

**Interreg**



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**Re:Fish**

**D 1.2.1 Results from the diving activities and methodology,  
findings and recommendations**

by

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## 1.0. Introduction

Lost fishing gear and fishing related litter is a well-known environmental problem that can cause significant harm to marine ecosystems. Over time these materials break apart or degrade in nature. Plastic materials gradually fragment into microplastics while metals slowly corrode and dissolve to water, and within months to brackish or sea water.

In addition of environmental impacts lost fishing gear can continue catching fish, birds and mammals, and unattended gears or hooks and lines left in nature may get entangle fish, birds or mammals. At worst this can lead to an injury, starvation, drowning or to a death of the animal. Further, lost gear can also cause near miss situations, harm or accidents to other fishers, boaters, swimmers or any people spending their time near shore or at sea.

Certain type of fishing methods is especially prone to gear loss. Jigging, a type of fishing method which practiced close to or at the bottom, often results in a lost equipment. Similarly fishing with a lead or iron sinker and a hook or a plastic lure can easily lead to the loss of the lure on underwater structures or vegetation and in popular recreational fishing spots the amount of lost gear can start to accumulate quickly. These hotspots are commonly found near fishing piers, under bridges, in canals, around peninsulas and at river estuaries. Often fish can be found hiding in uneven spots to avoid predation or predators lurking for feeding. Such areas increase the probability to catch fish but also to get lures snagged.

## 2.0. The project objectives diving for lost fishing gear

### 2.1. Objectives of the diving in Finland and Sweden

The primary objective of the project was to remove Abandoned, Lost, or otherwise Discarded Fishing Gear (ALDFG) from the seafloor and to report the cleaned seabed area. Knowledge of locations where lost fishing gear accumulates is critical for effective retrieval operations. In Sweden, it was decided to engage both professional diving companies and NGOs to target sites where fixed fishing gear was highly likely to be present, as well as to survey popular recreational fishing hotspots where lost fishing accessories accumulate. A secondary objective was to carry out dives at the same locations in consecutive years in order to investigate the annual accumulation rate of lost fishing accessories.

Additional dives were also conducted exclusively for cleaning shallow waters of recreational fishing accessories. Some of these activities were organised as public events to raise awareness of underwater litter, demonstrate project findings, and engage stakeholders on the issue of lost fishing gear. The results presented in this report are categorised by dive type: fixed gear retrieval, annual loss rate estimation, and cleaning activities.

During the planning phase, no previous data were available to support the establishment of retrieval objectives or target values for recreational fishing gear to be removed from the sea by the project. Therefore, the estimations were developed in consultation with recreational

fishers regarding achievable retrieval amounts. Based on these assessments, the project set a removal objective of 3,000 fishing accessories, corresponding to an estimated mass of 50–70 kg.

Furthermore, the planned diving activities were intended to cover an area of approximately 270 m<sup>2</sup> across 3–4 identified hotspot areas. The cleanup activities were planned to be carried out over consecutive years, enabling the estimation of the annual accumulation rate of lost recreational fishing gear. This report evaluates the achievement of the project objectives, particularly the retrieval of abandoned, lost, or otherwise discarded fishing gear (ALDFG) through diving operations conducted in Sweden and Finland. In addition, attention is given to the spatial designation, mapping, and retrieval methodologies applied in the two countries.

## 2.2. Methodology and results in Sweden

Keep Sweden Tidy engaged multiple diving companies, organisations and an NGO to survey fixed fishing gear and associated equipment at popular recreational fishing hotspots.

The participating companies were Sveriges Vattenkologer AB, Svensk Sjöentreprenad AB (SSE AB) and Captain Baltic Marine AB. In addition, a section of the Stockholm stream, in the heart of the Stockholm city, was surveyed by a group of volunteers, called Hands2Ocean.

The operators conducted dives at selected sites, which were identified using data from various databases and reports, supplemented by interviews with fishers, recreational anglers, and the public. Internal expertise from the hired divers also informed site selection.

All dives adhered to current safety regulations, with maximum depths not exceeding 30 m; most were conducted in shallower waters. In cases targeting fixed gear, divers occasionally used sonar for initial seabed scans to confirm the presence of fishing gear.

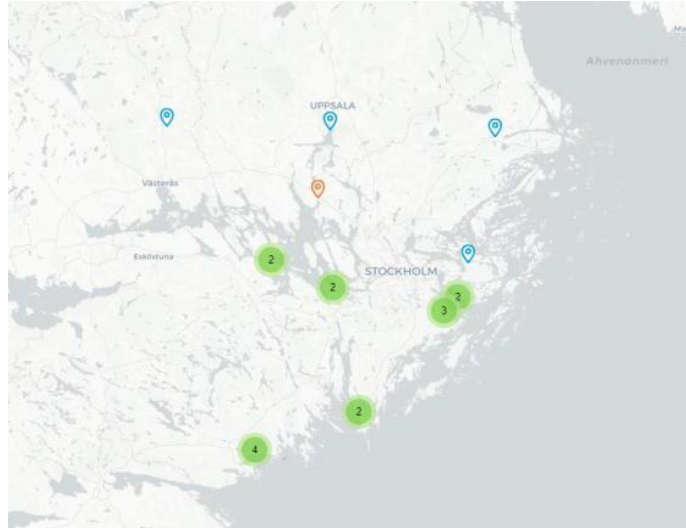
### 2.2.1. Sonar mapping for fixed fishing gear

Keep Sweden Tidy commissioned a professional diving company, Svensk Sjöentreprenad AB (SSE AB) to carry out underwater retrieval operations targeting abandoned lost or otherwise discarded fishing gear. The diving activities focused on shallow waters (generally less than 30 meters deep) along the coastline from Gävleborg County to Östergötland County, with the objective of locating and recovering lost fishing gear, commonly referred to as ghost nets.

The work was conducted by scanning selected areas with sonar equipment and subsequently deploying divers to investigate suspicious echoes. When objects were confirmed to be lost fishing gear, they were recovered from the seabed. The purpose of the assignment was to systematically locate and retrieve lost fixed fishing gear.

Survey areas were selected using data from databases such as GhostGuard together with information gathered from other media sources and public observations reporting lost fishing equipment. The dive team also consulted local commercial and recreational fishers to identify additional potential locations. This approach combined technical detection methods with local knowledge.

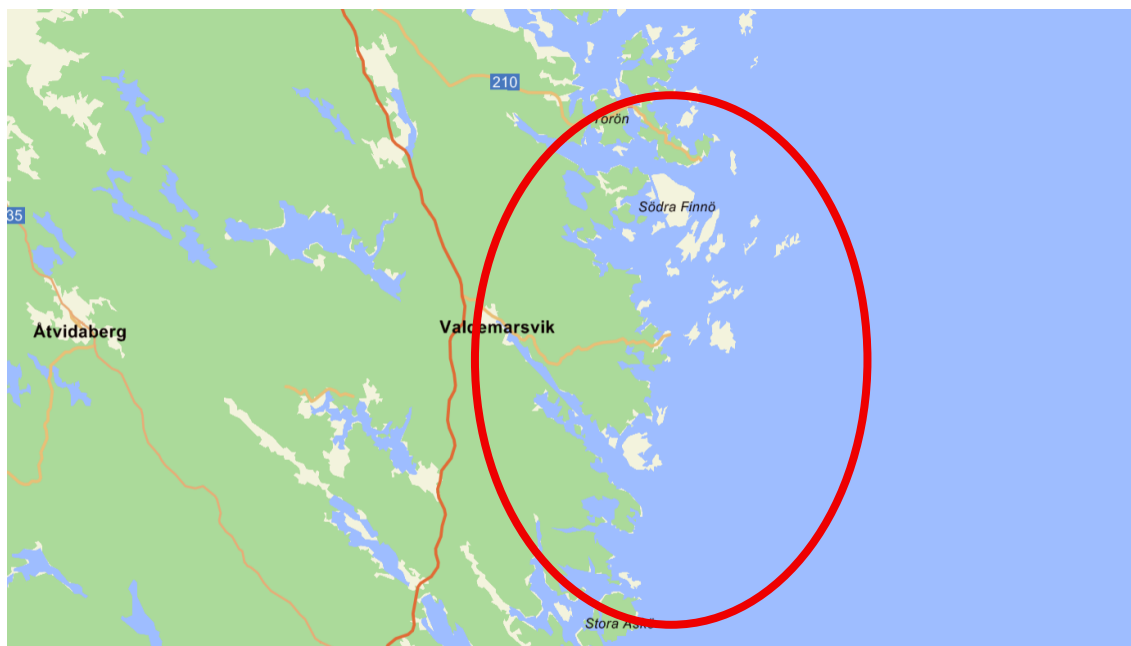
Preparations and equipment testing were conducted continuously throughout the contract period. In total, approximately, 225,000 square meters were surveyed across both study areas (Figure 1). Fieldwork took place in the Öregrund area (Figure 2) and Bråviken (Figure 3) during 2024.



