



## Restoring river connectivity in Finland by opening up and retrofitting culverts

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# Setting the scene in Finland

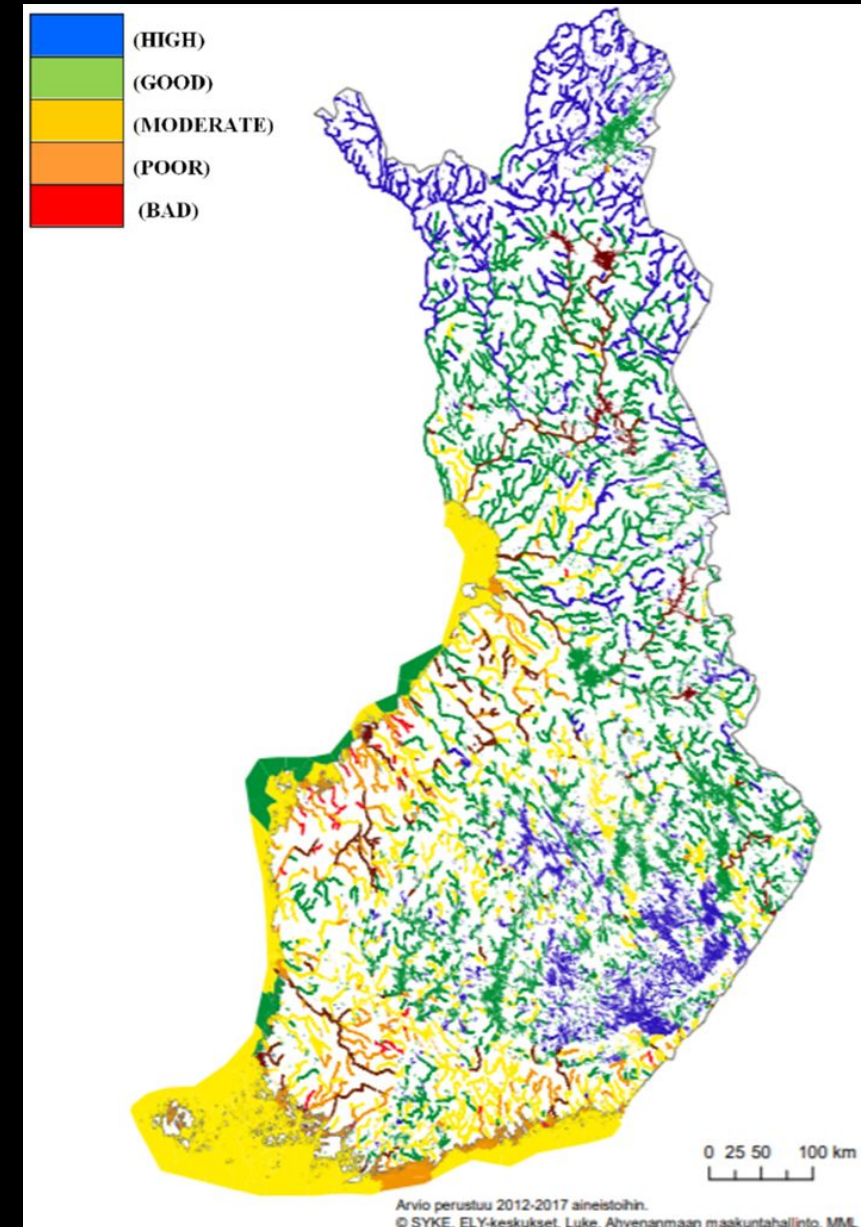


- Area 338 440 km<sup>2</sup>
- more than 57 000 lakes (> 1 ha)
- approximately 130 000 km of brooks and rills (Helmi elinympäristöohjelma, 2021)
- is the most forested country in Europe in relation to the total area. 73% (23 million ha) of the land area is covered by forests. (Natural Resources Institute Finland, 2015)
- Strictly protected forests cover only 6% of the total forest area □ other areas are potential areas for forestry (Natural Resources Institute Finland, 2019)



