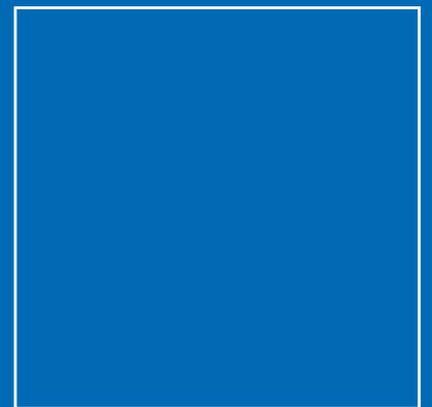
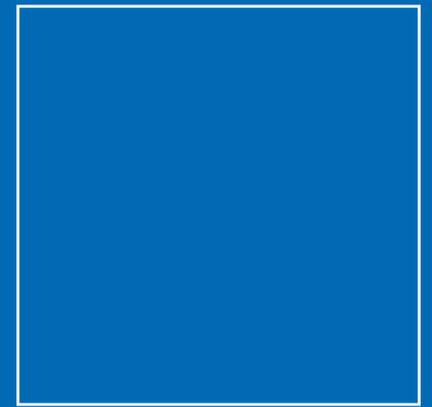


WATERWAYS in Finland



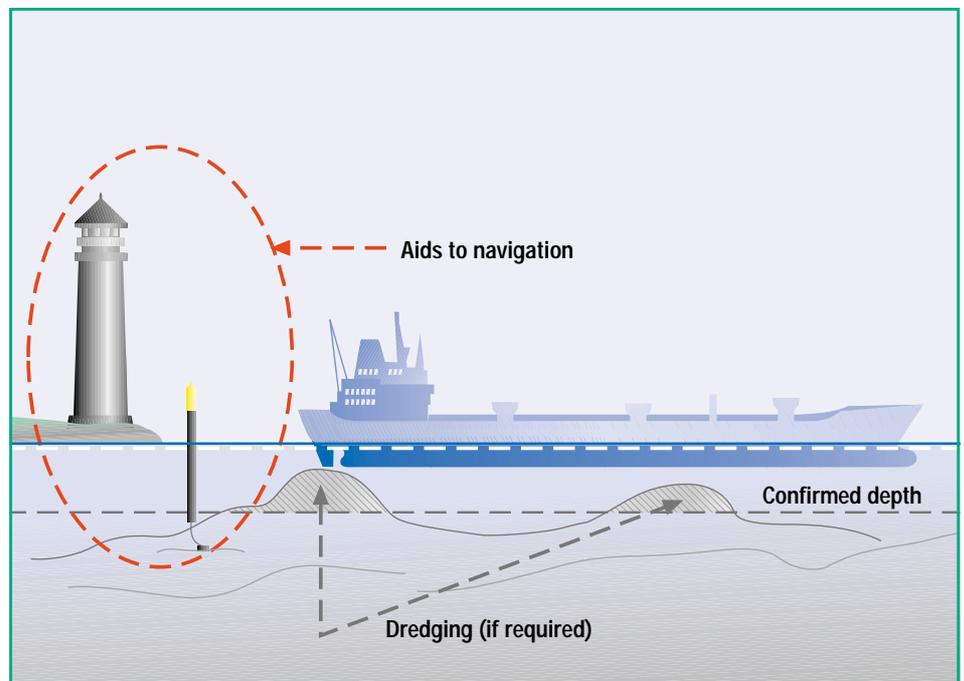
The efficient and economical running of Finland's vital international transport demands a comprehensive and safe network of fairways. The mission of the Finnish Maritime Administration is to build fairways so that they intermesh seamlessly with other modes of transport. In addition to merchant shipping, fairways also serve other shipping services, such as island ferries, fishing and boating.

