 BC), making this area the earliest major agricultural centre in Siberia.[361] Farming in Minusinsk is made possible by a combination of climatic and soil factors, which explain why, despite its antiquity in the basin, agriculture did not spread to other parts of Southern Siberia until modern times. Minusinsk features prominently in discussions about the origins and migrations of steppe peoples, and is usually considered as a source rather than a destination of migrants. Although agriculture was practiced in Minusinsk, the material culture of the region was as a rule the same as that of surrounding pastoralist societies (Karasuk and Tagar cultures).

Okhotsk culture

In the middle of the first millennium AD, the Okhotsk culture developed in the Amur River Basin and on Sakhalin Island, later spreading to the Kuril Islands and northern

Fig. 3.25: The settlement of Qassiarsuk.

Hokkaido. Okhotsk people lived in large aggregated settlements with as many as 100 dwellings, hunted sea mammals, fished and raised pigs. In the Amur region this culture was a continuation of earlier sedentary marine-oriented cultures, but in Sakhalin and especially the Kuril Islands its appearance seems to represent colonisation of previously sparsely or uninhabited lands. In the Kurils the Okhotsk culture represents a ca. 400-year period of intensive occupation, followed by the disappearance of pigs and a much lighter human presence of Ainu hunter-gatherers.[362]

With the exception of the pigs, which this culture has in common with the fishing communities of Finnmark mentioned above, Okhotsk culture is comparable to the intensive maritime-oriented societies of the coastal North Pacific.

South Island of New Zealand

New Zealand was settled by Maori originating from eastern Polynesia in the late 13th century AD. Although New Zealand has a warm temperate climate, it was considerably colder than the tropical islands the colonists originated from and, in that sense, represents an extreme adaptation. The Polynesians brought with them a farming economy based on the cultivation of the sweet potato and several other cultigens. They did not however bring with them, or manage to establish in their new land, the full suite of domesticated plants and animals (incl. the chicken and the pig), which underpinned the economy of the Cook and Society Islands whence they came. The North Island of New Zealand supports an economy based on cultivation, but conditions become progressively more marginal the farther south one goes. Yet many of the earliest sites known in New Zealand are from the South Island and this is normally explained with reference to the moa, a large flightless but very meat-rich bird, which was hunted to extinction within two centuries, and to a lesser extent seal colonies.[363] At the time of European contact in the late 18th and early 19th centuries, the South Island was much more sparsely populated than the North, with Maori population densities relating directly to conditions for cultivation. The southern Maori developed an economy that was not dependent on cultivation, relying instead on marine hunting and fishing, as well as extensive terrestrial foraging. Despite radical adaptations of subsistence and economic strategies, the southern Maori nevertheless retained the settlement organisation and social structure inherited from their homelands in the tropics.[364] An extreme form of this kind of adaptation has been recorded in the Chatham Islands, an archipelago nearly 800 km east of the South Island believed to have been settled from there, although it had been isolated for as many as four centuries when Europeans made contact around 1800. The Chatham islanders practised no cultivation and did not even have dogs, as did their New Zealand cousins; and although

Fig. 3.26: World map with indication of place names and sites mentioned in the text.

they were largely sedentary, they relied entirely on the hunting of marine mammals and birds as well as foraging.[365] Archaeological evidence from the unequivocally subantarctic Auckland Islands, some 400 km south of New Zealand proper, shows that early Maori explorers attempted to settle there with their farming economy, but the attempt failed and the islands were abandoned until another abortive attempt was made to colonise them in the 19th century.[366]

Modern farming at high latitudes

The spread of agriculture in the early modern period has already been mentioned several times. Vast spaces that had seen either very limited or no farming were transformed under the plough, beginning in the 17th century in Siberia, Manchuria and North America, but gaining pace in the 19th century, which saw continued expansion in these regions as well as in Australia, Patagonia and Africa. This agricultural expansion continued in most parts of the world in the 20th century and continues to this day, with the tropics being the principal enlargement zone at present. Despite the incredible increase in the amount of available farmland over the last 2–3 centuries, most of this occurred within the same climatic zones where agriculture has been practiced since prehistoric times.

Farming has been introduced on a small scale in the subarctic, in Russia,[367] Siberia, Alaska,[368] Canada,[369] Scandinavia and Greenland. This modern subarctic farming is associated with industrialisation in two ways. First, farms develop primarily in the vicinity of urban centres, which in the subarctic are as a rule based on mining or other kinds of resource extraction. In the 19th century when farming was introduced, e.g. in the Yukon territory,[370] it was high transport costs that made subarctic farming competitive and even necessary to feed the mining towns. Transport costs have decreased considerably since then, but they are still high in the subarctic compared to most other parts of the world, and this remains important for the continued survival of subarctic farming. Much subarctic farming is essentially gardening or small-scale animal husbandry within or on the outskirts of towns and cities. Second, modern subarctic farming is associated with industrialisation by virtue of its dependence on mechanisation, both for farm work and for transport, but above all it is synthetic fertilisers that make it possible to farm in these areas.

Another fundamental difference between the modern and the pre-modern age is that modern states have been directly involved in promoting, supporting and subsidising subarctic farming. Without state support, subarctic farming is only possible under exceptional circumstances, and where such support has been reduced or taken away (as in Russia and Alaska) farming has declined or disappeared altogether. One interesting characteristic of subarctic cultivation in modern times is the adoption of gardening by native people, traditionally not cultivators, to supplement other income and diet sources.[371]

Kujataa is unique among areas in the subarctic where farming is practiced in the present in that it has roots in a pre-modern farming landscape.

Table 3.2 – Summary table for external comparison

Attributes	Standards for comparison	Kujataa	Vega-øyan	Öland	Lofoten	St Kilda	Minusinsk	Okhotsk culture	South Island
Direct relation	Is the property the setting of subarctic farming? (Yes/No)	Yes	No	No	No	No	No	No	No
Cereal cultivation	Was plant cultivation a significant component of the economy? (Yes/No)	No	No	Yes	Yes	Yes	Yes	No	No
Animal husbandry	Was animal husbandry a significant component of the economy? (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Fishing	Was fishing a significant component of the economy? (Yes/No)	No	Yes	Yes	Yes	Yes	No	Yes	Yes
Sea mammal hunting	Was sea mammal hunting a significant component of the economy? (Yes/No)	Yes	No	No	No	No	No	Yes	Yes

Conclusion

In pre-modern times, farming was restricted to the temperate zone or warmer climates. It spread incrementally from its centres of origins, which means that first farmers were either colonists from similar, adjacent environments or local people who were used to their environment and adopted farming within the framework of their traditional knowledge. Before the modern period, farming had spread widely across the globe, but it was limited to temperate or warmer zones, and within these areas there remained vast tracts of land that were well suited to farming, yet still untouched by farmers. Well documented cases of farmers colonising climatic zones that were different from those in their homelands are rare and of the two unequivocal cases—New Zealand and Greenland—the latter stands out as a colonisation of the subarctic and a case where, despite significant adaptations to the new environment, the imported farming regime was maintained. The Kujataa combination of animal husbandry with seal hunting as the two main pillars of the subsistence economy is unique in world history. While sea mammal hunting in general and seal hunting in particular was a feature of all the coastal cultures considered here, it was nowhere a mainstay of the economy as it was in Kujataa. A comparable degree of reliance on sea mammal hunting is only found in societies that did not practice farming as well.

3.3 Proposed statement of outstanding universal value

Brief synthesis

Kujataa – a subarctic farming landscape in Greenland is located in the municipality of Kujalleq in South Greenland. The nominated property is made up of five component parts, which together represent the demographic and administrative core of two farming cultures, a Norse Greenlandic one from the late 10th to the mid-15th century AD and an Inuit one from the 1780s to the present. Although these two cultures are distinct, they are both based on a combination of animal husbandry and marine mammal hunting.

The overall landscape of pastures, fields, ruins and present-day buildings is an outstanding example of a human settlement and land use in the Arctic and is representative of a unique farming culture. Kujataa represents the first European settlement in the New World and the earliest introduction of farming to the Arctic. The resulting cultural landscape, shaped by grazing both in medieval and modern times, is composed of grassy slopes and willow copses and characterised by low settlement densities with isolated farmsteads surrounded by cultivated fields. The landscape of Kujataa represents an exceptionally comprehensive preservation of a medieval Northern European culture. The five component parts contain the full range of relics relating to Norse Greenlandic culture dating from the 10th to the 15th centuries AD, with complete examples of monumental architecture as well as key sites illustrative of the adaptation of the Inuit to a farming way of life from the 18th century onwards.

Justification of criterion

(v) Kujataa is an outstanding example of human settlement, where unique farming traditions have developed in a challenging environment. Situated between the cold desert of the Greenland ice cap and the cool outer coast of the Labrador Sea, Kujataa is an oasis with a relatively mild climate. Norse and Inuit subsistence practices based on a combination of animal husbandry and sea mammal hunting have resulted in a distinctive cultural landscape where cultivated fields and managed pastures contrast with the barren wastes of the Arctic. Kujataa is an extremely marginal landscape for farming, vulnerable to environmental change, illustrating the fragility as well as the resilience of past and present cultural traditions.

Statement of integrity

The boundaries of the nominated property are clearly defined and encompass all of the elements necessary to express its outstanding universal value. A comprehensive range of farming landscape is represented, including fields, meadows and pastures with introduced and naturalised plants. All of the known elements relating to Norse Greenlandic culture—including farms, churches, cemeteries and outfield structures—are represented in large numbers. The nominated property includes key sites relating to the reintroduction of farming in the 1780s and contains the core areas of contemporary farming, including all of the same attributes as those of the Norse Greenlandic culture.

Statement of authenticity

The nominated property has authenticity because the landscape retains the pastoral character introduced in the 10th century AD, where isolated farms surrounded by cultivated fields and interspersed by managed pastures are set against a background of vast and untouched wilderness. The archaeological remains of the Norse Greenlandic settlements in Kujataa have retained the highest degree of authenticity. The form, design and material composition of houses and other relics of this culture are unquestionably European and Norse. The characteristics and distinguishing features of Greenland Norse and Thule

Inuit material culture are clear and well known. This has been established through large scale excavations, extensive field surveys and intensive typological, art historical and environmental analyses stretching back into the 19th century. The historical view of the Norse Greenlandic settlements draws on contemporary written records from Iceland and Norway dating back to the 12th to 15th centuries AD. Conservation of architectural monuments has primarily taken place in the last 20 years based on the principle of ensuring structural stability rather than rebuilding. The majority of the Norse Greenlandic sites have suffered no anthropogenic modification since their abandonment. Modern sheep farms, located mostly on or adjacent to Norse Greenlandic farm sites, typify the managed character of the contemporary landscape. Detailed historical documentation and protected historic buildings in the farming settlements bear witness to the farming culture of modern Inuit.

Requirements for protection and management

A combination of effective legislation and well-organised municipal planning strategies—together with an up-to-date management plan, and a dedicated local community—contribute to the long-term protection and management of the nominated property and ensure the preservation of its outstanding universal value.

The site is governed and managed by a steering group with representives from the Government of Greenland, the Greenland National Museum and Archives, Kujalleq Municipality, village councils, sheep farmers, the Danish Agency for Culture and the tourism industry. The day-to-day management will be carried out by a local secretariat headed by a site manager and a staff consisting of one or more park rangers working in close collaboration with the authorities represented in the steering group.

All ancient monuments in the property are protected by the Greenland Parliament Act on Cultural Heritage Protection and Conservation. This act ensures a protection zone of 20 metres around each ruin except for agricultural surface cultivation that may take place up to a distance of two metres from a monument. The ruin groups at Sissarluttoq (cp 3) and at the Hvalsey (Qaqortukulooq) site (cp 5) are further protected by their status as "cultural heritage areas" including a much wider protection zone around the monuments where no agricultural activities can take place with the exception of pasture for sheep grazing during summer. The important ruin groups in Qassiarsuk (cp 1) and Igaliku (cp 2) also have an additional protection zone stipulated in the municipal planning. The listed buildings in the property are protected by the same legislative act as the ancient monuments, ensuring that demolition is prevented and that any alterations are carefully controlled. The Greenland National Museum and Archives is the responsible authority and offers advice and information on the maintenance of listed buildings. Furthermore, listed buildings are protected under the municipal planning

The Government of Greenland and Kujalleq Municipality are pursuing a pro-agricultural policy and investing development funds for the agricultural sector, with an observed focus on the nominated property, as it ranks among the most productive agricultural districts in contemporary Greenland. In recent decades, the Government of Greenland has developed an agricultural-legislation on the basis of the Agricultural Act of 1996, which has paved the way for the introduction of a number of regulations. Government support for the agricultural sector is expected to continue in the future.

This pro-agricultural policy ensures the ongoing livelihood of the agricultural sector, and there is a broad political consensus within Inatsisartut (the Parliament of Greenland) for both preserving and developing the agricultural sector. The main incentive for this support is to provide Greenland with more domestically grown produce, thereby reducing the country's dependency on food imports. This political will and ambition is reflected in both legislation and the fiscal budgets of the Government of Greenland, with funds being provided for public loans and grants for development initiatives.

The Government of Greenland and Kujalleq Municipality provide further subsidies for the development of infrastructure, particularly renewable energy projects and roads between farms and settlements. As noted above, the government provides operating subsidies to agriculture that support the sector's continued existence. However, the government intends to make agriculture less dependent on subsidies and will increasingly focus on economies of scale in agriculture.

Fig. 3.27: At low tide icebergs strand on the beaches.

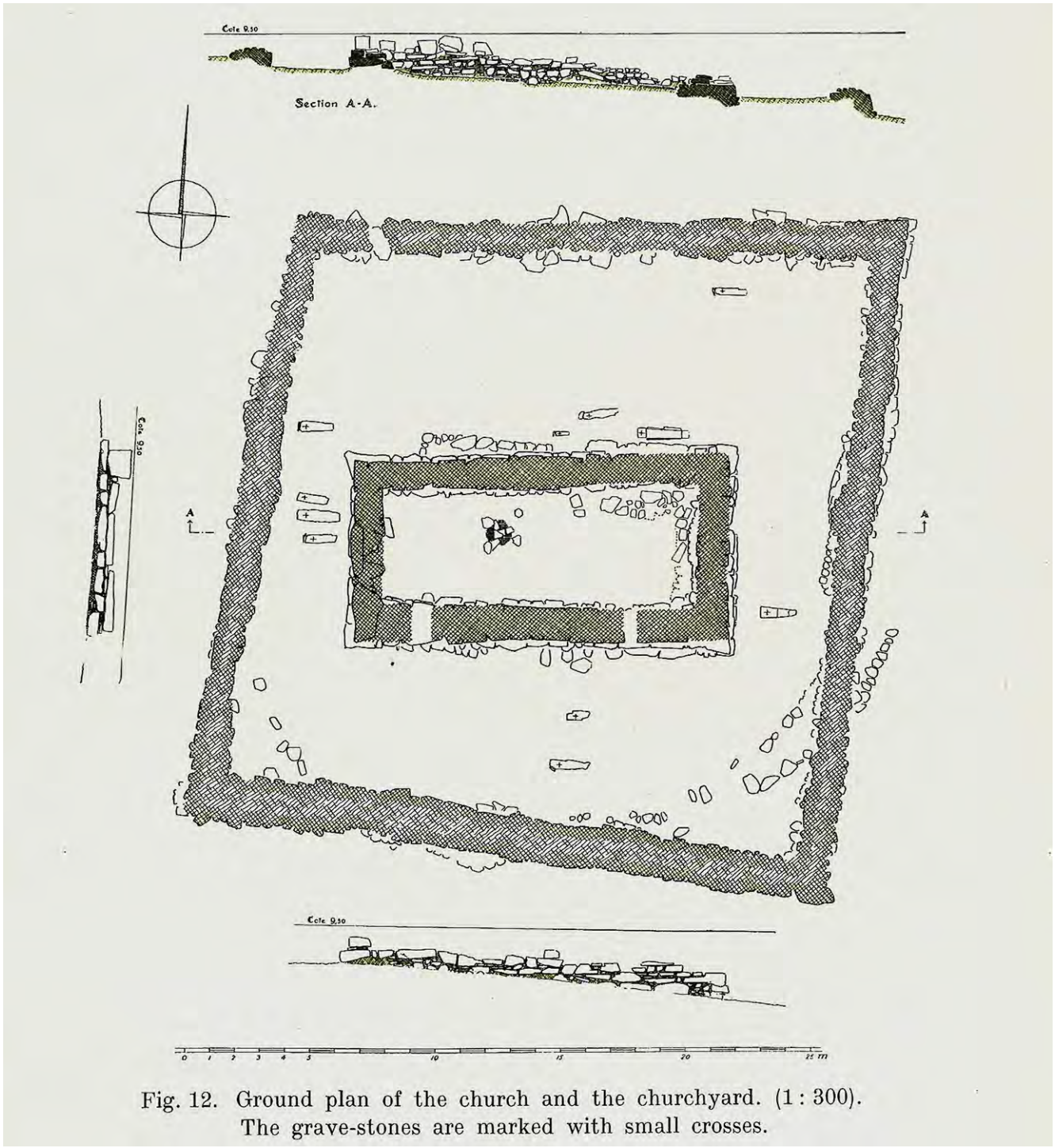


Fig. 12. Ground plan of the church and the churchyard. (1 : 300).
The grave-stones are marked with small crosses.

Fig. 3.28: Excavation plan showing the Gothic type parish church at Qassiarsuk/Brattahlíð (Ø29a), which was found to overlay an earlier church (note the traces of a circular churchyard enclosure wall).

Chapter 4 – State of conservation and factors affecting the property

4.1 Present state of conservation

Generally speaking, the conservation of ancient monuments and cultural landscapes within Kujataa is rather good, as is the case in most of Greenland. Due to the limited amount of large-scale development, including construction and business-related activities, ancient monuments are visible and have often been left untouched for centuries, and sometimes even millennia. Kujataa is therefore noteworthy in comparison to other Norse population areas, due to its conservation of a cultural landscape that not only represents the entire spectrum of Norse architecture and construction—from the largest known Norse farm (Igaliku, area 2) to smaller mountain pastures—but also serves as home to some of the most well preserved and rarest ruins within the Norse culture of the North Atlantic. Furthermore, the ancient monuments are an integral part of the cultural landscape of present-day sheep rearing, where the continuing utilisation of the former Norse fields and pastures contributes to the preservation of the authentic impression of farming and agriculture, which is unique both within and outside of Greenland. However, the degree of preservation varies from location to location, and the present state of conservation for each area is therefore described below.

The nominated area of ***Qassiarsuk (1)*** is characterised as being one of the most extensively cultivated agricultural areas during the Middle Ages and present-day farming. While this adds to the unique agricultural character of the landscape, it has also caused some amount of disruption to the locations of the ruins. Therefore, dialogue with local sheep farmers regarding the respect for and preservation of cultural heritage is held on an ongoing basis to ensure the coexistence of ancient Norse heritage and modern agriculture. Smaller locations in the mountains have been left almost entirely undisturbed.

The nominated area of ***Igaliku (2)*** is the oldest agricultural settlement in Greenland, and therefore also one of the locations where agricultural activities have taken a large toll on the original Norse ruins. Present-day agricultural activities have added to the particularly lush landscape, with vegetation influenced by grazing livestock, but the landscape has remained relatively unchanged since the Middle Ages. Although the most visible ruins have been marked and partially enclosed, one of the future conservation initiatives involves marking the ruins that are not as visible and exposed and may be threatened by various activities. Other locations in the area are also affected by intensive agricultural activities, but to a much lesser extent than Igaliku itself.

The area of ***Sissarluttoq (3)*** is characterised by its unique location and inaccessibility. Due to these conditions and the area's limited amount of fields, the agricultural use of this particular area in recent times has been very limited, and its Norse ruins are amongst the most well preserved in Kujataa and even all of Greenland. There are no immediate man-made or natural threats to the area, as long as the increasing tourism activities and logistic construction work are planned and carried out in a manner consistent with the preservation of existing ruins.

Apart from the oldest sheep-rearing locations in the nominated area of ***Tasikuluulik (4)*** adjacent to Igaliku Kujalleq and Qanisartuut, the development of sheep rearing and agriculture in the area has occurred relatively recently, i.e. from the 1980's and onwards. Therefore, the ruins appear better preserved than in other areas that have been exposed to extensive agricultural activities. Even in the intensively cultivated area of Igaliku Kujalleq, most known ruins have so far been treated with respect, and today the area appears as one of the most authentic agricultural areas in both the Norse and later Inuit contexts. If agricultural activities continue with the same respect for the cultural landscape, there are no reasons to fear that it will pose a threat in the future. The planned construction of new hydropower facilities at Qorlortorsuaq is also expected to proceed without conflict, as it will be carried out in cooperation with the Greenland National Museum and Archives.

Qaqortukulooq (5) is particularly interesting due to the excavated ruins at Hvalsey Church (Ø83), which are exceptionally well preserved. The church itself is the largest and best preserved Norse stone construction in Greenland. This is partly due to ongoing restoration projects by the Greenland National Museum and Archives, but also to the fact that modern sheep rearing has been limited to Tasiusaq (Ø83a) and Upernaviarsuk (Ø82). The remaining locations in the fjord have been left almost entirely untouched by later activities. Apart from minor coastal erosion at certain locations that has occurred from rising sea levels, there are no immediate conditions under which the current level of preservation will change.

Fig. 4.1: A well preserved window at Hvalsey Church.

The majority of the ancient Norse cultural landscape in the nominated property is also used today for farming. There are within the property a total of 22 farms that are almost exclusively based on sheep husbandry. The modern farms are distributed across the same limited areas of cultivable land that were exploited by Norse agriculture. Accordingly, there is a Norse ruin group in the vicinity of virtually every modern farm.

Developments in agriculture mean that the immediate surroundings (including old infields) of some of the Norse ruin groups are being swallowed up by field expansion and that "pressure" on the ruins and the ancient structures is generally on the increase. The problem is not, however, so great as to be insoluble given reference to (Inatsisartut) Parliament Act no. 11 of 19 May 2010 on conservation and other cultural heritage protection of ancient monuments (The Heritage Protection Act), and when Greenland National Museum and Archives routinely consults in connection with applications relating to cases of field expansion, extension of farm buildings (sheepcotes), construction or rerouting of roads and wheel tracks etc. The same applies to planned drainage projects in relation to bogs and wet fields with the aim of bringing these into cultivation. There are several examples of how wetland areas such as these can contain important remnants of well preserved Norse cultural remains—even without them necessarily being located in the immediate vicinity of a Norse farm.

Farming is today the primary commercial activity in the component parts defined within the nominated area. Currently, this mainly comprises sheep husbandry, but there are also a few horses, small cattle herds and the arable agriculture/fodder production associated with livestock rearing. The composition of the livestock has undergone change through time. For example, the Vikings had a greater proportion of cattle than is seen today and, taking into account climate change, new marketing forms and general developments in the farming sector, focus must constantly be maintained on relations between livestock farming and other interests in the area.

Cultivation consists primarily of hay production, for animal fodder, and a parallel cultivation of vegetables, in particular potatoes and turnips. To some extent, hay is produced on the same fields as those laid out by the Norse settlers, but field expansion has continually taken place. Work in the fields is predominantly carried out using large modern machinery.

Southern Greenland's is often referred to as the "bread basket of Greenland", and across shifting governments the political leadership has unwaveringly supported initiatives to pursue meaningful agricultural practices in this particular area. Consequently, protection and development of local agriculture has received a great deal of attention, and supporting initiatives, such as grants and legal reforms, are proposed on an ongoing basis.

Despite reconstruction and renovation work, protected buildings constitute a unique, homogenous, and valuable unity for Greenland's history of construction. Houses appear similar with characteristics such as low stone walls, wood board facades, white window frames, fascia edges and felted pitched rooftops.

The upcoming action plans for each protected construction will aid the safeguarding of houses against

Fig. 4.2: Bales of hay dot the fields on a farm near Igaliku.

unfortunate initiatives that could change the current appearance of the houses.