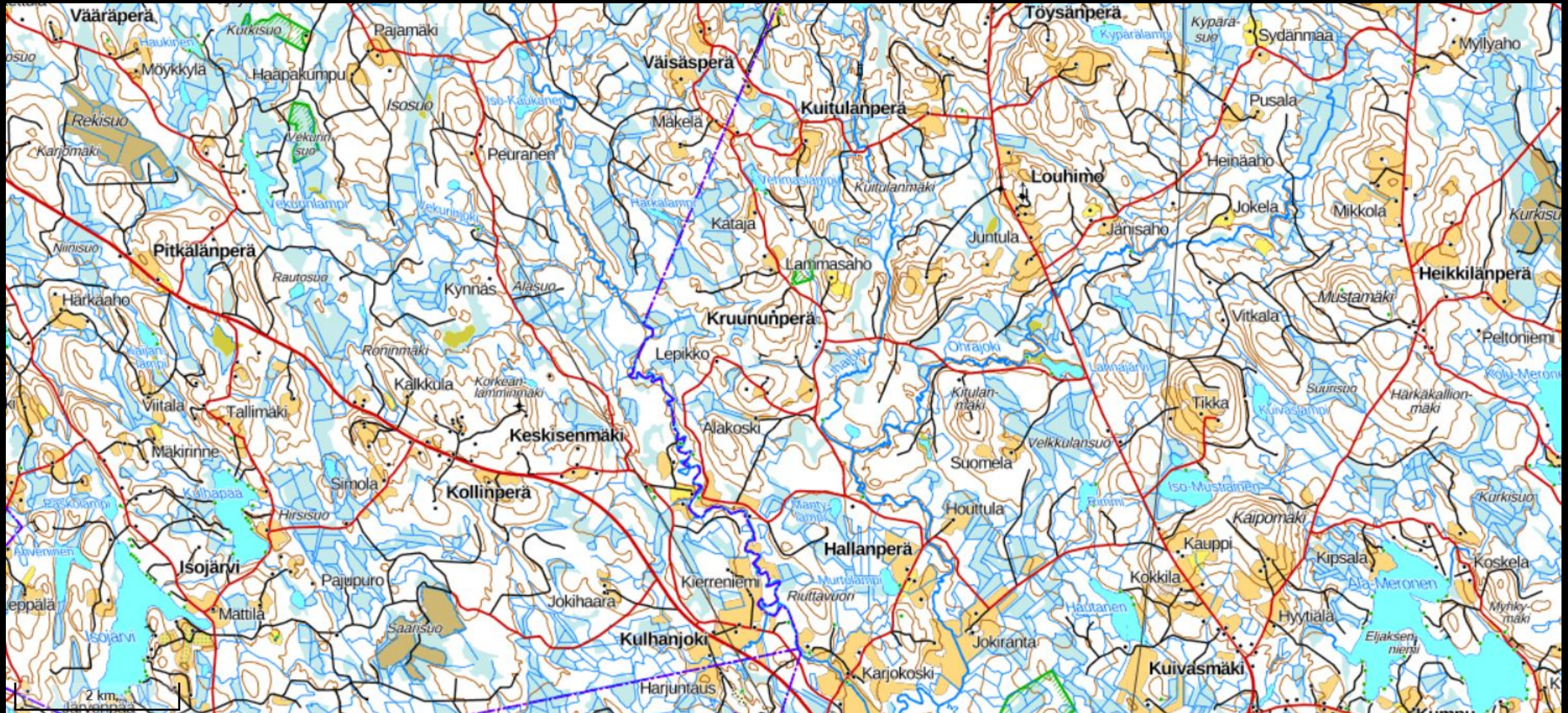
# The ecological status of Finnish surface waters

- 87% of Finnish lakes and 68% of rivers and streams are in good or high ecological status (Finnish Environment Institute, 2019)
- According to the Red List of habitat types at nationwide level 44% of streams and rivers are listed as threatened (CR, EN, VU) (Kontula & Raunio, 2019)
- Most headwater brooks and rills with catchment area under 10km<sup>2</sup> are not recognized as a water bodies and therefore are not monitored or protected as well as official water bodies.
- Headwaters are spawning grounds migratory fish but often harbour unique assemblages of other aquatic organisms as well. (Paller, 1994, Meyer *et al.*, 2007; Finn *et al.*, 2011, Besemer *et al.*, 2013; Jyrkänkallio-Mikkola *et al.*, 2018)





Draining of the mires and wetlands for the needs of forestry resulted to a VERY extensive forest road network and hence, to a huge number of culverts





# Legislation related to culverts

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Water Frame Directive 2000/60/EY - The ecological status of a water body can't be good if migration obstacles block the river continuum

According to the national Water Act (587/2011) a migration obstacle is subjected to a licence and it may not cause harmful changes to nature or its functions (3:2:2), harm to fishing or fish populations (3:2:6) or endanger the natural state of a brook or outside Lapland region rill's natural state □ culvert posing an obstacle does not fulfill the requirements of the Act.

