

**Estonia – Latvia**

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

Pilot Actions

Period 3

Period 3 marked a significant step forward in our ghost gear removal efforts. Over the course of 10 active days at sea, our team worked in the Bay of Haapsalu and Matsalu, with an additional 2 days of gillnet retrieval and cleaning completed in the first days of Period 4.

The Bay of Haapsalu was chosen following a recommendation from local Environmental Inspector Kadri Pärिमets, whose field knowledge pointed to a higher density of ghost gear compared to the open waters of Väinameri. Unfortunately, this insight proved invaluable.

In Matsalu Bay, we completed 6 full survey days, successfully applying the operational plan developed in Period 2. This seamless transition from planning to execution demonstrated the growing efficiency and adaptability.

Tools That Made It Possible

Boat – *Merry Fisher 605*

A compact but capable vessel featuring a wheelhouse and a generous working deck. Its maneuverability, stability, and practical layout proved to be a great match for the challenges of ghost net retrieval.



Sonar – *Marine Sonic Hunter MK II Side Scan Sonar (600 & 1200 kHz)*

Delivered clear, high-resolution imaging of the seabed, enabling us to detect ghost nets with precision, even in low-visibility conditions.



Estonia – Latvia

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

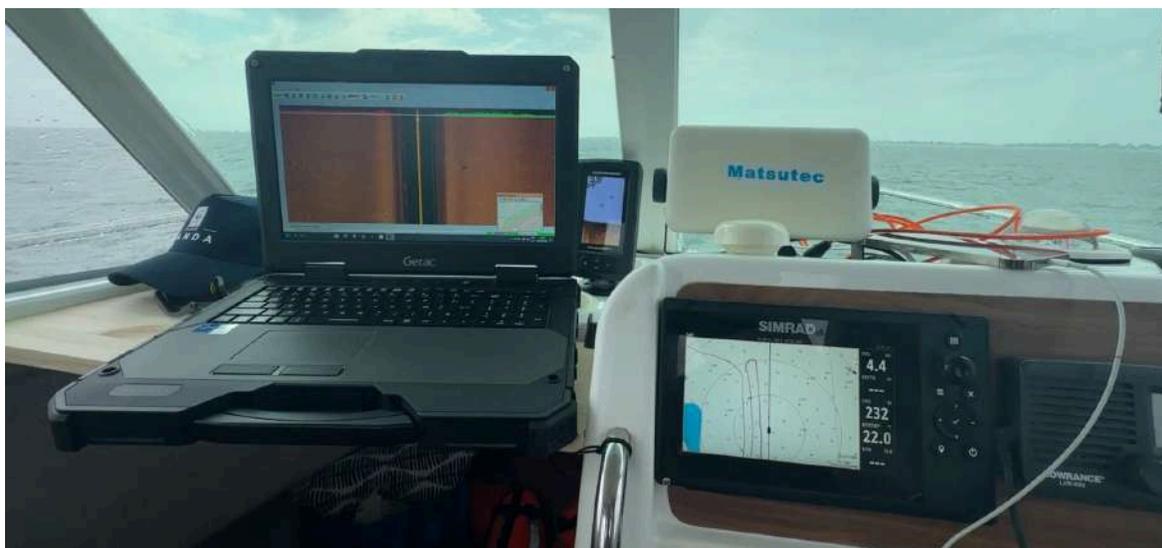
ROV – *Chasing Pro Max*

Fitted with purpose-built tools engineered by Timmu Tollimägi, the ROV became our underwater workhorse — locating, documenting, and assisting in the recovery of nets.



Field Computer – *Getac X600*

A rugged, high-performance laptop designed for demanding field work. Used for processing sonar data, storing geolocations, and supporting real-time operational decisions.

