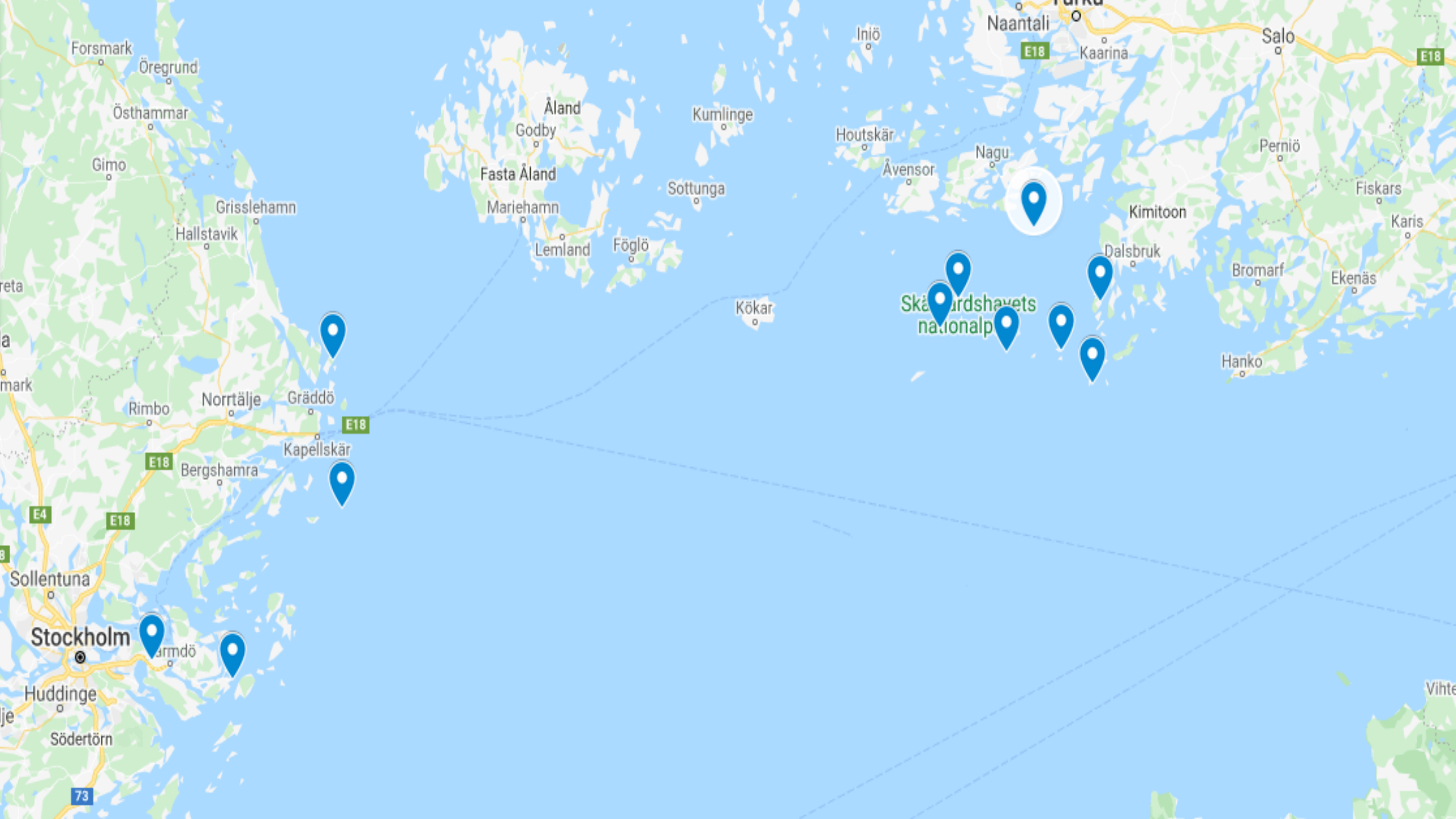
# Implementation WP

- Mapping of actors: responsibility and roles (ecoloop)
- Movement of leisure boats (ecoloop)
- User survey (KEST)
- Economic analysis (UTU)
- **Review of available technology** (UCV)
- **Analysis of sewage waste** (ecoloop)
- *Scoping study*: digital map (ecoloop)
- **Calculation tool for waste flows** (ecoloop)
- Compilation doc, guidelines (KEST/UTU)
- Lessons learnt (ecoloop)

