

RAAKKU!

Alleco

State of the freshwater pearl mussel populations in Finland



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METSÄHALLITUS
FORSTSTYRELSEN



INTERREG
IV A NORD

Gränslösa möjligheter
EUROPEISKA UNIONEN
Europeiska regionala
utvecklingsfonden

Distribution of FPM in Finland: northern Finland

Teno River Basin:

3 populations

Näätämö River Basin:

1 population

Lutto (Tuuloma) River Basin:

24 populations

Kemijoki River Basin:

32 populations

Torniojoki River Basin:

2 populations

Koutajoki River Basin:

4 populations

Simojoki River Basin:

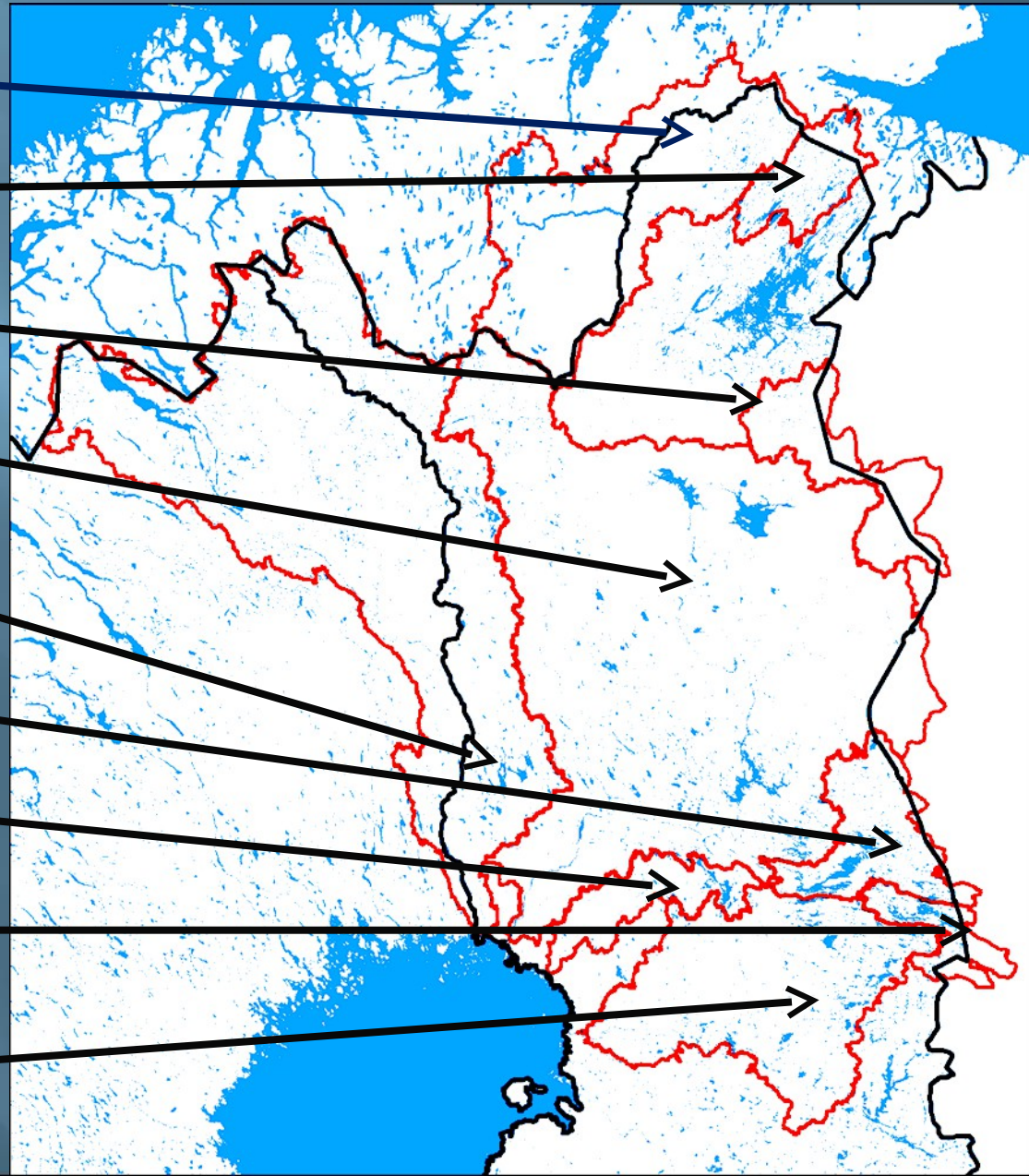
2 populations

Kem (Carelia) River Basin:

1 populations

Iijoki River Basin:

29 populations



Distribution of FPM in Finland: southern Finland

Oulujoki River Basin:
12 populations

Pyhäjoki River Basin:
1 population (extinct?)