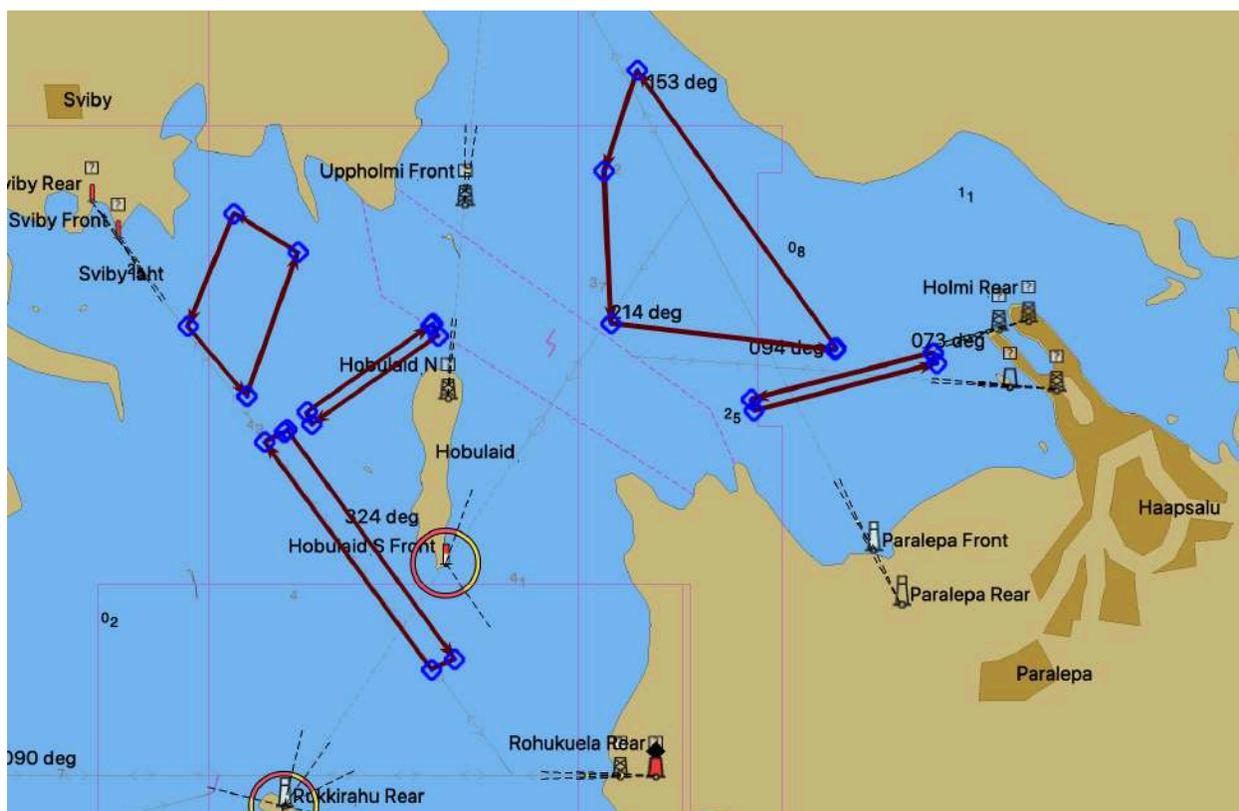


Survey Operations in Haapsalu Bay

Over **four intensive survey days**, we focused our efforts on the nearshore areas surrounding Haapsalu (see map below).

A typical day followed a two-phase approach:

- **Morning:** Systematic sonar surveys covering pre-planned transects.
- **Afternoon:** Verification dives using the ROV to investigate and confirm sonar detections.



Sonar Testing & Calibration

To ensure accuracy before committing to full-scale surveying, we conducted two controlled tests of the **Marine Sonic Hunter MK II** in Haapsalu Bay. The aim was to confirm that the sonar could reliably detect gillnets in realistic seabed conditions.

For the test, we deployed an old “Chinese gillnet,” tied in a way that replicated a lost net lying on the seabed — partially rolled and shaped by wave action. This controlled scenario allowed us to:

- Verify target visibility on sonar scans.
- Familiarize the team with the specific sonar signature of gillnets.
- Fine-tune operational settings for optimal detection.