# Sludge analysis

Task 2.5 – collection and analysis of sludge from pump-out stations


Forsmark
Öregrund
Östhammar
Gimo
Grisslehamn
Hallstavik
Åland
Godby
Fasta Åland
Mariehamn
Lemland
Föglö
Kumlinge
Sottunga
Kökar
Iniö
Houtskär
Åvensor
Nagu
Naantali
Kaarina
Salo
Perniö
Kimitoon
Dalsbruk
Fiskars
Karis
Bromarf
Ekenäs
Hanko
Rimbo
Norrtälje
Gräddö
Kapellskär
Bergshamra
E18
E4
Sollentuna
Stockholm
Huddinge
Södertörn
73

# Analysis

- Biological and chemical oxygen demand (BOD/COD)
- Total nitrogen, total phosphorus
- Metals, chloride, ammonia, oil-index
- pH, total solids
- Nitrification inhibition test

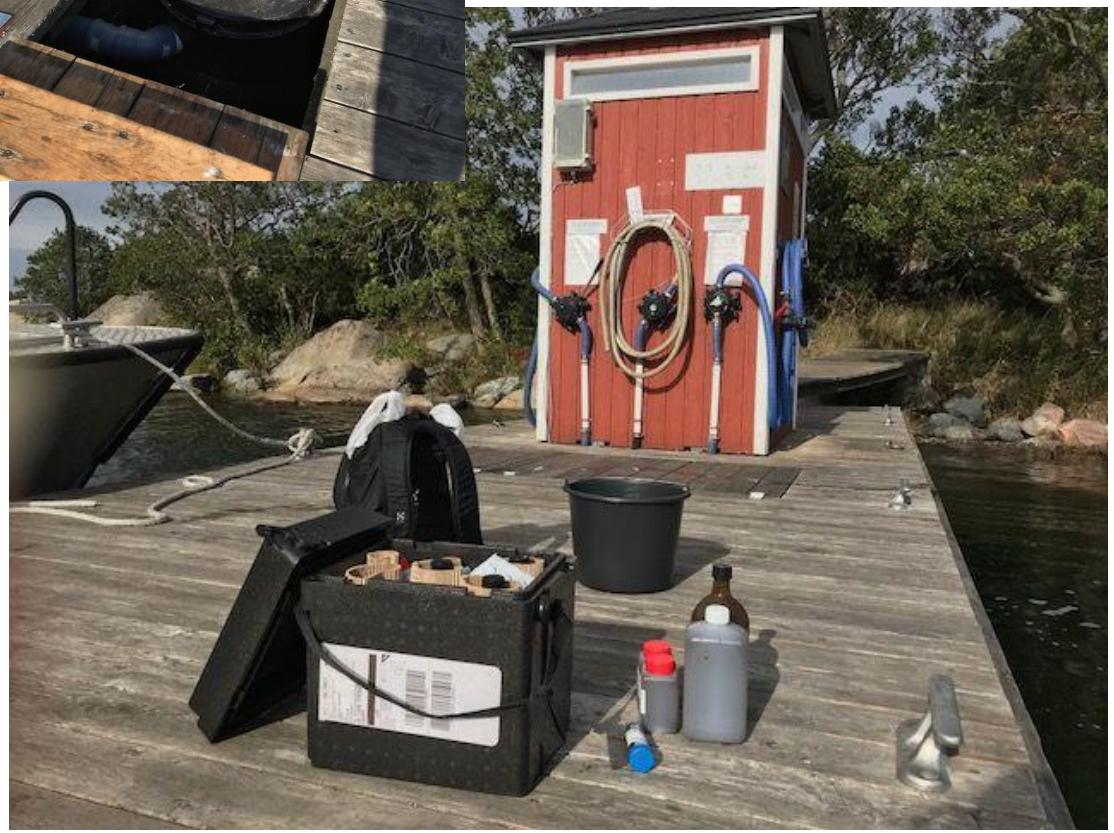
Compared results to guidelines from *Svenskt Vatten* for WWTP and “typical” WW values.