■ Finnish Maritime Administration is responsible for sea routes and inland waterways

The network of fairways consists of coastal fairways, inland waterways, and canals. The total length of the fairway network maintained by the Finnish Maritime Administration is approximately 16,000 km, of which coastal fairways account for 8,200 km and inland waterways for 7,800 km. The most visible part of the fairways is aids to navigation such as lighthouses, racons and edge marks, beacons, leading marks, buoys and spars. The maximum authorized draught of the deepest coastal fairways is 15.3m. The deepest fairways in the inland waterways are the Saimaa Canal and the Saimaa deep-water channels, where the maximum authorized draught is 4.35m.

Finland's indented and shallow coast, combined with the freezing of coastal waters in the winter, sets challenges to fairway maintenance. The fairways are long and they have many narrow and winding sections.

The structures of a coastal fairway



■ Development and maintenance

In fairway maintenance, the goal is a safe and logistically economical network of fairways. Fairways must also be economical to maintain.

Development projects are primarily aimed at upgrading the logistical economy or safety of existing fairways. The main thrust in improvements is to enhance the technical quality, navigability and safety of fairways as well as to upgrade the information systems related to them. The economic viability of fairway projects is considered as part of the transport system. The trend in the national economy and the prospects for the public economy are reflected in the demands and possibilities for development in the fairway network.

Fairways and their aids to navigation are maintained by channel masters and channel keepers, based at fairway depots. The country is divided into 36 fairway maintenance districts. Maintenance jobs on the open sea and those which entail heavy lifting are handled by nine purpose-built buoy tenders. The majority of fairway building work is commissioned from private contractors and consultants.

Basic fairway maintenance includes, in addition to maintaining fairways, major overhauls of fairways, canal maintenance, and the operational services of locks and movable bridges.

Fairway maintenance is closely linked with other functions of the Finnish Maritime Administration – hydrographic surveys, charting, icebreaker services, and vessel traffic management systems.

Maximum authorized draught of coastal fairways and inland waterways

	MERCHANT SHIPPING FAIRWAYS, maximum authorized draught 4.0-15.3 m	SHALLOW FAIRWAYS, maximum authorized draught < 4.0 m	TOTAL
Coastal	4 606 km	3 619 km	8 225 km
On inland waters	814 km	7 028 km	7 842 km
Total	5 420 km	10 647 km	16 067 km

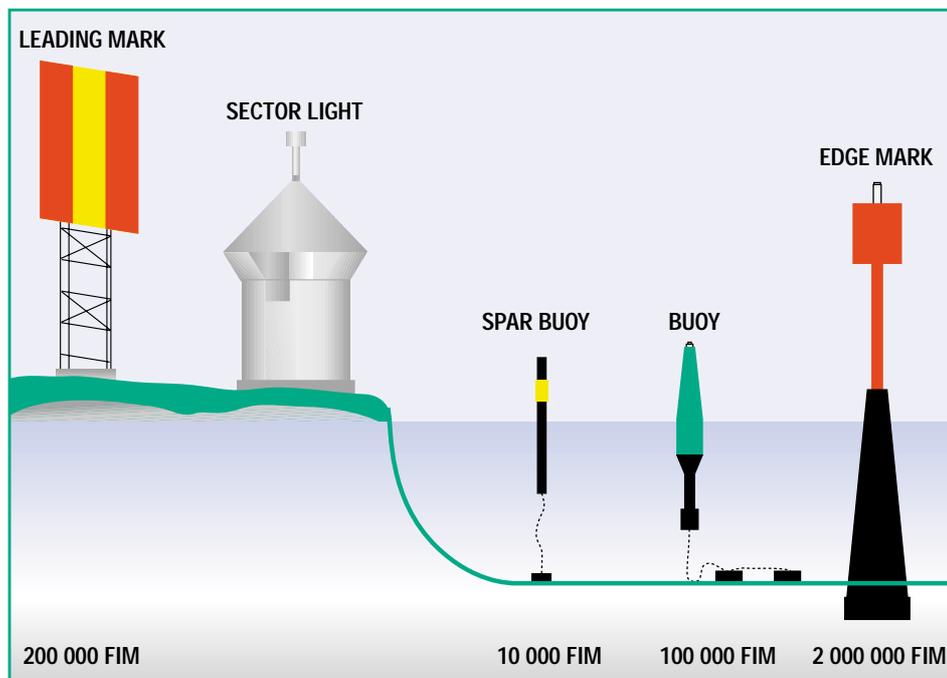
Network of routes for different modes of transport

PUBLIC ROADS	77 894 km
MUNICIPAL ROADS AND STREETS	40 313 km
RAILWAYS	5 867 km
WATERWAYS	16 067 km

(Privately maintained routes are not included.)