Administrative enforcement possible but *de facto* not used?

There is no obligation to notify on culvert structures even when in official water bodies

□ Environmental authorities have limited knowledge of the existing and new culvert crossings.

Private Roads Act 1069/2018

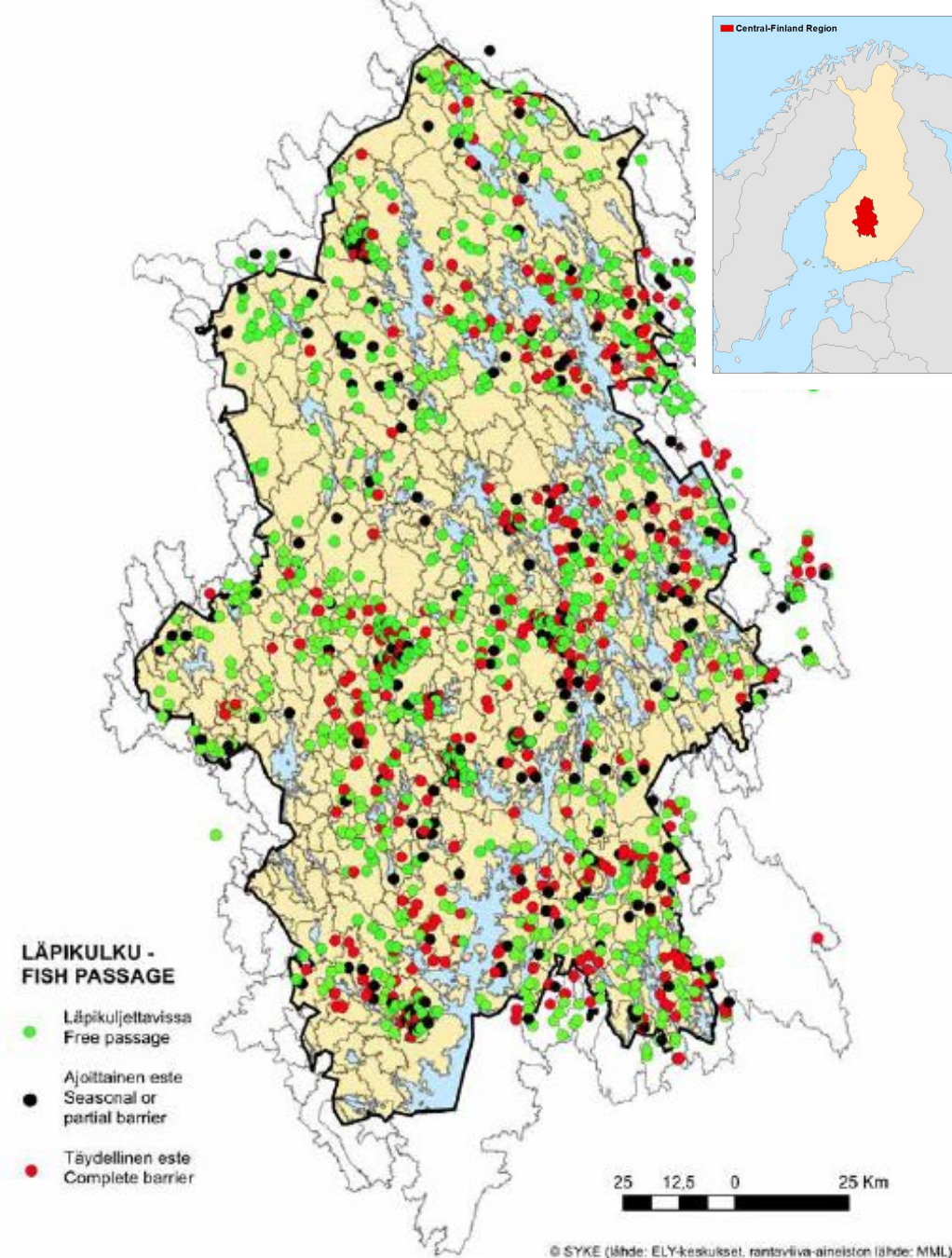
State subsidies for road maintenance must especially consider the repair of crossing structures when they ensure the movement of migratory fish.