**Figure 1. Taken from [ghostguard.havochvatten.se](https://ghostguard.havochvatten.se)**



**Figure 2. Area around Öregrund archipelago, where sonar detection was used to find lost nets in combination with observations from GhostGuard**



**Figure 3.** Area around Östergötland archipelago, where sonar detection was used to find lost nets in combination with observations from GhostGuard

### Öregrund (October 28–29, 2024)

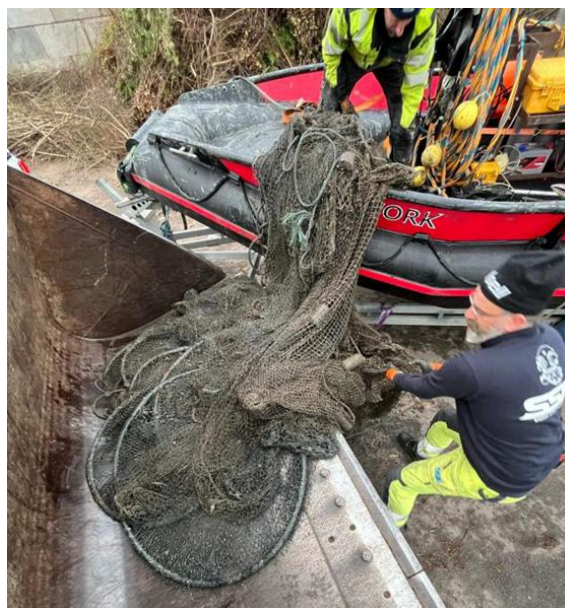
During operations in the Öregrund area, sonar searches were carried out, and multiple dives were conducted to examine suspicious sonar readings. However, none of the inspected targets were confirmed as lost fixed fishing gear. As a result, no ghost nets were recovered in this area.

**Table 1.** Sonar search and dives conducted in Öregrund in 2024.

| AREA | SITE     | DATE       | TIME          | DIVE NR      | DIVE TIME           | MAX DEPTH (in m) | SURFACE AREA (in m <sup>2</sup> ) | RESULT  |
|------|----------|------------|---------------|--------------|---------------------|------------------|-----------------------------------|---------|
|      | Öregrund | 28.10.2024 | 07:00 - 18:00 | Sonar search |                     |                  |                                   |         |
|      | Öregrund | 29.10.2024 | 08:00 - 09:00 | 1            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 30.10.2024 | 10:00 - 11:00 | 2            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 31.10.2024 | 11:00 - 12:00 | 3            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 1.11.2024  | 13:00 - 14:00 | 4            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 2.11.2024  | 14:00 - 15:00 | 5            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 2.11.2024  | 16:00 - 17:00 | 6            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 29.10.2024 | 07:00 - 18:00 | Sonar search |                     |                  |                                   |         |
|      | Öregrund | 30.10.2024 | 08:00 - 09:00 | 7            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 31.10.2024 | 10:00 - 11:00 | 8            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 1.11.2024  | 13:00 - 14:00 | 9            | Diver down to check |                  |                                   | No gear |
|      | Öregrund | 2.11.2024  | 15:00 - 16:00 | 10           | Diver down to check |                  |                                   | No gear |

### Bråviken (November 6–7, 2024)

In the areas north of Stora Askö and in Bråviken, sonar searches and dive inspections resulted in several recoveries. At one location in Bråviken, divers identified and recovered both a long net and a fyke net (Swedish: ryssja). During the recovery, five perch were found caught in the net and were successfully released alive. Other sonar indications were investigated but turned out to be natural debris such as branches, ropes, or remnants of equipment not classified as fixed fishing gear. In shallow waters with good visibility, visual searches from the boat were also conducted in addition to sonar scanning.



**Figure 4. A fyke net found in Bråviken**

**Table 2.** Sonar search and dives conducted in north of Stora Askö and Bråviken in 2024.

| AREA | SITE                   | DATE      | TIME          | DIVE NR      | DIVE TIME           | MAX DEPTH (in m) | SURFACE AREA (in m2) | RESULT           |
|------|------------------------|-----------|---------------|--------------|---------------------|------------------|----------------------|------------------|
|      | Bråviken, N Stora Askö | 4.11.2024 | 12:00 - 16:00 | Sonar search |                     |                  |                      |                  |
|      | Bråviken, N Stora Askö | 4.11.2024 | 13:40 - 14:30 | 1            | Diver down to check |                  |                      | No gear          |
|      | Bråviken, N Stora Askö | 4.11.2024 | 14:40 - 15:20 | 2            | Diver down to check |                  |                      | No gear          |
|      | Bråviken, N Stora Askö | 4.11.2024 | 15:20 - 16:00 | 3            | Diver down to check |                  |                      | No gear          |
|      |                        |           |               |              |                     |                  |                      |                  |
|      | Krokö                  | 5.11.2024 | 07:00 - 09:00 | Sonar search |                     |                  |                      |                  |
|      |                        | 5.11.2024 | 08:00 - 09:00 | 4            | Known place         |                  |                      | Gillnet          |
|      | Malmö sund             | 5.11.2024 | 10:00 - 12:00 | 5            | Known place         |                  |                      | No gear          |
|      |                        | 5.11.2024 | 11:00 - 12:00 | 6            | Known place         |                  |                      | Gillnet          |
|      | Transport to Gloön     | 5.11.2024 | 12:00 - 14:00 | 7            | Known place         |                  |                      | No gear          |
|      | Gloön                  | 5.11.2024 | 15:00 - 16:00 | 8            | Diver down to check |                  |                      | No gear          |
|      |                        |           |               |              |                     |                  |                      |                  |
|      | Bråviken               | 6.11.2024 | 07:00 - 11:00 | Sonar search |                     |                  |                      |                  |
|      | Bråviken               | 6.11.2024 | 08:15 - 08:35 | 9            | Diver down to check |                  |                      | No gear          |
|      | Bråviken               | 6.11.2024 | 08:55 - 09:15 | 10           | Diver down to check |                  |                      | No gear          |
|      | Bråviken               | 6.11.2024 | 09:25 - 09:45 | 11           | Diver down to check |                  |                      | Fish trap        |
|      | Bråviken               | 6.11.2024 | 11:35 - 12:00 | 12           | Diver down to check |                  |                      | No gear          |
|      | Bråviken               | 6.11.2024 | 13:30 - 14:15 | 13           | Diver down to check |                  |                      | Gillnet          |
|      | Bråviken               | 6.11.2024 | 15:00 - 15:35 | 14           | Diver down to check |                  |                      | A piece of a net |
|      |                        |           |               |              |                     |                  |                      |                  |
|      | Bråviken               | 7.11.2024 | 07:00 - 16:00 | Sonar search |                     |                  |                      |                  |
|      | Bråviken               | 7.11.2024 | 08:15 - 08:50 | 15           | Diver down to check |                  |                      | No gear          |
|      | Bråviken               | 7.11.2024 | 09:15 - 09:40 | 16           | Diver down to check |                  |                      | No gear          |
|      | Bråviken               | 7.11.2024 | 10:35 - 11:10 | 17           | Diver down to check |                  |                      | Fish trap        |
|      | Bråviken               | 7.11.2024 | 13:30 - 14:15 | 18           | Diver down to check |                  |                      | No gear          |