Component part 1 – Qassiarsuk

Qassiarsuk was the second place in Kujataa (after Igaliku) where sheep farming was reintroduced and nowhere else in Greenland does one find such an extensive pastoral landscape that spans across the entire isthmus. Nested in this unique pastoral landscape are registered 39 Norse and seven Inuit heritage sites. In spite of a long history of modern farming and heavy grazing, most heritage sites are very well preserved and represent one of the best known examples of a Norse settlement system with various sized farms and their associated upland and inland shielings. At Norse sites farmed historically and today, and especially at the intensively farmed settlement of Qassiarsuk, some attrition of the ruins has been affected by repeated archaeological excavations and farming activities, some early recorded ruins even having been removed to allow for early building of Inuit settlement housing and logistics (harbour facilities, gravel roads, houses etc.). On the other hand, the Inuit settlement represents one of the most authentic examples of pioneer and continued sheep farming. Overall the present state of preservation of the individual heritage sites range from average to very good. As long as the development of farming, tourism and other industry follows the guidelines outlined in the management plan, there are no immediate threats to this state of preservation.

Today, Qassiarsuk is a fully functional and thriving settlement with several active farms. There are currently 10 sheep farms situated within the nominated property:

1. Qorlortup Itinnera
2. Qorlortoq
3. Sammisoq
4. Qassiarsuk A (northernmost farm)
5. Qassiarsuk B (the original farm of Otto Frederiksen)
6. Qassiarsuk C
7. Qassiarsuk D (southernmost farm)
8. Inneruulalik
9. Nunataaq
10. Tasiusaq

The rangelands have been under the influence of winter grazing during the past century, and have therefore been transformed since the reintroduction of grazing in 1924, from being dominated by willow shrub forests to a grazing landscape being more and more dominated by grasslands. The winter grazing regime has been much less since the early 1990's, and this is reflected on the shrub forests, which seem to be in much better state than during the earlier periods of modern sheep farming.

Meanwhile, historical Norse structures have been excavated and remain visible and protected.

Agriculture continues to develop with the emergence of new construction and extension of existing fields, but these developments have occurred with consideration for cultural heritage. Ruins are cared for on a continuing basis, and are therefore expected to remain a permanent part of the landscape.

Today, the house of the first sheep farmer, Otto Frederiksen, is home to a local settlement museum.

Fig. 4.3: The living room in the house of Otto Frederiksen, which is now a museum in Qassiarsuk.

In Qassiarsuk there are two protected stone barns. One is used for sheep rearing purposes and storage. The second barn has collapsed and will need restoration in the future. The roof on the first protected barn has collapsed due to massive amounts of snow during the particularly rough winter of 2014–15. Most of the rafters remain intact, but both heads are broken. This building will be restored in the near future.

Component part 2 Igaliku

Farming was reintroduced to Igaliku in 1783, making this modern Greenland's oldest farming community and among its largest, not only historically, but also during the Middle Ages. 18 Norse and eight Inuit heritage sites are registered in the component area, the settlement of Igaliku itself occupying the site of the largest known Norse farm in all of Greenland. Not only do the ruins of Igaliku represent the apogee of Norse Greenlandic society, they are the only medieval episcopal manor in the North Atlantic to be comprehensively preserved. The long history of modern farming at Igaliku, as well as early excavation activity, has caused notable attrition of the ruins of Ø47, quite a number of which have been

completely removed. However, the existing Norse ruins represent most of the core buildings of the site. These ruins are now protected by fencing and their original impression is continually improved by restoration projects. The other heritage sites of this component area generally display the same high level of surface preservation as in the other component areas. Overall the present state of preservation of the individual heritage sites ranges from average (at Igaliku) to very good at the other sites. As long as the development of farming, tourism and other industry follows the guidelines outlined in the management plan, there are no immediate threats to this state of preservation, although gradual, but steady, submersion of parts of Ø49 must be expected due to a relative rise in sea level.

The building customs in southern Greenland during the late 1700s consisted mostly of houses made of stone and peat, with rafted roofs and longitudinal ridges.

When Anders Olsen, a Norwegian merchant, arrived in Igaliku in 1782, the ruins of the cathedral and numerous other constructions were nearly or entirely collapsed. He built a sturdy house from the remains, and determining whether the original house still exists requires further archaeological research.

The building customs in northern Greenland also changed, and peat walls were gradually replaced by stone. The building customs of Igaliku may be derivatives of northern Greenlandic customs, brought to the south by Anders Olsen.

60 years later, a new local building technique in the form of "square-cut wall techniques" emerged in southern Greenland. The walls rest on a sturdy foundation of rocks and consist of chiselled blocks of local stone. The roofs were elegantly attached to the stone walls with wooden wall anchors.

The distinctive building customs of Igaliku partially coincides with the tradition of stone houses in the rest of Greenland, and the unusual amount of preserved constructions constitute a characteristic, homogenous and valuable unity for Greenland's history of construction.

Today, the majority of houses in Igaliku serve as summer residences and are vacated during winter, whereas a small number of houses are still inhabited year-round.

Many of the houses are in good condition, but an increase in the amount of visitors may result in some degree of wear and tear. Likewise, changes in construction practices could potentially result in unfortunate modifications, especially due to access to cheap building materials.

The preservation work in Igaliku has been ongoing for many years. Previous plans for the former municipality of Narsaq, which included the area around Igaliku, contained stipulations for the preservation of central Igaliku. These stipulations have since been followed up in subsequent plans, most recently in the 2015 executive notice on the protection of cultural heritage in southern Greenland. As a result, the appearance of the basic structure of Igaliku remains relatively unchanged since the settlement was founded. Therefore, the original structure and characteristics of the buildings can still be observed.

The Norse ruin complex of Gardar within the present day village of Igaliku, has been exposed and well preserved, and clearly displays its history and former purposes. Throughout the years, the complex has been thoroughly cared for. These measures will be continued and strengthened with the nomination to the World Heritage list.

Presently there is only one farm situated in the village as such, but four other farms are placed within the property close to Igaliku:

1. Igaliku
2. Tatsip Kitaa
3. Itilleq/Tatsip Kitaa (no owner at the moment),
4. Attarnaatit
5. Uummannartiivaraq

These five farms are therefore the present-day agricultural production apparatus, making agriculture the most important livelihood of Igaliku. The farming is based on raising sheep, though one farm combines sheep rearing with the raising of Galloway beef cattle. The farms have developed their farmland to a high degree within the last three decades, cultivating rather large areas for fodder production. A small community plantation of 7 ha with exotic conifers is to be found in Itilleq, established in 2003–05 with spruce and larch seedlings.

The use of the rangelands has been changed as well within the last 30 years, as there were signs of overgrazing in the areas east of Igaliku during the early 1980s, i.e. low weights of lambs and sheep. As a consequence, grazing animals have been moved gradually during the late 1980s and 1990s from the eastern grazing areas by the foothills of Illerfissalik to the southern and western rangelands close to and around Sissarluttoq.

Fig. 4.4: The Norse ruins in Igaliku.

Component part 3 – Sissarluttoq

Sissarluttoq is among the best preserved Norse Greenlandic farmsteads in Kujataa, indeed in all of Greenland. At least 44 features have been identified at the site making it among the largest and most complex—and by far the largest farm in Norse Greenland without a church. Modern sheep farming activities in the environs of the heritage site have only included early sheep gatherings, and any attrition to ruins and the surrounding cultural landscape has therefore been very limited. Indeed, the present state of preservation at Ø59 must be described as outstanding, whereas the other heritage sites, one Norse and one Inuit, in the component area display an average degree of surface preservation. The lack of farming and location of the site ensures that there are no immediate threats to its present state of preservation.

No actual farming activities take place at this location, although Sissarluttoq is important for the mustering of sheep, being a meeting point for the coastal farms (Upernaviarsuk, Illorsuit and Qaqortukulooq) and the Igaliku farms. There are no modern buildings or structures in Sissarluttoq, aside from one small hut, which is used for overnight stays during the mustering season, and a sheep pen, for use during the mustering and slaughter season in September/October.

Component part 4 – Tasikuluulik

Component part 4, both known by its Norse name of Vatnahverfi and the Inuit name of Tasikuluulik, has one Inuit and 19 Norse Greenlandic registered sites, ranging from single structures to the regional centre in Igaliku Kujalleq (Ø66 – undir Höfða) with more than 30 features. The latter heritage site was also one of the earliest places to be resettled by modern sheep farmers, but the ruins have been remarkably spared in spite of recent intensive farming. Thus, the main attrition to the ruins at Igaliku Kujalleq has been due to early archaeological activities, as well as limited wind erosion, which appears to have been ongoing even during Norse settlement. A similar respect for the Norse ruins generally characterises the other heritage sites farmed today in the Tasikuluulik area, which accordingly displays one of the best preserved, densely settled, yet heavily farmed, agricultural landscapes in Greenland. The preservation of the cultural landscape also extends to the flora that comprises rather heavily grazed pastures, dense shrub forest and rich lakeshore vegetation. Overall the present state of preservation at the individual heritage sites ranges from good to excellent. As long as the development of farming, tourism and other industries follows the guidelines outlined in the management plan, there are no immediate threats to this state of preservation.

Tasikuluulik is home to several clusters of Norse ruins. They are currently not particularly exposed, but with the nomination comes increasing focus on making the Norse ruins in the area more visible. Tasikuluulik is the most recently repopulated agricultural area. The first modern sheep farms were established in the 1930's, and today the area is an active and well managed agricultural region with 6 active sheep farms.

Föhn winds from the ice cap have through the centuries blown sand from the outwash plain on the north side of Tasikuluulik, over the northern part of the district, burying a number of archaeological sites and changing vegetation and drainage patterns. As the sand blows from one location to another, new sites come to light from time to time.

Fig. 4.5: Cattle in the mist - Tasikuluulik (Vatnahverfi).

The use of timber framing began in Greenland during the 1880s. Houses were built by constructing a frame of sturdy square shaped lumber, with an exterior of vertical wooden panels. The Lund family built their timber framed house in 1946, at a time when the country was still under the influence of World War II American military bases. There was a shortage of building materials, and the main constructions of the roof and floor bear witness to a time when dimensions had to be halved. The protected timber framed house in Qanisartuut is well preserved, and maintenance is undertaken by the family.

Presently there are six farms situated in the area, spread along the 21 km long road from the fjord pier, close to Qanisartuut, overland to Igaliku Kujalleq:

1. Qanisartuut
2. Tasilikulooq
3. Saqqaa
4. Timerliit
5. Qorlortukasik
6. Igaliku Kujalleq

Only the farm in Igaliku Kujalleq is situated close to Igaliku fjord, while the rest of the farms are situated in the interior. This is a unique situation in Greenland, having an inland community, where settlements normally are situated close to a fjord or the ocean. Four of the farms, being Tasilikulooq, Saqqaa and Timerliit, are the result of the initial activities of the agricultural development project SAP[372] (1983-92), with further development activities up to early 2000. During the early 2000s, one farm established a small conifer plantation, dominated by larch trees. The pier/harbour, roads, fields and farms were developed during this period. Today, the area is a very productive farming district, with good soils and large homefields. Also the rangelands are of good quality, with a high lamb production. Farming is the sole livelihood in the area, based on sheep farming, though one farm is combining sheep with Dexter beef cattle and mink.

As in the other parts of the property, the use of the rangelands has changed as well within the last 30 years, with almost no winter grazing taking place since the 1990s.

Component part 5 – Qaqortukulooq (Hvalsey)

Component part 5 has 11 registered Norse Greenlandic sites, ranging from single structures to the regional centre of Hvalsey (Ø83) with 16 structures. It also has at least 4 Inuit sites, including the site of Tuperna and Anders Olsen's first farm from the early 1780s in Upernaviarsuk. The Hvalsey Church has been the focus of archaeological research since the 18th century and is one of the most visited archaeological sites in Kujataa. The walls of the church are preserved to their full height and recent analyses have shown that only a handful of stones have moved or fallen out since the earliest accurate measurements were made more than a century ago.

The adjacent farmhouses were comprehensively excavated in the 1930s but recent small-scale excavations at the site have shown that, although earlier excavations were extensive, they have not penetrated far and most of the archaeological resource is intact. Organic preservation at this site is very poor. The church and neighbouring feasting hall have been subject to conservation efforts aimed at stabilising the masonry. The Hvalsey farm site is fenced off to hinder livestock trampling in the ruins. At Upernaviarsuk most of the Norse Greenlandic ruins have been obscured by fields and buildings but the other Norse Greenlandic sites in the component part have not seen any modern modifications. Coastal erosion has damaged and/or is threatening individual structures at three of the Norse Greenlandic sites.

There are only two farms within the area, i.e. Upernaviarsuk and Qaqortukulooq[373]. In addition, the region is home to the most modern agricultural outpost in the Arctic: the Upernaviarsuk Research Station.

The Upernaviarsuk experimental farm is the Government of Greenland's research and training centre for the agricultural sector. The experimental farm normally has a small flock of sheep, approximately 350 winter sheep, and cattle and horses have been part of the stock. The homefields cover approx. 15 hectares, mainly perennial grass fields, but annual fodder crops, potatoes and vegetables are also produced. There is a small nursery and three greenhouses, and a little plantation (0.2 hectares) with exotic conifers.

The farm is located approx. 7 kilometres east of the town of Qaqortoq, and all transport to and from the facility is by boat. This takes place in an area in the outer fjord region, which is free of ice during the winter months, but often blocked by large quantities of pack ice during the spring.

The operation at Upernaviarsuk features agricultural research and training in a sub- and low arctic region. Studies cover a wide range of topics, focusing within the area of animal husbandry on the economically important area of sheep farming. Upernaviarsuk is developing systematic sheep farming methods, including activities within the scope of the Icelandic "Fjarvis" programme and feeding research. In addition, smaller herds of cattle and horses are raised at the farm, mostly for instructional purposes.

Fig. 4.6: Agricultural research at Upernaviarsuk.

Within the area of plant cultivation, research is conducted with various perennial types of grasses for the production of hay and silage, including experiments with annual feed crops such as grains, primarily rye, barley and oats, as well as ryegrass and varieties of the cabbage family.

In addition, a certain amount of research is conducted in the area of general vegetable cultivation and horticulture at the farm's gardens and nursery, including developing suitably hardy herbaceous perennials, bushes and trees as ornamentals for private and public gardens in South Greenland.

There is an agricultural school at Upernaviarsuk, with 10 active students enrolled (autumn 2015). The students work at the farm in teams of between three and seven at a time, while the others are away at internships on farms in Greenland, Iceland and Norway.

4.2 Factors affecting the property

Factors affecting the nominated serial property are described in detail in the sub-chapters for each component part, but the main factors affecting them are summarised below and listed in Table 4.1.

4.2.1 Development pressures

The proposed property comprises an area of active agriculture, Norse and Inuit ruins and historic and modern buildings.

Agriculture

With regard to the nominated world heritage site, one of the established targets is to protect cultural heritage while, at the same time, safeguarding ongoing development opportunities for local agricultural and livestock activities, which currently consist mainly of sheep rearing.

As a result of several years of coexistence between an active agriculture and the protection of cultural heritage, farming has incorporated a high level of consideration for the protection of historic sites. The larger ruin complexes have been enclosed to prevent grazing animals from causing unnecessary wear and tear.

Despite the diverging interests of preserving the ruins and using the full potential of an agricultural area, there is a strong tradition of respect for the Norse ruins among sheep farmers in southern Greenland. Marking of the ruins is incorporated in the management plan.

Greenland, like the rest of the world, is experiencing depopulation of rural areas, which is expected to affect the way these areas are perceived. Fewer houses will be inhabited year-round, and they are gradually transforming into holiday houses, hostels etc. Until now, this has not resulted in a decrease in agricultural activities, and there are no indications that this will change in the near future. Farms are merging and the number of individuals employed within agriculture is decreasing, yet the general impression is that the extent of farming remains unchanged. However, conditions are expected to change in the future, as they have also changed since the Norse inhabited the area.

The effects of agriculture on the landscape differ according to different practices in the region.

Agriculture is having an impact on the landscape on different levels, depending on the different types of agricultural production and methods within the property, i.e. the different domesticated animals, grazing strategies and plant culture. The grazing of sheep, horses and cattle— particularly winter grazing—has been and remains the main factor for the development of the cultural landscape in Kujataa.

In area 3, Tasikuluulik (Vatnahverfi), there is an active erosion area of approximately 10 km^2, close to the farms of Igaliku Kujalleq and Qorlortukasik. The area is under the influence of wind erosion, due to very high föhn wind velocities from the glacier valley of Jespersens Bræ. The erosion dates back to the Norse settlements during the Middle Ages, and in modern times winter grazing with sheep has been a factor in fuelling this erosion. In recent decades, agricultural practices have changed, with no or very limited winter grazing being conducted anymore, and eroded areas have been fertilised and seeded for erosion control and cultivated for fodder production, thereby reducing the active erosion area.

The other areas of the property are not affected by large-scale erosion, but degradation has been a factor during the initial history of modern agriculture. Modern farming methods and practices, without winter grazing and with proper amounts of winter fodder, have changed the situation, though, leading to improved rangeland quality. Willow copses in particular have recovered in the mountain pastures.

Since the 1980s, the rangelands of the property have been monitored by professional botanists, based on an ongoing programme with grazed and fenced-off reference areas. The reference areas are visited and studied every 3–5 years. The local farmers participate in the maintenance of the reference areas.

Fig. 4.7: A number of international research projects are ongoing in the Kujataa region. The North Atlantic Project examines the harbors; here on an island just across from Igaliku (Ø47).

Archaeological excavations

The Greenland National Museum and Archives continues to manage archaeological excavations and surveys in the region in close cooperation with international

institutions and teams of researchers. The surveys are conducted in accordance with museum guidelines regarding potential disruption and reestablishment of ancient monuments following scientific research. Recent surveys show that newly emerged archaeological findings in the nominated area still need to be identified and determined and that there are still more locations to discover. As such, continuing archaeological surveys still contribute to the story of the unique cultural and historical importance of Kujataa.

Tourism

Increasing tourism will have an impact on several ancient monuments. In order to guide the tourists in the best possible way, specific guidelines for each ruin complex are being devised.

Fig. 4.8: View of the Qooroq Icefjord.

Buildings

An increase in the number of visitors may cause wear to the structures. Furthermore, a shift in the usage has raised a demand for modernisations, extensions and new features, applying pressure on the original construction culture.

Consequently, central Igaliku is protected by stipulations in the municipal plan, and as a starting point no new structures are to be built in the area. Furthermore, rules for refurbishments and extensions have been codified in a set of special regulations.

Component part 1 – Qassiarsuk

Of the five areas, Qassiarsuk is most affected by modern—mainly agricultural—developments. The extensive development is, however, an outstanding value from the perspective of this particular area. As long as agricultural developments occur with continued respect for the surrounding cultural landscape, there is no reason to perceive new construction, heavy machinery and new cultivation methods (modern silage balers etc.) as threats.

The future pressure caused by tourism in Qassiarsuk is expected to be substantial and will cause increased wear on the areas. However, the initiatives of the management plan are expected to minimise the potential negative impacts of tourism on the region.

Component part 2 – Igaliku

In Igaliku no larger farms lie adjacent to the settlement's protected areas. The effect of modern agricultural development on the area is therefore expected to be minimal. In the settlement itself the tendency towards fewer year-around inhabitants will affect the appearance of the settlement the most. As a consequence of the stipulations on conservation, the increase in seasonal inhabitants is not expected to cause major changes to the appearance of the settlement.

Igaliku is also estimated to be capable of handling an increase in tourism, and initiatives in the management plan regarding tourism control are expected to minimise unnecessary wear and tear.

Component part 3 – Sissarluttoq

There are no signs of development pressure in Sissarluttoq, without any modern agricultural activities and the pressure from tourism is also very low (virtually non-existent).

Component part 4 – Tasikuluulik (Vatnahverfi)

The farms in Tasikuluulik are modernised and developments—including new construction, heavy machinery, and methods of production—are to be expected. This development is an outstanding value from the perspective of this particular area, as long as it occurs with continued respect for the surrounding cultural heritage.

Qorlortorsuaq Hydropower Station lies north-east of the area and is to be further developed in the near future. However, the development will take place in close cooperation with authorities in charge of the World Heritage site. As such, the project is perceived as adding potential to the development of Tasikuluulik and subsequently the World Heritage site, including improved accessibility (ports and roads) for tourists.

Component part 5 – Qaqortukulooq (Hvalsey)

The church ruin of Qaqortukulooq (Hvalsey) is protected and the area is no longer home to sheep rearing activities. Therefore, there is no reason to suspect any development pressure in the area. An existing high voltage power line has been put underground to avoid any impact on the appearance of the landscape surrounding the church ruin. Accessibility and vegetation surrounding the church is relatively robust, and increased tourism is not expected to cause any problems.

The Upernaviarsuk Research Station is itself an example of modernised Arctic agriculture and will naturally undergo continuous changes. These changes are expected

to happen in a sustainable manner, as the research station serves as an educational facility specialising in farming in cultural landscapes such as the World Heritage site.

4.2.2 Environmental pressures

There are very few environmental pressures affecting the Norse ruins, as the natural attrition of the ruins generally appears to be very slow. However, three environmental pressures with some negative effects on the ruins in the nominated areas can be identified as follows:

- Relative sea level rise and coastal erosion: South Greenland appears to have experienced relative sea level rise for at least the last 1,000 years, although the rate of this sea level rise is not exactly known and varies from inner to outer fjord. At some sites, this sea level rise combined with storms causes some coastal erosion of homefields and ruins. This coastal erosion is exceedingly hard to counteract as sea barriers, wave breakers etc. are expensive and, from present experience, only have a limited lifespan in the fairly extreme conditions of the arctic. However, coastal erosion at the sites in the nominated areas appears to have been very slow, at least over the last 100 years.
- Climate change, increased temperature and low precipitation: New studies imply that increased temperatures and lower precipitation can have a negative effect on the preservation of archaeological artefacts in the Norse middens in South Greenland. However, based on recent excavations, this degradation has already occurred and is not visible on the surface. Accordingly, it will not affect the appearance of the cultural landscape.
- Climate change, increased temperature: Increased temperatures in Greenland cause a change in the vegetation and in some areas a notable increase in scrub vegetation has been observed. In some place, there is a chance that scrub vegetation may spread over ruins, causing them to be less visible, and the roots may disturb the stratigraphy and cultural layers.

Environmental pressures from climate change can be observed throughout the property. Global warming will, among other things, cause more unstable weather that will affect farming, flora and fauna. In a general sense, the limiting factor for agriculture in a subarctic area such as Kujataa is the temperature and length of the growing season. Indeed, a warmer climate with a longer growing season can be generally viewed as a positive development, while a colder climate would limit the possibilities for farmers.

A warmer climate will create both challenges and opportunities for agriculture, meaning adaptations in terms of the choice of cultivars and the need for new production methods within a changed climate regime. The warmer climate will create opportunities for raising crops requiring a longer growing season, such as cereals. Furthermore, it will become possible to harvest hay more than once each summer, thereby making it possible to produce better quality forage. A tendency towards summers with more frequent and prolonged droughts has though been observed since the turn of the millennium, combined with a warmer climate, making it necessary for investments in developing new irrigations systems.

Fig. 4.9: A glacier tongue that is retreating and sending a constant stream of meltwater into the river, which cascades into the fjord.

The need for irrigation is a general tendency all over the property, but drained wetlands would, of course, be least affected by a drier climate.

A more humid climate could potentially damage the structures, which until now remain well preserved due to the dry climate of the region. As a consequence, action plans on the preservation of structures are being prepared.