Aids to navigation

The long and winding fairways of the coastal regions call for large numbers of aids to navigation. The price of an aid to navigation is affected by the type, by the ice conditions, and by the conditions in which the item is installed.

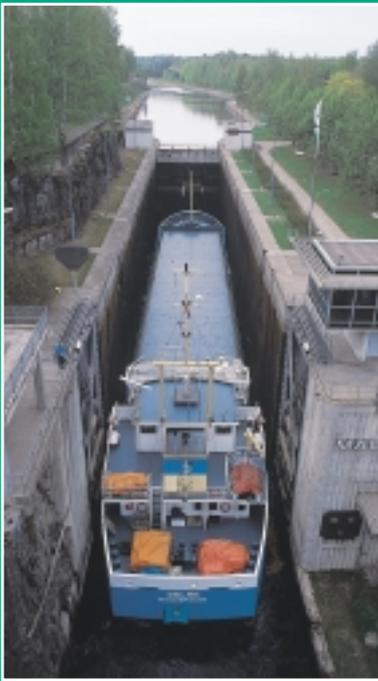


	Finnish Maritime Administration	Municipal and private	Total
Fixed aids to navigation	8 541	725	9 266
Floating aids to navigation	17 211	3 290	20 501
Total	25 752	4 015	29 767

Environmental factors

The Finnish Maritime Administration figures environmental factors into everything it does. The environmental impact is assessed in all cases when projects are being planned. Construction methods are being improved in a more environmentally friendly direction, and for maintenance, minimal impact materials and working methods are used. Environmental impact assessment procedures and statutory regulations further ensure that environmental aspects are given extensive consideration.





■ Canals

The Finnish Maritime Administration maintains 29 canals with locks as well as the Saimaa Canal, which has eight locks. Roughly two thirds of the locks have been automated by now, and more of them are being automated all the time, as are the drawbridges crossing canals and waterways.

The most important of the canals is the Saimaa Canal, some 40 kilometres in length, which connects Lake Saimaa with the Gulf of Finland. The section of the Saimaa Canal which is on the Gulf of Finland side is on territory leased from Russia.

■ Precise information on fairways

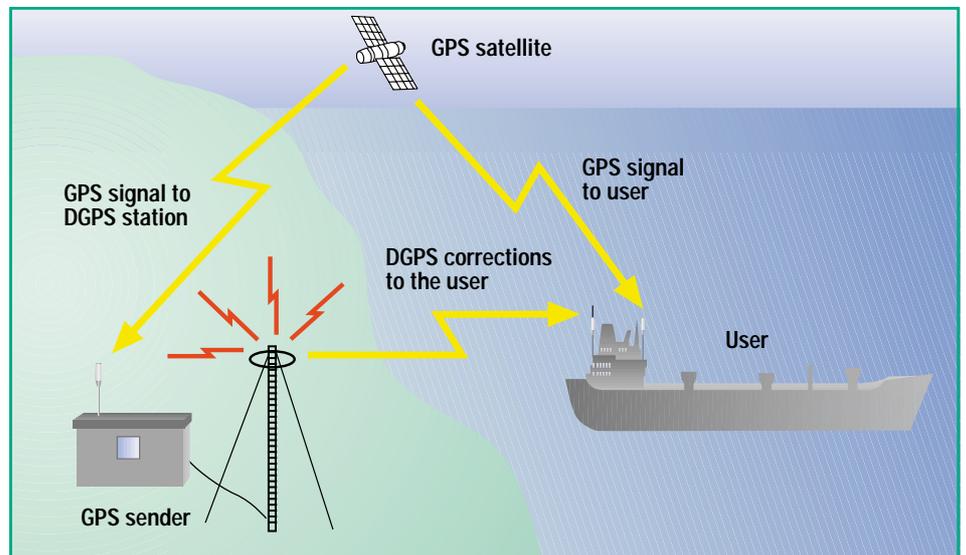
The Finnish Maritime Administration is running a programme in which the data relating to depths of fairways, the fairway area, the routing and buoyage are to be checked. At the same time small improvements will be made. The result will be more accurate and reliable information on the network of fairways, up to the standard of accuracy required for the latest satellite-based navigational systems. The job requires the implementation of an extensive programme of hydrographic surveying and fairway designing. The programme is scheduled for completion on the main fairways for merchant shipping in 2003, but work on the rest of the network of fairways will continue for a decade.