Total recovery through the combined use of sonar technology, professional diving inspections, and collaboration with local stakeholders, a total of 225,000 square meters of Central Baltic Sea seabed was cleaned. While no gear was recovered in Öregrund, the findings in Bråviken contributed to the total recovery of nearly 400 kilograms of lost fixed fishing gear.

At the end of the operational period, all recovered fishing gear was transported to a recycling station.

### 2.2.2 Recovery of derelict fishing gear I

In September 2025, contracted divers from Captain Baltic Marine AB retrieved a derelict fishing net that had become entangled on a wreck in northern Mysingen, off Ornö in the southern Stockholm Archipelago. The net, located at a depth of approximately 25 meters, continued to catch fish and other marine organisms. The operation aimed both to remove the net and to document the process, illustrating the issue of ghost nets in a concrete and visual way.

The dive site was revisited after a ghost net had previously been identified but not yet recovered. The location lies in relatively open waters and requires access by an appropriately equipped dive vessel.

Upon descent, the dive team observed that the net was still attached to the wreck and extended down to the seabed. It had been in place for a significant amount of time, partially overgrown with algae, yet remained open and actively catching fish. Several small fish and other marine organisms were found entangled in the gear.

The removal process was carried out section by section and rigging lines and lift bags to ensure controlled handling. The operation required patience and precision, as the net got easily snagged on structures and posed a significant entanglement risk to divers. Even minor movements stirred up sediment, creating limited visibility underwater. Once the lift bags were inflated, the net slowly rose from the seabed and ascended to the surface, where the crew of dive boat retrieved it safely.

Onboard, the team secured and handled the net. As expected, the design of the gear made it prone to entanglement with itself and other objects. Several live fish and small marine animals were discovered and carefully released back into the sea. The recovered net was subsequently transported ashore for recycling.

The entire operation was documented through both photos and video, covering the underwater rigging, lifting, and onboard handling phases.

The removal of the ghost net eliminated a direct source of harm to fish and other marine life. The visual documentation effectively demonstrates the reality of ghost nets and will be used to raise public awareness of the issue. The operation was successfully completed without complications. Unfortunately, no detailed data was provided on the exact location of the dive or the size of the fyke net that was found.

### 2.2.3. Recovery of derelict fishing gear II

During October and November 2025, a series of diving operations were conducted, with the objective of locating and retrieving ghost nets and other abandoned fishing gear in the Stockholm Archipelago.

Dive site 1 – Shallow area with fishing ban

The first dive site, an area off Gålö where fishing is prohibited, was surveyed. Gålö is located in the inner Stockholm archipelago in Haninge Municipality, south of Stockholm. The area was thoroughly searched, and several fishing lures, lines, and small pieces of gear were found scattered across the seabed. All materials were retrieved and brought to the surface. The area

is clearly affected by recreational fishing despite the ban, which makes this effort particularly important.

The cleaned and surveyed area covered approximately 2,000 m<sup>2</sup>. The lures were of various types, and at least 15 of them were collected along with several entangled fishing lines. A significant amount of additional gear remains in the area, as retrieval actions are time consuming and technically challenging due to the tendency of lures and fishing lines getting snagged on anything. It was noted that some lures appeared new while others were older, and even during the dive, recreational fishers arrived at the site.

#### Dive site 2 – Deep area with entangled nets

The second dive site is located off the coast of Värmdö, farther out than Gålö but still within the inner archipelago east of Stockholm. Two large nets were found entangled in the seabed at a greater depth, scattered with litter, and still actively fishing. During the first visit, a reconnaissance dive was conducted. During the second dive, the actual recovery of the two nets was carried out. The nets were located at a depth of 30 meters, and the operation required careful planning.

Several fish both dead and alive were found in the nets. Live fish were cut loose and released back into the sea. Once the nets were freed from the bottom, lift bags were used to bring them to the surface, where they were brought onboard and transported to shore for recycling. The total area surveyed and cleaned was approximately 45,000 m<sup>2</sup>. The nets were estimated to be about 40 meters long and 2 meters high each.

Both operations have been documented with photos and video, from dive preparations to salvage.

Approximately 47,000 m<sup>2</sup> of seabed has been surveyed and cleared of lost fishing gear. Many fishing lures were salvaged from an area with a fishing ban. Two large ghost nets were recovered from 30 meters depth. Several fish and organisms were rescued and returned to the sea. The documentation clearly shows how ghost nets and fishing gear continue to impact the environment even in deeper areas.

#### 2.2.4. Annual loss rate estimations in Sweden

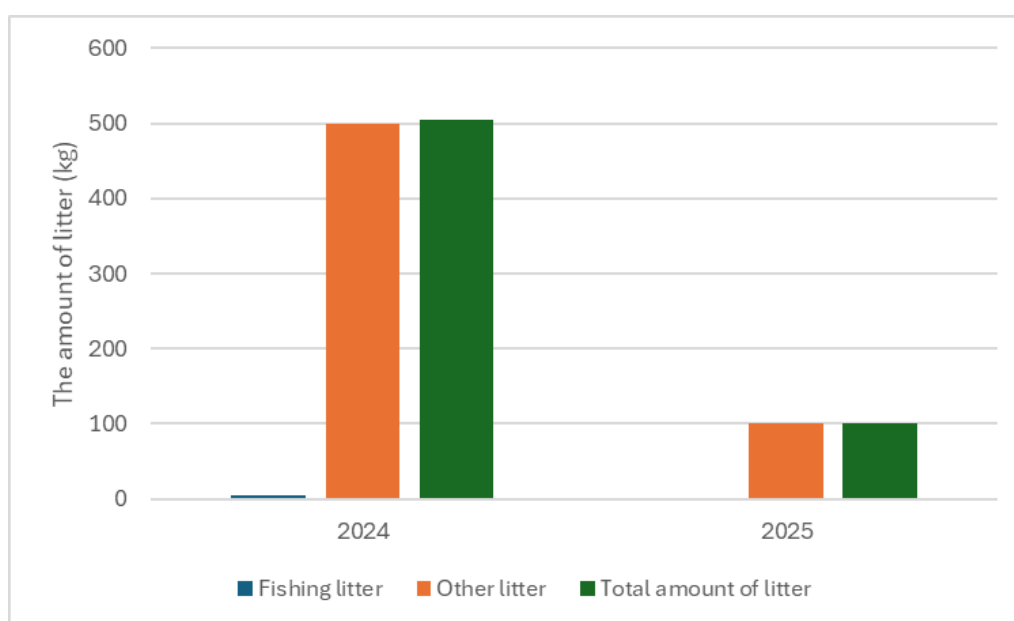
This pilot study was conducted between 2024 and 2025 with the aim to investigate the annual rate of lost fishing gear at popular fishing sites (hotspots). The principle is that the first dive corresponds to a zero value as all previously lost fishing gear and accessories are picked up and the bottom is considered clean. After a year, a second dive is made to see how many gears have been additionally lost, i.e. to estimate the accumulation rate of lost gears and accessories.