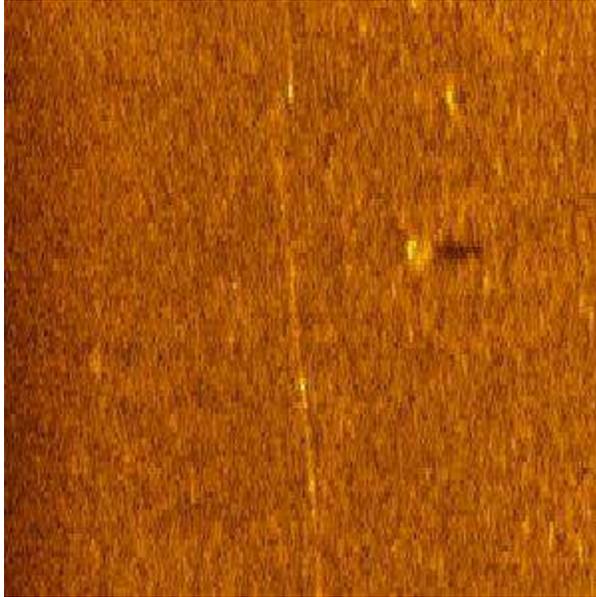
The successful detection during these trials provided confidence that the system was ready for real-world operations in the challenging, mixed-bottom conditions of the Baltic Sea.



Estonia – Latvia

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

On the sonar display, the **test net** appeared as follows:



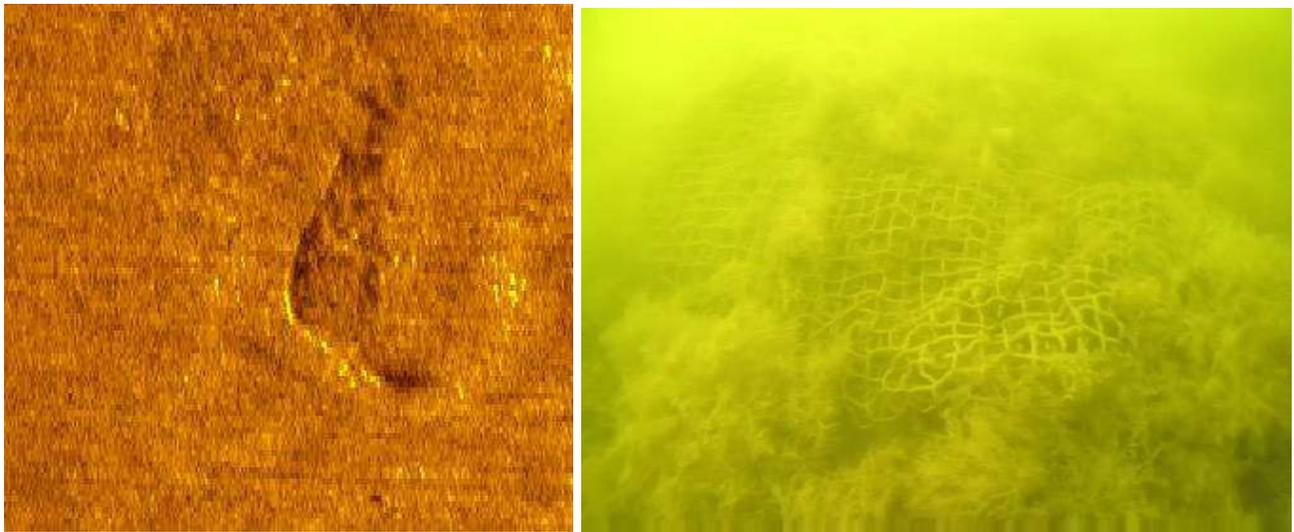
Since the net was already deployed in the water, we also used the opportunity to test our **ROV retrieval tools**. Initial trials showed that while the ROV could successfully catch the net, the **hook mechanism** was gripping too tightly and failed to release when the ROV moved backwards.

Engineer **Timmu Tollimägi** quickly adjusted the tool's tension settings, and during the next trial, the hook released as intended. This modification improved the reliability of the retrieval process and provided valuable real-world data for future operations.