Ähtävänjoki River Basin:
1 population

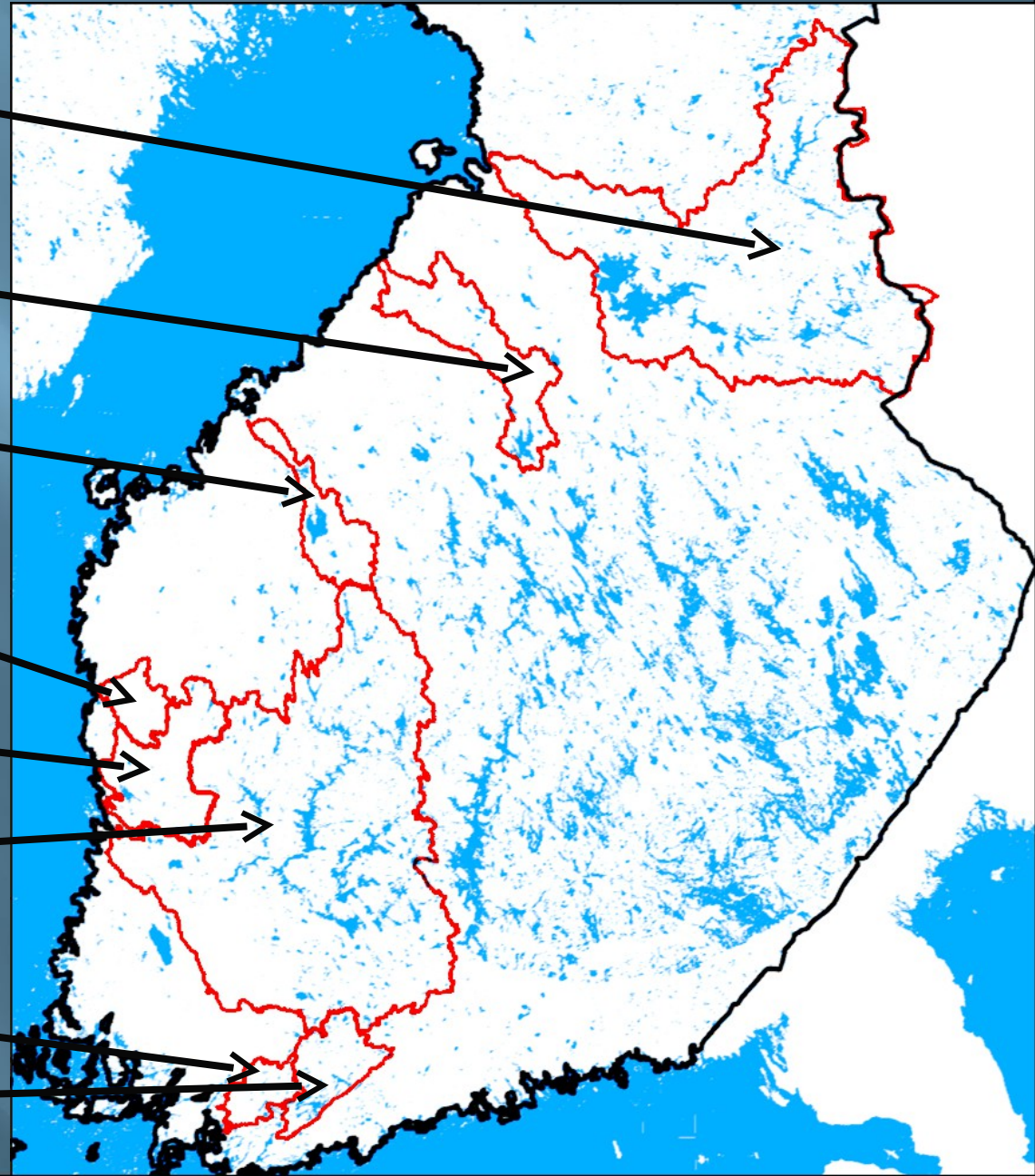
Lapväärtinjoki River Basin:
1 population (extinct?)

Karvianjoki River Basin:
3 populations (extinct?)

Kokemäenjoki River Basin:
2 populations

Kiskonjoki River Basin:
1 population (extinct?)