Unfortunately, the dives conducted at the identified hotspots in 2024 were not thoroughly documented, and the exact coordinates of the dive sites are unknown. The 2025 dive report provides a more detailed description of the surveyed sites; however, in some cases, the results from the two years are not directly comparable.

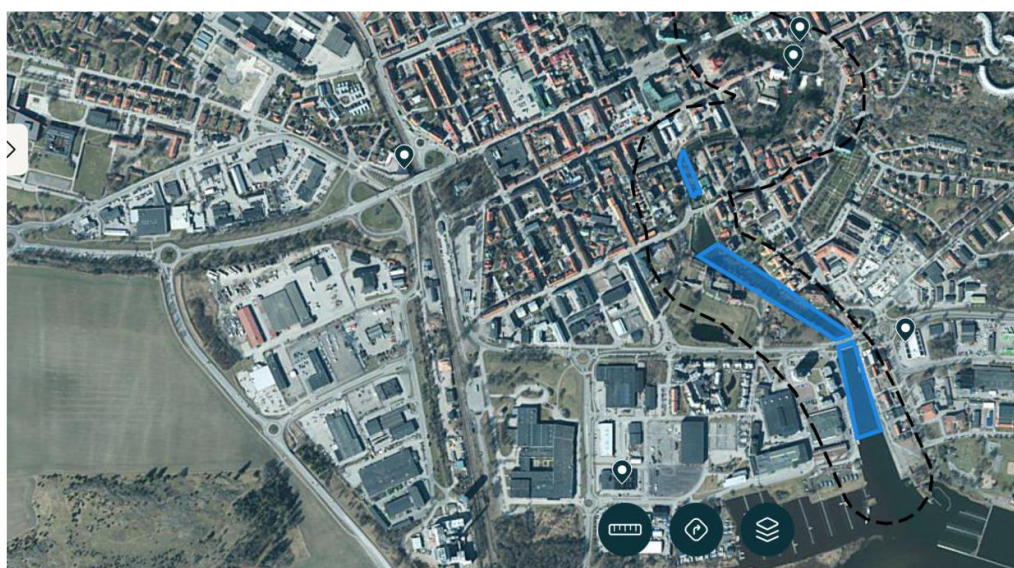
- Nyköping

First location for the dives was Nyköping, a coastal urban area in Södermanland County with approximately 40,000 inhabitants. The Nyköpingsån (a river) flows through the town centre and discharges into the Baltic Sea, and recreational fishing is common in the river, particularly near its outlet.

In Nyköpingsån, three dive operations were conducted along a 200-metre stretch of the river. The first dives took place in June 2024 and follow up dives were conducted in October 2025. The area cleaned during the three dives was approximately 26 500 square meters. The activities were carried out in cooperation with the Swedish Anglers Association and a local diving club. On both occasions, the dives were organised as public events, attracting numerous visitors and families. These events provided opportunities to engage with the public, raise awareness about the project, and discuss the issue of lost fishing gear.



**Figure 5.** Litter recovered from Nyköpingsån during 2024 and 2025.



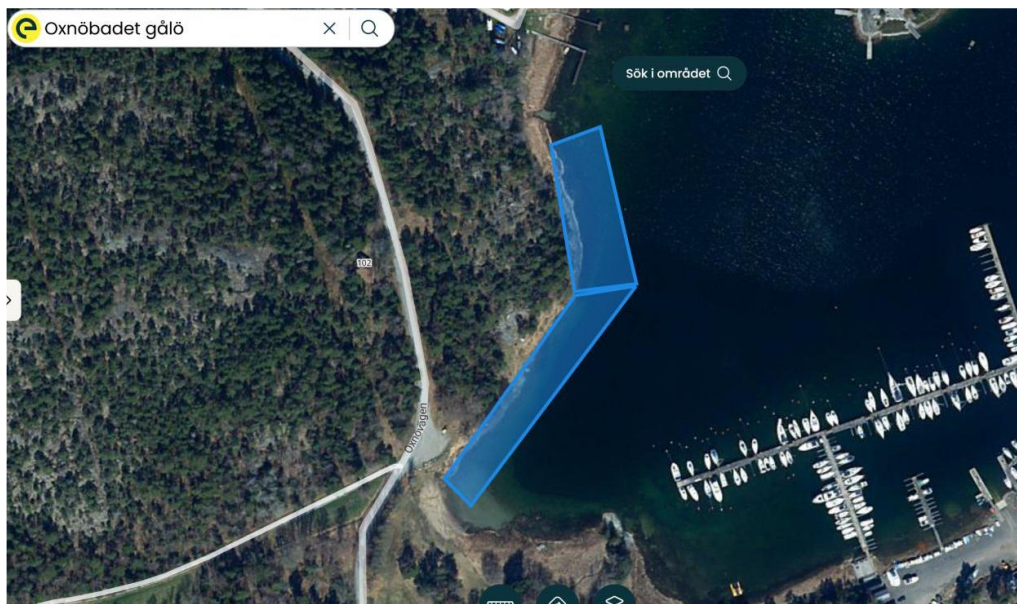
**Figure 6.** Map of Nyköping. The diving areas are marked in blue.

In Nyköpingsån, the cleanup of fishing gear and accessories appears to have had a noticeable effect. During the first year (2024), approximately 4 kg of fishing gear and 500 kg of litter and scrap were collected. These amounts were reduced to 1 kg of fishing gear and 100 kg of litter and scrap in the second year (2025).

Assuming that all lost fishing gear was removed during the 2024 cleanup, the results suggest that approximately 0.75 kg of fishing gear is lost annually at this hotspot. (Is the assumption that 250 g of fishing accessories weren't found during the first dive or what?)

- Gålö

At Oxnöbadet, one dive was conducted in 2025. The divers entered the water near the parking area and swam north along the shoreline at a depth of 3–5 m. Outside the camping area, they turned back and swam south at 1.5–2.5 m depth. The bottom at about 2 m depth outside the bathing area was also surveyed. Visibility was good, around 4 m. The area cleaned was approximately 6600 square meters.



**Figure 7.** Map of Oxnöbadet, Gålö. The diving areas are marked in blue.

At Apelviksudden in 2025, the divers entered the water at the small concrete pier east of the jetty. They followed the shoreline eastwards at a depth of 1.5–3 m for about 50 m before turning and swimming back at 3–5 m depth. They then followed the shoreline around the point, past the jetty, before returning at 1.5–3 m depth. Approximately 2000 square meter of the seabed was cleaned. The site contained numerous lures and a large amount of tangled fishing line and herring rigs. The divers did not have time to retrieve everything during the dive. Visibility was good, 3–4 m.

At the site in Apelviksudden, the estimated annual rate of lost fishing accessories appears to be higher, close to 4 kg per year. The finds in 2025 consisted of 54 tackles, several parts of fishing rods, a net and an unknown number of lead sinkers. At Fiskebryggan, within the area of Apelviksudden, where fishing is prohibited, a few lures were found, nonetheless.



**Figure 8.** Map of Apelviksudden, Gålö. The diving areas are marked in blue. Fiskebryggan is situated approximately in the connection between the two blue marked diving areas.

In Prästfjärden, the 2025 dives began at the launching ramp located next to the pier. The first dive was carried out north of the ramp, in the area outside the pier, and the second dive along the southern shoreline. The area cleaned was estimated at 4000 square meters. Water visibility was very limited, approximately 0.1–1 metre, which made it difficult to survey larger areas. Two unmarked fish traps, each about 1 metre long and 0.5 metres in diameter, were found near the ramp. One of the traps had a loose, thicker fishing line attached. A live pike measuring 30–40 cm was discovered inside one of the traps and released. Apart from that, the traps were empty.