Haapsalu Bay Findings

In Haapsalu Bay, we located and verified (via ROV) a section of a box trap.

However, as our tools are specifically designed for retrieving gillnets, this object was too large for recovery.



Additional findings included old cables and discarded car tyres.

All data and coordinates were forwarded to the Environmental Board Inspectors for reference and potential future action.

Estonia – Latvia

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

Date Found	Date Confirmed	Verified	Location	Goordinates	Description
18.07.25	18.07.25	ROV	Haapsalu, from Paralepa fairway to east	N 58°58,9709` E 23°26,1576`	part of a box trap
19.07.25	19.07.25	ROV	South West from Hobulaiu H2	N 58°57,6023` E 23°24,5446`	Steel Cable
20.07.25	20.07.25	ROV	South West from Pinukse Kivi	N 58°56,7944` E 23°26,4792`	Steel Cable
20.07.25	20.07.25	ROV	East from Hobulaiu H4	N 58°57,7301` E 23°23,7546`	Steel Cable

While no active gillnets were recovered, the surveys provided valuable confirmation of our search methods and equipment performance. The ROV successfully verified multiple underwater objects, ensuring our tools function effectively in real conditions.

This work refined our search patterns, confirmed the accuracy of sonar readings, and allowed us to eliminate areas with low potential for ghost gear presence.

With Haapsalu Bay mapped and key points documented, the team proceeded to **Matsalu Bay**.