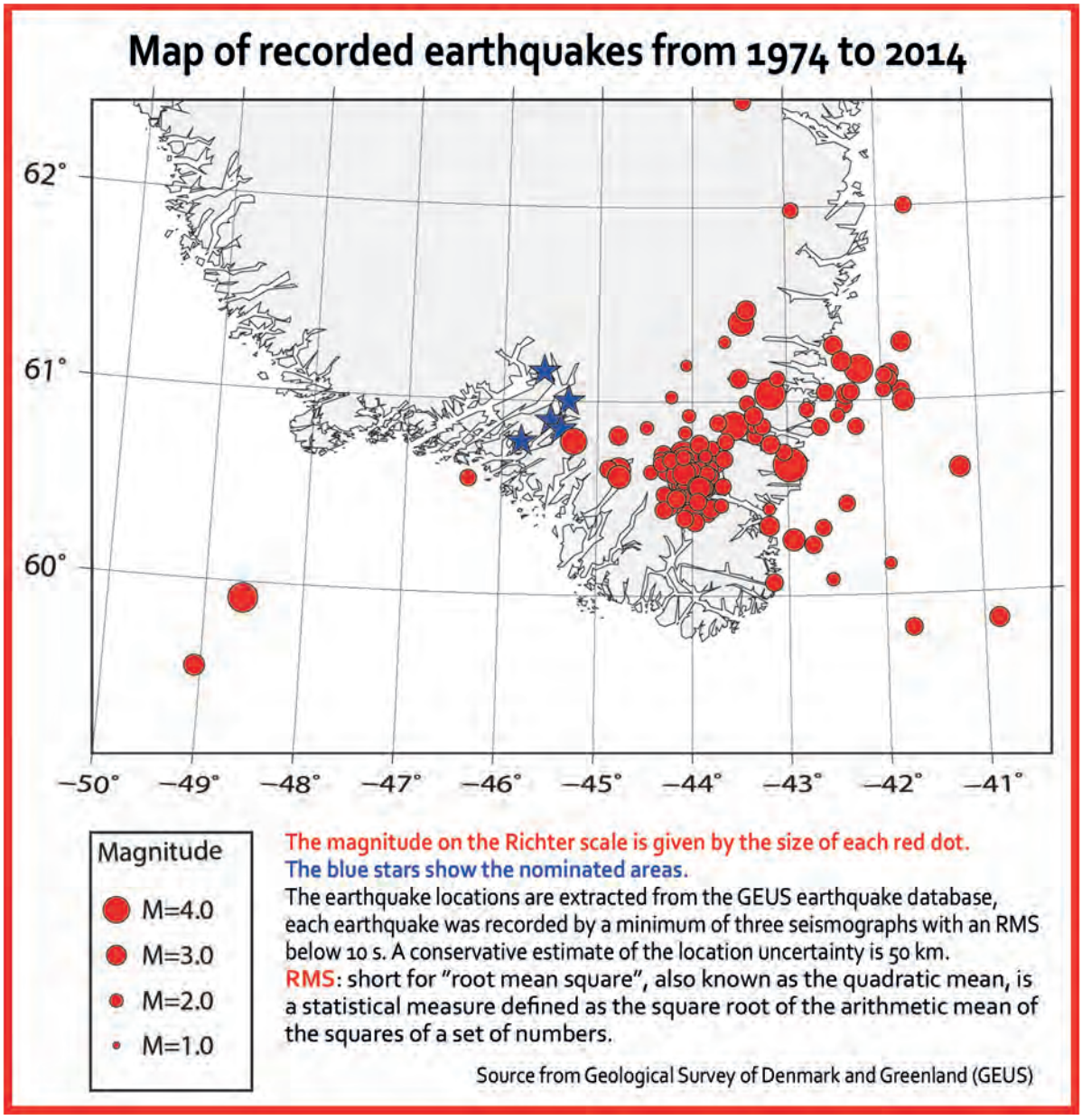
Furthermore, a warmer climate increases the threat of mountain fires, which can harm agriculture, buildings and ancient monuments.

Greenland focuses intensively on cruise ship safety. If cruise ship activities increase in the two fjords, there will be a need for a revised emergency plan to deal with potential oil spills.

4.2.3 Natural disasters and risk preparedness (earthquakes, floods, fires, etc.)

Natural disasters are of no great threat to the nominated property. The nominated property lies in an area where the risk of natural disasters is low on a global scale. Tsunamis, floods, and hurricanes are non-existent, and wildfires are rare in the area and limited in scale.

The settlements current fire response capabilities will be optimised, should the need arise. In Igaliku and Qassiarsuk there is a local emergency contingency facility in the form of a small "fire station", where fire-fighting equipment is stored; this has six trained fire and rescue staff. In Narsarsuaq, the Mittarfeqarfiit Airport Authority runs the fire service. There is also a sea rescue service here, which has a lifeboat that can be dispatched to



Tunulliarfik Fjord. A marine emergency contingency facility in Igalikup Kangerlua (Igaliku Fjord) operates from the fire station in Qaqortoq.

With increased tourism in the area, it may prove necessary to upgrade capacity and preparedness. An upgrade would improve conditions for visitors and local citizens.

However, the health service and the emergency management described above are presently both considered sufficient.

The recorded earthquake activity in the proposed area is sparse. The risks of natural disasters and environmental pressures are low, and natural disasters do not pose any relevant threat to the monuments.

Table 4.1 – Factors affecting Kujataa – a subarctic farming landscape in Greenland

Factors	Area 1 Qassiarsuk	Area 2 Igaliku	Area 3 Sissarluttoq	Area 4 Tasikuluulik	Area 5 Qaqortukulooq
Development pressures					
Encroachment					
Adaption					
Agriculture	X	X			X
Environmental pressures					
Pollution					
Erosion					
Overgrowth	X	X	X	X	X
Climate change	X	X	X	X	X
Natural disasters & risk preparedness					
Earthquakes					
Floods					
Visitor pressure					

Table 4.2 – Factors affecting component part 1 – Qassiarsuk

	Natural damage				Development pressures		Other
	Erosion	Temperature	Water/rain	Flora/fauna	Agriculture	Tourism	Vandalism
Ruins							
High					X		
Moderate						X	
Low	X			X			
Minimum		X	X				X
Listed buildings							
High							
Moderate		X	X			X	X
Low	X						
Minimum				X			
Agriculture							
High							
Moderate	X		X				
Low		X				X	X
Minimum				X			

Table 4.3 – Factors affecting component part 2 – Igaliku							
	Natural damage				Development pressures		Other
	Erosion	Temperature	Water/rain	Flora/fauna	Agriculture	Tourism	Vandalism
Ruins							
High					X		
Moderate				X		X	
Low	X	X					X
Minimum			X				
Listed buildings							
High							
Moderate		X	X			X	X
Low	X						
Minimum				X			
Agriculture							
High							
Moderate	X		X				
Low		X				X	X
Minimum				X			

There are no listed buildings in Sissarluttoq and no farming activity besides a place for collecting sheep.

Table 4.4 – Factors affecting component part 3 – Sissarluttoq							
	Natural damage				Development pressures		Other
	Erosion	Temperature	Water/rain	Flora/fauna	Agriculture	Tourism	Vandalism
Ruins							
High							
Moderate							
Low	X	X		X		X	
Minimum			X		X		X

Fig. 4.10: The Aqqaluk Ittuk on her way to Narsaq. This ship brings goods to the state-owned shops in the settlements.

Table 4.5 – Factors affecting component part 4 – Tasikuluulik							
	Natural damage				Development pressures		Other
	Erosion	Temperature	Water/rain	Flora/fauna	Agriculture	Tourism	Vandalism
Ruins							
High							
Moderate	X			X	X		
Low		X				X	
Minimum			X				X
Listed buildings							
High							
Moderate		X	X			X	X
Low	X						
Minimum				X			
Agriculture							
High	X						
Moderate			X				
Low		X				X	X
Minimum				X			

Table 4.6 – Factors affecting component part 5 – Qaqortukulooq							
	Natural damage				Development pressures		Other
	Erosion	Temperature	Water/rain	Flora/fauna	Agriculture	Tourism	Vandalism
Ruins							
High							
Moderate	X				X		
Low		X		X		X	X
Minimum			X				

4.2.4 Responsible visitation at World Heritage sites

There has been considerable tourism in South Greenland since the 1960s, based on the Norse era and the known ruin complexes, combined with the other cultural and natural attractions in the area. Tourists arrive by plane from Narsarsuaq and on cruise ships with one or more ports of call in southern Greenland. To meet the rising demand, a welcoming service and other services for tourists have been established. What's more, private entrepreneurs have founded a number of local tourism companies (Blue Ice Explorer, Greenland Sagalands, Tasermiut South Greenland Expeditions, Greenland Tours and others). They arrange tours, transport, overnight accommodation and other services. In 2015, the organisation Destination South Greenland was established, which has among its priorities the marketing and development of the World Heritage area as an attractive tourist area. Local involvement in tourism services has also developed over a number of years, primarily via sheep farmers who offer accommodation and meals on their farms and give visitors an insight into local everyday life.

Tourism activities are currently regulated mainly by stipulations for the protection of ancient monuments and regular codes of conduct. Travel agencies and local authorities prepare informational materials for tourists visiting the region, including national and regional tourism websites.

Without proper management, increasing tourism in the area may have a negative impact on the cultural heritage that needs protection. Tourism activities in or close to the ruins do pose a threat to the monuments as well as the vegetation, which may cause damage to agricultural activities. Furthermore, increasing tourism will result in more traffic (noise and pollution) as well as a need for more substantial waste management. These potential threats will be met by management initiatives (see appendix). Meanwhile, an increase in tourism may result in improved coordination of hiking activities in the areas adjacent to the ruins, as well as increased attention on management-related initiatives.

Information initiatives constitute another important area of focus in response to increasing tourism activities. The Greenland National Museum and smaller local museums are developing further initiatives in this area in cooperation with Kujalleq Municipality.

Analyses will be undertaken of the actual tourist traffic in the area and, on the basis of these and the protection requirements, general "traffic plans" will be formulated for tourists in the five component parts. These plans will be implemented via signs, information and possibly by fencing. These physical measures will be carefully harmonised with conservation interests and the general appearance of the area.

Tourism in the area will be monitored and regular assessments undertaken of the need for further regulatory measures or initiatives with regard to directing tourism in a particular direction in relation to the development in the World Heritage property.

The numbers of flight passengers, overnight stays and cruise passengers are listed below to show the amount of activities.

Table 4.7 – Overview of the number of flight passengers to Narsarsuaq (UAK), the international airport in Kujalleq Municipality

Year	Airport	June	July	August	September
2010	UAK	689	1,706	1,335	387
2011	UAK	688	1,649	1,730	381
2012	UAK	624	1,723	1,660	372
2013	UAK	564	1,536	1,611	400
2014	UAK	487	1,761	1,713	410
2015	UAK	580	1,652	1,494	708

The available data from Statistics Greenland only shows the overall overnight stays in hotels in Kujalleq Municipality. Hence, these figures are not calculated specific for the nominated areas.

Table 4.8 – Overview of accommodation in Kujalleq Municipality

Year	June	July	August	September
2010	3,308	3,762	4,754	4,124
2011	2,608	4,107	4,300	2,845
2012	2,697	4,243	4,630	2,716
2013	2,674	3,737	4,300	2,765
2014	2,441	4,109	3,354	2,582
2015	1,835	3,492	3,478	2,065

Table 4.9 – Overview of cruise passengers in Greenland

Year	June	July	August	September
2010	2,465	8,596	12,124	6,757
2011	1,190	6,007	11,445	11,182
2012	1,393	6,109	5,755	10,068
2013	1,426	2,927	5,211	11,726
2014	925	5,977	6,692	6,183

The available data from Statistics Greenland only shows the total numbers for cruise ships in Greenland.

There is currently no statistical information (baseline data) available on the numbers of visitors to the areas in the nominated World Heritage site *Kujataa*. Data relating to these new demarcations will be collected during 2016 and will serve as a baseline in relation to future developments.

4.2.5 Number of inhabitants within the property and the buffer zone

There are two settlements in the nominated area, and the second largest one (Igaliku) has in the past years developed increasingly to a cottage area, where buildings are primarily used during the summer holidays.

Table 4.10 – Estimated number of inhabitants within the nominated area as of 1 July 2015

Component part no.	Place name	Number of inhabitants
1	Qassiarsuk	88
2	Igaliku	33
3	Sissarluttoq	0
4	Tasikuluulik	19
5	Qaqortukulooq	11
	Total	**151**

Chapter 5 – Protection and management of the property

The proposed area is protected and conserved by an established framework of national legislation and protective designations as well as by local planning policies. These arrangements are reinforced through a series of national legislation and local planning documents, which are described in the annexes.

The management plan (see annexes) was produced by a working group with participants from the Greenland National Museum and Archives, Kujalleq Municipality and the Government of Greenland. The management plan for the proposed World Heritage Site sets out agreed objectives for the proposed site. This management plan has been the subject of local public consultations.

5.1 Ownership

There is no private ownership of land in Greenland, and therefore all land is owned by the Government of Greenland. Individuals and institutions can, though, be entitled to use concrete areas, but without formal ownership.

Land allotment

Greenland regulates land use through a system of land allotments (also called "areal allocations"), thereby permitting a legal use of public lands for private purposes. For example, when building a house or establishing a field for agriculture, a land allotment will be applied for from the authorities. A land allotment grants the right to use a certain area for a specified period of time, most often for as long as the applicant requires it. The conditions for land use are defined in accordance with the authorities to prevent conflicts with other interests associated with the area, such as conservation. All structures, buildings, fields and other uses requiring land allotments are thus given individual rights of usage.

Fig. 5.1: A replica of a Norse longhouse in Qassiarsuk.

Ancient monuments

All ancient monuments predating AD 1900 are protected under the administration of the Greenland National Museum and Archives (NKA), and can therefore not be subjected to private property or ownership.

Buildings

Some buildings are privately owned and some are owned by the public sector. However, buildings and other structures on land are subjected to ownership, often following a procedure of official registration.

5.2 Protective designation

The nominated area is covered by extensive legal restrictions partly through national legislation and partly through municipal planning.

National and local regulation of the area:

- The Heritage Protection Act – Inatsisartut Act no. 11, 19 May 2010 on Cultural Heritage Protection and Conservation
- Executive Order on Cultural Heritage Protection, is expected to be issued in February 2016
- The Museum Act – Inatsisartut Act no. 8, 3 June 2015 on museum activities
- The Planning Act - Inatsisartut Act no. 17, 17 November 2010 on Planning and Land Use
- In addition to the above, other legislation with provisions that may influence activities in an area exist. These include, but are not limited to:
  - ◊ Landsting[374] Act no. 29, 18 December 2003 on Preservation of Natural Amenities
  - ◊ Inatsisartut Act no. 9, 22 November 2011 on Environmental Protection, revised in Inatsisartut Act no. 1, 29 May 2012
  - ◊ Landsting Act no. 5, 2 May 1996 on Agriculture, revised in Inatsisartut Act no. 21, 22 November 2011
  - ◊ Landsting Act no. 12, 29 October 1999 on Catching and Hunting revised in Inatsisartut Act no. 1, 16 May 2008
  - ◊ Inatsisartut Act no. 7, 7 December 2009 on Mineral Resources and Mineral Resources Activities, revised in Inatsisartut Act no. 16, 3 June 2015.
  - ◊ Inatsisartut Act no. 13, 26 May 2010 on Construction
  - ◊ Inatsisartut Act no. 16, 17 November 2010 on Development, Sanitation, and Public Roads
  - ◊ Inatsisartut Act no. 25, 18 December 2012 on Large-Scale Construction Projects, revised in Inatsisartut Act no. 13, 29 November 2013
  - ◊ Inatsisartut Act no. 11, 8 June 2014 on the Use of Hydropower in Energy Production

- Landsting Act no. 20, 20 November 2006 on the Use of Biological Resources for Commercial and Research Purposes
- Landsting Act no. 20, 30 October 1992 on Harbour and Cruise Ship Passenger Taxes, revised in Parliament Act no. 14, 3 June 2015
- Inatsisartut Act no. 19, 3 December 2012 on Concessions for Tourist Business in Selected Areas
- Landsting Act no. 832, 18 December 1991 on Traffic Rules in Greenland, as proclaimed in Executive Order no. 995, 26 October 2009

The Heritage Protection Act

The introduction to the Heritage Protection Act identifies the aims of the legislation. It states that the Act forms part of the national responsibility to protect historic assets as a cultural resource, as scientific source material and as an enduring basis for the perception, self-understanding, well-being and activities of present and future generations. The Act also acknowledges that Greenland's cultural heritage is an important part of world history and of the history of humanity and that Greenland, through active protection of the cultural heritage in the form of designation (scheduling, listing) and other cultural heritage conservation management measures plays its part in safeguarding the global cultural heritage.

The Heritage Protection Act also defines what is meant by the term historic assets, namely ancient monuments, historic buildings and historical areas.

Historical areas

Historical areas are defined as areas possessing an historical value. The sub-areas that are encompassed by, and collectively constitute, the nominated World Heritage area possess an historical value and as such, under the terms of the Heritage Protection Act, can be considered as areas that can be protected with reference to the Act.

An historical area can, under the terms of the Heritage Protection Act, be protected by scheduling (i.e. granting protection as a nationally important archaeological and/or historic site) or other cultural heritage conservation management measures, if the conservation or protection of this historical area is of major significance. The Greenland National Museum and Archives is responsible for making the decision, subject to prior notification and consultation.

Other cultural heritage conservation management means that no activities are permitted within the area that may disfigure or damage parts of the area or the area as a whole. The Greenland National Museum and Archives can grant exemption to this under very special circumstances.

The Government of Greenland can, on the recommendation of the Greenland National Museum and Archives, specify provisions with regard to the scheduling or other cultural heritage conservation management of historical areas.

Fig. 5.2: Arctic cottongrass with Norse ruin in the background.

The Greenland National Museum and Archives is also obliged to monitor historical areas that are subject to scheduling or other cultural heritage conservation management, and must also carry out maintenance of such areas within the constraints of the financial limits laid down in the national budget.

Ancient monuments:

Ancient monuments are understood as the physical traces of past human activity and the context in which they occur.

Some ancient monuments are automatically protected under the Act. This applies to all ancient monuments pre-dating AD 1900, including ruins, settlements, graves and burial grounds. Isolated graves from AD 1900 or after are also automatically protected.

In addition to these automatically protected (scheduled) ancient monuments, the Greenland National Museum and Archives can, following consultation, make a decision on the scheduling of structures from 1900 or after, such as disused churchyards, cairns, fields and the stone walls associated with them, the protection of which is of significant importance due to them having an historical value.

The Government of Greenland can, on the recommendation of the Greenland National Museum and Archives, specify provisions relating to the scheduling of ancient monuments, including the criteria relating to this protection.

Scheduling means that the protected ancient monuments may not be damaged, altered or moved, either totally or in part. No activities may take place within 2 metres of ancient monuments and activities within 2–20 metres are restricted to agricultural practices and the construction of paths leading to the ancient monuments. Agricultural practices encompass superficial preparation of the soil, by harrowing to a depth of 15 cm, manuring, seeding or planting and the use of the area for grazing. The Greenland National Museum and Archives can grant consent for other agricultural practices, such as the removal of stones and the erection of information boards, the installation of rubbish bins and the addition of similar equipment appropriate to public access to the ancient monuments. The Greenland National Museum and Archives can grant exemption from these provisions on the basis of special grounds.

The scheduling must be respected by all rights of use holders for the area in which the ancient monument is located, regardless of when this right was established.

The Heritage Protection Act also contains provisions with respect to the protection of ancient monuments in conjunction with the physical planning process and preparations in advance of earthworks. These provisions oblige the Greenland National Museum and Archives to cooperate with the planning and mineral resources authorities and other parties involved in the exploitation of the nation's resources, such that ancient monuments, and the insight and information they contain, are secured for posterity.

Similarly, the planning and mineral resources authorities and other parties involved in the exploitation of the nation's resources are obliged to consult the Greenland National Museum and Archives in relation to the preparation of planning material and the processing of consents that can have consequences for ancient monuments.

The planning and mineral resources authorities and other parties involved in the exploitation of the nation's resources are obliged, in connection with the processing of consents that can have consequences for ancient monuments, to inform applicants of the contents of relevant provisions under the Heritage Protection Act.

The Heritage Protection Act also requires developers involved in major earthworks to involve the Greenland National Museum and Archives in the planning process relating to these.

In this respect, the Heritage Protection Act also contains provisions referring to archaeological inspections and investigations, including the stipulated time frame for these and who should cover the cost.

The Greenland National Museum and Archives decides whether earthworks can be carried out to the extent that they do not affect ancient monuments, an archaeological inspection or an archaeological investigation. In making this decision, emphasis is placed on the protection of ancient monuments, securing the execution of an archaeological inspection or archaeological investigation and the possibility of initiating the earthworks.

Should ancient monuments be encountered during earthworks, the developer must immediately report the discovery to the Greenland National Museum and Archives and work must be halted insofar as it affects the ancient monument. The Greenland National Museum and Archives decides whether an archaeological investigation should be carried out or whether scheduling should be initiated.

The Greenland National Museum and Archives can grant consents to other institutions and academic organisations for the excavation of ancient monuments and archaeological sites and specify the conditions for these consents.

Historic buildings

Historic buildings are understood as entire buildings, building exteriors, individual building elements and the immediate surroundings of the building to the extent that these constitute a part of the entity worthy of conservation and protection.

Buildings can only be listed according to a decision made by the Greenland National Museum and Archives following prior hearing (consultation). They must be buildings that, by virtue of their historical or architectonic value, are of particular significance.

The Government of Greenland can, on the advice of the Greenland National Museum and Archives, specify provisions with respect to the listing of buildings, including the criteria for listing.

The listing must be respected by all holders of rights to the building, regardless of when these rights were established.

The listing of buildings implies particular obligations with regard to maintenance of the buildings and limitations with regard to the carrying out of building works that affect the building. Accordingly, owners are obliged to maintain a listed building in a sound state in accordance with the listing. General maintenance must be carried out using the same materials, methods and colours as employed to date and in accordance with preservation of the state and appearance of the listed building at the time of listing. The Greenland National Museum and Archives can, given special grounds, grant an exemption in relation to the use of the same materials, methods and colours as those employed to date.

All building works relating to listed buildings require consent from the Greenland National Museum and Archives if these building works affect elements of the building subject to the listing and if the work extends beyond general maintenance. The Greenland National Museum and Archives can attach provisions to the consent.

The Greenland National Museum and Archives can, subject to an application, decide that the cost of maintenance or building work on a listed building be covered entirely or in part by the allocation specified for this purpose in the national budget.

The Greenland National Museum and Archives keeps a record of buildings that are listed, including a statement of the provisions attached to the listing.

Executive order on cultural heritage protection

It is expected that an executive order on cultural heritage protection of a historical area in South Greenland, which contains five areas around Qassiarsuk, Igaliku, Sissarluttoq, Tasikuluulik (Vatnahverfi/Qeqertaasaq), and Qaqortukulooq-Upernaviarsuk, will, on the recommendation of the Greenland National Museum and Archives, be issued pursuant to the Heritage Protection Act. The executive order is expected to be issued by the Government of Greenland in February 2016.

The executive order defines the limits of the area. This is done through a general description in the statutory instrument and a map with coordinates annexed to it.

Further to this, the executive order also contains provisions relating to access to the area as a whole and to the individual component sub-areas and the use of these.

The provisions laid down in the statutory instrument are partly a repetition of the general provisions laid down in the Heritage Protection Act and partly a

Fig. 5.3: One of the stone barns in Qassiarsuk that will be restored.

specification that access and use must be in accordance with the rules relating to scheduled ancient monuments and listed buildings and other cultural heritage conservation management of historical areas. Finally, it is specified that access to and use of the historical area must take place in accordance with the management plan formulated for the area.

The executive order also includes provisions relating to the prohibition of pollution and a framework for the use of the vegetation and the terrain. These specify that activities connected with commercial ventures, sheep farming and other forms of agriculture may continue, but must be in accordance with the aims of the statutory instrument and the general rules relating to use of the area. Further to these are provisions relating to camping, the use of open fires and anchoring, landing and periodic limitation of traffic. With respect to the latter, it is stated that rules can be specified by the municipal council in Kujalleq Municipality.

The executive order also includes provisions relating to management and monitoring. These specify that the Greenland National Museum and Archives, in consultation with the municipal council in Kujalleq Municipality, and based on the involvement of interested parties, is to formulate a management plan for the historical area and that this plan should be regularly updated. The executive order identifies, as a minimum, the aims of the management plan and what its contents should be. From this it is clear that the plan is a management tool employed by the managing authorities to ensure that the cultural heritage values of the historical area are preserved and protected along with public access to the area and the area's continued use and development.

It is also specified in the executive order that the Greenland National Museum and Archives, in cooperation with the municipal council in Kujalleq Municipality, is responsible for observance of the order. Finally, provisions are specified with respect to sanctions in the event of contravention of the executive order and guidelines are set out in pursuance of it.

The Museum Act

The Museum Act has the aim of safeguarding Greenland's material and immaterial cultural heritage and promoting the work and cooperation of the Greenlandic museum service.

The Act defines what is understood by, respectively, the material and immaterial cultural heritage.