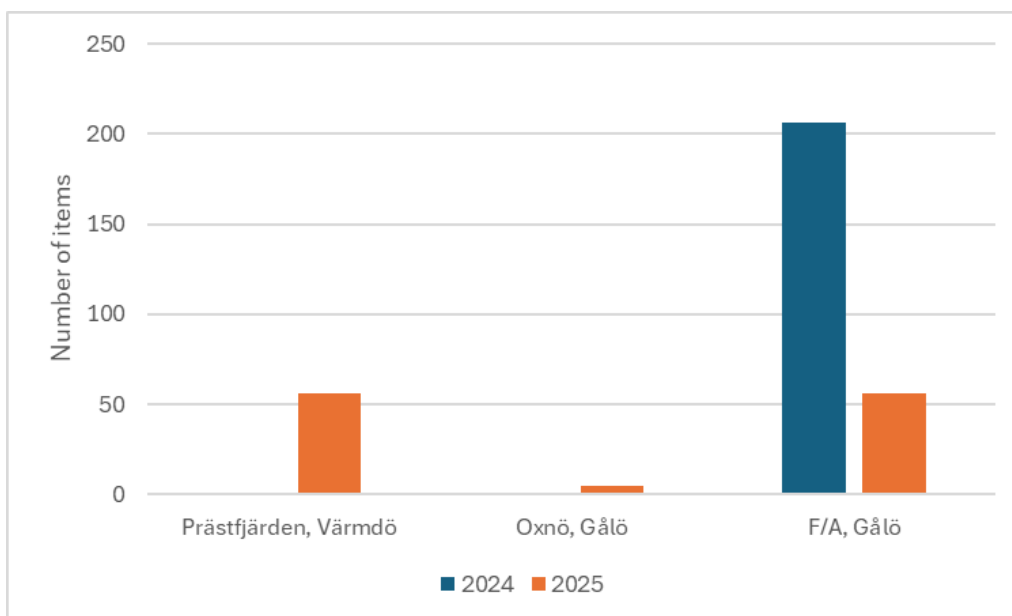
For the other surveyed fishing hotspots, the results are more difficult to interpret. At Prästfjärden, only one fish well was found during the first year, while numerous lures were recovered the following year. It is unclear whether the site had been cleaned before the initial dive or if the dives were conducted at slightly different locations. At Gålö (Oxnöbrygga), a jetty site, the second dive was carried out along the adjacent beach within the same general area. Very few fishing accessories were found there, and no reliable conclusions can be drawn from these results.



**Figure 9.** Map of Prästfjärden, Värmdö. The diving areas are marked in blue.



**Figure 10.** Diver bringing up a fyke net in Prästfjärden.



**Figure 11.** Recovery of fishing gear and accessories in three different diving sites during 2024 and 2025.

#### 2.2.5. Cleaning activities in public events

Several dives were also conducted to remove lost fishing gear from the seafloor. In some instances, Keep Sweden Tidy organised these as public events, including the dives in Nyköpingsån in 2024 and 2025. In autumn 2025, the diving at Hässelbybadet and Trosa were similarly arranged as public events.

- **Gävle**

In October 2024, two dives were made in Gavleån, in Gävle. The river goes thru the town and ends up in Bothnian Sea (the Baltic Sea). At the first dive site, south of Alderholmsbron, about 40 lures were picked up. They were quickly taken up by the public for reuse. The divers also found one net and a fish alive. The second dive site was located closer to the river mouth, at the north harbour pier. Not so many fishing gear were found; only one lure, one fish trap and one fishing rod. For the two dive sites, it was estimated that an area of 8800 square meters was cleaned.

- **Gålö**

In September 2025, in connection to the lost fishing accessories pilot study, two dives were made in Morarna. The first dive began at the launching ramp, and the divers followed the shoreline eastwards. Visibility was good, about 4 m. The second dive was carried out inside the bridge and the seal protection net, where visibility was slightly poorer, around 3 m. The divers followed the reed edge around the outer part of the ditch and, upon returning to the seal net, made a short swim into the middle part of the bay. During the first dive, one pike was observed, and during the second, two pike, each about 15–20 cm long.

The two dives resulted in 35 lures, one fishing rod and one hand net. The total weight was 0,6 kg of fishing gear and accessories. An area of approximately 4000 square meters was cleaned from lost fishing gear.



**Figure 12.** Divers and fishing lures from the dive site in Morarna.

- **Stockholm Ström**

On Sunday, 8 June 2025, in celebration of the UN International World Oceans Day, Keep Sweden Tidy with project partners hosted an inspiring event at Stockholm Ström, one of the city's prime fishing spots. The event centred around a litter dive, with a special focus on salvaging lost fishing gear. This engaging activity aimed to shed light on how litter affects ocean health while offering practical solutions for waste-free fishing practices.

Carried out in collaboration with partners from Sweden, Finland, and Estonia under the Interreg Central Baltic Programme, the initiative highlighted the importance of transnational efforts to protect marine ecosystems.

The event attracted over 500 visitors, including members of the public, families, and maritime enthusiasts. Visitors explored interactive activities, received valuable insights into sustainable fishing, and witnessed the tangible impact of marine cleanup efforts firsthand.

- **Programme Highlights during the event**

#### Litter-Free Fishing Tips

Practical guidance and resources on how to reduce fishing-related waste were shared, encouraging local and visiting fishers to adopt sustainable practices.

#### Interactive Activities for Children

Fun, hands-on activities were offered to engage younger participants and help them understand the importance of preserving our oceans.

#### Meet Tobias Fränstam

Renowned angler and author of *The Pike Bible*, Tobias Fränstam, shared his passion for fishing and inspired attendees with advice on environmentally friendly fishing adventures.

#### Main Activity: Litter Dive

Eight dedicated divers performed a debris dive under the surface of Stockholm Ström, retrieving discarded fishing gear and other submerged litter. Participants on land enthusiastically assisted by hauling the lifted items ashore.

#### Key Results

The litter dive proved to be both eye-opening and impactful, shining a spotlight on the scale and composition of underwater waste. The following items were recovered:

- 22 electric scooters
- Several bicycles
- One Darth Vader mask
- Approximately 170 kg of tires
- Approximately 300 kg of miscellaneous waste, including fishing equipment

Approximately 10 000 square meters of the seabed was estimated to be cleaned.

These findings illustrate the pressing need for continued cleanup efforts and underline the larger issue of plastic pollution and its harmful effects on marine life.

- **Dives in the Stockholm area**

In September–October 2025, a diving company conducted an assignment for Håll Sverige Rent to retrieve lost fishing gear from several popular fishing sites. The dives took place on 17–18 September, 29–30 September, and 2–3 October 2025. A total of 14 dives were performed, with a combined dive time of 20 hours and 5 minutes; the searched seabed area was estimated at over 10,200 m<sup>2</sup>. The assignment's maximum depth of 5 m was exceeded in cases where fishing lines extending from shallower areas down past 5 m were retrieved.

- Nibble, Järna

In Nibble, the dives started off from the boat ramp. The first dive went south, and the second one along the shore northwards. Visibility was relatively poor, about 1 m, which made it difficult to survey larger areas. Herring tackle and fishing lines were the most common, heavily tangled

in old foundations and larger blocks, which took time to disentangle. The southward dive reached past the pier into the reed belt, while the northward dive only extended about 15 m from the ramp due to all the tangled lines. There was therefore more bottom area to search here, and an additional dive was conducted a week later. The third dive went north from the boat ramp at 4–5 m depth to the reed belt and back at 1.5–3 m depth. Here too, a lot of line, herring tackle, and lead weights/sinkers were collected, along with two nets and a couple of fishing rods. Over 1,300 m<sup>2</sup> of bottom was searched.