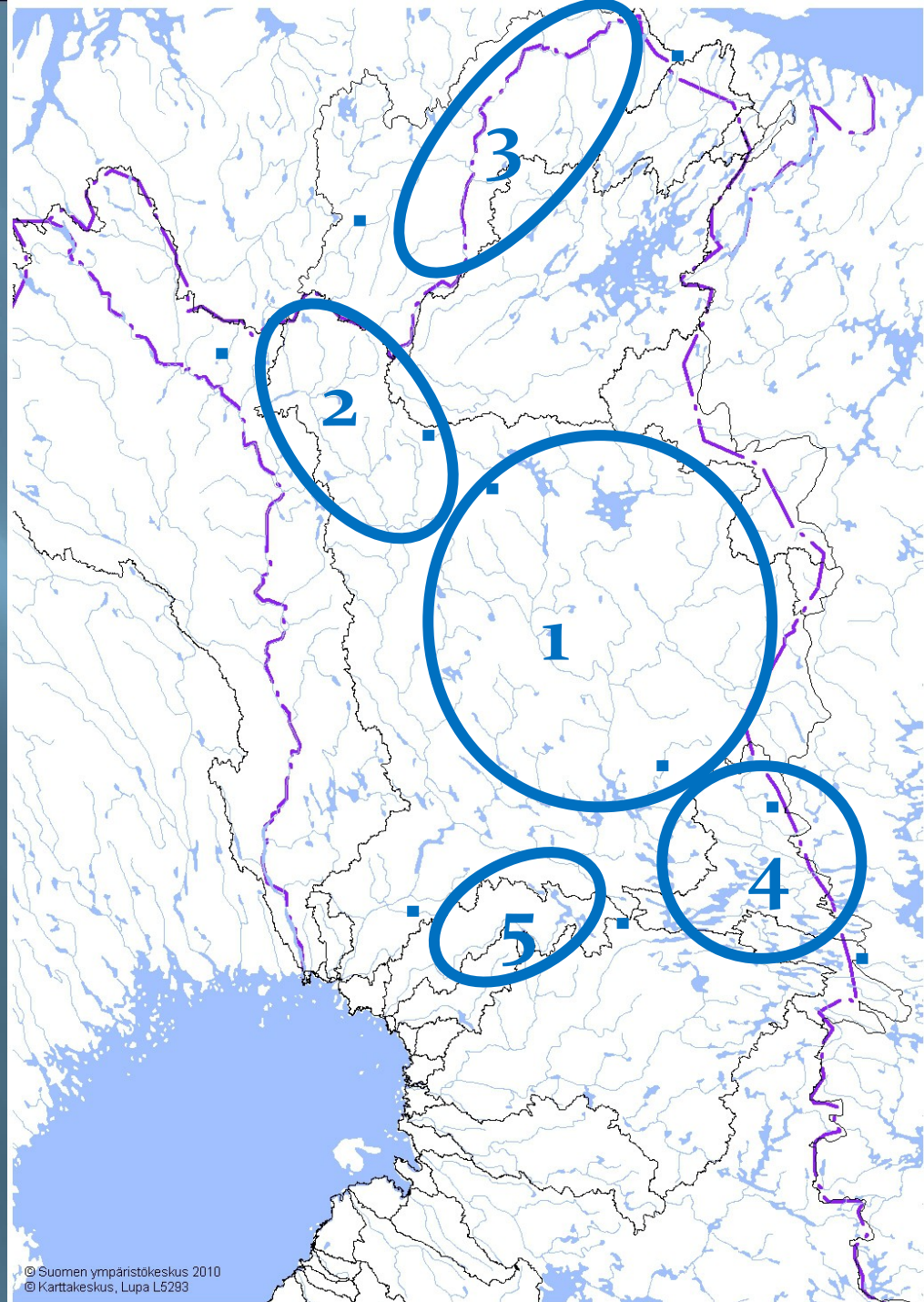
Karjaanjoki River Basin:
1 population



Summary:

- Total 120 known FPM populations
- Population status assessment has been done in 24 rivers (3 rivers in southern Finland and in 21 rivers in northern Finland)

Large areas still uninvestigated – especially in Kemijoki (1), Ounasjoki (2), Teno (3), Koutajoki (4) and Simojoki (5) river basins



Viability classes

Status class	Criteria
<i>Viable</i>	>20 % <50 mm and >0 % <20 mm (>500 ind.)
<i>Viable?</i>	>20 % <50 mm or >10 % <50 mm and >0 % <20 mm (>500 ind.)
<i>Non-viable/ Partly viable</i>	<20 % <50 mm (>500 ind.) or >20 % <50 mm (<500 ind.)
<i>Dying-out</i>	All >50 mm, (>500 ind.)
<i>Almost extinct</i>	All >50 mm, (<500 ind.)
<i>Extinct</i>	Earlier documented occurrence but now gone

Söderberg et al. (2009); Bergengren et al. (2010)

- Population size estimate and the proportion of juvenile mussels in random transects
- No digging of substrate: only visible mussels (observing by snorkling/SCUBA diving)

Summary studied populations

Status	Random sites	Optimal sites
Viabile	1	2
Viabile?	2	4
Non-viable/ Partly viable	18	14
Dying-out	2	2
Almost extinct	1	1
Extinct	-	-
Total	24	24

Breeding (< 50 mm mussels found)	21
Recent recruitment (< 20 mm mussels found)	8

=> In most of the studied populations recruitment takes place (partly viable)- but is it adequate to maintain the population?

Whole Finland (estimate)

Status	Number of rivers	%
Viable	5	4 %
Viable?	10	8 %
Non-viable/ Partly viable	31	26 %
Dying-out	54	45 %
Almost extinct (or probably already extinct)	20 (3)	17 %
Total	120	100 %
Extinct	>100	

Breeding (< 50 mm mussels found)	45	38 %
Recent recruitment (< 20 mm mussels found)	19	16 %

QUESTIONABLE:

Are the same viability criteria valid in northern FPM populations?

- Mussels live in their northern distribution range
- Mussels are long living and slow growing
- Glochidia development takes long time (up to 11 months, or longer)
- Size (age) cohorts can be distinguished

=> Recruitment takes place only in most favourable years?