■ Radio navigation services

In support of mariners and to protect their safety, we develop positioning, navigation, guidance and notification systems.

For purposes of satellite navigation, the Finnish Maritime Administration has built and maintains a network of reference stations with which to enhance the accuracy of the American GPS system. This DGPS application provides adequate positioning accuracy even for fairway navigation. Whereas a GPS signal still does not include information on the correctness of the broadcasts, even though the US has stopped interference with GPS, the use of DGPS is still essential for applications such as merchant shipping.

Among the main applications of the DGPS system, in addition to ordinary navigation, is the new AIS system for the automatic identification of ships.



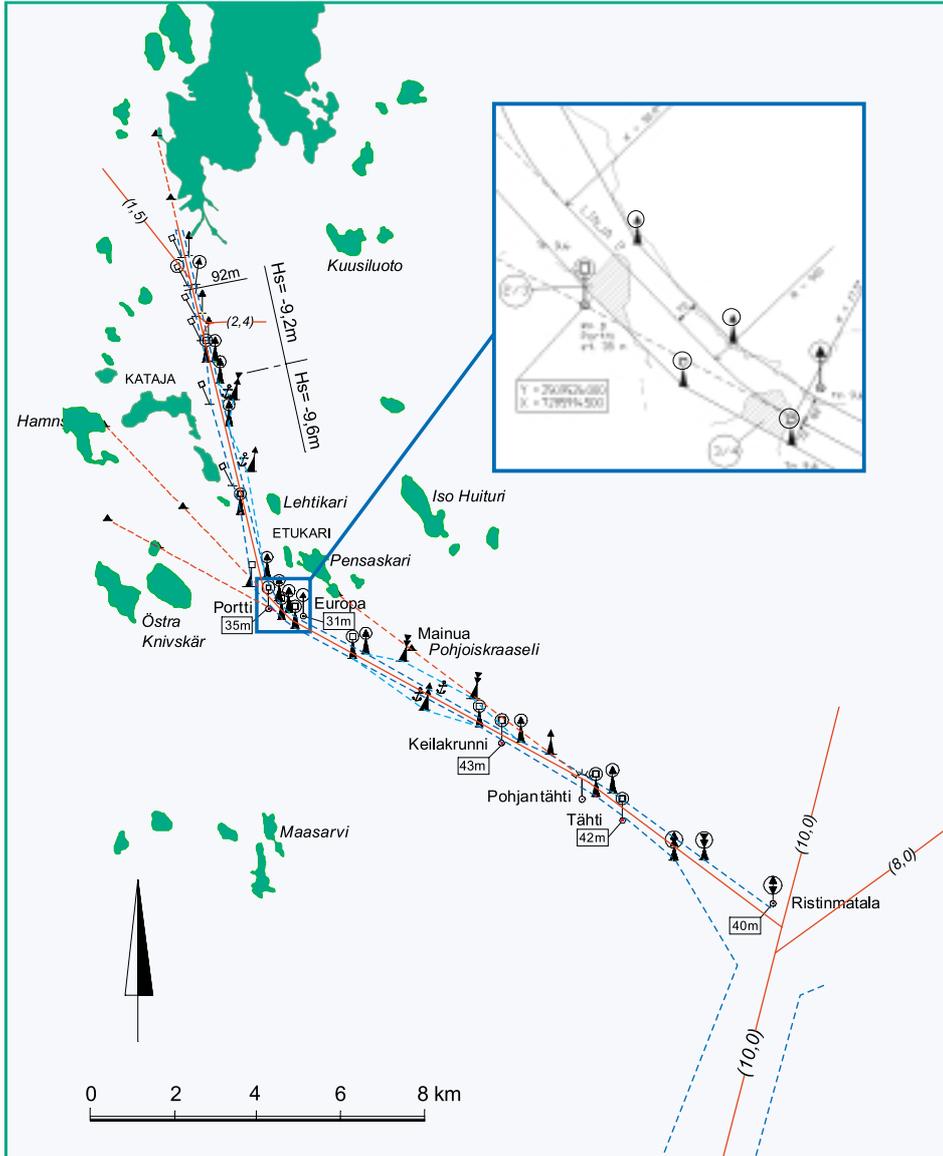
The operating principle of the differential GPS system