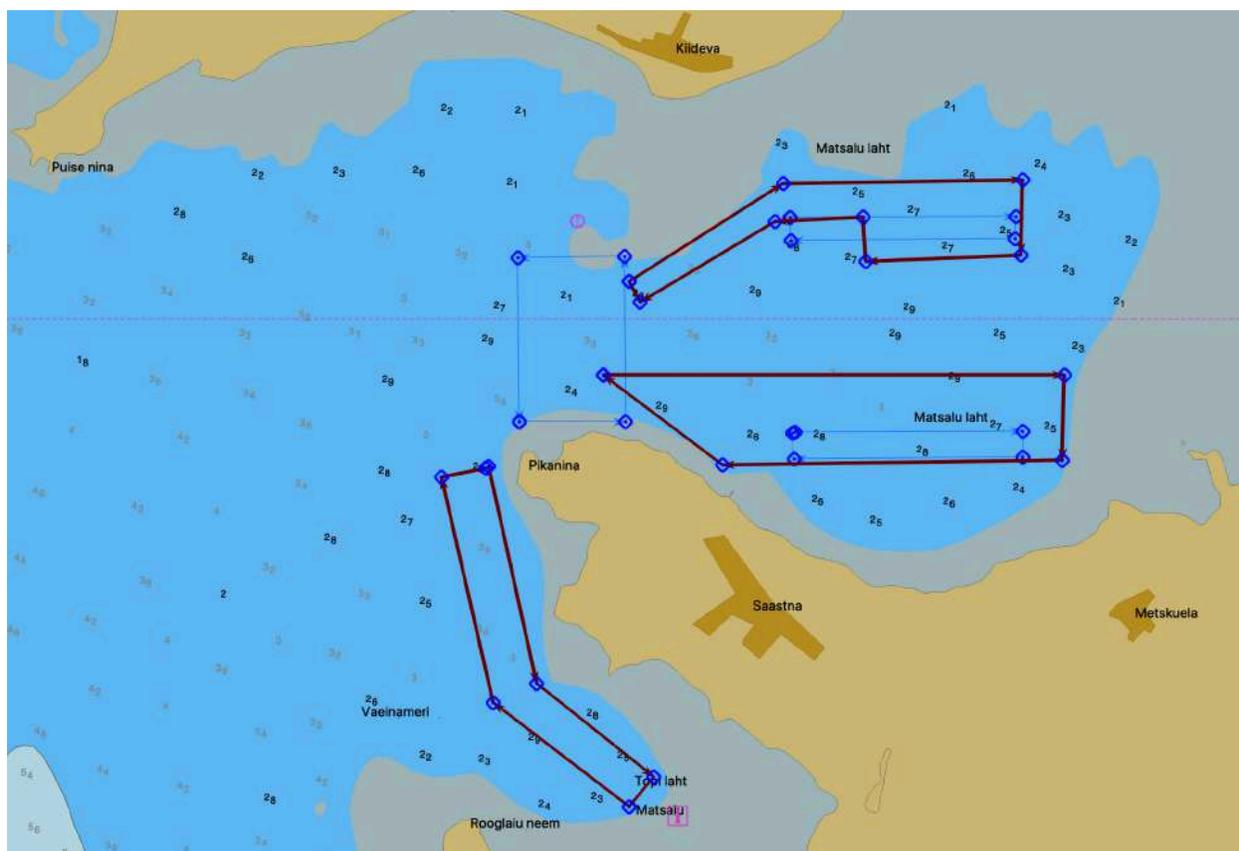
Survey Areas in the Bay of Matsalu

In the Bay of Matsalu, three designated areas were surveyed.

Due to unfavorable weather conditions, the planned survey in the middle of the bay was replaced with a survey in the Bay of Topi.

The operational approach remained consistent:

- The first half of each survey day was dedicated to sonar scanning.
- The second half focused on verifying sonar findings using the ROV.

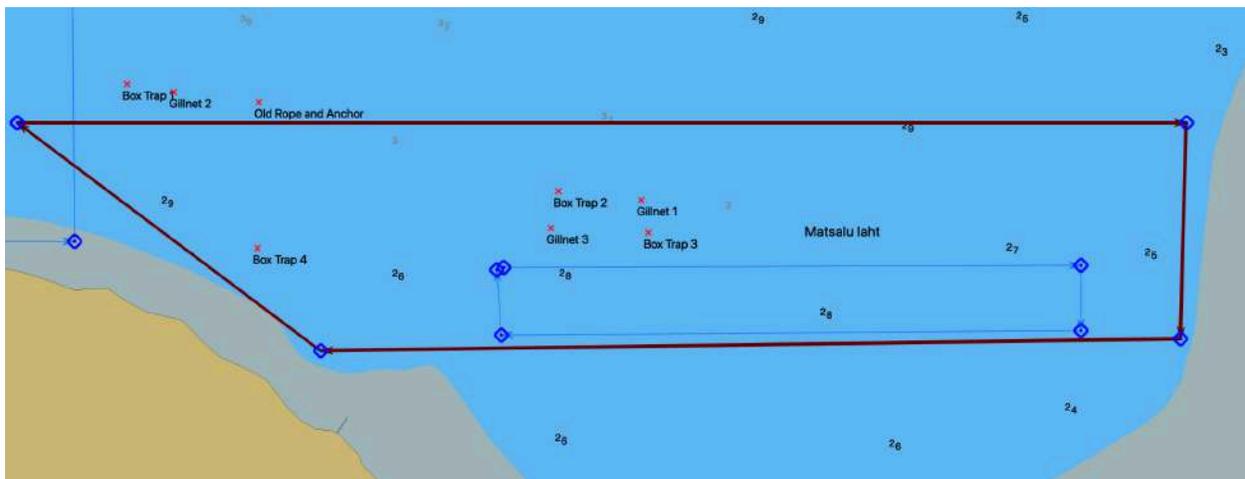


Matsalu South — Survey Findings

Estonia – Latvia

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

All confirmed findings in Matsalu Bay were located in the **southern sector**. The **blue box** on the map represents the planned survey area, while the **larger red box** shows the actual area covered during operations. This outcome highlights the importance of expanding the survey zones: had we limited ourselves strictly to the planned area, no gillnets would have been detected.

