

# TECHNICAL IMPROVEMENTS FOR INCREASING TRAFFIC

## Finland

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## 1 GENERAL

### 1.1 Purpose of the Study

The purpose of this study is to recognize technical barriers and possibilities to improve traffic in inland waterways in Finland. The original goal of the task was to develop a barge prototype for inland transport. However, it was soon realised that inland traffic in Finland occurs between inland ports and sea ports in the Baltic and Northern Sea; not between inland waterways. A standardised barge concept would be beneficial in other inland waterways, but the specific barge is not an option for Finland. The traffic is and will be done by standard seagoing coaster vessels.

Following technical challenges have been recognized:

- Limited availability of suitable vessels.
- Lock size is limiting usable size of the vessels
- Limited availability of operational information
- Limited draft in the Saimaa (4,35m)

### 1.2 Description of the Saimaa Canal and Lake Area

Vuoksi Waterways or Lake Saimaa consist of several lakes and waterways connected by natural or artificial canals and locks. There are several commercial ports in the Saimaa area. These are either public or industrial ports. Efficient waterway connection is essential for industry in Eastern Finland.

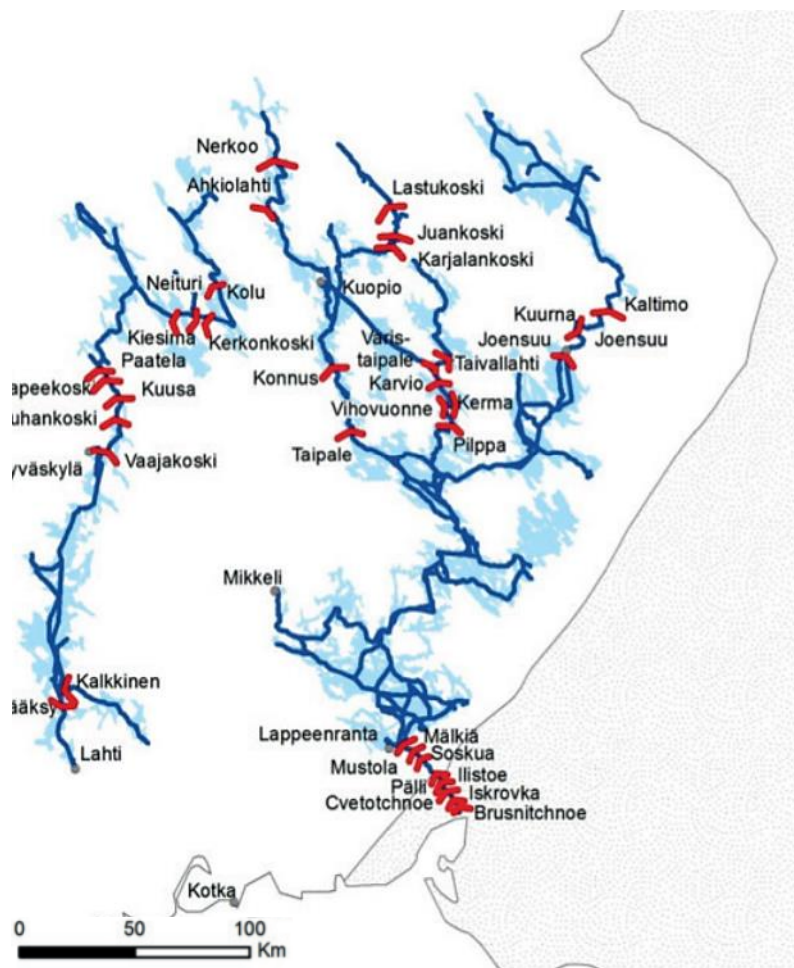
Major Ports in the Saimaa include:

- Lappeenranta
- Imatra
- Savonlinna
- Kuopio
- Joensuu

The Saimaa Canal is rented from Russia until 2062. The Canal was built originally in 1856 and it was rebuilt in 1968. The length of the Canal is 42.5 km half of which is in the rented area. The maximum size of the vessels in the Saimaa Canal are:

- Length: 82,50m
- Width: 12,60m
- Draft: 4,35m
- Height: 24,50m

The length of commercial fairways in the Saimaa Canal and Lake Saimaa is 772 km. The Saimaa Canal, Lake Saimaa and locks are described in the Figure 1. The Saimaa Canal connects Lake Saimaa to the Baltic Sea.