The Finnish Maritime Administration is an active participant in developing the system within the framework of international standardization.

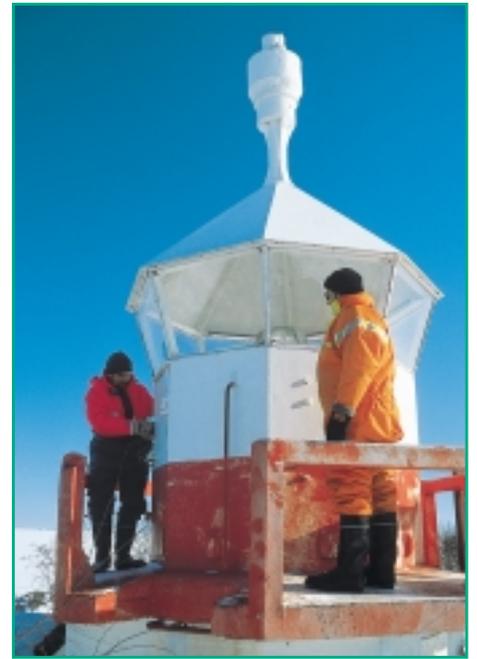
The VTS (Vessel Traffic Service) system is based on the combined use of a VHF telephone, radar, computers and TV monitoring. VTS helps to increase traffic safety and reduce risks. It also contributes to the prevention of environmental accidents.

VTS monitoring covers most of the Finnish coastline. There are VTS centres in Kotka, Helsinki, Turku and Vaasa.

A typical approach channel on the coast



Spar buoy port	Ice buoy south	Lighted ice buoy south	Lighted ice buoy port	Radar target
starboard	north	north	starboard	Leading mark
Spar buoy port	port	east	east	Distance of edge mark from edge of fairway
starboard	starboard	west	Edgemark port	42m



■ The economics of fairway maintenance

The costs of maintaining the network of fairways are approximately FIM 150 million per year, of which merchant shipping accounts for roughly half. Compared with overland modes of transport and in view of their importance to the national economy, fairway maintenance is a great bargain.

Investments in improvements have averaged FIM 50 million in the past few years. The grounds for development projects have been primarily savings in the cost of foreign-trade shipping – unit freightage rates decline when shipments can be handled with larger vessels.

Changing over to larger vessels has slowed down the growth in ship traffic, which has done much to reduce the risk of accidents and cut back on emissions from vessels.

Fairway projects are often a part of port improvements and they are carried out jointly with port authorities. The port authority is responsible for construction costs in the port area.

The costs of fairway maintenance and icebreaking for merchant shipping are covered by fairway charges. One hundred per cent correspondence to costs has been achieved with these charges.

■ Sea lanes vital to foreign trade

Sea traffic accounts for 70 per cent of Finnish imports and no less than 90 per cent of exports. In 1999, ships trading with foreign countries carried 77.5 million tonnes of cargo and some 16 million passengers. The number of port calls was approximately 34,000. Waterborne transport within Finland carried 10 million tonnes of cargo and 4.5 million passengers.