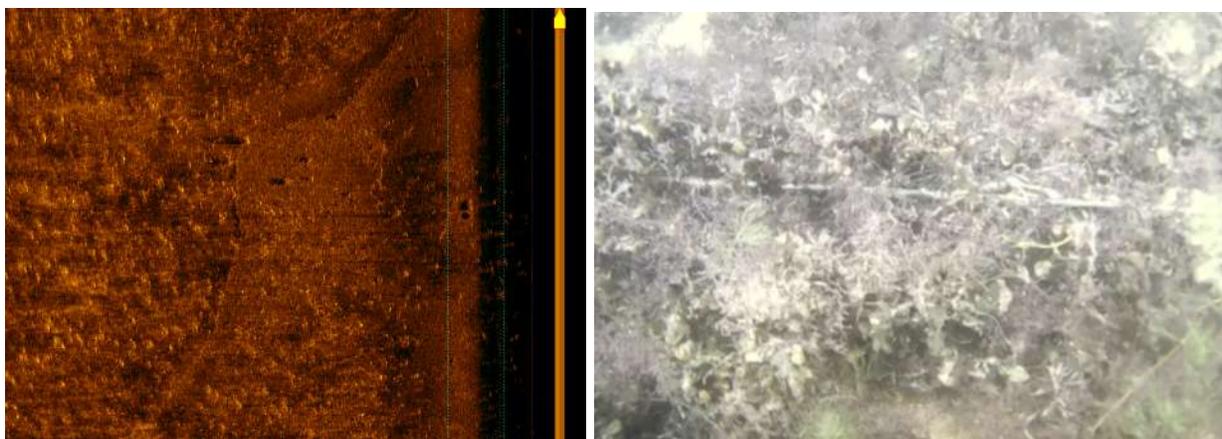


Within the expanded area, three separate gillnets were located and successfully retrieved, along with five partial box traps, one old rope with an anchor.

An interesting finding was that all the gillnets and most of the other debris were located close to each other, forming a small cluster within the surveyed zone. This pattern warrants further study, as it may be linked to local ice movements, seabed features that trap gear, or patterns in historical fishing activity. Another possibility is that abandoned nets can drift and accumulate in certain “catchment” areas over time, creating concentrated debris fields. Understanding these factors could help target future surveys more effectively.

Gillnet Retrieval and Additional Findings

Gillnets 1 and 3 were located in shallow waters (2–2.5 m) with heavy seaweed growth. Both were successfully retrieved using Lifting Tool No. 2 without any operational issues.



Estonia – Latvia

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

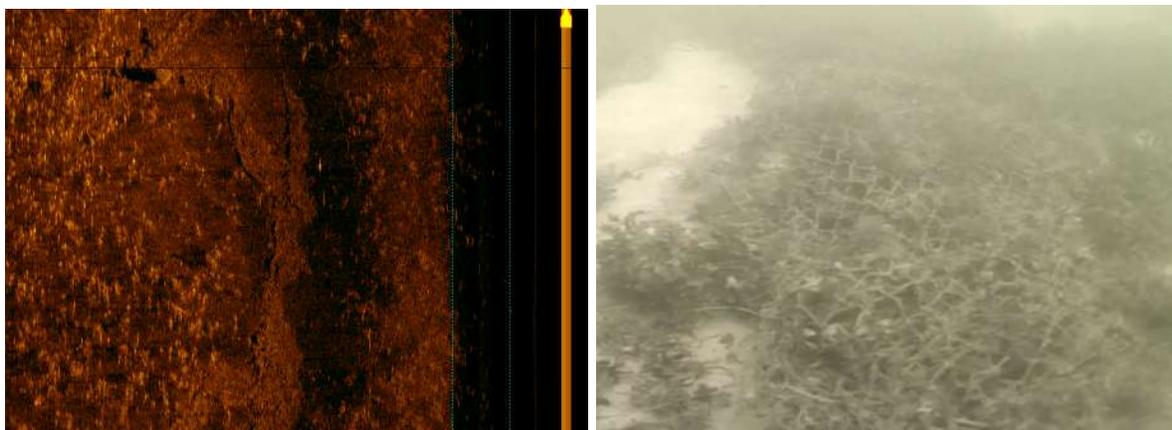
Gillnet 2 was situated deeper, at 3.5 m, over a muddy seabed with minimal seaweed. Retrieval was attempted using Lifting Tool No. 2.