# Pioneer work on culverts

- Pioneer work related to culverts and their environmental problems was done by Mr. Anssi Eloranta and Antti Eloranta in Central Finland.
- The survey mapped 2000 crossing structures in Central Finland, more thoroughly 1423.
- 73% of the crossing structures were culverts.
- Bridges are the main crossing structures on larger rivers whereas culverts are clearly more common in headwater areas
- There are approximately 120 000 water crossing structures on official water bodies in Finland, 25 000 bridges and **90 000 - 95 000 culverts**
- **At least third of them are total migration obstacles -> lots of actors needed**
- Survey includes recommendations for fixing environmental problems of crossing structures

(Eloranta & Eloranta, 2016)



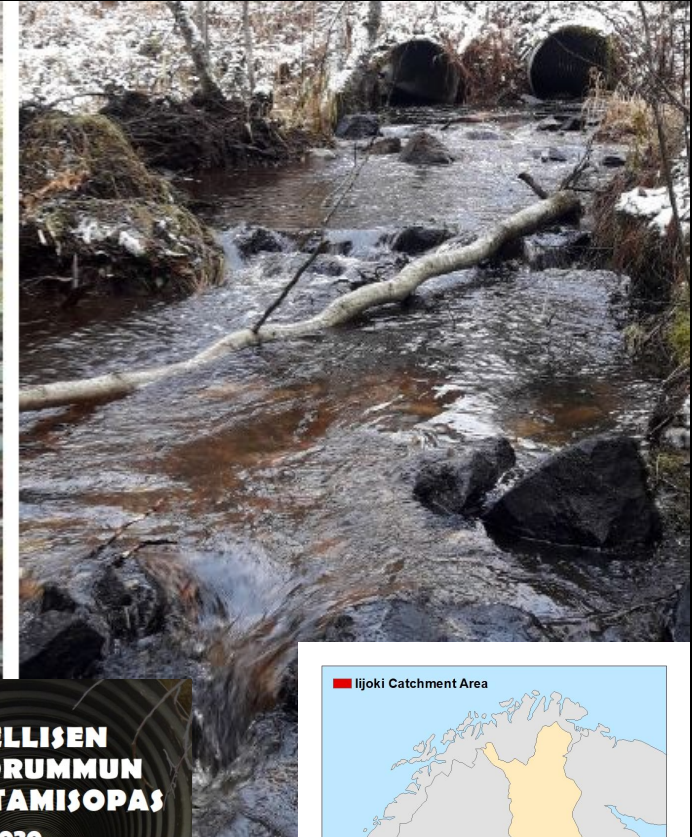
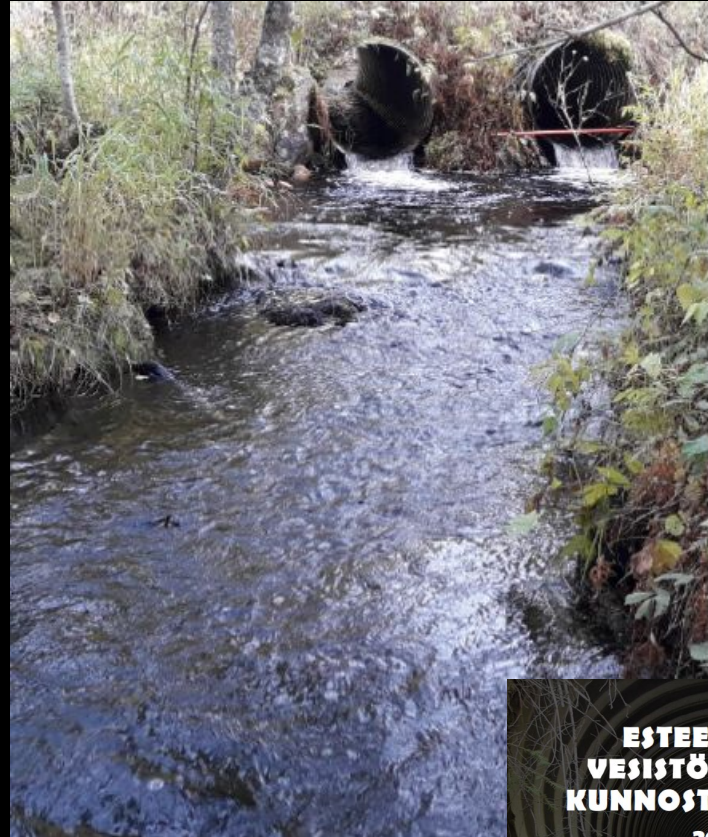
Kuva 3. Kartoitettujen ylitysrakenteiden sijainti ja läpikuljettavuus kaloille.  
Figure 3. Location and fish passability of study crossings.