The museum service has, in accordance with the Act, through recording, collection, conservation, research and communication, the task of safeguarding Greenland's cultural heritage and illuminating Greenlandic cultural and natural history, making collections accessible to the public and available for research and disseminating the results of this research.

The Greenland National Museum and Archives has national responsibility for the tasks incumbent upon the museum service. The Act specifies more detailed rules relating to the Museum's responsibilities with respect to recording, collecting, establishing and maintaining representative collections, historical research, communication etc.

The Museum Act also specifies rules with respect to the protection of archaeological/historical remains. It defines what is understood by national cultural and natural remains. The Act also specifies that the Greenland National Museum and Archives is permitted to classify artefacts that are not considered as national cultural or natural remains as being of particular value if these artefacts shed light on significant aspects of Greenland's cultural history.

National cultural and natural remains belong to the Government of Greenland, while classified artefacts belong to their owner.

The Museum Act also specifies rules regarding the duty to report the discovery or acquisition of remains from the past and how these remains should be treated, including storage and submission to the authorities.

The Act also specifies rules regarding the acquisition and export of artefacts.

The Planning Act

The Planning Act regulates land use in Greenland and is therefore of major relevance for the protection and development of a World Heritage area.

The aim of the Planning Act:

- Article 1. The Parliament Act has the aim of ensuring that land use takes place according to the interests of society as a whole. This aim is to be achieved by,

1. Protection of nature
2. A socially appropriate ratio between open land (wilderness) and the built environment (human habitation)
3. Land use that, in planning terms, promotes commercially, socially and environmentally favourable development
4. Involvement of the public in the planning of land use
5. Harmonisation of points 1–4 in decisions made within the framework of physical and economic planning

The responsibility for planning lies with the municipalities, although the Government of Greenland is the regulatory authority and has the power to issue national planning directives or require municipalities to formulate a specific plan. Municipal planning will, in a number of

cases, be bound by other legislative or administrative provisions in pursuance of this. Of particular relevance are the Heritage Protection Act and the Greenland Home Rule Executive Order no. 31 of 30 October 1991 on attention to conservation and preservation in municipal planning.

Municipal plans are passed by the municipal council after at least six weeks of public consultation. The plans contain a primary structure and general provisions that can only be altered by the adoption of a new amendment to the municipal plan and detailed provisions to which the municipal council can grant exemption.

Designation of a UNESCO World Heritage area can, in terms of the Planning Act, be a general provision on a municipal plan and be incorporated once nomination has taken place.

A characteristic aspect of planning in Greenland is that no one is permitted to own land. A specific right of use can be granted to an area, but it is not permitted to mortgage or sell this right of use, only whatever there may be in the form of real estate on the area. The right of use extends only as far as is necessary to accommodate the aim of an areal allocation. A situation can therefore arise where there are several holders of rights to the same area. For example, an area is laid out for grazing by sheep or reindeer, and also has a small number of holiday cabins. In so far as the functions are not mutually exclusive, for example if the number of cabins becomes so large that this precludes grazing, several rights of use are unproblematic according to the Planning Act.

Areal allocations are not made for a demarcated area, but for the positioning of a building within a delimited building plot or as close as possible to a particular geographical position. Should someone wish for example to erect a fence around their house, this would require a separate areal allocation, regardless of whether or not the fence lies within the building plot. Areal allocation is only required in cases where an area is withdrawn from common usage for more than two months. A holiday cabin requires an areal allocation, while an anchor buoy beside the cabin does not.

Other legislation

In addition to the acts mentioned above there is further legislation and regulation relating, for example, to farming and commercial activities, the environment and the fauna and flora. See the above list for details.

Specific legislation in relation to contemporary agriculture

Two main acts of the Parliament of Greenland and a number of bylaws regulate present-day agriculture in Greenland, and thereby also regulate the agricultural activities within the property:

Landsting Act No. 5 of 2 May 1996 on agriculture

The law aims to create a framework for Inatsisartut (the Parliament of Greenland) and the Government of Greenland's overall agricultural policy. It includes the intention that the competitiveness of the agricultural sector can be strengthened, as liberalisation initiatives are likely to put increasing demands on production efficiency, and thus the industry's adaptability. It is also of paramount importance that farming takes place under sustainable forms, both in relation to cultivation, rangelands and the environment in general, so as not to undermine agriculture's long-term development or other social interests in the countryside, including the laws and regulations on preserving ancient monuments and buildings.

The act provides general guidelines for farming in Greenland, based on the requirement for farmers to be residents of Greenland, in line with the rules of fishing and hunting legislation, as it is wished that the relatively limited agricultural resource base will be for the benefit of Greenlanders.

Fig. 5.4: Arctic gentiana (Gentiana algida).

Fig. 5.5: Niviarsiaq (Epilobium latifolium) - the Greenlandic national flower.

The framework surrounding the regulations for agriculture covers livestock issues, management of rangelands, crop production/cultivation and the provisions for using semi-domesticated animals (reindeer) for hunting, with the aim of ensuring sound agricultural practices that utilise resources in a sustainable manner.

The law has undergone amendments since 1996, and a number of bylaws have been issued pursuant to the Act, as follows:

- Home Rule Executive Order no. 10 of 5 July 2006 on reporting sales of hunting and sheep products
- Home Rule Executive Order no. 20 of 8 September 1997 on the supervision of agriculture
- Home Rule Executive Order no. 22 of 8 September 2000 on the management of rangelands and livestock
- Home Rule Executive Order no. 25 of 22 June 2001 on sheep and horse farming
- Home Rule Executive Order no. 26 of June 22, 2001 on promoting the development of the agricultural sector
- Home Rule Executive Order no. 37 of 12 September 1994 on sheep farmers' education

Inatsisartut (Parliament of Greenland) Act no. 6 of 2 December 2009 on promoting farming

The Act regulates public loans and grants/support to the agricultural industry, and is a development of a previous regulation. The law is to be considered a complementary law to the Law on Agriculture.

5.3 Means of implementing protective measures

The Government of Greenland is overall responsible for the nominated area.

Kujalleq Municipality is the authority responsible for implementing local legislation. The Planning Act is the basic planning tool for Kujalleq Municipality in guiding the local authorities and people in the area concerning land use. Aside from the Planning Act, there are appendixes for each of the two settlements (Qassiarsuk and Igaliku).

The Greenland National Museum and Archives is the national authority for implementing legislation about the Heritage Protection Act. The Greenland National Museum and Archives has made an action plan for ruin preservation and a maintenance plan for historic buildings. These plans serve as the basic tool in guiding the local authorities and people in the area. For several years now, museum officials have visited the area every summer and checked the ruins and the houses.

5.4 Existing plans related to municipality and region in which the proposed property is located

- e.g., regional or local plan
- conservation plan
- tourism development plan

Table 5.1 – Plans related to the proposed property

Agreed plan	Date of adoption	Agency responsible for preparation
Action Plan for ruin preservation	2014	Greenland National Museum and Archives
Action Plan for historic buildings	2014/2015	Greenland National Museum and Archives
National Tourism Strategy 2016–2020	Est. January 2016	Ministry of Industry, Labour and Trade
Strategy on Tourism	March 2015	Kujalleq Municipality
Municipal Plan 2011–2022 for Kujalleq Municipality	May 2014	Kujalleq Municipality

These plans are further described in the management plan (see annexes) and copies of the plans are included as attached documents.

5.5 Property management plan or other management system

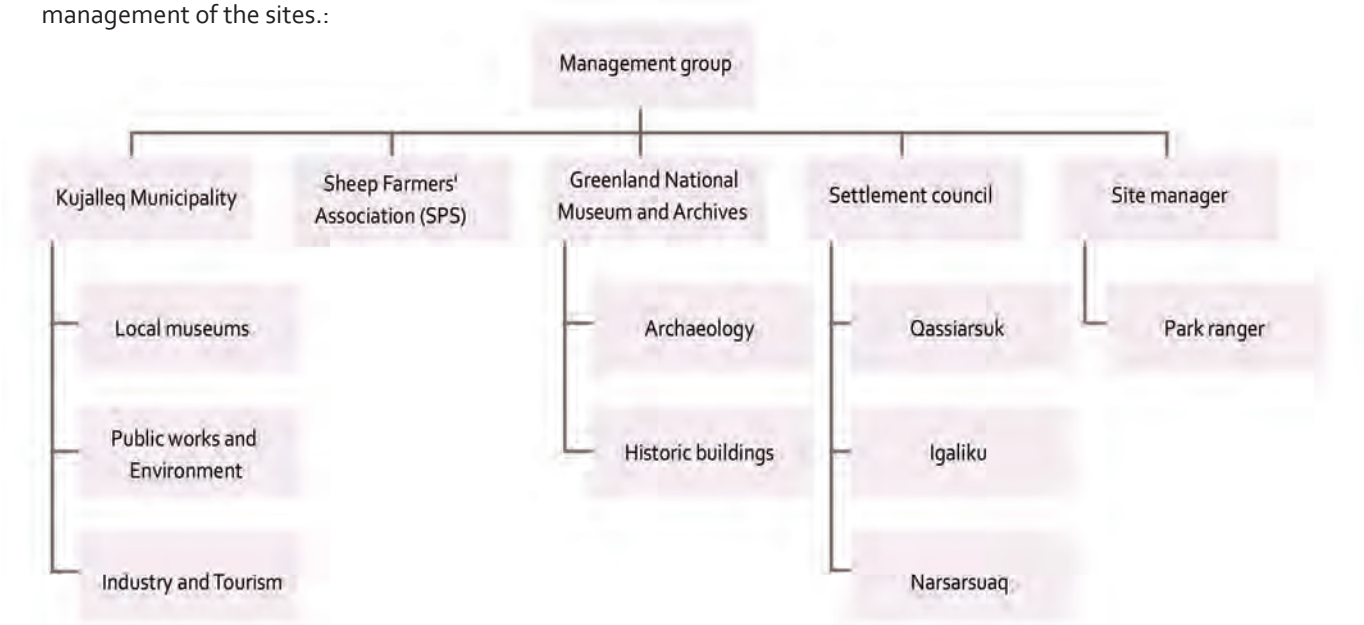
The nominated serial World Heritage property *Kujataa – a subarctic farming landscape in Greenland* and all its component parts are managed within a framework of cooperation to achieve common standards of identification, recording, research, protection, management, monitoring, presentation and understanding of the Kujataa heritage, in an interdisciplinary manner and within a sustainable framework.

The main goal of the management plan is to create and develop good practice in order to protect, preserve, monitor and promote the Outstanding Universal Value of Kujataa (see annexe 1).

The management plan has been prepared by Kujalleq Municipality in close collaboration with the Ministry of Culture and the Greenland National Museum and Archives. Elements of the draft of the management plan has been discussed with relevant parties during the process, and the population in the Kujalleq Municipality has been involved in the work, for instance through public meetings and visits to the selected farms.

The management plan has been drawn up as a general tool to be used by the relevant administrative authorities to safeguard a sound balance between conservation and development. The management plan provides a framework for sustainable preservation of Kujataa.

Diagram showing the management of the sites.:



Management principles of the nominated property

The aim of the participating parts in the steering group is to maintain the Outstanding Universal Value of the serial property *Kujataa – a subarctic farming landscape* in Greenland by developing and implementing the rules for its management.

This will be achieved through:

- The establishment of common principles and guidelines for effective management of the property
- Building capacity for management of the property through cooperation and networking
- Promoting *Kujataa – a subarctic farming landscape* in Greenland as a common heritage by improving public knowledge and accessibility
- Involving the farmers and local museums and other stakeholders and motivating them to cooperate
- Monitoring the maintenance of OUV and the implementation of the management principles

Management structure

The steering group makes decisions regarding the structure of the management system, its goals and procedures.

The steering group shall have the following members:

- Kujalleq Municipality shall nominate two representatives:
  - ◊ One from the central municipal administration (chair), and
  - ◊ One from the joint settlement council for Igaliku, Qassiarsuk and Narsarsuaq
- The Danish Agency for Culture and Palaces shall nominate one representative
- The Government of Greenland shall nominate two representatives:
  - ◊ One from the Ministry of Culture
  - ◊ One from the Ministry of Industry
- The Greenland National Museum and Archives shall appoint two representatives
  - ◊ One for the cultural heritage in general
  - ◊ One for historic buildings

The steering group has one general meeting annually. The decisions of the steering group must be unanimous. An extraordinary (electronic) meeting may be requested by any member at any time.

The steering group shall consider, among other things, the following:

- General guidelines for activities at sea, on land and in the air

- How business, recreational, tourism and research activities can take place in the area, with due consideration of its status as a World Heritage Site.
- The overall framework for regular reporting to UNESCO
- Evaluation and updating of the management plan
- Evaluation and updating of the monitoring plan
- Various initiatives in the World Heritage area that can optimise the area's assets
- How such initiatives can be financed
- Status from the Management Group for the World Heritage Property in Kujataa by the site manager.

Chair

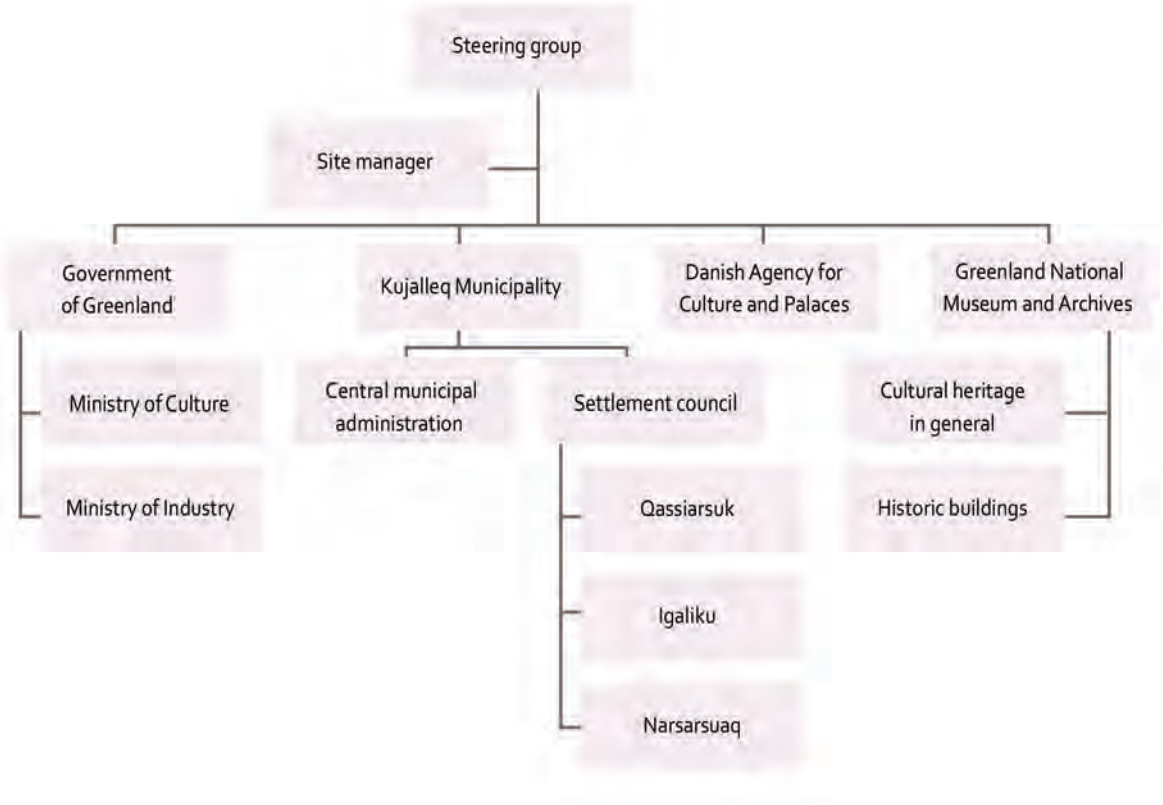
To prepare the meetings and decisions of the steering group

- To prepare annual work plan and budget for Kujataa
- To coordinate and promote the implementation of the decisions made by the steering group
- To represent *Kujataa – a subarctic farming landscape in Greenland*
- To draw up the annual report of the steering group before the annual meeting of the steering group
- To be in charge of the secretariat

Secretariat

The chair is in charge of the work programme for the secretariat. The main task of the secretariat is to assist the chair in pursuing the policies and decisions of the steering group. The secretariat shall assist the chair in preparing and organising the annual meetings of the steering group, as well as issuing the proceedings and other relevant tasks. The secretariat keeps all relevant records and is responsible for communicating with stakeholders. The secretariat administers the World Heritage property's website.

Diagram showing the steering group:



Site management plan for the component parts

Action Plan for ruin preservation

All Norse and Inuit ruins are protected under the Heritage Protection Act and ongoing management in all the nominated areas entails monitoring by the Greenland National Museum and Archives and a park ranger to ensure that this law is respected or enforced if broken. In addition, local site management actions for the individual are described below.

Component part 1 – Qassiarsuk

Around the present Inuit sheep farms, Norse ruins are marked if not plainly visible and the sheep farmers are supplied with the most recent and accurate survey plans indicating the location of protected monuments and buildings. Ruins are continually monitored and, where necessary, cleaned of rubbish, overgrowth etc. Drainage trenches are monitored and allowed only when not in conflict with ruins, cultural deposits or the landscape.

Component part 2 – Igaliku

Around the present Inuit sheep farms, Norse ruins are marked if not plainly visible and the sheep farmers are supplied with the most recent and accurate survey plans indicating the location of protected monuments and buildings. Ruins are continually monitored and, where necessary, cleaned of rubbish, overgrowth etc. Drainage trenches are monitored and allowed only when not in conflict with ruins, cultural deposits or the landscape.

Component part 3 – Sissarluttoq

There are no historic buildings in Sissarluttoq and no direct farming in the area. Consequently, the Norse ruins are in no need of management action in terms of human or natural threats, except for careful planning and positioning of a landing site and trails leading to the site.

Component part 4 – Tasikuluulik

Around the present Inuit sheep farms, Norse ruins are marked if not plainly visible and the sheep farmers are supplied with the most recent and accurate survey plans indicating the location of protected monuments and buildings. Ruins are continually monitored and, where necessary, cleaned of rubbish, overgrowth etc. Drainage trenches are monitored and allowed only when not in conflict with ruins, cultural deposits or the landscape. Development of infrastructure in connection with the enlargement of a local hydro-electrical plant is carried out with guidance from the national museum.

Component part 5 – Qaqortukulooq

Around the present Inuit sheep farms, Norse ruins are marked if not plainly visible and the sheep farmers are supplied with the most recent and accurate survey plans indicating the location of protected monuments and buildings. Ruins are continually monitored and, where necessary, cleaned of rubbish, overgrowth etc. The preservation of the church ruin is continually monitored by measurements of the standing walls and threats mitigated through continual restoration projects by the national museum.

Action plan for an agricultural development plan within the property

A report for Parliament (Inatsisartut) on a future agricultural policy for Greenland has been prepared during the recent years, and on this background a detailed development plan for agriculture in Greenland is expected to be produced during the years to come by the Ministry for Fisheries, Hunting and Agriculture. The development plans will include the areas within the property, and is expected to be produced in close cooperation with the farmers' organisation (SPS) and Kujalleq

Fig. 5.6: Farming equipment on the sheep farm Ipiutaq

Municipality. In the process, approval of the plans for the property is expected to be obtained from the municipality and the Government of Greenland. The development plan is expected to be accompanied by an environmental impact assessment.

If an activity is liable to bring about an essential change in the natural environment within the property, it must be reported for consultations with Kujalleq Municipality and the Agricultural Advisory Service (Nunalerinermut Siunnersorteqarfik). Activities subject to a duty of consultation could include, for example, road construction, cultivation of virgin land and major earthmoving and drainage enterprises.

In addition, local development issues for the individual components are described below.

Component part 1 – Qassiarsuk

A development plan in component part 1 is expected to consist of projects for improved infrastructure, new farm buildings, irrigation schemes and the cultivation of new grass fields. Wherever possible, solar- and/or hydropower facilities could be established or extended, and bridges could be constructed in relevant areas. There are no present plans for the establishment of new farms within the component.

Component part 2 – Igaliku

A development plan in component part 2 is expected to consist of projects for improved infrastructure, new farm buildings, irrigation schemes and cultivation of new grass fields. Wherever possible, solar- and/or hydropower facilities could be established or extended, and bridges could be constructed in relevant areas. There are no present plans for the establishment of new farms within the component, but former plans for one new farm may be rekindled.

Component part 3 – Sissarluttoq

A development plan in component part 3 is expected to be limited to projects for improved infrastructure for the sheep mustering, including a gravel road from Igaliku. A hut in Sissarluttoq will eventually need a refurbishment or have to be exchanged with a new building. Aside from grazing and rangeland activities, there are no plans for establishing farming in Sissarluttoq.

Component part 4 – Tasikuluulik

A development plan in component part 4 is expected to consist of projects for improved infrastructure, new farm buildings, irrigation schemes and cultivation of new fields. Wherever possible, solar- and/or hydropower facilities could be established or extended, and bridges could be constructed in relevant areas. There are no present plans for the establishment of new farms within the component.

Component part 5 – Qaqortukulooq

A development plan in component part 5 is expected to consist of projects for improved infrastructure, new farm buildings, irrigation schemes and cultivation of new fields. Wherever possible, solar- and/or hydropower facilities could be established or extended, and bridges could be constructed in relevant areas. There are no present plans for the establishment of new farms within the component, but the farms at Qaqortukulooq/Tasiusaq and Arpatsivik could be re-established in the years to come.

5.6 Sources and levels of finance

There are economic resources from the Government of Greenland, Kujalleq Municipality, the Danish Agency for Culture and Palaces and various foundations etc. that constitute the financial framework for the future management of the nominated property, including the preservation and optimisation of its values. Consideration is also being given to the introduction of admission charges for tourists wishing to visit the ruin areas, and possibly specific taxes associated with visits.

The financial framework for the preservation and management of the nominated World Heritage property in Kujataa is modest in comparison with other Nordic World Heritage properties, as the income of the municipality and the Government of Greenland is founded on a relatively small population base and the block grant from Denmark, and inter-municipal compensation. Kujalleq Municipality is also undergoing a process of structural-political change, which in the short term provides very limited economic scope in relation to new activities.

Meanwhile, extensive funding has already been allocated to the conservation of cultural heritage and agriculture. Each year, the Government of Greenland funds a variety of activities with regard to conservation, such as archaeological excavations and preservation measures for historical monuments, and part of these activities take place in the World Heritage Site in Kujataa. Furthermore, the Government of Greenland is funding an "agricultural consultancy service", with the purpose of advising farmers as well as assisting the conservation and development of local agriculture. Two full-time consultants have been assigned to South Greenland for these purposes. The agricultural consultancy service is involved in international cooperation, especially with professionals, research institutes and other agricultural development agencies in Iceland and subarctic Norway.

On a yearly basis, Kujalleq Municipality allocates funds to improve and promote the conditions for business development (such as agriculture and tourism), but it also subsidises land administration, including the protection

of cultural heritage. In the future, these funds will also be used to support the World Heritage Site. In addition, Kujalleq Municipality is signing a service contract with the tourism development association "Destination South Greenland", regarding management of information, marketing and supervision in the area.

In the following, the implementation of the measures and initiatives is presented in table form for clarity:

Table 5.2 – Implementation of measures and initiatives

Task	Timeframe	Responsibility	Funding
Launch of preliminary monitoring plan	2016	Kujalleq Municipality, Greenland National Museum and Archives	ca. 2 person-years
Clearing of dumps at Igaliku and Qassiarsuk	2016	Kujalleq Municipality, Public Works Department	400,000 DKK (in total)
Collection of scrap iron	2016	Kujalleq Municipality, Public Works Department	200,000 DKK
Info boards at the five ruin complexes	2016	Greenland National Museum and Archives	Part of salary
Formulation of detailed development plans for agriculture	2016-17	Government of Greenland, Farmers' Association SPS, Kujalleq Municipality	Part of overall planning
Formulation of detailed monitoring plan	2017 (immediately after inscription on World Heritage List)	Site manager	Part of salary
Ground marking of campsites in the four areas	2017	Kujalleq Municipality, Public Works Department	Part of salary
Temporary information centres in Narsarsuaq, Qassiarsuk and Igaliku	2017-18	Destination South Greenland	Part of service contract
Extension of path network in Igaliku and Qassiarsuk	2018	Kujalleq Municipality, Public Works Department	Part of salary
Mapping/survey of ruin groups	2016-	Greenland National Museum and Archives	Part of salary
Improved access in Sissarluttoq	2017	Kujalleq Municipality	Construction costs
Development of information and communication materials	2016-	Greenland National Museum and Archives, Kujalleq Municipality	Foundation grants
Website	2017-18	Greenland National Museum and Archives, Kujalleq Municipality	Foundation grants
App	2017-18	Greenland National Museum and Archives, Kujalleq Municipality	Foundation grants
Visitor Centre	ca. 2020	Steering group	Foundation grants

5.7. Sources of expertise and training in conservation and management techniques

Archaeological expertise on the ruins and historic buildings is mainly based at the Greenland National Museum and Archives and the local museums.