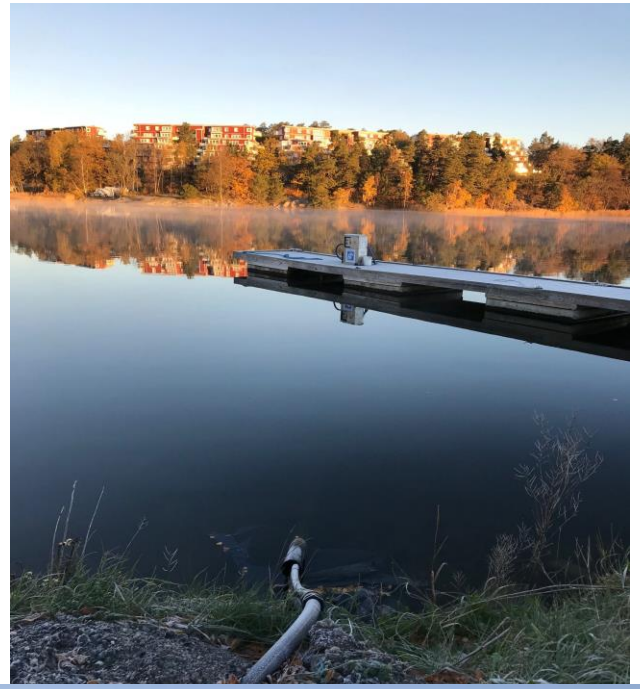
Metals analysed:
Pb, Cd, Cu, Ni, Zn, Hg

Finish archipelago

Arholma, Norrtälje

## Rödlöga, Norrtälje





## Farstaviken, Värmdö

# Results from sampling and analysis

| | |
|---|---|
| - Nitrification inhibition: | yes, it is inhibiting to the process |
| - BOD/COD | Varied between samples, indication of difficulty to decompose. Very high COD in Fin (< 30 000). |
| - tot-N, tot- P | Higher than conventional WW (esp. N) |
| - chloride | Above guideline levels (similar both swe/fin) |
| - Ammonia | Significantly above guideline/WW levels (higher fin) |
| - oil-index | Below guideline in Swe, a couple Fin stations high! |
| - Metals | Cr och Zn, somewhat high at Rödlöga<br>Cr, Zn and Cu very high in Finnish stations |

# Analysis results, Swedish stations

| Parameter | Unit | Arholma 2018 | Arholma 2019 | Rödlöga 2018 | Rödlöga 2019 | Stavsnäs 2018 | Farstaviken 2018 | Farstaviken 2019 | Guideline | ARV |
|---|---|---|---|---|---|---|---|---|---|---|
| pH | | 8,1 | 8,3 | 7,5 | 8,3 | 7,5 | 8,7 | 8,3 | 6,5 - 10 | |
| Tot-N | mg/l | 900 | 1100 | 920 | 1400 | 620 | 680 | 880 | | 35 - 100 |
| Tot-P | mg/l | 15 | 7,4 | **65** | 22 | 35 | 2,3 | 15 | | 5 - 25 |
| BOD | mg/l | **1200** | **880** | **620** | **1400** | **6500** | 180 | **510** | | 200-400 |
| COD | mg/l | 2400 | 1900 | 2800 | 4600 | 7100 | 750 | 1300 | | 400-1200 |
| BOD/COD | | 0,5 | 0,46 | **0,22** | **0,30** | 0,92 | **0,24** | 0,39 | 0,3-0,5 | |
| Chloride | mg/l | **2900** | **2800** | **2900** | **3000** | **2800** | **2500** | **2600** | 2500 | |
| Ammonium | mg/l | 830 | 1000 | 950 | 1100 | 520 | 330 | 700 | 60 | 22-60 |
| Oil index | mg/l | 4,4 | 7,5 | 5,4 | 2,4 | 2,4 | 0,81 | 2,8 | 5-50 | |
| Total solids | g/l | 9,2 | 6,6 | **14** | **11** | 7 | 8,6 | 5,3 | | |
| Lead | mg/l | 0,0072 | 0,0049 | 0,0074 | 0,016 | 0,0012 | 0,0017 | 0,0042 | 0,05 | |
| Cadmium | mg/l | 0,00027 | 0,00015 | 0,0014 | 0,0019 | 0,00013 | 0,00016 | 0,00016 | none | |
| Copper | mg/l | 0,73 | 0,38 | 0,49 | 1,2 | 0,088 | **0,23** | 0,12 | 0,2 | |
| Chromium | mg/l | 0,0052 | 0,0027 | **0,91** | 0,00064 | 0,0051 | 0,0015 | 0,011 | 0,05 | |
| Nickel | mg/l | 0,026 | 0,03 | **0,16** | 0,069 | 0,017 | 0,026 | 0,028 | 0,05 | |
| Zinc | mg/l | 0,33 | 0,24 | 1,3 | 2,3 | 0,15 | 0,22 | **0,97** | 0,2 | |
| Mercury | mg/l | 0,0001 | 0,0001 | 0,00023 | 0,00027 | 0,0001 | 0,0001 | 0,0001 | none | |