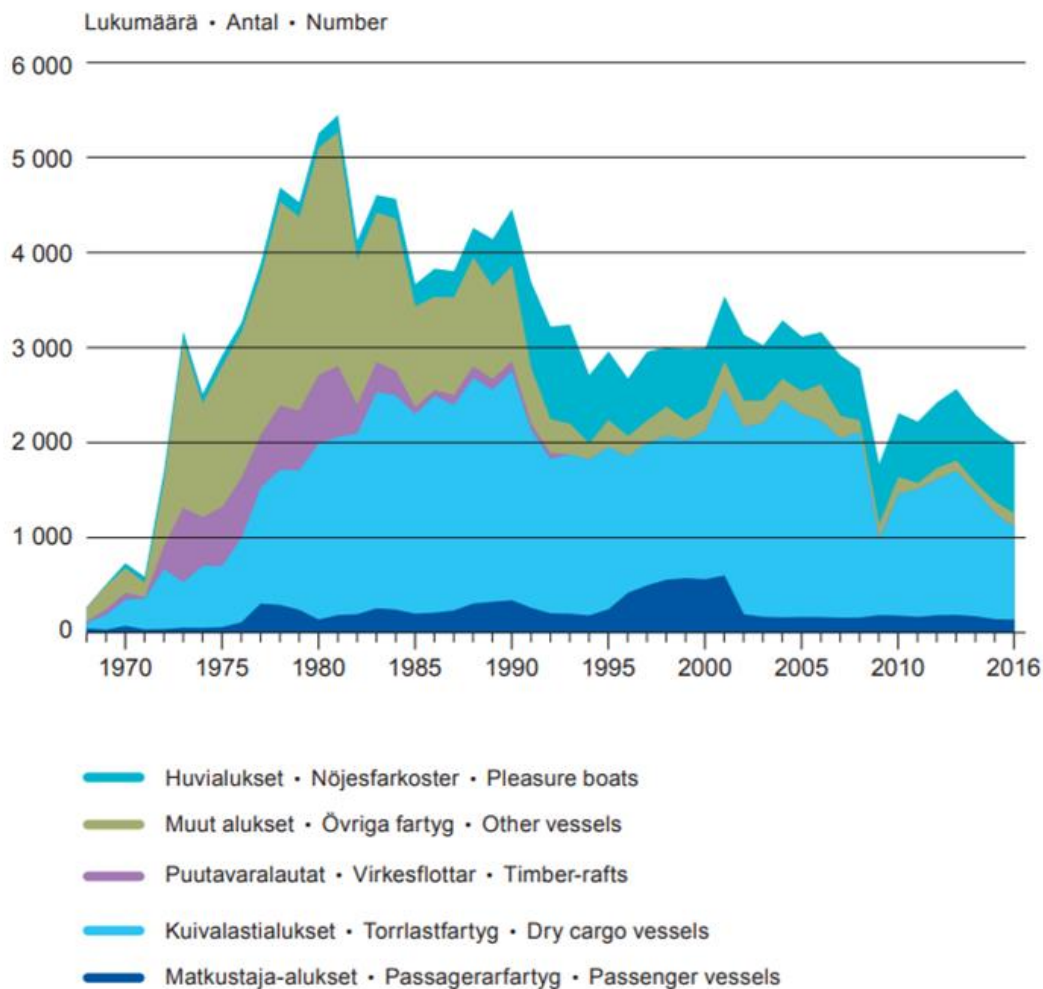
**Figure 1 - State-owned lock canals. Statistics on traffic through the Saimaa Canal and other canals in Finland Statistics of Finnish Transport Agency 1/2017**

### 1.3 Statistical Development and Future Expectations of Traffic Volumes

It is crucial to develop ship traffic as a commercial option for logistics. The present development is critical for the future. Ship traffic has decreased steadily (see figure 2).