Expert knowledge within the fields of archaeology, construction, agriculture and nature management are based on previous and continuing investigations by Greenlandic, Danish, and international experts from museums and research institutions, with a tradition of academic cooperation.

This means that there are qualified experts at its disposal in all areas.

5.8 Visitor facilities and infrastructure

The majority of tourists arrive either by plane through the international airport in Narsarsuaq or on cruise ships. Smaller boats and helicopters will then transport them to other destinations in the area.

Visitor facilities—including a municipal information desk at Narsarsuaq Airport and a World Heritage Site exhibition in Narsarsuaq Museum—have been established. Likewise, visitor facilities in the form of special exhibitions on the World Heritage Site have been set up in the settlements of Qassiarsuk (Otto Frederiksen's House) and Igaliku (Igaliku Church). Finally, visitor information will be set up in connection to the protected house B-345 in area 4, and the research station in Upernaviarsuk will be equipped with informational materials and personnel with the ability to guide potential visitors to the area.

An important part of tourist access to the five different areas thus consists of improving existing conditions and establishing local ports. Igaliku, Itilleq, Qassiarsuk, Upernaviarsuk, and Qaqortukulooq currently have means of docking, as do Igaliku Kujalleq and Qanisartuut. In Sissarluttoq there is a need for similar conditions.

At the airport and in each of these five areas, there will be information concerning the nomination. Existing buildings will be used to disseminate information.

Later on, it is possible that a big visitor centre will be established after the nomination has taken place.

5.9 Policies and programmes related to the presentation and promotion of the properties

In its municipal plan of 2011, Kujalleq Municipality has set out the following objectives for the tourism sector in relation to the nominated World Heritage property:

Kujalleq Municipality wishes to:

- Promote tourism as a commercial activity, perceived in relation to the municipality as a whole
- Promote tourism through a common branding of the unique experiences offered by our region, for example Norse history, Erik the Red, the Greenland Ice Sheet and Uunartoq
- Preserve and render visible historic buildings and areas from both the Norse and the Inuit cultures and, in this context, apply for inscription on the UNESCO World Heritage List
- Advance the tourism concept with local food product development in combination with tourism

Most recently, in 2015, Kujalleq Municipality developed a "Strategy for the Development of Tourism in Kujalleq Municipality 2015–2020", which also forms the basis for the activities of Destination South Greenland. This identifies some of the tourist categories on which development will concentrate: the Ethnophile, the Authenticity Seeker, the Culture Buff and the Special Interest Enthusiast—people who will have a considerable interest in visiting the nominated World Heritage property in South Greenland.

The strategy emphasises the following potential elements relative to branding of the area:

- "The Arctic Vikings": The history of the Norsemen, centred on the future UNESCO sites
- "The Inuit farmers": Arctic farming—the only area in the Inuit culture where the land is cultivated; farm tourism and walks between farms
- "The Full Circle": The area where humans met again after their migration out of Africa—the Inuit coming from the north-west and the Norse from the east.

Information strategy

The most important entry port to the World Heritage property is the airport at Narsarsuaq. When a visitor arrives on a plane from Europe, Iceland or Nuuk, they are already almost inside the nominated World Heritage property. An informational poster with an introduction to the World Heritage area will be displayed at the airport.

Information boards introducing the nominated World Heritage area will also be erected in the towns of Narsaq and Qaqortoq. The coastal ferry from Nuuk calls at these

towns and brings tourists and visitors from other parts of the country.

In each of the five component parts, information boards will be placed by the ports of call, providing an introduction to the individual component part.

Component part 1 – Qassiarsuk: Here the orientation board will be placed in the small harbour area at Qassiarsuk.

Component part 2 – Igaliku: Information boards will be placed at both ports of call in the component part: Itilleq in the northern part and in the small harbour in the settlement of Igaliku.

Component part 3 – Sissarluttoq: There is currently no jetty here. It is proposed that an information board be placed opposite the slope facing Igaliku Fjord.

Component part 4 – Tasikuluulik: Orientation posters for the area will be displayed near the moorings in Igaliku Kujalleq by the small quay in Qanisartuut.

Component part 5 – Qaqortukulooq: It is proposed that information boards be displayed at Qaqortukulooq and at Upernaviarsuk—in the former with a focus on the Norse ruin area with the well preserved ruins and in the latter with a focus on the Agricultural Research and Training Centre and modern Greenlandic farming. Upernaviarsuk will also include information about the World Heritage property in its education of sheep farmers, including how, as a sheep farmer, to be considerate of ancient monuments and historic remains. At Upernaviarsuk there will also be informational material (posters) communicating information about the World Heritage area.

In addition, local museums will set up new exhibitions, and the websites of the municipality and the World Heritage Site will be updated.

Information centres

Component part 1 – Qassiarsuk

A small information centre will be housed in "Otto Frederiksen's House", i.e. in the listed building that was built in 1934 by the first Greenlandic sheep-rearing family, which settled here in 1924. In one of the rooms the Norse history of the place will be told in an exhibition displaying original artefacts found during the archaeological excavation in 1932. Another room will tell the story of the settlement and the area after 1924.

Component part 2 – Igaliku

In the former schoolroom, situated in the settlement's small church, a temporary exhibition will be set up, providing information on the history of the Norse episcopal residence and the history of the settlement since Tuperna and Anders Olsen settled here in 1783. Over the long term, a former sheep barn in the eastern part of the settlement will be remodelled to house an information centre. This will provide space for an exhibition of original artefacts from the archaeological excavations at the site along with findings relating to its more recent history.

Component part 4 – Tasikuluulik

In Igaliku Kujalleq, in the northern part of the area, a small information centre will be established in one of the buildings dating from the period when as many as 30–40 people lived in the settlement. Several of these buildings stand unused. Information will be provided on the history of Tasikuluulik/Vatnahverfi and Igaliku Kujalleq in the Norse period, as well as in the period after 1934, when the first move from Igaliku to Igaliku Kujalleq took place. In the south-western part, in Qanisartuut, it is possible to visit a well maintained sheep farm housed in a listed building, once inhabited by Cecilie and Henning Lund, who were pioneers in this part of Qeqertaasaq in the late 1940s. Today, descendants of the couple live in a modern sheep farm located next to the listed sheep farm.

Component part 5 – Qaqortukulooq

Upernaviarsuk Research Station plays an important part in the dissemination of knowledge regarding the protection of the nominated area, since they are educating future members of the farming community in the art of combining agriculture and cultural heritage protection.

Visitors are able to view the nursery and greenhouse, as well as the old 1950s sheep barns, which will give them an impression of the development of modern sheep rearing.

In Upernaviarsuk, efforts must be made to make the ruins of Anders Olsen's house more accessible for visitors, including the erection of an information board.

Communication and presentation via the use of apps

Apps will be developed for the archaeological and historical key sites and used as guides on location in the various localities. There will be information apps for Qassiarsuk (Component part 1), Igaliku (Component part 2), Sissarluttoq (Component part 3), Igaliku Kujalleq (Component part 4) as well as Qaqortukulooq and Upernaviarsuk (Component part 5).

These will contain overviews and detailed plans for the most significant Norse ruin groups and provide information on each individual ruin. It will be possible to view selected photos from the early excavations of important sites, and a selection of photos of the artefacts excavated from the individual ruins.

Description of the local museums

Two public-funded museums, and one private one, are found near the nominated heritage areas. The

government-funded museums are all part of the Association of Greenlandic Museums, or Nunatsinni Katersugaasiviit Kattuffiat (NUKAKA). The main purpose of these museums is to disseminate knowledge of the archaeological, historical, and present material and immaterial cultural heritage from all periods in the local areas and nationally, as well as manage protected buildings directly owned by the local museums. In addition, the local museums display changing exhibitions of art, archaeology and history. Local museums directly associated with the nominated areas include:

Narsaq Museum: Associates mainly with nominated area Qassiarsuk and is located in the city of the same name just west of the nominated area. The museum has changing exhibitions, including some Norse artefacts.

Qaqortoq Museum: Associated mainly with the other nominated areas (2-5) and is located in city of the same name just west of the nominated area Qaqortokulooq. The museum has changing exhibitions, including some Norse artefacts.

In addition to the official government funded museums, there is a privately funded and managed museum by the settlement/airport of Narsarsuaq displaying images and artefacts of the local history, including Norse settlement in the area.

5.10 Staffing levels and expertise (professional, technical, maintenance)

The Greenland National Museum and Archives currently employs two archaeologists within the fields of Norse and Inuit archaeology. One is an internationally renowned researcher, with 10 years of experience in excavations of Norse settlements in southern Greenland, and excellent communication skills.

Furthermore, the museum employs an architect with several years of experience working in both the municipal sector and in studios in Greenland. The architect is in charge of case consideration as well as reviewing the value of all protected buildings in Greenland.

Several other museum employees have extensive experience within archaeological field surveys, and the communications unit employs a communications officer with a strong ability to reach a broad audience.

The operation at Upernaviarsuk features agricultural research and training in a sub and low arctic region. This covers a broad range of topics, and is focusing on the economically important area of sheep farming within the field of animal husbandry. Upernaviarsuk is developing systematic sheep farming approaches, including activities within the scope of Iceland's "Fjarvis" programme, as well as sheep feeding research.

Fig. 5.7: A German film team getting ready to shoot.

Within the field of plant cultivation, research is conducted with a variety of perennial grasses for producing hay and silage, including experiments with annual feed crops such as cereals (primarily spring rye, barley, and oats), ryegrass and varieties of cabbage. In addition, research on general vegetable cultivation and horticulture—including herbaceous perennials, bushes, and trees for private and public gardens—is conducted in the station's gardens and nursery.

There is an agricultural school at Upernaviarsuk, where students spend time interning on farms in Greenland, Iceland and Norway.

Kujalleq Municipality has hired museum directors for each of its three public museums (Narsaq, Qaqortoq, Nanortalik). They all have master's degrees in history and have professional knowledge of cultural heritage protection. The private museum in Narsarsuaq also engages in activities relating to the World Heritage Site. The museum director holds a master's degree in archaeology.

The municipality also employs six professionals within the field of construction as well as an architect with several years of experience in planning, including protection of cultural heritage.

Finally, the municipality currently employs a professional with a master's degree in agronomy who previously worked as an agricultural advisor in southern Greenland, providing the municipality with the necessary capacity within the field of Arctic agriculture.

Fig. 5.8: Early summer at a modern farm in central Tasikuluulik/Vatnahverfi (and Norse site Ø171).

Chapter 6 – Monitoring

Regular monitoring of the status of the area, and the activities taking place within it, constitutes an essential tool for managers of the nominated World Heritage property.

In conjunction with the application for the nomination of the World Heritage property, monitoring of the five component parts will be introduced already in 2016 in order to generate reference data prior to possible inscription of the area as a World Heritage Site.

The monitoring has the following general objectives:

- To document the values of the property, according to which it is inscribed, and subsequently to maintain these
- To constitute a basis for the continuing management of the area
- To provide data for periodic reports to UNESCO

Monitoring of physical conditions (nature and culture)

Ancient monuments

The Greenland National Museum and Archives has overall responsibility for the ancient monuments and their present supervision. This supervision will be further intensified with nomination for, and possible inscription on, the World Heritage List. In cooperation with the local site management, a dedicated monitoring programme will be developed for the ancient monuments, using photo documentation and descriptions of changes and potential threats. The same applies to buildings, both the listed buildings in Qassiarsuk and Tasikuluulik, and designated buildings in Igaliku. The municipal authorities keep track of development in the five nominated areas and will issue a status report on the area administration every four years.

The agricultural landscape

As farming is a principal element in the nominated World Heritage property, regular monitoring of agricultural developments must be undertaken—partly in relation to changes in the landscape involving either the creation or abandonment of fields, and partly in relation to the use of individual fields. There must also be monitoring of production (amount of livestock, slaughtered animals, hay and silage production, vegetables, potato cultivation etc.) resulting from the area and the use of labour. This will both document the current farming culture and form the basis for potential measures with regard to farming developments in the area. Monitoring will take place in close cooperation with the Sheep Farmers' Association SPS, the Agricultural Consulting Services and the municipality's Business and Labour Department. Development of farm features is monitored in relation to the strengthening of modern agriculture.

Nature

The natural landscape within the area demarcated for nomination for World Heritage inscription is important in relation to the overall appearance and impression of the area. This will therefore also be monitored, with a focus on wear and erosion, in the case of increased tourism, and in relation to climate change. A monitoring programme will be developed in cooperation between the local site management and the Ministry of the Environment and Nature.

Fig. 6.1: Wind and currents pushed a massive iceberg up the fjord all the way to Igaliku.

Monitoring human activities (visitors etc.)

The number of visitors to the area is an indication of its attractiveness, yet it also represents a potential threat to its values in the form of erosion and damage. The number and behaviour of visitors is also of significance for the local population, both as a threat and a potential source of income. Hence, routine monitoring of relations between the local population and visitors to the area is necessary and will be undertaken.

Data from this monitoring will be used to facilitate the development of tourism products within the area and to identify possible capacity problems, for example, in relation to the interaction with the local population. Monitoring will therefore take place in close cooperation with Destination South Greenland, Visit Greenland and the Business and Employment Department of Kujalleq Municipality.

There is a need for quantitative studies of the amount of visitors in each area as well as qualitative studies of how visitors and locals perceive the visits.

6.1. Key indicators for measuring state of conservation

Key issues for measuring state of conservation of the archaeological and building values, nature, farming and tourism are listed in Table 6.1.

Table 6.1 – Monitoring schema for the various categories

Focus	Indicator	Method	Evaluation	Frequency	Responsible
Norse Greenlandic sites and ruins	Number of sites and ruins	Visual inspection and recording	Comparison of site/ruin numbers with previous records	Every four years for each component part*	Greenland National Museum and Archives
Norse site/ruin preservation	Qualitative assessment of the state of sites/ ruins	Visual inspection, photo documentation, digital survey etc.	Comparison of sites/ruins preservation with previous archival imagery, restoration of ruins if necessary	Every four years for each component part	Greenland National Museum and Archives, park ranger
Site visibility and presentation	Are the sites/ ruins clearly visible and accessible	Visual inspection and clearing of possible vegetation and obstacles that obstruct/ impair site/ruin view/impression	Assessment of the individual sites/ruins to ensure their unimpaired visibility and accessibility	Every four years for each component part	Greenland National Museum and Archives, park ranger

* Excavations are also done in connection with specific scientific projects, and necessary excavations in connection with development of farming or industry.

Focus	Indicator	Method	Evaluation	Frequency	Responsible
Cultural landscape (Norse ruins, Inuit archaeology, historical archaeology and farming)	Preservation and state of the cultural landscape Potential conflicts between cultural heritage, tourism, farming, industry etc.	Visual inspection of sites/farming areas to ensure that the cultural landscapes are not being degraded by tourism,farming or other activities Local actors (park ranger, farmers, and tourism operators) are encouraged to continually report any conflicts. Potential conflicts are resolved through site/ruin restoration, management or marking, education or enforcing of existing national heritage legislation	Qualitative comparison with previous records (archival, visual etc.) on the preservation of the cultural landscapes Communication with local caretakers, stakeholders and farmers to ensure that heritage site protection and legislation is observed Comparison with existing records of cultural landscape preservation.	Every four years for each component part Continually	Greenland National Museum and Archives, park ranger Greenland National Museum and Archives, park ranger certain local stakeholders (according to special agreement)
Number of buildings in need of restoration (Number: 19)	Provides a general picture of the place and whether the overall condition is improving or worsening	State of conservation value analysis	Follow-up on action plan for each building	Every four years	Greenland National Museum and Archives
Number of restored buildings (Number: 11 renovated but not restored)	Provide a picture of the continued efforts to enhance the state of each site	Reviewing the list of protected buildings in the nominated area	Update list of protected buildings in the nominated area	Every four years	Greenland National Museum and Archives
Changes on the buildings (Architectural whole) (Number: 11)	Provide a picture of the place whether the architectural whole is changing	Review of recent condition registration of the building	Conservation value analysis (review of the buildings and registration)	Every four years	Greenland National Museum and Archives
Number of buildings that have an operating and maintenance plan (Number: 57,) A set of guidelines for maintenance has been devised. Action plan is missing.	Monitor the buildings, operation and maintenance are systemized	Transcript of municipal operating and maintenance plan	Reviewing the latest updated operating and maintenance plan	Every four years	Greenland National Museum and Archives / Kujalleq Municipality

Focus	Indicator	Method	Evaluation	Frequency	Responsible
Number of privately owned buildings (Number: 47)	Forms the basis for assessing whether the number of privately owned buildings is declining	Reviewing the list of protected buildings in the nominated area	Update list of protected buildings and ownership in the nominated area	Every four years	Greenland National Museum and Archives / Kujalleq Municipality
Number of municipality owned buildings (Number: 10)	Forms the basis for assessing whether the number of municipally-owned buildings is declining or increasing	Reviewing the list of municipality owned buildings in the nominated area	Update list of municipality owned buildings in the nominated area	Every four years	Greenland National Museum and Archives / Kujalleq Municipality
Number of residents within the nominated area	Monitoring of settlement increases and/or decreases	Review of statistics on population numbers in the nominated area	Update the list of number of occupants in the nominated area	Annually	Greenland National Museum and Archives / Kujalleq Municipality
Nature and environment	Climate records Erosion from increased tourism Climate changes	Collection of climate records from Narsarsuaq Airports and Qaqortoq Comparison of vegetation development of tourist sites Growth of exotic trees as an indicator for climate change	Long-term climatic data is available for +50 years for both Narsarsuaq and Qaqortoq The grazing monitoring programme, on-going since the 1980s, will be a reference for the vegetation development of tourist sites	On-going for climate data, and every three-five years for vegetation analysis	Kujalleq Municipality Greenland Government (Dept for Nature & Environment)
Farming Development of contemporary farming	No. and names of existing farms No. of farm animals (sheep, horses, cattle) Fields for fodder product. no. of hectares Areas planted with trees, no. of hectares, No. of slaughtered sheep and lambs/year No. of slaughtered heads of cattle/year Average slaughter weight of lambs within the farms Winter fodder production (silage, hay) Amount of heavy machinery on the farms	Already available statistics to be used Numbers will be obtained by the Greenland Agricultural Advisory Service / Nunalerinermut Siunnersorteqarfik, as a part of their yearly record	The obtained numbers will be compared with a year- by year analysis, having a long record of numbers stretching back +50 years	Annually	Greenland Agricultural Advisory Service

Focus	Indicator	Method	Evaluation	Frequency	Responsible
Tourism Development in tourism	No. of visitors to each of the five areas of the property (age, nationality, market segment) No. of overnight stays within the property at hostels, hotels and camping grounds Turnover shops and farms (souvenirs etc.) No. of passengers on boats and helicopters, (locals and visitors) Cruise calls within the property (no. of ships and pax.) Experiences of visitors, (the story, objects, coherence, service) Experiences of locals with visitors (interviews)	Collection of statistics from relevant persons and companies	Compare tourism development tendencies within the properties	Annually	Destination South Greenland (DSG)

Heritage Management

Present number of registered heritage sites in the nominated components and managed by the Greenland National Museum and Archives:

Component part 1 – Qassiarsuk:	46
Component part 2 – Igaliku:	26
Component part 3 – Sissarluttoq:	3
Component part 4 – Tasikuluulik:	20
Component part 5 – Qaqortukulooq:	16
In total:	111 sites

All sites are managed by the national museum.

6.2 Administrative arrangements for monitoring property

Names and contact information for the agencies responsible for monitoring the nominated area are listed below.

Kujalleq Municipality
PO Box 514
3920 Qaqortoq, Greenland
Tel.: +299 70 41 00
Fax: +299 70 41 77
Email: kommune@kujalleq.gl
Website: www.kujalleq.gl

Upernaviarsuk Research Station
PO Box 152
3920 Qaqortoq, Greenland
Tel.: +299 64 93 03 & & +299 64 93 06
Fax: +299 64 93 26

Greenland National Museum
Hans Egedesvej 8
PO Box 145, 3900 Nuuk
Greenland
Tel.: +299 32 26 11
Email: nka@natmus.gl

Visit Greenland
Hans Egedesvej 29
PO Box 1615, 3900 Nuuk
Greenland
Email: info@greenland.com
Website: www.greenland.com

Destination South Greenland
c/o Kujalleq Municipality
PO Box 514
3921 Qaqortoq, Greenland
Chair: Pitsi Høegh
Email: pitsi@qaq.gl
Website: Under construction

Greenland Agricultural Consultancy Service/ Nunalerinermut Siunnersorteqarfik
Landbrugets Hus
Sanatorievej B-1004
PO Box 153
3920 Qaqortoq, Greenland
Tel.: +299 64 23 06
Email: info@nunalerineq.gl
Website: www.nunalerineq.gl

Ministry for Nature, Environment and Justice
Imaneq 1A - 801
PO Box 1614
3900 Nuuk, Greenland
Tel.: +299 345000
Fax: +299 345410
Email: paian@nanoq.gl

Park ranger (when established)
c/o Kujalleq Municipality
PO Box 514
3920 Qaqortoq, Greenland
Tel.: +299 70 41 00
Fax: +299 70 41 77
Email: kommune@kujalleq.gl
Website: www.kujalleq.gl

6.3 Results of previous reporting exercises

The national museums in Denmark and Greenland are home to extensive archives of sketches, watercolours, excavation and surveying plans, as well as photographs from the last 150 years of archaeological research, all of which can be referred to within the context of the nominated World Heritage property, which ranks among the most thoroughly researched areas in Greenland.

To give an impression of the range of archaeological activities, five key research studies in each component part are listed below:

1) Bruun (1894): the first excavation of farm buildings and middens at Qassiarsuk (Ø29), Nørlund & Stenberger (1934): excavation of the main farm buildings at Qassiarsuk (Ø27-Ø29a), Meldgaard (1964): excavation of "Thjodhilde's Church" (Ø29a), Guldager et al. (2002): extensive survey of the entire isthmus, Edvardsson (2007): modern excavation of the midden of the chief residence (Ø29a).

2) Bruun (1894): excavation of selected farm buildings (Ø47), Nørlund (1930): excavation of many farm buildings (Ø47), Arneborg (2004): test excavation of churchyard (Ø48), Clemmensen (in press): DGSP survey (Ø47), Vésteinsson et al. (in press): rescue excavation of midden (Ø47).

3) Holm (1883): survey and test excavation of ruins, Clemmensen & Kapel (2008, 2010a) DGPS survey of the site.

4) Bruun (1894): extensive excavation (Ø66) and surveys, Roussell (1941): excavation of church, churchyard and outhouses (Ø66), Vebæk (1992): excavation of entire farm complexes Ø70, Ø71, Ø167), Madsen 2014 (extensive DGPS-surveys and description of all known sites in the area), Madsen et al. in press (rescue excavation of buildings).

5) Graah (1837): excavation in the church (Ø83), Holm (1883): excavation of farm buildings (Ø83), Roussell (1941): excavation of farm buildings (Ø83/Ø83a), Vesteinsson (2004): DGPS surveys of the regions' farms, Madsen et al. (in press): excavation and restoration at the church.

The action plan on ruin preservation and the action plan on listed buildings (both in Danish) are attached as annexes along with descriptions of the Heritage Protection Act.

Information and material concerning agriculture can be provided from the Greenland Agricultural Consultancy Service and the Ministry of Fisheries, Hunting and Agriculture. Furthermore, in the National Archives in Nuuk there is a large and comprehensive archive from the Upernaviarsuk research station with information on farming activities.