# Analysis results, Finish stations

| Parameter | Unit | Nötö | Björkö | Borstö | Vänö | Örö | Högsåra | Gullkrona | Guideline | ARV |
|---|---|---|---|---|---|---|---|---|---|---|
| pH | | 7,8 | 8,2 | 8,5 | 8,7 | 8 | 7,9 | 7,7 | 6,5 - 10 | |
| Tot-N | mg/l | 1600 | 1700 | 1500 | 1500 | 2200 | 2500 | 2700 | | 35 - 100 |
| Tot-P | mg/l | 280 | 130 | 300 | 80 | 880 | 280 | 70 | | 5 - 25 |
| BOD | mg/l | 3700 | 2300 | 1100 | 1500 | 5300 | 5200 | 2200 | | 200-400 |
| COD | mg/l | 8600 | 5100 | 12000 | 4400 | 30000 | 20000 | 2000 | | 400-1200 |
| BOD/COD | | 0.43 | 0.45 | 0.09 | 0.34 | 0.18 | 0.26 | 1.10 | 0,3-0,5 | |
| Chloride | mg/l | 2900 | 3000 | 2900 | 3000 | 2200 | 2500 | 2700 | 2500 | |
| Ammonium | mg/l | 1400 | 1600 | 1200 | 1400 | 1700 | 1600 | 1400 | 60 | 22-60 |
| Oil index | mg/l | 4,4 | 14 | 3,2 | 100 | 130 | 26 | 0,47 | 5-50 | |
| Susp solids | GF/A | 9000 | 1900 | 12000 | 2500 | 22000 | 8300 | 2100 | | |
| Lead | mg/l | 0,086 | 0,011 | 0,15 | 0,018 | 0,54 | 0,42 | 0,034 | 0,05 | |
| Cadmium | mg/l | 0,0041 | 0,001 | 0,0093 | 0,0014 | 0,01 | 0,0058 | 0,00063 | none | |
| Copper | mg/l | 7,1 | 1,2 | 1,7 | 0,96 | 35 | 23 | 3,7 | 0,2 | |
| Chromium | mg/l | 0,19 | 0,05 | 0,4 | 0,022 | 0,49 | 0,2 | 0,0093 | 0,05 | |
| Nickel | mg/l | 0,55 | 0,063 | 0,49 | 0,056 | 0,87 | 0,47 | 0,055 | 0,05 | |
| Zinc | mg/l | 7,2 | 1,6 | 3,3 | 2,6 | 18 | 12 | 1,7 | 0,2 | |
| Mercury | mg/l | 0,0022 | 0,0003 | 0,0021 | 0,00036 | 0,0041 | 0,0022 | 0,00017 | none | |

# https://batseco-boat.eu/publications/

## Publications

Technology assessment for sewage collecting systems for leisure boats

- Technology-assessment-.pdf

Catalogue of pump-out stations in Sweden, Finland and Estonia

- Catalogue.pdf

Overview of actors and legislation relevant to sewage collection stations in the central baltic region

- Mapping-of-actors.pdf

Localization of sewage collection stations in Norrtälje archipelago

- BATSECO_WP_2.2_Localization_memo.pdf

Visual instructions for the usage of stationary- and floating pumpoutstations

- Batseco_Stickers_Final.pdf

Cost analysis of sewage collecting network

- BATSECO-BOAT_Cost-analysis_by_Brahea-UTU.pdf

Survey on Sewage Reception Facilities at Selected Central Baltic Small Ports

- Batseco-Survey-KEST-final_4-1.pdf

**Sludge analysis report**

Sampling results from pump-out stations from Sweden and Finland, including analysis of nutrients, BOD, COD and metals.