Sea transport has grown by roughly three per cent a year, and the number of passengers has increased by almost five per cent. However, the number of ship calls in freight shipping has not increased substantially, as the expanding demand for transport has been accommodated by increasing the size of vessels.

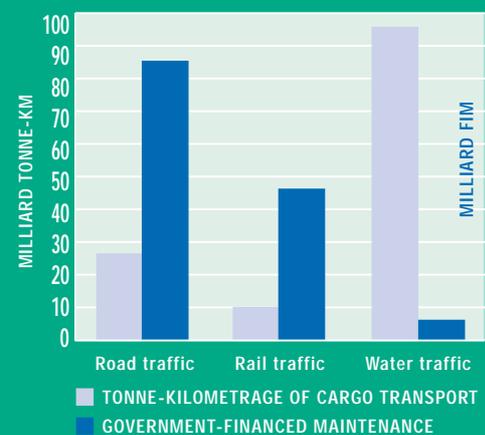
It is forecast that Finland's foreign-trade shipping will reach about 110 million tonnes in 2020 (excluding transit shipments), assuming that the gross domestic product grows by an annual average of 2.5 per cent and that world market prices and the methods used to implement energy tax policy hold the demand for coal and oil products at close to their present level. The increase from today's base level would be some 35 million tonnes. Particular growth is expected in the transport by road vehicles, trailers, railway wagons and containers. Container traffic is forecast to triple during the forecast period. Merchant shipping fairways also serve leisure boaters.

However, the Finnish Maritime Administration also improves and maintains special fairways and routes for yachtsmen. Some of the small craft tracks are the responsibility of municipalities and private parties such as yacht clubs.

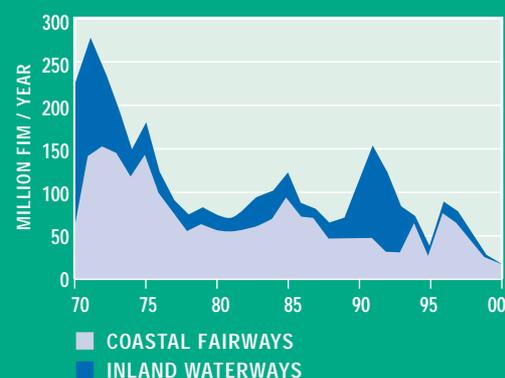
■ How to find more information

Information about fairways and aids to navigation is published on charts and in lists of lights (lighted aids to navigation). Charts of Finland's coastal and inland waters are published by the Finnish Maritime Administration, and sales and marketing is handled by the publishing house WSOY and its distributors. Charts are published both on paper and in electronic format.

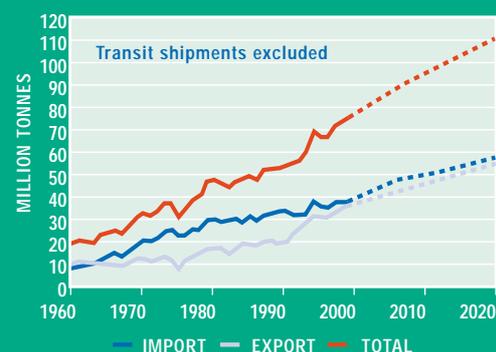
Changes in fairways are announced in Notices to Mariners and Notices to Yachtsmen. Information on fairways and aids to navigation is maintained in the Finnish Maritime Administration's register of geographical information.



The financing of the networks of different modes of transport from government budgets and the tonne-kilometrage of cargo transport using these networks, 1998. (Half of the foreign shipments have been counted in the tonne-kilometrage for water transport.)