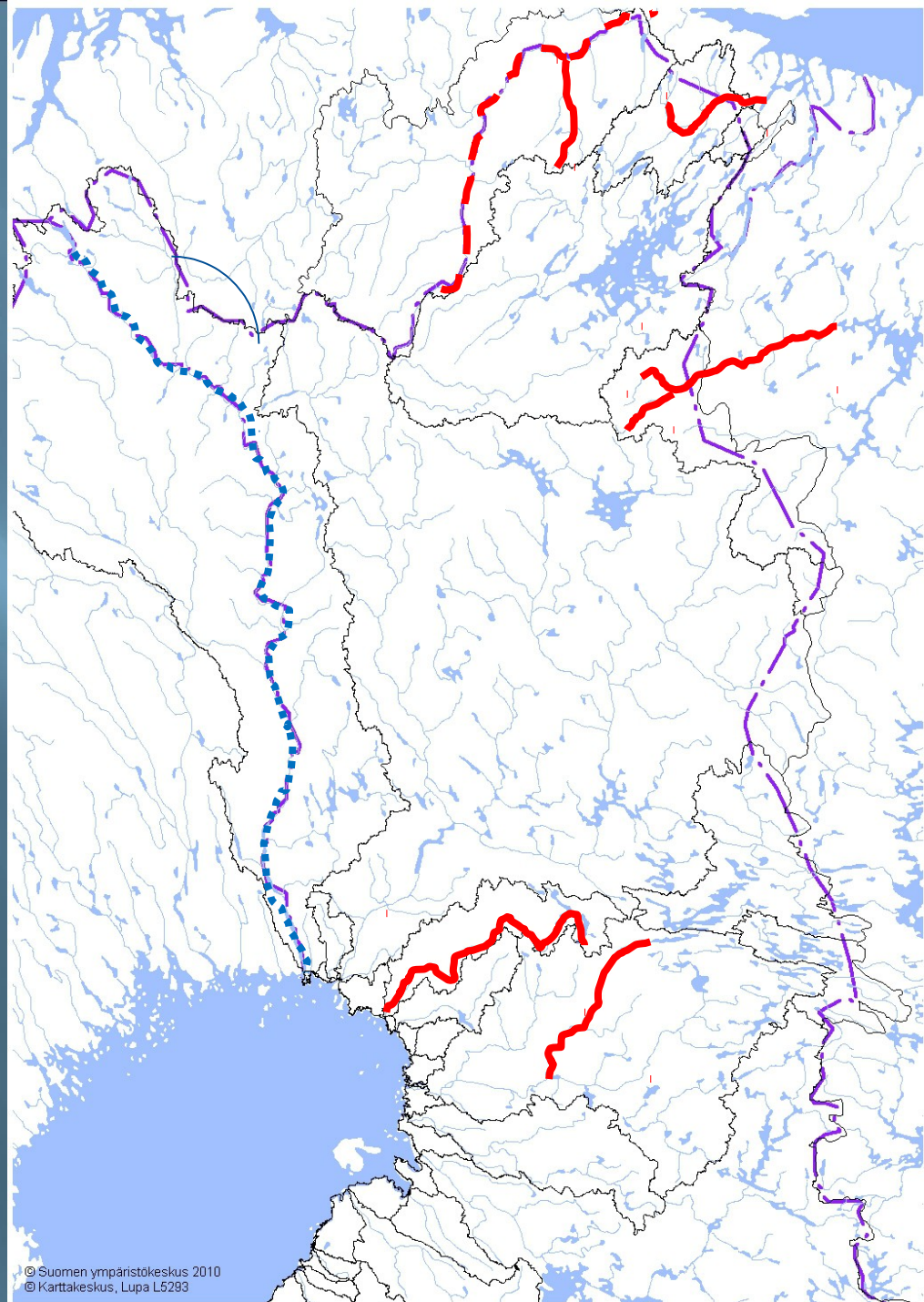
Conclusions

- All viable/ maybe viable populations are found from the small brooks situated at the upper part of the catchment
- => **Without conservation measures FPM distribution in Finland will be fragmented into few isolated small populations**
- Populations classified as *non-viable* are especially in northern Finland often partly recruiting (*partly viable*): recruitment occurs but not adequately
- Within the river recruitment takes place often only in the upper course (less anthropogenic pressure from the catchment)

MAIN CONCERN:

Big streams (salmon rivers/ previous salmon rivers)

- In main rivers the remaining FPM populations are all **non-functional** (no recruitment/ only minor recruitment)
- Primary host Atlantic salmon!
- Unmapped: Rivers Utsjoki, Tornionjoki, Inarijoki (Teno)



Reasons for decline: Historical

Pearl fishing



Kuva: Museovirasto

Pearl fishing was prohibited in Finland in 1955

Reasons for decline: Historical

Clearing and straightening rivers for timber floating



River Livojoki 1950s

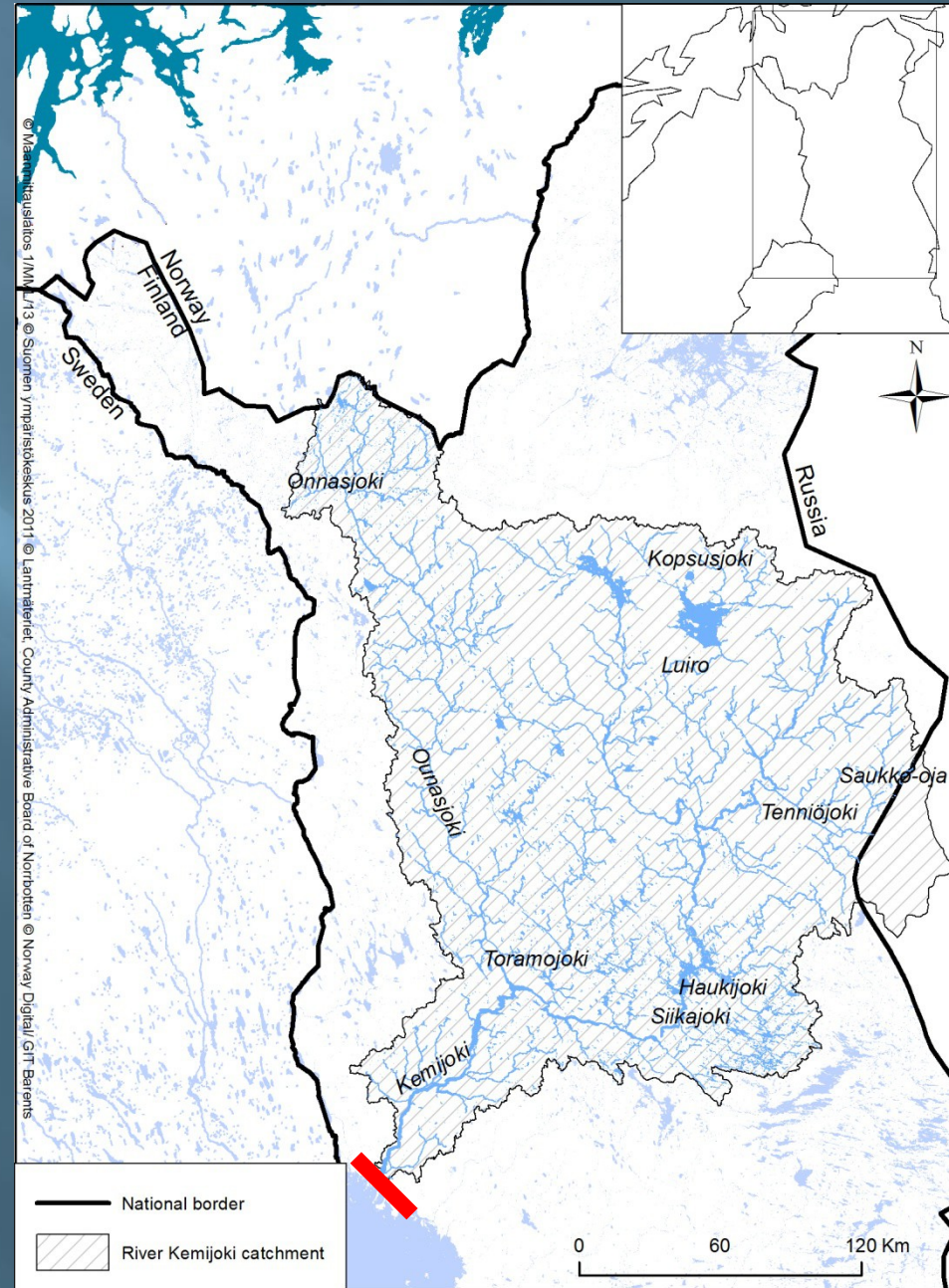
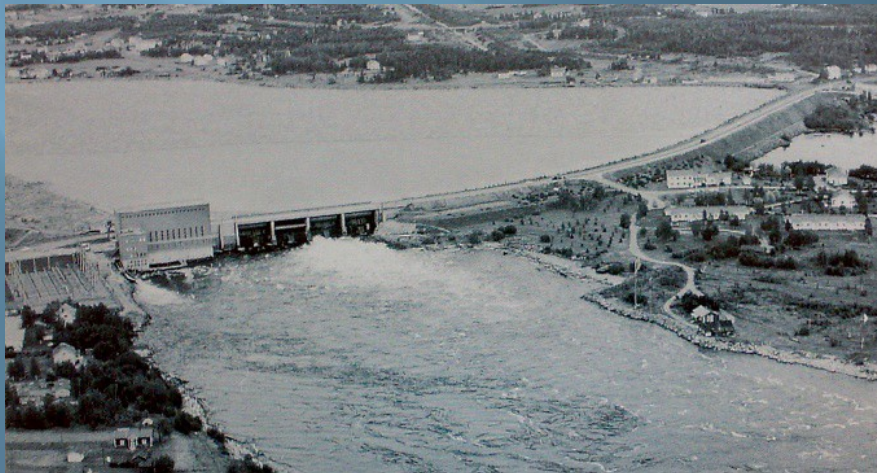