- BATSECO_WP_2.5_Sludge-analysis-report.pdf

**Other references**: Svenskt Vatten, 2012. ”Råd vid mottagande av avloppsvatten från industri och annan verksamhet”. Publikation P95.
J Klingberg, 2017, ”Latrin från fritidsbåtar i Stockholms skärgård – innehåll, volym och påverkan på avloppsreningsverk och ekosystem”. Examensarbete för Uppsala Universitet

# Lessons learnt

# Benefits of cross-border project?

Increased awareness of general public/society

New people, new ideas and input

Environmental benefit

**Improved harbour service**!

Knowledge of **end-user** perspectives

**Sharing experience** between several actors

Good resulting reports

Information sharing, shared challenges

Insight into neighbouring countries service levels

Insight into how partners in neighbouring countries work

# Needed?

**Collaboration** and information exchange between NGOs

**More stations** are needed!

Exchange of experience at all levels! Local to national authorities

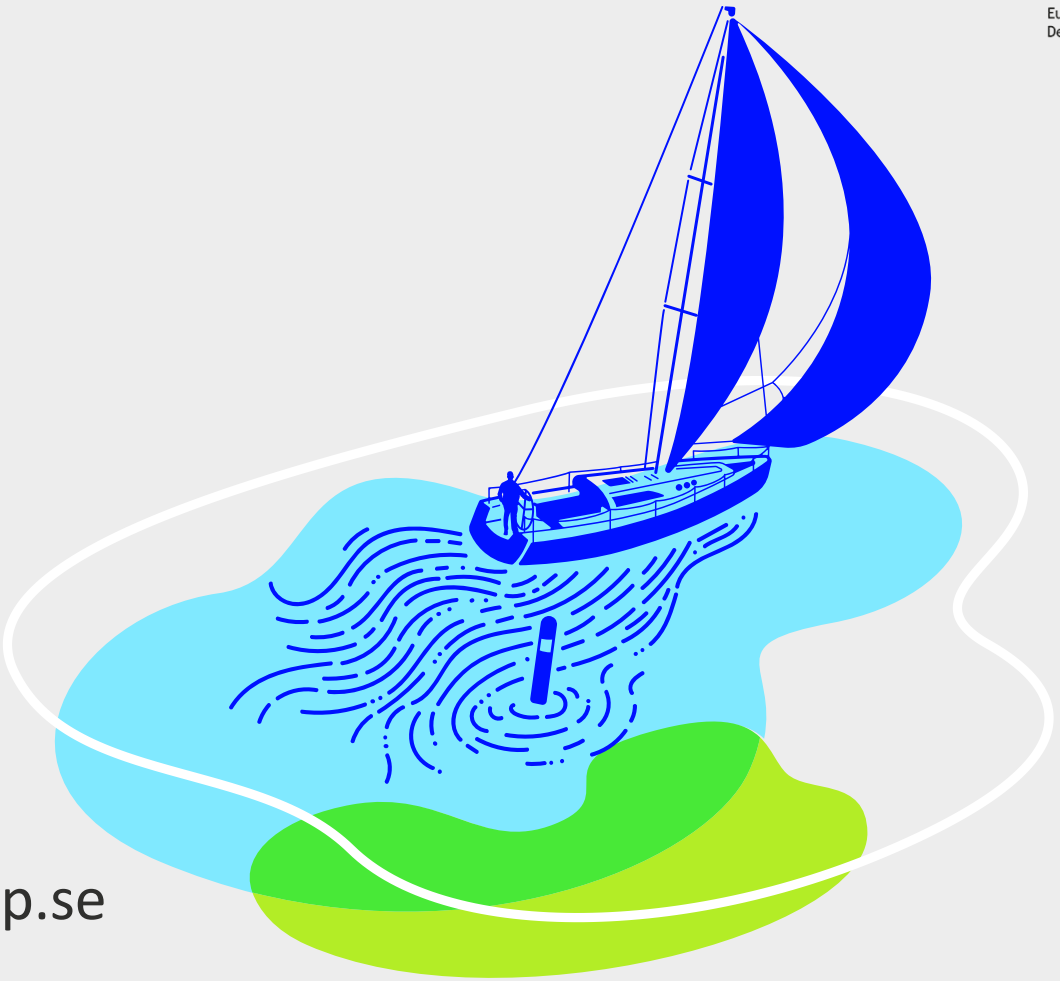
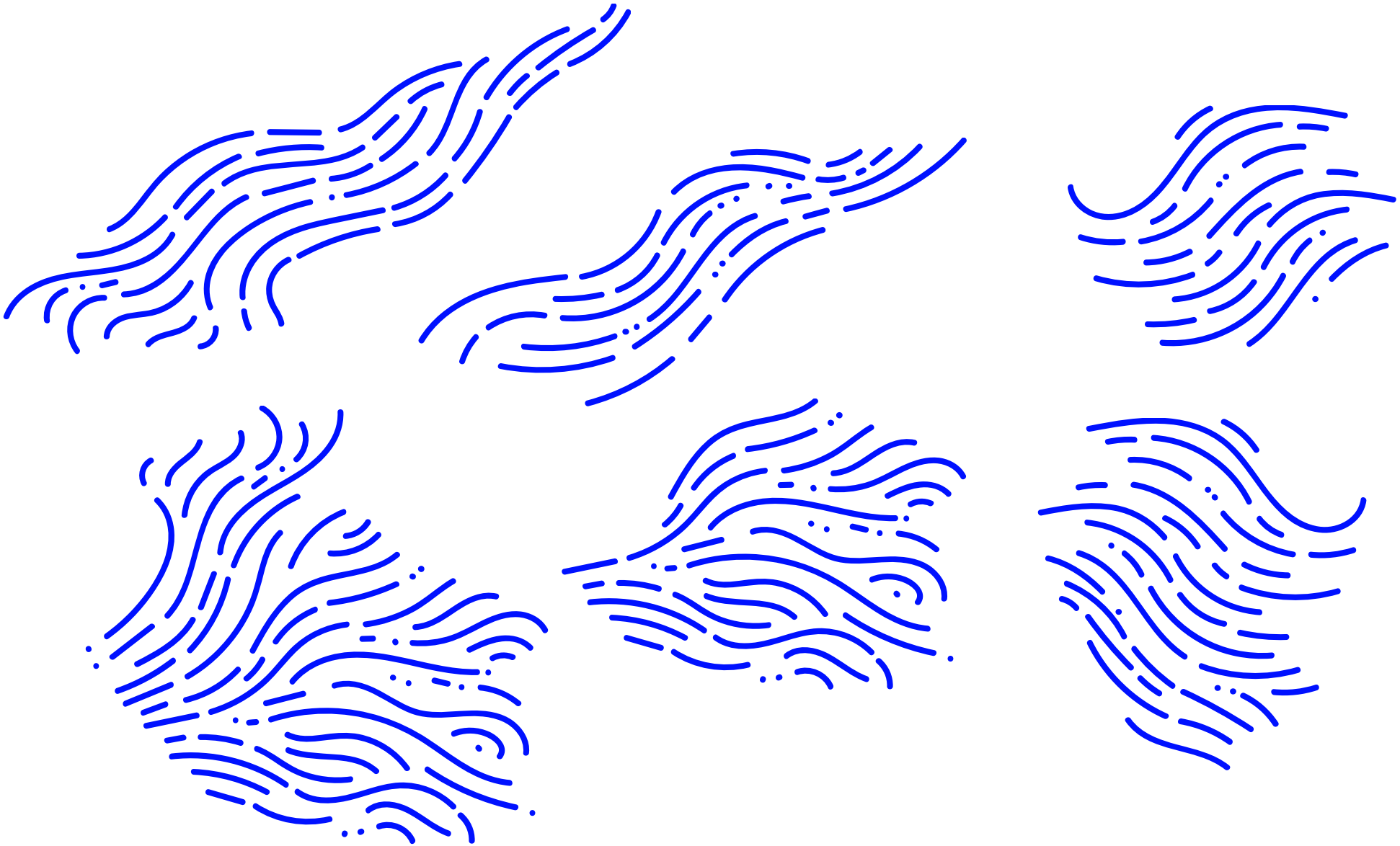
**Standardisation** of connections between boat and pump-out station

A coordinated/ standardised **map**

**Increased awareness** among boaters of problem

**Exchange of experience** regarding maintenance issues

# Thank you!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