# Finnish Forest Administration work on culverts



- Esteet pois -projects in North-Ostrobothnia Region in Oulujoki River basin.
- Esteet pois! (2016-2018) – project: 628 crossings mapped (52% were total migration obstacles, 35 were restored and 130 km streams opened for free migration. (Moilanen & Luhta, 2018)
- Esteet pois II -project (2019-2020) mapped 33 additional crossings, removed 27 obstacles and opened 93km for free migration (Karppinen, 2020)
- A guide how to repair culvers was published ([https://www.eraluvat.fi/media/dokumentit/esteet-pois/esteellisen-vesistöorummun-kunnostamisopas\\_esteetpoisii.pdf](https://www.eraluvat.fi/media/dokumentit/esteet-pois/esteellisen-vesistöorummun-kunnostamisopas_esteetpoisii.pdf))
- Goal is to include these instructions into forest road manual published by Metsäteho Oy, which is used by all forest road constructors.





# Finnish Forest Administration work on culverts



- In Esteet pois- projects machine assisted obstacle removal / restoration was on average 1068 €, ca. 35 t. stone material, ca. 6 excavator working hours
- Rumpusteet pois – project main goal is to spread knowledge of the environmental problems caused by culverts to enterprises focusing on forest road services
- Finnish Forest Administration has removed altogether 207 obstacles and opened 514 km for free migration 2016-2021.