Chapter 7 – Documentation

7.1 Photograph, image inventory and authorization

Cover & Summary							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/ director of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
Cover (big photo)	Slide	View of houses and church at the settlement of Igaliku (2), where building stones from the Norse ruins have been incorporated into the Inuit farmers' houses. ©Visit Greenland/Mads Pihl.	07/2013	Mads Pihl	Visit Greenland	2)	Yes
Small photo (left)	Slide	Boat model excavated from Norse farm in the Western Settlement, probably representing the type of boats typically used by the Greenland Norse.	09/2004	Arnold Mik-kelsen	National Museum of Denmark	3)	Yes
Small	Slide	Sheep grazing the plain of Igaliku.	07/2013	Mads Pihl	Visit Greenland	2)	Yes
Small	Slide	Window at church ruin.	08/2010	David Trood	Visit Greenland	2)	Yes
Small (right)	Slide	Different building techniques were used according to the qual-ity, accessibility, and functionally of the turf. Here small pieces of turf were used.	09/2013	Inge Bisgaard	Greenland National Museum & Archives	1)	Yes
S.0	Slide	Horses and sheep grazing in a highland meadow near Tasiusaq. In the background the ice-filled Tasiusaq Fjord.	07/2011	Christian K. Madsen	Niels Christian Clemmensen/ Christian K. Madsen	1)	Yes
S.1	Print	During a warm summer, when the glaciers are very active, there are large numbers of icebergs in the fjords, creating dazzling displays that are a hazard for marine traffic.	09/2015	Monika Brune	allu design	8)	No
S.2	Print	Arctic region	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.3	Print	Kujataa	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.4	Print	Kujataa with indication of nomi-nated component areas.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.5	Print	Component part 1, Qassiarsuk.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
S.6	Print	Detailed survey plan of central Qassiarsuk/Brattahlíð (Ø29a/ Ø29) with location of Norse and Inuit ruins, as well as heritage and modern buildings.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.7	Print	Component part 2, Igaliku.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes

Id. no.	Format (slide/ print/ video)	Caption	Date of photo	Photo-grapher	Copyright owner (if different than photographer/ director of video)	Contact details of copy-right owner	Non-ex-clusive cession of rights
S.8	Print	Detailed survey plan of Igaliku (Ø47) with location of Norse and Inuit ruins, as well as heritage and modern buildings.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.9	Print	Component part 3, Sissarluttoq	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
S.10	Print	Detailed survey plan of Sissarlut-toq.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.11	Print	Component part 4, Tasikuluulik (Vatnahverfi).	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
S.12	Print	Detailed survey plan of Tasikulu-ulik (Vatnahverfi).	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
S.13	Print	Component part 5, Qaqortuku-looq (Hvalsey).	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
S.14	Print	Detailed survey plan of Qaqor-tukulooq (Hvalsey).	12/2015	Clemmensen/ C. K. Madsen	Greenland National Museum & Archives	1)	Yes
S.15	Print	Silage bales on a sheep farm near Igaliku.	08/2015	Monika Brune	allu design	8)	No
S.16	Print	The church ruin of Hvalsey.	09/2015	Monika Brune	allu design	8)	No

Chapter 1							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/di-rector of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
1.1	Print	Norse church ruin in Qassiarsuk.	08/2015	Monika Brune	allu design	8)	No
1.2	Print	Arctic region.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
1.3	Print	Kujataa.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
1.4	Print	Kujataa with indication of nomi-nated component areas.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
1.5	Print	Map showing the geographic coordinates for the borders of component 1.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.6	Print	Component part 1, Qassiarsuk.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.7	Print	Detailed survey plan of central Qassiarsuk/Brattahlíð (Ø29a/ Ø29) with location of Norse and Inuit ruins, as well as heritage and modern buildings.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes

Chapter 1							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/ director of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
1.8	Print	Map showing the geographic coordinates for the borders of component 2.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.9	Print	Component part 2, Igaliku.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.10	Print	Detailed survey plan of Igaliku (Ø47) with location of Norse and Inuit ruins, as well as heritage and modern buildings.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
1.11	Print	Map showing the geographic coordinates for the borders of component 3.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.12	Print	Component part 3, Sissarluttoq	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.13	Print	Detailed survey plan of Sissar-luttoq.	12/2015	Clemmensen/ C. K. Madsen	Greenland National Museum & Archives	1)	Yes
1.14	Print	Map showing the geographic coordinates for the borders of component 4.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.15	Print	Component part 4, Tasikuluulik (Vatnahverfi).	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.16	Print	Detailed survey plan of Tasikulu-ulik (Vatnahverfi).	12/2015	Clemmensen/ C. K. Madsen	Greenland National Museum & Archives	1)	Yes
1.17	Print	Norse ruin of Qaqortukulooq (Hvalsey Church).	09/2014	Monika Brune	allu design	8)	No
1.18	Print	Component part 5, Qaqortuku-looq (Hvalsey).	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
1.19	Print	Detailed survey plan of Qaqor-tukulooq (Hvalsey).	12/2015	Clemmensen/ C. K. Madsen	Greenland National Museum & Archives	1)	Yes
1.20	Print	Map showing the geographic coordinates for the borders of component 5.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes

Chapter 2							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/di-rector of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
2.1	Print	Map of the North Atlantic and Arctic regions with place names and UNESCO world heritage sites mentioned in the text.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.2	Print	Map of Kujataa with place names and vegetation zones.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes

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2.3	Print	Map of central Kujataa with place names.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.4	Slide	Heroic bronze stature of Leif the Lucky – discoverer of the New World – overlooking the modern settlement of Qassiarsuk.	09/2013	Camilla Hey	Visit Greenland	2)	Yes
2.5	Slide	View of houses and church at the settlement of Igaliku, where building stones from the Norse ruins have been incorporated into the Inuit farmers' houses.	07/2013	Mads Pihl	Visit Greenland	2)	Yes
2.6	Print	Bar graph showing the distribu-tion of species found in Viking Age and Medieval North Atlantic ar-chaeofaunal assemblages; on the right Greenland, which stands out with its great numbers of seals.	01/2014	Konrad Smiarowski	City University of New York	4)	No
2.7	Slide	Nikolaj Egede and his family har-vesting hay in Igaliku, 1926.	-/1926	PoulNørlund	National Museum of Denmark	3)	Yes
2.8	Slide	Dorset Culture harpoon head of the type used in the 11th–12th century, found in Norse midden in the southern Vatnahverfi.	12/2015	Michael Nielsen	Greenland National Museum & Archives	1)	Yes
2.9	Slide	Norse artifacts found in the Thule-District, Northwest Green-land .	07/2004	John Lee	National Museum of Denmark	3)	Yes
2.10	Print	Map showing distribution of Norse artefacts found in Thule Culture context.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.11	Print	Map showing Norse settlement layout with lowland farms and upland shielings in Qorlortup Itinnera Valley.	06/2004	Niels AlgreenMøller	National Museum of Denmark	3)	No
2.12	Slide	Walrus resting on sea ice. The hunt for walrus ivory was likely a key factor driving the Norse settlement of Greenland.	03/2004	Claus Andreasen	Greenland National Museum & Archives	1)	Yes
2.13	Slide/ Print	Norse drill handle (length ca. 7.5 cm) made from walrus canine and with an incised walrus depiction. Excavated from the midden of a Norse farm in Vatnahverfi.	12/2015	Slide: Konrad Smiarowski. Print: Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.14	Slide	Cross carved from walrus ivory for Princess Gunhild of Denmark (dated 1157 AD), an exceptional example of exquisite craftsman-ship made from the Greenlandic exports once reaching Europe.	11/2014	Unknown	National Museum of Denmark	3)	Yes
2.15	Slide	Boat model excavated from Norse farm in the Western Settlement, probably representing the type of boats typically used by the Greenland Norse.	09/2004	Arnold Mikkelsen	National Museum of Denmark	3)	Yes

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2.16	Slide	One of the earliest – hand-coloured – photographs of Igaliku with Inuit houses and fences reusing Norse building stones; cows grazing on the left.	-/1908	Thomas N. Krabbe	Greenland National Museum & Archives	1)	Yes
2.17	Slide	Amos Egede of Igaliku 1956. Also known as "the King of Igaliku". Amos was an influential leader of the small community and one of the most important early Inuit sheep farmers.	-/1956	Unknown	Greenland National Museum & Archives	1)	No
2.18	Slide	Woman milking cow in Igaliku in 1926. She is dressed in traditional Inuit clothes and has adopted the distinctive working posture used when cutting up seal.	-/1926	Poul Nørlund	Greenland National Museum & Archives	1)	Yes
2.19	Slide	Farmhouse surrounded by lush green hay fields in Qassiarsuk.	07/2013	Mads Pihl	Visit Greenland	2)	Yes
2.20	Print	Detailed survey plan of central Qassiarsuk/Brattahlíð (Ø29a/ Ø29) with location of Norse and Inuit ruins, as well as heritage and modern buildings.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.21	Print	Detailed survey plan of Ø4, where one can see all the characteristics of a virtually undisturbed medium sized Norse farm.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.22	Print	Newly cultivated fields at Tasiusaq farm in the Qassiarsuk area.	10/2006	Unknown	Nunalerinermut Siunnersorteqarfik	10)	Yes
2.23	Print	Component part 1, Qassiarsuk.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
2.24	Slide	Aerial view of Igaliku/Garðar (NKAH 4328) and its surroundings. Tunulliarfik Fjord can be seen in the background.	08/2015	Garðar Guðmundsson	Fornleifastofnun Íslands	6)	Yes
2.25	Slide	Sheep grazing in Igaliku.	07/2013	Mads Pihl	Visit Greenland	2)	Yes
2.26	Slide	Dry-stone masonry building (ruin no.5) interpreted as the Norse bishop's tithe barn in Igaliku	08/2010	Georg Nyegaard	Greenland National Museum & Archives	1)	Yes
2.27	Slide	Norse ruin on the top of mount Illerfissavik/Burfjeld rising 1,727 m above the settlement of Igaliku..	08/2013	Henrik Høier	Greenland National Museum & Archives	1)	Yes
2.28	Print	Component part 2, Igaliku.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
2.29	Print	Detailed survey plan of Igaliku (Ø47) with location of Norse and Inuit ruins, as well as modern features.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.30	Print	Norse churches in Kujataa.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.31	Print	Detailed survey plan of Igaliku (Ø48).	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes

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2.32	Slide	View of the plain with the Norse ruins of Sissarluttoq, to the right a well preserved animal pen.	07/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.33	Slide	The doorway with lintel of the extremely well preserved ruin no.3 - a byre or barn at Sissarluttoq.	07/2006	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.34	Print	Component part 3, Sissarluttoq.	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
2.35	Print	Detailed survey plan of Sissarluttoq (Ø59) with location of Norse ruins and modern buildings.	12/2015	Niels Christian Clemmensen/ C. K. Madsen	Greenland National Museum & Archives	1)	Yes
2.36	Slide	Aerial view of Qanisartuut (NKAH no.4276) in Tasikuluulik (Vatnahverfi).	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.37	Print	Component part 4, Tasikuluulik (Vatnahverfi).	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
2.38	Print	Detailed survey plan of Qanisartuut (Ø76) with location of Norse ruins, heritage and modern buildings.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.39	Print	Qorlortukasik farmstead, harvesting with modern round baler.	08/2008	Kenneth Høegh	Kenneth Høegh	13)	Yes
2.40	Print	Harvesting of Bering Hairgrass.	08/2008	Kenneth Høegh	Kenneth Høegh	13)	Yes
2.41		Fields at Timerliit farm in autumn.	10/2006	Kenneth Høegh	Kenneth Høegh	13)	Yes
2.42	Print	Detailed survey plan of Igaliku Kujalleq/undir Höfða (Ø66) with location of Norse ruins, Inuit ruins and modern buildings.	12/2015	Niels Christian Clemmensen/ Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.43	Print	One of the greenhouses in Upernaviarsuk.	07/2011	Monika Brune	allu design	8)	No
2.44	Slide	Aerial view of Qaqortukulooq/ Hvalsey (Ø83).	07/2014	Garðar Guðmundsson	Fornleifastofnun Íslands	6)	Yes
2.45	Print	Component part 5, Qaqortukulooq (Hvalsey).	12/2015	Mikkel Myrup	Greenland National Museum & Archives	1)	Yes
2.46	Print	Survey plan of the small Norse farm Ø84 in the Qaqortukulooq area.	-/2008	Orri Vésteinsson	Fornleifastofnun Íslands	6)	Yes
2.47	Print	Hvalsey Church, the largest and best preserved Norse ruin in Greenland.	07/2011	Monika Brune	allu design	8)	No
2.48	Slide	Vegetable garden at Upernaviarsuk.	08/2009	A Taste of Greenland	Visit Greenland	2)	Yes
2.49	Print	Detailed survey plan of Qaqortukulooq/Hvalsey (Ø83) with location of Norse ruins.	12/2013	Niels Christian Clemmensen/ Christian Koch Madsen	Greenland National Museum & Archives	1)	Yes
2.50	Slide	View of the coastal plain with Qassiarsuk/Brattahlíð (Ø29a/Ø29).	05/2006	Christian Koch Madsen	Greenland National Museum & Archives	1)	Yes

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2.51	Slide	View of the coastal plain with Igaliku/ Garðar (Ø47).	08/2015	Garðar Guðmundsson	Fornleifastofnun Íslands	6)	Yes
2.52	Slide	Polar bear with cubs.	12/2012	Aqqalu Rosing-Asvid	Visit Greenland	2)	Yes
2.53	Slide	View from Ikerasassuaq (Prins Christians Sund), the type of dra-matic and forbidding landscape one encounters after rounding the southern tip of Greenland at Nunap Isua/Cape Farewell.	08/2014	Birger L. Kristoffersen	Kommune Kujalleq	7)	Yes
2.54	Print	Page from the Flateyjarbók, one of the Icelandic Medieval manu-scripts containing, among other sagas, Grœnlendinga saga telling of the Norse Vínland journeys.	1906	Anderson, Rasmus Björn	Published in: An-derson, R.B., 1906, *The Flatey book and recently discovered Vatican manuscripts concerning America as early as the tenth century.* London: Norræna Socierty.	No copyright	Yes
2.55	Print	Map of the Vestribyggð (Western Settlement) in the present-day Nuuk Fjord region with indica-tion of key place names and site numbers.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.56	Print	One of the many Inuit stories about violent encounters between Norsemen and Thule Culture hunters, here visualized by Aron of Kangeq (1869). A Norseman returns from the seal hunt to find his farm set aflame by a band of vengeful Inuit hunters.	-/1860's	Aron of Kangeq	Greenland National Museum & Archives	1)	Yes
2.57	Slide	Runestone left by Greenland Norse hunters in a cairn on the island Kingittorsuaq close to Upernavik north of Disko Bay in the 13th century AD.	09/2007	Unknown	National Museum of Denmark	3)	Yes
2.58	Slide	Dense shrub woodland in a subcontinental sheltered area just south of Tasikuluulik (Vatnahverfi).	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.59	Print	Greenlandic sheep in a shed during winter.	12/2010	Poul Erik Pedersen	Poul Erik Pedersen	12)	Yes
2.60	Print	1837 water colour of the Hvalsey Church	-/1837	H.G.F. Holm	National Museum of Denmark	3)	Yes
2.61	Print	Bar graph showing the number of Norse sites registered in the three main settlement areas in the period 1918-1982	12/2008	Orri Vésteinsson	Fornleifastofnun Íslands	6)	Yes

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2.62	Print	1741 map of Greenland in Hans Egede's celebrated first mono-graph on Greenland. In this map, Norse churches and place names are located on Greenland's East Coast.	-/1741	Hans Egede	Published in: Egede, H., 1741, Det gamle Grønlands *nye perlustration.* København: Johan Christoph Groth	No copy-right	Yes
2.63	Slide	C. L. Vebæk during his 1948 "Mounted Expedition" in the Tasi-kuluulik/Vatnahverfi area.	-/1948	Unknown	National Museum of Denmark	3)	Yes
2.64	Print	G. F. Holm's 1883 archaeological survey plan of the Hvalsey feast-ing hall, showing different types of views of the ruins.	-/1883	G.F. Holm	Published in: G.F. Holm, 1883, *Beskrivelse af Ruiner i Julianehaab Distrikt*, Meddelel-ser om Grønland 6. København: C.A. Reizel.	Published	Yes
2.65	Slide	2011 onset of test excavation at Norse farm Ø3 by Tasiusaq.	07/2011	Christian Koch Madsen	Greenland National Museum & Archives	1)	Yes
2.66	Print	Survey plan from the excavation of Þjóðhildarkirkja (Thjodhilde's Church) in Qassiarsuk, where bur-ials in red indicate women, blue indicate men and green indicate children.	-/1982	Sven Havsteen-Mikkelsen	National Museum of Denmark	3)	Yes
2,67	Slide	Photo from the 1934 excavation of a Thule Culture winter house at the site of Tuttutuup Isua in South Greenland.	-/1934	Unknown	National Museum of Denmark	3)	Yes
2.68	Print	1891-92 depiction of a Thule Culture house in Scoresby Sound, East Greenland.	-/1891-92	Carl Ryder	No copyright	-	Yes
2.69	Slide	Wooden church in Nanortalik, South Greenland, an example of the type of wooden architecture introduced to Greenland through Danish colonial rule.	03/2009	John Rasmussen	Visit Greenland	2)	Yes
2.70	Slide	A house in Igaliku showcasing the unique, local architectural style that reused Norse building stones.		David Trood	Visit Greenland	2)	Yes
2.71	Print	The church in Igaliku is built with red Igaliku sandstone.	07/2011	Monika Brune	allu design	8)	No
2.72	Print	Geological sketch map of the Kujataa region with indication of the main solid geology.	12/2015	Christian K. Madsen	Modified after: Henning Sørensen (ed.), 2006, *Geo-logical guide South Greenland: the Nar-sarsuaq – Narsaq – Qaqortoq region,* GEUS. København: Schultz tryk	1)	No
2.73	Print	Map of Greenland and the main sea currents influencing local and regional climatic conditions.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes

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2.74	Print	Dense fog swirls along the steep sides of a fjord near Cape Fare-well.	08/2014	Monika Brune	allu design	8)	No
2.75	Print	Fishing for cod on the frozen fjord near Narsaq.	11/2015	Monika Brune	allu design	8)	No
2.76	Slide	The landscape around farm Ø2 by Tasiusaq displays notable traces of heavy and prolonged sheep grazing.	07/2011	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.77	Print	A harvested hayfield between Itilleq and Igaliku.	0/2015	Monika Brune	allu design	8)	No
2.78	Print	A field filled with Rumex acetosella near Igaliku.	08/2015	Monika Brune	allu design	8)	No
2.79	Slide	A sandur (glacial outwash plain) in the northeast Tasikuluulik/Vat-nahverfi is a dynamic landscape of erosion and new soil deposits.	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.80	Slide	Examples of stone Arctic Small Tools from the Independence I Culture. Top: three knife blades. Below, left: two scrapers. Below right: two burins.	08/2004	John Lee	National Museum of Denmark	3)	Yes
2.81	Print	Archaeological plan of Eiríksstaðir in West Iceland, associated with Eiríkr rauði's stay in Iceland before he colonised Greenland.	-/1998	Guðmundur Ólafsson	National Museum of Iceland	11)	Yes
2.82	Slide	Excavation of a Norse mass grave just north of Igaliku Kujalleq with at least 15 individuals. Strontium analyses and a DNA analyses showed that several had grown up in Iceland.	08/2010	Jette Arneborg	National Museum of Denmark	3)	Yes
2.83	Slide	Harbour seal, a seal species found in the fjords of many parts of Greenland, where it was hunted by Palaeo-Eskimo, Norse and Inuit.	06/2004	Hanne Strager	Zoologisk Museum	9)	Yes
2.84	Print	Graph showing δ13C isotopic values of medieval Greenland Norse (red and green) and Icelandic (blue) skeletal samples, showing the distinct presence of marine mammals in the diet.	-/2012	JetteArneborg, Niels Lynnerup & Jan Heinemeier	Published in: J. Arneborg, N. Lynnerup, J. Heine-meier, 2012, Human *Diet and Subsis-tence Patterns in Norse Greenland ADc.980–AD c.1450*: Archaeo-logical Interpreta-tions, Journal of the North Atlantic Special Volume 3, p.119-133	Published	No

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2.85	Slide	Caribou was an important food source for both Norse and Inuit.	07/2011	Monika Brune	allu design	8)	No
2.86	Slide	Bishop's burial and skeleton unearthed inside a side chapel in the Norse Garðar Cathedral. The skeleton is14C-dated to the second half of the 13th century AD, and could be the remains of either of the historically known Green-land Norse bishop's Olaf, Thord, Arne or Alf. Isotopic analysis of the skeleton displayed a very terrestrial diet, reaffirming the high status of the buried person.	-/1926	Poul Nørlund	National Museum of Denmark	3)	Yes
2.87	Print	Summer pack ice in the fjord near Uunartoq. In some periods, the pack ice blocks the South Green-landic sounds, fjords and inlets for months on end.	07/2011	Monika Brune	allu design	8)	No
2.88	Slide	Depiction of a Knörr-type Viking ship on a 13th century seal from Bergen. This was probably the type of ship commonly used in the medieval voyages to the settlements in Greenland.	-/1982	Knut Helle	Pupblished in: K. Helle, 1982, *Bergen bys historie,* bind I. Bergen: Universi-tetsforlaget.	Published	No
2.89	Slide	Likely Norse cairn built in a pass approximately halfway between two farms (Ø100 located by the inlet in the background).	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
2.90	Slide	Bishop's crozier and ring found in burial inside the Norse Garðar Cathedral at present-day Igaliku along with skeleton 14C-dated to the second half of the 13th century AD.	08/2004	Lennert Larsen	National Museum of Denmark	3)	Yes
2.91	Slide	View through the doorway of the massive Norse byre/barn in Igali-ku/Garðar, the largest byre ever found in Greenland.	-/2004	Inge Bisgaard	Greenland National Museum & Archives	1)	Yes
2.92	Slide	View of the dramatic landscape in Tasermiut Fjord/ Ketilsfjörðr, where the Norse monastery was situated.	08/2004	Monika Brune	allu design	8)	No
2.93	Print	Detail from Aron of Kangeq's wood engraving of the last scene in a story in which the Inuit Qasapi after a long fight finally beats the Norse Uunngortoq and cuts of his arm.	-/1860's	Aron of Kangeq	Greenland National Museum & Archives	1)	Yes

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2.95	Slide	The statue of Hans Egede over-looking the harbor in Nuuk.	-/1922	John Møller	Greenland National Museum & Archives	1)	Yes
2.96	Print	In one of Aron of Kangeq's water colour depictions of violent Norse-Inuit encounters, a single Icelander manages to escape a raid by fleeing on a ship, while the Norse farm burns in the back-ground. Note how the ship is of 19th century European look, the type of ship Aron was familiar with.	-/1860's	Aron of Kangeq	Greenland National Museum & Archives	1)	Yes
2.97	Slide	A pectoral cross – reused as a book ornament – carved from walrus ivory, ca.1000 AD (origin unknown). It was shipped from Greenland as raw material. In Eu-rope walrus ivory was fashioned into highly valuable prestigious and religious artefacts.	06/2008	Unknown	National Museum of Denmark	3)	Yes
2.98	Print	In 1654, four Inuit were captured in present-day Nuuk Fjord. They were first brought to Bergen, where an artist painted them in their traditional outfits. The painting is now a valuable source of ethnographic information.	09/1654	Unknown			
2.99	Print	1770 contemporary etching depicting the Inuit communal house, a wood/stone/turf building housing multiple families in sep-arated sections. This house type was likely associated with intense trading and travelling activities in the 18th century.	-/1770	David Cranz	Published in: D. Cranz, 1770, David Cranz, *Historie von Grönland*, bind 1. Heinrich Detlef Ebers	Published	No
2.100	Print	Graph and map of Greenland aligning chronological develop-ment of climate with distribution of archaeological and historical cultures in Greenland.	12/2015	Adopted after Niels Algreen Møller & Martin Appelt	National Museum of Denmark	3)	Yes
2.101	Print	Archaeological survey plan of large Thule Culture winter and summer site on the island of Uunartoq.	-/1934	Erik Holtved	Published in, T. Mathiassen, 1936, *The Eskimo Archaeology of Ju-liaanehaab District*, Meddelelser om Grønland bd.188 nr.1. København: C.A. Reitzels Forlag.	Published	No
2.102	Slide	Qassiarsuk /Brattahlíð was the first place outside Igaliku to be resettled by farmers, when Otto Frederiksen settled there in 1924. The photo shows the settlement in 1929.	-/1929	Unknown	Greenland National Museum & Archives	1)	Yes