Reasons for decreased traffic:

- Ship sizes are getting bigger, limiting the number of available vessels
- Just on time deliveries require smaller batch sizes
- Trucks and trains are favoured



**Figure 2: Statistics of Finnish Transport Agency 1/2017**

#### 1.4 Suitable Vessels in the Northern Baltic

Vessels which are sailing to Lake Saimaa ports are ordinary sea vessels (coasters) with appropriate dimensions to fit in the locks. Vessels sizes have been increasing generally in the shipping business. This has led to the situation that a great deal of vessels sailing in the Northern Baltic cannot sail to Lake Saimaa in the future.



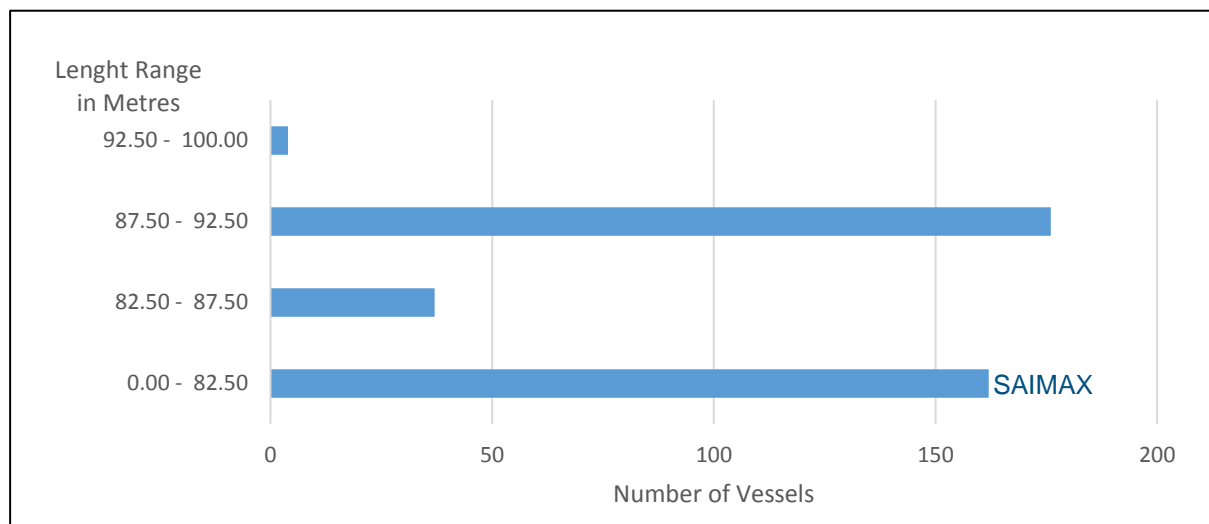
Saimax  
m/s Baltic Sailor  
DWCC 2950  
Length (LoA) 82,50 m  
Breadth 12,50 m  
Draught 5,10 m  
Source: [www.meriahura.fi](http://www.meriahura.fi)



m/s Prima Lady  
DWCC 3200 Summer  
Length (LoA) 87,96 m  
Breadth 12,50 m  
Draft 5,30 m  
Source: [www.primas.fi](http://www.primas.fi)

**Figure 3: Comparison of Saimax and larger vessel**

A statistical sample was made of 379 vessels operating in the Baltic area with width of 12.6 metres or less (Figure 4). 12.6 metres is the maximum width in the locks of Saimaa Canal. It is concluded that the number of possible vessels will more than double, if length of the locks will be increased by 10 metres. The figure below also shows that lengthening of five metres is not enough and lengthening more than ten metres is not feasible.



**Figure 4: Statistical sample of vessel lengths with maximum width of 12.6 metres**



## 2 DEVELOPMENT OF SOLUTIONS

### 2.1 Methodology

The methodology of this study is based on literature research, statistical analyses and interviews. This has been done in co-operation with the WP XXX. Partners' own local operational knowledge of the subject has also been vital for understanding both the complexity of current situation as well as future possibilities.

### 2.2 Developing a New Barge Type for Saimaa

Developing a new barge type for Lake Saimaa was a presupposition as the starting point. However, it was soon realized that the traffic structure in Lake Saimaa differs from most of the IWWs. The traffic in Lake Saimaa occurs from the lake area to the seaports in the Baltic and the North Sea; internal transport within Lake Saimaa and other IWWs is minor.

The traffic in Lake Saimaa is based on seagoing coasters. Shippers are using chartered vessels for single or multiple voyages. Contract period is typically short, and shippers cannot commit to long contracts (several years), which would be needed for investing in specific vessels.