Reasons for decline: Historical

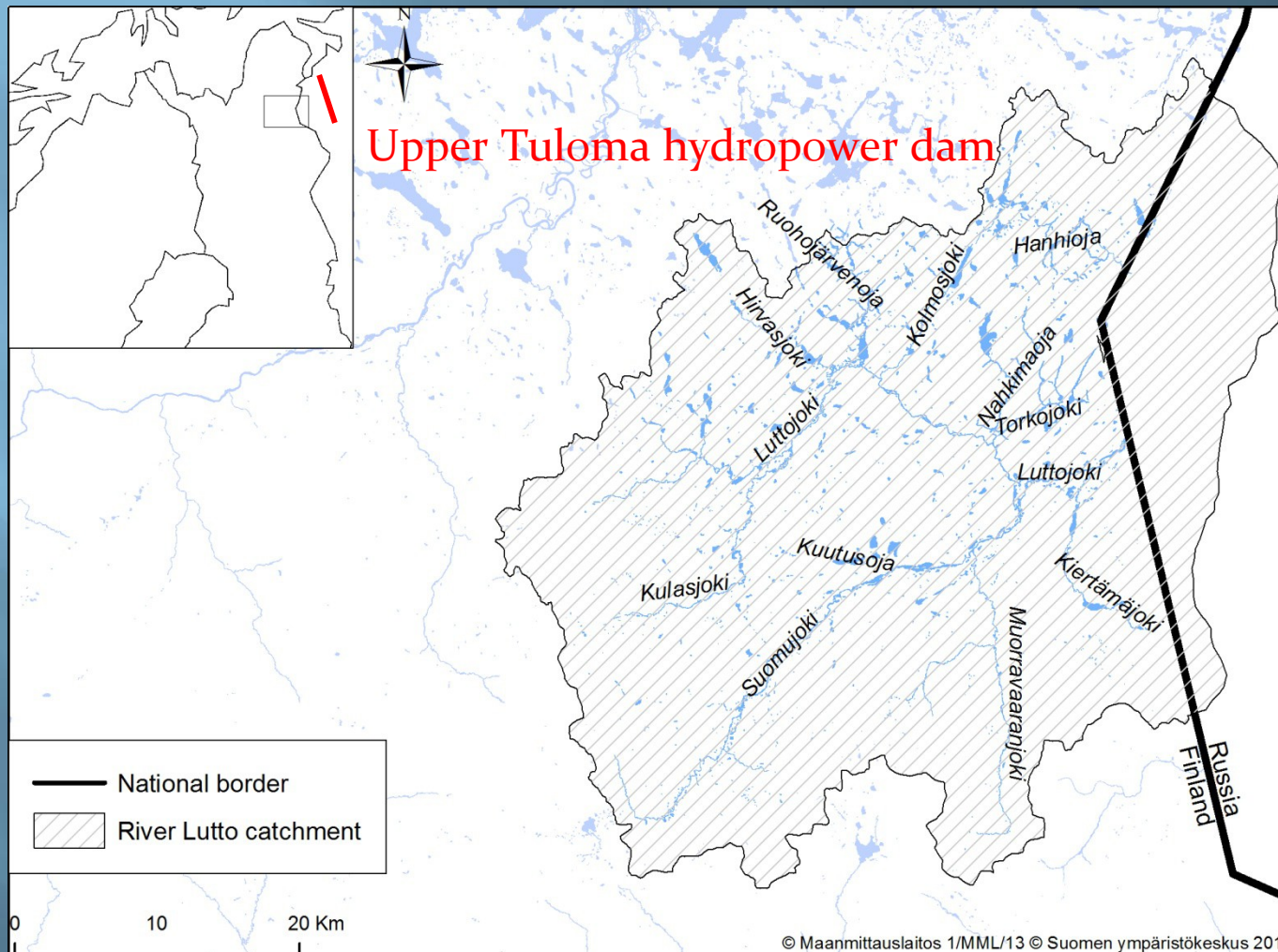
Harnessing rivers for
hydropower production

