Översyn av riksgränsen mellan
Sverige och Norge 2020–2024

USE OF GNSS FOR THE REVIEW OF THE NATIONAL BOUNDARY BETWEEN SWEDEN AND NORWAY

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Introduction

The national boundary between Sweden and Norway is the longest on land in Europe. It is approximately 1620 kilometres long and runs through very varied landscapes. The number of national boundary markers that are the basis for the definition of the boundary is 642. 612 of these markers are stone cairns and the other ones are mainly marked by natural stones, memorial monuments and wooden poles (with a sign). During the years 2020–2024, a review of the boundary is underway. The Swedish and Norwegian governments have appointed boundary commissions at Lantmäteriet and Kartverket respectively to carry out the review together. The Norwegian side performs the fieldwork on the southern part of the boundary and the Swedish side performs it on the northern part. A 5-metre-wide clearing (2.5 metres into each country) is made along the boundary line and all boundary markers of all different kinds are restored to satisfactory condition. GNSS are used for accurate positioning of all boundary markers, as well as for setting out the boundary line with sticks, enabling a straight and correct 5-metre-wide clearing. In areas with coverage of mobile telephone networks, the Swedish and Norwegian network RTK services (SWEPOS and CPOS) are used. Post-processing is needed in some areas, where virtual or real reference station data is used.