- Skanssundet, Mörkö

The first dive in Skanssundet started from the sandy beach north of the pier. The divers swam straight out and followed the bottom southwards at about 4 m depth. On the steep sand/gravel bottom, there were occasional lures and lines until a half-buried tangled net was found outside the pier. The net contained masses of tackle, lures, lines, and weights. Approximately half of the net was salvaged during this dive using a tow line from the car. The divers also collected fishing lines and lures from some of the pier's piles on the southern side.

The second dive in Skanssundet began by searching for what remained of the tangled net. The net was salvaged using a line from the car. Salvaging the net, which turned out to be longer than expected, took a long time, and the divers finished by swimming a loop southward, mainly to assess how much lost fishing gear remained. The assessment was that there was enough to justify another dive at this location. A third dive was therefore conducted in Skanssundet a week later. This time, lines, lures, tackle, nets, and rods were collected mainly around the pier's pillars, but the bottom south of the pier and outside it was also searched. Visibility was good, 3–4 m, meaning a total of over 2,500 m<sup>2</sup> of bottom was searched at the site.

- Mörköbron, Mörkö

Two dives were conducted at Mörköbron. The first followed the shore at about 2 m depth to, and slightly past, the steep rock wall before the divers turned and swam back at 3–4 m depth. During the second dive, the two nearest bridge pillars were circled before the divers swam north at about 5 m depth. There were many lures, heavily tangled lines, and some nets. Not everything was collected, and enough remains to justify another dive here. Visibility was somewhat better than in Nibble, about 2 m. In total, nearly 1,800 m<sup>2</sup> of bottom was searched.

- Lövstabadet, Hässelby

The first dive at Lövstabadet started approximately in the middle of the beach and followed the 4–5 m depth contour westwards along the shore. A bit past the small pier further along the beach, the divers turned and swam back at 1.5–2.5 m depth. Most of the lines, sinkers, and lures were found tangled in scrap or branches on the bottom.

The second dive started from the same spot on the beach but followed the 1–2 m depth contour eastwards towards the boat harbor. The divers turned at the pier and swam back at 3–6 m depth. The dive continued towards the small point in the western part of the shore before the divers turned back to the starting point. Outside the pier, there were some wooden structures underwater in which some lines and lures were caught. Two crayfish tangled in fishing lines were cut free and released.

During both dives, several large signal crayfish were observed, as well as lots of perch, some big ones. In total, approximately 2,600 m<sup>2</sup> of bottom was searched.

Note: During a recreational dive at the site on October 5, a lot of fishing lines and lures were observed tangled in various litter as well as in the wreck lying at 13–15 m depth. There is therefore a lot of fishing-related litter at the site, but deeper than five meters.

- Trosaån, Trosa

Four dives were conducted in Trosaån. Dive 1 in Trosaån was carried out in the harbour basin. The divers entered at the boat ramp in the southern end of the basin and swam a loop around the basin. Visibility was poor, and since there was a risk of swimming under the quay, the divers stayed a distance from the quay edges. The following three dives were planned based on information from an angler who came down to the event during dive 1.

Dive 2 started in the northern part of the harbour basin and went up to Villabron and back. The divers swam side by side, and few/no lures were found on the return leg. Dive 3 started on the southern side of Torgbron and went down to Villabron. Dive 4 also started on the southern side of Torgbron, but the divers swam upstream to, and about 10 m past, Bryggargrändens footbridge.

Generally, there was little fishing-related waste. Most of what was found was caught on bicycles and similar items on the bottom, but there was relatively little of that. During dive 3, downstream of Torgbron, a crayfish tangled in fishing line was found and rescued. Upstream of Torgbron (dive 4), visibility was better, there was significantly more vegetation, and the influence of brackish water from the Baltic Sea was noticeably less than downstream. Here, no jellyfish were observed, but many crayfish, some large ones, as well as a large trout. In total, over 2,000 m<sup>2</sup> of river bottom was searched.

Table 3 presents the number of collected fishing gear items, including lures, rods, cast nets, and nets. The table also reports the total weight of all salvaged fishing gear (lures, lines, herring tackle, nets, and lead weights/sinkers), as it was too entangled to separate. In total, 178 kg of fishing-related waste was recovered.

#### Additional Observations

Around Mörkö, at the sites Nibble, Mörköbron, and Skanssundet, the non-native species white-fingered brackish water crab (*Rhithropanopeus harrisi*) was observed. One dead specimen in Nibble, two live but somewhat lethargic individuals at Mörköbron, and three lively individuals in Skanssundet. The observations have been reported to Artportalen.

**Table 3.** The table presents the number of collected lures, fishing rods, pots/traps, and landing nets, as well as the total weight of all fishing gear, i.e., lures, rods, nets, weights, fishing lines, and herring tackle, per site grouped by area.

| Site          | Lures<br>(no.) | Rods<br>(no.) | Cast<br>nets<br>(no.) | Nets<br>(no.)     | Weight<br>(kg) | Comments                                                                                |
|---------------|----------------|---------------|-----------------------|-------------------|----------------|-----------------------------------------------------------------------------------------|
| Nibble S      | 2              | 0.5           | -                     | -                 | 4.6            | Lots of fishing lines and herring tackle.                                               |
| Nibble N1     | 10             | 1             | -                     | -                 | 3.3            | Lots of fishing lines and herring tackle.                                               |
| Nibble N2     | ~50            | 2.5           | -                     | 2                 | 15.3           | Lots of tackle, lead weights/sinkers and lines, some tangled in nets.                   |
| Skanssundet 1 | Hundreds       | 3             | -                     | Half net?         | 54.0           | Part of net with tangled lead weights/sinkers, tackle, lines and lures.                 |
| Skanssundet 2 | Hundreds       | 3.5           | -                     | 5 parts of 1 net? | 52.5           | Net salvaged in parts, full of lures, tackle and lead weights/sinkers. Rods with reels. |
| Skanssundet 3 | ~50            | 6.5           | -                     | -                 | 16.6           | Lots of tackle, lead weights/sinkers and lines.                                         |
| Mörköbron 1   | ~80            | 5             | 2                     | -                 | 12.1           | Cast nets ~1.5 m diameter. Lots of lead weights/sinkers and lines. Rods with reels.     |
| Mörköbron 2   | ~115           | -             | -                     | 1                 | 10.9           | Net length 30 m.                                                                        |
| Lövstabadet W | 11             | 1             | -                     | -                 | 1.2            | Also some lead weights/sinkers, tackle and lines.                                       |
| Lövstabadet E | 15             | -             | -                     | -                 | 0.4            | Also some lead weights/sinkers, tackle and lines.                                       |
| Trosaån 1     | ~25            | -             | -                     | -                 | 0.8            | Also some fishing lines.                                                                |
| Trosaån 2     | ~30            | -             | -                     | 1                 | 5.4            | Net length ~3 m. Lures alone weighed 0.83 kg.                                           |
| Trosaån 3     | 8              | -             | -                     | -                 | 0.6            | 1 lead weight.                                                                          |
| Trosaån 4     | 5              | -             | -                     | -                 | 0.2            | -                                                                                       |

## 2.3. General methodology and results in Finland

The dives were conducted within the Interreg Central Baltic programme project Re:Fish, and as such several diving companies were approached to provide tender offers to conduct the dives for the project's behalf. In 2024 Keep the Archipelago Tidy Association (KAT) in Finland sent out tender offers to five diving clubs and in 2024, and in 2025 they sent it to 4 diving clubs. Both years KAT chose Saaristomeren Sukeltajat ry to conduct the dives, as they were able to do the dives cost-effectively. They also have several years of experience in annual litter recovery dives in the Aura River during the Turku Day celebrations.