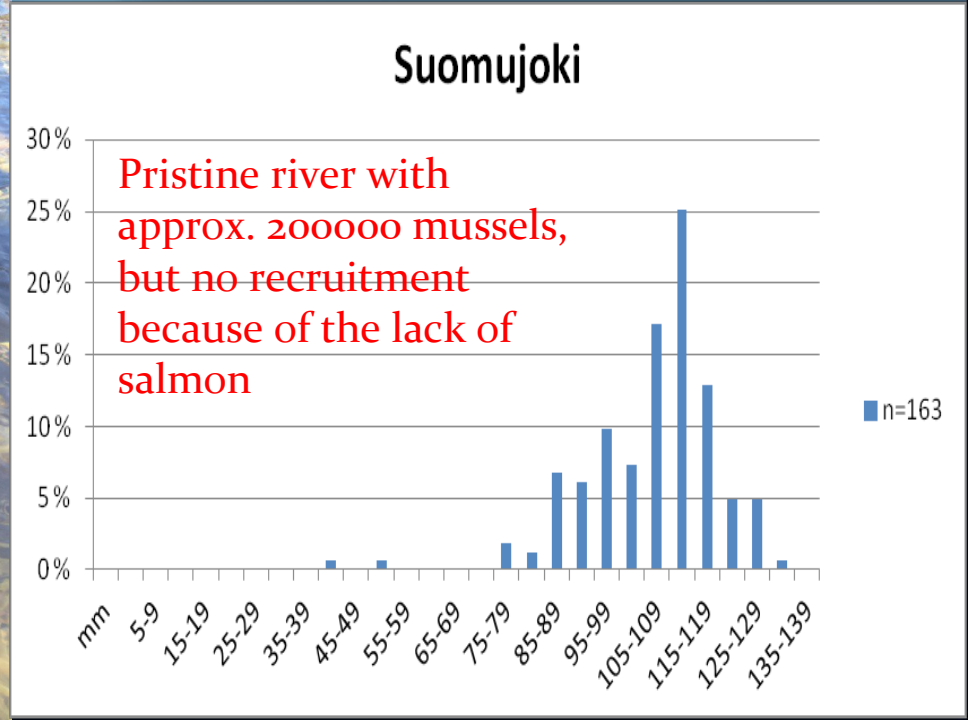
River Kemijoki catchment:

Construction of Isohaara power
plant dam in 1949



Tuloma River: Building of Upper-Tuloma hydro power plant in Russia in 1960s prevented salmon from ascending to the River Lutto and Suomu in Finland





Reasons for decline: recent

Forestry actions:

- Ditching
- Plowing
- Forest roads
- River crossings



Forest ditch leading to FPM river



Silt from the ditch after heavy rain, River Livojoki



Clear cut and plowing close to Natura 2000 FPM river



pH 4.7!



**Forest road collapsed to
FPM river**



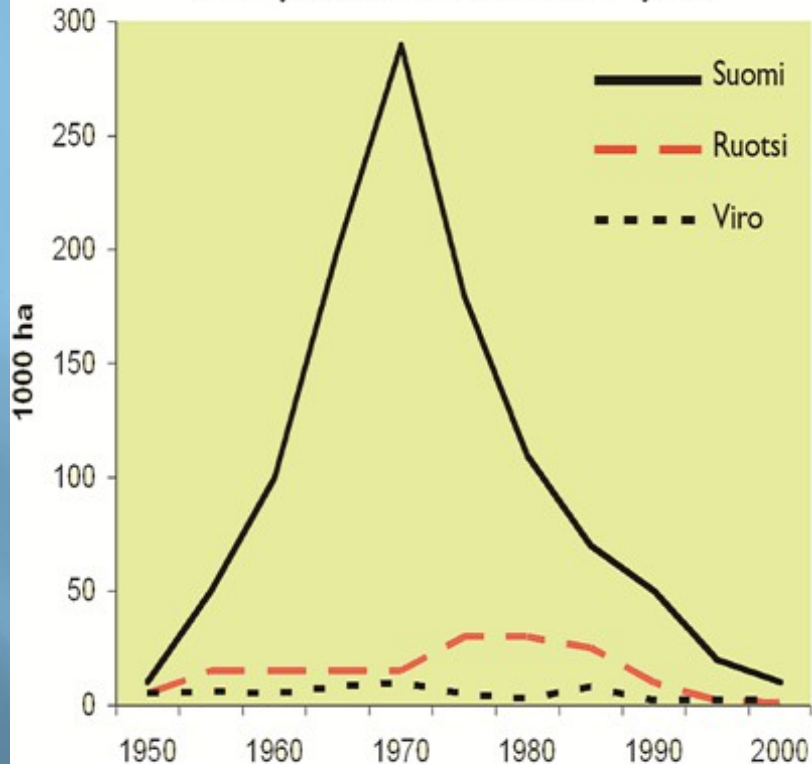
**Forest machine river
crossing on FPM river**