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2.103	Print	Map showing farming settle-ments and approximate grazing areas, 1783-1923.	12/2015	Kenneth Høegh B. Kristoffersen C. K. Madsen	Greenland National Museum & Archives	1)	Yes
2.104	Slide	In the early years of sheep farm-ing, hay production was limited and mainly reserved for cattle winter fodder, whereas the sheep had to graze freely throughout the year. Here, Nikolaj Egede in Igaliku/Garðar, 1926.	-/1926	Poul Nørlund	Greenland National Museum & Archives	1)	Yes
2.105	Print	Map showing farming settle-ments and approximate grazing areas, 1936.	12/2015	Kenneth Høegh B. Kristoffersen C. K. Madsen	Greenland National Museum & Archives	1)	Yes
2.106	Slide	Photo of an early document from the sheep breeding station, which was located in Qaqortoq at the time. During the years of extensive sheep farming, it was decided to earmark the animals to make it easier to differentiate the flocks of various farms. In this document, diverse earmarks are shown, Otto Frederiksen's being the one on the top. This earmark was later taken over by Niels Kleist.	-	Inge Seiding	Greenland National Museum & Archives	1)	
2.107	Slide	Photo of a 1928 ledger from the sheep breeding station, which was located in Qaqortoq at the time. In the ledger one can follow the development of Otto Fred-eriksen's farm the initial sheep stock of 117 ewes and 38 lambs. The ledger shows his success as a farmer: in 1925/26 he returned 5 lambs to the sheep breeding sta-tion, in 1927/28 another 56, and in 1928/29 the remaining 84.	-/1929	Inge Seiding	Greenland National Museum & Archives	1)	Yes
2.108	Slide	The early years of farming in Greenland were keenly monitored by the sheep breeding station. In the ledger pictured here, all kinds of livestock in the district is me-ticulously listed, including rabbits, chickens, geese and pidgins	-/1927	Inge Seiding	Greenland National Museum & Archives	1)	
2.109	Print	Map showing farming settle-ments and approximate grazing areas, 1965.	12/2015	Kenneth Høegh B. Kristoffersen C. K. Madsen	Greenland National Museum & Archives	1)	Yes
2.110	Print	Map showing farming settle-ments and approximate grazing areas, 2014.	12/2015	Kenneth Høegh B. Kristoffersen C. K. Madsen	Greenland National Museum & Archives	1)	Yes
2.111	Print	On her way to help her father gather the sheep in the moun-tains around the sheep farm of Qorlortoq, near Qassiarsuk.	10/2012	Monika Brune	allu design	8)	No

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2.112	Print	Lime application on experimental plots in Upernaviarsuk.	06/2008	Unknown	Nunalerinermut Siunnersorteqarfik	10)	Yes
2.113	Slide	Hay stacking on the fields in Igaliku in 1980.	-/1980	John Høgh	Greenland National Museum & Archives	1)	Yes
2.114	Slide	A garden in Igaliku. Gardening has always been an important part of the household economy on the Greenland sheep farms.	09/2014	Birger L. Kristoffersen	Kommune Kujalleq	7)	Yes
2.115	Print	"The Children's Forest 2004" - a small plantation with conifers at Itilleq.	08/2015	Monika Brune	allu design	8)	No
2.116	Pint	Grass field for forage production in Upernaviarsuk, dominated by timothy and blue grass.	08/2008	Unknown	Nunalerinermut Siunnersorteqarfik	10)	
2.117	Print	Cattle on Uummannartiivaaraq farm, near Igaliku.	05/2006	Unknown	Nunalerinermut Siunnersorteqarfik	10)	
2.118	Print	The new greenhouse at Upernaviarsuk, a heated plastic tunnel structure, with strawberries within the greenhouse and lettuce in the foreground.	07/2011	Monika Brune	allu design	8)	No
2.119	Print	Two sheep overlooking the settlement of Qassiarsuk.	07/2011	Monika Brune	allu design	8)	No
2.120	Print	A snowmobile track over the frozen fjord heads towards Hvalsey.	03/2015	Monika Brune	allu design	8)	No
2.121	Print	Horses on spring pasture, near Qassiarsuk.	05/2009	Poul Erik Pedersen	Poul Erik Pedersen	12)	Yes
2.122	Slide	Feeding hay and concentrates in a sheep shed from the 1980s.	08/2008	Unknown	Greenland National Museum & Archives	1)	Yes
2.123	Slide	A sheep shed in Tasiusaq, 2008.	08/2008	John S. Rasmussen	Greenland National Museum & Archives	1)	Yes
2.124	Print	Modern sheep shed at the Tatsip Kitaa farm, close to Igaliku, component part 2.	06/2015	Birger Lilja Kristoffersen	Kommune Kujalleq	7)	Yes
2.125	Print	The inside of the sheep shed at the Qorlortup Itinnera farm, component part 1.	06/2015	Birger Lilja Kristoffersen	Kommune Kujalleq	7)	Yes
2.126	Print	Wooden shed from the late 1980s and a steel barn from the 1990s at the Tasilikulooq farm.	06/2015	Birger Lilja Kristoffersen	Kommune Kujalleq	7)	Yes
2.127	Print	Fields at the Tasilikulooq farm, component part 4.	08/2015	Birger Lilja Kristoffersen	Kommune Kujalleq	7)	Yes

Chapter 3							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/ director of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
3.1	Slide	View of the plain at Igaliku Kujal-leq (Ø66), where Norse ruins and modern buildings lie side by side, occupying the same infield and suggesting the overlap of farming traditions.	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.2	Slide	A typical Igaliku house.	07/2005	Inge Bisgaard	Greenland National Museum & Archives	1)	no
3.3	Slide	At Sissarluttoq (Ø59) several ruins have been built with thick stone walls of neatly fitted, even worked, stones resulting in excel-lent preservation.	08/2008	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.4	Print	Excavation plan (1941) of the small centralised farm V16 in the Western Settlement.	-/1941	Aage Roussell	National Museum of Denmark	3)	Yes
3.5	Slide	One of the best preserved stone skemmas in Eystribyggð, close to Upernaviarsuk.	07/2013	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.6	Slide	The well-defined stone built Norse storehouse (Ø47) on a tiny island just off the Igaliku harbour.	08/2015	Garðar Guðmundsson	Fornleifastof-nunÍslands	6)	Yes
3.7	Slide	Early Christian cemetery in Igaliku (19th – 20th century).	08/2012	Orri Vésteinsson	Fornleifastofnun Íslands	6)	Yes
3.8	Slide	Different building techniques were used according to the qual-ity, accessibility, and functionally of the turf. Here small pieces of turf were used.	09/2013	Inge Bisgaard	Greenland National Museum & Archives	1)	Yes
3.9	Slide	Excavated, but still well-preserved circular enclosure at Qaqortuku-looq / Hvalsey.	07/2009	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.10	Slide	Well-preserved Norse storehouse or barn at farm Ø4 at Tasiusaq.	07/2011	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.11	Print	Archaeological survey plan of site Ø172 in Tasikuluulik/ Vatnahverfi, an example of a large farm. Norse ruins are numbered.	05/2011	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.12	Slide	Aerial photo of the main dwelling at Qaqortukulooq/Hvalsey (Ø83), where the well preserved room in the foreground is thought to have been a feasting hall.	07/2014	Garðar Guðmundsson	Fornleifastofnun Íslands	6)	Yes
3.13	Print	Map of the North Atlantic and Arctic regions with place names and UNESCO world heritage sites mentioned in the text.	12/2015	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes

3.14	Print	The dwelling at Igaliku/Garðar (Ø27), where room no. IX is interpreted as a feasting hall, signifying the great importance of the place.	-/1930	P. Nørlund	Published in: P. Nørlund, 1930, *Norse Ruins at Gardar. The Episcopal Seat of Norse Greenland*. Meddelelser om Grønland bind.76. København: C.A. Reitzel's Forlag.	Published	Yes
3.15	Print	Otto Frederiksen´s house in Qassiarsuk is today a little museum.	05/2015	Inge Bisgaard	Greenland National Museum & Archives	1)	No
3.16	Print	A dirt road connecting two sheep farms near Qassiarsuk. On the other side of the fjord is the international airport of Narsarsuaq.	08/2011	Monika Brune	allu design	8)	No
3.17	Slide	Thule Culture graves in Igaliku in a Norse animal enclosure, where the Inuit reused the building stones.	08/2012	Orri Vésteinsson	Fornleifastofnun Íslands	6)	Yes
3.18	Slide	The preservation conditions are astounding, resulting in the conserving of such fragile artefacts as textiles, here one of the famous Herjólfsnes gowns.	09/2004	John Lee	National Museum of Denmark	3)	Yes
3.19	Slide	The excellent preservation conditions often found in the Greenland Norse settlement areas have provided a wealth of wooden artefacts.	09/2004	John Lee	National Museum of Denmark	3)	Yes
3.20	Slide	Wooden toy horse found in Norse midden layers at the farm Ø34 in Qorlortup Itinnera.	11/2015	Mikkel Myrup/ Hans Lange	Greenland National Museum & Archives	1)	Yes
3.21	Slide	Archaeological excavations in Igaliku, 2012.	08/2012	Jette Arneborg	National Museum of Denmark	3)	Yes
3.22	Print	Blue ice from deep down under the Greenlandic ice cap.	08/2011	Monika Brune	allu design	8)	No
3.2	Slide	Aerial view of sheep farm at Saqqaa, Norse farm Ø71, in the central inland area of Tasikuluulik/ Vatnahverfi.	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
3.23	Print	A seal resting on a piece of ice.	07/2012	Monika Brune	allu design	8)	No
3.25	Print	Grass fields for silage on Qorlortoq farm, near Qassiarsuk.	10/2010	Poul Erik Pedersen	Poul Erik Pedersen		Yes
3.25	Print	The settlement of Qassiarsuk.	07/2011	Monika Brune	allu design	8)	No
3.26	Print	World map with indication of place names and sites mentioned in the text.	12/2015	Christian Koch Madsen	Greenland National Museum & Archives	1)	Yes
3.27	Slide	Horses browsing for seaweed between icebergs in near Norse farm Ø4.	07/2011	Konrad Smiarowski	Konrad Smiarowski	4)	Yes
3.28	Print	Excavation plan showing the Gothic type parish church at Qassiarsuk/Brattahlíð (Ø29a), which was found to overlay an earlier church (note the traces of a circular churchyard enclosure wall).	-/1934	P. Nørlund & M. Stenberger	Published in: P. Nørlund & M. Stenberger, *Brattahlid*, Meddelelser om Grønland 88. nr.1. København: C.A. Reizel's Forlag	Published	Yes

Chapter 4							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/di-rector of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
4.1	Print	A well preserved window at Hvalsey Church.	09/2015	Monika Brune	allu design	8)	No
4.2	Print	Bales of hay dot the fields on a farm near Igaliku.	08/2015	Monika Brune	allu design	8)	No
4.3	Print	The living room in the house of Otto Frederiksen, which is now a museum in Qassiarsuk.	06/2014	Inge Bisgaard	Greenland National Museum & Archives	1)	No
4.4	Print	The Norse ruins in Igaliku.	09/2015	Monika Brune	allu design	8)	No
4.5	Print	Cattle in the mist - Tasikuluulik (Vatnahverfi).	06/2014	Inge Bisgaard	Greenland National Museum & Archives	1)	No
4.6	Print	Agricultural research at Upernaviarsuk.	09/2015	Monika Brune	allu design	8)	No
4.7	Slide	A number of international re-search projects are ongoing in the Kujataa region. The North Atlantic Project examines the harbors; here on an island just across from Igaliku (Ø47).	08/2014	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
4.8	Slide	View of the Qooroq Icefjord.	07/2013	Mads Pihl	Visit Greenland	2)	Yes
4.9	Print	A glacier tongue that is retreating and sending a constant stream of meltwater into the river, which cascades into the fjord.	09/2015	Monika Brune	allu design	8)	No
4.10	Print	The Aqqaluk Ittuk on her way to Narsaq. This ship brings goods to the state-owned shops in the settlements.	06/2013	Monika Brune	allu design	8)	No

Chapter 5,6,7 & 8							
Id. no.	**Format (slide/ print/ video)**	**Caption**	**Date of photo**	**Photo-grapher**	**Copyright owner (if different than photographer/di-rector of video)**	**Contact details of copy-right owner**	**Non-ex-clusive cession of rights**
5.1	Print	A replica of a Norse longhouse in Qassiarsuk.	07/2005	Monika Brune	allu design	8)	No
5.2	Print	Arctic cottongrass with Norse ruin in the background.	07/2005	Monika Brune	allu design	8)	No
5.3	Print	One of the stone barns in Qassiar-suk that will be restored.	06/2014	Inge Bisgaard	Greenland National Museum & Archives	1)	No
5.4	Print	Arctic gentiana (Gentiana algida).	8/2005	Monika Brune	allu design	8)	No
5.5	Print	Niviarsiaq (Epilobium latifolium) - the Greenlandic national flower.	8/2005	Monika Brune	allu design	8)	No
5.6	Print	Farming equipment on the sheep farm Ipiutaq.	11/2006	Monika Brune	allu design	8)	No
5.7	Print	A German film team getting ready to shoot.	8/2011	Monika Brune	allu design	8)	No

Id. no.	Format (slide/ print/ video)	Caption	Date of photo	Photo-grapher	Copyright owner (if different than photographer/di-rector of video)	Contact details of copy-right owner	Non-ex-clusive cession of rights
5.8	Slide	Early summer at a modern farm in central Tasikuluulik/Vatnahverfi (and Norse site Ø171).	06/2006	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
6.1	Print	Wind and currents pushed a mas-sive iceberg up the fjord all the way to Igaliku.	7/2011	Monika Brune	allu design	8)	No
7.1	Slide	Sheep browsing for seaweed along the rocky coast of Tasiusaq.	07/2011	Christian K. Madsen	Greenland National Museum & Archives	1)	Yes
8.1	Slide	The Egede family in Igaliku, 1926: Therkil, Judithe, Sebulon, Marie, Flavia, Ane E., Gerda and Anders Egede (from left to right).	-/1926	Poul Nørlund	Greenland National Museum & Archives	1)	Yes
8.2	Print	A subarctic farming landscape in Kujataa.	8/2015	Monika Brune	allu design	8)	No

Fig. 7.1: Sheep browsing for seaweed along the rocky coast of Tasiusaq.

1) ***Greenland National Museum & Archives***
Hans Egedesvej 8
PO Box 145, 3900 Nuuk, Greenland
Tel.: +299 32 26 11
Email: nka@natmus.gl

2) ***Visit Greenland***
Hans Egedesvej 29
PO Box 1615
3900 Nuuk
Greenland
Tel: +299 34 28 20
Email: info@greenland.com

3) ***National Museum of Denmark***
Frederiksholms Kanal 12
1220 København K, Denmark
Tel: +45 33 13 44 11
Email: fogf@natmus.dk

4) ***The City University of New York / Hunter College***
695 Park Avenue
New York, NY 10021
Unisted States of America
Tel: (+1) 212 772 4490
Email: welcomecenter@hunter.cuny.edu

5) ***Jeppe Møhl***
Poppelvej 13 A
3450 Allerød, Denmark
Tel: +45 20291189
Email: ijmohl@mail.dk

6) ***Fornleifastofnun Íslands /***
The Institute of Archaeology Iceland
Bárugata 3, 101
Reykjavik, Iceland
Tel: +354 5511033
Email: fsi@instarch.is

7) ***Kommune Kujalleq***
PO Box 514
3920 Qaqortoq, Greenland
Tel: +299 70 41 00
Email:kommune@kujalleq.gl

8) ***allu design***
PO Box 3
3921 Narsaq, Greenland
Tel: +299 25 24 26
Email: info@allu.gl

9) ***Zoological Museum***
Universitetsparken 15
2100 København Ø, Denmark
Tel: +45 35 32 22 22
Email: snm@snm.ku.dk

10) ***Nunalerinermut Siunnersorteqarfik /***
Agricultural Consulting Services
Landbrugets Hus
Sanatorievej B-1004
3920 Qaqortoq, Greenland
Tel: +299 642 306
Email: info@nunalerineq.gl

11) ***National Museum of Iceland***
Sudurgata 41
101 Reykjavik, Iceland
Tel: +354 5302200
Email: thjodminjasafn@thjodminasafn.is

12) ***Poul Erik Pedersen***
PO Box 155
3920 Qaqortoq, Greenland

13) ***Kenneth Høegh***
PO Box 128
3920 Qaqortoq, Greenland

7.2 Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property

- Annexe 1: Management plan 2016–2020
- Annexe 2: Action plan for the preservation and maintenance of the ruins at key sites
- Annexe 3: Action plan for listing of buildings and other cultural heritage protection (in Danish, but described in the management plan)
  - ◊ 1) Action plan for Igaliku houses, Area D1
  - ◊ 2) Action plan for Otto Frederiksens' house B-316 and his two farrowing barns
  - ◊ 3) Action plan for Henning and Cecilie Lund's house B-345 in Qanisartuut
- Annexe 4: Maps
  - ◊ Five satellite maps, one for each component part, showing the respective boundaries (size AO)
  - ◊ Five detailed maps, one for each component part (size A2):
    Cp 1 – Qassiarsuk/Brattahlíð (Ø29/Ø29a)
    Cp 2 – Igaliku/Garðar (Ø47)
    Cp 3 – Sissarluttoq (Ø59)
    Cp 4 – Igaliku Kujalleq (Ø66)
    Cp 5 – Qaqortukulooq/Hvalsey (Ø83)

7.3 Form and date of most recent records or inventory of property

Component part 1:

(Guldager, Hansen et al. 2002, Adderley and Simpson 2006, McGovern and Palsdóttir 2006, Edvardsson, Paulsen et al. 2007, Edwards, Schofield et al. 2007, Schofield and Edwards 2011, Kapel, Hoier et al. 2013).

Component part 2:

(Arneborg, Hansen et al. 2002, Gulløv 2008, Buckland, Edwards et al. 2009, Gauthier, Bichet et al. 2010, Massa, Bichet et al. 2012, Massa, Perren et al. 2012, Panagiotakopulu, Greenwood et al. 2012, Perren, Massa et al. 2012, Smiarowski 2013, Nyegaard 2010, 2011, 2014).

Component part 3:

(Clemmensen and Kapel 2008, Clemmensen and Kapel 2010, Edwards, Schofield et al. 2011).

Component part 4:

(Møller and Madsen 2006, Møller and Madsen 2007, Møller and Madsen 2007, Clemmensen and Kapel 2010, Smiarowski 2010, Ledger, Edwards et al. 2013, Ledger, Edwards et al. 2014, Ledger, Edwards et al. 2014, Madsen 2014).

Component part 5:

(Vésteinsson 2008, Arneborg, Larsen et al. 2009, Nyegaard 2014, Høier, Vestéinsson et al. 2014).

Adderley, P. and I. Simpson (2006). "Soils and palaeo-climate based evidence for irrigation requirements in Norse Greenland." Journal of Archaeological Science 33: 1666–1679.

Arneborg, J., et al. (2002). Kirkearkæologiske undersøgelser (unpubl. field report). København, SILA - Nationalmuseets center for grønlandsforskning.

Arneborg, J., et al. (2009). "The "Dairy Farm" of the Hvalsey Fjord Farm." Journal of the North Atlantic Special Volume 2 (Norse Greenland: Selected Papers from the Hvalsey Conference 2008): 24–29.

Buckland, P. C., et al. (2009). "Palaeoecological and historical evidence for manuring and irrigation at Garðar (Igaliku), Norse Eastern Settlement, Greenland." The Holocene 19(1): 105–116.

Clemmensen, N. C. and H. Kapel (2008). Ruingrupperne ved Sissarluttoq og Narsap Ilua - Digital opmåling og fotodokumentation (unpubl. field report). Narsaq, Narsaq Museum.

Clemmensen, N. C. and H. Kapel (2010). Opmåling af ruiner ved Igaliku kujalleq - nordboernes Undir Höfdir? (unpubl. field report). Narsaq, Narsaq Museum.

Clemmensen, N. C. and H. Kapel (2010). Ruingruppen Sissarluttoq i Igaliku Fjord - Ruinkatalog og oversigtskort (unpubl. field report). Narsaq, Narsaq Museum.

Edvardsson, R., et al. (2007). Archaeological Excavations at Qassiarsuk 2005–2006: Field report. Bolungarvík, Náttúrustofa Vestfjarða: 109.

Edwards, K. J., et al. (2011). "Problematic but promising ponds? Palaeoenvironmental evidence from the Norse Eastern Settlement of Greenland." Journal of Quaternary Science 26(8): 854–865.

Edwards, K. J., et al. (2007). "High resolution paleoenvironmental and chronological investigations of Norse landnám at Tasiusaq, Eastern Settlement, Greenland." Quaternary Science Reviews 69(2008): 1–15.

Gauthier, E., et al. (2010). "Pollen and non-pollen palynomorph evidence of medieval farming activities in southwestern Greenland." Vegetation History and Archaeobotany 19(5–6): 427–438.

Guldager, O., et al. (2002). Medieval Farmsteads in Greenland. The Brattahlid Region 1999–2000. Copenhagen, Danish Polar Center.

Gulløv, H. C. (2008). Booths from early Norse Greenland - or tjaldat búðir from landnáma Greenland. Símunarbók. C. Paulsen and H. D. Michelsen. Tórshavn, Fródskapur - Faroe University Press: 90–105.

Høier, H., Vestéonsson, O. and Nyegaard, G. (2014). Ruinrestaurering, soignering og arkæologisk rekognoscering i Qaqortukulooq og omegn i 2014 (unpubl. field report). Grønlands National Museum og Arkiv.

Kapel, H., et al. (2013). Besigtigelse af norrøne ruiner i Qassiarsuk: Feltarbejde udført d. 1. august 2013 (unpubl. field report). Nunatta Katersugaasivia Allagaateqarfialu 2013.

Ledger, P. M., et al. (2013). "Shieling activity in the Norse Eastern Settlement: Palaeoenvironment of the 'Mountain Farm', Vatnahverfi, Greenland." The Holocene 23(6): 810–822.

Ledger, P. M., et al. (2014). "A multiple profile approach to the palynological reconstruction of Norse landscapes in Greenland's Eastern Settlement." Quaternary Research http://dx.doi.org/10.1016/j.yqres.2014.04.003: 1-16.

Ledger, P. M., et al. (2014). "Vatnahverfi: A Green and Pleasant land? Palaeoecological Reconstructions of Environmental and Land-use Change." Journal of the North Atlantic Special Volume 6: In The Footsteeps of Vebæk—Vatnahverfi Studies 2005–2011: 29–46.

Madsen, C. K. (2014). Pastoral Settlement, Farming, and Hierarchy in Norse Vatnahverfi, South Greenland. Ph.D-dissertation, University of Copenhagen. Copenhagen, University of Copenhagen, Faculty of Humanities.

Massa, C., et al. (2012). "A 2500 year record of natural and anthropogenic soil erosion in South Greenland." Quaternary Science Reviews 32(2012): 119–130.

Massa, C., et al. (2012). "A multiproxy evaluation of Holocene environmental change from Lake Igaliku, South Greenland." Journal of Paleolimnology 48(2012): 241–258.

McGovern, T. H. and Palsdóttir, A. (2006). Preliminary Report of a Medieval Norse Archaeofauna from Brattahlid North Farm (KNK 2629), Qassiarsuk, Greenland. NORSEC Zooarchaeology Laboratory REPORT No.34. CUNY Northern Science and Education Center.

Møller, N. A. and C. K. Madsen (2006). Nordboerne i Vatnahverfi - Rapport om rekognoscering og opmåling af nordboruiner i Vatnahverfi Sommeren 2005. Feltrapport 24. Nationalmuseet, SILA - Nationalmuseets Center for Grønlandsforkning: 36.

Møller, N. A. and C. K. Madsen (2007). Gård og Sæter, Hus og Fold - Vatnahverfi 2006. Rapport om besigtigelser og opmålinger i Vatnahverfi, sommeren 2006 (unpubl. field report). Nationalmuseet, SILA - Nationalmuseet Center for Grønlandsforskning.