However, due to poor visibility (20–30 cm) and the need to operate the ROV and tool in close proximity to the gillnet, the tool became entangled in the net. To prevent similar issues in the future, small design modifications to the tool are recommended to reduce the risk of snagging.

Other Findings in Matsalu Bay

In addition to the three gillnets, the survey identified **five separate box traps**, all of similar design.



**Estonia – Latvia**

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

At present, our equipment is not configured for retrieving heavy structures such as box traps. The current ROV tools are specifically designed for gillnet recovery and lack the working strength needed for larger nets and ropes. Initial workshop tests on heavier materials confirmed that the current manipulator cannot generate sufficient force for these tasks.

Given the frequency of box traps encountered, it might be needed to consider future development of more robust ROV tools capable of handling larger, heavier ghost gear.



Estonia – Latvia

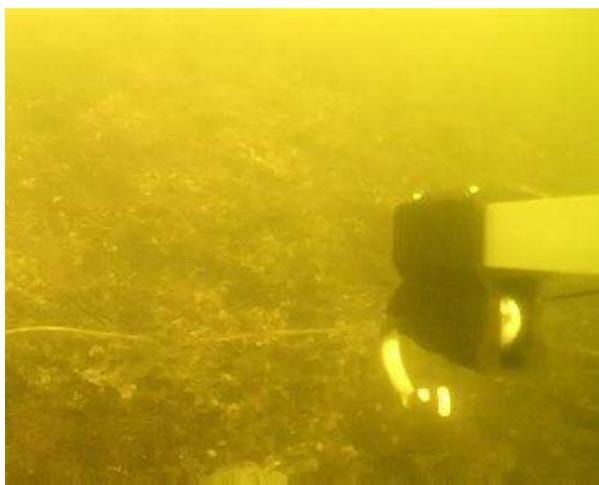
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All Findings in Matsalu Bay

Waypoint	Date Found	Date Confirmed	Verified	Location	Coordinates	Description	Retrieval Date
45-Gillnet-1	23.07.25	23.07.25	ROV	Matsalu South	N 58°44,5614` E 23°34,6470`	Gillnet	02.08.25
46-Box Trap-1	23.07.25	23.07.25	ROV	Matsalu South	N 58°44,7931` E 23°32,6654`	part of a box trap	
55-Gillnet-2	23.07.25	03.08.25	ROV	Matsalu South	N 58°44,7775` E 23°32,8453`	Gillnet	03.08.25
48-Gillnet-3	24.07.25	24.07.25	ROV	Matsalu South	N 58°44,5050` E 23°34,2991`	Gillnet	28.08.25
50-Box Trap-2	24.07.25	24.07.25	ROV	Matsalu South	N 58°44,5788` E 23°34,3275`	part of box trap	
57-Old Rope	23.07.25	27.07.25	ROV		N 58°44,7571` E 23°33,1736`	Old Rope and Anchor	
64-BoxTrap-3	26.07.25	26.07.25	ROV	Matsalu South	N 58°44,4863` E 23°34,6740`	part of box trap	
68-Box Trap-4	26.07.25	26.07.25	ROV	Matsalu South	N 58°44,4653` E 23°33,1672`	part of box trap	
61-Box Trap-5	26.07.25	26.07.25	ROV	Matsalu South	N 58°44,4974` E 23°33,6351`	part of box trap	

ROV Tools

Lifting Tool No. 2 — This tool was used extensively in Matsalu and performed very well. Only minor adjustments are required to further reduce the risk of entanglement with gillnets.



Estonia – Latvia

EE-LV00152 Collection and Recycling of End-of-Life and Lost Fishing Gear (COREEL)

Lifting Tool No. 1 — This tool could not be deployed during the Matsalu operations, as it requires an additional small boat to recover the floater and rope attached to the net. It is primarily designed for deeper waters and will be tested in Lake Peipus.