Road ditches lead to FPM river

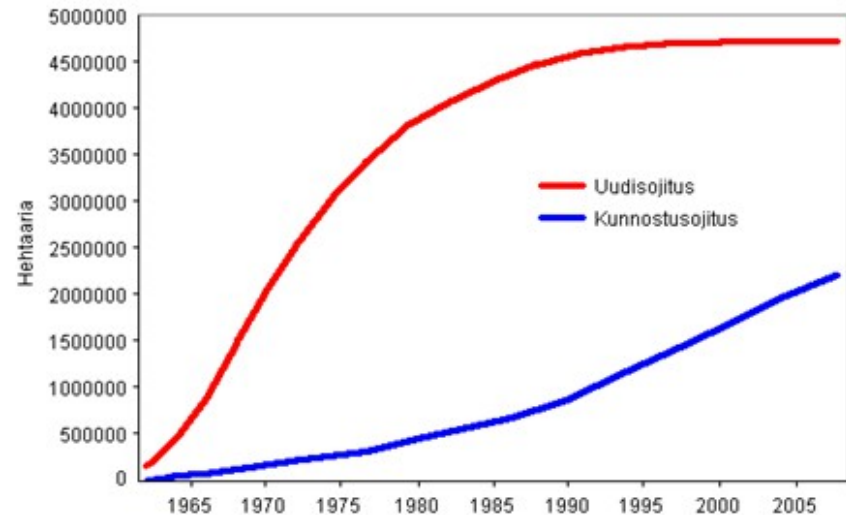
Made in Finland: One third of the world's forest ditches*

Suo- ja kosteikkoalueiden ojitus



Lähteet: Hallanaro ym. 2002; Valovirta 2006

Soiden kumulatiivinen uudis- ja kunnostusojitus vuosina 1962–2008

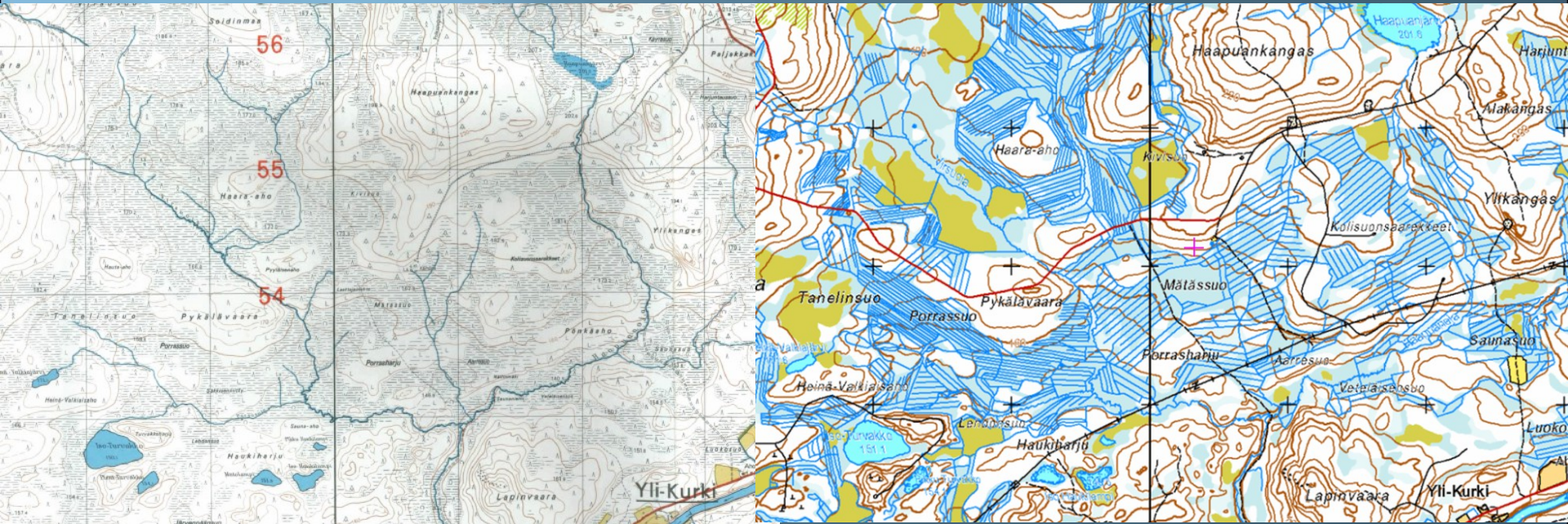


* uudisojitus = ojittamattoman suon ojitus, kunnostusojitus = vanhojen ojien kunnostaminen

Kaikkiaan uudisojituksia on tehty noin 5,7 milj. ha. Kuviosta puuttuvat noin miljoona hehtaaria selittyvät ilmeisesti sillä, että uusimmissa valtakunnan metsien inventoinneissa (VMI) eniten muuttuneet ojitetut suot on tulkittu kangasmaiksi. Myös ennen 1950-lukua tehtyjen lapio-ojitusten puuttuminen voi selittää vajetta. Lähteet: Luonnontila 2010 (SU 2), Korhola 1990.