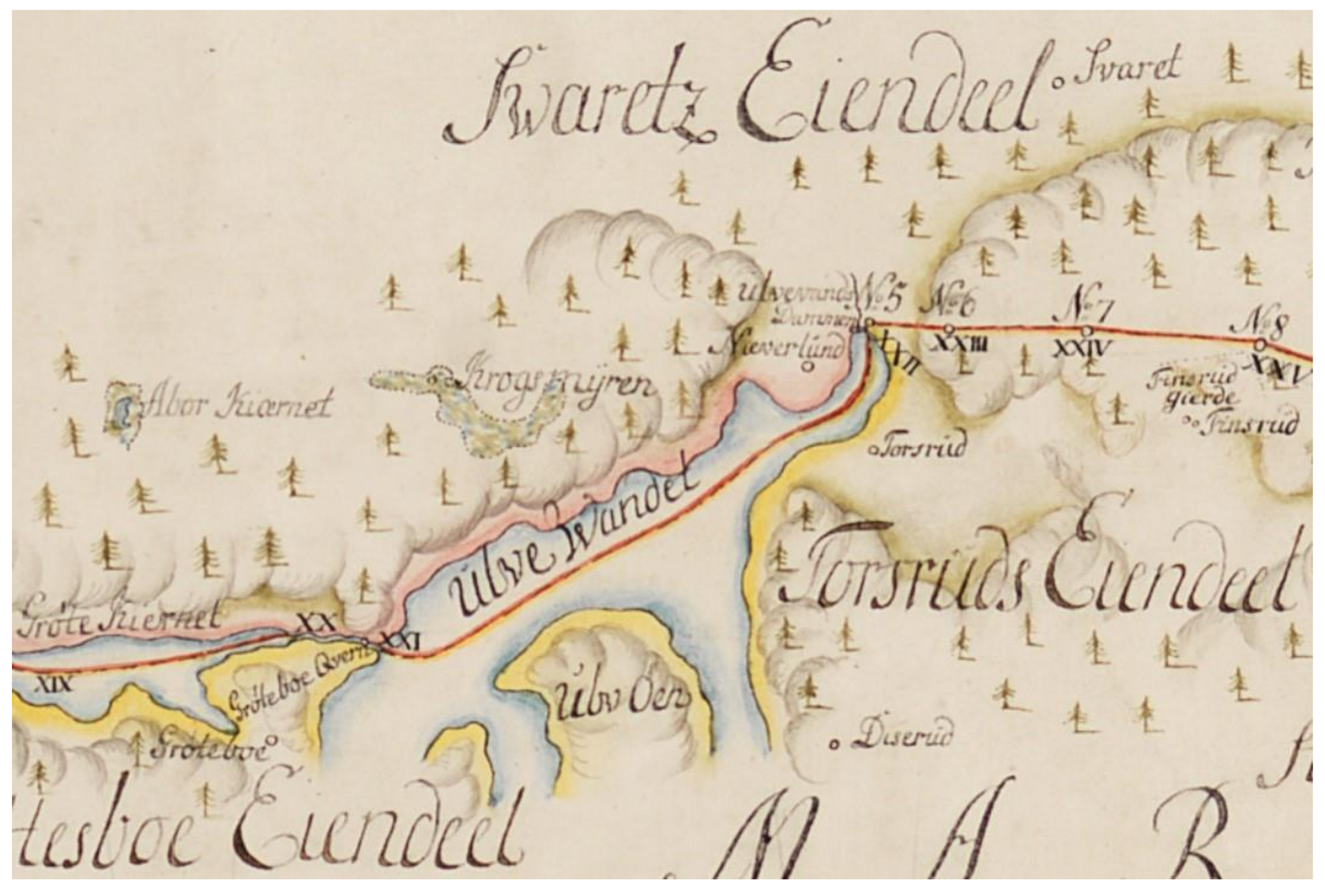

Figure 1: *The main part of the boundary between Norway and Sweden (including Finland) was agreed through the Treaty of Strömstad in 1751. 349 national boundary markers (stone cains) were built 1752–1766) Markers Rr 5–Rr 8 are located close to Lake Stora Ulvattnet.*

Figure 2: *The stone cairns are large monuments up to two metres high. They have an up-standing central stone with inscriptions, where the original stone cairns from the 18th century bare the royal monogram's of the Swedish king Adolf Fredrik and the Danish king Fredrik V. Picture: Malcolm Skalin.*

Figure 3: *During the ongoing review of the national boundary 2020–2024, all boundary markers are restored, painted yellow and measured. The inscriptions on the central stone are filled in with black paint. Picture: Dan Norin.*

Figure 4: *The fieldwork during the review of the national boundary 1929–1930 was done in a similar way as during the ongoing review. Rr A close to Idefjorden in the south is however nowadays positioned with more modern surveying technique. Picture: Lars Pettersson.*

Figure 5: *Norwegian Boundary Commissioner Anders Østeraas is surveying Rr 52B with a network RTK service (SWEPOS or CPOS). Rr 52B consists of a large natural stone. Picture: Dan Norin.*

Figure 6: *The highest point on the boundary between Sweden and Norway is located on the mountain Nuortta Sávllo (1752 metres above MSL). The boundary marker on the mountain (Rr 236Aa) was however difficult to find, since it nowadays is situated under a glacier. Picture: Dan Norin.*

Figure 7: *The boundary is along some stretches in the south part drawn in lakes and following rivers and creeks, which are indicated by signs. Some misspelled signs are replaced during the ongoing review. Picture: Dan Norin.*

Figure 8: *Helicopter transportation is essential to be able to carry out the ongoing review in remote locations. One helicopter base is located in Kvikkjokk, where a permanent reference station for GNSS in the SWEPOS network is also located. Picture: Dan Norin.*

Figure 9: *The five-metre-wide clearing along the boundary line is (below the tree line) made free of trees and shrubs. Picture: Dan Norin.*

Figure 10: *To be able to get a straight five-metre-wide clearing between the boundary markers, the boundary line is set out with network RTK and marked with wooden sticks. Picture: Dan Norin.*

Figure 11: *"Utliggare" are smaller stone cairns which only show the boundary line, not defining it. These are also measured with GNSS. Picture: Karl Tirén.*

Figure 12: *Treriksröset has been renovated during the ongoing reviews of the national boundaries between Sweden and Norway 2020–2024 and between Norway and Finland 2022–2025. Brigadier General Matti Sarasmaa from Finnish Boundary Surveillance gave a short speech during an inspection 18 August 2022. Director Generals of Lantmäteriet (Susanne Ås Sivborg) and Kartverket (Johnny Welle) were listening carefully. Picture: Dan Norin.*

Figure 13: *Swedish Boundary Commissioner Martin Lidberg explained in Swedish national TV that the restoration of Treriksröset was successful. During the repair of the lower part of the cairn, affected by the fact that it is situated in a lake, 260 kilograms of mortar was used. Picture: Dan Norin.*