# WWF Finland work on culverts

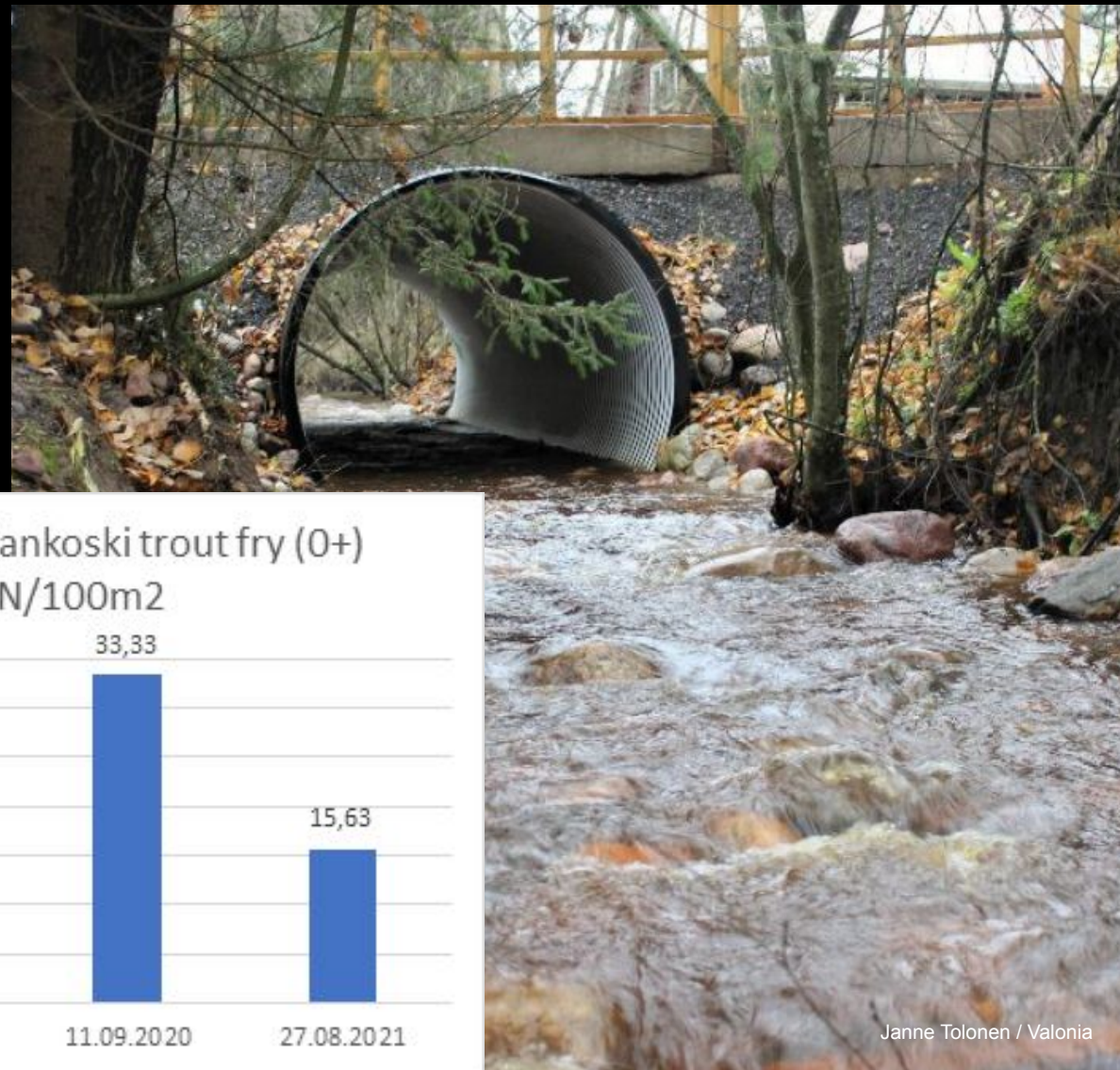


- Work related to migration obstacles started with a project that focused on culverts
- Three years later larger dams even active hydropower dams are removed and general and political views have changed towards free flowing rivers
- Advocacy work related to Private Roads Act
- Round table for forestry companies
- Within the past five years WWF Finland together with other actors has removed 20 culverts that were migration obstacles
- Two projects: Patokato (5) and K-Fishpaths (15)





# Juottimenoja, Perniö



Juottimenoja Knuutilankoski trout fry (0+)  
densities N/100m<sup>2</sup>





# Roominoja, Ruovesi



Tuomas Rinne / Virho ry



Manu Vihtonen / WWF Finland



# Ylösjoki, Hollola





# Let's restore the streams while we're at it!





# Helmi programme 2021-2030



- Helmi habitats programme, aims to strengthen Finland's biodiversity and safeguard the vital ecosystem services that nature provides for us
- Goals related to culverts:
  - to restore 200 km of small water bodies on conservation areas
  - to restore migration possibility to 700 small water bodies on private land outside conservation areas
  - to remove 970 migration obstacles from state owned areas by Finnish Forest Administration

(Valtioneuvoston periaatepäätös YM/2021/28)



Photo: Sabrina Bqain



# Threats, opportunities and to-dos



Kari Lindholm

- Climate change and increased runoff as challenge
- In the near future there is an increasing need to repair the forest road network or even build new roads □ crucial timing to fix the environmental problems caused by culverts.
- Getting the instructions into Metsäteho forest road manual
- Getting the obligation to notify on culvert crossings in official water bodies into the Water Act



# Some ideas



Who owns and maintains the structures for public roads, forest roads and railroads?

What kind of legal obligations are related to the structures?

Removal and retrofitting culverts is relatively cheap. Fixing the structures during road maintenance brings cost benefits

Priorization is needed but every removal / retrofit helps. If many obstacles block the same stream, start from the lowermost obstacle.

Lots of actors and co-operation needed.





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A photograph of a small, clear stream flowing through a dense forest. The water is white and frothy as it cascades over rocks and fallen logs. The surrounding vegetation is lush, with many green ferns and moss-covered rocks. Sunlight filters through the trees, creating a dappled light effect on the water and foliage. The overall scene is peaceful and natural.

**Thank you**