The dives were conducted annually in June 2024 and 2025 at three locations in the Archipelago Sea: Kaarina (Figure 1), Naantali (Figure 2), and Turku (Figure 3). The diving sites were selected based on historical data indicating areas of interest related to recreational fishing activity and litter accumulation.

All dives were carried out by a single experienced diver, who had prior experience with both cleanup operations and technical diving. The diver was secured to a surface rope by another representative from the same diving club. The rope served as a lifeline and also provided a means to attach and retrieve larger items if encountered, otherwise if the items were smaller the diver would come up to the surface and hand it to the people on shore and continue from the same place. The dives also happened less than 10 m from the shore to avoid recreational boating traffic.

During underwater operations, Keep the Archipelago Tidy Association conducted beach cleanups simultaneously according to the Finnish national cleanup standard. This was done to assess how much of fishing litter is found at the popular fishing spots on shore and compare annual accumulation of recreational fishing gear (Figure 19). All items collected and their quantities were recorded on site and later discarded properly. Based on previous beach cleanup results, the selected sites indicate significant recreational fishing activity.

### 2.3.1. Complications during the retrieval actions

Underwater visibility during all dives was highly limited in some areas offering no more than 15 cm, which made operations challenging and required underwater torches. In Ruissalo, poor visibility prevented the completion of a planned dive, as visibility even shallow waters, posed significant challenges. Overall, limited visibility persisted throughout the summer season.

Additionally, the dive location in Kaarina had to be slightly adjusted; the original site used in 2024 was obstructed by a sauna and restaurant building constructed over the winter, requiring a new spot for the 2025 dive. During the dive in Naantali 2025, the diver found a submerged wooden structure in which several fishing lures had been caught. All the lures could not be removed from it as they were too heavily entangled to be removed. This suggests that such structures may act as long-term accumulation “hot spots” for lost gear. Similar observations were discussed with a local diving club in Kotka, where fishers reported of wooden structures near a jetty that recreational fishers regularly lost fishing gear. Planned dives in Kotka were ultimately cancelled as river flow conditions did not decrease to a safe level.

Extra dives and cleanups were also conducted in Vaasa, Helsinki and on the Åland islands. The diving events in Vaasa and Åland were public events where people were cleaning up beaches and the local diving clubs’ removing underwater litter. The diving event in Helsinki was done together with two Finnish social media influencers to raise awareness of the Re:Fish project and highlighting the problem it’s trying to solve.



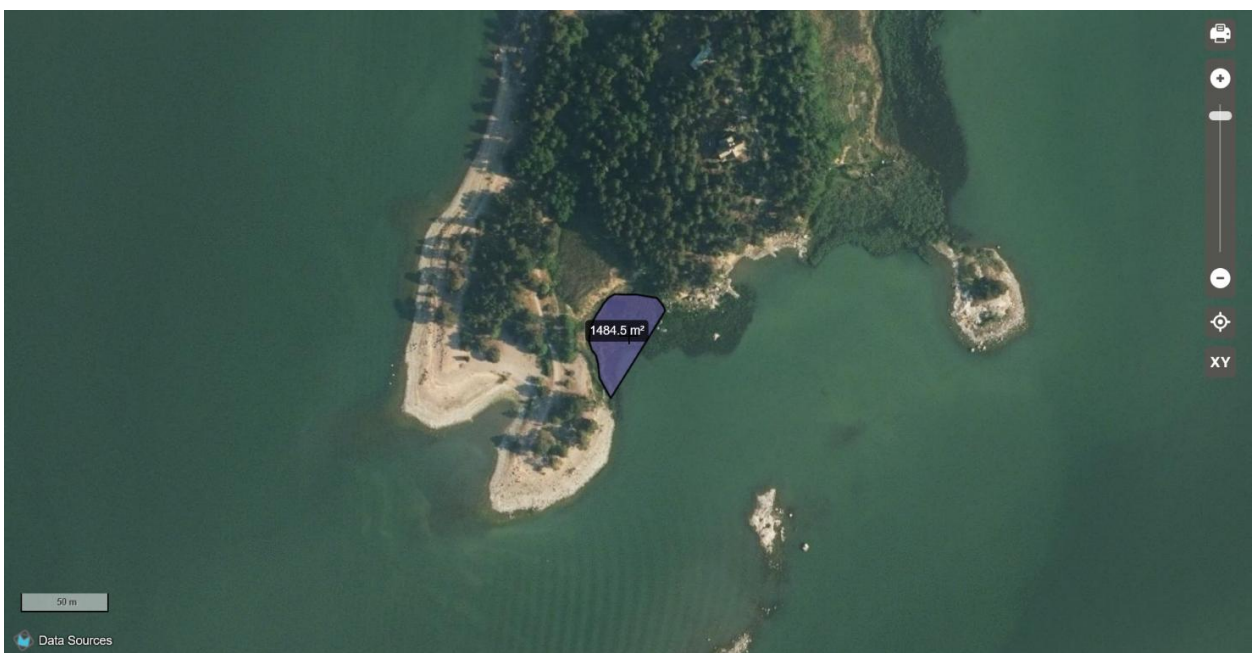
**Figure 13.** Fish trap found in Kaarina 2024.



**Figure 14.** Diving site at Hovirinta in Kaarina. Area a) was cleaned in 2024 and area b) was cleaned in 2025. We had to use a different diving site for 2025 as a sauna restaurant complex was built in between the diving cleanups.



**Figure 15.** Diving site in Naantali on the island of Särkkä.



**Figure 16.** Diving site in Turku Ruissalo.

### Monitoring dives

From the dives we organised a large percentage of the litter found was fishing related. Even in some areas that had been cleaned the in 2024 (Särkkä) had a significant increase in found gear from 80.9% found compared to a 100% in 2025. Unfortunately, we couldn't dive in the exact same spot in Hovirinta so the data points are not completely comparable, but the amount from that diving spot decreased in the number of items.