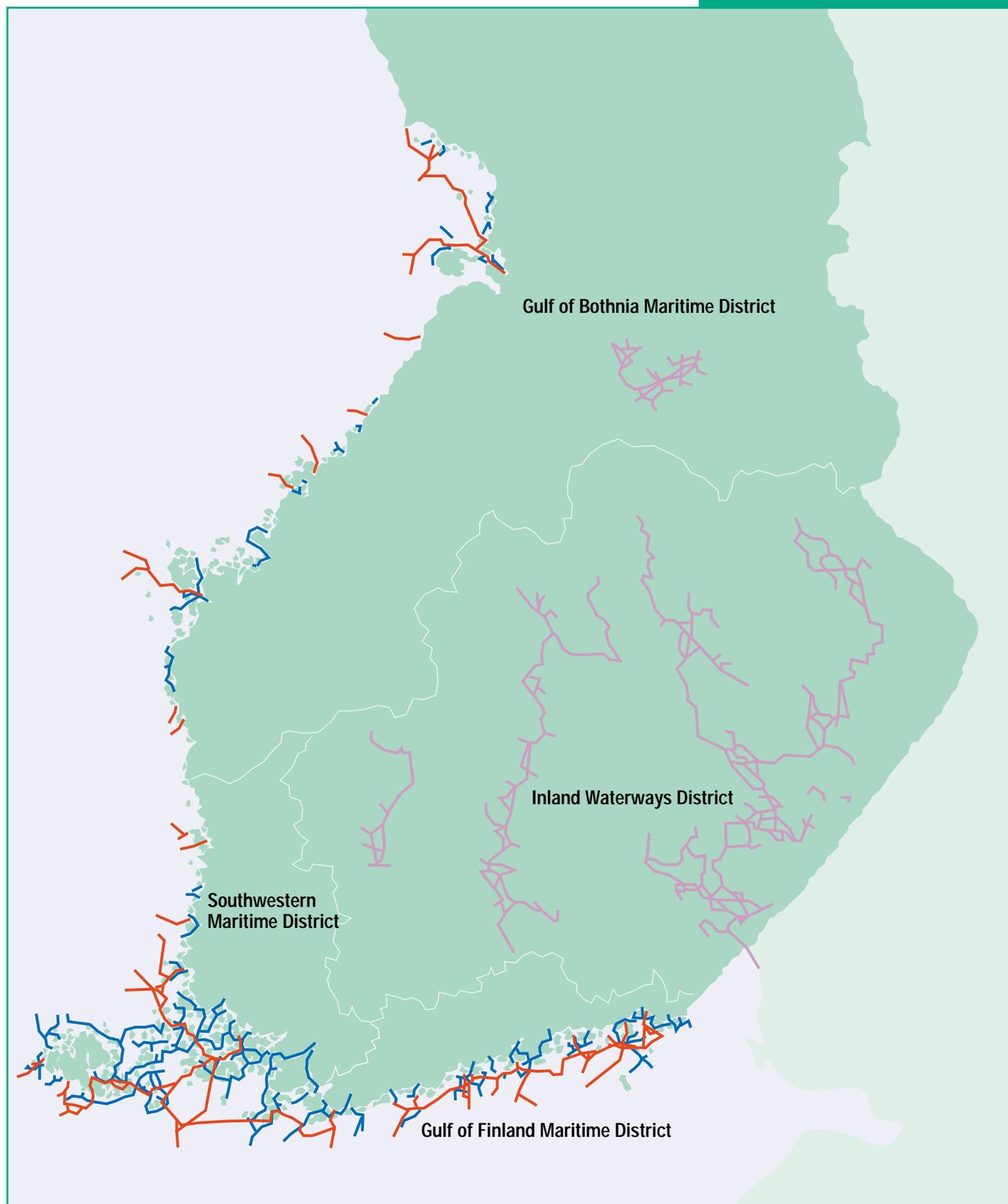


Funds allocated to improve the waterway network, 1970-2000.



The trend in sea transport between Finland and other countries since 1960 and the forecast to 2020 (Forecast: Growth prospects in shipping to and from Finland to the year 2020, Finnish Maritime Administration, 1999)

The most important Finnish waterways



	Fairways	≥ 8 m
	Fairways	$\geq 4 - < 8$ m
	Inland waterways	≥ 2.4 m





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