Møller, N. A. and C. K. Madsen (2007). "Med friske skridt i forgængeres fodspor." Tidsskriftet Grønland 2007(5-6): 307–314.

Nyegaard, G. (2011). Pleje og synliggørelse af norrøne ruiner i Igaliku. Rapport om feltarbejde fra d. 11. - 20. august 2010. Nunatta Katersugaasivia Allagaateqarfialu 2010.

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Panagiotakopulu, E., et al. (2012). "Insect Fossils and irrigation in Medieval Greenland." Geografiska Annaler: Series A, Physical Geography 94(4): 531–548.

Perren, B. B., et al. (2012). "A paleoecological perspective on 1450 years of human impacts from a lake in southern Greenland." The Holocene 22(9): 1025–1034.

Schofield, E. J. and K. J. Edwards (2011). "Grazing impacts and woodland management in Eriksfjord: Betula, coprophilous fungi and the Norse settlement of Greenland." Vegetation History and Archaeobotany 20(2011): 181–197.

Smiarowski, K. (2010). E172 Tatsip Ataa Midden Excavation 2009 & 2010 Preliminary Excavation Report (unpubl. field report). New York, Hunter College.

Smiarowski, K. (2013). Preliminary Report on the 2012 Archaeofauna from E47 Gardar in the Eastern Settlement, Greenland. New York, Hunter College Zooarchaeology Laboratory. NABO HERC Laboratory Report 61: 24.

Vésteinsson, O. (2008). Archaeological investigations in Hvalseyjarfjörður, Eystribyggð 2005. Reykjavík 2008, Fornleifastofnun Íslands. FS388-05301: 58.

7.4 Address where inventory, records and archives are held

Greenland National Museum
Hans Egedesvej 8
PO Box 145
3900 Nuuk, Greenland

Greenland National Archives
PO Box 1090
3900 Nuuk, Greenland

Groenlandica / Greenland National Library
Manutooq 1
PO Box 1074
3905 Nuussuaq, Greenland

National Museum of Denmark
Ny Vestergade 10, 1471 København K, Denmark

Institute of Eskimology
Strandgade 102, 1401 København K, Denmark

The Royal Library
National Library of Denmark
Copenhagen University Library
PO Box 2149,1016 København K, Denmark

Nunalerinermut Siunnersorteqarfik /
Greenland Agricultural Advisory Service
Sanatorievej B-1004, 3920 Qaqortoq, Greenland

Local museums in South Greenland:

Narsarsuaq Museum
v/ Ole Guldager
Box 46, 3923 Narsarsuaq

Narsaq Museum
Fiskervej B-98, 3921 Narsaq

Qaqortoq Museum
Torvevej B 29, 3920 Qaqortoq

Nanortalik Museum
Kiffat Aqqutaa B 21, 3922 Nanortalik

7.5 Endnotes

1. The Ecology of Greenland, 67.
2. Dzik 2014.
3. Vésteinsson 2013.
4. Nunalerinermut Siunnersorteqarfik / Greenland Agricultural Advisory Service, 2015.
5. See Knudsen et al. 2003; Madsen 2009, 69; Myrup 2010, 10 for recent observations of Palaeo-Eskimo presence in Kujataa.
6. Henriksen 2012, 2014.
7. Speculum regale, 142.
8. Supported both by animal bone and isotopic evidence which suggests that by the 14th century between 60 and 80% of the Norse Greenlanders' diet was marine foods – Arneborg 2004, 265-66.
9. Nyegaard forthcoming.
10. Vésteinsson et al. 2002, 108-13.
11. Arneborg 2005; Golding et al. 2011.
12. Also Buckland et al. 2009, Edwards & Schofield 2012, Panagiotakopulu & Buckland 2012.
13. Ledger et al. 2014b.
14. Íslenzk fornrit 1, 13-14; Íslendingabók – Kristni saga, 7.
15. Gulløv 2008a, Sutherland 2000, Schledermann 2000; Schledermann & McCullough 2003.
16. Arneborg 2004, 258.
17. Frei et al. 2015.
18. Keller 2010.
19. Islandske annaler, 213, 403.
20. Inatsisartutlov nr. 11 af 19. maj 2010.
21. Ostermann 1944, 75-77.
22. Holm 1883, Bruun 1895.
23. Nørlund & Stenberger 1934.
24. Krogh 1964, Albrethsen 1982, 274, 276.
25. Edvardsson 2013
26. Nørlund & Stenberger 1934, 14-16.
27. Nyegaard forthcoming.
28. Guldager et al. 2002.
29. Krogh 1996.
30. Inatsisartutlov nr. 11 af 19. maj 2010.
31. Nørlund 1930.
32. Buckland et al. 2009, Edwards & Schofield 2012, Panagiotakopulu & Buckland 2012.
33. Vésteinsson 2014.
34. Gulløv 2008b, Arneborg pers. Comm., Henriksen pers. comm.
35. Vésteinsson & Guðmundsson 2015.
36. Holm 1883.
37. Edwards et al. 2011.
38. Inatsisartutlov nr. 11 af 19. maj 2010.
39. Holm 1883, Bruun 1895.
40. Roussell 1941, 99-101.
41. Vebæk 1992.
42. Arneborg et al. eds. 2014.
43. Madsen 2014a.
44. Ledger 2013.
45. Christensen 1953.
46. Arneborg et al. 2010.
47. Nyegaard 2010 has a full research history of the site.
48. Roussell 1941, 141-47.
49. Nyegaard 2010.
50. Arneborg et al. 2010.
51. Vésteinsson 2008.
52. Diplomatarium islandicum I, 58. Greenland is not mentioned in comparable letters from 1022 and 1044 which indicates that information about its existence arrived in Rome in the late 1040s.
53. Magistri Adam Bremensis Gesta Hammaburgensis ecclesiae pontificum, 275.
54. Íslenzk fornrit 1, 13-14; Íslendingabók – Kristni saga, 7.
55. Íslenzk fornrit 1, 130-35. Book of Settlements, 48-50.
56. Íslenzk fornrit 4, 59-60; Complete Sagas V, 157.
57. Íslenzk fornrit 4, 195-237; Complete Sagas I, 1-18.
58. Íslenzk fornrit 4, 241-69; Complete Sagas I, 19-32.
59. Halldórsson 1978, 398-400.
60. Leifr also appears as the leader of the Greenlandic colony in the early 11th century in the Heimskringla version of Ólafs saga helga – Íslenzk fornrit 27, 126.
61. Íslenzk fornrit 26, 334.
62. Ólafs saga Tryggvasonar en elsta (Íslenzk fornrit 25), Morkinskinna (Íslenzk fornrit 23-24) and Fagrskinna (Íslenzk fornrit 29). The 'invention' of this fact is often attributed to Gunnlaugr Leifsson (d. 1216), whose version of Ólafs saga is lost, but was used by the author of Heimskringla.
63. Halldórsson 1978, 382-89.
64. Krogh 1964.
65. Íslenzk fornrit 13, 231-27; Complete Sagas III, 271-304.
66. Íslenzk fornrit 14, 119-60; Complete Sagas III, 397-420.
67. Íslenzk fornrit 13, 101-72; Complete Sagas II, 237-66.
68. Íslenzk fornrit 6, 121-276; Complete Sagas II, 329-402.
69. Grove 2010.
70. Íslenzk fornrit 4, 273-92; Complete Sagas V, 372-82.
71. Halldórsson 1978, 401-405.
72. Islandske annaler, 20, 59, 112, 252, 320, 473.

73. Jakobsson 2007.
74. Íslenzk fornrit 13, 282-302; Complete Sagas III, 290-94.
75. Islandske annaler, 22, 61, 120, 180, 477.
76. Islandske annaler, 121, 181, 477.
77. Islandske annaler, 282, 364-65, 413-14.
78. Det gamle Grønlands beskrivelse, 21-22.
79. Speculum regale, 142-45.
80. Íslenzk fornrit 32, 221.
81. Halldórsson 1978, 37-39, 44, 79.
82. Islandske annaler, 212, 228, 361.
83. Seaver 1996, 139-58. Diplomatarium norvegicum 15, 27; 18, 29-31.
84. E.g. Diplomatarium norvegicum 19, 125.
85. Kulturhistorisk leksikon 4, 142-54.
86. Keller 1989, 276-78.
87. E.g. in 1338 – Diplomatarium norvegicum 10, 33.
88. Det gamle Grønlands beskrivelse.
89. Diplomatarium norvegicum 5, 122.
90. Íslenzk fornrit 4, 233-34; Complete Sagas I, 17.
91. Historia Norvegiæ, 3.
92. Hauksbók, 500-501.
93. Islandske annaler, 364.
94. Islandske annaler, 288-89.
95. Diplomatarium islandicum 3, 720-21, 756.
96. Etting 2009.
97. Grænlandsannáll –Halldórsson 1978.
98. See Halldórsson 1978, 244-51, 273-77.
99. See Halldórsson 1978, 193-201.
100. Torfason 1706.
101. Jónsson 1688.
102. Jónsson 1905-22, vol. 1, 106-65; GHM 2, 419-575.
103. Imer 2014.
104. Egede 1738.
105. Rink ed. 1859-63.
106. Kleivan 1982.
107. E.g. Christensen 1953, Bak 1983, Madsen 2014, 219-22.
108. E.g. Knuthsen et al. 1906, Hansen 1910-11, Jespersen 1915, Simony 1917, Walsøe 1918, Chemnitz et al. 1919.
109. Grønlands Nationalarkiv: Upernaviarsuk.
110. Hansen 1926, Walsøe, L. 1936, Christensen 1946, 1950, Jensen 1951, 1958, Kampp 1964.
111. Kristiansen 1998.
112. Wille et al. 1980.
113. Hayashi 2013.
114. Egede 1738.
115. Rafn ed. 1837.
116. GHM.
117. GHM 3, 795-845.
118. Holm 1883.
119. Bruun 1895, 1903, 1917.
120. Clemmensen 1911.
121. Nørlund 1924. On the textiles see Østergård 2004, 21-29, 127-232, 246-50. The AMS dates are reported in Arneborg 1996. Recent research by Jette Arneborg and Michelle Hayeur- Smith suggests that the hat considered by Nørlund to be the latest European fashion of the late 15th century is in fact made up of textile pieces with 13th and 14th century dates.
122. Østergård 2004, 26.
123. E.g. Nørlund 1936.
124. Nørlund 1930.
125. Nørlund & Stenberger 1934.
126. Roussell 1936.
127. Roussell 1941.
128. Roussell 1941, 111-26.
129. Iversen 1934.
130. Vebæk 1992.
131. Vebæk 1991.
132. Vebæk 1993.
133. Krogh 1964.
134. Bak 1969, 1970a, 1970b, 1971, 1972a, 1972b.
135. Krogh 1982.
136. Albrethsen 1991.
137. Meldgaard 1977, Andreasen 1982, Arneborg 1991b.
138. Berglund 2000.
139. Frei et al. 2015.
140. Ogilvie et al. 2009.
141. Nyegaard forthcoming.
142. Edvardsson 2013b.
143. Vésteinsson 2014.
144. Smiarowski 2010.
145. Fredskild 1973, 1983.
146. Fredskild & Hulme 1991.
147. McGovern et al. 1983.
148. Sandgren & Fredskild 1991.
149. E.g. Ledger et al. 2014a, Edwards et al. 2008.
150. Guldager et al. 2002.
151. Madsen 2014a.
152. Vésteinsson 2005.
153. Arneborg 1991a, Høegsberg 2009.

154. Keller 1989, Heide 2012, Madsen 2014a.
155. Lynnerup 1998.
156. Buchwald 2001.
157. Østergård 2004.
158. Arneborg et al. eds. 2012.
159. Arneborg 2012.
160. Mathiassen 1936.
161. Gulløv 1997.
162. Gronnow & Jensen 2003.
163. Vadstrup & Schultz-Lorentzen 1994, Jørgensen et al. 2012.
164. Krogh 1996.
165. Allaart 1976.
166. Escher & Watt eds. 1976.
167. Mikkelsen et al. 2008, Long et al. 2010.
168. Johannessen 1986.
169. Jennings and Weiner 1996.
170. Johannessen 1986.
171. Jensen et al. 2004.
172. Feilberg 1984.
173. Box 2002.
174. Hanna & Cappelen 2001.
175. Jacobsen 1987.
176. Adderley and Simpson 2006.
177. Arneborg 2005, Golding et al. 2011.
178. Vinther et al. 2010.
179. Meeker and Mayewski 2002.
180. Dugmore et al. 2007.
181. Lamb 1995.
182. Ogilvie 1991, Lamb 1995.
183. Jennings & Weiner 1996.
184. Barlow et al. 1997, Dugmore et al. 2007.
185. Dugmore et al. 2007.
186. Seaver 1996, Diamond 2005.
187. Dugmore et al. 2012.
188. Fredskild 1973.
189. Fredskild 1973.
190. Fredskild 1973.
191. Böcher at al. 1968.
192. Feilberg 1984.
193. Fredskild 1973.
194. Gauthier et al. 2010.
195. Ledger et al. 2013.
196. Iversen 1934.
197. Ledger et al. 2014a; Schofield and Edwards 2011.
198. Bishop et al. 2013.
199. Ledger et al. 2013.
200. Schofield et al. 2013.
201. Fredskild 1973.
202. Schofield et al. 2013.
203. Henrikson 2013.
204. Ledger et al. 2015.
205. Edwards et al. 2008.
206. Fredskild 1988.
207. Fredskild 1992.
208. Massa et al. 2012.
209. Massa et al. 2012.
210. Kuijpers & Mikkelsen 2009.
211. Perren et al. 2012.
212. Gulløv ed. 2004.
213. Íslenzk fornrit 1, 13-14; Íslendingabók – Kristni saga, 7.
214. Madsen 2014a, 228-29.
215. Ín Islendingabók Eiríkr is said to have begun settling Greenland fourteen or fifteen winters before Christianity came to Iceland – a reference to the conversion of 999 or 1000 – Íslenzk fornrit 1, 14; Íslendingabók – Kristni saga, 7. The annals consistently date this to 986 – Islandske annaler, 16, 48, 104, 178, 315, 464.
216. Íslenzk fornrit 1, 13; Íslendingabók – Kristni saga, 7.
217. Íslenzk fornrit 1, 130-34; Book of Settlements, 48-50. Íslenzk fornrit 4, 197-202; Complete Sagas I, 2-3.
218. E.g. from Ø64, see Madsen 2014a, 228.
219. Price & Arneborg forthcoming.
220. Price & Arneborg forthcoming.
221. Albrethsen 1982, Vebæk 1992, Albrethsen & Ólafsson 1998.
222. Dugmore et al. 2012 with refs.
223. Keller 2010.
224. Vésteinsson et al. 2002, Madsen 2014a, 227-29.
225. Vésteinsson et al. 2014.
226. Dugmore et al. 2012.
227. Ogilvie et al. 2009.
228. Islandske annaler, 213, 403.
229. Nelson et al. 2012.
230. Madsen 2014a, 21-26 has a recent overview with references.
231. Mainland & Halstead 2005.
232. Speculum regale, 142.
233. Madsen 2014a, 112-79.
234. Lynnerup 1998, 2014.
235. Vésteinsson 2010, 148-49, Madsen 2014a, 227-35.
236. Nørlund 1936, Dugmore et al. 2007, Keller 2010.

237. Frei et al. 2015.
238. Roesdahl 1995, 2005, Seaver 2009.
239. Keller 1989, 276-78.
240. Madsen 2014a, 140-43.
241. Crumlin-Pedersen & Olsen eds. 2002, 125.
242. Kristjánsson 1965.
243. Dugmore et al. 2010.
244. Det gamle Grønlands beskrivelse, 17-19.
245. Íslenzk fornrit 1, 33. Book of Settlements, 16.
246. Crumlin-Pedersen & Olsen eds. 2002, 137-38 with references.
247. Keidel & Schnall 1985.
248. Islandske annaler, 228.
249. Diplomatarium islandicum 1, 602-716.
250. Islandske annaler, 282, 364-65, 413-14.
251. Íslenzk fornrit 4, 288; Complete Sagas V, 380.
252. Islandske annaler, 213, 403.
253. Andersen & Malmros 1992.
254. Madsen 2014a, 144-45.
255. Heide 2012.
256. Halldórsson 1978.
257. Price & Arneborg forthcoming.
258. Íslenzk fornrit 4, 274-76; Complete Sagas V, 372-74.
259. Islandske annaler, 20, 59, 112, 252, 320, 473.
260. Islandske annaler, 19, 59, 112, 251, 252, 320, 473.
261. Vésteinsson 2000, 20-21.
262. Magistri Adam Bremensis Gesta Hammaburgensis ecclesiae pontificum, 273-74.
263. Complete Sagas I, 10-11; Íslenzk fornrit 4, 217.
264. Halldórsson 1978, 79.
265. Arneborg 1990, 145.
266. Islandske annaler, 113, 252, 320, 473.
267. Íslenzk fornrit 4, 245; Complete Sagas I, 20.
268. Vésteinsson 2014.
269. Íslenzk fornrit 32, 221.
270. Íslenzk fornrit 32, 136.
271. Det gamle Grønlands beskrivelse, 24, 27.
272. Lárusson 1967, 61.
273. Nørlund 1936.
274. Raghavan et al. 2014.
275. Overview in Quinn 1975.
276. McGhee 2004, 121.
277. Gulløv 2008a.
278. Det gamle Grønlands beskrivelse, 29-30.
279. Arneborg 2003, 174-76.
280. Islandske annaler, 364.
281. Friesen & Arnold 2008.
282. Det gamle Grønlands beskrivelse, 17-18.
283. E.g. Dansgaard et al. 1969.
284. Madsen 2014a, 29-38.
285. Ogilvie et al. 2009.
286. Lynnerup 1998.
287. Diamond 2005, 211-76.
288. Madsen 2014a.
289. Ian Simpson pers.comm. August 2015.
290. Roesdahl 1995, 2005, Seaver 2009.
291. Arge et al. 2005.
292. Vésteinsson 2010, 148.
293. Lynnerup 2014.
294. Dugmore et al. 2012.
295. Gulløv 2004; Gulløv 1997; Petersen ed. 1991.
296. Mathiassen 1936.
297. Chemnitz et al. 1919.
298. Walsøe 1936.
299. Madsen 2014a, 220-26.
300. Egede 1985.
301. http://www.farmholidays.is.
302. Thorsteinsson 1983.
303. Thorsteinsson 1983.
304. Feilberg 2013.
305. Hjemmestyrets bekendtgørelse nr. 22 af 8. september 2000 om forvaltning af græsningsområder og husdyr, Hjemmestyrets bekendtgørelse nr. 25 af 22. juni 2001 om fåre- og hestehold.
306. Landstingslov nr. 5 af 2. maj 1996 om landbrug.
307. Enghoff 2003, Panagiotakopulu & Buchan 2015, Schofield et al. 2013.
308. Vebæk 1991.
309. Ø7, Ø39, Ø40 are just outside the borders of component part 1.
310. Nunalerinermut Siunnersorteqarfik / Greenland Agricultaral Advisory Service, 2015.
311. Vésteinsson 2014, Nyegaard forthcoming; Smiarowski 2010.
312. Østergård 2004 contains an inventory of all Norse sites in Greenland which had produced textiles up to the date of publication. This list gives an idea of the incidence of good organic preservation in Kujataa.
313. Mikkelsen et al. 2008. Long et al. 2010.
314. Madsen 2009.
315. Guldager et al. 2002.
316. Medieval texts relating to Norse Greenland are printed in GHM. A modern edition of some of the

key texts is in Halldórsson 1978. See also Jónsson 1898.

317. Nørlund 1930.
318. Nyegaard 2009.
319. Bruun 1895, 1918.
320. Nørlund & Stenberger 1934.
321. Nørlund 1930.
322. Roussell, 1941, which also provides an overview with references to earlier work at other sites
323. Nørlund, 1924.
324. Vebæk 1992.
325. Arneborg et al. eds. 2014.
326. Wallace 2003.
327. Roussell 1936, 14-30; 1941, 105-107.
328. Sandnes (V51) - Roussell 1936, 11-56; V52 and V52a – Roussell 1936, 57-94; V16 – Roussell 1941, 162-64; V35 – Roussell 1941, 164-167; V8 – Roussell 1941, 167-71; V53c – Roussell 1941, 171-79; V53d – Roussell 1941, 179-90; Nipatsoq (V54) – Andreasen 1982, and Niaqussat (V48) – Arneborg 1991b.
329. Berglund 2000.
330. Kent ed. 1989.
331. Vasey 1992.
332. Mann et al. 2009.
333. Olsen et al. eds. 2011.
334. Cramp et al. 2014.
335. Zvelebil & Dolukhanov 1991.
336. Ryabogina & Ivanov 2011.
337. Zvelebil ed. 1986. Christian 1998, 80-81, 189-90, Forsyth 1992, 20-22.
338. Wood ed. 1991.
339. Reardon-Anderson 2000.
340. Makohonienko et al. 2004. Christian 1998, 233-35.
341. Popov et al. 2014. Kuzmin et al. 1995.
342. Crawford 2011.
343. Moss & Erlandson 1995. Ames & Maschner 1999. Fitzhugh 2003. Mackie et al. 2011.
344. Boyd & Surette 2010.
345. Hart & Lovis 2013.
346. Rabassa et al. 2000.
347. Glassow 2005. Itoh et al. 2011.
348. Betts & Friesen 2013.
349. Savelle & Kishigami 2013.
350. Stringer et al. 2008.
351. Yesner et al. 1980. Monks ed. 2005. Braje & Rick eds. 2011.
352. Hartz et al. 2007, Eriksson et al. 2008, Bonsall et al. 2009, Berg 2013.
353. Storå 2002, Eriksson 2004, Martinsson-Wallin 2008, Bläuer & Kantanen 2013.
354. Daire et al. eds. 2013.
355. Barber, I. 2004, Smith 2005, Nagaoka 2006, Jacomb et al.2010; McClenachan & Cooper, 2008, Baisre 2013. Also Watson et al. 2011 on Hawaii.
356. McNiven & Bedingfield 2008, Méry et al. 2009.
357. http://whc.unesco.org/en/list/968.
358. Eriksson et al. 2008.
359. http://whc.unesco.org/en/list/1143.
360. http://whc.unesco.org/en/list/387.
361. Svyatko et al. 2009, 2013. Legrand 2006.
362. Fitzhugh et al. 2002.
363. Anderson 1989.
364. Walter 2006.
365. Sutton 1982.
366. Anderson. 2005. King 2000, 77-87.
367. Bruno 2011, 88-108.
368. Lewis et al. 1987, Shortridge 1976, 1978. Wilson 1978.
369. Piper & Sandlos 2007, Piper 2010.
370. Robinson 2010.
371. Loring & Gerlach 2010. Crate 2008.
372. SAP: Savaateqarnerup annertusarneqarnissaani pilersaarut. SAP was from 1983-85 financed by the EU (European Union), but after Greenland left the EU in 1985, the Greenland Government has financed the development activities.
373. Qaqortukulooq farm is not situated at the ruins with the same name, but in the nearby inlet of Tasiusaq.
374. The Landsting was the official name of the Parliament of Greenland from May 1979 until June 2009, whereafter the Inatsisartut has been used as the official name of the Parliament of Greenland.

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8.2 Official local institution/agency

Management of the Property:

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8.3 Other local institutions

Local museums in South Greenland:

Narsarsuaq Museum
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8.4 Official web address

A homepage about the proposed World Heritage area will be developed.

The municipality's homepage is www.kujalleq.gl and it will include information about the proposed World Heritage area.

Contact name: Ahmed Akkari

Email: webmaster@kujalleq.gl

Other web addresses

On the National Museum and Archives' homepage www.natmus.gl you can find information about the proposed nominated areas.

Contact name: Bo Albrechtsen

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You can also find information at Greenland's official tourism site ***www.greenland.com*** where there are descriptions of the Inuit and Norse cultures.

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Fig. 8.1: The Egede family in Igaliku, 1926: Therkil, Judithe, Sebulon, Marie, Flavia, Ane E., Gerda and Anders Egede (from left to right).

Fig. 8.2: A subarctic farming landscape in Kujataa.

Chapter 9 – Signature on behalf of the State Party

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Date

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Bertel Haarder

Minister of Culture

Denmark