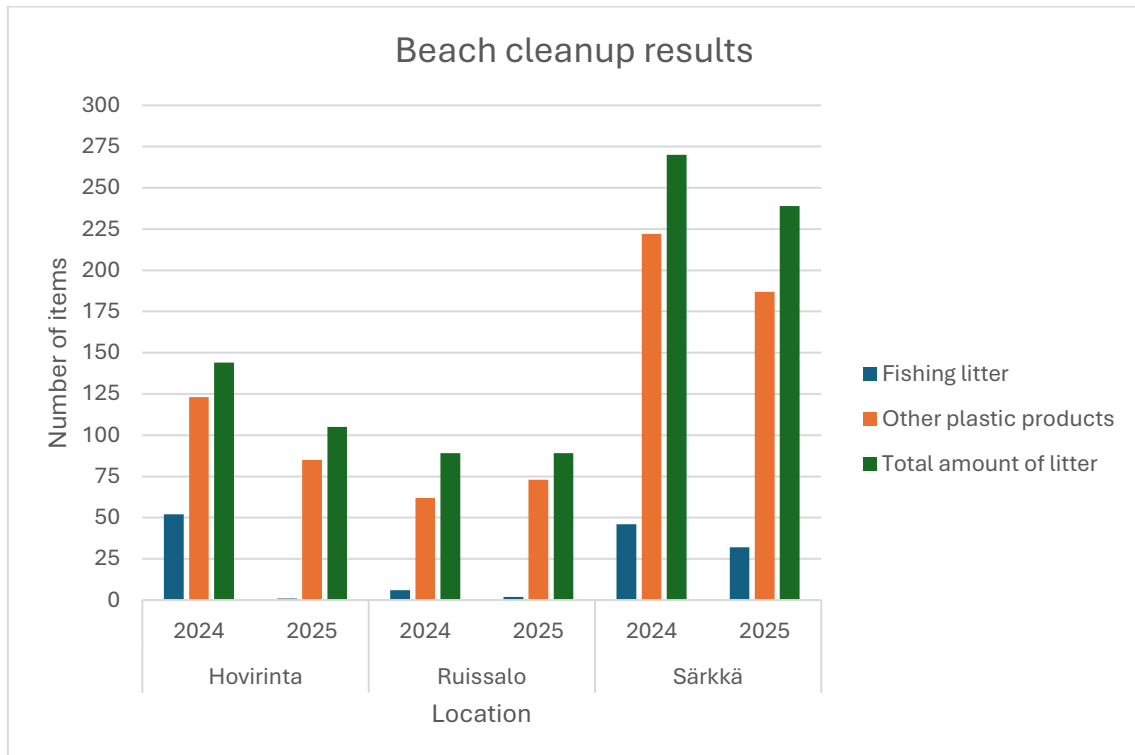


**Figure 17.** Diver in the water in Hovirinta diving site.

The Ruissalo diving site was not optimal for underwater surveys and could have been replaced with an alternative location. Although recreational fishing takes place in the area, underwater recovery results were limited, with only one item found in 2024. In 2025, visibility conditions were consistently poor, and despite several dive attempts on different days, low visibility remained a significant limiting factor. Consequently, weather conditions strongly influenced the feasibility of conducting dives, unless divers were equipped with underwater torches. Poor visibility also resulted in the cancellation of one planned dive in Ruissalo. These conditions were further affected by rainfall in the days preceding the dives, as Ruissalo is located at the mouth of the Aura River in Turku, which is known for high sediment loads.



**Figure 18.** Fishing lures and a magnet found in Särkkä 2025.



**Figure 19.** Results of the number of items of litter found at the beach cleanups conducted by Keep the Archipelago Tidy Association during the dives.

**Table 4.** Individual items found during the dives.

| Hovirinta 2024            | Nr of items: | Särkkä 2024                          | Nr of items: | Ruissalo 2024 | Nr of items: | Hovirinta 2025          | Nr of items: | Särkkä 2025     | Nr of items: | Ruissalo 2025 | Nr of items: |
|---------------------------|--------------|--------------------------------------|--------------|---------------|--------------|-------------------------|--------------|-----------------|--------------|---------------|--------------|
| Jig                       | 3            | Fishing rod                          | 1            | Jig           | 1            | Fishing line            | 5            | Fishing line    | 40-70 m?     |               |              |
| Lure                      | 4            | Plastic bottle, 0,25 l               | 1            |               |              | Metal frame with spikes | 1            | Jigs and lures  | 40           |               |              |
| Barstool (metal, plastic) | 1            | Plastic fragment from a food package | 1            |               |              | Barstool                | 1            | Fishing magnets | 1            |               |              |
| Fishing rod part          | 2            | The bottom of a glass bottle         | 1            |               |              | Fishing weights         | 6            | Metal weight    | 3            |               |              |
| Wooden chair              | 1            | Jigs and lures                       | 4            |               |              | Hooks                   | 4            |                 |              |               |              |
| Vacuum cleaner            | 1            | Fishing weights                      | 4            |               |              | Leader                  | 1            |                 |              |               |              |
| Fish trap (Plastic)       | 1            | Fishing hook                         | 3            |               |              | Insulin pump            | 1            |                 |              |               |              |

| Hovirinta<br>2024         | Nr of<br>items: | Särkkä<br>2024            | Nr of<br>items: | Ruissalo<br>2024 | Nr of<br>items: | Hovirinta<br>2025                            | Nr of<br>items: | Särkkä<br>2025 | Nr of<br>items: | Ruissalo<br>2025 | Nr of<br>items: |
|---------------------------|-----------------|---------------------------|-----------------|------------------|-----------------|----------------------------------------------|-----------------|----------------|-----------------|------------------|-----------------|
| Metal<br>drinking<br>can  | 1               | Plastic<br>bottlecap      | 1               |                  |                 | Pressure-<br>treated<br>board with<br>screws | 1               |                |                 |                  |                 |
| Fishing<br>line           | ca 4-5<br>m     | Fishing<br>line           | min 20<br>m     |                  |                 | Traffic<br>cone                              | 2               |                |                 |                  |                 |
| Snap<br>swivel<br>(metal) | 1               | Snap<br>swivel<br>(metal) | 1               |                  |                 | Snorkel                                      | 1               |                |                 |                  |                 |
|                           |                 |                           |                 |                  |                 | Chair                                        | 1               |                |                 |                  |                 |
|                           |                 |                           |                 |                  |                 | Wooden<br>grate                              | 1               |                |                 |                  |                 |
|                           |                 |                           |                 |                  |                 | Metal pole                                   | 1               |                |                 |                  |                 |

### 3.0. Conclusions of underwater cleanups in Finland and Sweden

The objectives posed to diving operations were partly achieved. The project recovered 2 044 kgs of lures and other fishing gear (gillnets excluded). The total mass of litter removed exceeded well the target 50-70 kg. Another target, i.e., the number of removed accessories ~3000', was not achieved. This occurred because the accessories weren't constantly counted and their type and great variety weren't anticipated when drafting the application.

#### 3.1. Lessons learned in Sweden

Effective methods for retrieving lures have been compiled, with three approaches used to date:

- In Nyköpingsån, plastic containers (with holes) were used to collect lures.
- In Gålö, a plastic food container with holes was secured to the diver propulsion vehicle (DPV).
- In Gålö, fishing line was wrapped around a stick, with hooks either hooked or wrapped around it.

The divers at Gålö concluded that lures are more likely to become entangled in higher quantities on hard-bottom areas than on soft sediment. Lures were more difficult to locate in areas with dense bladderwrack. Using a diver propulsion vehicle (DPV) proved effective for covering larger areas in less time. Shallower areas could be surveyed using snorkelling or freediving. Lures were most found at depths of less than 5 m.

#### 3.2. Lessons learned in Finland

As the dives conducted in 2025 were not repeated at the exact spots as in 2024 it is difficult to estimate the density of fishing litter and other litter that was found and the results reflect that. In Kaarina it was the newly constructed sauna and restaurant complex which prohibited the

replication dive, and in Särkkä it was due to the old wooden structure that was found which contained tens of lure and heavily skewed the results consequently.

If cleaning the shore and underwater of fishing gear is to become a regular practice in the future at popular fishing spots, several practical considerations must be taken into account. Diving to recover lost fishing gear has proven to be effective, as demonstrated by the results of the conducted dives; however, it also presents clear challenges in real-world conditions. Weather conditions play a significant role, as poor visibility can severely limit divers' ability to locate gear underwater. In such conditions, divers may be forced to rely on touch rather than sight, increasing the risk of entanglement in fishing lines, nets, or hooks. This requires divers to proceed slowly and with a high level of caution, which can limit efficiency and increase safety risks.

Due to these constraints, underwater clean-ups may be most feasible when focused on a limited number of actively used fishing locations rather than being applied broadly. Targeting known hotspots where fishing pressure is high could improve efficiency and reduce unnecessary risk. Cooperation with local diving clubs, fishing associations, and volunteers involved in shoreline clean-ups could further support these efforts by sharing local knowledge and distributing workload. In addition, consultation with water owners and relevant authorities is essential to ensure access permissions, safety coordination, and long-term sustainability of such activities.