Cutting Tool Testing

On 2–3 August, the planned underwater cutting tool test (in combination with the retrieval of Gillnet No. 2) was cancelled due to strong winds and limited visibility of 20–30 cm, which posed a high entanglement risk.

The cutting knife was previously tested in a pool environment, where it worked effectively. However, there is concern that in real underwater conditions, gillnets may not be held taut enough for the knife to cut efficiently.

In addition, cutting tools equipped with scissors and a wire cutter were tested in the workshop on retrieved gillnets and box trap ropes. While these tools worked well on gillnets, the current ROV manipulator does not have sufficient strength to cut through the thicker ropes used in box traps.

Future Development Needs

To enable box trap retrieval in future operations, a stronger ROV manipulator will be required.

DIY Gillnet Washing System

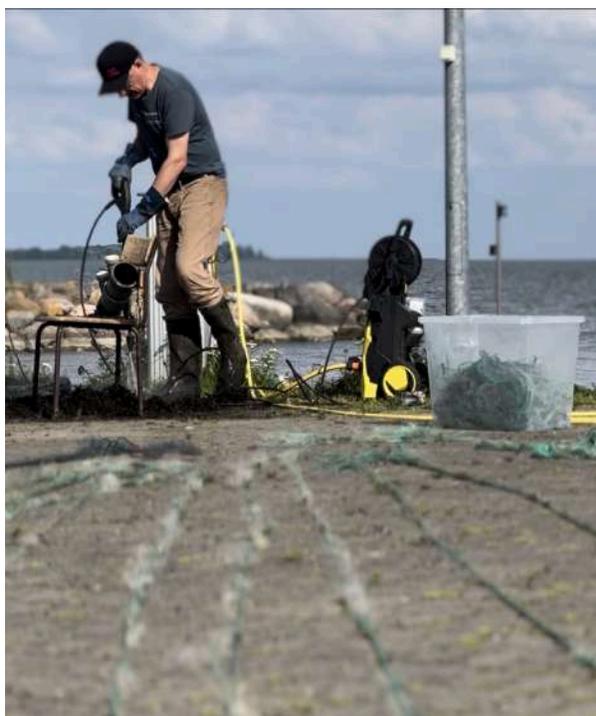
To prepare the retrieved gillnets for recycling, a simple yet highly effective washing system was developed on-site. The setup consisted of a **PVC pipe section** fitted with a T-joint, positioned horizontally on a chair. A high-pressure washer was inserted into each open end of the T-joint, directing strong water jets toward the center of the pipe where the net was fed through.



Initially, as shown in the picture above, the system operated with **only one pressure washer**, which effectively removed debris but at a slower pace. After adding a **second pressure washer** to the opposite side, the cleaning speed and efficiency increased significantly—reducing washing time per net section by more than half.

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This low-cost, portable design proved particularly valuable in the field, allowing the team to clean hundreds of meters of netting without the need for specialized industrial equipment.



Results

In total, **close to 700 m of gillnet** was recovered, washed at Puise Marina, and prepared for shredding tests by Weerec OÜ. The DIY cleaning system—constructed from a PVC pipe with two opposing pressure washers—proved highly effective for removing seaweed and debris.

In addition to the gillnets 6 different box traps (raam- või kastmõrd) were found. By the sonar images a local fisherman estimates the total weight of the box traps from 5 to 10 tons.

The mission demonstrated that with targeted search patterns, adapted tools, and coordinated two-person survey operations, significant amounts of ghost gear can be detected and recovered. Lessons learned from these operations will directly effect future expeditions, including equipment upgrades, improved data recording practices, and potential tool development for heavier gear retrieval.

The cleaned gillnets will be sent to **Weerec OÜ** for shredding tests as part of ongoing efforts to explore recycling and repurposing possibilities for recovered ghost gear. This step marks an important move toward a circular approach, where retrieved nets are not only removed from the marine environment but also given a second life as raw material.

Estonia – Latvia

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