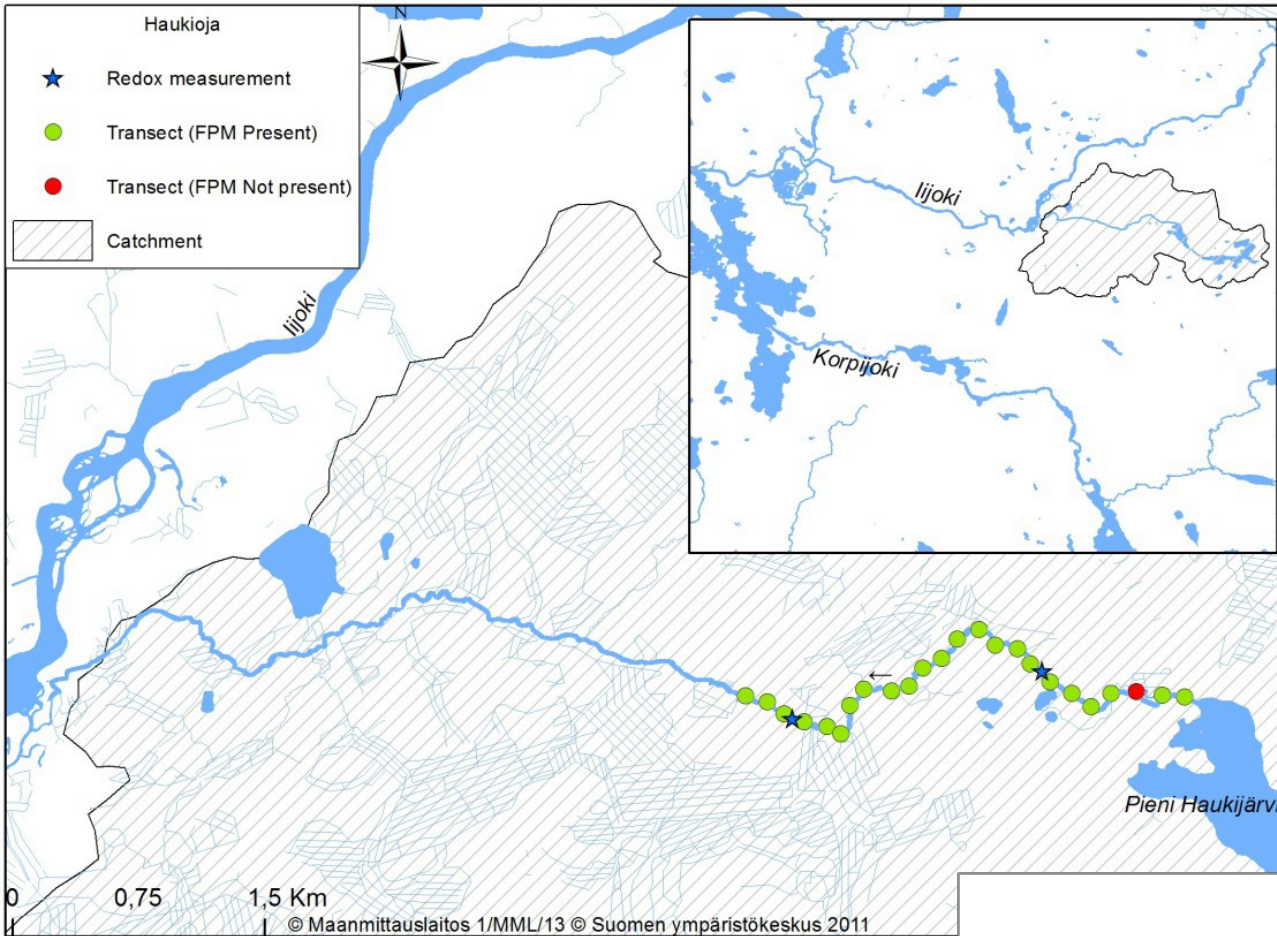
Kuva: SLL

Iijoki river basin



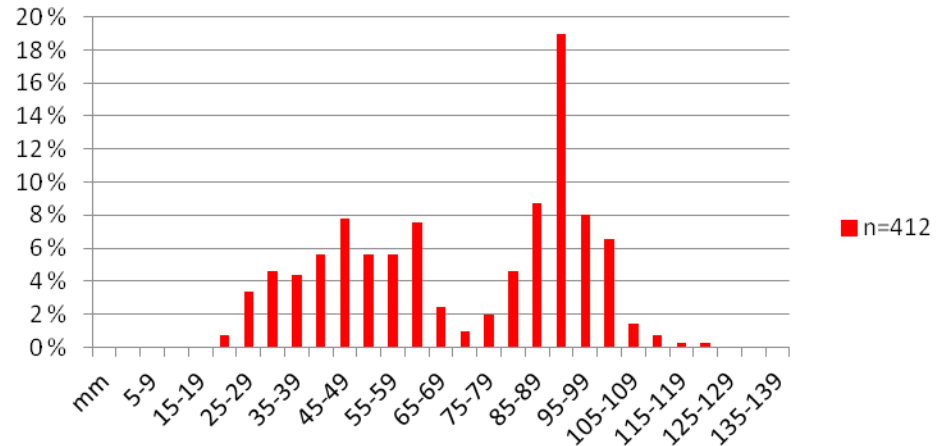
River Haapuanjoja in 1965...

...and today



River Haukioja: Gap in recruitment in 1960-70s

Haukioja



Failure of the conservation

Freshwater pearl mussel was protected in Finland
by the Nature Conservation Act in 1955

After that we have lost more Margaritifera
rivers than before the protection!

Urgent list

1. Searching for the yet unknown populations
2. Population status assessment and monitoring of the known populations
3. Restoration of the damaged catchments and rivers
4. Construction of the fishways to the old salmon rivers
5. Captive breeding of the most threatened populations
6. **An action plan for FPM in Finland**

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An underwater photograph showing a dense field of mussels on a seabed. The mussels are dark brown and covered in a thick layer of brown, fibrous material, likely seaweed or algae. The background is slightly out of focus, showing more mussels and some green seaweed. Two speech bubbles are overlaid on the image. The first is yellow and contains the text 'Give us some hope!'. The second is white and contains the text 'Thank you!'.

**Give us
some
hope!**

**Thank
you!**