### 2.3 Extending the Locks

Current locks were built in the late 1960s. Ships were considerably smaller as today. Some vessels were built according to "Saimax" dimensions in order to sail to the Saimaa. Smaller Saimax vessels are no longer competitive with other shipping and chartering activities in the Baltic Sea. Ships sailing to Saimaa must be flexible to transport cargo between other than Lake Saimaa ports.<sup>1</sup>

The Finnish Transport Agency has studied different options to extend locks for allowing larger vessels. It seems that locks can be extended approximately 10 to 12 metres by reconstructing the gates. However, it should be noted that increased length often increases the beam of the vessel, but there are also several longer vessels with adequate beam less than 12.6 metres.

The Finnish Transport Agency has estimated that the cost for extending the locks by 10 metres would cost approximately 60 million euros. This will allow 93 metres long vessels to Saimaa (Vuoksi) waterways. These vessels can transport from 200 to 500 tonnes more cargo.<sup>2</sup>

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<sup>1</sup> <https://yle.fi/uutiset/3-10343385>

<sup>2</sup> <https://www.liikennevirasto.fi/ajankohtaista/tapahtumat/vesivaylapaiva-6.4.2016#.W9gjVf1f3IV>

## 2.4 Higher Water Level in Saimaa

The Advisory Committee of Eastern Finland has presented a white paper for developing the Saimaa Canal in order to support industrial development in the traffic system in Eastern Finland. The subjects are lengthening the locks and raising the water level in the Saimaa Canal and Lake Saimaa (Vuoksi) waterway by 10 cm.

Raising the water level will require some structural changes in the canal. It will increase for instance maintenance costs of canal walls. The estimated costs for raising the water level is five million euros.

The Advisory Committee<sup>3</sup> has recognized following advantages for lengthening the locks and raising the water level by 10 cm:

- Available number of possible vessels will be increased
- Cargo capacity could be increased from 800 to 900 tonnes, which will improve feasibility of inland waterway traffic
- Ships capability to operate in icy conditions will be improved
- New passenger cruise ship traffic is possible

## 2.5 Providing Operational Information and Promoting the Saimaa IWW

Operational model in the Saimaa inland waterway resembles the seaports in Finland. This model includes e.g. Portnet – information platform, Vessel Traffic Service (VTS), Automatic Identification of Ships (AIS) and pilotage. However, information is not currently available to all stakeholders requiring information.

Open data principle has been adopted by the Finnish Public Authorities. Data is available free of charge. The main issue is to develop solution and interfaces to the data.

Example of available free open data:

- Sea charts
- AIS data (ships location and other information)
- Portnet data (ship schedules)
- Weather
- Water level

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<sup>3</sup> <http://www.pohjois-karjala.fi/-/ita-suomen-neuvottelukunnan-kannanotto>



### 3 CONCLUSIONS AND RECOMMENDATIONS

The Saimaa Canal and the Saimaa (Vuoksi) waterway are crucial for the industry in the area. There are several industries, such as pulp and paper mills as well as mines, which depend on economical mass transport provided by ships.

Dedicated barges, which could be a feasible solution elsewhere, are not suitable for Lake Saimaa because of the location of ports and the nature of traffic between inland ports and seaports.

The Saimaa Canal and waterway should be kept in operative condition and competitive compared to other transport modes. Ship sizes have continuously increased during the past years. This has reduced the number of available vessels. Lengthening the locks and increasing the water level in the Saimaa Canal and the Saimaa waterway will present an opportunity to a larger number of vessels and higher cargo capacity.

It is recommended to prepare a detailed feasibility study for the lengthening of the locks and raising the water level. This study should consider direct impacts but also indirect impacts to enable industrial development in the region.

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## 5 ABRIVIATION LIST

AIS	Automatic Identification of Ships
DWT	Dead Weight Ton (ships total weight)
DWCC	Dead Weight Ton (weight of cargo that can be loaded)
Saimax	Vessel with maximum dimension to enter the Saimaa Canal
VTs	Vessel Traffic Service



## 6 REFERENCES

The Advisory Committee of Eastern Finland, white paper. Retrieved October 9, 2018, from <http://www.pohjois-karjala.fi/-/ita-suomen-neuvottelukunnan-kannanotto>

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